# Raw Water Line Replacement Project



## Bid Packet
## Project WTR-00016
## November 2023

# CITY OF FORT BRAGG

*Incorporated August 5, 1889*
416 N. Franklin St.
Fort Bragg, CA 95437
Phone: (707) 961-2823
Fax: (707) 961-2802
http://city.fortbragg.com


## COVER LETTER TO PROSPECTIVE BIDDERS

Dear Prospective Bidder:

Enclosed is a complete bid package for the project entitled **Raw Water Line Replacement Project, Project No.WTR-00016**. This bid package includes the following:

Volume 1 – Bid Forms

Notice Inviting Bids
Access, Indemnity, and Release Agreement
Instructions to Bidders
Summary
Submittals
Geotechnical Data and Existing Conditions
**Bid Form**
**Bid Bond**
**Bidder Registration Form**
**Statement of Qualifications**
**Non-Collusion Affidavit**
**Bidder Certifications**
Substitution Request Form

Volume 2 – Contract Documents
Contract Check List
Contract, Part 1
Contract, Part 2 – General Provisions
Contract, Part 3 – Special Provisions
Performance Bond
Payment Bond
Maintenance Bond
Certificates of Insurance and Endorsements

Escrow for Security Deposit Agreement

Volume 3 – Technical Specifications and Project Plans

Technical Specifications
Geotechnical report available on City's website. See page 1-16 for details.

The project work is generally described as the construction and replacement of approximately 2 miles of untreated water pipeline between the City of Fort Bragg's water treatment plant at the intersection of Sherwood Road and Monsen Way, and Forest Road 450, located in Jackson Demonstration State Forest. The pipeline is located in both rural and rugged, undeveloped terrain and includes a bore and jack crossing of State Highway 20 at Dwyer Lane, the Hare Creek crossing replacement, and a small pump station and short section of force main located at Newman Reservoir as further described in the bid package.

Sealed completed bids must be received by the City Clerk, or a designee, at the place specified in the Notice Inviting Bids prior to the date and time specified in the Notice Inviting Bids. Any bids that are late according to the official time kept by the City will be returned unopened. Bids that do not conform to the requirements specified in the bid package may be rejected.

Questions regarding the bid package should be directed in writing as soon as possible (but no later than five working days prior to the opening of bids) to:

CITY OF FORT BRAGG
Attn: Diane O'Connor
Assistant City Engineer
416 North Franklin Street
Fort Bragg, California 95437
Phone: 707-961-2823 ext.134
Fax: 707-961-2802
doconnor@fortbragg.com

# VOLUME 1



# Bid Forms

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## NOTICE INVITING BIDS

### ARTICLE 1 - INVITATION TO BID

**1.01** **Notice Inviting Bids:** Notice is hereby given that sealed bids will be received by the City Clerk of the City of Fort Bragg ("City"), 416 North Franklin Street, Fort Bragg, California 95437 on or before 2:00 PM PST, on January 19, 2024 for the following public work:

**1.02**

**CITY OF FORT BRAGG**
**RAW WATER LINE REPLACEMENT PROJECT**
**CITY PROJECT WTR-00016**

Bids will be opened and read publicly at 2:00 PM on Tuesday January 19, 2024 via Zoom video conference:
Join Zoom meeting:
https://us06web.zoom.us/j/82640395211?pwd=QMSwEMezRKB8gHE2Dl30aRljpDP0TY.1
Meeting ID: 826 4039 5211
Passcode: 311635
Virtual or in-person participation is welcome.

**1.03** **Project Description:** The project is divided into four segments (Segments 2 – 5) as described below, and includes construction of pipeline segments between the City of Fort Bragg's water treatment plant at the intersection of Sherwood Road and Monsen Way, and Forest Road 450 in Jackson Demonstration State Forest. It also includes construction of a new pump station and force main at Newman Reservoir.

**Segment 2.** Pipeline installation associated with this segment will take place between the City of Fort Bragg's water treatment plant at the intersection of Sherwood Road and Monsen Way, and the norther Noyo River floodplain, primarily along a narrow access road bench containing the City's existing raw water pipeline. It also includes a trench crossing of Sherwood Road and work within residential roads in a subdivision south of Sherwood Road. Work will also take place within the water treatment plant site itself. The southerly portion of the work is located within the Coastal Zone.

**Segment 3.** Pipeline installation associated with this segment will take place from the Georgia Pacific Haul Road east of its bridge crossing of Newman Creek to a pipeline connection adjacent to the City's Summers Lane Reservoir, primarily via existing paths, trails and former log skids up the slopes of and along the top of the western side of Newman Creek Gorge. Segment 3 also includes the construction of a pump station adjacent to the Newman Reservoir, supply and installation of pumps, valves and pipelines in a timber building, a retaining wall, site grading and improvement works, a separate electrical and control equipment compound and a force main to connect the pump station to the new pipeline adjacent to Summers Lane Reservoir. The majority of the pipeline is located within the Coastal Zone, but not the pump station or force main.

**Segment 4.** Pipeline installation associated with this segment will take place between the existing raw water main just north of State Highway 20 at Dwyer Lane to a connection with the existing raw water main north of Covington Creek. This segment includes a jack-and-bore crossing of State Highway 20 and trench construction along Dwyer Lane in residential subdivision along a gravel road. Part of the segment includes trench construction in heavily wooded and steep terrain within Jackson Demonstration State Forest (JDSF) between the subdivision and Covington Creek.

**Segment 5.** Pipeline installation associated with this segment will take place between the existing raw water main at Forest Road 450, located within JDSF, and the existing raw water main located along the east side of Covington Creek just above its confluence with Hare Creek. Trench construction will include construction in paths, trails and former log skids, together with steep,

heavily-wooded slopes. Segment 5 also includes a trenched construction crossing of Hare Creek with the new pipe placed in a casing. The Hare Creek crossing is subject to significant environmental permit constraints and controls, impacting time of year for construction, construction staging and sequencing, creek flow diversion, allowable construction methods, surface water runoff controls, and spoil storage and disposal.

**1.04** Work shall be completed within 390 Working Days from the date when Contract Time commences to run.

**1.05** **Engineer's Estimate.** The Engineer's Opinion of Probable Costs is approximately $6,920,000.

**1.06** **Funding.** Funding for this project has been provided in part from the Budget Act of 2021 and though agreement with the State of California Department of Water Resources.

**1.07** **Procurement of Bidding Documents:** Bidding Documents contain the full description of the Work. Bidders may examine a complete hard-copy set of the Bidding Documents at the Fort Bragg City Hall, located at 416 North Franklin Street, Fort Bragg, California 95437. For on-line viewing of current bid postings and Project details, go to http://www.city.fortbragg.com/government/requests-for-proposals-bids.Bidders may obtain Bidding Documents by contacting Diane O'Connor, Assistant City Engineer by calling 707-961-2823 ext. 134, or emailing to doconnor@fortbragg.com on or after November 19, 2023. There will be a $365.25 non-refundable charge for each printed bid package.

**1.08** **Instructions:** Bidders shall refer to Instructions to Bidders for required documents and items to be submitted at the date and time as set forth in Paragraph 1.01 above.

**1.09** **Mandatory Pre-Bid Meeting and Site Visit:** City will conduct a Mandatory Pre-Bid Meeting and Site Visit at 9:00 AM on Tuesday December 12, 2023 at 416 N Franklin Street, Fort Bragg, CA 95437. The Mandatory Pre-Bid Meeting and Site Visit will last approximately 6 hours.

**1.010** **Bid Preparation Cost:** Bidders are solely responsible for the cost of preparing their Bids.

**1.011** **Reservation of Rights:** City specifically reserves the right, in its sole discretion, to reject any or all Bids, to re-bid, or to waive inconsequential defects in bidding not involving time, price or quality of the work. City may reject any and all Bids and waive any minor irregularities in the Bids.

## ARTICLE 2 - LEGAL REQUIREMENTS

**2.01** **Required Contractor's License(s):**

A. A California class "A" contractor's license is required to bid this contract. Joint ventures must secure a joint venture license prior to award of this Contract. Specialty work may require a specialty class contractor's license held by Bidder or a listed subcontractor.

**2.02** **Required Contractor and Subcontractor Registration**

A. City shall accept Bids only from Bidders that (along with all Subcontractors listed in Subcontractors List) are currently registered with the Department of Industrial Relations ("DIR") and qualified to perform public work pursuant to Labor Code Section 1725.5.

B. Subject to Labor Code Sections 1771.1(c) and (d), any Bid not complying with paragraph 1.01A above shall be returned and not considered; provided that if Bidder is a joint venture (Business & Professions Code Section 7029.1) or if federal funds are involved in the Contract (Labor Code Section 1771.1(a)), City may accept a non-complying Bid provided that Bidder and all listed Subcontractors are registered at the time of Contract award.

**2.03** **Bid Alternates:**

A. Bid alternates are identified as follows:

Alternate 1: Pipeline material C909 PVC Pressure Pipe (earthquake resistant), same pressure class as specified in the technical specifications and as shown on the plans.

B. The determination of lowest bid shall be based upon lowest of Base contract bid or Alternate 1.

**2.04** **Substitution of Securities:** City will permit the successful bidder to substitute securities for any retention monies withheld to ensure performance of the contract, as set forth in Escrow Agreement for Security Deposits in Lieu of Retention and incorporated herein in full by this reference, in accordance with Public Contract Code Section 22300.

**2.05** **Prevailing Wage Laws:** The successful Bidder must comply with all prevailing wage laws applicable to the Project, and related requirements contained in the Contract Documents. Copies of the general prevailing rates of per diem wages for each craft, classification, or type of worker

needed to execute the Contract, as determined by Director of the State of California Department of Industrial Relations, are on file at the City's Public Works Department, may be obtained from the California Department of Industrial Relations website (http://www.dir.ca.gov/OPRL/dprewagedetermination.htm) and are deemed included in the Bidding Documents. Upon request, City will make available copies to any interested party. Also, the successful Bidder shall post the applicable prevailing wage rates at the Site.

**2.06** **Prevailing Wage Monitoring:** This Project is subject to prevailing wage compliance monitoring and enforcement by the Department of Industrial Relations.

**2.07** **Skilled and Trained Workforce:** The successful Bidder acknowledges and agrees that it shall comply with the requirements of California Public Contracts Code sections 2600 et seq., in its entirety and, in particular, those sections related to Skilled and Trained Workforce.

**2.08** **Federal Prevailing Wage Provisions:** Attention is directed to the Federal minimum wage rate requirements. If there is a difference between the minimum wage rates predetermined by the Secretary of Labor and the general prevailing wage rates determined by the Director of the California Department of Industrial Relations for similar classifications of labor, the Contractor and subcontractors shall pay not less than the higher wage rate. The City will not accept lower State wage rates not specifically included in the Federal minimum wage determinations. This includes "helper" (or other classifications based on hours of experience) or any other classification not appearing in the Federal wage determinations. Where Federal wage determinations do not contain the State wage rate determinations otherwise available for use by the Contractor and subcontractors, the Contractor and subcontractors shall pay not less than the Federal minimum wage rate which most closely approximates the duties of the employees in question.

City of Fort Bragg

Dated: _____ By: _____

Cristal Munoz
Acting City Clerk

PUBLISH DATES: November 16, 2023

**ACCESS, INDEMNITY AND RELEASE AGREEMENT**

Dated _____

POTENTIAL CONTRACTOR: _____

CITY: CITY OF FORT BRAGG

SITE: Varies

PROJECT: Raw Water Line Replacement Project - Construction of pipeline segments 2-5 located between the City of Fort Bragg's water treatment plant at the intersection of Sherwood Road and Monsen Way, and Forest Road 450 in Jackson Demonstration State Forest, and includes construction of a new pump station and force main at Newman Reservoir.

In consideration of the above-referenced City's permitting the undersigned potential Contractor (**Contractor**) to have access to, and to conduct investigations, tests and/or inspections on the Site (**access**), and effective upon such access, Contractor hereby agrees as follows:

**1.01** To the greatest extent permitted by law including, without limitation, Civil Code Section 2782, Contractor hereby releases, and shall defend, indemnify, and hold harmless City, and its officers, employees, consultants, representatives, and agents, and all other parties having any other interest in the Site, against any claim or liability, including attorney's fees, arising from or relating to any Site-related access, investigation, test, inspection and/or other activity conducted by Contractor or any of Contractor's officers, employees, consultants, representatives, and/or agents, except for claims or liability arising out of the sole negligence, active negligence, or willful misconduct of City or any released and indemnified party.

**1.02** Contractor hereby waives the provisions of Civil Code Section 1542, which provides as follows:

> A general release does not extend to claims which the creditor does not know or suspect to exist in his or her favor at the time of executing the release, which if known by him or her must have materially affected his or her settlement with the debtor.

**1.03** Contractor shall repair any damage to the Site or adjacent property resulting from activities authorized hereunder, and comply with and be subject to all other requirements and obligations described or referenced in Geotechnical Data and Existing Conditions.

**1.04** Attached hereto (or to be delivered separately before Contractor's visit to the Site) is a certificate for general liability insurance satisfying Contract Documents requirements.

**1.05** Although this Access, Indemnity and Release Agreement is not a Contract Document (see Agreement), it shall be fully effective and binding regardless of whether Contractor submits a Bid for the subject Project, is awarded a contract for the Project, or otherwise.

CONTRACTOR: _____

By: _____
Signature

By: _____
Signature

Its: _____
Title (If Corporation: Chairman, President or Vice President)

Its: _____
Title (If Corporation: Secretary, Assistant Secretary, Chief Financial Officer or Assistant Treasurer)

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## INSTRUCTIONS TO BIDDERS

Bids are requested by City, for a general construction contract, or work described in general, as set forth in the Notice Inviting Bids in accordance with the following additional terms.

### ARTICLE 1 - PROCEDURES FOR SUBMISSION OF BIDS

**1.01 Required Pre-Bid Conference and Site Visit**

A. City will conduct a **Mandatory** Pre-Bid Meeting and Site Visit at the date, time and location indicated in Notice Inviting Bids, to consider such matters as Bidders may request and perform a Site Visit immediately following, at the Site. Bidders must attend Pre-Bid Meeting and Site Visit and sign an attendance roster as a condition to bidding.

B. The Site Visit may be the Bidders' only opportunity to investigate conditions at the Site. Other Pre-Bid Site Visits may be scheduled at City's sole discretion, depending on staff availability.

C. City will issue Summary Notes of the Pre-Bid Conference, which shall constitute the sole and exclusive record and statement of the results of the Pre-Bid Conference. The Summary Notes issued by City are not Contract Documents.

**1.02 Required Pre-Bid Investigations**

A. Prior to submission of Bid, Bidder must conduct a careful examination of Bidding Documents and understand the nature, extent, and location of Work to be performed. Refer to the General Conditions Document on required pre-bid investigations.

B. Any Bidder wishing to investigate subsurface conditions or otherwise conduct invasive investigations, explorations, test, or studies at this Site before bidding, shall schedule such examinations with City by providing City at least seven (7) days advanced written notice. Additionally, any such Bidder must deliver an executed Access, Indemnity and Release Agreement ("Release") and provide an insurance certificate as described therein by noon of the day prior to the site examination. Bidders who intend only to observe Site conditions and not conduct such examinations are not required to provide an executed Release or an insurance certificate.

C. Bidders may examine any available existing conditions information (e.g., record documents, specifications, studies, drawings of previous work), as well as applicable environmental assessment information (if any) regarding the Project, by giving City reasonable advanced notice. City will make copies available for a fee. A Bidder must give five (5) days advanced notice if copies are desired.

**1.03 Bidder Questions and Answers**

A. Bidders must direct all questions about the meaning or intent of Bidding Documents to City in writing. Interpretations or clarifications considered necessary by City in response to such questions will be issued by written Addenda mailed, emailed, faxed, or delivered to all parties recorded by City as having received Bidding Documents. City may not answer questions received less than 7 Days prior to the date for opening Bids.

B. Only questions answered by formal written Addenda will be binding. Any other interpretations or clarifications will be without legal effect, and Bidders shall not rely on oral statements.

**1.04 Addenda**

A. Addenda may also be issued to modify the Bidding Documents as deemed advisable by City. Addenda shall be acknowledged by number in the Bid Form and shall be part of the Contract Documents. A complete listing of Addenda may be secured from City.

### ARTICLE 2 - RECEIPT OF BIDS

**2.01 Date and Time**

A. Sealed Bids will be received by the City until the date and time indicated in the Notice Inviting Bids. All Bid envelopes will be time-stamped to reflect their submittal time. City shall reject all Bids received after the specified time and will return such Bids to Bidders unopened. Bidders must submit Bids in accordance with this Instructions to Bidders Document.

**2.02 Bid Submission**

A. City will receive Bids in opaque sealed envelopes, containing the required items described herein under Section 2.03, Required Contents of "Bid Submittals."

B. Bidders should mark their Bid envelopes using their name, address, identifying information and project number indicated in Notice Inviting Bids.

**2.03 Required Contents of "Bid Submittals"**

A. Bid Form. Bidders must submit Bids on the City's Bid Form. Bidders must complete all Bid items and supply all information required by Bid documents and specifications.

B. Bond Accompanying Bid. Bidders must submit a completed Bond Accompanying Bid document (surety bond), cash, cashier's check or certified check (certified without qualification and drawn on a solvent bank of the State of

California or a National Bank doing business in the State of California) in an amount not less than 10% of the base Bid, payable to City of Fort Bragg.

C. Bidder Registration Form. Bidders must submit a completed Bidder Registration Form.

D. Subcontractors List. Bidders must submit a Subcontractors List. The Subcontractors List must include the names, location, place of business, and other information required therein, for all subcontractors who will perform any portion of work, including labor, rendering of service, or specially fabricating and installing a portion of the work or improvement according to detailed drawings contained in the plans and specifications, in excess of one half of one percent (0.5%) of the total Bid amount. Any violation of this requirement may result in a Bid being deemed non-responsive and not being considered.

E. Non-Collusion Affidavit. Bidders must submit a completed Non-Collusion Affidavit.

F. Bidder Certifications. Bidders must submit a completed Bidder Certification.

G. Statement of Qualifications for Construction Work. Bidder must submit a Statement of Qualifications for Construction Work.

## ARTICLE 3 - BID OPENING AND EVALUATION

### 3.01 Determination of Apparent Low Bidder

A. City will open each Bidder's Envelopes at the time and place indicated in the Notice Inviting Bids, initially evaluate them for responsiveness, and determine an Apparent Low Bidder as specified herein.

B. Apparent Low Bid will be determined solely on the Total Bid Price based on terms contained in the Notice Inviting Bids and the Bid Form, or as set forth in Paragraph 2.03 of the Notice Inviting Bids. All Bidders are required to submit Bids on all Bid items (including any alternates).

C. For the Apparent Low Bidder only, City will evaluate the Apparent Low Bidder for responsiveness to the requirements of the Statement of Qualifications for Construction Work form and for Responsibility.

D. If Apparent Low Bidder is determined to be non-responsive or non-responsible, then City may proceed to the next Apparent Low Bidder's Bid pursuant to any procedures determined in its reasonable discretion, and proceed for all purposes as if this Apparent Low Bidder were the original Apparent Low Bidder.

### 3.02 Evaluation of Bids

A. Bids must be full, complete, clearly written and using the required forms. Bidders shall make any change in the Bid by crossing out the original entry, entering and initialing the new entry. Bidder's failure to submit all required documents strictly as required entitles City to reject the Bid as non-responsive. All Bidders must submit Bids containing each of the fully executed documents supplied in these bid documents.

B. In evaluating Bids, City will consider Bidders' qualifications, whether or not the Bids comply with the prescribed requirements, unit prices, and other data, as may be requested in the Bid Form or prior to the Notice of Award.

C. City may conduct reasonable investigations and reference checks of Bidder and other persons and organizations as City deems necessary to assist in the evaluation of any Bid and to establish Bidder's responsibility, qualifications, financial ability, and capability to perform the Work in accordance with the Contract Documents to City's satisfaction within the prescribed time. Submission of a Bid constitutes Bidder's consent to the foregoing.

D. City shall have the right to consider information provided by sources other than Bidder. City shall also have the right to communicate directly with Bidder's surety regarding Bidder's bonds.

E. 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. Discrepancies between written words and figures will be resolved in favor of the words.

F. Bids shall be deemed to include the written responses of the Bidder to any questions or requests for information of City made as part of Bid evaluation process after submission of Bid.

### 3.03 Reservation of Rights

A. City reserves the right to:

1. Reject any or all nonconforming, non-responsive, unbalanced, or conditional Bids, and
2. Reject the Bid of any Bidder as non-responsive as a result of any error or omission in the Bid, and
3. Reject the Bid of any Bidder if City believes that it would not be in the best interest of the Project to make an award to that Bidder, whether because the Bid is not responsive, the Bidder is unqualified or of doubtful financial ability, or fails to meet any other pertinent standard or criteria established by City.

B. For purposes of this paragraph, an "unbalanced Bid" is one having nominal prices for some Bid items and enhanced prices for other Bid items.

C. City may retain Bid securities and Bid bonds of other than the Apparent Low Bidder for a period of 120 Days after award or full execution of the Contract, whichever first occurs.

D. City may waive any informalities or minor irregularities in the Bids.

E. City also reserves the right, in its discretion, to reject any or all Bids and to re-Bid the Project.

**3.04 Required Contractor and Subcontractor Registration**

A. City shall accept Bids only from Bidders that (along with all Subcontractors listed in the Subcontractors List) are currently registered with the Department of Industrial Relations and qualified to perform public work pursuant to Labor Code Section 1725.5.

B. Subject to Labor Code Sections 1771.1(c) and (d), any Bid not complying with paragraph 3.04.A above, shall be returned and not considered; provided that if Bidder is a joint venture (Business & Professions Code Section 7029.1) or if federal funds are involved in the Contract (Labor Code Section 1771.1(a)), City may accept a non-complying Bid provided that Bidder and all listed Subcontractors are registered at the time of Contract award.

**ARTICLE 4 - MANDATORY BID PROTEST PROCEDURES**

**4.01 Submission of Written Bid Protest**

A. Any Bid protest in connection with the construction contract or work described in general in the Notice Inviting Bids must be submitted in writing to the **City Clerk, City of Fort Bragg, 416 North Franklin Street, Fort Bragg, California 95437**, before **3:30 p.m.** of the fifth Business Day following the Bid opening.

B. The initial protest document must contain a complete statement of the basis for the protest.

C. The protest must refer to the specific portion of the document that forms the basis for the protest.

D. The protest must include the name, address, and telephone number of the person representing the protesting party.

E. Only Bidders who the City otherwise determines are responsive and responsible are eligible to protest a Bid; protests from any other Bidder will not be considered. In order to determine whether a protesting Bidder is responsive and responsible, City may evaluate all information contained in any protesting Bidder's Bid, and conduct the same investigation and evaluation as City is entitled to take regarding an Apparent Low Bidder.

F. The party filing the protest must concurrently transmit a copy of the initial protest document and any attached documentation to all other parties with a direct financial interest that may be adversely affected by the outcome of the protest. Such parties shall include all other Bidders who appear to have a reasonable prospect of receiving an award depending upon the outcome of the protest.

**4.02 Exclusive Remedy**

A. The procedure and time limits set forth in this Article 4 are mandatory and are Bidder's sole and exclusive remedy in the event of Bid protest. Bidder's failure to comply with these procedures shall constitute a waiver of any right to further pursue the Bid protest, including filing a Government Code Claim or other legal proceedings. A Bidder may not rely on a protest submitted by another Bidder, but must timely pursue its own protest.

**ARTICLE 5 - AWARD AND EXECUTION OF CONTRACT**

**5.01 Notice of Award and Submittal of Executed Contract Documents**

A. If Contract is to be awarded, it will be awarded to the lowest responsible responsive Bidder. City will issue a Notice of Award. Such Award, if made, will be made within ninety (90) days after the opening of the Bid Proposals.

B. Successful Bidder must execute and submit to City the "Required Contract Documents and Proof of Insurance" set forth below, by 5:00 p.m. of the tenth ($10^{th}$) working Day following the Notice of Award.

**5.02 Required Contract Documents and Proof of Insurance**

A. Agreement, fully executed by successful Bidder. Submit two originals, each bearing an original, notarized signature on the signature page.

B. Construction Performance Bond, fully executed by successful Bidder and surety, in the amount set forth in that document. Submit one original.

C. Construction Labor and Material Payment Bond, fully executed by successful Bidder and surety, in the amount set forth in that document. Submit one original.

D. Insurance certificates and endorsements, required by Supplementary Conditions—Insurance. Submit one original set.

E. Any other items identified by City in its Notice of Award.

**5.03 Failure to Execute and Deliver Documents**

A. If Bidder to whom the Contract is awarded, within the period described in the Instructions to Bidders, fails or neglects to execute and deliver all required Contract Documents and file all required bonds, insurance certificates, and other documents, City may, in its sole discretion, rescind the award, recover on Bidder's surety bond, or deposit Bidder's cashier's check or certified check for collection, and retain the proceeds thereof as liquidated damages for Bidder's failure to enter into the Contract Documents. Bidder agrees that calculating the damages City may suffer as a result of Bidder's failure to execute and deliver all required Contract Documents would be extremely difficult and

impractical and that the amount of Bidder's required Bid security shall be the agreed and presumed amount of City's damages.

B. Upon Bidder's failure to timely deliver all required Contract Documents as set forth herein, City may determine the next Apparent Low Bidder and proceed accordingly.

## ARTICLE 6 - GENERAL CONDITIONS AND REQUIREMENTS

### 6.01 Modification of Commencement of Work

A. City expressly reserves the right to modify the date for the Commencement of Work under the Contract and to independently perform and complete work related to Project. City accepts no responsibility to Contractor for any delays attributed to its need to complete independent work at the Site.

B. City shall have the right to communicate directly with Apparent Low Bidder's proposed performance bond surety, to confirm the performance bond. City may elect to extend the time to receive faithful performance and labor and material payment bonds.

### 6.02 Conformed Project Manual

A. Following Award of Contract, City may prepare a conformed Project Manual reflecting Addenda issued during bidding, which will, failing objection, constitute the approved Project Manual.

### 6.03 Payment Bond

A. If the Project described in the Notice Inviting Bids involves an expenditure in excess of twenty-five thousand dollars ($25,000), the successful Bidder must file a payment bond with and approved by City prior to entering upon the performance of the Work, in accordance with Civil Code Section 9550, *et seq*.

### 6.04 Wage Rates

A. Copies of the general prevailing rates of per diem wages for each craft, classification, or type of worker needed to execute the Contract, as determined by Director of the State of California Department of Industrial Relations, are on file at the City's Public Works Department and may be obtained from the California Department of Industrial Relations website http://www.dir.ca.gov/OPRL/DPreWageDetermination.htm and are deemed included in the Bidding Documents. Upon request, City will make available copies to any interested party. Also, Contractor shall post the applicable prevailing wage rates at the Site.

### 6.05 Withdrawal of Bids

A. Bidders may withdraw their Bids at any time prior to the Bid opening time fixed in the Instructions to Bidders, only by written request for the withdrawal of Bid filed with City at the **City Clerk's office located at 416 North Franklin Street, Fort Bragg, California**. Bidder or its duly authorized representative shall execute request to withdraw Bid.

### 6.06 Ineligible Contractors and Subcontractors

A. City will reject a Bid from a Bidder who is ineligible to bid or work on, or be awarded, a public works project pursuant to Labor Code Section 1777.1 or 1777.7. Bidders and the Contractor who is awarded the project contract shall not utilize, or allow work by, any subcontractor who is ineligible to bid or work on, or be awarded, a public works project pursuant to Labor Code Section 1777.1 or 1777.7. (See Public Contract Code Section 6109.) The California Division of Labor Standards Enforcement publishes a list of debarred contractors and subcontractors on the Internet at www.dir.ca.gov/DLSE/debar.html.

### 6.07 Public Records Act Requests

A. In accordance with the California Public Records Act, City will make available to the public Bidder's Statement of Qualifications ("SOQ"), correspondence and written questions submitted during the Bid period, all Bid submissions opened in accordance with the procedures set forth herein, and all subsequent Bid evaluation information. All submissions not opened will remain sealed and shall be returned to the submitter. Except as otherwise required by law, City will not disclose trade secrets or proprietary financial information submitted by Bidders that has been designated as confidential by Bidder (including, without limitation, the SOQ). Any such trade secrets or proprietary financial information that Bidder believes should be exempted from disclosure shall be specifically identified and marked as such. Blanket-type identification by designating whole pages or sections shall not be permitted and shall be invalid. The specific confidential information must be clearly identified as such.

B. Upon a request for records regarding this Bid, City will notify the Bidder involved, within ten Days from receipt of the request, when the records will be made available for inspection. If the Bidder timely identifies any "proprietary, trade secret, or confidential commercial or financial" information that Bidder determines is not subject to public disclosure, and requests that City refuse to comply with the records request, Bidder will, at its sole expense, take all appropriate legal action and defend City's refusal to produce the information in all forums; otherwise City will make such information available to the extent required by applicable law, without restriction.

C. Information disclosed in the Statement of Qualifications and the attendant opened submissions are the property of City unless Bidder makes specific reference to data that is considered proprietary. Subject to the requirements in

the Public Records Act, reasonable efforts will be made to prevent the disclosure of information except on a need-to-know basis during the evaluation process.

**6.08 Substitutions**

A. Bidders must base their Bids on products and systems specified in Contract Documents or listed by name in Addenda. City will consider substitution requests only for “or equal items.”

Bidders wanting to use “or equal” item(s)” may submit a Substitution Request Form no later than thirty-five (35) Days after Notice of Award. To assess “or equal” acceptability of product or system, request(s) for substitution must contain the information required in the Substitution Request Form. Insufficient information will be grounds for City to reject the substitution. City will, within a reasonable time, after having received a request for substitution, issue in writing its decision as to whether the proposed substitution is an “or equal” item compatible to City systems, durability, and quality. City’s decision shall be conclusive as to all Bidders.

Prior to bid, requests for substitution will not be considered unless the Substitution Request Form is received at least seven (7) Days prior to Bid day. Substitutions approved before Bid day will be listed in Addenda and become part of the Contract Documents.

As a limitation on Bidder's privilege to request substitution of “or equal” items, City has found that certain items are designated as City standards and certain items are designated to match existing items in use on a particular public improvement either completed or in the course of completion or

are available from one source. As to such items, City will not permit substitution. Such items (if any) are described in Notice Inviting Bids.

# SUMMARY

## PART 1 - GENERAL

### 1.01 Work Covered by Contract Documents

A. The Work of this Contract comprises construction of all the Work indicated, described in the Specifications, or otherwise required by the Contract Documents. Unless provided otherwise in the Contract Documents, all risk of loss to Work covered by Contract Documents shall rest with Contractor until Final Acceptance of the Work. Cost of maintenance of systems and equipment prior to Final Acceptance will be considered as included in prices Bid and no direct or additional payment will be made therefore.

B. For all Bid items, furnish and install all Work, including connections to existing systems, indicated and described in Specifications and all other Contract Documents. Work and requirements applicable to each individual Bid item, or unit of Work, shall be deemed incorporated into the description of each Bid item (whether Lump Sum or Unit Price). Any Bid item may be deleted from the Work and Contract Sum, in total or in part, prior to or after award of Contract without compensation in any form or adjustment of other Bid items or prices therefore.

C. Allowance Work shall be done as Change Orders and as specified in the Modification Procedures section of this Document. Identify Allowance Items (from Bid Form) on the Progress Schedules and on Applications for Payment. The Amount given on the Bid Form under each Allowance Item is the sum of money set aside for each Allowance Item. These amounts shall be included in the Contract Sum on the Bid Form. If the cost of Work done under any Allowance Item is less than the amount given on the Bid Form under that Allowance Item, the Contract Sum shall be reduced by the difference between the amount given in the Bid Form and the cost of Work actually done.

### 1.02 Work Sequence

A. Construct Work in stages and at times to accommodate City operation requirements during the construction period; coordinate construction schedule and operations with City.

### 1.03 Partial Occupancy/Utilization Requirements

A. Allow City to take possession of and use any completed or partially completed portion of the Work during the progress of the Work as soon as is possible without interference to the Work.

B. Possession, use of Work, and placement and installation of equipment by City shall not in any way evidence the completion of the Work or any part of it.

C. Contractor shall not be held responsible for damage to the occupied part of the Work resulting from City occupancy.

D. Make available, in areas occupied, on a 24 hour per day and 7 day per week basis if required, any utility services, heating, and cooling in condition to be put in operation at the time of occupancy.

1. Responsibility for operation and maintenance of said equipment shall remain with Contractor.
2. Make, and City shall certify, an itemized list of each piece of equipment so operated with the date operation commences.
3. Itemized list noted above shall be basis for commencement of warranty period for equipment.
4. City shall pay for utility cost arising out of occupancy by City during construction.

E. Use and occupancy by City prior to acceptance of Work does not relieve Contractor of its responsibility to maintain insurance and bonds required under the Contract until entire Work is completed and accepted by City.

F. Prior to date of Final Acceptance of the Work by City, all necessary repairs or renewals in Work or part thereof so used, not due to ordinary wear and tear, but due to Defective materials or workmanship or to operations of Contractor, shall be made at expense of Contractor, as required in the General Conditions.

G. Use by City of Work or part thereof as contemplated by this Section of the General Requirements shall in no case be construed as constituting acceptance of Work or any part thereof. Such use shall neither relieve Contractor of any responsibilities under Contract, nor act as waiver by City of any of the conditions thereof.

### 1.04 Contractor Use of Site

A. Confine operations at Site to areas permitted by Contract Documents, permits, ordinances, and laws. Do not unreasonably encumber Site with materials or equipment.

B. Assume full responsibility for protection and safekeeping of products stored on premises. Move any stored products that interfere with operations of City or other contractor.

C. Coordinate parking, storage, staging, and Work areas with City. City will provide a storage area for Contractor's equipment and materials. Do not store construction materials in the dripline of any tree.

D. Prior to commencement of Work or excavation, Contractor and City shall jointly survey the area adjacent to the Project area making permanent note and record of such existing damage such as cracks, sags or other similar damage. This record shall serve as a basis for determination of subsequent damage to structures, conditions or other existing improvements due to Contractor's operations. All parties making the survey shall sign the official record of existing damage. Cracks, sags or damage of any nature to the adjacent Project area, not noted in the original survey but subsequently noted, shall be reported immediately to City.

E. The Contractor shall follow all County and City ordinances in force during the duration of this Contract.

F. It is essential that the Contractor perform the Work with as little interference and disturbance as possible to the surrounding neighborhood.

G. When suspect materials, outside the scope of Work, are encountered during the Work or restoration process, the Contractor shall immediately contact the Project Manager for evaluation and approval of the methods for dealing with the material.

## SUBMITTALS

### PART 1 – GENERAL

### 1.01 SUMMARY

A. Section includes description of requirements and procedures for submittals.

### 1.02 SCHEDULE OF SUBMITTALS

A. Contractor shall prepare for City's review and acceptance prior to commencement of work on the Site, for purposes of contract administration, a schedule of submittals (also referred to as a submittal register) required to complete the Work, prepared by Contractor and accepted by City for contract administration. Schedule of submittals shall include, for each submittal: the specification or drawing reference requiring the submittal, if applicable; the material, item, or process for which the submittal is required; the submittal number and identifying title of the submittal; the Contractor's anticipated submission date and the approval need date.

B. Contractor shall update monthly the schedule of submittals to reflect actual submission and acceptance dates for submittals. Review by City of schedule of submittals does not excuse Contractor of obligation to supply, schedule and coordinate all submittals required by the Contract Documents.

### 1.03 CONTRACTOR TO SUBMIT SHOP DRAWINGS, PRODUCT DATA AND SUBMITTALS

A. Contractor shall review for compliance with Contract Documents, approve and submit to City Shop Drawings, Product Data, Samples and similar submittals required by Contract Documents.

B. Contractor shall schedule and submit concurrently submittals covering component items forming a system or items that are interrelated. Contractor shall include certifications to be submitted with the pertinent drawings at the same time.

C. Contractor shall coordinate scheduling, sequencing, preparing and processing of all submittals with performance of work so that work will not be delayed by submittal processing.

D. Submittals shall specifically identify any Work depicted that does not conform to the Contract Documents.

### 1.04 CITY REVIEW OF SHOP DRAWINGS, PRODUCT DATA AND SUBMITTALS

A. After review by City of each Submittal, material will be returned to Contractor with actions defined as follows:

1. NO EXCEPTIONS TAKEN - Accepted subject to its compatibility with general design concept of the Work, future Submittals and additional partial Submittals for any portions of the Work not covered in this Submittal. Does not constitute acceptance or deletion of specified or required items not shown on the Submittal.
2. MAKE CORRECTIONS NOTED (NO RESUBMISSIONS REQUIRED) - Same as item 1 above, except that minor corrections as noted shall be made by Contractor.
3. REVISE AS NOTED AND RESUBMIT - Rejected because of major inconsistencies or errors that shall be resolved or corrected by Contractor prior to subsequent review by City.
4. REJECTED - RESUBMIT - Submitted material does not conform to Drawings and/or Specifications in major respect, i.e.: wrong size, model, capacity, or material.

B. City's review will not constitute acceptance by City of any responsibility for the accuracy, coordination, or completeness of the Submittals. Accuracy, coordination, and completeness of Submittals shall be Contractor's sole and exclusive responsibility including responsibility to back-check comments, corrections, and modifications from City's review before fabrication. Contractor, Subcontractors, or suppliers may prepare Submittals. Contractor submission of any Submittal is a representation that Contractor has confirmed that the Submittal meets requirements of Contract Documents including, without limitation, conforming to structural space and access conditions at point of installation. City's review will be only to assess 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 indicated by the Contract Documents. City's review of Submittal, method of Work, or information regarding materials and equipment Contractor proposes to furnish shall not relieve Contractor of responsibility for errors therein and shall not be regarded as assumption of risks or liability by City, or any officer or employee thereof. Contractor shall have no claim under Contract Documents on account of failure or partial failure or inefficiency or insufficiency of any plan or method of Work or material and

equipment so accepted. City's review shall be considered to mean merely that City has no objection to Contractor using, upon Contractor's own full responsibility, plan or method of Work proposed, or furnishing materials and equipment proposed.

C. Unless otherwise specified, City's review will not extend to the means, methods, techniques, sequences, or procedures of construction or to safety precautions or programs incident thereto. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.

D. Contractor shall perform no portion of the Work for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples or similar submittals until the City has reviewed respective Submittal and the Work described in the Submittal is authorized to proceed in accordance with paragraphs 1.04.A.1 or 2, above. Otherwise, any such Work is at Contractor's sole risk for removal and replacement, at City's sole discretion, and at Contractor's sole expense.

## GEOTECHNICAL DATA AND EXISTING CONDITIONS

### ARTICLE 1 - REPORTS AND INFORMATION ON EXISTING CONDITIONS

#### 1.01 Inspection of Reports

A. City, its consultants, and prior contractors may have collected documents providing a general description of the Site and conditions of the Work. These documents may consist of geotechnical reports for and around the Site, contracts, contract specifications, tenant improvement contracts, as-built drawings, utility drawings, information regarding Underground Facilities, and hazardous material surveys or information (collectively, Existing Conditions Data).

B. Bidders may inspect Geotechnical and Existing Conditions Data. These documents are available for review at: https://www.city.fortbragg.com/departments/public-works/current-public-works-projects/raw-water-line-replacement-project. Copies may be obtained for the cost of reproduction and handling upon Bidder's payment for the costs.

C. Existing Conditions Data is for information purposes only and does not describe labor, materials or equipment furnished by Contractor, but rather, information regarding conditions of the work. Such Existing Conditions Data is not a Contract Document.

### ARTICLE 2 - USE OF EXISTING CONDITIONS DATA

#### 2.01 Above-Ground Existing Conditions

A. City makes no warranty or representation of existing aboveground conditions, as-built conditions, or other aboveground actual conditions verifiable by reasonable independent investigation. These conditions are verifiable by Bidder by the performance of its own independent investigation that Bidder must perform prior to bidding and Bidder must not rely on the information supplied by City regarding such existing conditions.

B. Bidder represents and agrees that in submitting its Bid, it is not relying on any information regarding above-ground existing conditions supplied by City.

#### 2.02 Underground Facilities

A. Information supplied regarding existing Underground Facilities at or contiguous to the Site is based on information furnished to City by others (e.g., the builders of such Underground Facilities or others).

B. City assumes responsibility for only the general accuracy, completeness or thoroughness of information regarding Underground Facilities that are owned by City. This express assumption of responsibility applies only if Bidder has conducted the independent investigation required of it under the General Conditions of the Contract and discrepancies were not apparent. Bidder is solely responsible for any interpretation or conclusion drawn from this information. City is not responsible for information regarding Underground Facilities that are owned by others.

#### 2.03 Hazardous Materials Surveys

A. Bidders may rely on this data and information for general accuracy regarding the locations of potentially hazardous materials. City does not warrant and makes no representation regarding the completeness or thoroughness of any data or information regarding existing conditions or hazardous materials including, without limitation, quantities, characteristics, volumes, or associated structural features. Bidder represents and agrees that in submitting a Bid it is not relying on any such data, information or deductions.

B. Data and information regarding the locations of hazardous materials are not part of Contract Documents.

#### 2.04 Geotechnical Data

A. Bidder may rely upon the general accuracy of the "technical data" contained in the geotechnical reports and drawings identified above, but only insofar as it relates to subsurface conditions, provided Bidder has conducted the independent investigation required of it and discrepancies were not apparent.

B. The term "technical data" shall include actual reported depths, reported quantities, reported soil types, reported soil conditions, and reported material, equipment, or structures that were encountered during subsurface exploration. The term "technical data" does not include, and Bidder may not rely upon, any other data, interpretations, opinions or information shown or indicated in

such drawings or reports that otherwise relate to subsurface conditions or described structures. The term “technical data” shall not include the location of Underground Facilities.

C. Bidder may not rely on the completeness of reports and drawings for the purposes of bidding or construction. Bidder is solely responsible for any interpretation or conclusion drawn from any “technical data” or any other data, interpretations, opinions, or information contained in supplied geotechnical data.

**2.05 Representations**

A. Except as expressly set forth herein, City does not warrant, and makes no representation regarding, the accuracy or thoroughness of any geotechnical and existing conditions data.

B. Bidder represents and agrees that in submitting its Bid, it is not relying on any geotechnical and existing conditions data supplied by City, except as specifically set forth herein.

## ARTICLE 3 - INVESTIGATIONS

**3.01 Required Investigations**

A. Before submitting a Bid, each Bidder shall be responsible to obtain such additional or supplementary examinations, investigations, explorations, tests, studies and data concerning conditions (surface, subsurface, and Underground Facilities) at or contiguous to the Site or otherwise, which may affect cost, progress, performance or furnishing of Work or which relate to any aspect of the means, methods, techniques, sequences or procedures of construction to be employed by Bidder and safety precautions and programs incident thereto or which Bidder deems necessary to determine its Bid for performing and furnishing the Work in accordance with the time, price and other terms and conditions of Contract Documents.

B. Bidders shall advise City in writing during the Bid period of any questions, suppositions, inferences or deductions Bidders may have for City’s review and response.

C. City has provided time in the period prior to bidding for Bidder to perform these investigations.

**3.02 Access to Site for Investigations**

A. During the Pre-Bid Site Visit(s), City will provide each Bidder access to the Site to conduct such examinations, investigations, explorations, tests, and studies, as each Bidder deems necessary for submission of a Bid, provided that invasive testing will be permitted only to the extent provided in the Instructions to Bidders, and provided that each Bidder seeking access to conduct such investigations provides a signed Access, Indemnity and Release Agreement. Bidders must fill all holes and clean up and restore the Site to its former conditions upon completion of such explorations, investigations, tests, and studies. Such investigations may be performed only under the provisions of these Instructions to Bidders and the General Conditions of the Contract including, without limitation, proof of insurance and obligation to indemnify against claims arising from such investigation work. Each Bidder shall supply all equipment required to perform any investigations as each Bidder deems necessary. City has the right to limit the number of pieces of machinery operating at any one time due to safety concerns or in order to protect or maintain the Site from potential damage or interruption to general operational activities.

**BID FORM**
**TO THE CITY OF FORT BRAGG**

**THIS BID IS SUBMITTED BY:**

_____
(Firm/Company Name)

Re: **Raw Water Line Replacement Project, Segments 2-5** / City Project WTR-00016 at Fort Bragg, California.

1. The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an Agreement with the **CITY OF FORT BRAGG** in the form included in the Contract Documents (Agreement), to perform and furnish all Work as specified or indicated in the Contract Documents for the Contract Sum and within the Contract Time indicated in this Bid and in accordance with all other terms and conditions of the Contract Documents.
2. Bidder accepts all of the terms and conditions of the Contract Documents, Notice Inviting Bids, and Instructions to Bidders, including, without limitation, those dealing with the disposition of Bid Security. This Bid will remain subject to acceptance for 60 Days after the day of Bid opening, unless there is a bid protest, then 90 days after the day of bid opening.
3. In submitting this Bid, Bidder represents that Bidder has examined all of the Contract Documents, performed all necessary Pre-Bid investigations, attended the mandatory Pre-Bid Meeting, if any, received the Pre-Bid Meeting Summary Notes (if any), and received the following Addenda:

| Addendum Number | Addendum Date | Signature of Bidder |
|---|---|---|
| | | |
| | | |
| | | |
| | | |

4. Based on the foregoing, Bidder proposes and agrees to fully perform the Work within the time stated and in strict accordance with the Contract Documents for the following sums of money listed in the following Schedule of Bid Prices.

## SCHEDULE OF BID PRICES

All Bid items, including lump sums, unit prices and alternates (if any), must be filled in completely, in ink, and included in the bid proposal. The total cost of the project must be inclusive of all costs, whether direct or indirect, including profit and overhead, federal, state and local taxes, permit fees, etc. If an item of work is not specifically described by an item Description below, it shall be included in the most applicable item. It is intended that the TOTAL BASE BID listed below be inclusive of all costs to construct the improvements as described in the plans and specifications. Quote in figures only, unless words are specifically requested.

| Item | Description | Estimated Quantity | Unit | Unit Price | Total |
|---|---|---|---|---|---|
| 1 | Mobilization | 1 | LS | $ | $ |
| 2 | Demobilization | 1 | LS | $ | $ |
| 3 | Site Specific Safety Plan | 1 | LS | $ | $ |
| 4 | SWPP Plan | 1 | LS | $ | $ |
| 5 | Construction SWPPP and Erosion Control | 1 | LS | $ | $ |
| 6 | Clearing and Grubbing RoW | 1 | LS | $ | $ |
| 7 | Traffic Control | 1 | LS | $ | $ |
| 8 | Construction Survey | 1 | LS | $ | $ |
| 9 | Dewatering | 1 | LS | $ | $ |
| 10 | 10” DIP Waterline – Bridge Crossing | 711 | LF | $ | $ |
| 11 | 10” PVC Waterline – Unpaved Access Road | 2,949 | LF | $ | $ |
| 12 | 10” PVC Waterline – Paved Road | 50 | LF | $ | $ |
| 13 | 10” PVC Waterline – Unimproved RoW | 6,089 | LF | $ | $ |
| 14 | 10” PVC Waterline – Gravel Road | 2,982 | LF | $ | $ |
| 15 | 10” PVC Waterline – Remove and Replace | 166 | LF | $ | $ |
| 16 | 6” PVC Force Main – Summers Lane | 362 | LF | $ | $ |
| 17 | Rock Excavation | 400 | CY | $ | $ |
| | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| 18 | Unstable Trench Foundation | 400 | CY | $ | $ |
| 19 | 1” Air Release Valves | 9 | EA | $ | $ |
| 20 | 2” Low Point Blow-Off Valve | 6 | EA | $ | $ |
| 21 | 6” Gate Valve | 1 | EA | $ | $ |
| 22 | 10” Flange Couplings | 17 | EA | $ | $ |
| 23 | Trench Dams | 26 | EA | $ | $ |
| 24 | 10” Gate Valve | 26 | EA | $ | $ |
| 25 | 18” Gate Valve | 2 | EA | $ | $ |
| 26 | Noyo River Valve Vault | 1 | EA | $ | $ |
| 27 | Pump Station, including connecting piping | 1 | LS | $ | $ |
| 28 | Slope Stabilization (Allowance) | 1 | LS | $ | $ |
| 29 | 20” Bore and Jack – Highway 20 Crossing | 40 | LF | $ | $ |
| 30 | Bore Pit | 1 | EA | $ | $ |
| 31 | Receiving Pit | 1 | EA | $ | $ |
| 32 | Slurry Fill Abandon Existing Pipe | 110 | LF | $ | $ |
| 33 | Corrosion Protection | 1 | LS | $ | $ |
| 34 | Pipeline Cleaning and Testing | 1 | LS | $ | $ |
| 35 | Connect to Existing Waterline | 1 | LS | $ | $ |
| 36 | Trenched Underdrain System | 130 | LF | $ | $ |
| 37 | Place and Maintain Final Erosion Control | 1 | LS | $ | $ |
| 38 | Final Restoration | 1 | LS | $ | $ |
| | | | | **TOTAL BASE BID PRICE** | **$** |

**TOTAL BASE BID PRICE (Items 1-7 inclusive):**

_____

(Indicate Bid Price in Words)

_____

(Indicate Bid Price in Dollar Figures)

ADDITIVE BID ITEM: The City may consider substitution of the specified AWWA C-900 pipe with an alternative AWWA C-909 pipe. If the City elects to make this substitution for all pipe in the project, Additive Bid Item No. 8 is the lump sum price for making the change. If the City chooses to make this substitution, the additive bid price will be added to the Total Base Bid above to calculate the final bid price.

Bids may be evaluated based on the lowest Total Base Bid or on Total Base Bid plus Additive Bid Item No. 39. The City will select the evaluation method that is most advantageous to the City.

| Item No. | Description | Estimated Quantity | Unit | Unit Price | Total |
|---|---|---|---|---|---|
| 39 | Change AWWA C-900 pipe to AWWA C-909, Class 235 pipe | 12,236 | LF | $ | $ |
| | | **TOTAL BID PRICE FOR ALTERNATE** | | | $ |

**TOTAL BID PRICE INCLUDING BASE BID AND ALTERNATES (Items 1-8, inclusive):**

_____

(Indicate Bid Price in Words)

_____

(Indicate Bid Price in Dollar Figures)

1. The undersigned acknowledges that the Apparent Low Bidder will be determined as provided in Notice to Bidders and Instructions to Bidders.
2. Subcontractors for work are listed in Subcontractors List, submitted herewith.
3. The undersigned Bidder understands that City reserves the right to reject this Bid.
4. If written notice of the acceptance of this Bid, hereinafter referred to as Notice of Award, is mailed or delivered to the undersigned Bidder within the time described in Paragraph 2 of this Document or at any other time thereafter before it is withdrawn, the undersigned Bidder will execute and deliver the documents required by Instructions to Bidders within the times specified therein.
5. Notice of Award or request for additional information may be addressed to the undersigned Bidder at the address set forth below.
6. The undersigned Bidder herewith encloses cash, a cashier's check, or certified check of or on a responsible bank in the United States, or a corporate surety bond furnished by a surety authorized to do a surety business in the State of California, in form specified in the Instructions to Bidders, in the amount of ten percent (10%) of the Total Bid Price and made payable to the **CITY OF FORT BRAGG**.
7. The undersigned Bidder agrees to commence Work under the Contract Documents on the date established in the Agreement's General Conditions and to complete all Work within the time specified in the Agreement.

8. The undersigned Bidder agrees that, in accordance with the General Conditions, liquidated damages for failure to complete all Work in the Contract within the time specified in the Agreement shall be as set forth therein.

**IMPORTANT NOTICE**: If Bidder or other interested person is a corporation, give the legal name of the corporation, state where incorporated, and names of president and secretary thereof; if a partnership, give name of the firm and names of all individual co-partners composing the firm; if Bidder or other interested person is an individual, give first and last names in full.

**NAME OF BIDDER**: _____

is licensed in accordance with an act for the registration of Contractors, with license number:

_____ Expiration date: _____.

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

_____
(Signature of Bidder)

Date of Bid: _____
(Date)

Business Address: _____

_____

_____

Email Address: _____

**NOTE**: If Bidder is a corporation, set forth the legal name of the corporation together with the signature of the officer or officers authorized to sign contracts on behalf of the corporation. If Bidder is a partnership, set forth the name of the firm together with the signature of the partner or partners authorized to sign contracts on behalf of the partnership.

_____ _____
(Place of Incorporation, if Applicable) (Principal)

_____
(Principal)

_____
(Principal)

Contractor's Representative(s): _____
(Name/Title)

_____
(Name/Title)

_____

(Name/Title)

Officers Authorized to Sign Contracts _____
(Name/Title)

_____
(Name/Title)

_____
(Name/Title)

Telephone Number(s): _____
(Area Code) (Number)

_____
(Area Code) (Number)

Fax Number(s): _____
(Area Code) (Number)

_____
(Area Code) (Number)

**BOND ACCOMPANYING BID**

KNOW ALL PERSONS BY THESE PRESENTS:

That the undersigned

_____

,

(Name of Contractor)

as Principal and the undersigned as Surety are held and firmly bound unto **CITY OF FORT BRAGG, a California Municipal Corporation** ("City"), as obligee, in the penal sum of **(Dollar Amount In Words)** _____ Dollars **($**_____ _____**)** lawful money of the United States of America being at least ten percent (10%) of the aggregate amount of said Principal's base Bid, for the payment of which, well and truly to be made, we bind ourselves, our successors, executors, administrators, and assigns, jointly and severally, firmly by these presents.
Raw Water Line Replacement

WHEREAS, said Principal is submitting a Bid for City Contract Number **WTR-00016; Raw Water Line Replacement Project.**

THE CONDITION OF THIS OBLIGATION IS SUCH that if the Bid submitted by the said Principal be accepted and the Contract be awarded to said Principal and said Principal shall within the required periods enter into the Contract so awarded and provide the required Construction Performance Bond, Construction Labor and Material Payment Bond, insurance certificates, and all other endorsements, forms, and documents required under Instructions to Bidders, then this obligation shall be void, otherwise to remain in full force and effect.

IN WITNESS WHEREOF, the above parties have executed this instrument this _____ day of _____, 2024**.**

(Corporate Seal) By _____
Principal

By _____
Surety

(Corporate Seal) By _____
Attorney in Fact

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**BIDDER REGISTRATION FORM**

**INDEPENDENT CONTRACTOR REGISTRATION**

Contractor's License # _____

Date: _____ Fed Tax I.D. # _____

Contractor's DIR Registration # _____

Full Corporate Name of Company: _____

Street Address: _____

_____

Mailing Address: _____

_____

Phone: _____ Fax: _____

Name of Principal Contact: _____

Email Address: _____

Type of Business:
_____ Sole Proprietor _____ Partnership
_____ Non-Profit 501(c)(3) _____ Corporation
_____ other (please explain:_____)

**INSURANCE** (Complete all items listed below that are applicable and/or are required by Supplementary Conditions – Insurance and Indemnification)

**Workers' Compensation:**

Carrier: _____

Address: _____

Phone and Fax: _____

Policy Number: _____

**General Liability:**

Carrier: _____

Address: _____

Phone and Fax: _____

Policy Number: _____

Policy Limits: $ _____

A.M. Best Rating: _____

**Automobile Liability:**

Carrier: _____

Address: _____

Phone and Fax: _____

Policy Number: _____

Policy Limits: $ _____

A.M. Best Rating: _____

**Professional Liability**

Carrier: _____

Address: _____

Phone and Fax: _____

Policy Number: _____

Policy Limits: $ _____

A.M. Best Rating: _____

**Pollution Legal Liability Insurance**

Carrier: _____

Address: _____

Phone and Fax: _____

Policy Number: _____

Policy Limits: $ _____

A.M. Best Rating: _____

**BIDDER CERTIFIES, UNDER PENALTY OF PERJURY, THAT THE FOREGOING INFORMATION IS CURRENT AND ACCURATE AND AUTHORIZES CITY, AND ITS AGENTS AND REPRESENTATIVES TO OBTAIN A CREDIT REPORT AND/OR VERIFY ANY OF THE ABOVE INFORMATION.**

BIDDER: _____

(COMPANY NAME)

By: _____ _____
NAME TITLE

By: _____ _____
SIGNATURE DATE

**SUBCONTRACTORS LIST**

***[See Instructions to Bidders paragraph 2.03.D]***

| Subcontractor Name and Business Location | Description of Work | Subcontract Amount | Subcontractor License No. | DIR Registration Number | DBE? |
|---|---|---|---|---|---|
| | | | | | __Yes<br>__No |
| | | | | | __Yes<br>__No |
| | | | | | __Yes<br>__No |
| | | | | | __Yes<br>__No |
| | | | | | __Yes<br>__No |
| | | | | | __Yes<br>__No |
| | | | | | __Yes<br>__No |
| | | | | | __Yes<br>__No |

(Bidder to attach additional sheets if necessary)

## STATEMENT OF QUALIFICATIONS INSTRUCTIONS

### ARTICLE 1 – GENERAL INFORMATION

**1.01 Minimum Bidder Qualifications**

A. Bidders must be duly licensed, pursuant to the license requirements in Notice Inviting Bids, Paragraph 2.01, and in accordance with the California Business & Professions Code §§7006, *et seq.*, and have a history of work performance sufficient to meet the requirements of a responsible bidder in the Public Contract Code Section 1103.

B. Bidders must have three (3) years' experience as a continuously operating entity engaged in the performance of similar work.

**1.02 Measurement**

A. Bidder's compliance with the minimum qualification requirements will be measured by Bidder's experience as an operating entity and also by the experience of the supervisory personnel who will have responsible charge of the various major components of the Work.

B. If Bidder subcontracts portions of the Work, City, in its determination of whether the minimum qualification requirements have been met, may consider the qualifications of the Subcontractor's supervisory personnel.

C. The qualifications of the Key Personnel are to be submitted with the Statement of Qualifications (SOQ), by providing the information described herein.

**1.03 Other Requirements**

A. Bidder's attention is called to the following minimum requirements for a Bidder to be found responsible to perform the Work:

1. Building Capacity. Ability to secure, in accordance with the Contract documents, the required forms of Construction Performance Bond and Construction Labor and Material Payment Bond. Ability to obtain required insurance with coverage values that meet minimum requirements.
2. Subcontracting Prior Experience. Satisfactory experience on public works, including without limitation, no history of default termination, excessively delayed completion or excessive defective work.
3. Projects Public Experience. Evidence that Bidder and its team, including without limitation its Subcontractors (hereafter, including Bidder if Bidder performs such Work itself, "designated Subcontractor(s)"), have the human and physical resources of sufficient quantity and quality to perform the Work under Contract documents in a timely and Specification-compliant manner, to include:
    a. Construction and management organizations with sufficient personnel and requisite disciplines, licenses, skills, experience, and equipment for the Project.
    b. Minimum licensing requirements including evidence of a valid California contractor's license for the Bidder and evidence of requisite licenses for Key Personnel of Bidder or any designated Subcontractor(s).
    c. Sufficiency of proposed quality assurance plan to meet the requirements of the Contract documents.
    d. Bidder's safety record.
    e. A field organization with skills, experience, and equipment sufficient to perform all on-Site work and necessary scheduling.
    f. Expertise of Key Personnel to accomplish the duties and responsibilities required to perform the Work under Contract documents. Minimum experience requirements of Key Personnel including the completion of three projects of similar nature and complexity and having two years of experience on projects of similar nature and complexity.
    g. Bidder shall expressly indicate which, if any, of the foregoing designated Subcontractor(s)' functions it will perform itself.

### ARTICLE 2 – REQUIRED CONTENTS OF SOQ SUBMISSION

**2.01 Transmittal Letter**

A. The Transmittal Letter shall name the proposed prime contractor, its legal structure (i.e., corporation, partnership, limited partnership, joint venture). If a joint venture or partnership is

proposed, Bidder shall identify partner and/or member of the joint venture and their roles and responsibilities.

**2.02 Submittals**

A. Completed Questionnaires**.** Bidder shall include a completed Statement of Qualification Questionnaire in the following form.

B. Surety Letter re: Capability to Provide Required Performance and Payment Bonds. Bidder shall include a letter from a surety duly licensed to do business in the State of California, having a financial rating from A.M. Best Company of **[A-, VIII or A-, V]** or better, that the surety has agreed to provide Bidder with the required performance and payment bonds in accordance with the requirements set forth in the Construction Performance Bond and Construction Labor and Material Payment Bond documents, each in the penal sum of the Contractor's bid when submitted. City shall have the right to verify with the surety that the surety, based upon the Bid prices, will issue the required bonds under the conditions stated.

C. Insurer Letter re: Capability to Provide the Required Insurance. Bidder shall provide a letter from an insurance underwriter, having a financial rating reasonably acceptable to City, confirming that the insurer will provide Bidder the required coverages and amounts specified in the Contract Documents.

D. License: Evidence of a valid contractor's license and required licenses of all licensees of persons who are Key Personnel necessary to perform the Work.

E. Litigation History. Description of litigation history involving the Contractor in a professional capacity for the past three years including names of involved parties, nature of dispute, and disposition.

**2.03 Format**

A. The SOQ shall be clear and concise to enable management-oriented personnel to make a thorough evaluation and arrive at a sound determination as to whether the SOQ meets City's requirements. To this end, the SOQ should be so specific, detailed and complete as to demonstrate clearly and fully that the Bidder has a thorough understanding of and has demonstrated knowledge of the requirements to perform the Work (or applicable portion thereof).

B. Any explanation requested by a Bidder regarding the meaning or interpretation of the SOQ must be requested in writing and with sufficient time allowed for a reply to reach Bidder before the submission of its SOQ. Oral explanations or instructions will not be binding. Any information provided to any prospective Bidder concerning this SOQ document will be furnished to all prospective Bidders as an Addendum to the Bidding Documents.

**[NEXT PAGE - STATEMENT OF QUALIFICATIONS QUESTIONNAIRE]**

## STATEMENT OF QUALIFICATIONS QUESTIONNAIRE

Bidders shall complete the entire Statement of Qualifications Questionnaire and submit it in accordance with the Instructions to Bidders and Statement of Qualifications Instructions. Failure to complete the questionnaire or inclusion of any false statement(s) shall be ground for immediate disqualification.

### CONTACT INFORMATION

Company Name: _____

City of Company: _____

Contact Person: _____

Address: _____

Phone: _____ Fax: _____

Email: _____

### PART A: GENERAL INFORMATION

| | |
|---|---|
| 1. Does Bidder possess a valid and current California Contractor's license for the work proposed? | Yes ___ No ___ |
| 2. Does Bidder have the minimum liability insurance coverage required in the Insurance and Indemnification document? | Yes ___ No ___ |
| 3. Has Bidder's Contractor's License been revoked at any time within the last five years? | Yes ___ No ___ |
| 4. Has Bidder been "default terminated" by any City (other than for convenience), or has a Surety completed a contract for Bidder within the last five years? | Yes ___ No ___ |
| 5. Has Bidder been convicted more than twice for failure to pay prevailing wages in the last three years? | Yes ___ No ___ |
| 6. Are Bidder and all listed subcontractors registered and qualified with the Department of Industrial Relations pursuant to Labor Code Section 1725.5? | Yes ___ No ___ |

**Bidder may be disqualified if any answer to questions 1, 2, or 6 is No.**
**Bidder may be disqualified if any answer to questions 3, 4, or 5 is Yes.**

### PART B: SAFETY, PREVAILING WAGE, DISPUTES AND BONDS

**(SAFETY)**

Has Cal/OHSA, Federal OSHA, the EPA or any Air Quality Management Agency cited Bidder in the past five years? If yes, attach description of each citation.

Yes _____ No _____

**(PREVAILING WAGE PROVISIONS)**

Has Bidder been fined, penalized or otherwise found to have violated any prevailing wage or labor code provision? If yes, attach description of each occurrence.

Yes _____ No _____

**(LICENSE PROVISIONS)**

Has Bidder changed names or license numbers in the past five years? If so, please state reason for change.

Yes _____ No _____ Reason:_____

_____

**(DISPUTES)**

In the past five years, has Bidder on any project that Bidder performed construction services made any written claim against any City for additional compensation or additional time, that the City disputed, exceeding on a per project basis an aggregate amount of $100,000 or 10% of the original contract sum? If yes, attach description of each instance including details of total claim(s) amount, resolution description including amount, and City's name and phone number.

Yes _____ No _____

In the past five years, has any City on any project that Bidder performed construction services asserted any written claim against Bidder for delay, defective work, warranty work, back charges and/or offsets, that the Bidder disputed, exceeding on a per project basis, an aggregate amount of $100,000 or 10% of the original contract sum? If yes, attach description of each instance including details of total claim(s) amount, resolution description including amount, and City's name and phone number.

Yes _____ No _____

**(BONDING)**

Bonding Capacity – Provide documentation from Bidder's surety identifying the following:

Name of bonding company/surety: _____

Name of Surety Agent: _____

Surety Agent address: _____

Surety Agent phone number: _____

Is surety a California-admitted surety? Yes _____ No _____

Is surety listed in the current edition of the California Department of the Treasury's Listing of approved sureties? Yes _____ No _____

List surety's A.M. Best Rating: _____

What is Bidder's total bonding capacity? _____

What percent does Bidder pay for bonds? _____

## PART C: EXPERIENCE OF PRIME CONTRACTOR

The nature of this Project requires prior similar experience for the firm and the Key Personnel assigned.

Summarize similar project experience below and provide the detailed project information requested:

**Prime Contractor**
List three (3) projects of similar size and scope to the Work of the Contract, completed in the past, and indicate who were the superintendent, project manager and scheduler. NOTE: This listing will be used to assess compliance with the stated minimum qualifications in Paragraph 2.01 of the Notice Inviting Bids.

| Project Name/Description | Construction Cost ($) | Address | Contact Person & Phone Number |
|---|---|---|---|
| | | | |
| | | | |
| | | | |

**Key Personnel**
List Key Personnel that will be assigned to the Work of the current Project and their experience/training with the projects listed above:

Project Manager: _____

Project Superintendent: _____

Project Scheduler: _____

**Recent Projects**
Provide information about three (3) of Bidder's most currently completed projects. Names and references must be current and verifiable. NOTE: This listing will be used to assess compliance with the stated minimum qualifications in Paragraph 1.01 of the Instructions. If a separate sheet is used, it must contain all of the following information:

1. Project Name: _____

   Location: _____

   City: _____

   City Contact (name and phone): _____

   Architect/Engineer: _____

   Architect/Engineer Contact (name and phone number): _____

   Const. Mgr. or Project Mgr. (name and phone number): _____

   Description of Project, Scope of Work Performed: _____

   _____

   Total Construction Cost: _____

   Total Change Order Amount: _____

   Did Change Orders exceed 10% of original contract sum? _____ If yes, please explain on separate sheet.

   Original Scheduled Date of Completion: _____

   Time Extensions Granted (number of Days): _____

   Actual Date of Completion: _____

   Number of Stop Notices filed by Subcontractors or Suppliers: _____

2. Project Name: _____

   Location: _____

   City: _____

   City Contact (name and phone): _____

   Architect/Engineer: _____

   Architect/Engineer Contact (name and phone number): _____

Const. Mgr. or Project Mgr. (name and phone number):_____

Description of Project, Scope of Work Performed: _____

_____

Total Construction Cost: _____

Total Change Order Amount: _____

Did Change Orders exceed 10% of original contract sum? _____ If yes, please explain on separate sheet.

Original Scheduled Date of Completion: _____

Time Extensions Granted (number of Days): _____

Actual Date of Completion: _____

Number of Stop Notices filed by Subcontractors or Suppliers: _____

3. Project Name: _____

Location: _____

City: _____

City Contact (name and phone): _____

Architect/Engineer: _____

Architect/Engineer Contact (name and phone number): _____

Const. Mgr. or Project Mgr. (name and phone number): _____

Description of Project, Scope of Work Performed: _____

_____

Total Construction Cost: _____

Total Change Order Amount:_____

Did Change Orders exceed 10% of original contract sum? _____ If yes, please explain on separate sheet.

Original Scheduled Date of Completion: _____

Time Extensions Granted (number of Days): _____

Actual Date of Completion: _____

Number of Stop Notices filed by Subcontractors or Suppliers: _____

**PART D: FINANCIAL INFORMATION**

1. Has Bidder ever reorganized under the protection of bankruptcy laws?
   Yes _____ No _____ If yes, please state when _____

2. If Bidder has had the general liability carrier identified in the Bidder Registration and Safety Experience Form for less than five years, please provide additional information below for balance of the last five years:

   Agency Name: _____

   Contact Name: _____

   Phone Number _____

   Carrier: _____ A.M. Best Rating: _____

   Carrier: _____ A.M. Best Rating: _____

   Carrier: _____ A.M. Best Rating: _____

3. Has Bidder ever had insurance terminated by a carrier? Yes _____ No _____
   If yes, explain on a separate signed sheet marked with correlating cross-reference to this paragraph of the questionnaire.

Bidder hereby declares under penalty of perjury that all the information provided in this questionnaire is true and correct.

_____
SIGNATURE

_____
TITLE

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**NON-COLLUSION AFFIDAVIT**
PUBLIC CONTRACT CODE §7106

NON-COLLUSION AFFIDAVIT TO BE EXECUTED BY BIDDER AND SUBMITTED WITH BID

STATE OF CALIFORNIA )
) ss.
COUNTY OF _____)

_____, being first duly sworn,
(Name of Principal of Bidder)

deposes and says that he or she is the _____
(Office or Title of Affiant)

of _____, the party
(Name of Bidder)
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 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, and 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 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 City, or anyone interested in the proposed contract; that all statements contained in the Bid are true; and further, that Bidder has not, directly or indirectly, submitted its Bid price or any breakdown thereof, or the contents thereof, or divulged information or data relative thereto, or paid, and will not pay, any fee to any corporation, partnership, company association, organization, Bid depository, or to any member or agent thereof to effectuate a collusive or sham Bid.

Executed under penalty of perjury under the laws of the State of California:

_____
(Name of Bidder)

_____
(Signature of Principal)

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

State of California )
) ss.
County of _____)

Subscribed and sworn to (or affirmed) before me this _____ day of _____, 2019 by

_____
proved to me on the basis of satisfactory evidence to be the person(s) who appeared before me.

(Seal)

_____

Signature of Notary Public

**NOTE:** If Bidder is a partnership or a joint venture, this affidavit must be signed and sworn to by every member of the partnership or venture.

**NOTE:** If Bidder [including any partner or venturer of a partnership or joint venture] is a corporation, this affidavit must be signed by the Chairman, President, or Vice President and by the Secretary, Assistant Secretary, Chief Financial Officer, or Assistant Treasurer.

**NOTE:** If Bidder's affidavit on this form is made outside the State of California, the official position of the person taking such affidavit shall be certified according to law.

## BIDDER CERTIFICATIONS

TO BE EXECUTED BY ALL BIDDERS AND SUBMITTED WITH BID

The undersigned Bidder certifies to City as set forth in Articles 1 through 8 below:

**ARTICLE 1 – STATEMENT OF CONVICTIONS**

By my signature hereunder, I hereby swear, under penalty of perjury, that no more than one final, unappealable finding of contempt of court by a Federal Court has been issued against Bidder within the past two years because of failure to comply with an order of a Federal Court or to comply with an order of the National Labor Relations Board.

**ARTICLE 2 - CERTIFICATION OF WORKER'S COMPENSATION INSURANCE**

By my signature hereunder, as the Contractor, I certify that I am aware of the Labor Code Section 3700, which requires every employer to be insured against liability for worker's 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.

**ARTICLE 3 - CERTIFICATION OF PREVAILING WAGE RATES AND RECORDS**

By my signature hereunder, as the Contractor, I certify that I am aware of Labor Code Section 1773, which requires the payment of prevailing wage on public projects. Contractor and any subcontractors under the Contractor shall comply with Labor Code Section 1776 regarding wage records, and with Labor Code Section 1777.5 regarding the employment and training of apprentices. Contractor is responsible to ensure compliance by any and all subcontractors performing work under this Contract.

**ARTICLE 4 - CERTIFICATION OF COMPLIANCE WITH PUBLIC WORKS CHAPTER OF LABOR CODE**

By my signature hereunder, as the Contractor, I certify that I am aware of Labor Code Sections 1777.1 and 1777.7 Code, and Contractor and Subcontractors are eligible to bid and work on public works projects.

**ARTICLE 5 - CERTIFICATION OF NON-DISCRIMINATION**

By my signature hereunder, as the Contractor, I certify that there will be no discrimination in employment with regard to race, color, religion, gender, sexual orientation, age or national origin; that all federal, state, and local directives and executive orders regarding non-discrimination in employment will be complied with; and that the principal of equal opportunity in employment will be demonstrated positively and aggressively.

**ARTICLE 6 - CERTIFICATION OF NON-DISQUALIFICATION**

By my signature hereunder, as the Contractor, I swear, under penalty of perjury, that the below indicated Bidder, any officer of Bidder, or any employee of Bidder who has a proprietary interest in such Bidder, has never been disqualified, removed, or otherwise prevented from bidding on, or completing a Federal, State, or local government project because of a violation of law or safety regulation, except as indicated on the separate sheet attached hereto entitled "Previous Disqualifications." If a statement of "Previous Disqualifications" is attached, please explain the circumstances.

**ARTICLE 7 - CERTIFICATION OF ADEQUACY OF CONTRACT AMOUNT**

By my signature hereunder, as the Contractor, pursuant to Labor Code Section 2810(a), I certify that, if awarded the Contract based on the undersigned's Bid, the Contract will include funds sufficient to allow the Contractor to comply with all applicable local, state, and federal laws or regulations governing the labor or services to be provided. I understand that City will be relying on this certification if it awards the Contract to the undersigned.

**ARTICLE 8 - CERTIFICATION REGARDING DIR CONTRACTOR / SUBCONTRACTOR REGISTRATION**

By my signature hereunder, as the Contractor, I certify that Contractor, and all Subcontractors listed on the Subcontractors List are the subject of current and active contractor registrations pursuant to Division 2, Part 7, Chapter 1 (commencing with section 1720) of the California Labor Code. Contractor's registration number is _____ **[please complete]**. Subcontractors' registration numbers are as indicated in the Subcontractors List.

**BIDDER**: _____

(Name of Bidder)

Date: _____ By: _____

(Signature)

Name: _____

(Print Name)

Its: _____

(Title)

**SUBSTITUTION REQUEST FORM**

To: **CITY OF FORT BRAGG**

| | |
|---|---|
| **PROJECT:**<br><br>**City Project No:** | **Contractor:** |

| | |
|---|---|
| Substitution Request By: | Firm: |

| **Transmittal Record** | **Attn:** | **Firm:** | **Date Sent:** | **Date Rec'd:** | **Date Due:** |
|---|---|---|---|---|---|
| Contractor to City | | | | | |
| Contractor to Architect | | | | | |
| City / Architect to Consultant | | | | | |
| Architect to City Representative | | | | | |
| City Representative to Contractor | | | | | |

We hereby submit for your consideration the following product instead of the specified item for the Project:

| **Section / Drawing** | **Article** | **Specified Item** |
|---|---|---|
| | | |
| **Proposed Substitution:** | | |
| | | |

We have (a) attached manufacturer's literature, including complete technical data and laboratory test results, if applicable, (b) attached an explanation of why proposed substitution is a true equivalent to specified item, (c) included complete information on changes to Contract Documents that the proposed substitution will require for its proper installation, and (d) filled in the blanks below:

**Contractor to complete the questions that follow and certify to the accuracy of all answers:**

| | |
|---|---|
| A. | Does the substitution affect dimensions shown on Drawings? Yes __ / No __. If No, please explain proposed mitigation and why substitution is equivalent to originally specified item: |
| B. | Will the undersigned pay for changes to the building design, including engineering and detailing costs caused by the requested substitution? Yes __ / No __. If No, please state reasons explaining why substitution is equivalent to originally specified item: |
| C. | What effect does the substitution have on other trades? No effect: __ / Some effect __. If substitution will affect other trades, please explain the effect and why substitution is equivalent to originally specified item: |
| D. | Will substitution cause change to Project Schedule, or to critical delivery dates? Add? Shorten? If the substitution will add to schedule dates or affect critical activities, please explain why substitution is equivalent to originally specified item: |
| E. | Please describe differences between proposed substitution and specified item. Please explain and identify any and all differences, and please explain why substitution is equivalent to originally specified item: |
| F. | What is the Cost Differential to Contractor in original specified item and proposed substitution including all mark-ups? [If substitution requested during bid period, skip this question.] |
| G. | Are Manufacturer's guarantees for the proposed item the same as for item specified? Yes ____; No____. If No, please explain why substitution is equivalent to originally specified item: |

| | |
|---|---|
| H. | Does Contractor accept full responsibility for delays caused by redesign of other items of the Work necessitated by substitution? Yes __ / No __. If No, please state reasons and explain why substitution is equivalent to originally specified item: |
| I. | Does Contractor state that the function, appearance and quality are equivalent or superior to the specified item? Yes __ / No __. If No, please explain why substitution is equivalent to originally specified item: |

We certify that the function, appearance, and quality of the proposed substitution are equivalent or superior to those of the specified item, except as we may specifically state otherwise in this request.

Submitted by:_____ Signature: _____

Firm:_____ Date: _____

Address:_____ Phone/ Fax: _____

Remarks:_____

| **Consultant Response:** | **City Representative Response:** |
|---|---|
| o Accepted | o Accepted |
| o Not Accepted | o Not Accepted |
| o Accepted As Noted | o Accepted As Noted |
| o Received Too Late | o Received Too Late |
| **Remarks:**_____ | **Remarks:**_____ |
| _____ | _____ |
| **By:**_____ | **By:**_____ |

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# VOLUME 2




# Contract Documents

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CITY OF FORT BRAGG
416 N. Franklin Street
Fort Bragg, California 95437

## CONTRACT CHECK LIST

Complete, accurate, executed copies of the following documents must be submitted to the CITY OF FORT BRAGG in accordance with the bid package issued by the City for the Raw Water Line Replacement Project, Segments 2-5, Project No. 2019-02 - within ten (10) working days of receiving written notice of award of the project. The bidder's security of any successful bidder that fails to do so will be forfeited to the City.

_____ Contract Check List

_____ Contract, Part 1

_____ Contract, Part 2 – General Provisions

_____ Contract, Part 3 – Special Provisions

_____ Performance Bond

_____ Payment Bond

_____ Maintenance Bond

_____ Certificates of Insurance and Endorsements

## VOLUME 2 CONTRACT DOCUMENTS – TABLE OF CONTENTS


## CONTRACT, PART 1

### RECITALS
A. Notice Inviting Bids.
B. Bid Opening
C. Project Award.
D. Required Documents.
E. Investigation and Verification of Site Conditions.

### CONTRACT TERMS
1. The Work.
2. Location of Work.
3. Time for Completion
4. Remedies for Failure to Timely Complete the Work.
5. Contract Price and Payment.
6. Prevailing Wages.
7. The Contract Documents.
8. Provisions Incorporated by Reference.
9. Interpretation of Contract Documents.
10. Assignment Prohibited.
11. Contractor's License Certification.
12. Severability.
13. Project Representatives

## CONTRACT, PART 2 GENERAL PROVISIONS

### 1. DEFINITIONS

### 2. PLANS AND SPECIFICATIONS
2.1 Documents Furnished by City.
2.2 Ownership of Documents Furnished by City.
2.3 Technical Specifications and Project Plans.

### 3. CONTROL OF WORK AND MATERIAL
3.1 Construction Manager's Status.
3.2 Architect or Engineer's Status.
3.3 Inspection and Testing of Work and Material.
3.4 Samples Furnished by the Contractor.
3.5 Materials and Substitutions.
3.6 Maintenance and Examination of Records.
3.7 Advertising
3.8 Project Schedule.

3.9 Construction Staking.
3.10 Materials Testing.

**4. CHANGES IN WORK**
4.1 City Directed Change Orders.
4.2 Writing Requirement.
4.3 Contractor Proposed Change Orders.
4.4 All Change Orders.
4.5 Change Order Pricing.
4.6 Liability Under Unapproved Change Orders.
4.7 Changes Subject to Contract Documents.
4.8 Change Order Disputes.
4.9 Change in Time for Completion.

**5. TRENCHING AND UTILITIES**
5.1 Contractor to Locate Underground Facilities.
5.2 Excavation More Than Four Feet Deep.
5.3 Excavation of Five Feet or More.
5.4 Utility Relocation Costs.
5.5 Concealed or Unknown Conditions.
5.6 Underground Facilities not owned or built by the City
5.7 Contractor's compensation for claimed latent or materially different Project conditions

**6. PROJECT FACILITIES**
6.1 Work Site Offices.
6.2 City Rights of Access and Ownership

**7. PROSECUTION AND PROGRESS OF THE WORK**
7.1 Liquidated Damages.
7.2 No Damage for Avoidable Delays.
7.3 Unavoidable Delays.
7.4 No Damage for Contractor Caused Delay.
7.5 No Damage for Other Delay.
7.6 Delays Caused by the City and/or Its Privities.
7.7 Weather Delays.
7.8 Delay Claims.
7.9 Contractor Coordination of the Work.

**8. CONTRACTOR RESPONSIBILITIES**
8.1. Eligibility.
8.2 Non Discrimination.
8.3 Supervision of the Work.
8.4 Contractor's Superintendent.
8.5 Competent Employees.
8.6 Items Necessary for Proper Completion of the Work.
8.7 Construction Reports.

8.8 Subcontracting.
8.9 Insurance.
8.10 Indemnities.
8.11 Licenses/Permits.
8.12 California Labor Code Requirements.
8.13 Laws and Ordinances.
8.14 Guaranty.
8.15 Safety.
8.16 Assignment of Unfair Business Practice Claims
8.17 Notification
8.18 Recycled Printing Products

**9. MEASUREMENT AND PAYMENT**
9.1 F.O.B.
9.2 Payment
9.3 Non-Allowable Direct Charges.
9.4 Retention.
9.5 Securities in Lieu of Retention.

**10. PROJECT ACCEPTANCE AND CLOSEOUT**
10.1 Occupancy.
10.2 Work Completion and Final Inspection.
10.3 Work Acceptance.

**11. REMEDIES AND DISPUTES**
11.1 Failure to Correct Work
11.2 Termination for Cause
11.3 Termination for Convenience.
11.4 Disputes.
11.5 Non-Waiver.

**CONTRACT, PART 3 SPECIAL PROVISIONS**

**12. SPECIAL PROVISIONS**
12.1 Description of Work.
12.2 Construction Limitations.
12.3 Storm Water Pollution Prevention.
12.4 Maintaining Traffic and Pedestrian Operations.
12.5 Public Safety.
12.6 Protection of Existing Facilities and Property.
12.7 Preconstruction Conference.
12.8 Owner Notification.
12.9 Emergency Service Providers Notifications
12.10 Clean up.

12.11 Payment.
12.12 Construction Staking.
12.13 Materials Testing Allowance.
12.14 Obstructions.
12.15 Hours of Work.
12.16 Dust Control.
12.17 Water for Construction and Dust Control.
12.18 Protection and Restoration of Vegetation.
12.19 Surplus Material.
12.20 Cultural Resources.
12.21 Historical Finds.
12.22 Cultural Resources Defined.
12.23 Construction Manager's Discretion.

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CITY OF FORT BRAGG
416 Franklin Street
Fort Bragg, California 95437

## CONTRACT, PART 1

The CITY OF FORT BRAGG, 416 N. Franklin Street, Fort Bragg, California 95437 ("City") enters into this Contract, dated _____, for reference purposes only, with **[Name and Address of Contractor]** ("Contractor").

## RECITALS

A. NOTICE INVITING BIDS. The City gave notice inviting bids to be submitted by **January 19, 2024** for the **Raw Water Line Replacement Project** ("Project") by published notice and/or posting in accordance with California Public Contract Code Section 20164 and other applicable law.

B. BID OPENING. On January 19, 2024, at 2:00 PM, City representatives opened the bids for the Project and read the bids aloud.

C. PROJECT AWARD. On February 12, 2024, the City Council awarded the Project to the Contractor and directed City staff to send the Contractor written notice of award of the project. The City Council conditioned award of the project on the Contractor's providing executed copies of all documents specified in the contract check list included in the bid package within ten (10) working days of receiving written notice of award of the project.

D. REQUIRED DOCUMENTS. The Contractor has provided the City executed copies of all documents specified in the contract check list included in the bid package within ten (10) working days of receiving written notice of award.

E. INVESTIGATION AND VERIFICATION OF SITE CONDITIONS. The Contractor warrants that it has conducted all necessary pre-bid investigations and other obligations, and agrees that it shall not be entitled to Change Orders (time or compensation) due to any information, error, inconsistency, omission, or conditions that Contractor should have known as a part of this Work. Contractor shall be responsible for the resultant losses, including, without limitation, the cost of correcting Defective Work. In executing this Contract, Contractor shall rely on the results of its own independent investigation and shall not rely on City-supplied information regarding above ground conditions and as-built conditions, and Contractor shall accept full responsibility for its verification work sufficient to complete the Work as intended.

The City and the Contractor agree as follows:

1. THE WORK. The Contractor shall furnish all equipment, tools, apparatus, facilities, material labor, and skill necessary to perform and complete in a good and workmanlike manner the **Raw Water Line Replacement Project** ("Work") as shown in the Technical Specifications and Project Plans in accordance with the Contract Documents and applicable law.

2. LOCATION OF WORK.

   The Work will be performed at the following location: various locations between Forest Road 450 in Jackson Demonstration State Forest and the City's Water Treatment Plant on Monsen Way in Fort Bragg, CA.

3. TIME FOR COMPLETION. The Contractor must complete the Work in accordance with the Contract Documents within three hundred and ninety (390) working days from the date specified in the City's Notice to Proceed ("Time for Completion").

4. REMEDIES FOR FAILURE TO TIMELY COMPLETE THE WORK. If the Contractor fails to fully perform the Work in accordance with the Contract Documents by the Time for Completion, as such time may be amended by change order or other modification to this Contract in accordance with its terms, and/or if the Contractor fails, by the Time for Completion, to fully perform all of the Contractor's obligations under this Contract that have accrued by the Time for Completion, the Contractor will become liable to the City for all resulting loss and damage in accordance with the Contract Documents and applicable law. The City's remedies for the Contractor's failure to perform include, but are not limited to, assessment of liquidated damages of $500 per day in accordance with California Government Code Section 53069.85 and the Contract Documents, and/or obtaining or providing for substitute performance in accordance with the Contract Documents.

5. CONTRACT PRICE AND PAYMENT. As full compensation in consideration of completion of the Work in accordance with the Contract Documents and in consideration of the fulfillment of all of the Contractor's obligations under the Contract Documents, the City will pay the Contractor in lawful money of the United States the total price of $_____ (the "Contract Price") as specified in the Contractor's completed Bid Schedule dated _____, and attached to and incorporated in this Contract. Payment to the Contractor under this Contract will be for Work actually performed in accordance with the Contract Documents and will be made in accordance with the requirements of the Contract Documents and applicable law. The City will have no obligation to pay the Contractor any amount in excess of the Contract Price unless this Contract is first modified in accordance with its terms. The City's obligation to pay the Contractor under this Contract is subject to and may be offset by charges that may apply to the Contractor under this Contract. Such charges include but are not limited to, charges for liquidated damages and/or substitute performance in accordance with the Contract Documents.

   The Contract Sum is all inclusive and includes all Work; all federal, state, and local taxes on materials and equipment, and labor furnished by Contractor, its

subcontractors, subconsultants, architects, engineers, and" vendors or otherwise arising out of Contractor's performance of the Work, including any increases in any such taxes during the term of this Agreement; and any duties, fees, and royalties imposed with respect to any materials and equipment, labor or services. The taxes covered hereby include (but are not limited to) occupational, sales, use, excise, unemployment, FICA, and income taxes, customs, duties, and any and all other taxes on any item or service that is part of the Work, whether such taxes are normally included in the price of such item or service or are normally stated separately. Notwithstanding the foregoing, each party shall bear such state or local inventory, real property, personal property or fixtures taxes as may be properly assessed against it by applicable taxing authorities.

6. PREVAILING WAGES. In accordance with California Labor Code Section 1771, not less than the general prevailing rate of per diem wages for work of a similar character in the locality in which the Work is to be performed, and not less than the general prevailing rate of per diem wages for holiday and overtime work fixed as provided in the California Labor Code must be paid to all workers engaged in performing the Work. In accordance with California Labor Code Section 1770 et seq., the Director of Industrial Relations has determined the general prevailing wage per diem rates for the locality in which the Work is to be performed. In accordance with California Labor Code Section 1773, the City has obtained the general prevailing rate of per diem wages and the general rate for holiday and overtime work in the locality in which the Work is to be performed for each craft, classification or type of worker needed to perform the project. In accordance with California Labor Code Section 1773.2, copies of the prevailing rate of per diem wages are on file at the City Public Works Department and will be made available on request. Throughout the performance of the Work the Contractor must comply with all provisions of the Contract Documents and all applicable laws and regulations that apply to wages earned in performance of the Work.

6.1. Contractor acknowledges and agrees that it shall comply with the requirements of California Public Contracts Code sections 2600 et seq., in its entirety and, in particular, those sections related to Skilled and Trained Workforce. By its execution of this agreement Contractor certifies and warrants that it is aware of the requirement of California Public Contracts Code section 2600 et seq. and its requirements as to a Skilled and Trained Workforce.

7. THE CONTRACT DOCUMENTS. This Contract consists of the following documents ("Contract Documents"), all of which are incorporated into and made a part of this Contract as if set forth in full. In the event of a conflict between or among the Contract Documents, precedence will be in the following order:

7.1 This Part 1 of the Contract and change orders and other amendments to this Contract signed by authorized representatives of the City and the Contractor.

7.2 The General Provisions, Part 2 of the Contract, and change orders and other amendments to the General Provisions signed by authorized representatives of the City and the Contractor.

7.3 The Special Provisions, Part 3 of the Contract, addenda to the Special Provisions signed by authorized representatives of the City and issued prior to bid opening, Equal Product Proposals accepted by the City and signed by authorized representatives prior to bid opening, and change orders and other amendments to the Special Provisions signed by authorized representatives of the City and the Contractor.

7.4 The Technical Specifications, addenda to the Technical Specifications signed by authorized representatives of the City and issued prior to bid opening, Equal Product Proposals accepted by the City and signed by authorized City representatives prior to bid opening, and change orders and other amendments to the Technical Specifications signed by authorized representatives of the City and the Contractor.

7.5 The Project Plans, addenda to the Project Plans signed by authorized representatives of the City and issued prior to bid opening, Equal Product Proposals accepted by the City and signed by authorized City representatives prior to bid opening, and change orders and other amendments to the Project Plans signed by authorized representatives of the City and the Contractor.

7.6 Notice Inviting Bids

7.7 Instructions to Bidders

7.8 The successful bidder's completed Proposal Cover Page and Bid Schedule

7.9 The successful bidder's completed Contractor License Information

7.10 The successful bidder's completed List of Proposed Subcontractors

7.11 The successful bidder's Workers Compensation Insurance Certification

7.12 The successful bidder's completed Non-collusion Affidavit

7.13 The successful bidder's Debarment Certification

7.14 The successful bidder's completed Certificates of Insurance and Endorsements

7.15 The successful bidder's executed Performance Bond

7.16 The successful bidder's executed Payment Bond

7.17 The Maintenance Bond form included in the bid package that the Contractor must execute prior to release of final payment under the Contract

7.18 The successful bidder's Qualification Statement, if any

7.19 The successful bidder's signed Signature Form

8. PROVISIONS INCORPORATED BY REFERENCE. Provisions or parts of provisions that are incorporated by reference and not set forth at length in any of the Contract Documents will only form a part of this Contract to the extent the Contract Documents expressly make such provisions or parts of provisions a part of this Contract. For example, published public works agreement provisions, such as those of the State of California Department of Transportation Standard Specifications (known as the

Standard Specifications) are only a part of this Contract to the extent expressly incorporated in the Contract by section number. When such published provisions are made a part of this Contract, references in the published provisions to other entities, such as the State, the Agency, or similar references, will be deemed references to the City as the context of this Contract may require.

9. INTERPRETATION OF CONTRACT DOCUMENTS. Any question concerning the intent or meaning of any provision of the Contract Documents, including, but not limited to, the Technical Specifications or Project Plans, must be submitted to the Public Works Director, or his/her designee, for issuance of an interpretation and/or decision by the authorized Public Works Director in accordance with the requirements of the Contract Documents. Interpretations or decisions by any other person concerning the Contract Documents will not be binding on the City. The decision of the Public Works Director, or his/her designee, shall be final.

10. ASSIGNMENT PROHIBITED. The Contractor may not assign part or all of this Contract, or any monies due or to become due under this Contract, or any other right or interest of the Contractor under this Contract, or delegate any obligation or duty of the Contractor under this Contract without the prior written approval of an official authorized to bind the City and an authorized representative of Contractor's surety or sureties. Any such purported assignment or delegation without such written approval on behalf of the City and the Contractor's sureties will be void and a material breach of this Contract subject to all available remedies under this Contract and at law and equity.

11. CONTRACTOR'S LICENSE CERTIFICATION. By signing this Contract the Contractor certifies that the Contractor holds a valid license applicable to the work, issued by the California State Contractors Licensing Board, and that the Contractor understands that failure to maintain its license in good standing throughout the performance of the Work may result in discipline and/or other penalties pursuant to the California Business and Professions Code, and may constitute a material breach of this Contract subject to all available remedies under this Contract and at law and equity.

12. SEVERABILITY. If any term or provision or portion of a term or provision of this Contract is declared invalid or unenforceable by any court of lawful jurisdiction, then the remaining terms and provisions or portions of terms or provisions will not be affected thereby and will remain in full force and effect.

13. PROJECT REPRESENTATIVES

13.1 The City has designated Diane O'Connor as its Project Manager to act as its Representative in all matters relating to the Contract. If Project Manager is an employee of City, Project Manager is the beneficiary of all Contractor obligations to the City including, without limitation, all releases and indemnities.

The Public Works Director, John Smith shall have final authority over all matters pertaining to the Contract and shall have sole authority to modify the Contract on behalf of the City, to accept work, and to make decisions or actions binding on the City, and shall have sole signature authority on behalf of the City.

The City may assign all or part of the Project Manager's rights, responsibilities and duties to a construction manage or other City representative.

13.2 The Contractor has designated [_____] as its Project Manager to act as Contractor's Representative in all matters relating to the Contract. The Contractor's Project Manager shall have final authority over all matters pertaining to the Contract and shall have sole authority to modify the Contract on behalf of the Contractor and to make decisions or actions binding on the Contractor, and shall have sole signature authority on behalf of the Contractor.

**SIGNATURES ON FOLLOWING PAGE**

Executed on _____, by

CONTRACTOR

_____
By: _____
Title: _____

[Attach Notary Acknowledgment Page]

CITY

_____
By: Peggy Ducey
Title: City Manager

ATTEST:

By:_____
Cristal Munoz
Acting City Clerk

APPROVED AS TO FORM:

By: _____
Keith F. Collins
City Attorney

CITY OF FORT BRAGG
416 Franklin Street
Fort Bragg, California 95437

# CONTRACT, PART 2

# GENERAL PROVISIONS

## 1. DEFINITIONS

The following terms as used in any agreement of which these General Provisions are a part are defined as follows:

1.1 **Architect or Engineer**: The person or persons so specified on the title sheet of the Technical Specifications and/or Project Plans.

1.2 **ASTM**: American Society for Testing and Materials, latest edition.

1.3 **Bid Package**: All of the documents listed as comprising the entire Bid Package as specified in the Instructions to Bidders and representing the full set of documents made available to bidders on the Project.

1.4 **Caltrans Standard Specifications**: Caltrans construction manual entitled, "State of California, Department of Transportation, Standard Specifications," latest edition.

1.5 **City**: CITY OF FORT BRAGG.

1.6 **Construction Manager**: The City's authorized representative for administration and overall management of the Project contract and Work. The Construction Manager is the official point of contact between the City, the Architect and/or Engineer, and the Contractor. The Construction Manager for this project shall be Director of Public Works John Smith/ Assistant Director of Engineering Chantell O'Neal.

1.7 **Contract**: The agreement between the City and Contractor concerning the Project, as evidenced by and comprised of the Contract Documents.

1.8 **Contract Documents**: All documents identified in Section 7 of Part 1 of the Contract.

1.9 **Contractor**: The successful bidder for the Project and party to the Project agreement with the City as specified in the Project agreement. [INCLUDE NAME OF CONTRACTOR]

1.10 **Days**: Unless otherwise specified in the Contract Documents, Days mean working days.

1.11 **Project**: The **Raw Water Line Replacement Project** as described in the Technical Specifications and Project Plans.

1.12 **Project Inspector**: The party or parties charged by the City with inspecting the Work for compliance with the requirements of the Contract Documents and applicable laws and regulations. The Project Inspector acts under the direction of the City and shall coordinate with the Construction Manager and Architect as directed by the City in accordance with the Contract Documents.

1.13 **Project Plans**: The primarily graphic detailed requirements concerning the Project contained in Volume 3 of the Bid Package and any addenda to the Project Plans signed by authorized City representatives and issued prior to bid opening, Equal Product Proposals accepted by the City and signed by authorized City representatives prior to bid opening, and change orders and other amendments to the Project Plans signed by authorized representatives of the City and the Contractor in accordance with the requirements of the Contract Documents.

1.14 **Subcontractor**: A person, firm or corporation that is obligated as a party to a contract with the Contractor to perform part of the Project work. For purposes of these General Provisions Subcontractors include, but are not limited to, those that are obligated as parties to a contract with the Contractor to specially fabricate and install a portion of the Project Work according to the Technical Specifications and/or Project Plans.

1.15 **Technical Specifications**: The detailed Project requirements contained in Volume 3 of the Bid Package and any addenda to the Technical Specifications signed by authorized City representatives and issued prior to bid opening, Equal Product Proposals accepted by the City and signed by authorized City representatives prior to bid opening, and change orders and other amendments to the Technical Specifications signed by authorized representatives of the City and the Contractor in accordance with the requirements of the Contract Documents.

1.16 **Time for Completion**: The Time for Completion is the time by which the Work must be completed, as defined in the Contract, Part 1, or as modified in a writing, executed by the City and Contractor.

1.17 **Work**: The furnishing of all equipment, tools, apparatus, facilities, material, labor and skill necessary to perform and complete in a good and workmanlike manner the Project as shown in the Technical Specifications and Project Plans in accordance with the Contract Documents and applicable law.

1.18 **Written Notice**: Will be deemed to have been duly served for purposes of these General Provisions and any agreement of which they are a part if delivered in person to the individual or to a member of the firm or to any office of the corporation for whom the notice is intended, or if sent by registered or certified mail to the last known business address known to the party giving notice. Unless otherwise specified in the Contract Documents, the last known address of the Contractor shall be that listed in the Contractor's completed Proposal Cover Page and Bid Schedule.

## 2. PLANS AND SPECIFICATIONS

2.1 Documents Furnished by City. The City will furnish to the Contractor, free of charge, one (1) set of reproducible Project Plans and five (5) sets of prints of the Project Plans and Technical Specifications for execution of the Work. Throughout the performance of the Work the Contractor must keep one copy of the Project Plans and Technical Specifications in good order and available for review by the Construction Manager, the Engineer, the Architect, and any other City contractors or representatives.

2.2 Ownership of Documents Furnished by City. All documents furnished by the City, including, but not limited to, the Technical Specifications, Project Plans, and any copies, are the property of the City. Documents furnished by the City may not to be used on any other work. All documents furnished by the City must be returned to City upon completion of the Work.

2.3 Technical Specifications and Project Plans.

2.3.1 The Technical Specifications and Project Plans are complementary and intended to mutually describe the Work necessary to complete the Project in accordance with the Contract Documents.

2.3.2 In general, the Project Plans indicate dimensions, position and kind of construction, and the Technical Specifications indicate qualities and methods. Any Work indicated on the Project Plans and not mentioned in the Technical Specifications or vice versa must be furnished as though fully set forth in both. Work that is not particularly detailed, marked or specified shall be the same as similar Work that is detailed, marked or specified. The Contractor must furnish items necessary for the operation of equipment depicted in the Project Plans or specified in the Technical Specifications that are suitable to allow such equipment to function properly at no extra charge.

2.3.3 Contractor shall perform reasonably implied parts of Work as "incidental work" although absent from Drawings and Specifications. Incidental work includes any work not shown on Drawings or described in Specifications that is necessary or normally or customarily required as a part of the Work shown on Drawings or described in Specifications. Incidental work includes any work necessary or required to make each installation satisfactory, legally operable, functional, and consistent with the intent of Drawings and Specifications or the requirements of Contract Documents. Contractor shall perform incidental work without extra cost to City. Incidental work shall be treated as if fully described in Specifications and shown on

Drawings, and the expense of incidental work shall be included in price Bid and Contract Sum.

2.3.4 Before undertaking each portion of the Work, Contractor shall carefully study and compare the Contract Documents and check and verify pertinent figures shown in the Contract Documents and all applicable field measurements. Contractor shall be responsible for any errors that might have been avoided by such comparison. The Contractor must notify the Construction Manager and the Architect in writing as soon as possible of any apparent errors or inconsistencies, including, but not limited to, typographical or notational errors in the Project Plans, Technical Specifications, and/or in work done by others affecting the Work. The Construction Manager will issue written instructions concerning any such apparent errors, inconsistencies, or clarifications with reasonable promptness and these shall be binding on the Contractor. If Contractor believes that a written response, clarification or interpretation justifies an adjustment in the Contract Sum or Contract Time, Contractor shall give City prompt written notice. If the parties are unable to agree to the amount or extent of the adjustment, if any, then Contractor shall perform the Work in conformance with City's response, clarification, or interpretation and may make a written claim for the adjustment as provided in Section 11. If the Contractor proceeds with Work impacted by apparent errors or inconsistencies without instructions from the Construction Manager, the Contractor shall do so at its sole risk and shall have all of the obligations and the City shall have all of the rights and remedies specified in Section 11 concerning any resulting damage or defect.

2.3.5 The General Provisions apply with equal force to all of the Work, including extra work authorized by the Construction Manager in accordance with the Contract Documents. The Contractor must submit any required shop diagrams and/or drawings by the times and in the quantities indicated in the Technical Specifications. Any such shop diagrams and/or drawings must show completely the Work to be done, expanding on the Project Plans concerning details not previously shown, field conditions and the condition of the Work. Architect or Engineer review of such shop diagrams and/or drawings will concern conformance with the requirements of the Contract Documents only. The Architect or Engineer assumes no responsibility for the correctness or accuracy of the dimensions or any other contents of any shop diagrams and/or drawings submitted by the Contractor. The Contractor must check all dimensions at the Work site. Shop diagrams and/or drawings must be clearly marked with the name of the Project and the name of the Contractor, subcontractor or supplier making the submittal, and must be stamped and signed by the Contractor and submitted under a signed transmittal letter from the Contractor

certifying that all dimensions have been checked at the Work site. These requirements are mandatory. The Architect or Engineer will not review shop diagrams and/or drawings that do not satisfy these requirements. The Contractor will be responsible for any and all discrepancies between dimensions of the actual Project site and/or Work and those shown on shop diagram and/or drawings submitted by the Contractor, and for any other errors contained in or resulting from such shop diagrams and/or drawings, including, but not limited to, errors in material and/or equipment quantities and any resulting errors, delays or additional cost in the performance of the Work. The Contractor will have all of the obligations and the City will have all of the rights and remedies that are specified in Section 11 concerning any discrepancies or errors in shop diagrams and/or drawings submitted by the Contractor, and concerning any resulting errors, delays or additional costs in the performance of the Work.

3. CONTROL OF WORK AND MATERIAL

3.1 Construction Manager's Status. The Construction Manager will administer the Project in accordance with the Contract Documents. After execution of the agreement and issuance of the Notice to Proceed, all correspondence and/or instructions concerning the Project between the Contractor and/or City shall be forwarded through the Construction Manager. Except as otherwise provided in the Contract Documents, the Construction Manager will not be responsible for and will not have control or charge of construction means, methods, techniques, or procedures or for safety precautions in connection with the Work. The Construction Manager, however, will have authority to reject materials and/or workmanship that do not conform to the requirements of the Contract Documents. The Construction Manager will also have the authority to require inspection or testing of the Work.

3.2 Architect or Engineer's Status. The Architect or Engineer will advise the Construction Manager concerning decisions on all claims of the Contractor and all other matters relating to the execution and progress of the Work or the interpretation of the Contract Documents. The Architect or Engineer will also advise the Construction Manger concerning Work that does not conform to the Contract Documents. Whenever, in the Architect's or Engineer's opinion, it is necessary or advisable in accordance with the Contract Documents, the Architect or Engineer may recommend to the Construction Manager inspection or testing of the Work, whether or not such Work is then fabricated, installed or completed.

3.3 Inspection and Testing of Work and Material.

3.3.1 The City, the Construction Manager, the Architect or Engineer and their representatives will have access to the Work at all times wherever it is

in preparation or progress. The Contractor must provide proper facilities for such access and for inspection.

3.3.2 The Contractor must inspect all materials as delivered and promptly return all defective materials without waiting for their rejection by the Construction Manager or Architect or Engineer.

3.3.3 If the Construction Manager, the Technical Specifications, or any laws, ordinances, or any public authority require any Work to be tested or approved, the Contractor must give the Construction Manager timely notice of the Contractor's readiness for inspection. Inspections will be promptly made, and where practicable, at the source of supply. Any work subject to such testing that is covered up without timely notice to the Construction Manager or without the approval or consent of the Construction Manager must, if required by the Construction Manager, be uncovered for examination at the Contractor's expense. The Contractor will have all of the obligations and the City will have all of the rights and remedies that are specified in Section 11 concerning any work subject to testing that is covered up without timely notice to the Construction Manager and that is not uncovered for examination at the Contractor's Expense if required by the Construction Manager.

3.3.4 Tests of materials or qualification tests required by the Contract Documents must be made in accordance with the Technical Specifications and the requirements of the California Building Standards Code as adopted by the City and other applicable law. Copies of all testing reports shall be distributed as required in the Technical Specifications.

3.3.5 The City or its representatives may order re-examination of questioned Work. If ordered to do so, the Contractor must uncover such Work. If such Work is found to be according to the Contract Documents, the City shall pay the cost of uncovering and restoring the Work, unless such Work was subject to testing and covered up without timely notice to or approval of the Construction Manager. If re-examined Work is found not in accordance with the Contract Documents, the Contractor must pay the cost of uncovering and restoring the Work. The Contractor will have all of the obligations and the City will have all of the rights and remedies that are specified in Section 11 concerning any re-examined Work not in accordance with the Contract Documents that the Contractor fails to uncover and restore at the Contractor's expense.

3.3.6 The Contractor must replace or correct without charge any material or workmanship found not to conform to the requirements of the Contract Documents, unless the City consents to accept such material or workmanship with an appropriate adjustment in the Contract Price. The Contractor must promptly segregate and remove non-conforming

material from the Work site. The Contractor will have all of the obligations and the City will have all of the rights and remedies that are specified in Section 11 concerning any failure by the Contractor to replace or correct without charge any material or workmanship that does not conform to the requirements of the Contract Documents and that the City has not consented to accept.

3.4 Samples Furnished by the Contractor. The Contractor must furnish all samples for approval as directed in sufficient time to permit the Architect or Engineer to examine, approve and select samples before they are required by the progress of the Work. Portions of the Work for which samples are required and for which the Architect or Engineer has selected samples must be in accordance with such approved samples. Samples must be sent prepaid to the office of the Construction Manager or to such place as the Construction Manager may direct.

3.5 Materials and Substitutions.

3.5.1 Materials used for the Work must be new and of the quality specified. When not particularly specified, materials must be the best of their class or kind. The Contractor must, if required, submit satisfactory evidence as to the kind and quality of materials.

3.5.2 If the Contractor submitted complete information to the Public Works Department for products proposed as equals in accordance with the Bid Package, and the City approved such products proposed as equals in writing, the Contractor may either furnish such products approved as equals, or furnish the products listed by manufacturer name, brand or model number in the Technical Specifications or Project Plans. The City retains the right, in its sole discretion, to accept or reject any other proposed substitution. To be considered, proposals concerning products proposed as equals must include sufficient information to permit the City to determine whether the products proposed as equals will satisfy the same performance requirements as products listed by manufacturer's name, brand or model number. Such performance requirements may include, but are not limited to, size, strength, function, appearance, ease of maintenance and repair, and useful life requirements. If the City does not accept a proposed substitution, the Contractor must furnish the product specified in the Technical Specifications or Project Plans for the Contract Price, regardless of whether the product is specified by manufacturer's name, brand or model number, or otherwise.

3.5.3. During the performance of the Work, all materials must be neatly stacked, properly protected from the weather and other adverse impacts, and placed so as to avoid interference with efficient progress of the Work, with other activities of the City, or with the use of existing

City facilities by the public. All materials must be delivered so as to ensure efficient and uninterrupted progress of the Work. Materials must be stored so as to cause no obstruction and so as to prevent overloading of any portion of the Work. The Contractor will be responsible for damage or loss of materials delivered to and/or stored at the Work site due to weather or other causes. The Contractor must promptly remove from the Work site all materials rejected by the City or its representatives as failing to conform to the requirements of the Contract Documents, whether such non-conforming materials have been incorporated in the Work or not. If the City or its representatives so direct, the Contractor must promptly replace and re-execute Work performed by the Contractor and order the replacement and re-execution of Work performed by subcontractors using non-conforming materials with materials that satisfy the requirements of the Contract Documents without expense to the City. The Contractor will bear the expense of making good all Work destroyed or damaged by such removal. The Contractor will have all of the obligations and the City will have all of the rights and remedies that are specified in Section 11 concerning any failure by the Contractor to replace or re-execute Work using non-conforming materials, and/or to make good all work destroyed or damaged by such removal and/or execution.

3.6 Maintenance and Examination of Records. Contractor shall maintain in a safe place at the Site one record copy of all Drawings, Specifications, Addenda, Contract Modifications, Change Orders, Work Directives, Force Account orders, and written interpretations and clarifications in good order and annotated to show all as-built changes made during construction. These Project Record Documents, together with all approved Samples and a counterpart of all approved Shop Drawings, shall be maintained and available to the City for reference. Upon completion of the Work, Contractor shall deliver to the City, the Project Record Documents, Samples and Shop Drawings and as-built drawings.

Throughout Contractor's performance of the Work of the Project, Contractor shall maintain construction records to include: shop drawings; product data/material data sheets; samples; submittals; purchases; materials; equipment; inspections; applicable handbooks; applicable codes and standards; maintenance and operating manuals and instructions; RFI Log; Submittal Log; other related documents and revisions which arise out of the Construction Contracts. Contractor shall maintain records of principal building layout lines, elevations for the bottom of footings, floor levels, and key site elevations (certified by a qualified surveyor or professional engineer). Contractor shall make all records available to the City. At the completion of the Project, Contractor shall deliver all such records to the City to have a complete set of record as-built drawings.

The City may examine and audit at no additional cost to the City all books, estimates, records, contracts, documents, bid documents, bid cost data, subcontract job cost reports and other Project related data of the Contractor, subcontractors engaged in performance of the Work, and suppliers providing supplies, equipment and other materials required for the Work, including computations and projections related to bidding, negotiating, pricing or performing the Work or contract modifications and other materials concerning the Work, including, but not limited to, Contractor daily logs, in order to evaluate the accuracy, completeness, and currency of cost, pricing, scheduling and any other project related data. The Contractor will make available all such Project related data at all reasonable times for examination, audit, or reproduction at the Contractor's business office at or near the Work site, and at any other location where such Project related data may be kept until three years after final payment under the Agreement. Pursuant to California Government Code Section 8546.7, if the amount of public funds to be expended is in excess of $10,000, this Contract shall be subject to the examination and audit of the State Auditor, at the request of the City, or as part of any audit of the City, for a period of three (3) years after final payment under the Agreement.

3.7 Advertising. No advertising signs of any kind may be displayed on the Work site, or on fences, offices or elsewhere adjacent to the Work site.

3.8 Project Schedule. Prior to the pre-construction meeting, the Contractor shall submit a baseline schedule showing each task of Work, including, as required by the City, equipment procurement and delivery (Contractor and City supplied), activities with Subcontractors and suppliers, major submittal reviews, commissioning of systems, use of major equipment on site, and necessary interface with the City and third parties. The baseline schedule shall include the sequence of each task, the number of days required to complete each task, and the critical path controlling the completion of the entire Work. The schedule shall allow for the completion of the entire Work within the Time for Completion.

3.8.1 City Review of Schedule. The City may review the Contractor's submitted schedule and may note any exceptions. The Contractor shall correct any exceptions noted by the City within five (5) working days of being notified of the exceptions.

3.8.2 Update of Schedule. After submission of a schedule to which the City has taken no exceptions, the Contractor shall submit an updated schedule on a biweekly basis until completion of the Work. The updated schedule shall show the progress of Work as of the date specified in the updated schedule. Contractor shall provide the City with an electronic copy of each updated schedule.

3.8.3 Float. The baseline schedule and all later submitted schedules shall show early and late completion dates for each task. The number of days between these dates shall be designated as "Float." The Float shall be designated to the Project and shall be available to both the City and the Contractor as needed to complete the Work in accordance with the Contract.

3.8.4 Failure to Submit Schedule. If the Contractor fails to submit the schedule within the time period specified in this section or submit a schedule to which the City has taken uncorrected exceptions, the City may withhold payments to the Contractor until such schedules are submitted and/or corrected in accordance with the Contract documents.

3.8.5 Responsibility for Schedule. The Contractor will be solely and exclusively responsible for creating the schedule and properly updating it. The City may note exceptions to any schedule submitted by the Contractor. However, the Contractor will be solely responsible for determining the proper method of addressing such exceptions, and the City's review of the schedule will not create scheduling obligations for the City.

3.8.6 Contractor's baseline schedule and progress schedules shall be in the form of a CPM (arrow) diagram. Contractor shall provide the City with native format electronic schedules and hard copies of the baseline schedule, schedule updates, and look ahead schedules. All electronic and hard copies of the schedule that Contractor provides to the City shall indicate the critical path of the Work (in red) and shall show a logical progression of the Work through completion within Contract Time.

3.8.7 The City has no obligation to accept an early completion date.

3.8.8 The City may request a recovery schedule should Contractor fall 21 or more Days behind any schedule milestone, which schedule shall show Contractor's plan and resources committed to retain Contract completion dates. The recovery schedule shall show the intended critical path. If the City requests, Contractor shall also: secure and demonstrate appropriate subcontractor and supplier consent to the recovery schedule; and submit a written plan and narrative explaining on trade flow and construction flow changes and man-hour loading assumptions for major Work activities and/or subcontractors.

3.8.9 If the Contractor requests an extension of the Time for Completion, it shall submit the request in a writing that provides information justifying the request and stating the extent of the adjustment requested for each specific change or alleged delay. The writing shall include this narrative and a schedule diagram depicting how the changed Work or other

impact affects other schedule activities. The schedule diagram shall show how Contractor proposes to incorporate the changed Work or other impact in the schedule and how it impacts the current schedule impact or critical path or otherwise. Any requests of an extension of the Time for Completion stemming from an alleged project delay shall be made within five (5) days of the commencement of the alleged delay, explain the reason for delay, include the anticipated length of the delay, and contain a narrative justifying the extension, in addition to the other information and schedules required by this section.

3.9 Construction Staking. All Work done under this Contract must be in conformance with the Project Plans and staked by the Engineer in the field. The Contractor must inform the Engineer, forty-eight (48) hours in advance, of the time and places at which he or she wishes to do work, in order that lines and grades may be furnished and necessary measurements for record and payment made, with the minimum of inconvenience to the Engineer and delay to the Contractor.

3.10 Materials Testing. Materials will be tested by the CITY OF FORT BRAGG or its authorized agent, following State of California Test Methods. Statistical testing may not be used. All individual samples must meet the specified test results. Each material used must meet the specified requirements.

The Contractor must request and coordinate all testing. All tests must occur in the presence of the Project Inspector. The City will, at its sole discretion, have the right to reject any and/or all test results that do not meet this requirement, and to order a retest in the presence of the Project Inspector. The costs for all retests so ordered will be the responsibility of the Contractor. The cost of all retests will be charged to the Contractor at the actual cost plus 30 percent, with a minimum charge of $150.00 per test to cover staff and administrative costs.

The City, at its sole expense, will provide all initial material and compaction tests. Sampling and testing will comply with Chapter 6 of the Caltrans Construction Manual, at a minimum. Where conditions vary, the City may perform additional testing. Cost for testing of materials offered in lieu of the specified materials will be the responsibility of the Contractor. Cost for R-value tests when required by the Standard Specifications will be the responsibility of the Contractor.

Testing will only be performed on normal City working days between the hours of 8:00 a.m. and 4:00 p.m. unless other arrangements are made in advance. Tests performed outside of these hours may be subject to increased charges.

The Contractor must request all tests in writing a minimum of two (2) working days in advance of the time desired. A minimum of one working day must be allowed for compilation and reporting of data and test results after tests have

been performed. No subsequent layer of material may be placed until a passing test is obtained and acknowledged by the City.

Concrete and asphalt may be supplied only from suppliers approved and certified by the State Department of Transportation. Proposed mix designs for all concrete and asphalt concrete to be placed within the CITY OF FORT BRAGG must be provided to and approved by the City, prior to placement.

The Contractor must coordinate with the City concerning any additional testing as required.

4. CHANGES IN WORK

4.1 City Directed Change Orders. The City may at any time during the progress of the Work direct any amendments to the Work or any of the Contract Documents, including, but not limited to the Technical Specifications, or Project Plans. Such amendments will in no way void the agreement, but may be applied to amend the Contract Price or Time for Completion, if such amendments affect the Contract Price, the Project schedule, or any other provision of the Contract Documents based on a fair and reasonable valuation of the amendment in accordance with this Section 4.

4.2 Writing Requirement. Change orders and other amendments to the Technical Specifications, the Project Plans, or other Contract Documents may be made only by a writing executed by authorized representatives of the City and the Contractor.

4.3 Contractor Proposed Change Orders. Unless the Construction Manager otherwise authorizes or the City and the Contractor otherwise agree, change order proposals submitted by the Contractor must be submitted to the Construction Manager no later than the time of the proposed change.

4.4 All Change Orders. All change order proposals must be submitted on completed Change Order forms provided by the City. All such change order proposals must itemize all cost impacts of the proposed change order and include a total price for that change order and the amended Contract Price that would become effective upon execution of the change order. All change order proposals must specify any change in the Project schedule, or in any project milestone including, but not limited to, the Time for Completion, under the change order, and must provide information justifying the requested change in the Time for Completion. It is understood that change orders that do not specify a change in any milestone, including, but not limited to, the Time for Completion, will be accomplished by the Time for Completion then in effect.

4.5 Change Order Pricing. Change order pricing will be governed by the following:

4.5.1 Unit prices specified in the Contract Documents will apply to cost impacts involving items for which the Contract Documents specify unit prices.

4.5.2 Cost impacts involving items for which no unit prices are specified will be calculated by adding the itemized actual direct cost that would be added or reduced under the change order and an allowance for indirect costs in accordance with this Section. Itemization for direct costs for required labor must include the classifications of labor required, the total hours required for each classification, the hourly rate for each classification and other labor related costs such as liability and workers compensation insurance, social security, retirement and unemployment insurance. All other cost impacts for which no unit prices are specified must be itemized as appropriate, including the cost of tools, vehicles, phones and other equipment, and the cost of all required materials or supplies. Indirect costs added under a change order may not exceed an allowance of fifteen (15) percent of the total of combined Contractor and subcontractor direct costs added under the change order. Such allowance covers Contractor overhead and profit under the change order and includes the cost of insurance in addition to that required pursuant to Section 8.8, bond premiums, superintendent labor, clerical labor, home office expenses, worksite office expenses, and utility costs under the change order. Such costs may not be itemized as direct costs under a change order. Indirect costs deducted under a change order will be calculated in exactly the same way as indirect costs added under a change order, except indirect costs deducted under a change order may not exceed an allowance of seven and a half (7.5) percent of the total of combined Contractor and subcontractor direct costs deducted under the change order.

4.6 Liability Under Unapproved Change Orders. The Contractor shall be solely responsible for any and all losses, costs, or liabilities of any kind incurred by the Contractor, any subcontractor engaged in the performance of the Work, any party supplying material or equipment for the Work or any third party that are incurred pursuant to Contractor-proposed change orders prior to issuance of an approved change order executed in accordance with this Section 4. The Contractor will have all of the obligations and the City will have all of the rights and remedies that are specified in Section 11 concerning any work or resulting losses, costs, or liabilities pursuant to a Contractor proposed change order before issuance of an approved change order executed in accordance with this Section 4.

4.7 Changes Subject to Contract Documents. Any changes in the Work and/or the Contract Documents pursuant to change orders and any other amendments issued in accordance with the Contract Documents, including

this Section 4, will in all respects be subject to all provisions of the Contract Documents, including, but not limited to, the Technical Specifications and the Project Plans, except as modified by such change orders or amendments.

4.8 Change Order Disputes.

4.8.1 Disputed City Directed Change Orders. If the Contractor disputes a City directed change order following a reasonable effort by the City and the Contractor to resolve the dispute including, at a minimum, a meeting between appropriate representatives of the Contractor and the City, the Contractor must commence performing the Work consistent with the disputed change order within five (5) working days of the last meeting between representatives of the Contractor and the City to resolve the dispute, or within the time specified in the disputed City directed change order, whichever is later. In performing Work consistent with a disputed City-directed change order pursuant to this provision the Contractor will have all of the Contractor's rights concerning claims pursuant to the Contract Documents and applicable law.

4.8.2 Disputed Contractor Proposed Change Orders. If the City disputes a Contractor proposed change order, the City and the Contractor will use reasonable efforts to resolve the dispute including, at a minimum, holding a meeting between appropriate representatives of the Contractor and the City. Regardless of and throughout any such efforts to resolve the dispute the Contractor must continue performing the Work irrespective of and unmodified by the disputed change order. In continuing to perform the Work, the Contractor will retain all of the Contractor's rights under contract or law pertaining to resolution of disputes and protests between contracting parties. Disputes between the City and the Contractor concerning any Contractor-proposed change order or other amendment do not excuse the Contractor's obligation to perform the Work in accordance with the Contract Documents excluding such Contractor-proposed change order or other amendment by the Time for Completion or waive any other Project milestone or other requirement of the Contract Documents.

4.9 Change in Time for Completion. The Time for Completion may only be changed through a Change Order, and all time limits stated in the Contract Documents are to mean that time is of the essence. Contractor shall not be entitled time extension for impacts that consume Float, but do not impact the critical path. Time extensions will not be granted unless substantiated by the Critical Path Method (CPM) Schedule, and then not until the CPM float becomes zero. If contractor fails to submit documentation requesting and justifying a change in Time for Completion consistent with the Contract Documents, the Contractor shall be deemed to have agreed that there is no

extension of time and that Contractor has irrevocably waived its rights to any change in the Time for Completion. Contractor initiated change orders shall address any impacts on the Time for Completion when first submitted to the City. Contractor shall submit any request for change in the Time for Completion and all supporting information and documentation required by the Contract Documents within seven (7) working days of receipt of a City-directed Change Order.

5. TRENCHING AND UTILITIES

5.1 Contractor to Locate Underground Facilities. During construction, Contractor shall comply with Government Code Sections 4216 to 4216.9, and in particular Section 4216.2 which provides, in part: "Except in an emergency, every person planning to conduct any excavation shall contact the appropriate regional notification center at least two working days, but no more than 14 calendar days, prior to commencing that excavation, if the excavation will be conducted in an area which is known, or reasonably should be known, to contain subsurface installations other than the underground facilities owned or operated by the excavator, and, if practical, the excavator shall delineate with white paint or other suitable markings the area to be excavated. The regional notification center shall provide an inquiry identification number to the person who contacts the center and shall notify any member, if known, who has a subsurface installation in the area of the proposed excavation."

Contractor shall contact Underground Service Alert (USA), and schedule the Work to allow ample time for the center to notify its members and, if necessary, for any member to field locate and mark its facilities. Contractor is charged with knowledge of all subsurface conditions reflected in USA records. Prior to commencing excavation or trenching work, Contractor shall provide the City with copies of all USA records secured by Contractor. Contractor shall advise the City of any conflict between information in the Contract Documents, Drawings, independent investigations, and that provided by USA records. Contractor's excavation shall be subject to and comply with the Contract Documents.

Contractor shall also investigate the existence of existing service laterals, appurtenances or other types of utilities, indicated by the presence of an underground transmission main or other visible facilities, such as buildings, manholes, new asphalt, meters and junction boxes, on or adjacent to the Site, even if not shown or indicated in existing conditions data, Contract Documents, or USA records, or discovered during Contractor's pre- or post-bid investigation. Contractor shall immediately secure all such available information and notify the City and the utility City, in writing, of its discovery.

5.2 Excavation More Than Four Feet Deep. In accordance with California Public Contract Code Section 7104, if the Work involves excavation more than four feet deep the Contractor must promptly notify the City in writing before

disturbing: any material that the Contractor believes may be 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; any subsurface or latent physical conditions at the Work site differing from those indicated; or any unknown physical conditions at the Work 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 Documents. The City will promptly investigate any such conditions for which notice is given. If the City finds that the conditions do materially differ, or involve hazardous waste, and would cause a decrease or increase in the cost or time of performance of the Work, the City will issue a change order pursuant to Section 4 of these General Provisions. If a dispute arises between the City and the Contractor concerning whether the conditions materially differ, or involve hazardous waste, or cause a decrease or increase in the cost or time of performance, the Contractor will not be excused from any completion date provided in the Contract Documents, but shall proceed with all Work to be performed. The Contractor will retain all rights under contract or law pertaining to resolution of disputes and protests between contracting parties.

5.3 Excavation of Five Feet or More. In accordance with California Labor Code Section 6705, contractors performing contracts exceeding $25,000 in cost and involving excavation five or more feet deep must submit for the City's acceptance, prior to excavation, a detailed plan showing the design of shoring, bracing, sloping, or other provisions to be made for worker protection from the hazard of caving ground during excavation. If the plan varies from the shoring system standards, it must be prepared by a registered civil or structural engineer.

5.4 Utility Relocation Costs.

5.4.1 In accordance with California Government Code Section 4215, the City assumes the responsibility for the timely removal, relocation or protection of existing main or trunkline utility facilities located on the Work site if such utilities are not identified by the City in the Technical Specifications and/or Project Plans. The City will compensate the Contractor for the costs of locating, repairing damage not due to the Contractor's failure to exercise reasonable care, and removing or relocating existing main or trunkline utility facilities located at the Work site and not identified with reasonable accuracy in the Technical Specifications and/or Project Plans. The City will also compensate the Contractor for the cost of equipment on the Project necessarily idled during such work. The Contractor will not be assessed liquidated damages for Work completion delays caused by the City's failure to provide for removal or relocation of such main or trunkline utility facilities.

5.4.2 Nothing in this provision or the Contract Documents will be deemed to require the City to indicate the presence of existing service laterals or appurtenances whenever the presence of such utilities on the Work site can be inferred from the presence of other visible facilities, such as buildings, meter and junction boxes, on or adjacent to the Work site; provided, however, that nothing in this provision or the Contract Documents shall relieve the City from identifying main or trunklines in the Technical Specifications and/or Project Plans.

5.4.3. Nothing in this provision or the Contract Documents will preclude the City from pursuing any appropriate remedy against the utility for delays which are the responsibility of the utility.

5.4.4 Nothing in this provision or the Contract Documents will be construed to relieve the utility from any obligation as required either by law or by contract to pay the cost of removal or relocation of existing utility facilities.

5.4.5 If the Contractor while performing the Work discovers utility facilities not identified by the City in the Technical Specifications and/or Project Plans, the Contractor must immediately notify the City and utility in writing.

5.4.6 Either the City or the utility, whichever owns existing main or trunkline utility facilities located on the Work site, shall have sole discretion to effect repairs or relocation work or to permit the Contractor to perform such repairs or relocation work at a reasonable price.

5.5 Concealed or Unknown Conditions.

5.5.1 If either of the following conditions is encountered at Site when digging trenches or other excavations that extend deeper than four feet below the surface, Contractor shall promptly give a written Notice of Differing Site Conditions to the City before conditions are disturbed, except in an emergency, and in no event later than seven (7) calendar days after first observance of:

5.5.1.1 Subsurface or Latent physical conditions which differ materially from those indicated in the Contract Documents; or

5.5.1.2 Unknown physical conditions of an unusual nature or which differ materially from those ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents.

5.5.2 In response to Contractor's Notice of Differing Site Conditions under this Section, the City will investigate the identified conditions, and if they differ materially and cause increase or decrease in Contractor's

cost of, or time required for, performance of any part of the Work, the City will negotiate the appropriate change order following the procedures set forth in the Contract Documents. If the City determines that physical conditions at the Project are not latent or are not materially different from those indicated in Contract Documents or that no change in terms of the Contract Documents is justified, the City will so notify Contractor in writing, stating reasons (with Contractor retaining all rights under the Contract Documents).

5.5.3 Contractor shall not be entitled to any adjustment in the Contract Sum or Contract Time regarding claimed latent or materially different Project conditions (whether above or below grade) if Contractor knew or should have known of the existence of such conditions at the time Contractor submitted its Bid, failed to give proper notice, or relied upon information, conclusions, opinions or deductions of the kind that the Contract Documents preclude reliance upon.

5.5.4 Regarding Underground Facilities, Contractor shall be allowed an increase in the Contract Sum or an extension of the Time for Completion, or both, to the extent that they are attributable to the existence of any Underground Facility that is owned and was built by the City only where the Underground Facility:

5.5.4.1 Was not shown or indicated in the Contract Documents or in the information supplied for bidding purposes or in information on file at USA; and;

5.5.4.2 Contractor did not know of it; and

5.5.4.3 Contractor could not reasonably have been expected to be aware of it or to have anticipated it from the information available. (For example, if surface conditions such as pavement repairs, valve covers, or other markings, indicate the presence of an Underground Facility, then an increase in the Contract Sum or an extension of the Time for Completion will not be due, even if the Underground Facility was not indicated in the Contract Documents, in the information supplied to Contractor for bidding purposes, in information on file at USA, or otherwise reasonably available to Contractor.)

5.6 Contractor shall bear the risk that Underground Facilities not owned or built by the City may differ in nature or locations shown in information made available by the City for bidding purposes, in information on file at USA, or otherwise reasonably available to Contractor. Underground Facilities are inherent in construction involving digging of trenches or other excavations on City's Project, and Contractor is to apply its skill and industry to verify the information available.

5.7 Contractor's compensation for claimed latent or materially different Project conditions shall be limited to the actual, reasonable, incremental increase in cost of that portion of the Work, resulting from the claimed Latent or materially different Site conditions. Such calculation shall take into account the estimated value of that portion of the Work and the actual value of that portion of the Work, using for guidance Contractor's or its subcontractor's bid amount and actual amounts incurred for that portion of the Work and the reasonable expectation (if any) of differing or difficult site conditions in the Work area based on the available records and locale of the Work. For example, if Contractor excavates in an area unexpected, then such costs would be recoverable entirely; while if Contractor extends an existing excavation, then such costs would be recoverable if the resulting excavation costs in that work area exceeded the reasonable expectations therefor.

6. PROJECT FACILITIES

6.1 Work Site Offices. Any Work site office facilities used by the Contractor and/or its privities must conform to all applicable codes, ordinances and regulations. The cost of such Work site office facilities shall be paid from and included in the Contract Price.

6.2 City Rights of Access and Ownership. The City and its authorized representatives will at all reasonable times while such office facilities are located at the Work site (including, at a minimum, all times during which the Work is performed), have access to any such Work site office facilities used by the Contractor and/or its privities. With respect to the right of access of the City and its authorized representatives, neither the Contractor nor its privities shall have a reasonable expectation of privacy pursuant to the Fourth Amendment to the United States Constitution or other applicable law concerning such Work site office facilities used by the Contractor and/or its privities. Without exception, any and all Project related materials located at such Work site facilities will be deemed at all times to be City property subject to inspection and copying by the City and its authorized representatives at all reasonable times while such facilities are located at the Work site (including, at a minimum, all times during which the Work is performed). Any interference by the Contractor or its privities with the City's rights of access and/or Ownership pursuant to this Section 6 will constitute a material breach of the Agreement subject to any and all remedies available pursuant to the Contract Documents and at law and equity.

7. PROSECUTION AND PROGRESS OF THE WORK

7.1 Liquidated Damages. Time is of the essence in the Agreement. The City and the Contractor agree that it will be difficult and/or impossible to determine the actual damage which the City will sustain in the event of the Contractor's failure to fully perform the Work or to fully perform all of the Contractor's obligations that have accrued pursuant to the Agreement by the Time for

Completion. Accordingly, the City and the Contractor agree in accordance with California Government Code Section 53069.85 that the Contractor will forfeit and pay to the City liquidated damages in the sum of $500 per day for each and every calendar day completion of the Work and/or performance of all of the Contractor's obligations that have accrued pursuant to the Agreement is delayed beyond the Time for Completion. The City and the Contractor further agree in accordance with California Government Code Section 53069.85 that the liquidated damages sum specified in this provision is not manifestly unreasonable under the circumstances existing at the time the Agreement was made, and that the City may deduct liquidated damages sums in accordance with this provision from any payments due or that may become due the Contractor under the Agreement.

7.2 No Damage for Avoidable Delays. All delays in the Work that might have been avoided by the exercise of care, prudence, foresight and diligence of the Contractor or any privities of the Contractor will be deemed avoidable delays. Delays in the Work that may be unavoidable but that do not necessarily affect other portions of the Work or prevent completion of all Work within the Time for Completion, including, but not limited to, reasonable delays in Engineer approval of shop drawings, placement of construction survey stakes, measurements and inspection, and such interruption as may occur in prosecution of the Work due to reasonable interference of other contractors of the City, will be deemed avoidable delays. The Contractor will not be awarded a change in the Project schedule, the Time for Completion, and/or additional compensation in excess of the contract price for avoidable delays.

7.3 Unavoidable Delays. All delays in the Work that result from causes beyond the control of the Contractor and that the Contractor could not have avoided through exercise of care, prudence, foresight, and diligence will be deemed unavoidable delays. Orders issued by the City changing the amount of Work to be done, the quantity of materials to be furnished, or the manner in which the work is to be prosecuted, and unforeseen delays in the prosecution of the Work due to causes beyond the Contractor's control, such as strikes, lockouts, labor disturbances, fires, epidemics, earthquakes, acts of God, neglect by utility owners or other contractors that are not privities of the Contractor will be deemed unavoidable delays to the extent they actually delay the Contractor's completion of the Work. The Contractor will be awarded a change in the Project schedule, the Time for Completion, and/or additional compensation in excess of the Contract Price for unavoidable delays to the extent such delays actually delay the Contractor's completion of the Work and/or result in the Contractor incurring additional costs in excess of the Contract Price.

7.4 No Damage for Contractor Caused Delay. Contractor shall not be entitled to additional compensation for extended field or home office overhead, field supervision, costs of capital, interest, escalation charges, acceleration costs or other impacts for any delays to the extent such delays are caused by the

failure of the Contractor or any subcontractor or other entity engaged in performance of the Work to perform the Work in accordance with the Contract Documents.

7.5 No Damage for Other Delay. Contractor will not be entitled to damages for delay to the Work caused by the following, which the City and Contractor agree will be deemed for purposes of California Public Contract Code Section 7102 either not caused by the City, and/or within the contemplation of the City and the Contractor, and/or reasonable under the circumstances:

7.5.1 Exercise of the City's right to sequence the Work in a manner that would avoid disruption to the City and other contractors based on: the failure of the Contractor or any subcontractor or other entity engaged in the performance of the Work to perform the Work in accordance with the Contract Documents, enforcement by the City or any other governmental agency of competent jurisdiction of any government act or regulation, or enforcement by the City of any provisions of the Agreement.

7.5.2 Requests for clarification or information concerning the Contract Documents or proposed change orders or modifications to the Contract Documents, including extensive and/or numerous such requests for clarification or information or proposed change orders or modifications, provided such clarifications or information or proposed change orders or modifications are processed by the City or its representatives in a reasonable time in accordance with the Contract Documents.

7.6 Delays Caused by the City and/or Its Privities. Delay caused by the City and/or other Contractors of the City will be deemed unavoidable delays. Either the City or the Contractor may propose a change in the Time for Completion for delays that are purported to be caused by the City and/or its privities and that are not reasonable under the circumstances involved and/or that are not within the contemplation of the City and the Contractor. Such proposed changes in the Time for Completion will constitute change order proposals subject to Section 4. In accordance with Section 4, the City and the Contractor may agree upon pricing for the cost impacts, if any, resulting from such delays. If such pricing is in anticipation of cost impacts that may, but have not yet occurred, the City will be obligated to pay the Contractor for such anticipated impacts in accordance with the Agreement and any applicable, approved change orders only to the extent the Contractor actually incurs the anticipated cost impacts. Notwithstanding anything to the contrary in Section 4, the City and the Contractor may agree to a daily rate or cap or lump sum that will apply to the cost impacts, if any, resulting from delay purportedly caused by the City and/or its privities subject to this provision. However, if such daily rate or cap or lump sum is in anticipation of cost impacts that have not yet occurred, the City will be obligated to pay such daily rate or cap or lump sum only to the extent the Contractor actually incurs such cost impacts.

7.7 Weather Delays. Extensions of the Time for Completion will not be allowed for normal, adverse weather conditions that are consistent with historical weather data of the National Oceanographic and Atmospheric Administration of the U.S. Department of Commerce for the record station that is nearest or most applicable to the Work site. The Contractor should understand that normal adverse weather conditions are to be expected and plan the Work accordingly, such as by incorporating into the Project schedule, normal adverse weather delays as reflected in historical data of the National Oceanic and Atmospheric Administration of the U.S. Department of Commerce for the weather station most applicable to the Work site. Extensions of the Time for Completion for delays due to adverse weather will be allowed only if the number of adverse weather days far exceeds the historical data. No extensions of the Time for Completion will be granted for normal, adverse weather conditions or for adverse weather conditions that merely result in delays that do not or would not, themselves, result in failure to complete the Work by the Time for Completion.

7.8 Delay Claims. Within five (5) days of the beginning of any delay, Contractor shall notify the City in writing, by submitting a notice of delay that shall describe the anticipated delays resulting from the delay event in question. Whenever the Contractor claims a delay for which the Time for Completion may be extended, the Contractor must request an extension of time within five (5) days of submitting its notice of delay. The request must be in writing in the form of a change order and describe in detail the cause for the delay, and, if possible, the foreseeable extent of the delay. The City will determine all claims and adjustments in the Time for Completion. No claim for an adjustment in the Time for Completion will be valid and such claim will be waived if not submitted in accordance with the requirements of this Section and Section 4.9. In cases of substantial compliance with the notice timing requirements of this Section (but not to exceed twenty-one (21) days from the beginning of the delay event), City may in its sole discretion recognize a claim for delay accompanied with the proper documentation and justification, provided the Contractor also shows good faith and a manifest lack of prejudice to the City from the late notice.

7.9 Contractor Coordination of the Work.

7.9.1 The City reserves the right to do other work in connection with or in the vicinity of the Project by contract or otherwise, and Contractor shall at all times conduct the Work so as to impose no hardship on the City, others engaged in the Work or other contractors working at the Work site. The Contractor will adjust, correct and coordinate the Work with the work of others so that no delays result in the Work or other work at or near the Work site.

7.9.2 If any part of the Work depends for proper execution or results upon the work of the City or any other contractor, the Contractor will, before

proceeding with such Work, promptly report to the City any apparent discrepancies or defects in such other Work. Failure of the Contractor to promptly report any apparent discrepancy or defect will be deemed an acceptance of the City's or other contractor's Work as fit and proper.

7.9.3 The Contractor will anticipate the relations of the various trades to the progress of the Work and will ensure that required anchorage or blocking is furnished and set at proper times. Anchorage and blocking necessary for each trade shall be part of the Work except where stated otherwise.

7.9.4 The Contractor will provide proper facilities at all times for access of the City, the Construction Manager, Architect or Engineer, and other authorized City representatives to conveniently examine and inspect the Work.

8. CONTRACTOR RESPONSIBILITIES

8.1. Eligibility. By executing the Agreement, the Contractor certifies that the Contractor is not ineligible to perform work on public works projects pursuant to California Labor Code Sections 1777.1 or 1777.7. In accordance with California Public Contract Code Section 6109(a), contractors who are ineligible to perform work on public works projects pursuant to California Labor Code Sections 1777.1 or 1777.7 may neither bid on, be awarded or perform the Work. To the fullest extent permitted by law, the Contractor shall hold harmless and indemnify the City from and against any and all damages, costs, and liability arising from or as a consequence of any violation of Public Contract Code Section 6109.

8.2 Non Discrimination. During the performance of this Contract, Contractor will not discriminate against any employee or subcontractor of the Contractor or applicant for employment because of race, religion, creed, color, national origin, gender, sexual orientation, or age. Contractor will take affirmative action to ensure that applicants are employed and that employees are treated during employment without regard to their race, religion, creed, color, national origin, gender, sexual orientation, or age.

Contractor acknowledges that Contractor, and all subcontractors hired by Contractor to perform services under this Agreement, are aware of and understand the Immigration Reform and Control Act ("IRCA"). Contractor is and shall remain in compliance with the IRCA and shall ensure that any subcontractors hired by Contractor to perform services under this Agreement are in compliance with the IRCA. In addition, Contractor agrees to indemnify, defend and hold harmless City, its agents, officers and employees, from any liability, damages or causes of action arising out of or relating to any claims that Contractor's employees, or employees of any subcontractor hired by Contractor, are not authorized to work in the United States for Contractor or its

subcontractor and/or any other claims based upon alleged IRCA violations committed by Contractor or Contractor's subcontractors.

8.3 Supervision of the Work. The Contractor will be solely responsible for the performance of the Work, including portions of the Work to be performed by subcontractors. The Contractor is charged with ensuring that all orders or instructions from the City, Construction Manager or Architect are disseminated to and followed by all subcontractors engaged in performance of the Work. The Contractor will supervise the Work using the Contractor's best skill and attention. At any time during the progress of the Work, the City, the Construction Manager, or the Architect may require the Contractor and/or subcontractors engaged in performance of the Work to attend a project meeting and the Contractor will attend, and ensure the attendance of any subcontractors whose attendance is required by the City and/or advisable in light of the matters to be addressed at the meeting.

8.4 Contractor's Superintendent. The Contractor will keep on the Work, throughout its progress, a competent superintendent and any necessary assistants, all satisfactory to the City. The superintendent may not be changed without the consent of the City. The superintendent will represent the Contractor and all directions given by the City to the superintendent will bind the Contractor in accordance with the Agreement. Superintendent time included in Contractor's completed bid schedule and/or in approved change orders, if any, must be included in Contractor's approved overhead rate and may not be charged as a direct cost.

8.5 Competent Employees. The Contractor must at all times enforce strict discipline and good order among the Contractor's employees and may not employ on the Project any unfit person or anyone not skilled in the Work assigned, or anyone incompetent or unfit for the duties of that person. When the City determines that a Contractor employee does not satisfy the requirements of this provision, upon notice from the City, the Contractor must ensure that employee performs no further Work and is no longer present at the Work site. Any such Contractor employee may not again be employed on the Project without City approval.

8.6 Items Necessary for Proper Completion of the Work. Except as otherwise noted in the Contract Documents, the Contractor will provide and pay for all labor, materials, equipment, permits, fees, licenses, facilities and services necessary for the proper execution and timely completion of the Work in accordance with the Contract Documents.

8.7 Construction Reports. The Contractor must submit daily construction reports detailing the daily progress of the Work to the Construction Manager on a weekly basis.

8.8 Subcontracting. The Contractor must perform with his or her own organization, a value of work amounting to not less than fifty percent (50%) of

the Contract amount, except that the bid amount for subcontracted "Specialty Items" so designated in the Special Provisions may be eliminated from the Contract amount and not considered as sub-contracted for the purposes of calculating the value of work to be performed by the Contractor. For the purposes of determining the value of work to be performed by the Contractor pursuant to this provision, materials, equipment, incidentals, etc., shall be considered to have been purchased by the Contractor or Subcontractor that is to install them. Where a portion of an item is subcontracted, the value of work subcontracted will be based on the estimated cost of such portion of the subcontracted item, as determined from information submitted by the Contractor, subject to approval by the Engineer.

8.8.1 By executing the Contract, the Contractor certifies that no subcontractor included on the list of proposed subcontractors submitted with the Contractor's bid is ineligible to perform work on public works projects pursuant to California Labor Code Sections 1777.1 or 1777.7. In accordance with California Public Contract Code Section 6109(a), subcontractors who are ineligible to perform work on public works projects pursuant to California Labor Code Sections 1777.1 or 1777.7 may neither bid on, be awarded or perform as a subcontractor on the Work. In accordance with California Public Contract Code Section 6109(b), any contract on a public works project entered into between a contractor and a debarred subcontractor is void as a matter of law. The Contractor will ensure that no debarred subcontractor receives any public money for performing the Work, and any public money that may have been paid to a debarred subcontractor for the Work is returned to the City. The Contractor will be responsible for payment of wages to workers of a debarred subcontractor who has been allowed to perform the Work.

8.8.2 The Agreement and the performance of the Work are subject to the requirements of the Subletting and Subcontracting Fair Practices Act codified at California Public Contract Code Section 4100 et seq. If the Contractor fails to specify a subcontractor or specifies more than one subcontractor for the same portion of the Work in excess of one-half of one percent of the Contractor's total bid, the Contractor agrees that the Contractor is fully qualified to perform that portion of the Work with the Contractor's own forces, and that the Contractor will perform that portion of the Work with the Contractor's own forces. If after award of the Agreement the Contractor subcontracts, except as provided for in California Public Contract Code Sections 4107 or 4109, any such portion of the Work, the Contractor will be subject to the penalties set forth in California Public Contract Code Sections 4110 and 4111, including cancellation of the Agreement, assessment of a penalty of up to 10 percent of the amount of the subcontract, and disciplinary action by the Contractors State License Board.

8.8.3. No contractual relationship exists between the City and any subcontractor engaged in performance of the Work.

8.8.4 Incorporation of Contract Documents. The Contractor must incorporate the Contract Documents in each contract with a subcontractor engaged in the performance of the Work including the indemnity and insurance requirements to the extent they apply to the scope of the subcontractor's work. The Contractor shall be solely responsible for any delay or additional costs incurred as a result of its failure to provide adequate or accurate project information to a subcontractor that results in improper submittals and/or work, or time or other impacts is the sole responsibility of the Contractor. The Contractor will have all of the obligations and the City will have all of the remedies that are specified in Section 11.

8.8.5 Subcontractor agrees to be bound to General Contractor and City in the same manner and to the same extent as General Contractor is bound to City under the Contract Documents. Subcontractor further agrees to include the same requirements and provisions of this agreement, including the indemnity and insurance requirements, with any Sub-subcontractor to the extent they apply to the scope of the Sub-subcontractor's work. A copy of the City's Contract Document Indemnity and Insurance provisions will be furnished to the Subcontractor upon request. The Contractor shall require all subcontractors to provide a valid certificate of insurance with the required endorsements included in the agreement prior to commencement of any work and General Contractor will provide proof of compliance to the City.

8.8.6 Coordination of Subcontract Work: The Contractor is responsible for scheduling the Work of subcontractors so as to avoid delay or injury to either Work or materials.

8.9 Insurance.

8.9.1 All required insurance shall be provided in the form of "occurrence"-type policies underwritten by admitted insurers in the State of California with a rating of A or better from the current year Best Rating Guide. All policies must be issued at the expense of the Contractor and must be maintained at the Contractor's expense throughout the performance of the Work.

8.9.2 The Contractor and any subcontractors engaged in performance of the Work must secure payment of workers compensation in accordance with California Labor Code Section 3700 and other applicable law. The Contractor must verify that all Subcontractors comply with this requirement.

8.9.3 Within ten (10) working days following notice of award the Contractor must submit to the City along with executed copies of all other documents specified in the Contract Check List certificates of insurance and endorsements evidencing that the Contractor has in effect and will maintain throughout the performance of the Work the following kinds and amounts of insurance:

8.9.3.1 Worker's Compensation Insurance. Workers Compensation and Employers Liability insurance as required by any applicable law, regulation or statute, including the provisions of Division IV of the Labor Code of the State of California, and any act or acts amending it. Worker's Compensation insurance must be for Statutory Limits and must cover the full liability of the Contractor. The Contractor's Employer's Liability Insurance must be in an amount no less than $1,000,000.00 per occurrence. The insurance must be endorsed to waive all rights of subrogation against City and its officials, officers, employees, and volunteers for loss arising from or related to the work performed under this agreement.

8.9.3.2 Commercial General Liability and Automobile Liability Insurance. Coverage for liability because of Bodily Injury and Property Damage including, but not limited to the following coverage:

- Completed Operations and Products Liability
- Bodily Injury
- Personal Injury
- Broad Form Property Damage Liability
- Contractual Liability insuring the obligations assumed by the Contractor under the Contract Documents
- Automobile Liability, including owned, non-owned and hired automobiles
- Coverage for the XCU hazards of Explosion, Collapse and Underground Hazards

8.9.3.3 Commercial General Liability Self-Insured Retentions:

- All self-insured retentions (SIR) must be disclosed to City for approval and shall not reduce the limits of liability.
- Policies containing any self-insured retention (SIR) provision shall provide or be endorsed to provide that the SIR may be satisfied by either the named insured or the City.

- The City reserves the right to obtain a full certified copy of any insurance policy and endorsements. Failure to exercise this right shall not constitute a waiver of right to exercise later.

8.9.3.4 Commercial Umbrella Policy. The limits of insurance required in these Contract Documents 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 (if agreed to in a written contract or agreement) before the City's own Insurance or self-insurance shall be called upon to protect it as a named insured.

8.9.3.5 Professional Liability with limits no less than $2,000,000 per occurrence or claim, and $2,000,000 policy aggregate. The retroactive date must be shown, and this date must be before the execution date of the contract or the beginning of contract work. Insurance must be maintained and evidence of insurance must be provided for at least five (5) years after completion of contract work. If coverage is canceled or non-renewed, and not replaced with another claims-made policy form with a retroactive date prior to the contract effective, or start of work date, the Contractor must purchase extended reporting period coverage for a minimum of five (5) years after completion of contract work. A copy of the claims reporting requirements must be submitted to the City for review.

8.9.3.6 Contractors' Pollution Legal Liability and/or Errors and Omissions (if project involves environmental hazards) with limits no less than $1,000,000 per occurrence or claim, and $2,000,000 policy aggregate. If the services involve lead-based paint or asbestos identification/remediation, the Contractors Pollution Liability policy shall not contain lead-based paint or asbestos exclusions. If the services involve mold identification/remediation, the Contractors Pollution Liability policy shall not contain a mold exclusion, and the definition of Pollution shall include microbial matter, including mold.

8.9.4 [Section Removed].

8.9.5 The limits of the insurance required above will be at least:

Comprehensive General Liability

| | | |
|---|---|---|
| Bodily Injury Liability | $3,000,000 | each occurrence |
| | $6,000,000 | each aggregate |
| Property Damage Liability | $3,000,000 | each occurrence |
| | $6,000,000 | each aggregate |

Comprehensive Automobile Liability

| | | |
|---|---|---|
| Bodily Injury Liability | $2,000,000 | each person |
| | $2,000,000 | each occurrence |
| Property Damage Liability | $2,000,000 | each occurrence |

8.9.6 Other Insurance Provisions:

8.9.6.1 Additional Insured. The Entity, its officers, officials, employees, and volunteers are to be covered as additional insureds on the CGL policy with respect to liability arising out of work or operations performed by or on behalf of the Contractor including materials, parts, or equipment furnished in connection with such work or operations and automobiles owned, leased, hired, or borrowed by or on behalf of the Contractor. General liability coverage can be provided in the form of an endorsement to the Contractor's insurance at least as broad as one of the following ISO ongoing operations Forms: CG 20 10 or CG 20 26 or CG 20 33 (not allowed from subcontractors), or CG 20 38; and one of the following ISO completed operations Forms: CG 20 37, 2039 (not allowed from subcontractors), or CG 20 40.

8.9.6.2 Primary Insurance. For any claims related to this project, the Contractor's insurance coverage shall be primary insurance coverage at least as broad as ISO CG 20 01 04 13 as respects the Entity, its officers, officials, employees, and volunteers. Any insurance or self-insurance maintained by the Entity, its officers, officials, employees, or volunteers shall be excess of the Contractor's insurance and shall not contribute with it.

8.9.6.3 Notice of Cancellation. Contractor shall provide immediate written notice if (1) any of the required insurance policies is terminated; (2) the limits of any of the required polices are reduced; (3) or the deductible or self-insured retention is increased. In the event of any cancellation or reduction in coverage or limits of any insurance, Contractor shall forthwith obtain and submit proof of substitute insurance.

8.9.6.4 Waiver of Subrogation. Contractor hereby agrees to waive rights of subrogation which any insurer of Contractor may

acquire from Contractor by virtue of the payment of any loss. Contractor agrees to obtain any endorsement that may be necessary to affect this waiver of subrogation, but this provision applies regardless of whether or not the Entity has received a waiver of subrogation endorsement from the insurer. However, the Workers' Compensation policy shall be endorsed with a waiver of subrogation in favor of the Entity for all work performed by the Contractor, its employees, agents and subcontractors.

8.9.7 It shall be a requirement under these Contract Documents that any available insurance proceeds broader than or in excess of the specified minimum insurance coverage requirements and/or limits shall be available to the Additional Insured. Furthermore, the requirements for coverage and limits shall be (1) the minimum coverage and limits specified in this Agreement; or (2) the broader coverage and maximum limits of coverage of any insurance policy or proceeds available to the named insured; whichever is greater.

8.9.8 Contractor shall maintain insurance as required by these Contract Documents to the fullest amount allowed by law and shall maintain insurance for a minimum of five years following the completion of this project. In the event contractor fails to obtain or maintain completed operations coverage as required by this Agreement, the City at its sole discretion may purchase the coverage required and the cost will be paid by Contractor.

8.9.9 Subcontractors. Contractor shall require and verify that all subcontractors maintain insurance meeting all the requirements stated herein, and Contractor shall ensure that Entity is an additional insured on insurance required from subcontractors. For CGL coverage subcontractors shall provide coverage with a form at least as broad as CG 20 38 04 13.

8.9.10 Special Risks or Circumstances. Entity reserves the right to modify these requirements, including limits, based on the nature of the risk, prior experience, insurer, coverage, or other circumstances.

8.10 Indemnities.

8.10.1 The Contractor will take all responsibility for the Work, and will bear all losses and damages directly or indirectly resulting to the Contractor, any subcontractors engaged in performance of the Work, the City, its officials, officers, employees, agents, volunteers and consultants, and to third parties on account of the performance or character of the Work, unforeseen difficulties, accidents, or occurrences of other causes arising out of the Contractor's execution of the Work or of any subcontractor engaged in

performance of the Work. To the fullest extent permitted by law the Contractor will indemnify, defend and hold harmless the City, its officials, officers, employees, agents, volunteers and consultants from and against any or all loss, liability, expense, claims, costs (including costs of defense and consultants' costs), suits, and damages of every kind, nature and description (including, but not limited to, penalties resulting from exposure to hazards in violation of the California Labor Code and bodily injury or death) directly or indirectly arising from the Contractor's performance of the Work, failure to perform the Work, or condition of the Work that is caused in whole or in part by any act or omission of Contractor, its subcontractors, or anyone directly or indirectly employed by any of them, or anyone for whose acts any of them may be liable, resulting from any cause whatsoever, save for liability for any loss, damage, or expense arising out of the City's sole negligence or willful misconduct.

8.10.2 The Contractor will indemnify, defend and hold harmless the City, the City's officials, officers, employees, volunteers, agents and the Construction Manager and Architect for all liability on account of any patent rights, copyrights, trade names or other intellectual property rights that may apply to the Contractor's performance of the Work. The Contractor will pay all royalties or other charges as a result of intellectual property rights that may apply to methods, types of construction, processes, materials, or equipment used in the performance of the Work, and will furnish written assurance satisfactory to the City that any such charges have been paid.

8.10.3 The Contractor assumes all liability for any accident or accidents resulting to any person or property as a result of inadequate protective devices for the prevention of accidents in connection with the performance of the Work. The Contractor will indemnify, defend, and hold harmless the City and its officials, officers, employees, agents, volunteers and consultants from such liability.

8.10.4 Approval of the Contractor's certificates of insurance and/or endorsements does not relieve the Contractor of liability under this Section 8.9. The Contractor will defend, with legal counsel reasonably acceptable to the City, any action or actions filed in connection with any Claims and will pay all related costs and expenses, including attorney's fees incurred. The Contractor will promptly pay any judgment rendered against the City, its officials, officers, employees, agents, volunteers or consultants for any Claims. In the event the City, its officials, officers, employees, agents, volunteers or consultants is made a party to any action or proceeding filed or prosecuted against Contractor for any Claims,

Contractor agrees to pay the City, its officials, officers, employees, agents, volunteers and consultants any and all costs and expenses incurred in such action or proceeding, including but not limited to, reasonable attorneys' fees.

8.10.5 Subject to the requirements of Section 5 of the General Provisions, the Contractor will indemnify, hold harmless and defend, with legal counsel reasonably acceptable to the City, the City and its officials, officers, employees, agents and volunteers from and against any and all claims related to damage to surface or underground facilities caused by the Contractor or any of the Contractor's privities or agents.

8.10.6 The Contractor will indemnify, hold harmless and defend, with legal counsel reasonably acceptable to the City, the City and its officials, officers, employees, agents and volunteers from and against any and all claims, including any fines or other penalties, related to failure of the Contractor and/or privities or agents of the Contractor to comply with the requirements of the General Permit, or to implement the Stormwater Pollution Prevention Plan ("SWPPP") in accordance with provision 12 of the Special Provisions. The City may withhold from amounts due or that may become due to the Contractor under this Contract amounts that equal or are estimated to equal the amount of claims, including fines, resulting from failure of the Contractor and/or privities or agents of the Contractor to comply with the requirements of the General Permit, or to implement the SWPPP in accordance with provision 12 of the Special Provisions.

8.10.7 In accordance with California Civil Code Section 2782(a), nothing in the Contract will be construed to indemnify the City for its sole negligence, willful misconduct, or for defects in design furnished by the City. By execution of the Contract Documents the Contractor acknowledges and agrees that the Contractor has read and understands the insurance and indemnity requirements of the Contract Documents, which are material elements of consideration.

8.10.8 The defense and indemnification obligations of these Contract Documents are undertaken in addition to, and shall not in any way be limited by, the insurance obligations contained in these Contract Documents.

8.10.9 Contractor/Subcontractor's responsibility for such defense and indemnity obligations shall survive the termination or completion of these Contract Documents for the full period of time allowed by law.

8.10.10 If Contractor fails to perform any of the foregoing defense and indemnity obligations, the City may defend itself and back-charge

the Contractor for the City's costs and fees (including attorneys' and consultants' fees), and damages and withhold such sums from progress payments or other Contract monies which may become due.

8.11 Licenses/Permits. The Contractor must, without additional expense to the City, obtain all licenses, permits and other approvals required for the performance of the Work.

8.12 California Labor Code Requirements.

8.12.1 In accordance with California Labor Code Section 1771.1, this Project is subject to compliance monitoring and enforcement by the Department of Industrial Relations (DIR). The Contractor and subcontractors engaged in performance of the Work must comply with Labor Code Section 1771.1.

8.12.2 In accordance with California Labor Code Section 1810, eight (8) hours of labor in performance of the Work shall constitute a legal day's work under the Agreement.

8.12.3 In accordance with California Labor Code Section 1811, the time of service of any worker employed in performance of the Work is limited to eight hours during any one calendar day, and forty hours during any one calendar week, except in accordance with California Labor Code Section 1815, which provides that work in excess of eight hours during any one calendar day and forty hours during any one calendar week is permitted upon compensation for all hours worked in excess of eight hours during any one calendar day and forty hours during any one calendar week at not less than one-and-one-half times the basic rate of pay.

8.12.4 The Contractor and its subcontractors will forfeit as a penalty to the City $25 for each worker employed in the performance of the Work for each calendar day during which the worker is required or permitted to work more than eight (8) hours in any one calendar day, or more than forty (40) hours in any one calendar week, in violation of the provisions of California Labor Code Section 1810 et seq.

8.12.5 In accordance with California Labor Code Section 1773.2, the City has determined the general prevailing wages in the locality in which the Work is to be performed for each craft or type of work needed to be as published by the State of California Department of Industrial Relations, Division of Labor Statistics and Research, a copy of which is on file in the Public Works Department and shall be made available on request. The Contractor and subcontractors engaged in the

performance of the Work shall pay no less than these rates to all persons engaged in performance of the Work.

8.12.6 In accordance with California Labor Code Section 1775, the Contractor and any subcontractors engaged in performance of the Work must comply with Labor Code Section 1775 which establishes a penalty of up to $200 per day for each worker engaged in the performance of the Work that the Contractor or any subcontractor pays less than the specified prevailing wage. The amount of such penalty shall be determined by the Labor Commissioner. The Contractor or subcontractor shall pay the difference between the 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. If a subcontractor worker engaged in performance of the Work is not paid the general prevailing per diem wages by the subcontractor, the Contractor is not liable for any penalties therefor unless the Contractor had knowledge of that failure or unless the Contractor fails to comply with all of the following requirements:

8.12.6.1 The contract executed between the Contractor and the subcontractor for the performance of part of the Work must include a copy of the provisions of California Labor Code Sections 1771, 1775, 1776, 1777.5, 1813, and 1815.

8.12.6.2 The Contractor must monitor payment of the specified general prevailing rate of per diem wages by the subcontractor by periodic review of the subcontractor's certified payroll records.

8.12.6.3 Upon becoming aware of a subcontractor's failure to pay the specified prevailing rate of wages, the Contractor must diligently take corrective action to halt or rectify the failure, including, but not limited to, retaining sufficient funds due the subcontractor for performance of the Work.

8.12.6.4 Prior to making final payment to the subcontractor, the Contractor must obtain an affidavit signed under penalty of perjury from the subcontractor that the subcontractor has paid the specified general prevailing rate of per diem wages to employees engaged in the performance of the Work and any amounts due pursuant to California Labor Code Section 1813.

8.12.7 In accordance with California Labor Code Section 1776, the Contractor and each subcontractor engaged in performance of the Work, must 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 diem wages paid to each journeyman, apprentice, worker, or other employee employed in performance of the Work. Each payroll record must contain or be verified by a written declaration that it is made under penalty of perjury, stating that the information contained in the payroll record is true and correct and that the employer has complied with the requirements of Sections 1771, 1811, and 1815 for any work performed by the employer's employees on the public works project. The payroll records required pursuant to California Labor Code Section 1776 must be certified and must be available for inspection by the City and its authorized representatives, the Division of Labor Standards Enforcement, and the Division of Apprenticeship Standards of the Department of Industrial Relations and must otherwise be available for inspection in accordance with California Labor Code Section 1776.

8.12.8 In accordance with California Labor Code Section 1777.5, the Contractor, on behalf of the Contractor and any subcontractors engaged in performance of the Work, will be responsible for ensuring compliance with California Labor Code Section 1777.5 governing employment and payment of apprentices on public works contracts.

8.12.9 In case it becomes necessary for the Contractor or any subcontractor engaged in performance of the Work to employ on the Work any person in a trade or occupation (except executive, supervisory, administrative, clerical, or other non-manual workers as such) for which no minimum wage rate has been determined by the Director of the Department of Industrial Relations, the Contractor must pay the minimum rate of wages specified therein for the classification which most nearly corresponds to Work to be performed by that person. The minimum rate thus furnished will be applicable as a minimum for such trade or occupation from the time of the initial employment of the person affected and during the continuance of such employment.

8.13 Laws and Ordinances. The Contractor and all subcontractors engaged in the performance of the Work must conform to the following specific rules and regulations as well as all other laws, ordinances, rules and regulations that apply to the Work. Nothing in the Technical Specifications or Project Plans is to be construed to permit Work not conforming to these codes:

- National Electrical Safety Code, U. S. Department of Commerce
- National Board of Fire Underwriters' Regulations
- California Building Standards Code as adopted by the City
- California Plumbing Code as amended by applicable local ordinances for plumbing, sewage disposal and health requirements.

- California Mechanical Code as amended by applicable local ordinances for all construction work.
- California Administrative Code Titles 15, 19 and 24 (with California amendments).
- Manual of Accident Prevention in Construction, latest edition, published by A.G.C. of America
- Industrial Accident Commission's Safety Orders, State of California
- Regulations of the State Fire Marshall (Title 19, California Code of Regulation) and Applicable Local Fire Safety Codes
- Labor Code of the State of California - Division 2, Part 7, Public Works and Public Agencies
- Federal, state, and local air pollution control laws and regulations applicable to the Contractor and/or Work

8.14 Guaranty. The Contractor guarantees all of the Work for one year from the date the City accepts the Work. Upon receiving written notice of a need for repairs which are directly attributable to defective materials or workmanship the Contractor must make good any defects arising or discovered in any part of the Work by diligently commencing the necessary repairs within seven (7) days from the date of notice from the City. If the Contractor fails to make good any defects in the Work in accordance with this provision, in addition to any other available remedy under the contract or at law or equity, the City may make good or have made good such defects in the Work and deduct the cost from amounts that may be due or become due the Contractor, and/or call on the Contractor's maintenance bond for the cost of making good such defects and for the City's reasonable legal costs, if any, of recovering against the bond. The Contractor shall remain responsible for repairing any Work found to be defective regardless of when such defect is discovered by the City.

Where defective or rejected Work and any damage caused thereby has been corrected, removed, or replaced by the Contractor pursuant to this section, the guarantee period with respect to that Work shall be extended for an additional period of one year after such correction, removal, or replacement has been satisfactorily completed.

8.15 Safety.

8.15.1 In accordance with generally accepted construction practices and applicable law, the Contractor will be solely and completely responsible for conditions of the Work 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. For purposes of California Labor Code Section 6400 and related provisions of law, the Contractor and the Contractor's privities and any other entities engaged in the performance of the Work will be "employers" responsible for furnishing employment and a

place of employment that is safe and healthful for the employees, if any, of such entities engaged in the performance of the Work. Neither the City nor its officials, officers, employees, agents, volunteers or consultants will be “employers” pursuant to California Labor Code Section 6400 and related provisions of law with respect to the Contractor, the Contractor’s privities or other entities engaged in the performance of the Work. The Contractor agrees that neither the City, the Construction Manager, the Architect, nor the Engineer will be responsible for having hazards corrected and/or removed at the Work site. The Contractor agrees that the City will not be responsible for taking steps to protect the Contractor’s employees from such hazards, or for instructing the Contractor’s employees to recognize such hazards or to avoid the associated dangers. The Contractor agrees with respect to the Work and the Work site, the Contractor will be responsible for not creating hazards and for having hazards corrected and/or removed, for taking appropriate, feasible steps to protect the Contractor’s employees from such hazards and that the Contractor has instructed and/or will instruct its employees to recognize such hazards and how to avoid the associated dangers.

8.15.2 Review and inspection by the City, the Construction Manager, the Architect or Engineer, and/or other representatives of the City of the Contractor's performance of the Work will not constitute review of the adequacy of the Contractor's safety measures in, on, or near the Work site. Such reviews and inspections do not relieve the Contractor of any of the Contractor’s obligations under the Contract Documents and applicable law to ensure that the Work site is maintained and the Work is performed in a safe manner.

8.15.3 The Contractor will be solely responsible for the implementation and maintenance of safety programs to ensure that the Work site is maintained and the Work is performed in a safe manner in accordance with the Contract Documents and applicable law.

8.15.4 Within ten (10) working days following notice of award the Contractor must submit to the City a copy of the Contractor’s Safety Plan.

8.15.5 The Contractor must furnish and place proper guards and systems for the prevention of accidents, including, but not limited to, those systems required pursuant to Title 8, Section 1670 et seq. of the California Code of Regulations concerning safety belts and nets. The Contractor must provide and maintain any other necessary systems or devices required to secure safety of life or property at the Work site in accordance with accepted standards of the industry and applicable law. The Contractor must maintain during all night hours sufficient lights to prevent accident or damage to life or property.

8.16 Assignment of Unfair Business Practice Claims. In accordance with California Public Contract Code Section 7103.5, the Contractor and any subcontractors offer and agree to assign to the City all rights, title, and interest in and to all causes of action the Contractor or any subcontractors may have under Section 4 of the Clayton Act (15 U.S.C. § 15) or under the Cartwright Act (Chapter 2 (commencing with § 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. This assignment shall be made and become effective at the time the City tenders final payment to the Contractor, without further acknowledgement by the parties.

8.17 Contractor shall be responsible for properly notifying residents and property owners impacted by this project in accordance with City standards. Specific notification procedures vary with the type of work and shall be coordinated with the City before work begins. The City will furnish a list of impacted property owners.

8.18 Contractor shall use paper products and printing and writing paper that meets Federal Trade Commission recyclability standards as defined in 16 CFR 260.12.

## 9. MEASUREMENT AND PAYMENT

9.1 F.O.B. All shipments must be F.O.B. destination to the Work site and/or other sites indicated in the Contract Documents. The Contract Price is all-inclusive (including sales tax). There shall be no additional compensation paid for containers, packing, unpacking, drayage or insurance.

9.2 Payment

9.2.1 On or about the first day of each calendar month the Contractor will submit to the Construction Manager a verified application for payment and schedule of values supported by a statement showing all materials actually installed during the preceding month and the cost of labor actually expended in the performance of the Work. **Billing must be received on a monthly basis, at a minimum.** Unless otherwise provided in the Contract Documents, no allowances or payments will be made for material or equipment not placed at the Work site.

9.2.2 To be eligible for payment the Contractor's applications for payment must include certified payroll reports prepared in accordance with California Labor Code Section 1776 and the Agreement for each employee of the Contractor and any subcontractors engaged in the performance of the Work during the preceding months, applications for payment will not be processed without certified payroll reports.

9.2.3 In accordance with California Public Contract Code Section 20104.50, the City will review applications for payment as soon as practicable after receipt. Any application or part of an application that is determined to be improper will be returned to the Contractor as soon as practicable, but no later than seven (7) days after receipt by the City, along with a written description of the reasons why the application is improper. The Contractor's failure to submit a schedule in the time specified in Section 3.8, or its submission of a schedule to which the City has taken any uncorrected exception, shall serve as a basis for returning an application for payment in its entirety.

9.2.4 Unless the Contractor has elected to post securities in lieu of retention in accordance with California Public Contract Code Section 22300 and the Agreement, and the Contractor and the City have executed an escrow agreement in accordance with the Public Contract Code and the Agreement, the City will make progress payments to the Contractor in accordance with applicable law in the amount of ninety-five (95) percent of the value of the labor actually performed and the material incorporated in the Work as specified in Contractor's verified application for payment upon approval by the City's authorized representative(s). Payment of progress payments will not be construed as acceptance of the Work performed. If the Contractor has elected to post securities in lieu of retention in accordance with Public Contract Code Section 22300 and the Agreement and the Contractor and the City have executed an escrow agreement in accordance with the Public Contract Code and the Agreement, the City will make payments to the Contractor or the Contractor's escrow agent in accordance with such escrow agreement.

9.2.5 The City will pay the Contractor's final invoice in accordance with applicable law and this Section 9 following acceptance of the Work provided that:

9.2.5.1 The Contractor has furnished evidence satisfactory to the City that all claims for labor and material have been paid, or the time for filing valid stop notices has passed and no stop notices have been filed, or all stop notices filed have been released by valid release or release bond acceptable to the City.

9.2.5.2 No claim has been presented to the City by any person based upon any acts or omissions of the Contractor or any subcontractor engaged in the performance of the Work.

9.2.5.3 No other claim or dispute exists under the Agreement or applicable law concerning payment of the Contractor's final invoice and/or release of the Agreement retention.

9.2.5.4 The Contractor has filed with the City the Maintenance Bond provided in the Contract Documents with duly notarized signatures of an authorized representative of the Contractor and an attorney-in-fact of an admitted surety insurer acceptable to the City and such Maintenance Bond binds the Contractor as Principal and the Surety in accordance with its terms in the amount of 10% of the final Contract Price.

9.2.6 In accordance with California Public Contract Code Section 20104.50, if the City fails to make a progress payment within thirty (30) days of receipt of an undisputed, properly submitted application for payment, the City will pay the Contractor interest equivalent to the legal rate set forth in subdivision (a) of California Code of Civil Procedure Section 685.010. The number of days available to the City to make a payment without incurring an interest obligation pursuant to this provision and California Public Contract Code Section 20104.50 will be reduced by the number of days, if any, by which the City has delayed return of an application for payment beyond the seven day return requirement set forth in Section 9.2.5.

9.3 Non-Allowable Direct Charges. The following costs are not allowable direct charges under the Agreement. The following costs may only be paid under the Agreement, if at all, as part of any allowance for contractor overhead and/or profit established under the Agreement.

9.3.1 Labor costs in excess of applicable prevailing wages pursuant to the Agreement and applicable law, liability and workers compensation insurance, social security, retirement and unemployment insurance and other employee compensation and benefits pursuant to bona fide compensation plans in effect at the time specified for the opening of Project bids for contractor and subcontractor employees engaged in the performance of the Work or in excess of the labor costs specified in Section 4.5 of this Contract in the case of cost impacts involving items for which the Contract Documents do not specify prices and for which no lump sum amount has been approved by the City. However, in no event will allowable direct labor charges under the agreement include employee bonuses, employee vehicles or vehicle allowances, employee telephones or telephone allowances, or employee housing or housing allowances, whether or not such benefits are part of a bona fide compensation plan in effect at the time specified for the opening of Project bids.

9.3.2 Superintendent labor and clerical labor.

9.3.3 Bond premiums.

9.3.4 Insurance in excess of that required under Section 8.8.

9.3.5 Utility costs.

9.3.6 Work Site office expenses.

9.3.7 Home office expenses.

9.3.8 Permit or license costs.

9.4 Retention. The City or its agent may, in accordance with the Contract Documents and applicable law, withhold any payment of monies due or that may become due the Contractor because of:

9.4.1 Defective work not remedied or uncompleted work.

9.4.2 Claims filed or reasonable evidence indicating probable filing of claims.

9.4.3 Failure to properly pay subcontractors or to pay for material or labor.

9.4.4 Reasonable doubt that the Work can be completed for the balance then unpaid.

9.4.5 Damage to another contractor.

9.4.6 Damage to the City.

9.4.7 Damage to a third party.

9.4.8 Delay in the progress of the Work, which, in the City's judgment, is due to the failure of the Contractor to properly expedite the Work.

9.4.9 Liquidated damages or other charges that apply to the Contractor under the Agreement.

9.4.10 Any other lawful basis for withholding payment under the contract.

9.5 Securities in Lieu of Retention.

9.5.1 In accordance with Public Contract Code Section 22300, except where federal regulations or policies do not permit substitution of securities, the Contractor may substitute securities for any moneys withheld by the City to ensure performance of the Work. At the Contractor's request and expense, securities equivalent to the amount withheld will be deposited with the City, or with a state or federally chartered bank in California as the escrow agent, who will then pay those moneys to the Contractor under the terms of an Escrow for Security Deposit agreement. The Escrow for Security Deposit agreement is provided in the Contract Documents. Upon satisfactory completion of the Work, the securities will be returned to the Contractor.

9.5.2 Alternatively, at the Contractor's request and expense, the City will pay retentions earned directly to the escrow agent. At the Contractor's expense, the Contractor may direct investment of the

payments into securities. Upon satisfactory completion of the Work, the Contractor will receive from the escrow agent all securities, interest, and payments received by the escrow agent from the City pursuant to this provision and the terms of the Escrow for Security Deposit agreement. The Contractor will, within 20 days of receipt of payment, pay to each subcontractor the respective amount of interest earned, less costs of retention withheld from each Subcontractor, on monies withheld to ensure the Contractor's performance of the Work.

9.5.3 Securities eligible for investment in accordance with this provision include those listed in Government Code Section 16430, bank or savings and loan certificates of deposit, interest bearing demand deposit accounts, standby letters of credit, or any other security mutually agreed to by the Contractor and the City.

9.5.4 The Contractor will be the beneficial owner of any securities substituted for moneys withheld and will receive any interest thereon.

10. PROJECT ACCEPTANCE AND CLOSEOUT

10.1 Occupancy. The City reserves the right to occupy or use any part or parts or the entirety of the Work before the Work is fully performed. Subject to applicable law, exercising this right will in no way constitute acceptance of any part of the Work so occupied or used or acceptance of the entire Work, nor will such occupancy or use in any way affect the times when payments will become due the Contractor, nor will such occupancy or use in any way prejudice the City's rights under the Agreement, any Agreement bonds, or at law or equity. Occupancy or use shall not waive the City's rights to assess liquidated damages in accordance with Section 7 after the date of such occupancy or use.

10.2 Work Completion and Final Inspection. When the Contractor considers the Work is completed, the Contractor will submit written certification to the Construction Manager specifying that: the Contract Documents have been reviewed; the Work has been inspected for compliance with the Contract Documents; the Work has been completed in accordance with the Contract Documents; and that equipment and systems have been tested in the presence of the City's representative and are operational. The City and/or the City's authorized representatives will make an inspection to verify that the Work is complete and will notify the Contractor in writing of any incomplete or deficient Work. The Contractor will take immediate steps to remedy the stated deficiencies and give notice of correction to the Construction Manager. Upon receiving a notice of correction, the City or the City's authorized representatives will re-inspect the Work. The Contractor must correct all punch list items within 15 working days after the issuance of the punch list. Before acceptance of the Work the Contractor must submit: one set of the

Project Record Drawings (As-Builts), and any equipment operating and maintenance instructions and data, warranties.

10.3 Work Acceptance.

10.3.1 All finished Work will be subject to inspection and acceptance or rejection by the City, the Construction Manager, and the Architect or Engineer and other government agencies having jurisdiction over the Work. Final acceptance of the Work will be at the discretion of the City.

10.3.2 The City will accept the Work in writing only when the Work has been completed to the City's reasonable satisfaction. Progress payments will in no way be construed as acceptance of any part of the Work.

10.3.3 In evaluating the Work, no allowance will be made for deviations from the Technical Specifications, Project Plans or other Contract Documents unless already approved in writing in accordance with the requirements of Section 4, above.

10.3.4 The fact that the Work and materials have been inspected from time to time and that progress payments have been made does not relieve the Contractor of the responsibility of replacing and making good any defective or omitted work or materials in accordance with the requirements of the Contract Documents.

10.3.5 None of the provisions of this section, including acceptance of the Project, final payment, or use or occupancy of the Project Site shall constitute acceptance of Work not done in accordance with the Contract Documents nor relieve Contractor of liability relating to the express guarantees or responsibility for faulty materials or workmanship. Nothing in this section or the Contract Documents shall be construed to limit, relieve, or release Contractor's, subcontractors', and materials suppliers' liability to the City for damages sustained as a result of latent defects in materials, equipment, or the Work caused by the Contractor, its agents, suppliers, employees, or Subcontractors.

## 11. REMEDIES AND DISPUTES

11.1 Failure to Correct Work. Within ten (10) working days of receiving written notice from the City describing Work that is defective or that is otherwise not in accordance with the requirements of the Agreement and/or applicable law and directing that such Work be corrected, the Contractor and/or the Contractor's sureties must give the City written notice of the intent of the Contractor and/or the Contractor's sureties to correct such Work and commence correction of such Work in accordance with the City's notice and the Agreement. If the Contractor and/or the Contractor's sureties do not give the City written notice

of intent to correct such Work and commence correction of such Work within ten (10) working days of receipt of the City's notice, then the City may correct such work and/or have such work corrected for the account and at the expense of the Contractor and/or its sureties, and the Contractor and/or its sureties will be liable to the City for any resulting excess cost. The City may, in addition to all other remedies that the City may have under the Agreement and at law or equity, deduct any such excess cost of completing the Work from amounts that are due or that may become due the Contractor. Contractor shall not be entitled to an extension of the Time of Completion because of a delay in the performance of the Work attributable to the City's exercise of its rights under this section.

11.2 Termination for Cause

11.2.1 In accordance with California Public Contract Code Section 7105, in addition to all other available remedies that the City may have under the Agreement, and at law or equity, the City may terminate the Contractor's control of the Work for any material breach of the Contract, including, but not limited to the following:

11.2.1.1 If the Contractor or any of its subcontractors engaged in the performance of the Work fails to timely perform the Work and/or any of the Contractor's material obligations under the Contract Documents, including but not limited to submission of an acceptable schedule, that have accrued except for due to reasons beyond the control of the Contractor pursuant to the Contract Documents.

11.2.1.2 If the Contractor is adjudged bankrupt, or if it should make a general assignment for the benefit of creditors, or if a receiver should be appointed on account of its creditors.

11.2.1.3 If the Contractor or any of the subcontractors engaged in the performance of the Work persistently or repeatedly refuses or fails to supply enough properly skilled workmen or proper materials for the timely completion of the Work.

11.2.1.4 If the Contractor fails to make prompt payment to subcontractors engaged in the performance of the Work or for material or labor used in the performance of the Work in accordance with the Contract Documents and applicable law.

11.2.1.5 If the Contractor or any subcontractors engaged in the performance of the Work persistently disregards laws or ordinances applicable to the performance of the Work, or the instructions of the City, the Construction Manager, the Architect, or other authorized representatives of the City.

11.2.2 If the City intends to terminate the Contractor's control of the Work for any of the reasons specified in Sections 11.2.1.1 through 11.2.1.5, above, the City will immediately serve written notice to the Contractor and its sureties in accordance with the Contract Documents. Notice of the City's intent to terminate the Contractor's control of the Work will be given by registered or certified mail and specify the grounds for termination, the required cure and the time by which the cure must be effected. Upon receipt of notice of the City's intent to terminate the Contractor's control of the Work for any of the reasons specified in provisions 11.2.1.1 through 11.2.1.5, above, the Contractor will have ten (10) days from receipt of the notice or a longer time specified in the notice to cure its default. If the Contractor does not affect the required cure by the time specified in the notice, the City will issue a written notice of termination to the Contractor and its sureties by registered or certified mail. The notice of termination will specify: that upon receipt of the notice the Contractor's right to perform or complete the Work, including on behalf of the Contractor's sureties, is terminated; that the Contractor's sureties will have the right to take over and complete the Work and perform all of the Contractor's remaining obligations that have accrued under the Agreement; and that if the Contractor's sureties do not both give the City written notice of their intention to take over and perform the Agreement and commence completion of the Work and performance of all of the Contractor's remaining obligations that have accrued under the Agreement within ten (10) days after receipt of notice of termination that the City may declare the Contractor's sureties in default and take over the completion of the Work or have the Work completed for the account and at the expense of the Contractor and its sureties, and the Contractor and its sureties will be liable to the City for any resulting excess cost. The City may, in addition to all other available remedies that the City may have under the Contract Documents and at law or equity, deduct any such excess cost of completing the Work from amounts that are due or that may become due the Contactor.

11.2.3 Upon termination of the Contractor's control of the Work for any of the reasons specified in Sections 11.2.1.1 through 11.2.1.5, the Contractor will, if so directed by the City, immediately remove from the Work site any and all materials and personal property belonging to the Contractor which have not been incorporated in the Work and the Contractor and its sureties will be liable upon their bond for all damages caused the City by reason of the Contractor's failure to complete the Work.

11.2.4 Upon termination of the Contractor's control of the Work for any of the reasons specified in provisions 11.2.1.1 through 11.2.1.5, above, the

City reserves the right to refuse tender of the Contractor by any surety to complete the Work.

11.2.5 If the City completes or has completed any portion of, or the whole of the Work, following termination of the Contractor's control of the Work for any of the reasons specified in Sections 11.2.1.1 through 11.2.1.5, above, the City will neither be liable for nor account to the Contractor or the Contractor's sureties in any way for the time within which, or the manner in which such Work is performed, or for any changes made in such Work or for the money expended in satisfying claims and/or suits and/or other obligations in connection with completing the Work. If, following termination of the Contractor's control of the Work for any of the reasons specified in Sections 11.2.1.1 through 11.2.1.5, above, the unpaid balance of the Contract Price exceeds the expense of completing the Work, including compensation for additional legal, managerial and administrative services and all other amounts due for the completion of the Work and/or satisfaction of claims of the City and/or others arising out of the Agreement and any other charges that apply to the Contractor under the Agreement, the difference will be paid to the Contractor. If such expenses of completing the Work exceed the unpaid balance of the Contract Price, the Contractor or its sureties will pay the difference to the City.

11.2.6 If the Agreement or Contractor's control of the Work is terminated for any reason, Contractor waives all consequential damages resulting therefrom, including, but not limited to, the loss of any anticipated profit by the Contractor for the Work, the loss of profit on any potential or future jobs, and the loss of bonding capacity.

11.2.7 In accordance with California Government Code Section 4410, in the event a national emergency occurs, and public work being performed by contract is stopped, directly or indirectly, because of the freezing or diversion of materials, equipment or labor, as the result of an order or a proclamation of the President of the United States, or of an order of any federal authority, and the circumstances or conditions are such that it is impracticable within a reasonable time to proceed with a substantial portion of the work, then the City and the Contractor may, by written agreement, terminate the Agreement. In accordance with California Government Code Section 4411, such an agreement will include the terms and conditions of the termination of the contract and provision for the payment of compensation or money, if any, which either party will pay to the other or any other person, under the facts and circumstances in the case. Compensation to the Contractor will be determined on the basis of the reasonable value of the work done, including preparatory work. As an exception to the foregoing, in the case of any fully completed separate item or portion of the Work for

which there is a separate contract price, the contract price shall control. The parties may in any other case adopt the contract price as the reasonable value of the work or any portion of the work done.

11.2.8 In the event a termination for cause is later determined to have been made wrongfully or without cause, then the termination shall be treated as a termination for convenience, and the Contractor shall have no greater rights than it would have following a termination for convenience. Any contractor claim arising out of a termination for cause shall be made in accordance with this section.

11.3 Termination for Convenience.

11.3.1 The City may terminate performance of the Work under the Contract Documents in accordance with this clause in whole, or from time to time in part, whenever the City shall determine that termination is in the City's best interest. Termination shall be effected by the City delivering to the Contractor notice of termination specifying the extent to which performance of the Work under the Contract Documents is terminated, and the effective date of the termination.

11.3.2 Contractor shall comply strictly with the City's direction regarding the effective date of the termination, the extent of the termination, and shall stop work on the date and to the extent specified.

11.3.3 Contractor shall be entitled to a total payment on account of the Contract work so terminated measured by: (i) the actual cost to Contractor of Work actually performed, up to the date of the termination, with profit and overhead limited to twelve percent (12%) of actual cost of work performed, up to but not exceeding the actual contract value of the work completed as measured by the Schedule of Values and Progress Schedule; and (ii) offset by payments made and other contract credits. In connection with any such calculation, however, the City shall retain all rights under the Contract Documents including, without limitation, claims, indemnities, or setoffs.

11.3.4 Under no circumstances may Contractor recover legal costs of any nature, nor may Contractor recover costs incurred after the date of the termination.

11.4 Disputes.

The procedure set forth in California Public Contracts Code section 9204 (as summarized in Exhibit A attached hereto) shall apply to all "claims" by the Contractor on the City, as that term is defined in Section 9204. With respect to "claims" or any portion of a claim not resolved by way of the procedure set forth in Section 9204, the following procedure shall thereafter apply as follows:

11.4.1 In accordance with California Public Contract Code Section 20104.2, the following procedures apply to claims of $375,000 or less between the Contractor and the City:

11.4.1.1 The claim shall be in writing and include the documents necessary to substantiate the claim. Claims must be filed on or before the date of final payment. Nothing in this subdivision is intended to extend the time limit or supersede notice requirements otherwise provided by contract for the filing of claims.

11.4.1.2 For claims of less than fifty thousand dollars ($50,000), the City shall respond in writing to any written claim within 45 days of receipt of the claim, or may request, in writing, within 30 days of receipt of the claim, any additional documentation supporting the claim or relating to defenses to the claim the City may have against the Contractor.

11.4.1.2.1 If additional information is thereafter required, it shall be requested and provided pursuant to this subdivision, upon mutual agreement of the City and the Contractor.

11.4.1.2.2 The City's written response to the claim, as further documented, shall be submitted to the Contractor within 15 days after receipt of the further documentation or within a period of time no greater than that taken by the Contractor in producing the additional information, whichever is greater.

11.4.1.3 For claims of over fifty thousand dollars ($50,000) and less than or equal to three hundred seventy-five thousand dollars ($375,000), the City shall respond in writing to all written claims within 60 days of receipt of the claim, or may request, in writing, within 30 days of receipt of the claim, any additional documentation supporting the claim or relating to defenses to the claim the City may have against the Contractor.

11.4.1.3.1 If additional information is thereafter required, it shall be requested and provided pursuant to this subdivision, upon mutual agreement of the City and the Contractor.

11.4.1.3.2 The City's written response to the claim, as further documented, shall be submitted to the Contractor within 30 days after receipt of the

further documentation, or within a period of time no greater than that taken by the Contractor in producing the additional information or requested documentation, whichever is greater.

11.4.1.4 If the Contractor disputes the City's written response, or the City fails to respond within the time prescribed, the Contractor may so notify the City, in writing, either within 15 days of receipt of the City's response or within 15 days of the City's failure to respond within the time prescribed, respectively, and demand an informal conference to meet and confer for settlement of the issues in dispute. Upon a demand, the City shall schedule a meet and confer conference within 30 days for settlement of the dispute.

11.4.1.5 Following the meet and confer conference, if the claim or any portion remains in dispute, the Contractor may file a claim as provided in Chapter 1 (commencing with Section 900) and Chapter 2 (commencing with Section 910) of Part 3 of Division 3.6 of Title 1 of the Government Code. For purposes of those provisions, the running of the period of time within which a claim must be filed shall be tolled from the time the Contractor submits his or her written claim pursuant to subdivision (a) until the time that claim is denied as a result of the meet and confer process, including any period of time utilized by the meet and confer process.

11.4.1.6 This article does not apply to tort claims and nothing in this article is intended nor shall be construed to change the time periods for filing tort claims or actions specified by Chapter 1 (commencing with Section 900) and Chapter 2 (commencing with Section 910) of Part 3 of Division 3.6 of Title 1 of the Government Code.

11.4.2 In accordance with California Public Contract Code Section 20104.4, the following procedures apply to civil actions to resolve claims of $375,000 or less between the City and the Contractor:

11.4.2.1 Within 60 days, but no earlier than 30 days, following the filing or responsive pleadings, the court shall submit the matter to non-binding mediation unless waived by mutual stipulation of both parties. The mediation process shall provide for the selection within 15 days by both parties of a disinterested third person as mediator, shall be commenced within 30 days of the submittal, and shall be concluded within 15 days from the commencement of the mediation unless a time requirement is extended upon a good cause

showing to the court or by stipulation of both parties. If the parties fail to select a mediator within the 15-day period, any party may petition the court to appoint the mediator.

11.4.2.2 If the matter remains in dispute, the case shall be submitted to judicial arbitration pursuant to Chapter 2.5 (commencing with Section 1141.10) of Title 3 of Part 3 of the Code of Civil Procedure, notwithstanding Section 1141.11 of that code. The Civil Discovery Act of 1986 (Article 3 (commencing with Section 2016) of Chapter 3 of Title 3 of Part 4 of the Code of Civil Procedure) shall apply to any proceeding brought under this subdivision consistent with the rules pertaining to judicial arbitration.

11.4.2.2.1 Notwithstanding any other provision of law, upon stipulation of the parties, arbitrators appointed for purposes of this article shall be experienced in construction law, and, upon stipulation of the parties, mediators and arbitrators shall be paid necessary and reasonable hourly rates of pay not to exceed their customary rate, and such fees and expenses shall be paid equally by the parties, except in the case of arbitration where the arbitrator, for good cause, determines a different division. In no event shall these fees or expenses be paid by state or county funds.

11.4.2.2.2 In addition to Chapter 2.5 (commencing with Section 1141.10) of Title 3 of Part 3 of the Code of Civil Procedure, any party who after receiving an arbitration award requests a trial de novo but does not obtain a more favorable judgment shall, in addition to payment of costs and fees under that chapter, pay the attorney's fees of the other party arising out of the trial de novo.

11.4.2.3 The court may, upon request by any party, order any witnesses to participate in the mediation or arbitration process.

11.4.3 In accordance with California Public Contract Code Section 20104.6:

11.4.3.1 The City shall not fail to pay money as to any portion of a claim which is undisputed except as otherwise provided in the contract.

114.3.2 In any suit filed under Public Contract Code Section 20104.4 concerning this contract, the City shall pay interest at the

legal rate on any arbitration award or judgment. Such interest shall accrue from date the suit was filed.

11.5 Non-Waiver.

11.5.1 Either party's waiver of any breach or failure to enforce any of the terms, covenants, conditions or other provisions of the Contract Documents at any time shall not in any way affect, limit, modify or waive that party's right thereafter to enforce or compel strict compliance with every term, covenant, condition or other provision hereof, any course of dealing or custom of the trade or oral representations notwithstanding.

11.5.2 Neither acceptance of the whole or any part of Work by City nor any verbal statements on behalf of City or its authorized agents or representatives shall operate as a waiver or modification of any provision of the Contract Documents, or of any power reserved to City herein nor any right to damages provided in the Contract Documents.

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CITY OF FORT BRAGG
416 Franklin Street
Fort Bragg, California 95437

# CONTRACT, PART 3

# SPECIAL PROVISIONS

## 12. SPECIAL PROVISIONS

### 12.1 Description of Work.

The Work in general consists of raw water pipeline construction in four segments (Segments 2 – 5) between the City of Fort Bragg's water treatment plant at the intersection of Sherwood Road and Monsen Way, and Forest Road 350, as shown on the Project Plans and in the Technical Specifications. It includes construction of a new pump station and force main at Newman Reservoir as part of Segment 3. The Work also includes any other such items of work as are required to complete the project in accordance with this Contract, the Project Plans and Technical Specifications.

The estimate of the quantities of work to be done is approximate only, being as a basis for the comparison of bids, and the City does not expressly or by implication agree that the actual amount of work will correspond therewith, but reserves the right to increase or decrease the amount or any portion of the work as directed by the Construction Manager.

Incidental items of construction necessary to complete the whole Work in a satisfactory and acceptable manner as shown on the Project Plans and as provided for in the Technical Specifications and not specifically referred to in this section, will be understood to be furnished by the Contractor.

### 12.2 Construction Limitations.

The Contractor will be expected to conduct his or her operations in a manner that creates a minimum of damage to the natural vegetation and landscape. Ingress and egress must be via the existing driveways. Care must be exercised to avoid hazards that may cause injury to persons, animals or property either during working hours of after work hours, which will include dust control, backfilling trenches immediately following pipe laying and temporary fencing as required. Excavation made under this Contract must be backfilled before leaving the Work for the night.

The Contractor will be responsible for obtaining permission from the property owners for any construction outside of the Work site or easements as shown on the plans. Equipment will be restricted to the immediate area of construction, pipe trenches will be backfilled as soon as possible.

Receptacles for construction residue, including oil, cleaning fluids, and litter must be covered. Such residues must be disposed of in a proper manner.

Construction activity within the existing right-of-way must be scheduled to minimize traffic inconvenience and safety hazards to motorists, pedestrians and cyclists.

12.3 Storm Water Pollution Prevention.

The Contractor must perform the Work in compliance with all applicable requirements of the California State Water Resources Control Board pursuant to Order No. 99-08-DWQ, National Pollutant Discharge Elimination System (NPDES) General Permit No. CAS000002 ("General Permit") adopted pursuant to regulations adopted by the U.S. Environmental Protection Agency (USEPA) on November 16, 1990 and codified in 40 Code of Federal Regulations Parts 122, 123, 124. The General Permit applies to storm water discharges from construction sites that disturb land equal to or greater than one acre, and to construction activity that results in soil disturbances of less than one acre if the construction activity is part of a larger common plan of development that encompasses one acre or more of soil disturbance or if there is significant water quality impairment resulting from the activity. The General Permit requirements that may apply to the Contractor's performance of the Work include, but are not limited to:

a. Development and implementation of a Storm Water Pollution Prevention Plan ("SWPPP") that specifies Best Management Practices ("BMPs") that will prevent all construction pollutants from contacting storm water and with the intent of keeping all products of erosion from moving off site into receiving waters.

b. Elimination or reduction of non-storm water discharges to storm sewer systems and other waters of the nation.

c. Inspection of all BMPs.

Portions of the Work that may be subject to the General Permit include, but are not limited to clearing, grading, stockpiling and excavation.

Prior to commencing performance of the Work, the Contractor must prepare and file a Notice of Intent to obtain coverage under the General Permit, a vicinity map, and the applicable fee, with the California State Water resources Control Board, Division of Water Quality, Storm Water Permit Unit, P.O. Box 1977, Sacramento, California 95812-1977.

Prior to commencing performance of the Work, the Contractor must also prepare an SWPPP in accordance with all applicable requirements of the General Permit and submit the SWPPP to the Construction Manager for approval.

The Contractor must also develop and implement a monitoring program to verify compliance with the General Permit.

The SWPPP must include a Project site map. Geometric equations, notes, details, and all data not related to water pollution control work shall be removed to provide clarity. A copy of the Project Plans must be used as a base plan, with the pertinent stage of construction shown as an overlay to accurately reflect Project Site conditions at various phases of construction.

The Contractor must revise and update the SWPPP whenever there is a change in construction operations that may affect the site drainage patterns or discharge of pollutants to surface waters, groundwaters, or a separate municipal storm sewer system.

Any fines, damages, Work delays or other impacts that result from failure of the Contractor or privities or agents of the Contractor to fully comply with the requirements of the General Permit or to fully implement the SWPPP will be solely the responsibility of the Contractor.

The Contractor must keep a copy of the General Permit, together with updates and revisions, at the Project Site and provide copies of the SWPPP at the request of the City.

12.4 Maintaining Traffic and Pedestrian Operations.

The Contractor must conduct his or her operations so as to cause the least possible obstruction and inconvenience to public traffic. Unless otherwise approved by the Construction Manager, all traffic must be permitted to pass through the Work.

Due to the need to accommodate and minimize inconvenience to the public, unless expressly specified or approved in writing by the Construction Manager, no road closures will be permitted. Public vehicular and

pedestrian traffic must be allowed to travel through the Work area with an absolute minimum of interruption or impedance unless otherwise provided for in the Special Provisions or approved in writing by the Construction Manager. The Contractor must make provisions for the safe passage of pedestrians around the area of Work at all times.

Residents affected by construction must be provided passage and access through the Work area to the maximum extent possible. Where existing driveways occur on the street, the Contractor must make provisions for the trench crossings at these points, either by means of backfill or by temporary bridges acceptable to the Construction Manager, so that the length of shut-down of any driveway is kept to a minimum. In addition, all driveways must be accessible at the end of each workday, and no driveway or property access may be closed for more than four (4) hours during the workday. Access to driveways, houses, and buildings along the road or street must be as convenient as possible and well maintained, and all temporary crossings must be maintained in good condition. To minimize the need for and complexity of detours, not more than one crossing or street intersection or road may be closed at any one time without the written approval of the Construction Manager.

The Contractor must provide multiple, advance written notices of closures to all affected property owners in a form approved by the Construction Manager.

Except as otherwise approved by the Construction Manager, the stockpiling or storing of material in City streets or rights of way shall be prohibited. Where this is unavoidable, all such materials must be piled or stored in a manner that will not obstruct sidewalks, driveways, or pedestrian crossings. Gutters and drainage channels must be kept clear and unobstructed at all times. All such materials shall be stored and handled in a manner that protects City streets, sidewalks, or other facilities from damage.

Where approved in advance by the Construction Manager, the Contractor must construct and maintain detours for the use of public traffic at his or her own expense. Failure or refusal of the Contractor to construct and maintain detours so approved at the proper time will be a material breach of the Contract subject to any and all remedies available pursuant to the Contract Documents and at law and equity. Such remedies include, but are not limited to, termination pursuant to Section 11.

Throughout performance of the Work, the Contractor must construct and adequately maintain suitable and safe crossings over trenches and such

detours as are necessary to care for the public and private traffic at all times including Saturdays, Sundays and holidays.

The Contractor will be responsible for keeping all emergency services, including the Fort Bragg police and fire departments informed of obstructions to, or detours around any public or private roads caused by reasons of his or her operations.

The Contractor must comply with the State of California, Department of Transportation Manual of warning signs, lights, and devices for use and performance of work within the job site.

The fact that rain or other causes, either within or beyond the control of the Contractor, may force suspension or delay of the Work, shall in no way relieve the Contractor of his or her responsibility of maintaining traffic through the Project and providing local access as specified in this section. The Contractor must, at all times, keep on the job such materials, force and equipment as may be necessary to keep roads, streets and driveways within the Project open to traffic and in good repair and shall expedite the passage of such traffic, using such force and equipment as may be necessary.

Full compensation for conforming to the requirements of this section will be deemed included in the prices paid or the various Contract items of Work, and no additional allowances will be made therefor.

12.5 Public Safety.

The Contractor must at all times conduct the Work in accordance with Construction Safety Orders of the Division of Industrial Safety, State of California, to ensure the least possible obstruction to traffic and inconvenience to the general public, and adequate protection of persons and property in the vicinity of the Work.

No pedestrian or vehicle access way may be closed to the public without first obtaining permission of the Construction Manager.

Should the Contractor fail to provide public safety as specified or if, in the opinion of the Construction Manager, the warning devices furnished by the Contractor are not adequate, the City may place any warning lights or barricades or take any necessary action to protect or warn the public of any dangerous condition connected with the Contractor's operations, and the Contractor will be liable to the City for, and the City may deduct from amounts due or that may become due to the Contractor under the Contract, all costs incurred including, but not limited to, administrative costs.

Nothing in this section will be construed to impose tort liability on the City or Construction Manager.

Contractor acknowledges that, pursuant to the Americans with Disabilities Act ("ADA"), programs, services and other activities provided by a public entity to the public, whether directly or through a Contractor, must be accessible to the disabled public. Contractor shall provide the services specified in the Contract Documents in a manner that complies with the ADA and any and all other applicable federal, state and local disability rights legislation. Contractor agrees not to discriminate against disabled persons in the provision of services, benefits or activities provided under the Contract Documents and further agrees that any violation of this prohibition on the part of Contractor, its employees, agents or assigns shall constitute a material breach of the Contract Documents.

12.6 Protection of Existing Facilities and Property.

The Contractor must notify Underground Service Alert (USA) for marking the locations of existing underground facilities.

Subject to Section 5 of the General Provisions, the Contractor must take all necessary measures to avoid injury to existing surface and underground utility facilities in and near the Work site. Subject to Section 5 of the General Provisions, no error or omission of utility markouts will be construed to relieve the Contractor from his responsibility to protect all underground pipes, conduits, cables or other structures affected by the Work.

The existing underground facilities in the area of Work may include telephone, television and electrical cables, gas mains, water mains, sewer pipe and drainage pipe. The various utility companies must be notified before trenching begins and at such other times as required to protect their facilities. Subject to Section 5 of the General Provisions, all underground facilities must be located and exposed ahead of trenching to prevent damage to the facilities, and to determine the depth and character of all facilities that cross or infringe on the trench prism. The Contractor must immediately notify the Construction Manager of any facilities found. If damage should occur to the existing facilities, the utility company and the City must be notified immediately and, subject to Section 5 of the General Provisions, repairs acceptable to the utility company must be made at the Contractor's expense.

The Project Plans show the underground utilities on the site of the construction insofar as they are known to the City. The drawings may not

show facilities apparent from visual inspection of the site or service laterals or appurtenances, the existence of which can be inferred from the presence of other visible facilities such as buildings, meters, junction boxes, etc. on or adjacent to the construction site.

If in the performance of the Work an existing utility is encountered that is not shown on the Project Plans and is not apparent or inferable from visual inspection of the Project site, the Project Inspector must be notified immediately. The Construction Manager will determine, subject to Section 5 of the General Provisions, whether the Project Plans or Technical Specifications should be modified, or whether the existing utility should be relocated or whether the Contractor must work around the existing utility. Subject to Section 5 of the General Provisions, the Contractor must replace, at his or her own expense, in as good condition as they were prior to the start of construction, all existing improvements and surroundings damaged by his or her operation. Reconstruction of all existing improvements must conform to CITY OF FORT BRAGG Public Works Standard Specifications and Details under the direction of and subject to the acceptance by the Construction Manager.

Subject to Section 5 of the General Provisions, should the Contractor fail to take adequate measures to avoid injury or damage to the facilities described above, the City may take any actions necessary to protect such facilities from the Contractor's operations. Subject to Section 5 of the General Provisions, the City may withhold the cost of injury to existing surface and underground utility facilities in and near the Work site from amounts due or that may become due the Contractor.

12.7 Preconstruction Conference.

A pre-construction conference will be scheduled, at which time the Contractor must present his or her proposed work schedule in accordance with Section 3.8 of the General Provisions, information concerning offsite yards, Subcontractors, location of disposal and stock pile areas, and traffic control plans. All such schedules will be subject to the approval of the Construction Manager and the applicable agencies.

City will schedule and administer intermittent progress meetings throughout duration of work. City will determine the location and time for the meetings.

12.8 Owner Notification.

The Contractor must notify all property owners and businesses affected by the Work at least 48 hours before Work is to begin. The notice must be in

writing in the form of a door hanger, and must indicate the Contractor's name and phone number, type of work, day(s) and time when Work will occur. Notices must be reviewed in advance and approved by the Construction Manager.

12.9 Emergency Service Providers Notifications.

The Contractor must furnish the name and phone number of a representative that can be contacted in the event of an emergency. Said information must be reported to the City Police Department dispatcher, and updated as required to provide 24-hour phone access.

12.10 Clean up.

Attention is directed to Section 4-1.02 of the Caltrans Standard Specifications, which section is made a part of this Contract.

Before final inspection of the Work, the Contractor must clean the construction site and all ground occupied by him in connection with the Work, of all rubbish, excess material, falsework, temporary structures and equipment. All parts of the Work shall be left in a neat and presentable condition.

Nothing herein shall require the Contractor to remove warning, regulatory, and guide signs prior to formal acceptance by the Construction Manager.

12.11 Payment.

Payment for all work and work requirements specified in these Special Provisions shall be considered as included in the Contract Price and no additional allowances shall be made therefore.

12.12 Construction Staking.

Attention is directed to Section 3.9 of the General Provisions for information on Construction Staking.

12.13 Materials Testing Allowance.

Attention is directed to Section 3.10 of the General Provisions for information on Materials Testing Allowance.

12.14 Obstructions.

Attention is directed to Section 15, “Existing Highway Facilities,” of the Caltrans Standard Specifications, which section is made a part of this Contract.

Attention is directed to the existence of overhead and underground power, telephone, and television cable poles, underground sewer mains and laterals, underground gas mains, and underground water mains and laterals within the area in which construction is to be performed.

Prior to starting the Work, the Contractor must (a minimum of 2 working days in advance) call Underground Service Alert (USA), toll free, at 811, and provide USA with all necessary data relative to the proposed work. USA will accept calls and process information to participating agencies who have underground facilities in the area between the hours of 7:30 a.m. and 5:00 p.m. daily, except Saturdays, Sundays, and holidays. Between the hours of 5:00 p.m. and 7:30 a.m. calls will be recorded and then processed after 7:30 a.m. For emergency situations, after hours and on Saturdays, Sundays and holidays, the Contractor shall contact the organization owning the affected facility. Upon notification, agencies having facilities in the area of the proposed excavation will mark their locations in the field using USA standard colors and codes to identify the facility.

The Contractor will be required to work around public and private utility facilities and other improvements that are to remain in place within the construction area, and he will be held liable to the owners of such facilities for interference with service resulting from his operations.

12.15 Hours of Work.

Unless otherwise specified herein, all construction activity, except for emergency situations, will be confined to Monday through Friday between the hours of 7:30 a.m. and 6:00 p.m., to minimize nuisances to local residents. Mufflers and/or baffles will be required on all construction equipment to control and minimize noise. The Contractor must comply with all applicable noise regulations in the City’s Zoning Ordinance.

Saturdays, Sundays, holidays and overtime shall not be regarded as working days. Work shall not be allowed on non-working days without the expressed approval of the Construction Manager. The Contractor shall make a request for approval in writing with the stipulation (implied or expressed) that the Contractor shall pay for all overtime labor charges at the applicable hourly rate of the City or contract employee performing duties of inspector and/or

resident engineer. All overtime labor charges shall be deducted from the final payment along with any liquidated damages.

Work necessary for the proper care and protection of work already performed or in case of emergency may be allowed without permission of the Construction Manager.

12.16 Dust Control.

The Contractor must furnish all labor, equipment, and means required and carry out effective measures wherever and as often as necessary to prevent its operation from producing dust in amounts damaging to property, cultivated vegetation, or domestic animals, or causing a nuisance. The Contractor will be responsible for any damage resulting from any dust originating from the performance of the Work. The use of water resulting in mud on streets, sidewalks, or driveways, will not be permitted as a substitute for sweeping or other methods of dust control. The Contractor may not discharge smoke, dust, or any other air contaminants into the atmosphere in such quantity as will violate the regulations of any legally constituted authority.

Dust control must conform to the provisions in Sections 10-5, “Dust Control” and Section 18, “Dust Palliatives” of the Caltrans Standard Specifications, which section is made a part of this Contract.

12.17 Water for Construction and Dust Control.

Unless otherwise provided, the Contractor will be responsible for applying to the City’s Utility Department to establish utility accounts (at no charge) for all water necessary to perform the Work. The Contractor must comply with all City requirements for construction water, including provision of deposits and provision of backflow prevention devices. In accordance with State law, backflow prevention devices for construction water connections must be re-tested when relocated. The Contractor will be responsible for the cost of any re-testing.

The Contractor is prohibited from operating gate valves, fire hydrants, pumps or any other components of the City water system. The Contractor must contact the City’s utilities staff, a minimum of twenty-four (24) hours in advance, to operate these or any other components on the City water system.

12.18 Protection and Restoration of Vegetation.

Trees, lawns, shrubbery and vegetation that are not to be removed must be protected from damage or injury. Existing trees, shrubs, and other plants, that are not to be removed and are injured or damaged by reason of the Contractor's operations, must be replaced by the Contractor in accordance with the requirements in Section 20-3.01C, "Replacement," of the Caltrans Standard Specifications. Section 20-3.01C of the Caltrans Standard Specifications is made a part of this Contract.

When it is necessary to excavate adjacent to existing trees, shrubs, or hedges, the Contractor must use all possible care to avoid injury to the trees, shrubs, or hedges and their roots. No roots or limbs two inches (2") or larger in diameter may be cut without the express approval of the Construction Manager.

All roots two inches (2") in diameter and larger left in place must be wrapped with burlap to prevent scarring or excessive drying. When it is necessary to cut limbs and branches of trees to provide clearance for equipment used in construction, the Contractor must repair the damaged areas by properly painting with an emulsified asphalt type seal. All cuts through 1/2" or larger roots and limbs must be hand trimmed and cleanly cut before being repaired.

12.19 Surplus Material.

All material removed or excavated during the course of construction will be surplus. All surplus material will be the property of the Contractor and be disposed of outside the right-of-way, unless the City elects to salvage certain objects that are determined to be of historical interest. The City reserves the right of ownership of all objects that it elects to salvage, and the Contractor must protect such objects from subsequent damage until delivered unto the care of the owner.

12.20 Cultural Resources.

In accordance with the National Historic Preservation Act of 1966 (16 U.S.C. 470), the following procedures are implemented to ensure historic preservation and fair compensation to the Contractor for delays attendant to the cultural resources investigation. The Contractor hereby agrees to comply with these procedures.

12.21 Historical Finds.

In the event potential historical, architectural, archeological, or cultural resources (hereinafter called cultural resources) are discovered during subsurface excavations at the site of construction, the following procedures will apply:

1. The Contractor must immediately notify the Construction Manager and stop any Work that may jeopardize the find pending an investigation of its significance;
2. The Construction Manager will select a qualified archeologist (such as through the Northwest Information Center at Sonoma State University or other official contact) and wait for an archaeologist to complete an evaluation of significance before continuing Work in that area.
3. The Construction Manager will supply the Contractor with a “Stop Work Order” directing the Contractor to cease all portions of the Work that the Construction Manager determines may impact the find. The “Stop Work Order” will be effective until a qualified archaeologist assesses the value of the potential cultural resources. The “Stop Work Order” will contain the following:
    a. A clear description of the Work to be suspended;
    b. Any instructions regarding issuance of further orders by the Contractor for materials services;
    c. Guidance as to action to be taken regarding Subcontractors;
    d. Any direction to the Contractor to minimize costs; and
    e. Estimated duration of the temporary suspension.
4. If the archaeologist determines the potential find is a bona fide cultural resource, the Construction Manager may extend the duration of the “Stop Work Order” in writing, and if so the ”Stop Work Order” will remain in effect and Work subject to the “Stop Work Order” may not resume until authorized by the Construction Manager.

12.22 Cultural Resources Defined.

Possible indicators that a cultural resource has been found include, but are not limited to the following:

1. Prehistoric-era archaeological site indicators: obsidian tools, tool manufacture waste flakes, grinding and other implements, dwelling sites, animal or human bones, fossils, and/or locally darkened soil

containing dietary debris such as bone fragments and shellfish remains;

2. Historic-era site indicators: ceramic, glass, and/or metal.

12.23 Construction Manager's Discretion.

Once possible cultural resources are found at the Work site, the Construction Manager may use discretion to continue the Work, regardless of the cultural resource find, if the Construction Manager determines that there are overriding considerations such as the instability of the excavation site, the existence of adverse weather or other conditions that would preclude leaving the site exposed, or if the site would be unsafe to workers who would retrieve cultural resource items from therein.

CITY OF FORT BRAGG
416 Franklin Street
Fort Bragg, California 95437

## CONSTRUCTION PERFORMANCE BOND

**(Note: The successful bidder must use this form. Use of any other bond form may prevent a contract from forming and/or result in forfeiture of the successful bidder's bid bond.)**

THIS CONSTRUCTION PERFORMANCE BOND (Bond), dated _____, is in the amount of _____ (Penal Sum), which is 100% of the Contract Sum and is entered into by and between the parties listed below to ensure the faithful performance of the Contract identified below. This Bond consists of this page and the Bond Terms and Conditions, Paragraphs 1 through 14 attached to this page. Any singular reference to _____ (Contractor),

_____ (Surety), City of Fort Bragg (City), or other party shall be considered plural where applicable.

| CONTRACTOR: | SURETY: |
|---|---|
| _____ | _____ |
| Name of Contractor | Name of Surety |
| _____ | _____ |
| Address | Principal Place of Business |
| _____ | _____ |
| City/State/Zip | City/State/Zip |

CONSTRUCTION CONTRACT:

Agreement for the _____ (Project) located at _____ (Address), California, dated _____, in the amount of _____.

| CONTRACTOR AS PRINCIPAL | SURETY |
|---|---|
| Company: (Corp. Seal) | Company: (Corp. Seal) |
| Signature:_____ | Signature: _____ |
| Name:_____ | Name:_____ |
| Title: _____ | Title: _____ |

BOND TERMS AND CONDITIONS

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

2. If Contractor completely and properly performs all of its obligations under the Construction Contract, Surety and Contractor shall have no obligation under this Bond.

3. If there is no City Default, Surety's obligation under this Bond shall arise after:

   3.1 City provides Surety with written notice that City has declared a Contractor Default under the Construction Contract pursuant to the terms of the Construction Contract; and

   3.2 City has agreed to pay the Balance of the Contract Sum:

      3.2.1 To Surety in accordance with the terms of this Bond and the Construction Contract; or

      3.2.2 To a Contractor selected to perform the Construction Contract in accordance with the terms of this Bond and the Construction Contract.

4. When City has satisfied the conditions of Paragraph 3 above, Surety shall promptly (within 40 Days) and at Surety's expense elect to take one of the following actions:

   4.1 Arrange for Contractor, with consent of City, to perform and complete the Construction Contract (but City may withhold consent, in which case the Surety must elect an option described in Paragraphs 4.2, 4.3 or 4.4 below); or

   4.2 Undertake to perform and complete the Construction Contract itself, through its agents or through independent contractors or Construction entities; provided, that Surety may not select Contractor as its agent or independent contractor or Contractor without City's consent; or

   4.3 Undertake to perform and complete the Construction Contract by obtaining bids from qualified contractors or Construction entities acceptable to City for a contract for performance and completion of the Construction Contract and, upon determination by City of the lowest responsive and responsible Bidder, arrange for a contract to be prepared for execution by City and the contractor or Contractor selected with City's concurrence, to be secured with performance and payment bonds executed by a qualified surety

equivalent to the bonds issued on the Construction Contract; and, if Surety's obligations defined in Paragraph 6 below, exceed the Balance of the Contract Sum, then Surety shall pay to City the amount of such excess; or

4.4 Waive its right to perform and complete, arrange for completion, or obtain a new contractor or Contractor, and with reasonable promptness under the circumstances and, after investigation and consultation with City, determine in good faith its monetary obligation to City under Paragraph 6 below, for the performance and completion of the Construction Contract and, as soon as practicable after the amount is determined, tender payment therefor to City with full explanation of the payment's calculation. If City accepts Surety's tender under this Paragraph 4.4, City may still hold Surety liable for future damages then unknown or unliquidated resulting from the Contractor Default, as agreed by City and Surety at the time of tender. If City disputes the amount of Surety's tender under this Paragraph 4.4, City may exercise all remedies available to it at law to enforce Surety's liability under Paragraphs 6 and 7 below.

5. At all times City shall be entitled to enforce any remedy available to City at law or under the Construction Contract including, without limitation, and by way of example only, rights to perform work, protect Work, mitigate damages, advance critical Work to mitigate schedule delay, and coordinate Work with other consultants or contractors.

6. If Surety elects to act under Paragraphs 4.1, 4.2 or 4.3 above, within the time period provided in Paragraph 4, above, and complies with its obligations under this Bond, Surety's obligations under this Bond are commensurate with Contractor's Construction Contract obligations. Surety's obligations include, but are not limited to:

6.1 Contractor's obligations to complete the Construction Contract and correct Defective Work;

6.2 Contractor's obligations to pay liquidated damages; and

6.3 To the extent otherwise required of Contractor under the Construction Contract, Contractor's obligations to pay additional legal, design professional, and other costs not included within liquidated damages resulting from Contractor Default (but excluding attorney's fees incurred to enforce this Bond).

7. If Surety does not elect to act under Paragraphs 4.1, 4.2, 4.3, or 4.4, above, within the time period provided in Paragraph 4, above, or comply with its obligations under this Bond, then Surety shall be deemed to be in default on this Bond ten Days after receipt of an additional written notice from City to Surety demanding that Surety perform its obligations under this Bond. Such Surety default shall be independent of the Contractor Default. To the extent Surety's independent default causes City to suffer damages including, but not limited to, delay damages, which are different from, or in addition to (but not duplicative of) damages which City is entitled to receive under the Construction Contract, Surety shall also be liable for such damages. In the event any Surety obligation following its independent default is inconsistent or conflicts with California Civil Code Section 2809, or any other law which either prohibits, restricts, limits or modifies in any way any obligation of a surety which is larger in amount or in any other respect more burdensome than that of the principal, Surety hereby waives the provisions of such laws to that extent.

8. If Surety elects to act under Paragraphs 4.1, 4.2, 4.3 or 4.4 above, within the time period provided in Paragraph 4, above, and complies with all obligations under this Bond, Surety's monetary obligation under this Bond is limited to the Penal Sum.

9. No right of action shall accrue on this Bond to any person or entity other than City or its successors or assigns.

10. Surety hereby waives notice of any change, alteration or addition to the Construction Contract or to related subcontracts, design agreements, purchase orders and other obligations, including changes of time, and of any City action in accordance with Paragraph 5 above. Surety consents to all terms of the Construction Contract, including provisions on changes to the Contract. No extension of time, change, alteration, Modification, deletion, or addition to the Contract Documents, or of the Work (including services) required thereunder, or any City action in accordance with Paragraph 5 above shall release or exonerate Surety on this Bond or in any way affect the obligations of Surety on this Bond, unless such action is an City Default.

11. Any proceeding, legal or equitable, under this Bond shall be instituted in any court of competent jurisdiction where a proceeding is pending between City and Contractor regarding the Construction Contract, or in the Superior Court of the County of Mendocino, California, or in a court of competent jurisdiction in the location in which the Work is located. Communications from City to Surety under Paragraph 3.1 above shall be deemed to include the necessary agreements under Paragraph 3.2 above unless expressly stated otherwise.

12. All notices to Surety or Contractor shall be mailed or delivered (at the address set forth on the signature page of this Bond), and all notices to City shall be mailed or delivered as provided in the Construction Contract. Actual receipt of notice by

Surety, City or Contractor, however accomplished, shall be sufficient compliance as of the date received at the foregoing addresses.

13. Any provision in this Bond conflicting with any statutory or regulatory requirement shall be deemed deleted herefrom and provisions conforming to such statutory requirement shall be deemed incorporated herein.

14. Definitions

14.1 Balance of the Contract Sum: The total amount payable by City to Contractor pursuant to the terms of the Construction Contract after all proper adjustments have been made under the Construction Contract, for example, deductions for progress payments made, and increases/decreases for approved Modifications to the Construction Contract.

14.2 Construction Contract: The agreement between City and Contractor identified on the signature page of this Bond, including all Contract Documents and changes thereto.

14.3 Contractor Default: Material failure of Contractor, which has neither been remedied nor waived, to perform or otherwise to comply with the terms of the Construction Contract, limited to "default" or any other condition allowing a termination for cause as provided in the Construction Contract.

14.4 City Default: Material failure of City, which has neither been remedied nor waived, to pay Contractor progress payments due under the Construction Contract or to perform other material terms of the Construction Contract, if such failure is the cause of the asserted Contractor Default and is sufficient to justify Contractor termination of the Construction Contract.

**END OF DOCUMENT**

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CITY OF FORT BRAGG
416 Franklin Street
Fort Bragg, California 95437

## CONSTRUCTION LABOR AND MATERIAL PAYMENT BOND

**(Note: The successful bidder must use this form. Use of any other bond form may prevent a contract from forming and/or result in forfeiture of the successful bidder's bid bond.)**

KNOW ALL PERSONS BY THESE PRESENTS:

1.01 WHEREAS, the City of Fort Bragg, 416 N. Franklin Street, Fort Bragg, California 95437 (City) has awarded a Contract to _____ _____ as Principal, dated the _____ day of _____, _____ (the Contract), titled THE _____ PROJECT in the amount of $_____, which Contract is by this reference made a part hereof, for the work of the following Contract:

_____

_____

_____

1.02 WHEREAS, Principal is required to furnish a bond in connection with the Contract to secure the payment of claims of laborers, mechanics, material suppliers, and other persons as provided by law;

1.03 NOW, THEREFORE, we, the undersigned Principal and _____ _____ , as Surety, are held and firmly bound unto City in the sum of 100% OF THE CONTRACT PRICE **($_____)**, for which payment well and truly to be made we bind ourselves, our heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

1.04 THE CONDITION OF THIS OBLIGATION IS SUCH, that if Principal, or its executors, administrators, successors, or assigns approved by City, or its subcontractors shall fail to pay any of the persons named in California Civil Code Section 9100, or amounts due under the State of California Unemployment Insurance Code with respect to work or labor performed under the Contract, or for any amounts required to be deducted, withheld, and paid over to the State of California Employment Development Department from the wages of employees of Principal and subcontractors pursuant to Section 13020 of the State of California Unemployment Insurance Code with respect to such work and labor, that Surety will pay for the same in an amount not exceeding the sum specified in this bond,

plus reasonable attorneys' fees, otherwise the above obligation shall become and be null and void.

1.05 This bond shall inure to the benefit of any of the persons named in California Civil Code Section 9100, as to give a right of action to such persons or their assigns in any suit brought upon this bond. The intent of this bond is to comply with the California Mechanic's Lien Law.

1.06 Surety, for value received, hereby expressly agrees that no extension of time, change, modification, alteration, or addition to the undertakings, covenants, terms, conditions, and agreements of the Contract, or to the work to be performed thereunder, shall in any way affect the obligation of this bond; and it does hereby waive notice of any such extension of time, change, modification, alteration, or addition to the undertakings, covenants, terms, conditions, and agreements of the Contract, or to the work to be performed thereunder.

1.07 Surety's obligations hereunder are independent of the obligations of any other surety for the payment of claims of laborers, mechanics, material suppliers, and other persons in connection with Contract; and suit may be brought against Surety and such other sureties, jointly and severally, or against any one or more of them, or against less than all of them without impairing City's rights against the other.

1.08 Correspondence or claims relating to this bond shall be sent to Surety at the address set forth below.

IN WITNESS WHEREOF, we have hereunto set our hands this ____day of _____ , _____.

| **CONTRACTOR AS PRINCIPAL** | **SURETY** |
|---|---|
| Company: (Corp. Seal) | Company: (Corp. Seal) |
| Signature | Signature |
| Name | Name |
| Title | Title |
| Street Address | Street Address |
| City, State, Zip Code | City, State, Zip Code |

**END OF DOCUMENT**

FORT BRAGG
416 Franklin Street
Fort Bragg, California 95437

## MAINTENANCE BOND

**(Note: The successful bidder must use this form. Use of any other bond form may prevent a contract from forming and/or result in forfeiture of the successful bidder's bid bond.)**

KNOW ALL MEN BY THESE PRESENTS:

WHEREAS the City Council of the CITY OF FORT BRAGG has awarded to _____, (designated as the "PRINCIPAL") a contract for the _____ Project, Project No. _____, which contract and all of the contract documents as defined therein (designated as the "Contract") are hereby made a part hereof; and

WHEREAS, the PRINCIPAL is required under the terms of the Contract to furnish a bond for the correction of any defects due to defective materials or workmanship in the work performed under the Contract.

NOW, THEREFORE, we the PRINCIPAL and the undersigned _____ _____, as surety (designated as "SURETY"), an admitted surety insurer authorized to do business in the State of California, are held and firmly bound unto the CITY OF FORT BRAGG, (designated as the "OBLIGEE"), in the penal sum of _____ Dollars ($_____), lawful money of the United States, being a sum not less than ten percent (10%) of the final Contract price, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors, and assigns jointly and severally, firmly by these presents.

THE CONDITIONS OF THIS OBLIGATION ARE SUCH that if, during a maintenance period of one (1) year from the date of acceptance by the OBLIGEE of the contracted work, the PRINCIPAL upon receiving written notice of a need for repairs which are directly attributable to defective materials or workmanship, shall diligently take the necessary steps to correct said defects within seven (7) days from the date of said notice, then this obligation shall be null and void; otherwise it shall remain in full force and effect.

If any action shall be brought by the OBLIGEE upon this bond, a reasonable attorney's fee, to be fixed by the Court, shall be and become a part of OBLIGEE's judgment in any such action.

No right of action shall accrue on this bond to, or for the use of, any person or corporation other than the OBLIGEE named herein or the heirs, executors, administrator or successor of the OBLIGEE.

IN WITNESS WHEREOF, the above bound parties have executed this instrument under their seals this ____ day of _____, _____ the name and corporate seals

of each corporate party being hereto affixed and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

(Corporate Seal) PRINCIPAL

By:_____

(Acknowledgement) Title:_____

(Corporate Seal) SURETY

By:_____
(Attorney-in-fact)

(Acknowledgement) Title:_____

*(NOTE TO SURETY COMPANY: A certified copy of unrevoked resolution of authority for the attorney-in-fact must be submitted with and attached to the executed bid bond.*

**END OF DOCUMENT**

# EXHIBIT A

## CLAIMS PROCEDURE

SUMMARY OF PUBLIC CONTRACT CODE § 9204

The following procedure will apply to any claims by the Contractor on the City:

A "claim" is a separate demand on the City by a contractor on a public works project and sent by registered mail or certified mail with return receipt requested, for one or more of the following:

- A time extension, including relief from penalties for delay
- Payment by the City of money damages under the terms of the contract
- Payment of an amount that is disputed by the City

Initial Review

The claim must be supported by appropriate documentation. The City has 45 days within which to review the claim and provide the contractor with a written statement identifying the disputed and undisputed portions of the claim. If the City does not issue a written statement, the claim is deemed rejected in its entirety. The City will pay any undisputed portion of the claim within 60 days of issuing the statement.

Meet & Confer

If the contractor disputes the City's written response, or if the City does not issue one, the contractor may request in writing an informal conference to meet and confer for possible settlement of the claim. The City will schedule the meet and confer conference within 30 days of this request and provide a written statement identifying the remaining disputed and undisputed portions of the claim within 10 business days of the meet and confer. The City will pay the undisputed portion within 60 days of issuing this statement.

Mediation

With respect to any disputed portion remaining after the meet and confer, the City and contractor will submit the matter to nonbinding mediation, agree to a mediator within 10 business days after issuing the written statement, and share mediation costs equally. If mediation is unsuccessful, then the terms of the public works agreement and applicable law will govern resolution of the dispute.

Miscellaneous Provisions

Amounts not paid by the City in a timely manner bear interest at 7% per annum. Subcontractors may submit claims via this procedure through the general contractor. The City and contractor may waive the requirement to mediate, but cannot otherwise waive these claim procedures.

# VOLUME 3




# Technical Specifications

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**TECHNICAL SPECIFICATIONS FOR**
**CITY OF FORT BRAGG, CALIFORNIA**
**RAW WATER LINE REPLACEMENT PROJECT, SEGMENTS 2 – 5**
**CITY PROJECT No. 2019-02**


Division 01 – General

| | |
|---|---|
| Section 01 10 00 | Summary |
| Section 01 20 00 | Price and Payment Procedures |
| Section 01 25 00 | Substitution Procedures |
| Section 01 30 00 | Administrative Requirements |
| Section 01 32 16 | Construction Progress Schedule |
| Section 01 33 00 | Submittal Procedures |
| Section 01 40 00 | Quality Requirements |
| Section 01 50 00 | Temporary Facilities and Controls |
| Section 01 60 00 | Product Requirements |
| Section 01 70 00 | Execution and Closeout Requirements |
| Section 01 74 19 | Construction Waste Management |
| Section 01 91 00 | Commissioning |

Division 02 – Existing Conditions

| | |
|---|---|
| Section 02 41 16 | Structure Demolition |
| Section 02 82 13 | Asbestos Abatement for Utilities |

Division 03 – Concrete

| | |
|---|---|
| Section 03 10 00 | Concrete Forming and Accessories |
| Section 03 20 00 | Concrete Reinforcing |

Section 03 30 00 Cast-in-Place Concrete

Section 03 60 00 Grouting

Division 5 – Metals

Section 05 52 00 Metal Railings

Division 6 – Wood, Plastics and Composites

Section 06 10 00 Rough Carpentry

Section 06 17 53 Wood Trusses

Section 06 20 00 Finish Carpentry

Division 7 – Roofing, Waterproofing and Insulation

Section 07 03 11 Fiber Glass Based Asphalt Shingles

Section 07 06 00 Flashing

Section 07 21 03 Batt and Blanket Insulation

Section 07 46 46 Siding

Section 07 92 00 Sealants and Caulking

Division 8 – Windows and Doors

Section 08 11 00 Metal Doors and Frames

Section 08 31 13 Horizontal Access Doors

Section 08 71 00 Door Hardware

Division 09 – Finishes

Section 09 90 00 Painting and Coating

Division 26 – Electrical

Section 26 05 00 Electrical Work – General

Section 26 05 19 Wires and Cables

Section 26 05 26 Grounding

Section 26 05 33 Electrical Raceway Systems

Section 26 05 43 Underground Raceway Systems

Section 26 05 73 Protective Device Studies

Section 26 08 00 Electrical Testing

Section 26 24 13 480V Metering Panel

Section 26 24 19 Low Voltage Motor Control Center

Section 26 27 26 Wiring Devices

Section 26 29 13 Local Control Stations

Section 26 50 00 Lighting

Division 31 – Earthwork

Section 31 05 13 Soils for Earthwork

Section 31 05 16 Aggregates for Earthwork

Section 31 10 00 Site Clearing

Section 31 22 13 Rough Grading

Section 31 23 16 Excavation

Section 31 23 16.13 Trenching

Section 31 23 19 Dewatering

Section 31 23 23 Fill

Division 32 – Exterior Improvements

Section 32 12 16 Asphalt Paving

Section 32 92 19 Seeding

Division 33 – Utilities

Section 33 05 05.31 Hydrostatic Testing

Section 33 05 07 Trenchless Installation of Utility Piping

Section 33 05 09.33 Thrust Restraint for Utility Piping

Section 33 05 63 Concrete Vaults and Chambers

Section 33 14 13 Public Water Utility Distribution Piping

Section 33 14 19 Valves and Hydrants for Water Utility Service

Division 40 – Process interconnections

Section 40 90 00 Process Control and Instrumentation Systems

Section 40 91 00 Process Measurement Devices

Section 40 95 13 Process Control Panels and Hardware

Division 43 – Process gas and liquid handling, purification and storage equipment

Section 43 23 31.23 Overhung Close-Coupled Vertical End Suction Pumps

SECTION 01 10 00 – SUMMARY

PART 1 GENERAL

1.1 SUMMARY

A. This section consists of a description of the items of work included in the bid, the location of the work and constraints on construction sequencing, staging and schedule.

B. Funding for this project has been provided in part from the Budget Act of 2021 and through an agreement with the State of California Department of Water Resources.

1.2 PROJECT LOCATION

A. The project is divided into four segments (Segments 2 – 5) as described below and includes pipeline construction between the City of Fort Bragg's water treatment plant at the intersection of Sherwood Road and Monsen Way, and Forest Road 450. It also includes construction of a new pump station and force main at Newman Reservoir.

B. Segment 2. Pipeline installation associated with this segment will take place between the City of Fort Bragg's water treatment plant at the intersection of Sherwood Road and Monsen Way, and the norther Noyo River floodplain, primarily along a narrow access road bench containing the City's existing raw water pipeline. It also includes a trench crossing of Sherwood Road and work within residential roads in a sub-division south of Sherwood Road. Work will also take place within the water treatment plant site itself. Part of the work is within the Coastal Zone.

C. Segment 3. Pipeline installation associated with this segment will take place from the Georgia Pacific Haul Road east of its bridge crossing of Newman Creek to a pipeline connection adjacent to the City's Summers Lane Reservoir, primarily via existing paths, trails and former log skids up the slopes of and along the top of the western side of the Newman Creek gorge. Segment 3 also includes the construction of a pump station adjacent to the Newman Reservoir, supply and installation of pumps, valves and pipelines in a timber building, a retaining wall, site grading and improvement works, a separate electrical and control equipment compound and a force main to connect the pump station to the pipelines adjacent to Summers Lane Reservoir. The work is located partially within the Coastal Zone.

D. Segment 4. Pipeline installation associated with this segment will take place between the existing raw water main just north of State Highway 20 at Dwyer Lane to a connection with the existing raw water main north of Covington Creek. This

segment includes a jack-and-bore crossing of State Highway 20 and trench construction along Dwyer Lane in residential subdivision paved and gravel roads. Part of the segment includes trench construction in heavily wooded and steep terrain south of the subdivision.

E. Segment 5. Pipeline installation associated with this segment will take place between the existing raw water main at Forest Road 450 and the existing raw water main on the northern slope above Hare Creek. Trench construction will include construction in paths, trails, and former log skids, together with steep, heavily wooded slopes. Segment 5 also includes trenched construction crossing of Hare Creek limited to a mini-excavator with the new pipe placed in a casing. The Hare Creek crossing is subject to significant environmental permit constraints and controls, impacting time of year for construction, construction staging and sequencing, creek flow diversion, allowable construction methods, surface water runoff controls, and spoil storage and disposal.

## 1.3 COOPERATION

A. The Contractor shall be responsible for restricting construction activities to the site, project property, and identified easements provided by the Owner, unless approved by the Construction Manager.

B. The Contractor shall be responsible for minimizing disturbances (noise, dust) to the greatest extent possible to the surrounding residential and commercial areas in compliance with all local codes and requirements.

## 1.4 CONSTRUCTION SEQUENCING, METHODOLOGY, STAGING AND SCHEDULE CONSTRAINTS

A. Construction sequencing, methodology, staging and scheduling for work under the Contract shall be constrained and limited by the following:
   A. Conditions imposed by environmental permits for the project issued by regulators, including State of California Department of Fish and Wildlife Section 1602 Streambed Alteration Agreement(s); U.S. Army Corps of Engineers Nationwide Permit (NWP) 58 (in lieu of a 404 NWP) for water utility lines; Clean Water Act Section 401 administered by the State of California North Coast Regional Water Quality Control Board; and a Coastal Development Permit (CDP) from Mendocino County for work in the Coastal Zone. A CDP waiver has been obtained for the project from the California Coastal Commission.
   B. Conditions imposed by building, grading and any other permits issued or required by the City of Fort Bragg and Mendocino County.
   C. Conditions imposed by a Caltrans Encroachment Permit for the jack-and-bore crossing of State Highway 20 at Dwyer Lane.

D. Hare Creek Crossing construction as detailed on Drawing C36. Construction is to be scheduled for late August / early September 2024, subject to low flow in Hare Creek. Schedule to be agreed with the City and the Engineer.
E. Construction staging areas as detailed on Drawing C35.
F. Maintaining the existing raw water line in service at all times, except when scheduled shutdowns agreed with the City are required to put the new water line into service.
G. Maintaining uninterrupted operations at the City's water treatment plant.
H. 2023 construction season work is limited to:
    a. Segment 2 from the water treatment plant to the Coastal Zone boundary.
    b. Segment 4 from Highway 20 (including the jack-and-bore crossing), through the Dwyer Lane neighborhood as far as the forest road.
    c. Segment 5 from Forest Road 450 to the top of the slope above Hare Creek.
I. These restrictions assume all environmental permits will not be issued until January 2024. If these permits are issued earlier, the City may allow earlier construction of work scheduled for 2024 (see item no. 9 below) if requested by the Contractor.
J. 2024 construction season work includes all other work, including 2023 construction season work not completed at the Contractor's discretion.

1.5 WORK INCLUDED AS BID ITEMS

A. The work under the base bid items of this contract consists of the project elements defined in the Bid Schedule in Section 00 41 00. The Contractor shall organize his Schedule of Values such that all project costs are paid under one of the bid items. If an item of work is not specifically described by an Item Description in the Bid Schedule, it shall be included in the most applicable item.

1.6 ADDITIVE BID ITEM

A. Change AWWA C-900 pipe to AWWA C-909, Class 235 pipe throughout the project
    a. Work under this item shall include substitution of the specified AWWA C-900 pipe with AWWA C-909, Class 235 pipe throughout the project.
    b. The City is not obligated to accept this additive bid item but may choose to make the substitution if in the sole discretion of the City the City feels it is in its best interest.
    c. Bid evaluations will be made on the basis of lowest Total Base Bid or lowest Total Base Bid plus additive Bid Item 8. The City will determine the most advantageous method of bid evaluation.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

# SECTION 01 20 00 – PRICE AND PAYMENT PROCEDURES

## PART 1 GENERAL

### 1.1 SECTION INCLUDES

A. Schedule of Values.

B. Application for Payment.

C. Change procedures.

D. Defect assessment.

E. Unit prices.

F. Alternates.

### 1.2 SCHEDULE OF VALUES

A. Submit schedule; Contractor's standard form or electronic media printout will be considered for this use.

B. Submit Schedule of Values according to City of Fort Bragg Instruction to Bidders.

### 1.3 APPLICATION FOR PAYMENT

A. Submit application for payment according to City of Fort Bragg Volume 2 Contract Documents.

### 1.4 CHANGE PROCEDURES

A. Submittals: Submit name of individual who is authorized to receive change documents and is responsible for informing others in Contractor's employ or Subcontractors of changes to the Work.

B. Carefully study and compare Contract Documents before proceeding with fabrication and installation of Work. Promptly advise Engineer of any error, inconsistency, omission, or apparent discrepancy.

C. Requests for Interpretation (RFI) and Clarifications: Allot time in construction scheduling for liaison with Engineer; establish procedures for handling queries and clarifications.
   1. Use CSI Form 13.2A - Request for Interpretation for requesting interpretations.

2. Engineer may respond with a direct answer on the Request for Interpretation form, Clarification Notice, or Proposal Request.

D. Engineer will advise of minor changes in the Work not involving adjustment to Contract Sum/Price or Contract Time by issuing supplemental instructions.

E. Engineer may issue Notice of Change including a detailed description of proposed change with supplementary or revised Drawings and Specifications, a change in Contract Time for executing the change with stipulation of overtime work required and with the period of time during which the requested price will be considered valid. Contractor will prepare and submit estimate within 14 days.

F. Contractor may propose changes in accordance with the City of Fort Bragg Volume 2 Contract.

G. Construction Change Directive: Engineer may issue directive, signed by Owner, instructing Contractor to proceed with change in the Work, for subsequent inclusion in a Change Order. Document will describe changes in the Work and designate method of determining any change in Contract Sum/Price or Contract Time. Promptly execute change.

H. Document each quotation for change in Project Cost or Time with sufficient data to allow evaluation of quotation.

1.5 DEFECT ASSESSMENT

A. Replace the Work, or portions of the Work, not conforming to specified requirements.

B. If, in the opinion of City of Fort Bragg, it is not practical to remove and replace the Work, City of Fort Bragg will direct appropriate remedy or adjust payment.

C. The defective Work may remain, but unit sum/price will be adjusted to new sum/price at discretion of the City.

D. Defective Work will be partially repaired according to instructions of the City, and unit sum/price will be adjusted to new sum/price at discretion of the City.

E. Authority of the City to assess defects and identify payment adjustments is final.

1.6 UNIT PRICES

A. Take measurements and compute quantities. Engineer will verify measurements and quantities.

B. Unit Quantities: Quantities and measurements indicated on Bid Form are for Contract purposes only. Actual quantities provided shall determine payment.
   1. When actual Work requires more or fewer quantities than those quantities indicated, provide required quantities at contracted unit sum/prices.
   2. When actual Work requires 10 percent or greater change in quantity than those quantities indicated, Owner or Contractor may claim a Contract Price adjustment.

C. Payment Includes: Full compensation for required labor, products, tools, equipment, plant and facilities, transportation, services and incidentals; erection, application, or installation of item of the Work; overhead and profit.

D. Final payment for Work governed by unit prices will be made on basis of actual measurements and quantities accepted by the City multiplied by unit sum/price for Work incorporated in or made necessary by the Work.

1.7 ALTERNATES

A. Alternates quoted on Bid Forms will be reviewed and accepted or rejected at Owner's option. Accepted Alternates will be identified in Owner-Contractor Agreement. The Owner-Contractor Agreement may identify certain Alternates to remain an Owner option for a stipulated period of time.

B. Coordinate related Work and modify surrounding Work. Description for each Alternate is recognized to be abbreviated but requires that each change shall be complete for scope of Work affected.
   1. Coordinate related requirements among Specification Sections as required.
   2. Include as part of each Alternate: Miscellaneous devices, appurtenances, and similar items incidental to or necessary for complete installation.
   3. Coordinate Alternate with adjacent Work and modify or adjust as necessary to ensure integration.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

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# SECTION 01 25 00 – SUBSTITUTION PROCEDURES

## PART 1 GENERAL

### 1.1 SUMMARY

A. Quality assurance.

B. Product substitution procedures.

### 1.2 QUALITY ASSURANCE

A. Contract is based on products and standards established in Contract Documents without consideration of proposed substitutions.

B. Products specified define standard of quality, type, function, dimension, appearance, and performance required in accordance with City of Fort Bragg Volume 2 Contract Documents.

C. Substitution Proposals: Permitted for specified products except where specified otherwise. Do not substitute products unless substitution has been accepted and approved in writing by Owner.

### 1.3 PRODUCT SUBSTITUTION PROCEDURES

A. Substitutions may be considered when a product becomes unavailable through no fault of Contractor.

B. Document each request with complete data, substantiating compliance of proposed substitution with Contract Documents, including:
   1. Manufacturer's name and address, product, trade name, model, or catalog number, performance and test data, and reference standards.
   2. Itemized point-by-point comparison of proposed substitution with specified product, listing variations in quality, performance, and other pertinent characteristics.
   3. Reference to Article and Paragraph numbers in Specification Section.
   4. Cost data comparing proposed substitution with specified product and amount of net change to Contract Sum.
   5. Changes required in other Work.
   6. Availability of maintenance service and source of replacement parts as applicable.
   7. Certified test data to show compliance with performance characteristics specified.
   8. Samples when applicable or requested.
   9. Other information as necessary to assist Engineer's evaluation.

C. A request constitutes a representation that Contractor:
   1. Has investigated proposed product and determined that it meets or exceeds quality level of specified product.
   2. Will provide same warranty for substitution as for specified product.
   3. Will coordinate installation and make changes to other Work that may be required for the Work to be complete with no additional cost to Owner.
   4. Waives claims for additional costs or time extension that may subsequently become apparent.
   5. Will coordinate installation of the accepted substitute, making such changes as may be required for the Work to be complete in all respects.
   6. Will reimburse Owner and Engineer for review or redesign services associated with reapproval by authorities having jurisdiction.

D. Substitutions will not be considered when they are indicated or implied on Shop Drawing or Product Data submittals without separate written request or when acceptance will require revision to Contract Documents.

1.4 INSTALLER SUBSTITUTION PROCEDURES

A. Document each request with:
   1. Installer's qualifications.
   2. Installer's experience in work similar to that specified.
   3. Other information as necessary to assist Engineer's evaluation.

B. Substitution Submittal Procedure:
   1. Submit electronic files to Project website of Request for Substitution for consideration. Limit each request to one proposed substitution.
   2. Engineer will notify Contractor in writing of decision to accept or reject request.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

# SECTION 01 30 00 – ADMINISTRATIVE REQUIREMENTS

## PART 1 GENERAL

### 1.1 SECTION INCLUDES

A. Coordination and Project conditions.

B. Preconstruction meeting.

C. Site mobilization meeting.

D. Progress meetings.

E. Preinstallation meetings.

F. Closeout meeting.

G. Alteration procedures.

### 1.2 COORDINATION AND PROJECT CONDITIONS

A. Coordinate scheduling, submittals, and Work of various Sections of Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements.

B. Verify that utility requirements and characteristics of operating equipment are compatible with building utilities. Coordinate Work of various Sections having interdependent responsibilities for installing, connecting to, and placing operating equipment in service.

C. Coordinate space requirements, supports, and installation of mechanical and electrical Work indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit as closely as practical; place runs parallel with lines of building. Use spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
   1. Coordination Drawings: Prepare as required to coordinate all portions of Work. Show relationship and integration of different construction elements that require coordination during fabrication or installation to fit in space provided or to function as intended. Indicate locations where space is limited for installation and access and where sequencing and coordination of installations are important.

D. Coordination Meetings: In addition to other meetings specified in this Section, hold coordination meetings with personnel and Subcontractors to ensure coordination of Work.

E. In finished areas, conceal pipes, ducts, and wiring within construction. Coordinate locations of fixtures and outlets with finish elements.

1.3 PRECONSTRUCTION MEETING

A. Owner will schedule and preside over meeting after Notice of Award.

B. Attendance Required: Engineer, Owner, appropriate governmental agency representatives, major Subcontractors, and Contractor.

C. Minimum Agenda:
   1. Execution of Owner-Contractor Agreement.
   2. Submission of executed bonds and insurance certificates.
   3. Distribution of Contract Documents.
   4. Submission of list of Subcontractors, list of products, schedule of values, and Progress Schedule.
   5. Designation of personnel representing parties in Contract, and Engineer.
   6. Communication procedures.
   7. Procedures and processing of requests for interpretations, field decisions, field orders, submittals, substitutions, Applications for Payments, proposal request, Change Orders, and Contract closeout procedures.
   8. Scheduling.
   9. Critical Work sequencing.
   10. Scheduling activities of Geotechnical Engineer.

D. Contractor: Record minutes and distribute to participants within two days after meeting, with two copies each to Engineer, Owner, and those affected by decisions made.

1.4 SITE MOBILIZATION MEETING

A. Owner will schedule meeting at Project Site prior to Contractor occupancy. Contractor presides over meeting.

B. Attendance Required: Engineer, Owner, Contractor, and major Subcontractors.

C. Minimum Agenda:
   1. Use of premises by Owner and Contractor.
   2. Owner's requirements.
   3. Construction facilities and controls.

4. Temporary utilities.
5. Survey layout.
6. Security and housekeeping procedures.
7. Schedules.
8. Procedures for testing.
9. Procedures for maintaining record documents.
10. Requirements for startup of equipment.
11. Inspection and acceptance of equipment put into service during construction period.

D. Contractor: Record minutes and distribute to participants within two days after meeting, with two copies each to Engineer, Owner, and those affected by decisions made.

1.5 PROGRESS MEETINGS

A. The City will schedule intermittent progress meeting throughout the duration of work.

B. Attendance Required: Job superintendent, major Subcontractors and suppliers, Engineer, and Owner, as appropriate to agenda topics for each meeting.

C. Minimum Agenda:
1. Review minutes of previous meetings.
2. Review of Work progress.
3. Field observations, problems, and decisions.
4. Identification of problems impeding planned progress.
5. Review of submittal schedule and status of submittals.
6. Review of off-site fabrication and delivery schedules.
7. Maintenance of Progress Schedule.
8. Corrective measures to regain projected schedules.
9. Planned progress during succeeding work period.
10. Coordination of projected progress.
11. Maintenance of quality and work standards.
12. Effect of proposed changes on Progress Schedule and coordination.
13. Other business relating to Work.

D. Contractor: Record minutes and distribute to participants within two days after meeting, with two copies each to Engineer, Owner, and those affected by decisions made.

## 1.6 PREINSTALLATION MEETINGS

A. When required in individual Specification Sections, convene preinstallation meetings at Project Site before starting Work of specific Section.

B. Require attendance of parties directly affecting, or affected by, Work of specific Section.

C. Notify Engineer four days in advance of meeting date.

D. Prepare agenda and preside over meeting:
   1. Review conditions of installation, preparation, and installation procedures.
   2. Review coordination with related Work.

E. Record minutes and distribute to participants within two days after meeting, with two copies each to Engineer, Owner, and those affected by decisions made.

## 1.7 CLOSEOUT MEETING

A. Schedule Project closeout meeting with sufficient time to prepare for requesting Substantial Completion. Preside over meeting and be responsible for minutes.

B. Attendance Required: Contractor, major Subcontractors, Engineer, Owner, and others appropriate to agenda.

C. Notify Engineer four days in advance of meeting date.

D. Minimum Agenda:
   1. Start-up of facilities and systems.
   2. Operations and maintenance manuals.
   3. Testing, adjusting, and balancing.
   4. System demonstration and observation.
   5. Operation and maintenance instructions for Owner's personnel.
   6. Contractor's inspection of Work.
   7. Contractor's preparation of an initial "punch list."
   8. Procedure to request Engineer inspection to determine date of Substantial Completion.
   9. Completion time for correcting deficiencies.
   10. Inspections by authorities having jurisdiction.
   11. Certificate of Occupancy and transfer of insurance responsibilities.
   12. Partial release of retainage.
   13. Final cleaning.
   14. Preparation for final inspection.
   15. Closeout Submittals:
       a. Project record documents.

b. Operating and maintenance documents.
c. Operating and maintenance materials.
d. Affidavits.

16. Final Application for Payment.
17. Contractor's demobilization of Site.
18. Maintenance.

E. Record minutes and distribute to participants within two days after meeting, with two copies each to Engineer, Owner, and those affected by decisions made.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION

3.1 ALTERATION PROCEDURES

A. Designated areas of existing facilities will be occupied for normal operations during progress of construction. Cooperate with Owner in scheduling operations to minimize conflict and to permit continuous usage.
   1. Perform Work not to interfere with operations of occupied areas.
   2. Keep utility and service outages to a minimum and perform only after written approval of Owner.
   3. Clean Owner-occupied areas daily. Clean spillage, overspray, and heavy collection of dust in Owner-occupied areas immediately.

B. Materials: As specified in product Sections; match existing products with new products for patching and extending Work.

C. Employ skilled and experienced installer to perform alteration and renovation Work.

D. Cut, move, or remove items as necessary for access to alterations and renovation Work. Replace and restore at completion.

E. Remove unsuitable material not marked for salvage, including rotted wood, corroded metals, and deteriorated masonry and concrete. Replace materials as specified for finished Work.

F. Remove debris and abandoned items from area and from concealed spaces.

G. Prepare surface and remove surface finishes to permit installation of new Work and finishes.

H. Close openings in exterior surfaces to protect existing Work from weather and extremes of temperature and humidity.

I. Remove, cut, and patch Work to minimize damage and to permit restoring products and finishes to original or specified condition.

J. Refinish existing visible surfaces to remain in renovated spaces, to renewed condition for each material, with neat transition to adjacent finishes.

K. Where new Work abuts or aligns with existing Work, provide smooth and even transition. Patch Work to match existing adjacent Work in texture and appearance.

L. When finished surfaces are cut so that smooth transition with new Work is not possible, terminate existing surface along straight line at natural line of division and submit recommendation to Engineer for review.

M. Where change of plane of 1/4 inch or more occurs, submit recommendation for providing smooth transition to Engineer for review.

N. Trim existing doors to clear new floor finish. Refinish trim to original or specified condition.

O. Patch or replace portions of existing surfaces that are damaged, lifted, discolored, or showing other imperfections.

P. Finish surfaces as specified in individual product Sections.

END OF SECTION

# SECTION 01 32 16 – CONSTRUCTION PROGRESS SCHEDULE

## PART 1 GENERAL

### 1.1 SECTION INCLUDES

A. Submittals.

B. Format.

C. Review and evaluation.

D. Distribution.

### 1.2 SUBMITTALS

A. Prior to the commencement of work, submit draft of proposed complete schedule of submittals. Include written certification that major Subcontractors have reviewed and accepted proposed schedule.

B. Submit updated schedules with each Application for Payment.

C. Schedule Updates:
   1. Overall percent complete, projected and actual.
   2. Completion progress by listed activity and subactivity, to within five working days prior to submittal.
   3. Changes in Work scope and activities modified since submittal.
   4. Delays in submittals or resubmittals, deliveries, or Work.
   5. Adjusted or modified sequences of Work.
   6. Other identifiable changes.
   7. Revised projections of progress and completion.

D. Narrative Progress Report:
   1. Submit with each monthly submission of Progress Schedule.
   2. Summary of Work completed during the past period between reports.
   3. Work planned during the next period.
   4. Explanation of differences between summary of Work completed and Work planned in previously submitted report.
   5. Current and anticipated delaying factors and estimated impact on other activities and completion milestones.
   6. Corrective action taken or proposed.

1.3 FORMAT

A. Computer-generated bar chart schedule to include at least:
   1. Identification and listing in chronological order of those activities reasonably required to complete the Work, including:
      a. Subcontract Work.
      b. Major equipment design, fabrication, factory testing, and delivery dates including required lead times.
      c. Move-in and other preliminary activities.
      d. Equipment and equipment system test and startup activities.
      e. Project closeout and cleanup.
      f. Work sequences, constraints, and milestones.
   2. Listings identified by Specification Section number.
   3. Identification of the following:
      a. Horizontal time frame by year, month, and week.
      b. Duration, early start, and completion for each activity and subactivity.
      c. Critical activities and Project float.
      d. Subschedules to further define critical portions of Work.

1.4 REVIEW AND EVALUATION

A. Participate in joint review and evaluation of schedules with Engineer at each submittal.

B. Evaluate Project status to determine Work behind schedule and Work ahead of schedule.

1.5 DISTRIBUTION

A. Following joint review, distribute copies of updated schedules to Contractor's Project site file, to Subcontractors, suppliers, Engineer, Owner, and other concerned parties.

B. Instruct recipients to promptly report, in writing, problems anticipated by projections shown in schedules.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

SECTION 01 33 00 – SUBMITTAL PROCEDURES

PART 1 GENERAL

A. SUMMARY

B. Definitions.

C. Submittal procedures.

D. Proposed product list.

E. Product data.

F. Use of electronic CAD files of Project Drawings.

G. Shop Drawings.

H. Samples.

I. Design data.

J. Test reports.

K. Certificates.

L. Manufacturer's instructions.

M. Manufacturer's field reports.

N. Erection Drawings.

O. Construction photographs.

P. Contractor review.

Q. Engineer review.

1.2 DEFINITIONS

A. Action Submittals: Written and graphic information and physical samples that require Engineer's responsive action.

B. Informational Submittals: Written and graphic information and physical Samples that do not require Engineer's responsive action. Submittals may be rejected for not complying with requirements.

1.3 SUBMITTAL PROCEDURES

A. Sequentially number transmittal forms beginning with the number “1.0” with the decimal place representing the revision number of the submittal.

B. Identify: Project, Contractor, Subcontractor and supplier, pertinent Drawing and detail number, and Specification Section number appropriate to submittal.

C. Apply Contractor's stamp, signed or initialed, certifying that review, approval, verification of products required, field dimensions, adjacent construction Work, and coordination of information is according to requirements of the Work and Contract Documents.

D. Schedule submittals to expedite Project, and post electronic submittals as PDF electronic files to Project website or submit electronic submittals via email as PDF electronic files. Coordinate submission of related items.

E. For each submittal for review, allow 15 days excluding delivery time to and from Contractor.

F. Identify variations in Contract Documents and product or system limitations that may be detrimental to successful performance of completed Work.

G. When revised for resubmission, identify changes made since previous submission.

H. Distribute copies of reviewed submittals as appropriate. Instruct parties to promptly report inability to comply with requirements.

I. Incomplete Submittals: Engineer will not review. Complete submittals for each item are required. Delays resulting from incomplete submittals are not the responsibility of Engineer.

1.4 PRODUCT DATA

A. Product Data: Action Submittal: Submit to Engineer for review for assessing conformance with information given and design concept expressed in Contract Documents.

B. Post electronic submittals as PDF electronic files to Project website or submit electronic submittals via email as PDF electronic files.

C. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.

D. Indicate product utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

E. After review, produce copies and distribute.

1.5 ELECTRONIC CAD FILES OF PROJECT DRAWINGS

A. Electronic CAD Files of Project Drawings: May only be used to expedite production of Shop Drawings for the Project. Use for other Projects or purposes is not allowed.

B. Electronic CAD Files of Project Drawings: Distributed only under the following conditions:
   1. Use of files is solely at receiver's risk. Engineer does not warrant accuracy of files. Receiving files in electronic form does not relieve receiver of responsibilities for measurements, dimensions, and quantities set forth in Contract Documents. In the event of ambiguity, discrepancy, or conflict between information on electronic media and that in Contract Documents, notify Engineer of discrepancy and use information in hard-copy Drawings and Specifications.
   2. CAD files do not necessarily represent the latest Contract Documents, existing conditions, and as-built conditions. Receiver is responsible for determining and complying with these conditions and for incorporating addenda and modifications.
   3. User is responsible for removing information not normally provided on Shop Drawings and removing references to Contract Documents. Shop Drawings submitted with information associated with other trades or with references to Contract Documents will not be reviewed and will be immediately returned.
   4. Receiver shall not hold Engineer responsible for data or file clean-up required to make files usable, nor for error or malfunction in translation, interpretation, or use of this electronic information.
   5. Receiver shall understand that even though Engineer has computer virus scanning software to detect presence of computer viruses, there is no guarantee that computer viruses are not present in files or in electronic media.
   6. Receiver shall not hold Engineer responsible for such viruses or their consequences, and shall hold Engineer harmless against costs, losses, or damage caused by presence of computer virus in files or media.

1.6 SHOP DRAWINGS

A. Shop Drawings: Action Submittal: Submit to Engineer for assessing conformance with information given and design concept expressed in Contract Documents.

B. Indicate special utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

C. When required by individual Specification Sections, provide Shop Drawings signed and sealed by a professional Engineer responsible for designing components shown on Shop Drawings.
   1. Include signed and sealed calculations to support design.
   2. Submit Shop Drawings and calculations in form suitable for submission to and approval by authorities having jurisdiction.
   3. Make revisions and provide additional information when required by authorities having jurisdiction.

D. Post electronic submittals as PDF electronic files to Project website or submit electronic submittals via email as PDF electronic files.

E. After review, produce copies and distribute.

1.7 SAMPLES

A. Samples: Action Submittal: Submit to Engineer for assessing conformance with information given and design concept expressed in Contract Documents.

B. Samples for Selection as Specified in Product Sections:
   1. Submit to Owner for aesthetic, color, and finish selection.
   2. Submit Samples of finishes, textures, and patterns for Owner selection.

C. Submit Samples to illustrate functional and aesthetic characteristics of products, with integral parts and attachment devices. Coordinate Sample submittals for interfacing work.

D. Include identification on each Sample, with full Project information.

E. Submit number of Samples specified in individual Specification Sections; Engineer will retain one Sample.

F. Reviewed Samples that may be used in the Work are indicated in individual Specification Sections.

G. After review, produce copies and distribute.

1.8 DESIGN DATA

A. Informational Submittal: Submit data for Engineer's knowledge as Contract administrator or for Owner.

B. Submit information for assessing conformance with information given and design concept expressed in Contract Documents.

1.9 TEST REPORTS

A. Informational Submittal: Submit reports for Engineer's knowledge as Contract administrator or for Owner.

B. Submit test reports for information for assessing conformance with information given and design concept expressed in Contract Documents.

1.10 CERTIFICATES

A. Informational Submittal: Submit certification by manufacturer, installation/application Subcontractor, or Contractor to Engineer, in quantities specified for Product Data.

B. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.

C. Certificates may be recent or previous test results on material or product but must be acceptable to Engineer.

1.11 MANUFACTURER'S INSTRUCTIONS

A. Informational Submittal: Submit manufacturer's installation instructions for Engineer's knowledge as Contract administrator or for Owner.

B. Submit printed instructions for delivery, storage, assembly, installation, adjusting, and finishing, to Engineer in quantities specified for Product Data.

C. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

1.12 MANUFACTURER'S FIELD REPORTS

A. Informational Submittal: Submit reports for Engineer's knowledge as Contract administrator or for Owner.

B. Submit report within 5 days of observation to Engineer for information.

C. Submit reports for information for assessing conformance with information given and design concept expressed in Contract Documents.

## 1.13 CONSTRUCTION PHOTOGRAPHS

A. Provide photographs of Site and construction throughout progress of Work produced by an experienced photographer acceptable to Engineer.

B. Each month submit photographs with Application for Payment.

C. Digital Images: Deliver complete set of digital image electronic files to Owner with Project record documents. Identify electronic media with date photographs were taken. Submit images that have same aspect ratio as sensor, uncropped.
   1. Digital Images: Uncompressed TIFF format, produced by digital camera with minimum sensor size of 4.0 megapixels, and image resolution of not less than 1600 by 1200 pixels.
   2. Date and Time: Include date and time in filename for each image.

## 1.14 CONTRACTOR REVIEW

A. Review for compliance with Contract Documents and approve submittals before transmitting to Engineer.

B. Contractor: Responsible for:
   1. Determination and verification of materials including manufacturer's catalog numbers.
   2. Determination and verification of field measurements and field construction criteria.
   3. Checking and coordinating information in submittal with requirements of Work and of Contract Documents.
   4. Determination of accuracy and completeness of dimensions and quantities.
   5. Confirmation and coordination of dimensions and field conditions at Site.
   6. Construction means, techniques, sequences, and procedures.
   7. Safety precautions.
   8. Coordination and performance of Work of all trades.

C. Stamp, sign or initial, and date each submittal to certify compliance with requirements of Contract Documents.

D. Do not fabricate products or begin Work for which submittals are required until approved submittals have been received from Engineer.

## 1.15 ENGINEER REVIEW

A. Do not make "mass submittals" to Engineer. "Mass submittals" are defined as six or more submittals or items in one day or 15 or more submittals or items in one week. If "mass submittals" are received, Engineer's review time stated above will be extended as

necessary to perform proper review. Engineer will review "mass submittals" based on priority determined by Engineer after consultation with Owner and Contractor.

B. Informational submittals and other similar data are for Engineer's information, do not require Engineer's responsive action, and will not be reviewed or returned with comment.

C. Submittals made by Contractor that are not required by Contract Documents may be returned without action.

D. Submittal approval does not authorize changes to Contract requirements unless accompanied by Change Order.

E. Owner may withhold monies due to Contractor to cover additional costs beyond the second submittal review.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

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# SECTION 01 40 00 – QUALITY REQUIREMENTS

## PART 1 GENERAL

### 1.1 SECTION INCLUDES

A. Quality control.

B. Tolerances.

C. References.

D. Labeling.

E. Mockup requirements.

F. Testing and inspection services.

G. Manufacturers' field services.

### 1.2 QUALITY CONTROL

A. Monitor quality control over suppliers, manufacturers, products, services, Site conditions, and workmanship, to produce Work of specified quality.

B. Comply with specified standards as the minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

C. Perform Work using persons qualified to produce required and specified quality.

D. Supervise performance of Work in such manner and by such means to ensure that Work, whether completed or in progress, will not be subjected to harmful, dangerous, damaging, or otherwise deleterious exposure during construction period.

### 1.3 TOLERANCES

A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.

B. Comply with manufacturers' recommended tolerances and tolerance requirements in reference standards. When such tolerances conflict with Contract Documents, request clarification from Engineer before proceeding.

1.4 REFERENCES

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 as of date of Contract Documents except where specific date is established by code.

C. Obtain copies of standards and maintain on Site when required by product Specification Sections.

D. When requirements of indicated reference standards conflict with Contract Documents, request clarification from Engineer before proceeding.

E. Neither contractual relationships, duties, or responsibilities of parties in Contract nor those of Engineer shall be altered from Contract Documents by mention or inference in reference documents.

1.5 LABELING

A. Attach label from agency approved by authorities having jurisdiction for products, assemblies, and systems required to be labeled by applicable code.

B. Label Information: Include manufacturer's or fabricator's identification, approved agency identification, and the following information, as applicable, on each label:
   1. Model number.
   2. Serial number.
   3. Performance characteristics.

C. Manufacturer's Nameplates, Trademarks, Logos, and Other Identifying Marks on Products: Not allowed on surfaces exposed to view in public areas, interior or exterior.

1.6 MOCK-UP REQUIREMENTS

A. Tests will be performed under provisions identified in this Section and identified in individual product Specification Sections.

B. Assemble and erect specified or indicated items with specified or indicated attachment and anchorage devices, flashings, seals, and finishes.

C. Accepted mockups shall be comparison standard for remaining Work.

1.7 TESTING AND INSPECTION SERVICES

A. Testing must comply with the City of Fort Bragg Volume 2 Contract Documents

B. Water Quality must be checked 60 days prior to, and following, the construction of the Hare Creek Crossing according to the permit. Submit any testing plans to the City prior to any testing.

C. Reports shall be submitted to City, Engineer, Contractor, and authorities having jurisdiction, in duplicate, indicating observations and results of tests and compliance or noncompliance with Contract Documents.

D. Retesting or re-inspection required because of nonconformance with specified or indicated requirements shall be performed on instructions from Engineer. Payment for retesting or re-inspection will be charged to Contractor by deducting testing charges from Contract Sum/Price.

1.8 MANUFACTURER'S FIELD SERVICES

A. When specified in individual specification Sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe Site conditions, conditions of surfaces and installation, and quality of workmanship as applicable, and to initiate instructions when necessary.

B. Report observations and Site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturer's written instructions.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

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# SECTION 01 50 00 – TEMPORARY FACILITIES AND CONTROLS

## PART 1 GENERAL

### 1.1 SECTION INCLUDES

A. Temporary Utilities:
   1. Temporary electricity.
   2. Temporary lighting for construction purposes.
   3. Temporary water service.

B. Construction Facilities:
   1. Field offices and sheds.
   2. Vehicular access.
   3. Parking.
   4. Progress cleaning and waste removal.
   5. Project identification.
   6. Traffic regulation.
   7. Fire-prevention facilities.

C. Temporary Controls:
   1. Barriers.
   2. Enclosures and fencing.
   3. Security.
   4. Water control.
   5. Dust control.
   6. Erosion and sediment control.
   7. Noise control.
   8. Pest and rodent control.
   9. Pollution control.

D. Removal of utilities, facilities, and controls.

### 1.2 TEMPORARY ELECTRICITY

A. Provide and pay for power service required from utility source as needed for construction operation.

B. Provide power outlets with branch wiring and distribution boxes located as required for construction operations. Provide suitable, flexible power cords as required for portable construction tools and equipment.

1.3 TEMPORARY LIGHTING FOR CONSTRUCTION PURPOSES

A. Provide and maintain lighting for construction operations.

B. Provide and maintain 1 watt/sq ft lighting to exterior staging and storage areas after dark for security purposes.

1.4 TEMPORARY WATER SERVICE

A. Provide and pay for suitable quality water service as needed to maintain specified conditions for construction operations.

1.5 TEMPORARY SANITARY FACILITIES

A. Provide and maintain required facilities and enclosures. Provide facilities at time of Project mobilization.

B. At end of construction, return existing facilities used for construction operations to same or better condition as original condition.

1.6 FIELD OFFICES AND SHEDS

A. Do not use existing facilities for field offices or for storage.

B. Provide work site offices in accordance with the City of Fort Bragg Volume 2 Contract Documents.

C. Do not use permanent facilities for field offices or for storage.

D. Construction: Portable or mobile buildings, or buildings constructed with floors raised aboveground, securely fixed to foundations with steps and landings at entrance doors.
   1. Construction: Structurally sound, secure, weathertight enclosures for office and storage spaces. Maintain during progress of Work; remove enclosures when no longer needed.
   2. Thermal Resistance of Floors, Walls, and Ceilings: Compatible with occupancy and storage requirements.

E. Environmental Control:
   1. Heating, Cooling, and Ventilating for Offices: Automatic equipment to maintain comfort conditions.
   2. Storage Spaces: Heating and ventilating as needed to maintain products according to Contract Documents; lighting for maintenance and inspection of products.

F. Removal: At completion of Work remove buildings, foundations, utility services, and debris. Restore areas to same or better condition as original condition.

1.7 VEHICULAR ACCESS

A. Extend and relocate vehicular access as Work progress requires and provide detours as necessary for unimpeded traffic flow.

B. Locate as approved by Owner.

C. Provide and maintain access to fire hydrants and control valves free of obstructions.

D. Use existing on-Site roads for construction traffic when possible.

1.8 PARKING

A. Arrange for temporary parking areas to accommodate construction personnel.

B. Locate as approved by Owner.

C. If Site space is not adequate, provide additional off-Site parking.

D. Use of existing on-Site streets and driveways used for construction traffic is permitted. Tracked vehicles are not allowed on paved areas.

E. Use of designated areas of existing parking facilities used by construction personnel is permitted.

F. Maintenance:
   1. Maintain traffic and parking areas in sound condition free of excavated material, construction equipment, products, mud, snow, ice, and the like.
   2. Maintain existing paved areas used for construction; promptly repair breaks, potholes, low areas, standing water, and other deficiencies, to maintain paving and drainage in original condition.

G. Removal, Repair:
   1. Remove temporary materials and construction before Substantial Completion.
   2. Repair existing facilities damaged by use, to original condition.

1.9 PROGRESS CLEANING AND WASTE REMOVAL

A. Maintain areas free of waste materials, debris, and rubbish. Maintain Site in clean and orderly condition.

B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, before enclosing spaces.

C. Broom and vacuum clean interior areas before starting surface finishing, and continue cleaning to eliminate dust.

D. Collect and remove waste materials, debris, and rubbish from Site periodically and dispose of off-Site.

1.10 PROJECT IDENTIFICATION

A. Project Identification Sign:
   1. One painted sign, 32-sq ft area, bottom 6 feet aboveground.
   2. Content:
      a. Project title, and name of Owner.
      b. Names and titles of authorities.
      c. Names and Logo of Engineer.
      d. Name of Prime Contractor.
   3. Graphic Design, Colors, and Style of Lettering: Designated by Engineer.
   4. Sign shall be posted in a prominent location at Project sites or at the City of Fort Bragg's headquarters and shall include the Department of Water Resources color logo and the following disclosure statement:
      a. "Funding for this project has been provided in full or in part from the Budget Act of 2021 and through an agreement with the State Department of Water Resources."

B. Project Informational Signs:
   1. Painted informational signs of same colors and lettering as Project identification sign or standard products; size lettering for legibility at 100-foot distance.
   2. Provide Caltrans traffic agency directional traffic signs to and within Site.
   3. No other signs are allowed without Owner's permission except those required by law.
   4. Sign shall be posted in a prominent location at Project sites or at the City of Fort Bragg's headquarters and shall include the Department of Water Resources color logo and the following disclosure statement:
      a. "Funding for this project has been provided in full or in part from the Budget Act of 2021 and through an agreement with the State Department of Water Resources."

C. Design sign and structure to withstand 60-mph wind velocity.

D. Show content, layout, lettering, color, and sizes of members.

E. Installation:
   1. Install Project identification sign within 15 days after date established by Notice to Proceed.
   2. Erect at location of high public visibility adjacent to main entrance to Site.
   3. Erect supports and framing on secure foundation, rigidly braced and framed to resist wind loadings.
   4. Install sign surface plumb and level, with butt joints. Anchor securely.
   5. Paint exposed surfaces of sign, supports, and framing.

F. Removal: Remove signs, framing, supports, and foundations at completion of Project and restore area.

1.11 TRAFFIC REGULATION

A. Signs, Signals, and Devices:
   1. Post-Mounted and Wall-Mounted Traffic Control and Informational Signs: As approved by authorities having jurisdiction.
   2. Traffic Control Signals: As approved by local jurisdictions.
   3. Traffic Cones, Drums, Flares, and Lights: As approved by authorities having jurisdiction.
   4. Flag Person Equipment: As required by authorities having jurisdiction.

B. Flag Persons: Provide trained and equipped flag persons to regulate traffic when construction operations or traffic encroach on public traffic lanes.

C. Flares and Lights: Use flares and lights during hours of low visibility to delineate traffic lanes and to guide traffic.

D. Haul Routes:
   1. Consult with authorities having jurisdiction and establish public thoroughfares to be used for haul routes and Site access.
   2. Confine construction traffic to designated haul routes.
   3. Provide traffic control at critical areas of haul routes to regulate traffic and to minimize interference with public traffic.

E. Traffic Signs and Signals:
   1. Provide signs at approaches to Site and on Site, at crossroads, detours, parking areas, and elsewhere as needed to direct construction and affected public traffic.
   2. Provide, operate, and maintain traffic control signals to direct and maintain orderly flow of traffic in areas under Contractor's control and areas affected by Contractor's operations.
   3. Relocate signs and signals as Work progresses, to maintain effective traffic control.

F. Removal:
   1. Remove equipment and devices when no longer required.
   2. Repair damage caused by installation.
   3. Remove post settings to depth of 2 feet.

1.12 FIRE-PREVENTION FACILITIES

A. Designate area on Site where smoking is permitted. Provide approved ashtrays in designated smoking areas.

B. Establish fire watch for cutting, welding, and other hazardous operations capable of starting fires. Maintain fire watch before, during, and after hazardous operations until threat of fire does not exist.

C. Portable Fire Extinguishers: NFPA 10; 10-pound capacity, 4A-60B: C UL rating.
   1. Provide minimum of one fire extinguisher in every construction trailer and storage shed.

1.13 BARRIERS

A. Provide barriers to prevent unauthorized entry to construction areas and to protect existing facilities and adjacent properties from damage from construction operations.

B. Provide barricades and covered walkways required by authorities having jurisdiction for public rights-of-way.

C. Tree and Plant Protection: Preserve and protect existing trees and plants designated to remain.
   1. Protect areas within drip lines from traffic, parking, storage, dumping, chemically injurious materials and liquids, ponding, and continuous running water.
   2. Provide 6-foot-high barriers around drip line, with access for maintenance.
   3. Replace trees and plants damaged by construction operations.

D. Protect non-owned vehicular traffic, stored materials, Site, and structures from damage.

1.14 ENCLOSURES AND FENCING

A. Construction: Contractor's option.

B. Provide 6-foot-high fence around construction Site; equip with vehicular and pedestrian gates with locks.

C. Exterior Enclosures:

1. Provide temporary weathertight closure of exterior openings to accommodate acceptable working conditions and protection for products, to allow for temporary heating and maintenance of required ambient temperatures identified in individual Specification Sections, and to prevent entry of unauthorized persons. Provide access doors with self-closing hardware and locks.

1.15 SECURITY

A. Security Program:
   1. Protect Work on existing premises from theft, vandalism, and unauthorized entry.
   2. Initiate program in coordination with Owner's existing security system at Project mobilization.
   3. Maintain program throughout construction period until Owner's acceptance precludes need for Contractor's security.

B. Restrictions:
   1. Do not allow cameras on Site or photographs taken except by written approval of Owner.
   2. Do no work on days indicated in Owner-Contractor Agreement.

1.16 WATER CONTROL

A. Grade Site to drain. Maintain excavations free of water. Provide, operate, and maintain necessary pumping equipment.

B. Protect Site from puddles or running water. Provide water barriers as required to protect Site from soil erosion.

1.17 DUST CONTROL

A. Execute Work by methods that minimize raising dust from construction operations.

B. Provide positive means to prevent airborne dust from dispersing into atmosphere.

1.18 EROSION AND SEDIMENT CONTROL

A. Plan and execute construction by methods to control surface drainage from cuts and fills from borrow and waste disposal areas. Prevent erosion and sedimentation.

B. Provide temporary measures including berms, dikes, drains, and other devices to prevent water flow.

1.19 NOISE CONTROL

A. Provide methods, means, and facilities to minimize noise from and noise produced by construction operations.

1.20 PEST AND RODENT CONTROL

A. Provide methods, means, and facilities to prevent pests and insects from damaging the Work.

B. Provide methods, means, and facilities to prevent rodents from accessing or invading premises.

1.21 POLLUTION CONTROL

A. Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances and pollutants produced by construction operations.

B. Comply with pollution and environmental control requirements of authorities having jurisdiction.

1.22 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

A. Remove temporary utilities, equipment, facilities, and materials before Substantial Completion inspection.

B. Remove underground installations to minimum depth of 2 feet.

C. Clean and repair damage caused by installation or use of temporary Work.

D. Restore existing facilities used during construction to original condition. Restore permanent facilities used during construction to specified condition.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

# SECTION 01 60 00 – PRODUCT REQUIREMENTS

## PART 1 GENERAL

### 1.1 SECTION INCLUDES

A. Products.

B. Product delivery requirements.

C. Product storage and handling requirements.

D. Product options.

### 1.2 PRODUCTS

A. At minimum, comply with specified requirements and reference standards.

B. Specified products define standard of quality, type, function, dimension, appearance, and performance required.

C. Furnish products of qualified manufacturers that are suitable for intended use. Furnish products of each type by single manufacturer unless specified otherwise. Confirm that manufacturer's production capacity can provide sufficient product, on time, to meet Project requirements.

D. Do not use materials and equipment removed from existing premises except as specifically permitted by Contract Documents.

E. Furnish interchangeable components from same manufacturer for components being replaced.

### 1.3 PRODUCT DELIVERY REQUIREMENTS

A. Transport and handle products according to manufacturer's instructions.

B. Promptly inspect shipments to ensure products comply with requirements, quantities are correct, and products are undamaged.

C. Provide equipment and personnel to handle products; use methods to prevent soiling, disfigurement, or damage.

1.4 PRODUCT STORAGE AND HANDLING REQUIREMENTS

A. Store and protect products according to manufacturer's instructions.

B. Store products with seals and labels intact and legible.

C. Store sensitive products in weathertight, climate-controlled enclosures in an environment suitable to product.

D. For exterior storage of fabricated products, place products on sloped supports aboveground.

E. Provide off-Site storage and protection when Site does not permit on-Site storage or protection.

F. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.

G. Store loose granular materials on solid flat surfaces in well-drained area. Prevent mixing with foreign matter.

H. Provide equipment and personnel to store products; use methods to prevent soiling, disfigurement, or damage.

1.5 PRODUCT OPTIONS

A. Products Specified by Reference Standards or by Description Only: Products complying with specified reference standards or description.

B. Products Specified by Naming One or More Manufacturers: Products of one of manufacturers named and complying with Specifications; no options or substitutions allowed.

C. Products Specified by Naming One or More Manufacturers with Provision for Substitutions: Submit Request for Substitution for any manufacturer not named, according to Section 01 25 00 - Substitution Procedures.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

# SECTION 01 70 00 – EXECUTION AND CLOSEOUT REQUIREMENTS

## PART 1 GENERAL

### 1.1 SECTION INCLUDES

A. Field engineering.

B. Closeout procedures.

C. Starting of systems.

D. Demonstration and instructions.

E. Project record documents.

F. Operation and maintenance data.

G. Manual for materials and finishes.

H. Manual for equipment and systems.

I. Spare parts and maintenance products.

J. Product warranties and product bonds.

K. Examination.

L. Preparation.

M. Execution.

N. Cutting and patching.

O. Protecting installed construction.

P. Final cleaning.

### 1.2 FIELD ENGINEERING

A. Employ land surveyor registered in State of California and acceptable to Engineer.

B. Locate and protect survey control and reference points. Promptly notify Engineer of discrepancies discovered.

C. Control datum for survey is indicated on Drawings.

D. Verify setbacks and easements; confirm Drawing dimensions and elevations.

E. Provide field engineering services. Establish elevations, lines, and levels using recognized engineering survey practices.

F. Submit copy of Site drawing signed by land surveyor certifying elevations and locations of the Work are in conformance with Contract Documents.

G. Protect survey control points prior to starting Site Work; preserve permanent reference points during construction.

H. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Engineer.

I. Final Property Survey: Prior to Substantial Completion, prepare final property survey illustrating locations, dimensions, angles, and elevations of buildings and Site Work that have resulted from construction indicating their relationship to permanent bench marks and property lines.
   1. Show significant features (real property) for Project.
   2. Include certification on survey, signed by surveyor, that principal metes, bounds, lines, levels, and elevations of Project are accurately shown.

1.3 CLOSEOUT PROCEDURES

A. Closeout to be in accordance with the City of Fort Bragg Contract Documents.

B. Prerequisites to Substantial Completion: Complete following items before requesting Certification of Substantial Completion, either for entire Work or for portions of Work:
   1. Submit maintenance manuals, Project record documents, digital images of construction photographs, and other similar final record data in compliance with this Section.
   2. Complete facility startup, testing, adjusting, balancing of systems and equipment, demonstrations, and instructions to Owner's operating and maintenance personnel as specified in compliance with this Section.
   3. Conduct inspection to establish basis for request that Work is substantially complete. Create comprehensive list (initial punch list) indicating items to be completed or corrected, value of incomplete or nonconforming Work, reason for being incomplete, and date of anticipated completion for each item. Include copy of list with request for Certificate of Substantial Completion.
   4. Obtain and submit releases enabling Owner's full, unrestricted use of Project and access to services and utilities. Include certificate of occupancy, operating

certificates, and similar releases from authorities having jurisdiction and utility companies.
5. Deliver tools, spare parts, extra stocks of material, and similar physical items to Owner.
6. Make final change-over of locks and transmit keys directly to Owner. Advise Owner's personnel of change-over in security provisions.
7. Discontinue or change over and remove temporary facilities and services from Project Site, along with construction tools, mockups, and similar elements.
8. Perform final cleaning according to this Section.

C. Substantial Completion Inspection:
1. When Contractor considers Work to be substantially complete, submit to Owner:
   a. Written certificate that Work, or designated portion, is substantially complete.
   b. List of items to be completed or corrected (initial punch list).
2. Owner will make inspection to determine whether Work or designated portion is substantially complete.
3. Should Owner determine that Work is not substantially complete:
   a. Owner will promptly notify Contractor in writing, stating reasons for its opinion.
   b. Contractor shall remedy deficiencies in Work and send second written request for Substantial Completion to Owner.
   c. Owner will reinspect Work.
   d. Redo and Inspection of Deficient Work: Repeated until Work passes Owner's inspection.
4. When Owner finds that Work is substantially complete, Owner will:
   a. Prepare Certificate of Substantial Completion on EJCDC C-625 - Certificate of Substantial Completion, accompanied by Contractor's list of items to be completed or corrected as verified and amended by Engineer and Owner (final punch list).
   b. Submit Certificate to Owner and Contractor for their written acceptance of responsibilities assigned to them in Certificate.
5. After Work is substantially complete, Contractor shall:
   a. Allow Owner occupancy of Project under provisions stated in Certificate of Substantial Completion.
   b. Complete Work listed for completion or correction within time period stipulated.

D. Prerequisites for Final Completion: Complete following items before requesting final acceptance and final payment.
1. When Contractor considers Work to be complete, submit written certification that:
   a. Contract Documents have been reviewed.
   b. Work has been examined for compliance with Contract Documents.

c. Work has been completed according to Contract Documents.
d. Work is completed and ready for final inspection.

2. Submittals: Submit following:
   a. Final punch list indicating all items have been completed or corrected.
   b. Final payment request with final releases and supporting documentation not previously submitted and accepted. Include certificates of insurance for products and completed operations where required.
   c. Specified warranties, workmanship/maintenance bonds, maintenance agreements, and other similar documents.
   d. Accounting statement for final changes to Contract Sum.
   e. Contractor's affidavit of payment of debts and claims on AIA G706 - Contractor's Affidavit of Payment of Debts and Claims.
   f. Contractor affidavit of release of liens on AIA G706A - Contractor's Affidavit of Release of Liens.
   g. Consent of surety to final payment on AIA G707 - Consent of Surety to Final Payment Form.
3. Perform final cleaning for Contractor-soiled areas according to this Section.

E. Final Completion Inspection:
1. Owner will make inspection to determine whether Work or designated portion is complete.
2. Should Owner consider Work to be incomplete or defective:
   a. Owner will promptly notify Contractor in writing, listing incomplete or defective Work.
   b. Contractor shall remedy stated deficiencies and send second written request to Owner that Work is complete.
   c. Owner will reinspect Work.
3. Redo and Inspection of Deficient Work: Repeated until Work passes Owner's inspection.

1.4 STARTING OF SYSTEMS

A. Coordinate schedule for startup of various equipment and systems.

B. Notify Owner seven days prior to startup of each item.

C. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions which may cause damage.

D. Verify that tests, meter readings, and electrical characteristics agree with those required by equipment or system manufacturer.

E. Verify that wiring and support components for equipment are complete and tested.

F. Execute startup under supervision of manufacturer's representative or Contractors' personnel according to manufacturer's instructions.

G. When specified in individual Specification Sections, require manufacturer to provide authorized representative who will be present at Site to inspect, check, and approve equipment or system installation prior to startup and will supervise placing equipment or system in operation.

H. Submit a written report that equipment or system has been properly installed and is functioning correctly.

1.5 DEMONSTRATION AND INSTRUCTIONS

A. Demonstrate operation and maintenance of products to Owner's personnel two weeks prior to date of final inspection.

B. Demonstrate Project equipment and instruct in classroom environment and instructed by manufacturer's representative who is knowledgeable about the Project.

C. Video Recordings: Provide high-quality color video recordings of demonstration and instructional sessions. Engage commercial videographer to record sessions. Include classroom instructions, demonstrations, board diagrams, and other visual aids. Include menu navigation.

D. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.

E. Use operation and maintenance manuals as basis for instruction. Review contents of manual with Owner's personnel in detail to explain all aspects of operation and maintenance.

F. Demonstrate startup, operation, control, adjustment, troubleshooting, servicing, maintenance, and shutdown of each item of equipment at agreed time, at designated location.

G. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.

1.6 PROJECT RECORD DOCUMENTS

A. Maintain on Site one set of the following record documents; record actual revisions to the Work:

1. Drawings.
2. Specifications.
3. Addenda.
4. Change Orders and other modifications to the Contract.
5. Reviewed Shop Drawings, product data, and Samples.
6. Manufacturer's instruction for assembly, installation, and adjusting.

B. Ensure entries are complete and accurate, enabling future reference by Owner.

C. Store record documents separate from documents used for construction.

D. Record information concurrent with construction progress, not less than weekly.

E. Specifications: Legibly mark and record, at each product Section, description of actual products installed, including the following:
1. Manufacturer's name and product model and number.
2. Product substitutions or alternates used.
3. Changes made by Addenda and modifications.

F. Record Drawings: Legibly mark each item to record actual construction as follows:
1. Include Contract modifications such as Addenda, supplementary instructions, change directives, field orders, minor changes in the Work, and change orders.
2. Include locations of concealed elements of the Work.
3. Identify depth of buried utility lines and provide dimensions showing distances from permanent facility components that are parallel to utilities.
4. Dimension ends, corners, and junctions of buried utilities to permanent facility components using triangulation.
5. Identify and locate existing buried or concealed items encountered during Project.
6. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
7. Field changes of dimension and detail.
8. Details not on original Drawings.

G. Submit marked-up paper copy documents to Engineer with claim for final Application for Payment.

H. Submit PDF electronic files of marked-up documents to Engineer with claim for final Application for Payment.

1.7 OPERATION AND MAINTENANCE DATA

A. Submit in PDF composite electronic indexed file.

B. Submit data bound in 8-1/2 x 11-inch text pages, three D side ring binders with durable plastic covers.

C. Prepare binder cover with printed title "OPERATION AND MAINTENANCE INSTRUCTIONS," title of Project, and subject matter of binder when multiple binders are required.

D. Internally subdivide binder contents with permanent page dividers, logically organized as described below; with tab titling clearly printed under reinforced laminated plastic tabs.

E. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

F. Contents: Prepare table of contents for each volume, with each product or system description identified, typed on white paper, in three parts as follows:
   1. Part 1: Directory, listing names, addresses, and telephone numbers of Engineer, Contractor, Subcontractors, and major equipment suppliers.
   2. Part 2: Operation and maintenance instructions, arranged by process flow and subdivided by Specification Section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Include the following:
      a. Significant design criteria.
      b. List of equipment.
      c. Parts list for each component.
      d. Operating instructions.
      e. Maintenance instructions for equipment and systems.
      f. Maintenance instructions for finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.
      g. Safety precautions to be taken when operating and maintaining or working near equipment.
   3. Part 3: Project documents and certificates, including the following:
      a. Shop Drawings and product data.
      b. Air and water balance reports.
      c. Certificates.
      d. Originals of warranties and bonds.

1.8 MANUAL FOR MATERIALS AND FINISHES

A. Submit two copies of preliminary draft or proposed formats and outlines of contents before start of Work. Engineer will review draft and return one copy with comments.

B. For equipment or component parts of equipment put into service during construction and operated by Owner, submit documents within ten days after acceptance.

C. Submit one copy of completed volumes 15 days prior to final inspection. Draft copy be reviewed and returned after final inspection, with Engineer comments. Revise content of document sets as required prior to final submission.

D. Submit two sets of revised final volumes within ten days after final inspection.

E. Submit in PDF composite electronic indexed file of final manual within ten days after final inspection.

F. Building Products, Applied Materials, and Finishes: Include product data, with catalog number, size, composition, and color and texture designations.

G. Instructions for Care and Maintenance: Include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.

H. Moisture Protection and Weather Exposed Products: Include product data listing applicable reference standards, chemical composition, and details of installation. Include recommendations for inspections, maintenance, and repair.

I. Additional Requirements: As specified in individual product Specification Sections.

J. Include listing in table of contents for design data, with tabbed fly sheet and space for insertion of data.

1.9 MANUAL FOR EQUIPMENT AND SYSTEMS

A. Submit two copies of preliminary draft or proposed formats and outlines of contents before start of Work. Engineer will review draft and return one copy with comments.

B. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit documents within ten days after acceptance.

C. Submit one copy of completed volumes 15 days prior to final inspection. Draft copy will be reviewed and returned after final inspection, with Engineer comments. Revise content of document sets as required prior to final submission.

D. Submit two sets of revised final volumes within ten days after final inspection.

E. Submit in PDF composite electronic indexed file of final manual within ten days after final inspection.

F. Each Item of Equipment and Each System: Include description of unit or system and component parts. Identify function, normal operating characteristics, and limiting

conditions. Include performance curves, with engineering data and tests, and complete nomenclature and model number of replaceable parts.

G. Panelboard Circuit Directories: Provide electrical service characteristics, controls, and communications; typed.

H. Include color-coded wiring diagrams as installed.

I. Operating Procedures: Include startup, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shutdown, and emergency instructions. Include summer, winter, and special operating instructions.

J. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and troubleshooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

K. Include servicing and lubrication schedule and list of lubricants required.

L. Include manufacturer's printed operation and maintenance instructions.

M. Include sequence of operation by controls manufacturer.

N. Include original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

O. Include control diagrams by controls manufacturer as installed.

P. Include Contractor's coordination drawings with color-coded piping diagrams as installed.

Q. Include charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.

R. Include list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.

S. Include test and balancing reports.

T. Additional Requirements: As specified in individual product Specification Sections.

U. Include listing in table of contents for design data with tabbed dividers and space for insertion of data.

## 1.10 SPARE PARTS AND MAINTENANCE PRODUCTS

A. Furnish spare parts, maintenance, and extra products in quantities specified in individual Specification Sections.

B. Deliver to Project Site and place in location as directed by Owner; obtain receipt prior to final payment.

## 1.11 PRODUCT WARRANTIES AND PRODUCT BONDS

A. Obtain warranties and bonds executed in duplicate by responsible Subcontractors, suppliers, and manufacturers within ten days after completion of applicable item of Work.

B. Execute and assemble transferable warranty documents and bonds from Subcontractors, suppliers, and manufacturers.

C. Verify documents are in proper form, contain full information, and are notarized.

D. Co-execute submittals when required.

E. Include table of contents and assemble in three D side ring binder with durable plastic cover.

F. Submit prior to final Application for Payment.

G. Time of Submittals:
   1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within ten days after acceptance.
   2. Make other submittals within ten days after date of Substantial Completion, prior to final Application for Payment.
   3. For items of Work for which acceptance is delayed beyond Substantial Completion, submit within ten days after acceptance, listing date of acceptance as beginning of warranty or bond period.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that existing Site conditions and substrate surfaces are acceptable for subsequent Work. Beginning new Work means acceptance of existing conditions.

B. Verify that existing substrate is capable of structural support or attachment of new Work being applied or attached.

C. Examine and verify specific conditions described in individual Specification Sections.

D. Verify that utility services are available with correct characteristics and in correct locations.

3.2 PREPARATION

A. Clean substrate surfaces prior to applying next material or substance according to manufacturer's instructions.

B. Seal cracks or openings of substrate prior to applying next material or substance.

C. Apply manufacturer-required or -recommended substrate primer, sealer, or conditioner prior to applying new material or substance in contact or bond.

3.3 EXECUTION

A. Comply with manufacturer's installation instructions, performing each step in sequence. Maintain one set of manufacturer's installation instructions at Project Site during installation and until completion of construction.

B. When manufacturer's installation instructions conflict with Contract Documents, request clarification from Engineer before proceeding.

C. Verify that field measurements are as indicated on approved Shop Drawings or as instructed by manufacturer.

D. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, or disfigurement.
   1. Secure Work true to line and level and within specified tolerances, or if not specified, industry-recognized tolerances.

2. Physically separate products in place, provide electrical insulation, or provide protective coatings to prevent galvanic action or corrosion between dissimilar metals.
3. Exposed Joints: Provide uniform joint width and arrange to obtain best visual effect. Refer questionable visual-effect choices to Engineer for final decision.

E. Allow for expansion of materials and building movement.

F. Climatic Conditions and Project Status: Install each unit of Work under conditions to ensure best possible results in coordination with entire Project.
1. Isolate each unit of Work from incompatible Work as necessary to prevent deterioration.
2. Coordinate enclosure of Work with required inspections and tests to minimize necessity of uncovering Work for those purposes.

G. Mounting Heights: Where not indicated, mount individual units of Work at industry recognized standard mounting heights for particular application indicated.
1. Refer questionable mounting heights choices to Engineer for final decision.
2. Elements Identified as Accessible to Handicapped: Comply with applicable codes and regulations.

H. Adjust operating products and equipment to ensure smooth and unhindered operation.

I. Clean and perform maintenance on installed Work as frequently as necessary through remainder of construction period. Lubricate operable components as recommended by manufacturer.

## 3.4 CUTTING AND PATCHING

A. Employ skilled and experienced installers to perform cutting and patching.

B. Submit written request in advance of cutting or altering elements affecting:
1. Structural integrity of element.
2. Integrity of weather-exposed or moisture-resistant elements.
3. Efficiency, maintenance, or safety of element.
4. Visual qualities of sight-exposed elements.
5. Work of Owner or separate contractor.

C. Execute cutting, fitting, and patching including excavation and fill to complete Work and to:
1. Fit the several parts together, to integrate with other Work.
2. Uncover Work to install or correct ill-timed Work.
3. Remove and replace defective and nonconforming Work.

4. Remove samples of installed Work for testing.
5. Provide openings in elements of Work for penetrations of mechanical and electrical Work.

D. Execute Work by methods to avoid damage to other Work and to provide proper surfaces to receive patching and finishing.

E. Cut masonry and concrete materials using masonry saw or core drill.

F. Restore Work with new products according to requirements of Contract Documents.

G. Fit Work tight to pipes, sleeves, ducts, conduits, and other penetrations through surfaces.

H. Maintain integrity of wall, ceiling, or floor construction; completely seal voids.

I. Refinish surfaces to match adjacent finishes. For continuous surfaces, refinish to nearest intersection; for assembly, refinish entire unit.

J. Identify hazardous substances or conditions exposed during the Work to Engineer for decision or remedy.

## 3.5 PROTECTING INSTALLED CONSTRUCTION

A. Protect installed Work and provide special protection where specified in individual Specification Sections.

B. Provide temporary and removable protection for installed products. Control activity in immediate Work area to prevent damage.

C. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.

D. Use durable sheet materials to protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects.

E. Prohibit traffic or storage upon waterproofed or roofed surfaces. When traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.

F. Prohibit traffic from landscaped areas.

## 3.6 FINAL CLEANING

A. Execute final cleaning prior to final Project assessment.

B. Employ experienced personnel or professional cleaning firm.

C. Clean equipment and fixtures to sanitary condition with appropriate cleaning materials.

D. Clean Site; sweep paved areas, rake clean landscaped surfaces.

E. Remove waste and surplus materials, rubbish, and construction facilities from Site.

END OF SECTION

SECTION 01 74 19 – CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Construction waste management plan.
   2. Construction waste recycling.
   3. Construction waste adaptive reuse.

1.2 PLAN REQUIREMENTS

A. Develop and implement construction waste management plan as approved by Owner.

B. Intent:
   1. Divert construction, demolition, and land-clearing debris from landfill disposal.
   2. Redirect recyclable material back to manufacturing process.
   3. Generate cost savings or increase minimal additional cost to Project for waste disposal.

1.3 SUBMITTALS

A. Construction Waste Management Plan: Submit construction waste management plan describing methods and procedures for implementation and monitoring compliance including the following:
   1. Transportation company hauling construction waste to waste processing facilities.
   2. Recycling and adaptive reuse processing facilities and waste type each facility will accept.
   3. Construction waste materials anticipated for recycling and adaptive reuse.
   4. On-Site sorting and Site storage methods.

B. Submit documentation prior to Substantial Completion substantiating construction waste management plan was maintained and goals were achieved.
   1. Trash: Quantity by weight deposited in landfills. Include associated fees, transportation costs, container rentals, and taxes for total cost of disposal.
   2. Salvaged Material: Quantity by weight with destination for each type of material salvaged for resale, recycling, or adaptive reuse. Include associated fees, transportation costs, container rentals, taxes for total cost of disposal, and reimbursements due to salvage resale.
   3. Total Cost: Indicate total cost or savings for implementation of construction waste management plan.

## 1.4 CONSTRUCTION WASTE MANAGEMENT PLAN

A. Construction Waste Landfill Diversion: Minimum 50 percent by weight of construction waste materials for duration of Project through resale, recycling, or adaptive reuse.

B. Implement construction waste management plan at start of construction.

C. Review construction waste management plan at preconstruction meeting and progress meetings.

D. Distribute approved construction waste management plan to Subcontractors and others affected by plan requirements.

E. Oversee plan implementation, instruct construction personnel for plan compliance, and document plan results.

F. Purchase products to prevent waste by:
   1. Ensuring correct quantity of each material is delivered to Site.
   2. Choosing products with minimal or no packaging.
   3. Requiring suppliers to use returnable pallets or containers.
   4. Requiring suppliers to take or buy back rejected or unused items.

## 1.5 CONSTRUCTION WASTE RECYCLING

A. Use source separation method or comingling method suitable to sorting and processing method of selected recycling center. Dispose nonrecyclable trash separately into landfill.

B. Source Separation Method: Recyclable materials separated from trash and sorted into separate bins or containers, identified by waste type, prior to transportation to recycling center.

C. Comingling Method: Recyclable materials separated from trash and placed in unsorted bins or container for sorting at recycling center.

## 1.6 CONSTRUCTION WASTE ADAPTIVE REUSE

A. Arrange with processing facility for salvage of construction material and processing for reuse. Do not reuse construction materials on-Site except as allowed by Owner.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION

3.1 CONSTRUCTION WASTE COLLECTION

A. Collect construction waste materials in marked bins or containers and arrange for transportation to recycling centers or adaptive salvage and reuse processing facilities.

B. Maintain recycling and adaptive reuse storage and collection area in orderly arrangement with materials separated to eliminate co-mingling of materials required to be delivered separately to waste processing facility.

3.2 CONSTRUCTION WASTE DISPOSAL

A. Deliver construction waste to waste processing facilities. Obtain receipt for deliveries.

B. Dispose of construction waste not capable of being recycled or adaptively reused by delivery to landfill, incinerator, or other legal disposal facility. Obtain receipt for deliveries.

END OF SECTION

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SECTION 01 91 00 – COMMISSIONING

PART 1 GENERAL

A. SUMMARY

B. This Section specifies the installation, testing, and commissioning for all mechanical, electrical and instrumentation systems.

C. Section includes:
   1. General
   2. Submittals
   3. Closeout Submittals
   4. Commissioning responsibilities
   5. Commissioning reports
   6. Sequencing
   7. Test equipment
   8. Examination
   9. Delivery acceptance tests and inspections
   10. Verification check and startup procedures
   11. Functional performance test procedures
   12. Function performance test methods
   13. Deficiencies and test approvals
   14. Demonstration

1.2 GENERAL

A. Commissioning: systematic process of ensuring systems perform interactively according to design intent and Owner's operational needs. Commissioning process encompasses and coordinates system documentation, equipment startup, control system calibration, testing and balancing, performance testing and training, and verification of actual performance.

B. Commissioning intent:
   1. Verify equipment and systems are installed according to manufacturer's instructions, industry accepted minimum standards, and Contract Documents.
   2. Verify equipment and systems receive adequate operational checkout by Contractor.
   3. Verify and document proper performance of equipment and systems.
   4. Verify complete operation and maintenance documentation is delivered to Owner.
   5. Verify Owner's operating and maintenance personnel are adequately trained.

C. Equipment and systems to be commissioned:
   1. All equipment and partially complete or fully completed portions of the Work included in the Contract Documents shall be tested and inspected to demonstrate compliance with the requirements.
   2. Unless otherwise specified, all costs of testing, including temporary facilities and connections, shall be borne by the Contractor.
   3. For the purpose of this Section, equipment shall mean all mechanical, electrical, instrumentation, or other devices with one or more moving parts or devices requiring an electrical, pneumatic, or hydraulic connection.

D. Sections of these Specifications contain additional testing and commissioning procedures for specific systems, equipment, and components.

E. Tolerances:
   1. Test results shall be within the tolerances set forth in the detailed Specification Sections of this contract document.
   2. If no tolerances have been specified, test results shall conform to tolerances established by recognized industry practice.

F. Commissioning does not relieve Contractor of responsibility to provide finished and fully functioning Project.

G. Commissioning process overview and general order of commissioning tasks:
   1. Commissioning begins with initial commissioning meeting. Conduct progress commissioning meetings throughout construction to plan, scope, coordinate, and schedule future activities and to resolve problems.
   2. Submit equipment documentation to Construction Manager during normal submittals with detailed startup procedures.
   3. Develop and submit to the Construction Manager startup plans and startup documentation formats, including verification checklists to be completed by installers, during verification check and startup process. Construction Manager reviews procedures and approves or requires revisions and resubmittal.
   4. In general, checkout and performance verification proceeds from simple to complex, that is, from component level to equipment to systems and intersystem levels, with verification checklists being completed before functional testing.
   5. Equipment and system installers execute and document verification checklists and perform verification check and startup. Construction Manager verifies that checklists and startup were completed according to approved plans. Items of noncompliance in material, installation, or setup are corrected at Contractor's expense, and system is retested.

6. Contractor develops and submits to the Construction Manager specific equipment and system functional performance test procedures. Construction Manager reviews procedures and approves or requires revisions and resubmittal.
7. Equipment and system installers execute and document functional performance tests under direct observation of the Construction Manager. Items of noncompliance in functional capacity, system interaction, safety, or operational intent are corrected at Contractor's expense, and system is retested.
8. Construction Manager reviews operation and maintenance documentation for completeness.
9. Construction Manager reviews, approves, and coordinates training provided by equipment and system installers and verifies training was completed.
10. Commissioning is completed before final completion.

1.3 SUBMITTALS

A. Furnish one copy of reviewed and approved submittals to Construction Manager.
   1. Make submittals for each piece of equipment or system within 10 days of approval.

B. Furnish one complete set of preliminary operation and maintenance data manuals to Construction Manager for each piece of equipment or system to be commissioned.
   1. Submit required manuals within 30 days after submittals for each piece of equipment or system required under Section 01 33 00 - Submittal Procedures are approved.
   2. Make additional submittals to Construction Manager for each piece of equipment or system to be commissioned. Incorporate submittal information into related operation and maintenance manuals. Include the following:
      a. Manufacturer's field checkout forms to be used by factory or field technicians.
      b. Other documentation necessary for commissioning process.
      c. Other documents requested by the Construction Manager.

C. Furnish two copies of verification check and startup plan to Construction Manager for review and approval. Include the following at minimum:
   1. Construction Manager's verification checklists with party responsible for each item indicated.
   2. Manufacturer's standard startup procedures copied from installation manuals.
   3. Manufacturer's standard field checkout sheets.
   4. Supplemental procedures and checklists prepared by equipment and system installers to accommodate Project conditions.
   5. Sensor and actuator calibration procedures.
   6. Include boxes or lines for recording and documenting, checking, and inspections of each procedure and summary statement with signature block at end of plan.

7. The verification check and startup plan shall be maintained by the Contractor and shall cover all components in the Project including piping, equipment, electrical, and instrumentation. The verification check and startup plan shall be provided with loose leaf pages which shall be copied weekly after updating for transmittal to the Construction Manager. At the completion of the project, the complete master test log book shall be submitted to the Construction Manager.

D. Furnish two copies of each functional performance test procedure to Construction Manager for review and approval. Include the following at minimum:
   1. Test procedures to demonstrate that each piece of equipment and system is operating according to design intent and Contract Documents.
   2. Test procedures to verify performance of individual components and systems.
   3. Test procedures to verify performance of interactions between systems.
   4. Complete functional test plan for each piece of equipment or system.
   5. Sequential plan to operate each piece of equipment and system through each specified mode of operation including seasonal, partial load, and full load conditions.
   6. Checklist to record verification of each sequence in sequences of operation.
   7. Test procedures for proper responses to power failure, freezing, overheating, low oil pressure, no flow, equipment failure, and other abnormal conditions as applicable.
   8. Designate party assigned to perform each procedure.
   9. Include boxes or line for recording completion and results of each procedure. Include space for signing and dating as each part of the plan is executed.
   10. Submit executed plan to Construction Manager within four days of completion.
   11. Identify and correct areas of deficient performance.

E. Submit written training plan to Construction Manager for review and approval prior to conducting training including the following:
   1. Equipment included in training session.
   2. Intended audience.
   3. Location of training.
   4. Objectives.
   5. Subjects covered.
   6. Duration of training on each subject.
   7. Instructor for each subject.
   8. Instructional methods to be used.

F. Construction Manager will review and approve submittals for conformance to Contract Documents as related to commissioning process.

## 1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: submit operation and maintenance data as specified in Section 01 33 00 – Submittal Procedures
   1. Submittals made to Construction Manager for commissioning do not constitute compliance with operation and maintenance manual documentation.
   2. Acceptable operating and maintenance data shall be delivered to the Construction Manager.

B. Commissioning Record: Contractor will submit two copies of commissioning record for inclusion in operation and maintenance manuals. Furnish records in following format, arranged by system, with each part separated by tabbed flyleafs:
   1. Final commissioning report including the following:
      a. Executive summary with list and roles of participants.
      b. Brief Project description.
      c. Overview of commissioning and testing scope.
      d. General description of testing and verification methods.
   2. For each piece of commissioned equipment include a statement regarding compliance with Contract Documents in the following areas:
      a. Equipment Specifications.
      b. Equipment installation.
      c. Functional performance and efficiency.
      d. Equipment design intent.
      e. Operator training.
      f. Include recommendations for improvement to equipment or operations.
      g. List outstanding deficiencies referenced to specific functional test, inspection, trend log, or other record where deficiency is documented.
      h. Include brief description of verification method used as well as observations and conclusions from testing for each commissioned piece of equipment and system.
      i. Startup plan and report, approvals, corrections, and blank verification checklists.
      j. Separate data for each equipment type with tabbed dividers.
      k. Include: completed functional tests, approvals and corrections, training plan, blank functional test forms, and recommended re-commissioning schedule.

## 1.5 COMMISSIONING RESPONSIBILITIES

A. Engineer responsibilities:
   1. Clarify operation and control of commissioned equipment when Specifications, Drawings, or equipment documentation is not sufficient for writing detailed testing procedures.

2. Coordinate resolution of design issues affecting system performance identified during commissioning.
3. Coordinate resolution of system deficiencies identified during commissioning, according to Contract Documents.
4. Review and approve operation and maintenance manuals.
5. Review verification checklists for major pieces of equipment.
6. Review functional test procedure forms for major pieces of equipment.

B. Construction Manager's responsibilities:
   1. Perform site observation of each system immediately before system startup.
   2. Basic Responsibilities:
      a. Coordinate, direct, and approve commissioning Work.
      b. Coordinate execution of commissioning plan Revise commissioning plan to suit Project conditions.
      c. Schedule commissioning Work with Contractor for inclusion in Progress Schedule.
      d. Plan and conduct commissioning meetings.
      e. Review commissioning submittals required to perform commissioning tasks.
      f. Approve verification check and startup plan submitted Contractor.
      g. Approve all functional performance test procedures submitted by Contractor.
      h. Attend Project progress meetings Review meeting minutes Resolve potential conflicts with commissioning activities.
      i. Observe equipment and system installations.
      j. Approve documentation that equipment and systems are installed and perform according to design intent and Contract Documents.
      k. Notify Owner of deficiencies.
      l. Coordinate and supervise required seasonal or deferred testing and deficiency corrections.
      m. Oversee and approve content and adequacy of Owner's personnel training.
   3. Detailed responsibilities:
      a. Witness and document each piping, electrical, and mechanical system testing, cleaning, and flushing.
      b. Approve verification tests and checklist completion by reviewing verification checklist reports, site observation, and spot checking.
      c. Approve system startup by reviewing startup reports and site observation.
      d. Oversee functional testing of control system. Approve control system for use for test and balance operations.
      e. Coordinate, witness, and approve manual functional performance tests performed by equipment and system installers. Coordinate retesting until satisfactory performance is achieved.
      f. Maintain deficiency and resolution log and separate testing record. Submit progress reports and test results with recommended actions to Owner.

g. Review documentation for factory performance tests that Construction Manager does not oversee.
h. Review equipment warranties to ensure Owner's responsibilities are defined.
i. Return to site minimum of two months before expiration of warranty period.
1) Review with Owner's personnel the current equipment and system operation and condition of outstanding issues related to original and seasonal commissioning.
2) Interview Owner's personnel to identify problems or concerns regarding equipment and system operation.
3) Identify deficiencies covered by warranty or original construction contract.

4. Construction Manager may not:
a. Release, revoke, alter, or enlarge on requirements of Contract Documents.
b. Approve or accept any portion of the Work.
c. Assume duties of Contractor or Engineer.
d. Stop the Work.

C. Owner responsibilities:
1. Arrange for Owner's personnel to attend commissioning activities and training sessions according to commissioning plan.
2. Approve commissioning Work completion.
3. Ensure seasonal or deferred testing and deficiency issues are addressed.

D. Contractor responsibilities:
1. Submit verification check and startup plan to Construction Manager within 10 calendar days of equipment or system submittal approval by Engineer.
2. Submit functional performance test procedures to Construction Manager within 30 calendar days of equipment or system submittal approval by Engineer.
3. Facilitate coordination of commissioning Work by Construction Manager.
4. Attend commissioning meetings.
5. Cooperate with Construction Manager and provide access to the Work.
6. Require equipment and system installers to formulate and provide functional test procedures and to execute tests.
7. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions which may cause damage.
8. Verify that tests, meter readings, and electrical characteristics agree with those required by equipment or system manufacturer.
9. Furnish proprietary test equipment required by manufacturers to complete equipment and system tests.
10. When testing requires the availability of auxiliary systems such as electrical power, compressed air, control air, or instrumentation which have not yet been placed in service, the Contractor shall provide acceptable substitute sources, capable of

meeting the requirements of the machine, device or system, at no additional cost to the Owner. Disposal methods for test media shall be subject to review and acceptance of the Construction Manager.

11. Furnish qualified personnel to assist in completing commissioning.
12. Furnish manufacturer's qualified field representatives as specified in Section 01 40 00 - Quality Requirements and individual Specification Sections to assist in completing commissioning.
13. Ensure equipment and system installers execute commissioning responsibilities according to Contract Documents and Progress Schedule.
14. Coordinate Owner's personnel training.
15. Prepare operation and maintenance manuals specified in Section 01 33 00 – Submittal Procedures. Update original sequences of operation reflecting actual installation.

## 1.6 COMMISSIONING REPORTS

A. Verification test and startup reports: using the approved verification procedures and reporting forms, the Contractor reports test procedures and results including the following information:
   1. System and equipment or component names.
   2. Equipment location and identification number.
   3. Unique test identification number and unique verification checklist and startup documentation identification numbers for piece of equipment.
   4. Date.
   5. Project name.
   6. Participating parties and initials.
   7. Specific sequence of operations or other specified parameters being verified.
   8. Formulas used in calculations.
   9. Required pre-test field measurements.
   10. Instructions for setting up test.
   11. Special cautions, alarm limits, and safety concerns.
   12. Specific step-by-step procedures to execute test, in clear, sequential, and repeatable format.
   13. Acceptance criteria of proper performance with "Yes/No" check box to allow for marking whether or not proper performance of each part of test was achieved.
   14. Section for comments.
   15. Signatures and date block for Construction Manager.

B. Functional performance test reports: using the approved test procedures and reporting forms, the Contractor reports test procedures and results including the following information. Include completed documentation in operation and maintenance manuals submittal.

1. System and equipment or component names.
2. Equipment location and identification number.
3. Unique test identification number and reference to unique verification checklist and startup documentation identification numbers for all equipment related to system being tested.
4. Date.
5. Project name.
6. Participating parties and initials.
7. Specific sequence of operations or other specified parameters being verified.
8. Formulas used in calculations.
9. Required pre-test field measurements.
10. Instructions for setting up test.
11. Special cautions, alarm limits, and safety concerns.
12. Specific step-by-step procedures to execute test, in clear, sequential, and repeatable format.
13. Acceptance criteria of proper performance with "Yes/No" check box to allow for marking whether or not proper performance of each part of test was achieved.
14. Section for comments.
15. Signatures and date block for Construction Manager.

1.7 SEQUENCING

A. Sequence work to achieve functional completion before final completion. Complete the following for each piece of equipment and system to be commissioned to achieve functional completion:
   1. Complete and sign startup and verification checklist documentation.
   2. Submit trend log data.
   3. Submit final approved test and balance report.
   4. Complete functional testing and documentation.
   5. Complete training of Owner personnel.
   6. Submit approved operation and maintenance data manuals.
   7. Correct identified deficiencies or obtain approval by Owner to exclude deficiencies from functional completion.

B. Commissioning: after functional completion and certification by the Construction Manager that the systems did meet all performance requirements, commissioning will begin:
   1. The commissioning period for each system or system component shall be 30 calendar days except where specified otherwise.
   2. The Construction Manager may allow the Contractor to apply for substantial completion prior to the completion of the 30 day commissioning period as long as the commissioning period is without incident or excursion from the Specification.

3. In the event that substantial completion is granted prior to the completion of the commissioning period, the Commissioning period shall continue the full 30 calendar days prior to final completion.
4. The Contractor shall remove all temporary piping or bulkheads that may have been in use during the functional performance testing.
5. The Owner's operations and maintenance personnel will be responsible for operation of the Project during this period of time.
6. The Project shall be fully operational, accepting all normal conditions called for in design and performing all functions as designed.
7. The Contractor and the equipment manufacturer's technical representative shall be available at all times during the commissioning period to provide immediate assistance in case of failure of any portion of the system.
8. At the end of the commissioning period and when all corrections required by the Construction Manager to assure a reliable and completely operational facility are complete, the Construction Manager shall issue a certificate of substantial completion.
9. During the commissioning period, the Owner shall be responsible for all normal operational costs and the Contractor shall bear the costs of all necessary repairs or replacements, including labor and materials, required to keep the Project being commissioned, operational.

C. For equipment or systems where commissioning is delayed by Owner occupancy requirements or unforeseen conditions, perform commissioning as specified for seasonal operation equipment.

## PART 2 PRODUCTS

### 2.1 TEST EQUIPMENT

A. Gauges, meters, recorders, and monitors:
   1. Gauges, meters, recorders, and monitors shall be provided by the Contractor to supplement or augment the instrumentation system provided under this contract to properly demonstrate that all equipment fully satisfies the requirements of the contract documents.
   2. All devices employed for the purpose of measuring the performance of the facility's equipment and systems shall be specifically selected to be consistent with the variables to be monitored.
   3. All instruments shall be calibrated within the last year and the Contractor shall be prepared at all times to demonstrate, through recalibration, the accuracy of all instruments employed for testing purposes.
   4. Calibration procedures shall be in accordance with applicable standards of ASTM, ISA, and IEEE.

5. The adequacy of all gauges, meters, recorders, and monitors shall be subject to review of the Construction Manager.
6. Recalibrate test equipment according to manufacturer's recommended intervals and when dropped or damaged.

## PART 3 EXECUTION

### 3.1 EXAMINATION

A. Verify equipment and systems are installed according to individual Specification Sections.

B. Verify utility and power connections are complete and services operational.

### 3.2 DELIVERY ACCEPTANCE TESTS AND INSPECTIONS

A. The delivery acceptance tests and inspections and any remedial work to correct deficiencies shall be at the Contractor's expense for any equipment specified and shall include the following:
   1. Test of items at the place of manufacture during and on completion of manufacture, comprising hydraulic pressure tests, electric and instrumentation subsystems tests, performance and operating tests, and inspections in accordance with the relevant standards of the industry and more particularly as detailed in individual Sections of these Specifications to satisfy the Construction Manager that the items tested and inspected comply with the requirements of the contract documents.
   2. Inspection of all items delivered at the site or to any authorized place of storage in order that the Construction Manager may be satisfied that such items are of the specified quality and workmanship and are in good order and condition at the time of delivery. The Contractor shall be prepared to remove all coverings, containers, or crates to permit the Construction Manager to conduct his inspection. Should the Construction Manager find, in his opinion, indication of damage or deficient quality of workmanship, the Contractor shall remedy such deficiencies and provide the necessary documentation or conduct such tests deemed necessary by the Construction Manager to demonstrate compliance.

### 3.3 VERIFICATION CHECK AND STARTUP PROCEDURES

A. Notify Construction Manager and schedule verification check and startup activities with each party required to complete verification check and startup a minimum of two days in advance.

B. Allow Construction Manager to witness verification check and startup.

1. Primary Equipment: Construction Manager will witness procedures for each piece of equipment.
2. Secondary Equipment: Construction Manager will witness sampling of each type unit as specified in commissioning plan.

C. Verification check and startup:
1. Perform verification check and startup according to approved verification check and startup plan.
2. Verification check and startup shall include:
    a. Piping system pressure testing and cleaning as specified in Division 40 - Process Integration.
    b. Electrical system testing as specified in Division 26 – Electrical.
    c. Instrumentation system testing as specified in Division 40 – Process Integration.
    d. Alignment of equipment.
    e. Pre-operation lubrication.
    f. Confirmation of operational readiness.
3. Complete entire plan for each piece of equipment or system.
4. Complete each procedure in sequence performed by party assigned to each procedure.
5. Record completion of each procedure. Indicate results of procedure where required. Sign and date plan by individual performing procedure.
6. Identify items not completed successfully.
7. Sign and date plan indicating completion of entire plan.
8. Submit executed plan to Construction Manager within four days of completion.

D. Deficiencies and Approvals:
1. Construction Manager will review verification check and startup reports and issue deficiency report or approval.
2. Correct deficiencies and resubmit updated verification check and startup report with statement indicating corrections made for Construction Manager approval.
3. Repeat process until verification check and startup report are approved.
4. Costs for incomplete verification check and startup items that later cause deficiencies or delays during functional tests will be charged to the Contractor.

## 3.4 FUNCTIONAL PERFORMANCE TEST PROCEDURES

A. Complete the following before performing functional tests:
1. Verification check and startup.
2. Control system testing with approval by Construction Manager for use for test and balance operations.

B. Notify Construction Manager of completion of verification check and startup activities.

C. Construction Manager will direct, witness, and independently document results of functional performance tests.

D. Conduct functional performance tests:
   1. Demonstrate that each piece of equipment and system is operating according to design intent and Contract Documents.
   2. Conduct testing proceeding from components, to subsystems, to systems.
   3. Bring equipment and systems to condition capable full dynamic operation.
   4. Verify performance of individual components and systems.
   5. Verify performance of interactions between systems.
   6. Complete entire functional test plan for each piece of equipment or system.
   7. Complete each procedure in sequence performed by party assigned to each procedure.
   8. The equipment shall be operated a sufficient period of time to determine machine operating characteristics, including temperatures and vibration; to observe performance characteristics; and to permit initial adjustment of operating controls.
   9. Record completion of each procedure. Indicate results of procedure where required. Sign and date plan by individual performing procedure.
   10. Identify items not completed successfully.
   11. Sign and date plan indicating completion of entire plan.
   12. Submit executed plan to Construction Manager within four days of completion.
   13. Identify and correct areas of deficient performance.

E. Operate each piece of equipment and system through each specified mode of operation including seasonal, partial load, and full load conditions.
   1. Verify each sequence in sequences of operation.
   2. Test for proper responses to power failure, freezing, overheating, low oil pressure, no flow, equipment failure, and other abnormal conditions, as applicable.

## 3.5 FUNCTIONAL PERFORMANCE TEST METHODS

A. Tests and inspections, unless otherwise specified or accepted, shall be in accordance with the recognized standards of the industry.

B. Perform testing and verification by using manual testing or by monitoring performance and analyzing results using control system trend log capabilities or by standalone data loggers as specified for each piece of equipment or system.
   1. Construction Manager may require alternate or additional method other than specified method.
   2. Construction Manager will approve test method when method is not specified.

C. Simulated conditions: simulating conditions, not by overwritten values, is permitted. Timing tests to use real conditions is encouraged wherever practical.

D. Overwritten values: overwriting sensor values to simulate conditions may be used with caution and avoided when possible.

E. Simulated signals: using signal generator to create simulated signals to test and calibrate transducers automatic temperature controls is generally recommended over using sensors as signal generators with simulated conditions or overwritten values.

F. Altering setpoints: rather than overwriting sensor values, and when simulating conditions is difficult, altering setpoints to test specific sequence is acceptable. Reset setpoint after completing test.

G. Indirect indicators: using indirect indicators for responses or performance is permitted only after visually and directly verifying and documenting indirect readings through control system representing actual conditions and responses over tested parameter range.

H. Perform each function and test under conditions simulating actual conditions as close as is practically possible.
   1. Provide materials, system modifications, and other items or steps necessary to produce flows, pressures, temperatures, and other responses to execute test according to specified conditions.
   2. At completion of test, return modified equipment and systems to pretest condition.

3.6 DEFICIENCIES AND TEST APPROVALS

A. Deficiencies:
   1. Construction Manager will record and report deficiencies to Owner.
   2. Minor deficiencies may be corrected during tests at Construction Manager's discretion. Deficiency and resolution will be documented on the procedure form.
   3. When deficiency is identified, Construction Manager will discuss issue with party executing test.
      a. When party executing test accepts responsibility to correct deficiency:
         1) Construction Manager documents deficiency and executing party's response.
         2) Construction Manager submits deficiency report to Owner, Contractor, and party executing test.
         3) Party executing test corrects deficiency, signs statement of correction on deficiency form certifying equipment is ready for retesting, and submits form to Construction Manager.
         4) Construction Manager reschedules test, and test is repeated until satisfactory performance is achieved.
      b. When party executing test disputes deficiency or responsibility for deficiency:

1) Construction Manager documents deficiency and executing party's response.
2) Construction Manager submits deficiency report to Owner, Contractor, party executing test, and party believed to be responsible for deficiency.
3) Construction Manager negotiates resolution with parties involved and refers continuing disputes to Engineer for resolution according to Contract Documents.
4) Construction Manager documents resolution process.
5) When resolution is decided, appropriate party corrects deficiency, signs statement of correction on deficiency form certifying equipment is ready for retesting, and submits form to Construction Manager.
6) Construction Manager reschedules test, and test is repeated until satisfactory performance is achieved.

B. Retesting costs:
   1. When verification check and startup or functional performance test deficiency is discovered requiring rescheduling or retesting:
      a. Owner will compensate Construction Manager and Engineer for attending and directing additional testing.
      b. Owner will deduct additional testing compensation from final payment due to Contractor.

C. Manufacturing defects: when ten percent but not less than three identical pieces of equipment or equipment with only small size or capacity differences fail to perform to Contract Document requirements due to manufacturing defect, all identical units may be considered defective by Owner.
   1. Within one week of notice from Owner, examine all other identical units and record findings Submit findings to Owner within two weeks of original notice.
   2. Within two weeks of original notification, provide signed and dated written explanation of problem, cause of defect, and proposed solutions meeting Contract Document requirements. Include equipment submittals supporting solution.
   3. Owner will determine whether replacement or repair of all identical units is required.
   4. Install two examples of proposed solution Owner will test installations for up to one week before deciding solution is acceptable.
   5. Upon acceptance, replace or repair all identical items, at Contractor's expense. Extend warranty accordingly, when original equipment warranty had begun.
   6. Complete repairs or replacements with reasonable speed beginning within one week from when parts can be obtained.

D. Test approval: Construction Manager notes each satisfactorily demonstrated function on functional performance test form.

1. Construction Manager recommends acceptance of each test to Owner using standard form.
2. Owner gives final approval for each test using same form, providing signed copy to Construction Manager and Contractor.

## 3.7 DEMONSTRATION

A. Demonstrate equipment and systems and train Owner's personnel as specified in individual equipment and system Specifications.
   1. Construction Manager will interview Owner's personnel to determine special needs and areas where training will be most valuable.
   2. Owner and Construction Manager will determine type and extent of training for each commissioned piece of equipment and system.
   3. Construction Manager will communicate training requirements to Contractor for benefit of equipment and system installers and manufacturers with training responsibilities.
   4. The Contractor shall make available experienced factory trained representatives of the manufacturers of all the various pieces of equipment, to train the County's personnel in the operation and maintenance thereof.

B. For primary equipment training:
   1. Require controls contractor to provide short discussion of equipment control as part of training session.

END OF SECTION

# SECTION 02 41 16 – STRUCTURE DEMOLITION

## PART 1 GENERAL

### 1.1 SUMMARY

A. Section Includes:
   1. Demolishing designated structures.
   2. Demolishing designated foundations.
   3. Demolishing designated slabs-on-grade.
   4. Disconnecting and capping designated utilities.
   5. Removing designated items for Owner's retention.
   6. Protecting items designated to remain.
   7. Removing demolished materials.

### 1.2 SUBMITTALS

A. Shop Drawings: Indicate:
   1. Demolition and removal sequence and location of salvageable items.
   2. Location and construction of barricades, fences, and temporary Work.

B. Delegated Design Submittals: Signed and sealed Shop Drawings with design calculations and assumptions for bracing, shoring, and underpinning.

C. Permits: Copies of permits required by regulatory agencies for demolition and sidewalk and street closings.

D. Qualifications Statements:
   1. Qualifications for demolition firm and licensed professional.

### 1.3 CLOSEOUT SUBMITTALS

A. Project Record Documents: Accurately record actual locations of capped utilities, and subsurface obstructions.

B. Operation and Maintenance Data: Description of system, inspection data, and parts lists.

### 1.4 QUALITY ASSURANCE

A. Perform Work according to City of Fort Bragg standards.

B. Conform to applicable code for demolition of structures, safety of adjacent structures, dust control, runoff control, and disposal.

C. Conform to applicable code for procedures when hazardous or contaminated materials are discovered.

D. Permits: Obtain required permits from authorities having jurisdiction.

E. Demolition Firm: Company specializing in performing Work of this Section with minimum five years' experience.

F. Licensed Professional: Design shoring, bracing, and underpinning under direct supervision of professional engineer experienced in design of this Work and licensed in State of California.

1.5 EXISTING CONDITIONS

A. Notify Engineer upon discovery of hazardous materials.

B. Do not sell demolished materials on-Site.

C. Maintain existing sidewalks to greatest extent possible.

PART 2 PRODUCTS Not Used

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine existing structures indicated to be demolished before demolition.

3.2 PREPARATION

A. Notify affected utility companies before starting Work and comply with utility's requirements.

B. Erect and maintain temporary barriers and security devices, including warning signs and lights, and similar measures, for protection of public and existing improvements indicated to remain.

C. Adjacent Surfaces: Protect existing landscaping materials, trees, appurtenances, and structures indicated to remain.

D. Prevent movement or settlement of adjacent structures. Provide bracing and shoring.

3.3 DEMOLITION

A. Use of explosives is not permitted.

B. Conduct demolition to minimize interference with adjacent structures.

C. Cease operations immediately when adjacent structures appear to be in danger. Notify authority having jurisdiction. Do not resume operations until directed.

D. Conduct operations with minimum interference to public or private accesses to occupied adjacent structures. Maintain continuous egress and access from adjacent structures.

E. Obtain written permission from adjacent property owners when demolition equipment will traverse, infringe upon, or limit access to their property.

F. Sprinkling: Sprinkle Work with water to minimize dust. Provide hoses and water connections as required for this purpose.

G. Capped Utilities:
   1. Disconnect and cap designated utilities.
   2. Identify utilities at termination of demolition.
   3. Record termination or capped location on Record Documents.

H. Remove concrete slabs-on-grade.

I. Remove materials to be re-installed or retained in manner to prevent damage; store and protect.

J. Backfill open pits and holes resulting from demolition according to 31 23 23 - Fill.

K. Rough grade and compact areas affected by demolition to maintain Site grades and contours.

L. Continuously clean up and remove demolished materials from Site. Do not allow materials to accumulate on-Site.

M. Do not burn or bury materials on-Site; leave Site in clean condition.

END OF SECTION

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# SECTION 02 82 13 – ASBESTOS ABATEMENT FOR UTILITIES

## PART 1 GENERAL

### 1.1 SUMMARY

A. Section Includes:
   1. Removal of ACM-contaminated pipeline coatings.
   2. Cutting of pipelines containing or coated with ACM.
   3. Monitoring of Work area during cutting and cleaning operations.

### 1.2 DEFINITIONS

A. ACM: Asbestos-containing material.

### 1.3 SUBMITTALS

A. Product Data: Manufacturer information on respirators and air monitor.

B. Manufacturer's Certificate: Products meet or exceed specified requirements.

C. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.

D. Qualifications Statements:
   1. Qualifications for contractor, on-Site representative, and disposal firm.
   2. Qualifications for testing laboratory.

### 1.4 QUALITY ASSURANCE

A. Perform Work according to NESHAPs, OSHA, and City of Fort Bragg standards.

B. Contractor: Company specializing in repairing, modifying, cleaning, or removing AC pipe or ACM-coated pipe as specified in this Section with three years' experience.

C. On-Site Representative: Person trained in performing Work of this Section with three years' experience.

D. Disposal Firm: Company specializing in packaging and hauling ACM to disposal site.

E. Active Waste Disposal Site: Solid waste disposal site permitted to accept ACM waste.

F. Testing Laboratory: Company participating in National Voluntary Laboratory Accreditation Program for asbestos, administered by National Institutes of Standards and Technology.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store materials according to manufacturer instructions.

B. Respirators Not in Use:
   1. Store in sanitary location that protects respirators from dust, sunlight, heat, extreme cold, excessive moisture, and potentially damaging chemicals.
   2. Place in plastic bags or closed containers.

PART 2 PRODUCTS

2.1 RESPIRATORS

A. Manufacturers:
   1. Enviro Safety Products.
   2. Or approved equal.

B. Description:
   1. Comply with 42 CFR Part 84, Subpart K.
   2. Type: Half-face mask; reusable after washing.
   3. Maintenance: Replaceable filters and cartridges only.
   4. Single-use respirators are not acceptable.

C. Filters: Top air inlet.

D. Performance and Design Criteria:
   1. Application: Asbestos abatement for concentrations up to 10 times permissible exposure limit (PEL).
   2. Design: Low profile.

2.2 AIR MONITOR

A. Manufacturers:
   1. Applied Physics Inc.
   2. Dylos Corporation.
   3. Or approved equal.

B. Description:
   1. Type: Laser.

2. Power Source: Batteries.
3. Screen: LCD.
4. Output: Greater than 0.5 micron and 2.5-micron particulates.

## PART 3 EXECUTION

### 3.1 PREPARATION

A. Perform ACM removal without damage to or contamination of adjacent Work or existing area.

### 3.2 APPLICATION

A. Removal of Pipe Coating:
   1. Use cleaning machines or "line-traveling machines" that move along pipeline while removing exterior pipe coating.
   2. Cutting and Disposal:
      a. Transport removed piping to a central staging area to cut for transport or disposal.
      b. Deposit pipeline pieces in leakproof metal collection box secured with tarpaulin covers.
      c. Transport filled boxes to an approved landfill.
      d. A licensed and certified asbestos supervisor will accompany transport vehicles to manage transport process.
      e. Maintain supply of fresh water near cutting operation to keep freshly cut areas of ACM damp while cutting piping.
      f. Individually wrap each joint of piping and pipe ends prior to loading.

### 3.3 FIELD QUALITY CONTROL

A. Sample Testing:
   1. Test pipe or pipe coating for asbestos prior to repairing, modifying, or removing pipelines.
   2. Remove samples of pipe or coating along entire length of piping to be removed and have testing laboratory determine quantity of asbestos that may be present.

END OF SECTION

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SECTION 03 10 00 – CONCRETE FORMING AND ACCESSORIES

PART 1 GENERAL

1.1 SUMMARY

A. Section includes:
   1. Formwork for cast-in-place concrete
   2. Wood form materials
   3. Form coatings
   4. Form accessories
   5. Form stripping

1.2 SUBMITTALS

A. Shop Drawings:
   1. Formwork, shoring, and reshoring.
   2. Pertinent dimensions, openings, methods of construction, types of connections, materials, joint arrangement and details, ties and shores, location of framing, studding and bracing, and temporary supports.
   3. Sequence and timing of erection and stripping, assumed compressive strength at time of stripping, height of lift, and height of drop during placement.
   4. Notes to formwork erector showing size and location of conduits and piping embedded in concrete.
   5. Procedure and schedule for removal of shores and installation and removal of reshores.

B. Product Data:
   1. Mill affidavits stating the grade and physical properties of form materials before the materials are delivered to the site. The affidavits shall demonstrate that the materials and procedures comply with the specifications of this section.
   2. Form release agent.
   3. Joint sealant(s), backer, and filler materials.

1.3 QUALITY ASSURANCE

A. Perform Work according to ACI 318 and City of Fort Bragg standards.

B. The Contractor shall comply fully with the requirements of Section 1717 of the Construction Safety Orders, State of California, Department of Industrial Relations, regarding the design of concrete forms, falsework and shoring, and the inspection of same prior to placement of concrete. Where the said Section 1717 requires the services of a civil engineer registered in the State of California to approve design calculations and

working drawings of the falsework or shoring system, or to inspect such system prior to placement of concrete, the Contractor shall employ a registered civil engineer for these purposes, and all costs therefore shall be included in the price named in the Contract for completion of the work as set forth in the Contract Documents.

1.4 COORDINATION

A. Contractor shall check all drawings for anchor bolt schedules and locations, anchors, inserts, conduits, sleeves, and any other items which are required to be cast in concrete, and in coordination with the affected trades shall make necessary provisions as required so that forms will accommodate and support the placement of such embedded items.

PART 2 PRODUCTS

2.1 FORM MATERIALS

A. Form Materials for Exposed Finish Concrete:
   1. Unless otherwise indicated, construct formwork for exposed concrete surfaces with plywood, metal, metal-framed plywood faced, or other acceptable panel-type materials, to provide continuous, straight, smooth, exposed surfaces. Furnish in largest practicable sizes to minimize number of joints. Provide form material with sufficient thickness to withstand pressure of newly-placed concrete without bow or deflection.
   2. Use plywood complying with PS-1 "B-B (Concrete Form) Plywood", Class I, Exterior Grade or better, mill-oiled and edge-sealed, with each piece bearing legible inspection trademark.

B. Form Materials for Unexposed Finish Concrete:
   1. Form concrete surfaces which will be unexposed in finished structure with plywood, lumber, metal, or other acceptable material as determined by the Engineer.
   2. Provide lumber dressed on at least two edges and one side for tight fit.

C. Form Liners: Smooth, durable, grainless and non-staining hardboard.

D. Framing, Studding and Bracing: Stud or No. 3 structural light framing grade.

E. Preformed Steel Forms: Minimum 16 gauge, matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished surfaces.

F. Glass Fiber Fabric Reinforced Plastic Forms: Matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished concrete surfaces.

## 2.2 FORMWORK ACCESSORIES

A. Form Ties:
   1. Provide factory-fabricated, adjustable-length, removable or snap-off type, metal form ties designed to prevent deflection, and to prevent spalling concrete surfaces upon removal. Ties shall be provided with a tightly fitting washer at midpoint.
   2. Unless otherwise shown, provide ties so that portion remaining within concrete after removal of exterior parts is at least 1 1/2 inches from the outer concrete surface. Unless otherwise indicated, provide form ties which will leave a cone-shaped depression at the surface at least 1 inch diameter and 1 1/2 inches deep to allow filling and patching.

B. Form Anchors and Hangers:
   1. Do not use anchors and hangers leaving exposed metal at concrete surface.
   2. Symmetrically arrange hangers supporting forms from structural steel members.
   3. Penetration of structural steel members is not permitted.

C. Form Release Agent:
   1. Commercial formulation designed for use on all form facing materials used, which will not:
      a. Bond with, stain, or adversely affect concrete surfaces.
      b. Impair subsequent treatment of concrete surfaces requiring bond or adhesion.
      c. Impede wetting of surfaces which will be cured with water, steam, or curing compounds.
      d. Form coatings containing mineral oils or petroleum solvents such as paraffin or other non-drying materials will not be permitted.
      e. For metal forms, use specially formulated coatings for metal forms to prevent rust stains on concrete.

D. Nails, Spikes, Lag Bolts, Through-bolts, and Anchorages: Size, strength, and character to maintain formwork in place while placing concrete.

E. Formed Construction Joints for Slab-on-Grade: galvanized steel, tongue and groove type profile, knockout holes to receive doweling; use where indicated in the Drawings.

F. Bituminous Joint Filler: ASTM D1751.

G. Waterstop: Flexible strip of bentonite waterproofing compound in coil form for joints in concrete construction.

2.3 COATINGS: See Section 09 90 00 - Painting and Coating.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify lines, levels, and centers before proceeding with formwork. Verify dimensions agree with Drawings.

B. Obtain approval from Owner's Representative before framing openings not shown on Structural Drawings.

3.2 INSTALLATION

A. Earth Forms:
   1. Trench earth forms neatly, accurately, and at least 1 inch wider than footing widths indicated on Drawings.
   2. Trim sides and bottom of earth forms.
   3. Construct wood edge strips at top of each side of trench to secure reinforcing and prevent trench from sloughing.
   4. Form sides of footings where earth sloughs.
   5. Tamp earth forms firm and clean forms of debris and loose material before depositing concrete.

B. Formwork - General:
   1. Construct forms in compliance with ACI 347, to sizes, shapes, lines and dimensions shown, and to obtain accurate alignment, location, grades, level and plumb work in finished structures.
   2. Provide for openings, offsets, sinkages, keyways, recesses, moldings, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages and inserts, and other features required in work.
   3. Use selected materials to obtain required finishes.
   4. Kerf wood inserts for forming keyways, reglets, recesses, and the like, to prevent swelling and for easy removal.
   5. Solidly butt joints and provide back-up at joints to prevent leakage of cement paste.
   6. Provide top form for sloped surfaces steeper than 1.5 horizontal to 1 vertical to hold shape of concrete during placement, unless it can be demonstrated that top forms can be omitted.
   7. Construct forms to correct shape and dimensions, mortar-tight, braced, and of sufficient strength to maintain shape and position under imposed loads from construction operations.

8. Design formwork to be readily removable without impact, shock, or damage to cast-in-place concrete surfaces and adjacent materials.
9. Carefully verify horizontal and vertical positions of forms. Correct misaligned or misplaced forms before placing concrete.
10. Complete wedging and bracing before placing concrete.

C. Forms for Smooth Finish Concrete:
   1. Use steel, plywood, or lined board forms.
   2. Use clean and smooth plywood and form liners, uniform in size, and free from surface and edge damage capable of affecting resulting concrete finish.
   3. Install form lining with close-fitting square joints between separate sheets without springing into place.
   4. Use full size sheets of form lines and plywood wherever possible.
   5. Tape joints to prevent protrusions in concrete.
   6. Use care in forming and stripping wood forms to protect corners and edges.
   7. Level and continue horizontal joints.
   8. Keep wood forms wet until stripped.
   9. Forms for exposed concrete surfaces shall be designed and constructed so that the formed surface of the concrete does not undulate excessively in any direction between studs, joists, form stiffeners, form fasteners, or wales. Undulations exceeding either 3/32 in. or 1/270 of the center to center distance between studs, joists, form stiffeners, form fasteners or wales will be considered to be excessive. Should any form or forming system, even though previously approved for use, produce a concrete surface with excessive undulations, its use shall be discontinued until modifications satisfactory to the Engineer have been made. Portions of concrete structures with surface undulations in excess of the limits herein may be rejected by the Engineer.

D. Forms for Surfaces to Receive Membrane Waterproofing: Use plywood or steel forms. After erection of forms, secure form joints to prevent protrusions in concrete.

E. Framing, Studding, and Bracing:
   1. Space studs at 16 inches on center maximum for boards and 12 inches on center maximum for plywood.
   2. Size framing, bracing, centering, and supporting members with sufficient strength to maintain shape and position under imposed loads from construction operations.
   3. Construct beam soffits of material minimum of 2 inches thick.
   4. Distribute bracing loads over base area on which bracing is erected.
      a. When placed on ground, protect against undermining, settlement, or accidental impact.

F. Erect formwork, shoring, and bracing to achieve design requirements, in accordance with requirements of ACI 318.

G. Arrange and assemble formwork to permit dismantling and stripping. Do not damage concrete during stripping. Permit removal of remaining principal shores.

H. Install void forms in accordance with manufacturer's recommendations.

I. Do not reuse wood formwork more than four times for concrete surfaces to be exposed to view.

3.3 APPLICATION - FORM RELEASE AGENT

A. Apply prior to placement of reinforcing steel, anchoring devices, and embedded items.

B. Do not apply form release agent where concrete surfaces are indicated to receive special finishes or applied coverings that are affected by agent. Soak inside surfaces of untreated forms with clean water. Keep surfaces coated prior to placement of concrete.

C. Reuse and Coating of Forms:
   1. Thoroughly clean forms and reapply form coating before each reuse.
   2. For exposed work, do not reuse forms with damaged faces or edges.
   3. Apply form coating to forms in accordance with manufacturer’s specifications.
   4. Apply form coatings before placing reinforcing steel.

3.4 INSTALLATION - INSERTS, EMBEDDED PARTS, AND OPENINGS

A. Install formed openings for items to be embedded in or passing through concrete Work.

B. Locate and set in place items required to be cast directly into concrete.

C. Coordinate with Work of other sections in forming and placing openings, slots, reglets, recesses, sleeves, bolts, anchors, other inserts, and components of other Work.

D. Install accessories straight, level, and plumb. Ensure items are not disturbed during concrete placement.

E. Install water stops continuous without displacing reinforcement.

F. Access Panels: Provide temporary openings where interior area of formwork is inaccessible for cleanout, for inspection before concrete placement, and for placement of concrete.
   1. Securely brace access panels and set tightly to forms to prevent loss of concrete mortar.

2. Locate access panels on forms at inconspicuous locations.
3. Close access panels with tight fitting panels, flush with inside face of forms, and neatly fitted so joints will not be apparent in exposed concrete surfaces.

G. Form Ties:
1. Use sufficient strength and sufficient quantity to prevent spreading of forms.
2. Place ties at least 3 inches away from finished surface of concrete.
3. Leave inner rods in concrete when forms are stripped.
4. Space form ties equidistant, symmetrical and aligned vertically and horizontally unless otherwise shown on Drawings.

H. Arrangement: Arrange formwork to allow proper erection sequence and to permit form removal without damage to concrete.

I. Construction Joints:
1. Install surfaced pouring strip where construction joints intersect exposed surfaces to provide straight line at joints.
2. Just prior to subsequent concrete placement, remove strip and tighten forms to conceal shrinkage.
3. Show no overlapping of construction joints. Construct joints to present same appearance as butted plywood joints.
4. Arrange joints in continuous line straight, true, and sharp.
5. Provide sealant grooves for joint sealant where indicated on the Drawings.

J. Embedded Items:
1. Accurately place and securely support items built into forms.
2. Make provisions for pipes, sleeves, anchors, inserts, reglets, anchor slots, nailers, water stops, and other features.
3. Do not embed wood or uncoated aluminum in concrete.
4. Obtain installation and setting information for embedded items furnished under other Specification sections.
5. Install accessories straight, level, and plumb. Ensure items are not disturbed during concrete placement.
6. Verify conduits and pipes, including those made of coated aluminum, meet requirements of ACI 318 for size and location limitations.

K. Openings for Items Passing Through Concrete:
1. Frame openings in concrete where indicated on Drawings and as required to accommodate the work of other trades. Establish exact locations, sizes, and other conditions required for openings and attachment of work specified under other sections.
2. Coordinate work to avoid cutting and patching of concrete after placement.

3. Perform cutting and repairing of concrete required as result of failure to provide required openings.

L. Screeds:
   1. Set screeds and establish levels for tops of concrete slabs and levels for finish on slabs.
   2. Slope slabs to drain where required or as indicated on Drawings.

M. Screed Supports:
   1. For concrete over waterproof membranes and vapor retarder membranes, use cradle, pad, or base type screed supports which will not puncture membrane.
   2. Staking through membrane is not permitted.

N. Cleanouts:
   1. Provide removable cleanout form sections or access panels at bottoms of forms to permit inspection and effective cleaning of loose dirt, debris and waste material.
   2. Clean forms and surfaces against which concrete is to be placed. Remove chips, saw dust and other debris. Thoroughly blow out forms with compressed air just before concrete is placed.

## 3.5 FORMWORK

A. Cleaning:
   1. Clean forms as erection proceeds.
   2. Clean formed cavities of debris.
   3. Flush with water or use compressed air.

B. Removal:
   1. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads.
   2. Loosen forms carefully. Do not wedge tools against finish concrete surfaces.
   3. Leave forms in place for minimum number of days according to ACI 347.

## 3.6 ERECTION TOLERANCES

A. Construct formwork to maintain tolerances according to ACI 318 and Section 03 30 00 – Cast-In-Place Concrete.

## 3.7 FIELD QUALITY CONTROL

A. Inspect erected formwork, shoring, and bracing to ensure that Work is in accordance with formwork design, and that supports, fastenings, wedges, ties, and items are secure.

B. Notify Engineer after placement of reinforcing steel in forms and at least 48 hours prior to placing concrete.

C. Schedule concrete placement to permit formwork inspection before placing concrete.

END OF SECTION

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SECTION 03 20 00 – CONCRETE REINFORCING

PART 1 GENERAL

1.1 SUMMARY

A. Section includes:
   1. Reinforcing bars
   2. Welded wire fabric
   3. Reinforcement accessories

1.2 SUBMITTALS

A. Shop Drawings:
   1. Prepare Shop Drawings according to ACI SP-66
   2. Indicate bar sizes, spacing, locations, quantities of reinforcing steel, bending and cutting schedules, and supporting and spacing devices.
   3. Placement drawings shall be complete so that placement of the reinforcing may proceed without reference to the contract drawings. Placement drawings shall not be marked up copies of the design drawings.
   4. Dimensions and locations shall be verified prior to the preparation of shop drawings. Review shall not relieve the Contractor from responsibility for accuracy of the fabrication details and placing diagrams.

B. Welder Certificates: Certify welders and welding procedures employed on Work, verifying AWS qualification within previous 12 months.

C. Manufacturer's Certificates: Products meet or exceed specified requirements.

D. Certified copies of mill test report of reinforcement materials analysis. Mill affidavits, stating the grades and physical and chemical properties of the reinforcing steel, and conformance with ASTM specifications, shall be submitted before delivery of the steel to the job site.

E. Qualifications Statement:
   1. Welders: Qualify procedures and personnel according to AWS D1.4.

1.3 QUALITY ASSURANCE

A. Perform Work according to ACI 318.

B. Prepare Shop Drawings according to ACI SP-66.

C. Welders: AWS-qualified within previous 12 months for employed weld types.

1.4 DELIVERY AND STORAGE

A. Deliver reinforcement bundled and tagged to identify placement and certify testing.

B. Reinforcing steel shall be transported to the building site, stored and covered in a manner which will ensure that no damage shall occur to it from moisture, dirt, grease, or any other cause that might impair bond to concrete. Identification of steel shall be maintained after bundles are broken.

C. Provide additional protection according to manufacturer instructions.

1.5 EXISTING CONDITIONS

A. Field Measurements:
   1. Verify field measurements prior to fabrications.
   2. Indicate field measurements on Shop Drawings.

1.6 COORDINATION

A. Contractor shall check all drawings for anchor bolt schedules and locations, anchors, inserts, conduits, sleeves, and any other items which are required to be cast in concrete, and shall make necessary provisions as required so that reinforcing steel will not interfere with the placement of such embedded items.

PART 2 PRODUCTS

2.1 REINFORCEMENT

A. Reinforcing bars to be welded shall be weldable steel ASTM A706, Grade 60.

B. Welded Plain Wire Fabric: ASTM A1064.

2.2 ACCESSORY MATERIALS

A. Reinforcement accessories, consisting of spacers, ties, and similar items shall be provided as required for spacing, assembling, and supporting reinforcement in place. Accessories shall be reinforcing steel or precast concrete blocks conforming to the applicable requirements of the CRSI Manual of Standard Practice.

B. Tie Wire: Minimum 16 gauge annealed type conforming to ASTM 82.

C. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for strength and support of reinforcement during concrete placement conditions including load bearing pad on bottom to prevent vapor retarder puncture.

D. Reinforcing Splicing Devices: Exothermic welding type; full tension and compression; sized to fit joined reinforcing.

E. Welding Electrodes: AWS A5.1, grade E70XX for welding grade 40 reinforcing steel and E90XX for welding grade 60.

F. Epoxy Bonding: Epoxy shall be used to bond reinforcement dowels into drilled holes in existing concrete. Epoxy shall be Hilti HY 150, Simpson SET, or an approved equal. The approved equal shall be equal in materials, strength, and intended use.

2.3 FABRICATION

A. Fabricate concrete reinforcement according to CRSI Manual of Practice and ACI 318.

B. Form standard hooks for 180 degree bends, 90 degree bend, stirrup and tie hooks, and seismic hooks as indicated on Drawings.

C. Form reinforcement bends with minimum diameters according to ACI 318.

D. Form ties and stirrups as indicated in the Drawings; where not indicated, form ties and stirrups from the following:
   1. Bars No. 10 and Smaller: No. 3 deformed bars.
   2. Bars No. 11 and Larger: No. 4 deformed bars.

E. Weld reinforcement according to AWS D1.4.

F. Locate reinforcement splices at point of minimum stress. Review location of splices with Engineer.

2.4 SOURCE QUALITY CONTROL

A. When fabricator is approved by authority having jurisdiction, submit certificate of compliance indicating Work performed at fabricator's facility conforms to Contract Documents.
   1. Specified shop tests are not required for Work performed by approved fabricator.
   2. All reinforcing bars shall be bent in the approved fabricating shop. Field bending of reinforcement shall not be permitted.

PART 3 EXECUTION

3.1 PLACEMENT

A. Place, support, and secure reinforcement against displacement. Do not deviate from required position beyond specified tolerance.
   1. Place reinforcement in accordance with CRSI Manual of Standard Practices and the current edition of the CBC.
   2. Bars and welded wire fabric layers shall be supported on precast concrete blocks wire tied to reinforcement. Spacing of blocks and accessories shall conform to CRSI Recommended Practice for Placing Bar Supports. No wood will be permitted inside forms. Precast concrete blocks shall be used to support footing and slab reinforcing on ground.
   3. Do not weld crossing reinforcement bars for assembly.

B. Space reinforcement bars with minimum clear spacing in accordance with ACI 318.
   1. Where bars are indicated in multiple layers, place upper bars directly above lower bars.

C. Unless otherwise shown on the plans, maintain concrete cover around reinforcement in accordance with ACI 318 and the following schedule:

| Reinforcement Location | | Minimum Concrete Cover |
|---|---|---|
| Footings and Concrete Formed Against Earth | | 3 inches |
| Concrete exposed to earth or weather | No. 6 bars and larger | 2 inches |
| | No. 5 bars and smaller | 2 inches |
| Supported Slabs, Walls, and Joists | No. 14 bars and larger | 1 1/2 inches |
| | No. 11 bars and smaller | 3/4 inches |
| Beams and Columns | | 1 1/2 inches |

D. Tying: All reinforcing shall be set in place, spaced, and rigidly and securely tied or wired at all splices and at crossing points and intersections in the position shown, or as directed by the Construction Manager. Point ends of wire away from forms.

E. Bond and ground reinforcement in accordance with requirements of Division 26 – Electrical.

F. Splices:
   1. Except for temperature bars in slabs and horizontal wall reinforcing, no splicing will be allowed for reinforcing bars unless detailed locations are given for these splices on the Drawings or approved Shop Drawings. Stagger lapped splices for horizontal wall reinforcing and slab temperature bars by the required lap splice length minimum. Wherever possible, splices of adjacent bars shall be staggered. The location of splices, except where shown on the Drawings, shall be determined by the Contractor based upon using available commercial lengths where practicable.
   2. Reinforcing bars may be continuous at locations where splices are shown on the Drawings, at the option of the Contractor.

G. Welded Wire Fabric: Wire fabric shall be in as long lengths as practicable and shall be wired at all laps and splices. Laps shall be one full spacing of the cross wires plus 2 inches at splices.

H. Dowels:
   1. Dowels to be placed in new concrete shall be tied securely in place before concrete is deposited. In the event there are no bars in position to which dowels may be tied, No. 3 bars shall be added to secure dowels.
   2. Dowels to be installed in existing concrete shall be drilled and bonded into place using epoxy. Horizontal holes shall be drilled at a slight downward angle to facilitate holding the epoxy. Reinforcing steel installed in horizontal holes shall be bent slightly to obtain level placement prior to placing concrete. Dowels extended for future construction shall be protected from weather.

I. Cleaning: Reinforcement, at time of pour, shall be free of mortar, oil, dirt, excessive mill scale, scabby rust and other coatings that would impair bond to concrete.

J. Welding:
   1. Welding of reinforcing steel shall comply with AWS D1.4.
   2. Do not weld reinforcing steel until a chemical analysis sufficient to determine the carbon equivalent of the steel has been performed. This analysis shall be made from the chemical composition shown in the mill test reports or by chemical analysis of bars representative of the bars to be welded. The carbon equivalent shall not exceed 0.55.
   3. Preheating of Grade 60 bars will be required immediately prior to welding.

## 3.2 ERECTION TOLERANCES

A. Install reinforcement within following tolerances for flexural members, walls, and compression members unless specified otherwise on drawings:

| Reinforcement Depth | Depth Tolerance | Concrete Cover Tolerance |
|---|---|---|
| Greater than 8 inches | plus or minus 3/8 inch | minus 3/8 inch |
| Less than 8 inches | plus or minus 1/2 inch | minus 1/2 inch |

B. Install reinforcement within tolerances specified in ACI 318 for foundation walls.

3.3 FIELD QUALITY CONTROL

A. Perform field inspection and testing in accordance with ACI 318.

B. Inspection access and approval:
   1. Provide free access to Work and cooperate with appointed firm.
   2. Contractor shall provide notification to Engineer at least 2 working days ahead of each concrete pour.
   3. No concrete shall be placed until all reinforcing steel has been installed by the Contractor and approved by the Engineer.
   4. All reinforcing shall be complete in every way by the end of the working day prior to concrete placing.

C. Special Inspection: Special inspection is required as defined in CBC Chapter 17.

D. Reinforcement Inspection:
   1. Placement Acceptance: Specified material requirements and specified placement tolerances.
   2. Welding: Inspect welds in accordance with AWS D1.1.
   3. Periodic Placement Inspection: Inspect for correct materials, fabrication, sizes, locations, spacing, concrete cover, and splicing.
   4. Weldability Inspection: Inspect for reinforcement weldability when formed from steel other than ASTM A706.
   5. Continuous Weld Inspection: Inspect reinforcement as required by ACI 318.
   6. Periodic Weld Inspection: Other welded connections.

END OF SECTION

# SECTION 03 30 00 – CAST-IN-PLACE CONCRETE

## PART 1 GENERAL

### 1.1 SUMMARY

A. Section includes:
   1. Accessories
   2. Concrete materials
   3. Compounds, hardeners, and sealers
   4. Joint seals and fillers
   5. Concrete mix

### 1.2 SUBMITTALS

A. Certificates of compliance for Portland cement.

B. Certificates of compliance and gradation of all aggregates nominal sizes and qualities. Indicate the proportions and intended use for each aggregate certified.

C. Shop Drawings:
   1. Indicate dimensioning, form materials, arrangement of joints and ties, location of bracing and temporary supports, schedule of erection and stripping for all cast in place concrete structures.
   2. Indicate reinforcement sizes, spacing, locations, quantities, bending and cutting schedules, supporting, and spacing devices, and penetrations.
   3. Provide drawings for construction joint layout as specified and necessary for construction purposes.

D. Product Data: Indicate admixtures, curing compounds, sealers, chemical hardeners, anchors, water stops, joint materials, and penetrations.

E. Design Data: Submit mix designs.
   1. A list of where the mix designs are to be used shall accompany the designs.

F. Delivery Tickets: Furnish duplicate delivery tickets indicating actual materials delivered to Project Site.

### 1.3 QUALITY ASSURANCE

A. Construct and erect concrete formwork, provide concrete reinforcing, and perform cast-in-place concrete work in accordance with ACI 318.

PART 2 PRODUCTS

2.1 REINFORCEMENT MATERIALS

A. In accordance with Section 03 20 00 – Concrete Reinforcing.

2.2 CONCRETE MATERIALS

A. Cement: ASTM C150, sulfate resistant, Type V Portland type.
   1. All cement used in the manufacture of cast-in-place concrete for exposed surfaces of like elements of a structure shall be from the same cement mill.

B. Fine and Coarse Aggregates: ASTM C33.
   1. Fine aggregate shall be washed clean, shall be uniformly screen graded, and shall not contain more than 2 percent by weight of deleterious materials such as shale, schist, alkali, clay lumps, earth, loam, mica or similar materials. Fine aggregate shall be uniformly graded.
   2. Coarse aggregate shall consist of clean, hard, crushed rock or washed gravel, free from organic materials or soft or friable materials and shall not contain more than 2 percent by weight of shale or cherty material and not more than 15 percent by weight of elongated fragments.
   3. Water: Clean and not detrimental to concrete.

C. Air Entrainment Admixture: ASTM C260.
   1. Subject to approval by the Engineer.

D. Admixtures: ASTM C494.
   1. Admixtures shall be of a type that increases workability and reduces water demand of concrete, but will not increase shrinkage. Admixture shall be subject to approval as to type and amount used. Admixtures shall contain no more than 1 percent chloride ions.

E. Curing Membrane:
   1. Non-staining paper conforming to ASTM C171, or 6 mil polyethylene film.

F. Bonding Agent:
   1. Epoxy resin bonding compounds shall be used for all concrete repairs and shall be Degusa Admixtures, Inc. Concresive Liquid (LPL), Paste (LPL), or Paste (SPL), as applicable; or ChemCo Liquid (LWL), Paste (LWL), Paste (SWL), as applicable; or approved equal.
   2. Non-epoxy bonding compounds may be used for dry areas and shall be Intralock as manufactured by W.R. Meadows, Weld-Crete as manufactured by Larsen Products Corp, or approved equal.

3. Bonding compounds shall be applied in accordance with the manufacturer's instructions.

G. Grout: refer to Section 03 60 00 – Grouting.

2.3 COMPOUNDS, HARDENERS, AND SEALERS

A. Curing compounds shall not be used.

2.4 CONCRETE MIX – PUMP STATION STRUCTURE

A. Mix and deliver concrete in accordance with ASTM C94.
   1. All concrete shall be normal weight concrete unless otherwise specified. Normal weight concrete shall have a minimum density of 150 pounds per cubic foot.

B. Furnish concrete of the following strength:
   1. Compressive strength: 4,500 psi at 28 days.
   2. Slump: 3 to 4 inches.
   3. Cementitious materials: maximum 15 percent flyash by weight.
   4. Air entrainment: 3-5 percent.
   5. Maximum water-cement ratio by weight: 0.5

C. Maximum aggregate size:
   1. Aggregates' maximum diameter: 1 inch.
   2. In no case shall the maximum aggregate size used exceed 20 percent of a members' thickness, nor 3/4 of the clear spacing between reinforcing.

D. Select admixture proportions for normal weight concrete in accordance with ACI 318.

E. Add air entraining agent to concrete mix for concrete work exposed to weather.

2.5 CONCRETE MIX – FLATWORK CONCRETE

A. Mix and deliver concrete in accordance with ASTM C94.
   1. All concrete shall be normal weight concrete unless otherwise specified. Normal weight concrete shall have a minimum density of 150 pounds per cubic foot.

B. Furnish concrete of the following strength:
   1. Compressive strength: 3,000 psi at 28 days.
   2. Slump: 3 to 4 inches.
   3. Cementitious materials: maximum 15 percent flyash by weight.
   4. Air entrainment: 3-5 percent.
   5. Maximum water-cement ratio by weight: 0.5

C. Maximum aggregate size:
   1. Aggregates' maximum diameter: 1 inch.
   2. In no case shall the maximum aggregate size used exceed 20 percent of a members' thickness, nor 3/4 of the clear spacing between reinforcing.

D. Select admixture proportions for normal weight concrete in accordance with ACI 318.

E. Add air entraining agent to concrete mix for concrete work exposed to weather.

2.6 JOINT SEALS AND FILLERS:

A. All materials used together in a given joint (bond breakers, backer rods, joint fillers, sealants, etc.) shall be compatible with one another. Coordinate selection of suppliers and products to ensure compatibility. Under no circumstances shall asphaltic bond breakers or joint fillers be used in joints receiving sealant.

B. Expansion Joint Filler:
   1. Structures:
      a. Self-expanding cork, premolded joint filler
      b. Conform to ASTM D1752, Type III.
      c. Thickness shall be 3/4 inches unless shown otherwise on the Drawings.
   2. Sidewalk and roadway concrete pavements or where fiber joint filler is specifically noted on the Drawings:
      a. Asphalt-impregnated fiberboard conforming to ASTM D1751.
      b. Thickness shall be 3/4 inches unless shown otherwise on the Drawings.

C. Joint Sealant: non-sag elastomeric sealant, Sikaflex 1A, or approved equal.

D. Bond Breaker:
   1. Backer Rod: closed cell polyethylene foam, sized to fit the gap being filled.
   2. Bond Breaker Tape: adhesive backing, 8 mil polyethylene or 2.8 mil polypropylene, sized to fit gap being sealed.
   3. Bond Prevention Coating: non-staining, Silcoseal Select by Nox-Crete, Conlift Bond Breaker Waterbased by Parchem, or approved equal.

E. Bonding Agent:
   1. Epoxy bonding agent shall be two-component, solvent-free, moisture insensitive, epoxy resin material conforming to ASTM C881.
      a. Non-load bearing: Type II.
      b. Load bearing: Type V.
      c. The bonding agent shall be Sikadur 32 Hi-Mod by Sika Corporation; Concresive Liquid LPL by Master Builders Solutions; or approved equal.

2. Latex bonding agent shall be non-reemulsifiable acrylic-polymer latex conforming to ASTM C1059, Type II.

F. Compressible Joint Filler:
   1. The joint filler shall be a non-extruded watertight strip material used to fill expansion joints between structures. The material shall be capable of being compressed at least 40 percent for 70 hours at 68 degrees-Fahrenheit and subsequently recovering at least 20 percent of its original thickness in the first half hour after unloading.
   2. Compressible joint filler shall be Phyzite/Evazote 380 by Chase Construction Products; Wabo® Evazote as by Master Builders Solutions, Inc.; or approved equal.

G. Waterstop: Flexible strip of bentonite waterproofing compound in coil form for joints in concrete construction.
   1. Manufacturer: Swellstop, substitutions not permitted.

2.7 COATINGS: See Section 09 90 00 – Painting and Coating.

PART 3 EXECUTION

3.1 GENERAL

A. Design, engineer, and construct formwork, shoring, and bracing in accordance with Section 03 10 00 – Concrete Forming and Accessories to conform to design and code requirements to achieve concrete shape, line and dimension as indicated on Drawings.
   1. Edge forms and intermediate screed strips shall be set accurately to produce the designed elevations and contours in the finished surface, and shall be sufficiently strong to support vibrating bridge screeds or roller pipe screeds if the nature of the finish specified requires the use of such equipment. The concrete surface shall be aligned to the contours of screed strips by the use of strike-off templates or approved compacting type screeds.
   2. Joints in slabs on grade shall be located and detailed as indicated in the Drawings.

3.2 INSERTS, EMBEDDED COMPONENTS, AND OPENINGS

A. Provide inserts, embedded components, opening and other cast-in-place features in accordance with Section 03 10 00 – Concrete Forming and Accessories and the following:
   1. Provide formed openings where required for work to be embedded in and passing through concrete members.
   2. Coordinate work of other Sections in forming and setting openings, slots, recesses, chases, sleeves, bolts, anchors, and other inserts.

3. Install concrete accessories straight, level, and plumb.
4. Install water stops continuous without displacing reinforcement.
5. Place formed construction joint device in floor slab pattern pouring sequence.
6. Place joint filler at penetrations, isolation joints, and between building and pavement and secondary slabs.

## 3.3 PREPARATION FOR PLACEMENT

A. Notification:
   1. Notify the Construction Manager at least two working days in advance of placing concrete.

B. Before Placing:
   1. Hardened concrete and foreign materials shall be removed from the inner surfaces of the conveying equipment.
   2. Formwork shall be complete; excess water shall be removed; reinforcement shall be secured in place; expansion joint materials, anchors, and other embedded items shall be positioned; and the entire preparation shall be approved at least one day before the placing of concrete.
   3. All subgrades, except aggregate base courses 8 inches and thicker, shall be moisture conditioned in the upper 12 inches to at least 5 percent above optimum moisture content.
   4. Thoroughly soak subgrade prior to placing concrete; do not allow the subgrade to dry out.
   5. All incrustation shall be removed from forms and reinforcing steel at construction joints.
   6. Before depositing new concrete on or against hardened concrete retighten forms and roughen surface of hardened concrete as follows:
      a. Concrete which has been placed longer than 3 1/2 hours, but less than 6 1/2 hours, prepare by removing all laitance from concrete by wire brushing.
      b. Concrete which has been placed longer than 6 1/2 hours, prepare by sand blasting to roughen surfaces to 1/4 inch amplitude and remove curing compounds previously applied to the construction joint. Thoroughly clean off foreign matter and laitance, and moisten with water.

C. Install vapor retarder under interior slabs on grade in accordance with ASTM E1745. Lap joints minimum 12 inches and seal all seams with an adhesive tape recommended by Manufacturer.
   1. Repair damaged vapor retarder with vapor retarder material; lap over damaged areas a minimum 12 inches and seal all seams with an adhesive tape recommended by Manufacturer.

2. Unless indicated otherwise, place 2 inches of clean sand (less than 5 percent passing a US Standard 200 Sieve) on top of vapor retarder membrane.

D. Where new concrete is doweled to existing work, drill holes in existing concrete, insert steel dowels and bond in place with epoxy in accordance with Section 03 20 00 – Concrete Reinforcing.

3.4 MIXING

A. Ready mixed concrete shall be mixed and transported in accordance with ASTM C94.

B. Concrete shall be mixed only in quantities for immediate use and shall be placed within 1 1/2 hours after the introduction of water to the mixture. Concrete which has set shall be discarded and shall not be retempered.

C. Indiscriminate addition of water to increase slump is prohibited.
1. If concrete arrives at the project with slump below that suitable for placing, water may be added only if neither the maximum permissible water-cement ratio nor the maximum slump is exceeded.
2. Additional water shall be added to the concrete one time only, upon immediate delivery of the concrete to the job site.
3. The water must be incorporated by additional mixing equal to at least half of the total mixing required.
4. Any addition of water above that permitted by the limitation of water-cement ratio must be accompanied by a quantity of cement sufficient to maintain the proper water-cement ratio. Such addition must be approved by the Engineer.

3.5 PLACEMENT

A. Before depositing concrete, remove debris from space to be occupied by concrete and thoroughly wet forms. Remove freestanding water.

B. Concrete shall be handled from the mixer to the place of final deposit as rapidly as practicable by methods which will prevent separation or loss of ingredients.

C. Place concrete continuously between predetermined expansion, control, and construction joints. Do not break or interrupt successive pours creating cold joints or visible pour lines in the finish surface.

D. Conveying equipment shall be of size and design to ensure a continuous flow of concrete at the delivery end.

E. All concrete shall be consolidated by vibration so that the concrete is thoroughly worked around the reinforcement, around the embedded items, and into corners of forms,

eliminating all air or stone pockets which may cause honeycombing, pitting, or planes of weakness.

1. All mechanical vibrators shall have a minimum frequency of 7,000 rpm and shall be operated by competent workers.
2. Over-vibration and use of vibrators to transport concrete within forms shall not be allowed.
3. Vibrators shall be inserted and withdrawn at many points, from 18 to 30 in. apart, for 5 to 15 seconds duration.
4. Consolidation of slabs and floors shall be obtained with vibrating bridge screeds, roller pipe screeds, or other approved means.
5. A spare vibrator shall be kept on the job site during all concrete placing operations.
6. Particular care shall be given at exposed concrete surfaces.

F. Free fall placement of concrete is limited to 4 feet.

G. Joints:
   1. Separate slabs-on-grade from vertical penetrations larger than 6 inches in diameter with 3/4 inch thick joint filler, extended from bottom of slab to within 1/4 inch of finished slab surface. Install water stops as indicated in the Drawings.
   2. Separate slabs-on-grade from vertical penetrations 6 inches in diameter and smaller with sleeves extending from bottom of slab to within 1/16 to 1/4 inch of finished slab surface. Seal between the sleeve and the penetrating conduit with flexible waterproof sealant.

H. Place pavement slabs in an every-other-lane placement pattern.

## 3.6 SEPARATE FLOOR TOPPINGS

A. Separate floor toppings are not permitted.

## 3.7 REPAIR OF SURFACE DEFECTS

A. Repair of Surface Defects:
   1. All form tie holes shall be filled and repairable defective areas patched and cured immediately after the forms have been removed.
   2. Remove fins and burrs.

B. Removal:
   1. After forms have been removed, any concrete which is not formed as shown on the Drawings, or does not meet the approval of the Construction Manager shall be removed and replaced. Defective surfaces may be repaired and patched in accordance with the following procedure:
      a. All conditions requiring patches and completed patches will be inspected.

b. Patches disapproved as not restoring the quality and appearance of the surrounding work shall be removed and replaced so as to match the surrounding work.

C. Repair Procedure:
1. All honeycombed and other defective concrete shall be removed to sound concrete, but in no case to a depth of less than 1 inch.
2. The area to be patched and an area of at least 6 inches wide surrounding it shall be dampened to prevent absorption of water from the patching mortar.
3. A bond of neat Portland cement, water, and if permitted, some fine sand passing a No. 30 sieve, shall be mixed to the consistency of thick cream and shall then be well brushed into the surface.
4. Other concrete bonding agents may be used when approved.
5. The patching mixture shall be made of the same materials and of approximately the same proportions as used for the concrete, except that the coarse aggregate shall be omitted and the mortar shall consist of not more than 2 parts cement to 5 parts sand by damp loose volume.
6. White Portland cement shall be substituted for a part of the gray Portland cement on exposed concrete in order to produce a color matching the color of the surrounding concrete, as determined by a trial patch.
7. The quantity of mixing water shall be no more than necessary for handling and placing. The patching mortar shall be mixed in advance and allowed to stand with frequent manipulation with a trowel, without addition of water, until it has reached the stiffest consistency that will permit placing.
8. After surface water has evaporated from the areas to be patched, the bond coat shall be well brushed into the surface. When the bond coat begins to lose the water sheen, the premixed patching mortar shall be applied. The mortar shall be thoroughly consolidated into place and struck off so as to leave the patch slightly higher than the surrounding surface. To permit initial shrinkage, it shall be left undisturbed for at least one hour before being finally finished.
9. The patched area shall be kept damp for 7 days.
10. Before proceeding with any patch work, the Contractor is responsible for establishing trial patch areas to develop the approved patching color and the method of applying and surface-texturing the patching material.

## 3.8 SLAB FINISHES

A. General:
1. Uniformly spread, screed, and float concrete.
2. Maintain surface flatness, with maximum variation of 1/4 inch in 10 feet.
3. Slope surfaces uniformly as indicated in the Drawings.

B. Surface finishes for floors and slabs:
   1. Where finish is not specified, floor slabs shall receive steel troweling.
   2. Dry cement shall not be used on new concrete surfaces to absorb excess moisture.
   3. Edges shall be rounded to a radius of 1/2 inch.
   4. Joints shall be grooved to a radius and depth of 1/4 inch.
   5. Finished surfaces shall be cured and protected as specified in Section 3.10.

C. Float Finish:
   1. Float finish shall conform to ACI 301, Section 11.7.2.
   2. Floating shall be performed with a hand or power driven float. Floating of any one area shall be the minimum necessary to produce the finish specified.
   3. Floating shall compact and smooth the surface and close any cracks and checking of surfaces.

D. Steel Trowel Finish:
   1. Steel trowel finish shall conform to ACI 301, Section 11.7.3.
   2. Immediately after final troweling, the surface shall be cured and protected as specified in Section 3.10.

E. Broomed Finish:
   1. Broomed finish shall conform to ACI 301, Section 11.7.4, except that steel trowelling shall precede the broomed finish.
   2. Broomed finish shall be provided for walks, top decks of water treatment structures, slabs on grade exposed to atmosphere, and where otherwise indicated or specified.

## 3.9 RELATED SURFACES

A. Monolithic Surfacing:
   1. Monolithic surfacing shall be provided on floor areas as specified.
   2. Monolithic surfacing shall consist of a steel trowel finish.

B. Finishing of Unformed Surfaces:
   1. Related Unformed Surfaces: Tops of walls or buttresses, horizontal offsets, and similar unformed surfaces occurring adjacent to formed surfaces shall be struck smooth after concrete is placed and shall be floated to a texture reasonably consistent with that of the adjacent formed surfaces. Final treatment of formed surfaces shall continue uniformly across the unformed surfaces.
   2. Pavements and Sidewalks: The surfaces of the concrete shall be screeded to grade and sloped to drain. After screeding, the surface shall receive a broomed finish. Edges and expansion joints shall be rounded to a radius of 1/2 inch. Joints shall be grooved to a radius and depth of 1/4 inch each.

## 3.10 PROTECTION AND CURING

A. General:
   1. Freshly deposited concrete shall be protected from premature drying and excessively hot or cold temperatures, and shall be maintained without drying at a relatively constant temperature for the period of time necessary for the hydration of the cement and proper hardening of the concrete.

B. Initial Curing:
   1. Initial curing shall immediately follow the finishing operation. Concrete shall be kept continuously moist at least overnight. One of the following materials or methods shall be used:
      a. Ponding or continuous sprinkling.
      b. Absorptive mat or fabric kept continuously wet.
      c. Sand or other covering kept continuously wet.
   2. Curing compounds shall be applied in accordance with the recommendations of the manufacturer and shall not be used on any surfaces against which additional concrete or other cementitious finishing materials are to be bonded, or on surfaces to be coated, waterproofed, moisture proofed, tiled, roofed, or on surfaces on which such curing is prohibited by these specifications.

C. Final Curing:
   1. Immediately following the initial curing and before the concrete has dried, additional curing shall be accomplished by one of the following materials or methods:
      a. Continuing the method used in initial curing.
      b. Waterproof paper covering.
      c. Other moisture-retaining coverings as approved.

D. Duration of Curing:
   1. The final curing shall continue until the cumulative number of days or fractions thereof, not necessarily consecutive, during which temperature of the air in contact with the concrete is above 50 degrees F has totaled 7 days.
   2. If high early strength of concrete has been used, the final curing shall continue for a total of 3 days.
   3. Rapid drying at the end of the curing period shall be prevented.

E. Formed Surfaces:
   1. Steel forms heated by the sun and all wood forms in contact with the concrete during the final curing period shall be kept wet.
   2. If forms are to be removed during the curing period, one of the above curing materials or methods shall be employed immediately. Such curing shall be continued for the remainder of the curing period.

F. Protection from Mechanical Injury:
   1. During the curing period, the concrete shall be protected from damaging mechanical disturbances, particularly load stresses, heavy shock, and excessive vibration. All finished concrete surfaces shall be protected from damage caused by construction equipment, materials, or methods, and by rain or running water.
   2. Self-supporting structures shall not have form supports removed until the concrete strength has met the requirements of Section 03 10 00 - Concrete Forming and Accessories.

## 3.11 CONSTRUCTION JOINTS

A. General:
   1. Make construction joints only at locations shown on the Drawings or as approved by the Engineer. Any additional or relocation of construction joints proposed by the Contractor, must be submitted to the Engineer for written approval.
   2. Concrete in each unit of construction shall be placed continuously.
   3. Prior to placing new concrete against concrete which has set, make preparations in accordance with paragraph 3.3 of this Section.
   4. Reinforcing steel and welded wire fabric shall be continued across construction joints unless shown otherwise on the plans.
   5. Girders and floor slabs shall not be constructed over columns or walls until at least 1 hour has elapsed to allow for shrinkage in the column or wall. No joint will be allowed between a slab and a beam or girder unless otherwise specified.
   6. Joints shall be perpendicular to the main reinforcement.
   7. Keyways shall not be used in construction joints unless specifically shown on the Drawings or approved by the Engineer.

B. Joint Construction:
   1. A rough surface of exposed concrete aggregates shall be produced using a surface retardant at construction joints, including joints between slabs and topping concrete.
      a. The limit of the treated surfaces shall be 1 inch away from the joint edges.
      b. Within 24 hours after placing, retarded surface mortar shall be removed either by high pressure water jetting or stiff brushing or combination of both so as to expose aggregate.
      c. A rough surface of exposed aggregate may also be produced by abrasive blasting followed by high pressure water jetting. Abrasive blasting, if used, shall remove 1/4 inch of laitance film and shall expose coarse aggregate to ensure adequate bond and watertightness at the construction joints.

C. Construction Joint Locations:

1. Walls exceeding 60 feet in length shall be cast in panels not to exceed 50 feet in length. Where the number of panels is three or more, the panels shall be cast in an alternating pattern, unless 5 days have elapsed between casting of adjoining panels.
2. Joints in beams or girders shall be located at or near the quarter points between permanent supports.
3. Joints in the members of a floor system, if needed, shall be made at or near the outer quarters of the span.
4. Joints in walls and columns shall be at the underside of floors, slabs, beams or girders and at the tops of footings or floor slabs. Joints in columns shall be perpendicular to the axis.
5. Unless otherwise noted on the plans, building slabs on grade shall be cast in panels not to exceed 45 feet in length or not to exceed 2,025 sq ft in area. Panels shall be cast in every-other-lane patterns. Minimum lapsed time between placing adjacent panels shall be 24 hours.

## 3.12 CONTRACTION/CONTROL JOINTS

A. General:
   1. Place contraction joints where indicated in the Drawings and incompliance with these Specifications.
   2. Seal joints as indicated in the Drawings and Part 2.5 above.

B. Construct contraction joints in concrete using saw cuts 1/8 inch wide by 1/3 concrete depth or joint-filler strips 1/4 inch wide by 1/3 concrete depth, for concrete sections 5 1/2 inches thick or less unless noted otherwise in the Drawings.
   1. Space joints at 25 times concrete thickness on-center horizontally and vertically unless noted otherwise in the Drawings.
   2. Tool edges round on each side of strip inserts if floated or troweled finishes are required.
   3. After concrete has cured, remove strip inserts and clean groove of loose debris.

C. Construct contraction joints in concrete using joint-filler strips 1/4 inch wide by 1/6 concrete depth on the front and back face of the concrete, for concrete sections 6 inches thick or more.
   1. Space joints at 25 feet on-center maximum horizontally and vertically.
   2. Align joints in thicker members continuously with those in thinner portions of the Work.
   3. Tool edges round on each side of strip inserts if floated or troweled finishes are required.
   4. After concrete has cured, remove strip inserts and clean groove of loose debris.

## 3.13 EXPANSION JOINTS

A. Provide premolded expansion joints to full depth of slabs where indicated on the Drawings.
   1. Install with top edge 3/4 inch below the surface and tool adjacent concrete edges to a 1/4 inch radius.
   2. Use steel pins to hold material in place during placing and floating of concrete.
   3. After a minimum of 28 days after slabs have been placed and finished, fill tops of expansion joints with backer rod and sealant to 1/8 inch below surface of slabs. No traffic shall be permitted to travel over sealed joints until sealer is thoroughly dry.

## 3.14 ERECTION TOLERANCES

A. Install reinforcement within tolerances required by ACI 318 and Section 03 20 00 Concrete Reinforcing.

B. Form and finish concrete so that final vertical surfaces are within +/- 1/2 inch of dimensions indicated in the Drawings and horizontal surfaces are within +/- 1/8 inch of elevations indicated in the Drawings.

## 3.15 FIELD QUALITY CONTROL

A. General:
   1. Compression tests of concrete shall be performed by a qualified testing laboratory retained and paid by the Construction Manager.
   2. Mill tests and manufacturer's certification of compliance with ASTM Specifications may be submitted to the Construction Manager in lieu of testing of cement and aggregate analysis.
   3. Perform field inspection and testing in accordance with ACI 318 and the 2013 CBC.

B. Mix Designs:
   1. Contractor shall employ an approved testing laboratory who shall determine mix designs to fulfill the specified requirements for strength, aggregate size and workability of concrete, and such designs shall be used in proportioning all structural concrete.
   2. Mix designs shall be made in accordance with ACI 211.1.
   3. Review shall not be considered unqualified approval, and shall not relieve the Contractor of his responsibility to furnish concrete of proper consistency and specified strengths.

C. Reinforcement Inspection: See Section 03 20 00 – Concrete Reinforcing.

D. Strength Test Samples:

1. Sample concrete and make one set of four cylinders for every 75 cu yd or less of each class of concrete placed each day and for every 5,000 sq ft of surface area for slabs and walls.

E. Field Testing:
   1. Measure slump and temperature for each compressive strength concrete sample.
   2. Measure air content in air entrained concrete for each compressive strength concrete sample.

F. Cylinder Compressive Strength Testing:
   1. Test Method: ASTM C39.
   2. Test Acceptance: In accordance with ACI 318.
   3. Test one cylinder at 7 days.
   4. Test two cylinders at 28 days.
   5. Retain one cylinder for 365 days for testing when requested by the Engineer.

## 3.16 DEFECTIVE CONCRETE

A. Defective concrete work shall be removed and replaced at Contractor's expense. Concrete not conforming to required lines, details and elevations, shall be considered defective as determined by the Construction Manager.

END OF SECTION

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# SECTION 03 60 00 - GROUTING

## PART 1 GENERAL

### 1.1 SUMMARY

A. Section Includes:
   1. Portland cement grout.
   2. Rapid-curing epoxy grout.
   3. Non-shrink cementitious grout.

### 1.2 SUBMITTALS

A. Product Data: Submit manufacturer information regarding grout.

B. Manufacturer's Certificate: Products meet or exceed specified requirements.

C. Manufacturer Instructions: Mixing, handling, surface preparation, and placing epoxy-type and nonshrink grouts.

D. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.

E. Qualifications Statement:
   1. Qualifications for manufacturer.

### 1.3 QUALITY ASSURANCE

A. Perform Work according to City of Fort Bragg standards.

B. Manufacturer: Company specializing in manufacturing products specified in this Section with three years' experience.

### 1.4 DELIVERY, STORAGE, AND HANDLING

A. Store materials according to manufacturer instructions.

B. Protection:
   1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
   2. Provide additional protection according to manufacturer instructions.

1.5 AMBIENT CONDITIONS

A. Maximum Conditions: Do not perform grouting if temperatures exceed 100 degrees F.

B. Minimum Conditions: Maintain minimum temperature of 50 degrees F before, during, and after grouting, until grout has set.

PART 2 PRODUCTS

2.1 PORTLAND CEMENT GROUT

A. Portland Cement: Comply with ASTM C150, Type V.

B. Water:
   1. Potable.
   2. No impurities, suspended particles, algae, or dissolved natural salts in quantities capable of causing:
      a. Corrosion of steel.
      b. Volume change increasing shrinkage cracking.
      c. Efflorescence.
      d. Excess air entraining.

C. Fine Aggregate:
   1. Washed natural sand.
   2. Gradation:
      a. Comply with ASTM C33.
      b. Represented by smooth granulometric curve within required limits.
   3. Free from injurious amounts of organic impurities according to ASTM C40.

D. Mix:
   1. Portland cement, sand, and water.
   2. Do not use ferrous aggregate or staining ingredients in grout mixes.

2.2 RAPID-CURING EPOXY GROUT

A. Manufacturers:
   1. Laticrete International, Inc, Sika Corporation, W.R. Meadows, Inc.
   2. Or approved equal.

B. Description:
   1. High-strength, three-component epoxy grout formulated with thermosetting resins and inert fillers.
   2. Rapid-curing, high adhesion, and resistant to ordinary chemicals, acids, and alkalis.

C. Performance and Design Criteria:
    1. Compressive Strength:
        a. 12,000 psi at seven days.
        b. Comply with ASTM C579.
    2. Minimum Tensile Strength:
        a. 2,000 psi.
        b. Comply with ASTM C307.
    3. Coefficient of Expansion:
        a. 0.000030 inch per degree F.
        b. Comply with ASTM C531.
    4. Shrinkage:
        a. None.
        b. Comply with ASTM C827.

## 2.3 NON-SHRINK CEMENTITIOUS GROUT

A. Manufacturers:
    1. CGM, Incorporated, Euclid Chemical Company, Laticrete International, Inc, Quickrete, Sika Corporation.
    2. Or approved equal.

B. Description:
    1. Pre-mixed and ready-for-use formulation requiring only addition of water.
    2. Nonshrink, non-corrosive, nonmetallic, non-gas forming, and no chlorides.

C. Performance and Design Criteria:
    1. Certified to maintain initial placement volume or expand after set, and to meet following minimum properties when tested according to CRD-C621 for Type D nonshrink grout:
        a. Setting Time:
            1) Initial: Approximately two hours.
            2) Final: Approximately three hours.
            3) Comply with ASTM C191.
        b. Maximum Expansion: 0.10 to 0.40 percent.
        c. Compressive Strength:
            1) One-Day: 4,000 psi.
            2) Seven-Day: 7,000 psi.
            3) 28-Day: 10,000 to 10,800 psi.
            4) Comply with CRD-C621.

## 2.4 FORMWORK

A. As specified in Section 03 10 00 – Concrete Forming and Accessories.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify areas to receive grout.

3.2 PREPARATION

A. Remove defective concrete, laitance, dirt, oil, grease, and other foreign material from concrete surfaces by brushing, hammering, chipping, or other similar means until sound and clean concrete surface is achieved.

B. Roughen concrete lightly, but not to interfere with placement of grout.

C. Remove foreign materials from metal surfaces in contact with grout.

D. Align, level, and maintain final positioning of components to be grouted.

E. Saturate concrete surfaces with clean water, and then remove excess water.

3.3 INSTALLATION

A. Formwork:
   1. Construct leakproof forms anchored and shored to withstand grout pressures.
   2. Install formwork with clearances to permit proper placement of grout.
   3. As specified in Section 03 10 00 – Concrete Forming and Accessories.

B. Mixing:
   1. Portland Cement Grout:
      a. Use proportions of two parts sand and one part cement, measured by volume.
      b. Prepare grout with water to obtain consistency to permit placing and packing.
      c. Mix only quantities of grout capable of being placed within 30 minutes after mixing.
      d. Do not add additional water after grout has been mixed.
   2. Rapid-Curing Epoxy Grout:
      a. Mix and prepare according to manufacturer instructions.
   3. Non-shrink Cementitious Grout:
      a. Mix and prepare according to manufacturer instructions.

C. Placing of Grout:
   1. Do not use pneumatic-pressure or dry-packing methods.
   2. Do not remove leveling shims for at least 48 hours after grout has been placed.

D. Curing:

1. Prevent rapid loss of water from grout during first 48 hours by use of approved membrane curing compound or by using wet burlap method.
2. Immediately after placement, protect grout from premature drying, excessively hot or cold temperatures, and mechanical injury.
3. After grout has attained its initial set, keep damp for minimum three days.

## 3.4 FIELD QUALITY CONTROL

A. Inspection and Testing:
   1. Comply with ACI 318.
   2. Submit proposed mix design of each class of grout to Engineer of Record for review prior to commencement of Work.
   3. Tests of grout components may be performed to ensure compliance with specified requirements.

END OF SECTION

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# SECTION 05 52 00 – METAL RAILINGS

## PART 1 GENERAL

### 1.1 SUMMARY

A. Section Includes:
   1. Steel pipe tube railings, balusters, and fittings.

### 1.2 SUBMITTALS

A. Shop Drawings: Indicate profiles, sizes, connection attachments, anchorage, size and type of fasteners, and accessories.

B. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

C. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.

D. Qualifications Statements:
   1. Submit qualifications for fabricator and erector.
   2. Submit manufacturer's approval of fabricator and erector.

### 1.3 QUALITY ASSURANCE

A. Perform Work of this Section according to ASTM E985.

B. Finish joints according to NOMMA Guideline 1.

C. Perform Work according to City of Fort Bragg and Mendocino County standards.

D. Fabricator: Company specializing in fabricating products specified in this Section with minimum three years' experience.

E. Erector: Company specializing in performing Work of this Section with minimum three years' experience.

### 1.4 EXISTING CONDITIONS

A. Field Measurements: Verify field measurements prior to fabrication. Indicate field measurements on Shop Drawings.

PART 2 PRODUCTS

2.1 PERFORMANCE AND DESIGN CRITERIA

A. Design handrail, guardrail, and attachments to resist forces as required by ASTM E985. Apply loads non-simultaneously to produce maximum stresses.
   1. Guard Top Rail and Handrail Concentrated Load: 200 lb. applied at any point in any direction.
   2. Guard Top Rail Uniform Load: 50 plf, applied in any direction.
   3. Intermediate Rails, Panels, and Baluster Concentrated Load: 50 psf..

2.2 HANDRAILS AND RAILINGS

A. Manufacturers:
   1. Furnish materials according to City of Fort Bragg standards.

2.3 MATERIALS

A. Steel Railing System:
   1. Pipe: ASTM A53, Grade B, Schedule 40.
   2. Posts: 1.66-inch-diameter steel pipe; welded joints.
   3. Fittings: Elbows, T-shapes, wall brackets, escutcheons; machined steel.
   4. Mounting: Adjustable brackets and flanges, with steel inserts for casting in concrete.
   5. Exposed Fasteners: Flush countersunk screws or bolts; consistent with design of railing.
   6. Galvanizing: According to ASTM A123; hot-dip galvanized after fabrication.
   7. Touchup Primer for Galvanized Surfaces: SSPC Paint 20, Type II - Organic, zinc-rich.

2.4 FABRICATION

A. Fit and shop-assemble components in largest practical sizes for delivery to Site.

B. Fabricate components with joints tightly fitted and secured. Furnish spigots and sleeves to accommodate Site assembly and installation.

C. Form simple and compound curves by bending pipe in jigs to produce uniform curvature for each repetitive configuration required; maintain cylindrical cross section of pipe throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of pipe.

D. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.

E. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

F. Exterior Components: Continuously seal joined pieces by continuous welds. Drill condensate drainage holes at bottom of members at locations not encouraging water intrusion.

G. Interior Components: Continuously seal joined pieces by continuous welds.

H. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

I. Accurately form components to suit stairs and landings, to each other and to building structure.

J. Accommodate expansion and contraction of members and building movement without damage to connections or members.

## PART 3 EXECUTION

### 3.1 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive Work.

### 3.2 PREPARATION

A. Clean and strip primed steel items to bare metal where Site welding is required.

B. Supply items required to be cast into concrete with setting templates to appropriate Sections.

### 3.3 INSTALLATION

A. Install components plumb and level, accurately fitted, free from distortion or defects.

B. Anchor railings to structure with anchors.

C. Field-weld anchors as indicated on Shop Drawings. Touch up welds with primer. Grind welds smooth.

D. Conceal bolts and screws whenever possible.

E. Assemble with spigots and sleeves to accommodate tight joints and secure installation.

3.4 TOLERANCES

A. Maximum Variation from Plumb: 1 inch per story, noncumulative.

B. Maximum Offset from Alignment: 1 inch.

C. Maximum Out-of-Position: 1 inch.

END OF SECTION

SECTION 06 10 00 – ROUGH CARPENTRY

PART 1 GENERAL

1.1 SUMMARY

A. Section includes:
   1. Lumber materials.
   2. Sheathing materials.
   3. Factory wood treatment.
   4. Accessories.

1.2 REFERENCES

A. California Building Code (CBC) 2010 Edition

B. National Design Specification for Wood Construction (NDS) 2005 Edition

C. Federal Specification, *FF-N-105*

D. National Evaluation Report, *NER-272*

E. American Society for Testing and Materials:
   1. ASTM A153 *Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware*
   2. ASTM A307 *Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength*
   3. ASTM A536 *Standard Specification for Carbon and Alloy Steel Nuts*
   4. ASTM C1280 *Standard Specification for Application of Exterior Gypsum Panel Products for Use as Sheathing*
   5. ASTM D226 *Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing*
   6. ASTM F1667 *Standard Specification for Driven Fasteners: Nails, Spikes, and Staples*

F. American Lumber Standard Committee, *Voluntary Product Standard PS 20-10*

G. American National Standards Institute: ANSI B18.6.1, *Wood Screws (Inch Series)*

H. APA – Engineered Wood Association:
   1. APA *APA Engineered Wood Construction Guide Form E30*
   2. APA *APA PS1, Panel Design Specification*

I. American Society of Mechanical Engineers:

1. ASME B18.2.1 *Square, Hex, Heavy Hex, and Askew Head Bolts and Hex, Heavy Hex, Hex Flange, Lobed Head, and Lag Screws (Inch Series)Wood Screws (Inch Series)*

1.3 SUBMITTALS

A. Product Data:
   1. Engineered connection hardware.
   2. Fasteners and nails.
   3. Bolts and Anchors.

B. Material certificates for dimensional lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use as well as design values approved by the Board of Review of American Lumber Standards Committee.

C. Wood treatment data including chemical treatment manufacturer's instructions for handling, storing, installation, and finishing of treated material.
   1. For each type of preservative treated wood product include certification by treating plant stating type of preservative solution and pressure process used, net amount of preservative retained, and compliance with applicable standards.
   2. For water-borne treated products include statement that moisture content of treated materials was reduced to levels indicated prior to shipment to project site.
   3. Warranty of chemical treatment manufacturer for each type of treatment.

D. Material certificates for engineered wood products specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use as well as design values approved by the APA-The Engineered Wood Association.

1.4 QUALITY ASSURANCE

A. Single Source Responsibility for Engineered Wood Products. Obtain each type of engineered wood products from one source from a single manufacturer.

B. Lumber Grading Agency: Certified by DOC PS 20.

C. Wood Structural Panel Grading Agency: Certified by APA-The Engineered Wood Association.

D. Perform Work according to City of Dixon standards.

## 1.5 DELIVERY, STORAGE, AND HANDLING

A. Keep materials under cover and dry. Protect against exposure to weather and contact with damp or wet surfaces. Stack lumber as well as plywood and other panels; provide for air circulation within and around stacks and under temporary coverings

B. Protect lumber and structural panels from warping, delaminating, or other distortion by stacking in vertical position, braced to resist movement, and covered when not in use.

# PART 2 PRODUCTS

## 2.1 LUMBER MATERIALS

A. Furnish lumber manufactured to comply with PS 20 "American Softwood Lumber Standard" and with applicable grading rules of inspection agencies certified by American Lumber Standards Committee's (ALSC) Board of Review.

B. Grade stamps:
   1. Provide lumber with each piece factory-marked with grade stamp of inspection agency evidencing compliance with grading rule requirements and identifying grading agency, grade, species, moisture content at time of surfacing, and mill.

C. Nominal sizes:
   1. Nominal sizes are indicated, except as shown by detail dimensions. Provide actual sizes as required by PS 20, for moisture content specified for each use.
      a. Provide dressed lumber, S4S, unless otherwise indicated.
      b. Provide seasoned lumber with 19 percent maximum moisture content at time of dressing and shipment for sizes 2 inches or less in nominal thickness, unless otherwise indicated.

D. For nonstructural light framing (2 to 4 inches thick, 2 to 4 inches wide) provide the following grade and species:
   1. Grade: Construction.
   2. Any species graded under WWPA or WCLIB rules.

E. For structural light framing (2 to 4 inches thick, 2 to 4 inches wide), provide the following grade and species.
   1. Grade: No. 2 & BTR.
   2. Same species as indicated for structural framing grade below.

F. Blocking And draftstopping:
   1. Fireblocking: Solid lumber nominal 2 inches (50 mm) thick.

2. Structural Diaphragm Blocking: Solid lumber nominal 2 inches (50 mm) thick, unless otherwise indicated in the Drawings.
3. Same species and grade as indicated for structural framing grade below.

G. For structural framing (2 to 4 inches thick, 5 inches and wider), provide the following grade and species.
1. Grade: Select Structural.
2. Douglas Fir-Larch graded under WCLIB or WWPA rules.

2.2 SHEATHING MATERIALS

A. Comply with PS 1 for plywood construction panels.

B. Furnish wood structural panels that are each factory-marked with APA trademark evidencing compliance with grade requirements.
1. Roof Sheathing: APA-rated sheathing 19/32; Structural I, C-C grade plywood; Span Rating 40/32; Exposure Durability, exterior 1; unsanded.
2. Wall Sheathing: APA-rated sheathing 19/32; Structural I, C-C grade plywood; Span Rating 40/32; Exposure Durability, exterior 1; unsanded.

C. For mounting electrical or telephone equipment:
1. Provide fire-retardant-treated plywood panels with grade designation, APA C-D plugged, exposure 1, in thickness indicated. If not indicated, thickness not less than 23/32 inch.

2.3 FACTORY WOOD TREATMENT

A. All sill plates, wood in contact with concrete or masonry, wood exposed to weathering, and roofing battens shall be pressure treated per the requirements AWPA.

B. Pressure treat above-ground items with water-borne preservatives to a minimum retention of 0.25 pcf.

C. Moisture Content after Treatment:
1. Lumber: Maximum 19 percent.
2. Structural Panels: Maximum 15 percent.

2.4 ACCESSORIES

A. Fasteners:
1. ASTM A153 hot-dip galvanized steel or of AISI Type 304 stainless steel for all exterior sheathing, pressure treated lumber, and exterior trim locations.
2. Nails and Staples:
a. ASTM F1667

b. FS FF-N-105
c. Power Driven Fasteners: National Evaluation Report NER-272

3. Drywall Screws: Bugle head, hardened steel, power-driven type, length of three times thickness of sheathing.
4. Wood Screws: ANSI B18.6.1.
5. Lag Bolts: ANSI B18.2.1.
6. Bolts: Steel bolts complying with ASTM A307, Grade A: with ASTM A563 hex nuts and where indicated, flat washers.

B. Anchors: See Section 04 20 16 – Reinforced Unit Masonry.
   a. Treaded Rod with washers and nuts as required by Drawings.
   b. Coordinate with masonry to cast in place during grouting.

C. Structural Framing Connectors: Galvanized steel, as indicated in Drawings, manufactured by Simpson, or approved equal.

D. Sill Gasket:
   1. Isolate top of masonry walls from wood structural framing members with compressible joint filler, TVM Sill Seal or approved equal.
   2. 1/4 inch thick, plate width, closed-cell polyethylene foam from continuous rolls.

E. Building Paper: ASTM D226; Type II, No. 30 unperforated asphalt felt.

## PART 3 EXECUTION

### 3.1 PREPARATION

A. Protect adjacent surfaces, equipment, and structures.

B. Clean contact surfaces of wood components prior to assembly.

### 3.2 APPLICATION

A. Framing:
   1. Carefully select all members. Select individual pieces so that knots and defects will not interfere with placement of bolts, nails, or connections. Discard defective pieces.
   2. Install framing members of size and spacing indicated. Set structural members level and plumb, in correct position.
   3. Fasten framing according to CBC, 2013 Edition. Make contact surfaces fit tightly. Install fasteners without splitting of wood; predrill as required.

4. Make provisions for erection loads and for sufficient temporary bracing to maintain structure safe, plumb, and in alignment until completion of erection and installation of permanent bracing.
5. Place horizontal members, crown side up.
6. Construct load-bearing framing and curb members full length without splices.
7. Double members at openings over 24 inches wide.
8. Construct double joist headers at both ends of openings in roof framing and over openings in walls.
9. Place sill gasket directly on masonry walls. Puncture gasket clean, and fit tight to protruding foundation anchor bolts.
10. Curb roof openings except where prefabricated curbs are provided. Form corners by alternating lapping side members.

B. Sheathing:
1. Comply with applicable recommendations contained in APA Form No. E30, for types of construction panels and applications indicated.
2. Secure roof sheathing with longer edge (strength axis) perpendicular to framing members and with ends staggered and sheet ends at least 1/2 inch over bearing.
3. Place building paper horizontally over sheathing; weather lap edges 2 inches or more and ends 12 inches or more.
4. Secure wall sheathing with long dimension perpendicular to wall studs, with ends over firm bearing and staggered.
5. Place wood structural panel sheeting at building corners for minimum horizontal distance of 24 inches.
6. Install telephone and electrical panel backboards with wood structural panel sheathing material where required. Size back boards 12 inches beyond size of electrical panel.

C. Fireblocking: Install fireblocking to cut off concealed draft openings.
1. Concealed Framed Wall and Furred Spaces: Install fireblocking vertically at floor and ceiling levels and horizontally at maximum 10 feet on center.
2. Connections between Horizontal and Vertical Spaces: Install fireblocking between vertical walls and partitions and the following:
    a. Horizontal floor and roof framing.
    b. Soffits, dropped ceilings, cove ceilings, and other horizontal concealed spaces.
3. Exterior Combustible Architectural Trim: Install fireblocking at maximum 20 feet on center.

D. Gypsum Sheathing:
1. Fasten to exterior face of stud framing for exterior walls and soffits.
2. Use self-drilling drywall screws.
3. Keep perimeter fasteners 3/8-inch from edges and ends of board units.

4. Fit boards tightly against each other and around openings.
5. Install 4-foot x 8-foot or longer sheathing horizontally with long edges at right angles to studs. Center end joints over supports and stagger in each course.
6. Install gypsum sheathing according to ASTM C1280.

3.3 TOLERANCES

A. Framing and Furring Members to Receive a Finished Wall or Ceiling: Align finish surface to vary not more than 1/8 inch from a theoretical plane or surfaces of the room or space.

B. Other Framing Members: 1/4 inch from indicated position, maximum.

C. Surface Flatness of Floor: 1/4 inch in 10 or more feet, maximum.

3.4 FIELD QUALITY CONTROL

A. Keep premises in a neat, safe, and orderly condition at all times during execution of this portion of the work, free from accumulation of sawdust, cut-ends, and debris.

B. Construction Manager will inspect for:
1. Sheathing and framing constructed positions within tolerance.
2. Nailing to adequacy meet required schedule per location.
3. Installation of engineered connections and other hardware per requirements.

END OF SECTION

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# SECTION 06 17 53 - WOOD TRUSSES

## PART 1 - GENERAL

### 1.1 SECTION INCLUDES

A. Gable-shaped trusses. Roof sheathing is specified in Section 06100.

### 1.2 REFERENCED SECTIONS

A. The following Sections are referenced in this Section

1. Section 01 33 00 – Submittals
2. Section 06 10 00 – Rough Carpentry

### 1.3 DEFINITIONS

A. Prefabricated metal-plate-connected wood trusses include planar structural units consisting of metal-plate-connected members that are fabricated from dimension lumber and that have been cut and assembled prior to delivery to the project site.

### 1.4 SUBMITTALS

A. Submit the following in accordance with Section 01 33 00 – Submittal Procedures.

1. Product data for lumber, metal connector plates, hardware, fabrication process, and fasteners.
2. Shop drawings indicating species, species group, sizes, and stress grades of lumber to be used; pitch, span, camber, configuration, and spacing for each type of truss required; type, size, material, finish, design values, and location of metal connector plates; and bearing details.
3. To the extent engineering design considerations are indicated as fabricator's responsibility, include design analysis indicating loading, assumed allowable stress, stress diagrams and calculations, and other information needed for review that have been signed and sealed by a qualified professional engineer, registered in the State of California, responsible for their preparation.
4. Provide shop drawings that have been signed and stamped by a qualified professional engineer registered in the State of California.
5. Product certificate, signed by officer of fabricating firm, certifying that metal-plate-connected wood trusses supplied for Project comply with specified requirements.

### 1.5 QUALITY ASSURANCE

A. TPI Standards: Comply with applicable requirements and recommendations of the following Truss Plate Institute (TPI) publications:

1. "Design Specification for Metal Plate Connected Wood Trusses."
2. "Design Specification for Metal Plate Connected Parallel Chord Wood Trusses."
3. "Commentary and Recommendations for Handling and Erecting Wood Trusses."
4. "Commentary and Recommendations for Bracing Wood Trusses."
5. "Quality Standard for Metal Plate Connected Wood Trusses."

B. Connector Plate Manufacturer's Qualifications

1. A manufacturer that is a member of TPI and that complies with TPI quality control procedures for manufacture of connector plates published in TPI "Quality Standard for Metal Connector Plate Manufacture."

C. Wood Structural Design Standard

1. Comply with applicable requirements of N.F.P.A. "National Design Specification for Wood Construction."

D. Single-Source Engineering Responsibility

1. Provide trusses engineered by the metal plate connector manufacturer to support superimposed dead and live loads indicated, with design approved and certified by a qualified professional engineer.

E. Engineer Qualifications

1. A professional engineer legally authorized to practice in jurisdiction where Project is located and experienced in providing engineering services of the kind indicated that have resulted in the installation of metal-plate-connected wood trusses similar to those of this Project and with a record of successful in-service performance.

F. Fabricator's Qualifications

1. A firm that complies with the following requirements for quality control and is experienced in prefabricating metal-plate-connected wood trusses similar to those of this Project that have a record of successful in-service performance:

G. Fabricator participates in a recognized quality assurance program that involves inspection by SPIB; Timber Products Inspection, Inc.; Truss Plate Institute; or other independent inspection and testing agency acceptable to Architect and authorities having jurisdiction.

H. Single Source Responsibility for Connector Plates

1. Provide metal connector plates from a single manufacturer.

I. Provide construction conforming to:

1. Uniform Building Code, including ordinances thereto adopted by governing authority having jurisdiction.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Handle and store trusses with care and comply with manufacturer's instructions and TPI recommendations to avoid damage from bending, overturning, or other cause which trusses are not designed to resist or endure.

1.7 SEQUENCING AND SCHEDULING

A. Time delivery and erection of trusses to avoid extended on-site storage and to avoid delaying work of other trades whose work must follow erection of trusses.

PART 2 - PRODUCTS

2.1 CONNECTOR PLATE MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering metal connector plates that may be incorporated in the Work include, but are not limited to, the following:

1. Alpine Engineered Products, Inc.
2. Bemax of Florida, Inc.
3. Clary Corporation.
4. Computrus, Inc.
5. Gang-Nail Systems, Inc.
6. Hydro-Air Engineering, Inc.
7. Inter-Lock Steel Co., Inc.
8. Metal-Lock, Inc.
9. Robbins Manufacturing Co.
10. TEE-Lok Corp.
11. Truss Connectors of America.
12. Truswal Systems Corporation.

2.2 LUMBER

A. Factory mark each piece of lumber with type, grade, mill, and grading agency.

B. Lumber Standard: Manufacture lumber to comply with PS 20 "American Softwood Lumber Standard" and with applicable grading rules of inspection agencies certified by American Lumber Standards Committee's (ALSC) Board of Review.

C. Nominal sizes are indicated, except as shown by detail dimensions.

D. Provide dressed lumber, S4S, manufactured to actual sizes required by PS 20 to comply with requirements indicated below:

E. Moisture Content: Seasoned, with 19 percent maximum moisture content at time of dressing and shipment for sizes 2 inches or less in nominal thickness, unless otherwise indicated.

2.3 METAL CONNECTOR PLATES

A. General

1. Fabricate connector plates from metal complying with requirements indicated in this article.

B. Hot-Dip Galvanized Steel Sheet

1. Structural (physical) quality steel sheet complying with ASTM A 446, Grade A; zinc coated by hot-dip process to comply with ASTM A 525, Designation G60; minimum coated metal thickness indicated but not less than 0.036 inch.

2.4 FASTENERS

A. General

1. Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.

B. Where truss members are exposed to weather or to high relative humidities, provide fasteners with a hot-dip zinc coating per ASTM A 153 or of AISI Type 304 stainless steel.

C. Nails, Wire, Brads, and Staples: FS FF-N-105.

D. Power Driven Fasteners: National Evaluation Report NER-272.

E. Wood Screws: ANSI B18.6.1.

F. Lag Bolts: ANSI B18.2.1.

G. Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and where indicated, flat washers.

2.5 METAL FRAMING ANCHORS

A. General

1. Provide metal framing anchors of type, size, metal, and finish indicated that comply with requirements specified including the following:

B. Current Evaluation/Research Reports

1. Provide products for which reports exist from a model code organization acceptable to authorities having jurisdiction that evidence compliance of metal framing anchors for application indicated with the building code in effect for this Project.

C. Allowable Design Loads

1. Provide products for which manufacturer publishes allowable design loads that are determined from empirical data or by rational engineering

analysis and that are demonstrated by comprehensive testing performed by a qualified independent testing laboratory.

D. Galvanized Steel Sheet

1. Steel sheet zinc-coated by hot-dip process on continuous lines prior to fabrication to comply with ASTM A 525 for Coating Designation G60 and with ASTM A 446, Grade A (structural quality); ASTM A 526 (commercial quality); or ASTM A 527 (lock-forming quality); as standard with manufacturer for type of anchor indicated.

2.6 FABRICATION

A. Cut truss members to accurate lengths, angles, and sizes to produce close-fitting joints with wood-to-wood bearing in assembled units.

B. Fabricate metal connector plates to size, configuration, thickness, and anchorage details required to withstand design loadings for types of joint designs indicated.

C. Assemble truss members in design configuration indicated using jigs or other means to ensure uniformity and accuracy of assembly with joints closely fitted to comply with tolerances specified in TPI "Quality Standard for Metal Plate Connected Wood Trusses." Position members to produce design camber indicated.

D. Connect truss members by means of metal connector plates accurately located and securely fastened to each side of wood members by means indicated or approved.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Erect and brace trusses to comply with applicable requirements of referenced TPI standards.

B. Where trusses do not fit, return them to fabricator and replace with trusses of correct size; do not alter trusses in the field.

C. Erect trusses with plane of truss webs vertical (plumb) and parallel to each other, located accurately at design spacings indicated.

D. Hoist trusses in place by means of lifting equipment suited to sizes and types of trusses required, exercising care not to damage truss members or joints by out-of-plane bending or other causes.

E. Anchor trusses securely at all bearing points to comply with methods and details indicated.

F. Install permanent bracing and related components to enable trusses to maintain design spacing, withstand live and dead loads including lateral loads, and to comply with other indicated requirements.

G. Do not cut or remove truss members.

H. Do not install damaged members. Do not repair field-damaged members until Engineer reviews damage and specific instruction is provided. Do not cover-up damaged members.

END OF SECTION

# SECTION 06 20 00 – FINISH CARPENTRY

## PART 1 GENERAL

### 1.1 SUMMARY

A. Section Includes:
   1. Exterior wood trim
   2. Preformed mineral-fiber cement soffit panels
   3. Provide miscellaneous accessories, flashings, exposed sheet metal, trim, fasteners, and sealants associated with the work of this Section

B. Related Sections:
   1. Section 06 10 00 – Rough Carpentry
   2. Section 07 23 00 – Concrete Roof Tile
   3. Section 07 92 00 – Sealant and Caulking
   4. Section 09 90 00 – Painting and Coatings

### 1.2 SUBMITTALS

A. Product Data: Submit literature for manufactured items

B. Submittals shall comply with the General Requirements

C. Shop Drawings: Indicate materials and wood specifies, component profiles, fastening, joining details, finishes, and accessories.

D. Samples: Furnish samples of each type of wood trim and plastic lumber

E. Certificates:
   1. Quality Standards Certification: WIC certification will not be required, however, Agency reserves right to retain WIC if quality of work is questionable
   2. Wood Product Certification: Furnish certification indicating wood products are from “well-managed” forests
   3. Submit certification that mineral-fiber cement siding is asbestos-free

### 1.3 QUALITY ASSURANCE

A. Standards: Perform finish carpentry in accordance with standards sof Woodwork Institute of California (WIC) “Manual of Millwork”

B. Certified Wood Products: Wood products to be from forests certified “well-managed” by an agency accredited by forest Stewardship Council (FSC) including SmartWood Program and Forest Conservation Program

C. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication where possible, do not delay job progress, allow for trimming and fitting

1.4 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver materials until site conditions are adequate to receive work; protect items from weather while in transit

B. Store wood materials indoors, in ventilated areas with constant but minimum temperature of 60 degrees F and maximum relative humidity of 25% to 55%

C. Protect the finished surfaces from damage and abrasion during delivery, storage, and handling. Any surface having noticeable and objectionable damage of abrasion, as deemed by the Engineer will be rejected

D. Stack planks and panels on edge or laid flat on a smooth, level surface. Protect edges and corners from chipping. Store sheets under cover and keep dry prior to installing. If sheet should become wet, allow to dry thoroughly before installing

E. Immediately remove from site materials with visible mold and materials with mildew

PART 2 PRODUCTS

2.1 MATERIALS

A. Exterior Wood Trim and Fascia
   1. Grade and Grain: WCLIB “C and Better Clear”, maximum 19 percent moisture content, 6 foot lengths minimum
   2. Species: WRCLA Western Red Cedar
   3. Texture: S4S (surfaced four sides), with smooth face

B. Anchors, Nails and Screws: Select the material, type, size and finish required by each substrate for secure anchorage and as recommended by manufacturer; provide toothed steel or lead expansion bolt screws for drilled-in-place anchors

C. Wood Filler: Color to match wood being filled

D. Fiber-Cement Soffit:
   1. Manufacturer: James Hardie Building Products "Hardiplank", Certainteed, or equal

2. Standard: Conforming to ASTM C1186, Type A - Exterior, Grade II
3. Combustibility: Non-combustible, in accordance with ASTM E184
4. Fire Resistance: ASTM E84: Flame spread = 0; smoke developed = 5
5. Size/Profile: As indicated on drawings
6. Texture: Same as Hardisoffit " Smooth Soffit Panel"

2.2 ACCESSORY MATERIALS

A. Underlayment: 30-pound asphalt-saturated unperforated roofing felt, conforming to ASTM D2178 (glass-fiber)

B. Formed Sheet Metal Trim, Corners, Flashings, Joint Backing, and Other Exposed Items: Galvanized sheet metal. Refer to Section 07600

C. Fasteners for Planks and Trim over Wood Framing: 6d common nails, hot-dip galvanized finish, or stainless steel

D. Lap Sealant: Single component silicone rubber sealant, as recommended by panel manufacturer

E. Perimeter Sealant As specified in Section 07920

2.3 FABRICATION

A. Fabricate finish carpentry items in accordance with specified quality standard

B. Use exposed fastening devices or nails only when approved and unavoidable; arrange neatly

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify surfaces are ready to receive work and field measurements are as shown on shop drawings

B. Beginning installation signifies acceptance of conditions

C. Ensure mechanical and electrical items affecting work are properly placed, complete, and have been inspected by applicable authorities prior to commencement of installation

D. Inspect each piece of finish carpentry and discard damaged and defective pieces

## 3.2 INSTALLATION OF WOOD TRIM AND FIBER CEMENT SOFFIT

A. Install work consistent with specified WIC quality grade, plumb, level, true and straight with no distortions; shim as required, using concealed shims
   1. Prime paint surfaces in contact with cementitious materials prior to installation; comply with requirements of Section 09900 – Painting and Coating

B. Secure work to blocking or framing with countersunk, concealed fasteners and blind nailing as required for a complete installation

C. Scribe and cut for accurate fit to other finished work

D. Install trim in single, unjointed lengths for openings and for runs less than 10'-0"
   1. For longer runs, use only one piece less than 10'-0" in any straight run; provide scarf joints between members
   2. Stagger joints in adjacent members
   3. Cope at returns and miter at corners

E. Accessories: Install accessories in accordance with manufacturer's recommendations in locations indicated or as directed by Engineer

F. Acceptable Tolerances:
   1. Variation from True Position: Maximum 1/16" at any position and maximum 1/8" in any 10'-0" length
   2. Adjoining Surfaces of Same Material: No variation permitted
   3. Offset with Abutting Materials: Maximum 1/32”

G. Preparation for Field Finishing:
   1. Sand work smooth and set exposed nails and screws
   2. Apply wood filler in exposed nail and screw indentations and leave ready to receive site-applied finishes
   3. Seal Concealed and semi-concealed surfaces; brush apply only, using primer consistent with finish coats specified under Section 09900 – Protective Coatings

END OF SECTION

SECTION 07 03 11 – FIBER GLASS BASED ASPHALT SHINGLES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Roof shingles and accessories including the following:

B. Fiberglass-based asphalt shingles.

C. Hip and ridge shingles.

D. Starter shingles.

E. Self-adhering ice and water barrier.

F. Shingle underlayment.

G. Fasteners.

H. Metal flashing and trim.

1.2 RELATED SECTIONS

A. Section 06 10 00 - Rough Carpentry.

B. Section 07 60 00 - Flashing and Sheet Metal; for snow guards, metal flashing and drip edges, including step-type flashing installed with shingles.

1.3 REFERENCES

A. Asphalt Roofing Manufacturers Association (ARMA).
   1. ASTM International (ASTM):
   2. ASTM D1079 – Standard Terminology Relating to Roofing and Waterproofing.
   3. ASTM D3018 - Standard Specification for Class A Asphalt Shingles Surfaced with Mineral Granules.
   4. ASTM D3161 - Standard Test Method for Wind-Resistance of Asphalt Shingles (Fan-Induced Method).
   5. ASTM D3462 - Standard Specification for Asphalt Shingles Made from Glass felt and Surfaced with Mineral Granules
   6. ASTM D4586 - Standard Specification for Asphalt Roof Cement, Asbestos-Free.
   7. ASTM D6381 - Standard Test Method for Measurement of Asphalt Shingle Mechanical Uplift Resistance.
   8. ASTM E108 - Standard Test Methods for Fire Tests of Roof Coverings.

9. ASTM F1667 - Standard Specification for Driven Fasteners: Nails, Spikes, and Staples.

1.4 REGULATORY REQUIREMENTS AND CERTIFICATIONS

A. Provide a roofing system having an Underwriters Laboratories (UL) Class A or ASTM E108 Class A fire resistance classification.

B. When applicable provide a roofing system achieving ENERGY STAR certification.

1.5 SUBMITTALS

A. Submit under provisions of Section 013300 - Submittal Procedures.

B. Submit printed copies of Owens Corning product data sheets indicating product characteristics, product information, installation instructions (including required preparation and installation procedures) and product limitations and color samples.

C. Certificate of Compliance: Provide Certificate of Compliance or Evaluation Report from independent laboratory or Evaluation Agency indicating that Owens Corning asphalt shingles made in normal production meet or exceed the requirements of the following:
   1. ASTM D3462.
   2. ASTM D3161/D7158 – Indicating a Class of Wind Resistance.
   3. ASTM E108/UL790 – Indicating Class A Fire Resistance.

D. Shop Drawings: Indicate specially configured metal flashing, jointing methods and locations, fastening methods and locations, and installation details as required by project conditions.

E. Copy of Warranty: For warranty specified in Section 1.9.

F. Selection Samples: Two complete sets of samples, representing manufacturer's full range of available products and colors.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Provide all primary roofing products, including shingles, underlayment, ice and water barrier, and ventilation, by a single manufacturer.

B. Installer Qualifications: Installer shall be licensed or otherwise authorized by all federal, state and local authorities to install all products specified in this section. Installer shall follow Owens Corning published installation instructions.
   1. Installer shall be an Owens Corning Roofing Preferred Contractor as defined and certified by manufacturer.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to site in manufacturer’s unopened bundles with labels intact and legible.

B. Store all products in manufacturer's unopened, labeled packaging until they are ready for installation.

C. Store all products in accordance with Owens Corning recommendations.

D. Do not install underlayment or shingles on wet surfaces.

E. Store and dispose of solvent-based materials in accordance with all federal, state and local regulations.

F. For rooftop loading, lay shingle bundles flat. Do not bend over the ridge.

1.8 PROJECT CONDITIONS

A. Do not install systems under environmental conditions outside Owens Corning recommended limits. Proceed with work only when existing and forecasted weather conditions will permit work to be performed within Owens Corning recommended limits.

1.9 WARRANTY

A. Standard Limited Warranty: Provide to the Owner Corning standard prorated warranty coverage for materials in the event of a material defect, including up to 10 years Tru Protection® coverage. Refer to actual warranty for complete details, limitations and requirements.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: Owens Corning Roofing and Asphalt, LLC. or equal.

B. Requests for substitutions will be considered in accordance with provisions of Section 016000.

2.2 ASPHALT SHINGLES

A. TruDefinition® Duration® COOL PLUS (Non-Algae Resistant) Shingles: As manufactured by Owens Corning Roofing and Asphalt, LLC. Or equal.

1. Product Attributes: Includes SureNail® Technology, a woven fabric reinforcing strip in the nailing zone on the shingle's top surface.
2. Nominal Size: 13-1/4 in (337 mm) by 39-3/8 in (1000 mm).
3. Exposure: 5-5/8 in (143 mm).
4. Shingles per Square: 64.
5. Bundles per Square: 3 bundles of 20 or 22 shingles.
6. Coverage per Square: 98.4 sq ft (9.1 sq m).
7. Color: As selected from manufacturer's full range.
8. Standards/Qualifications: ASTM D228, ASTM D3018 (Type 1), ASTM D3161 (Class F Wind Resistance), ASTM D3462, ASTM D7158 (Class H Wind Resistance), ASTM E108/UL 790 (Class A Fire Resistance), Listed by the Cool Roof Rating Council (CRRC), ICC-ES AC438, PRI ER 1378E01, Florida Product Approval, and Miami-Dade County Product Approval.

2.3 HIP AND RIDGE SHINGLES

A. Provide hip and ridge shingles color formulated to complement field of roof.

B. DuraRidge® Hip and Ridge (Algae Resistant) Shingles with Sealant: As manufactured by Owens Corning Roofing and Asphalt, LLC.

C. ASTM D3462, ASTM E108/UL790 (Class A Fire Resistance), ICC-ES AC438, PRI ER 1378E01, Florida Product Approval, Miami-Dade County Product Approval, and CSA A123.5.

2.4 STARTER SHINGLES

A. Starter Strip PLUS: As manufactured by Owens Corning Roofing and Asphalt, LLC.
   1. Nail applied starter course. Individual starter shingle is 7-3/4 in (197 mm) by 39-3/8 in (1000 mm).
   2. Standards/Qualifications: ASTM D3462, ASTM D3161 (Class F Wind Resistance), ASTM E108/UL 790 (Class A Fire Resistance), ICC-ES AC438, PRI ER 1378E01, Florida Product Approval, and Miami-Dade County Product Approval.

2.5 SELF-ADHERING UNDERLAYMENTS

A. WeatherLock® Mat: As manufactured by Owens Corning Roofing and Asphalt, LLC.
   1. Mat-faced skid resistant surface, self-adhering, self-sealing, bituminous ice and water barrier.
   2. Roll Width: 36 in (914 mm).
   3. Selvage: 3 in (76 mm).

4. Standards/Qualifications: ASTM D1970, ASTM E108/UL 790 (Class A Fire Resistance1), PRI ER 1378E02, Florida Product Approval, and Miami-Dade County Product Approval.

2.6 FASTENERS

A. Fasteners: Galvanized steel, stainless steel, or aluminum nails complying with ASTM F1667, minimum 12-gauge, 0.0808 in (2.05 mm) shank with 3/8 in (9.5 mm) diameter head. Check local building code requirements.

2.7 METAL FLASHING

A. Flashing: Provide flashing as specified by Section 07600 - Metal Flashing and Sheet Metal.

PART 3 EXECUTION

3.1 EXAMINATION

A. Prior to starting work, examine all roof decks on which work will be applied for defects in materials and workmanship.

B. Do not begin installation until the roof deck has been properly prepared.

C. If another installer is responsible for roof deck preparation, notify the architect, designer-of-record on the project, or building owner of unsatisfactory preparation prior to proceeding with installation. Commencement of installation constitutes acceptance of conditions.

D. Underlayment and shingles installed directly over roof insulation or similar type decks is not approved.
   1. Roof deck must be dry, minimum 3/4 in (19 mm) thick, minimum 6 in (152 mm) wide boards with maximum 1/4 in (6.4 mm) spaces, or APA rated sheathing (exposure 1): minimum 3/8 in (9.5 mm) plywood, minimum 7/16 in (11.1 mm) oriented strand board. Consult your manufacturer for other approved constructions.
   2. Ventilation under the roof deck must meet local code requirements.

3.2 PREPARATION

A. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

B. Remove all existing roofing down to the roof deck.

C. Verify that the deck is dry, structurally sound, clean and smooth. It shall be free of any depressions, waves, and projections. Cover ALL holes 1 in (25 mm) or less in diameter, cracks over 1/2 in (13 mm) in width, loose knots and excessively resinous areas with minimum 28 gauge; 0.0187 in (0.475 mm) galvanized steel, 0.0156 in (0.396 mm) stainless steel, or 0.0126 in (0.320 mm) aluminum sheet metal. Decking or deck boards with holes greater than 1 in (25 mm) in diameter shall be replaced.

D. Verify installed roof deck is acceptable to receive shingles. Acceptable roof decks include the following:
   1. Wood boards: 6 in (152 mm) minimum width, 3/4 in (19 mm) minimum thickness.
   2. Plywood sheathing: 3/8 in (9.5 mm) minimum thickness Exposure 1 grade plywood sheathing as recommended by APA and in compliance with local building code requirements.
   3. OSB panels: 7/16 in (11.1 mm) minimum thickness non-veneer structural panels as recommended by APA and in compliance with local building code requirements.
   4. Spacing between boards or panels shall not exceed 1/4 in (6.4 mm) between roof boards or 1/8 in (3.2 mm) between plywood or OSB sheathing panels.

3.3 UNDERLAYMENT INSTALLATION

A. Install Owens Corning™ underlayments using Owens Corning, installation instructions and in accordance with local building code requirements. When local codes and installation instructions are in conflict, the local building code requirements shall take precedence.
   1. In areas where ice damming is likely to occur, Install self-adhering ice and water barrier from the eaves edge of roof up the slope not less than 24 in (610 mm), measured horizontally,
   2. beyond the interior edge of the exterior wall. Lap ends 6 in (152 mm) on roof decks sloped 5:12 and greater. On roofs with slopes from 2:12 up to 4:12, see application instructions printed on each package.

B. Drip Edge
   1. Drip edge shall be installed on all roof edges.
   2. Install drip edge on eaves first with underlayment installed over the drip edge, or per local code requirements.
   3. Install drip edge on rakes after underlayment is installed, with the drip edge fastened over the underlayment.
   4. Joints in drip edge shall be lapped minimum 2 in (51 mm) with the upslope piece lapped over the down slope piece, or per local building code requirements

5. Install fasteners 8 in to 10 in (203 mm to 254 m) on center, approximately 1-3/4 in (44 mm) to 3 in (76 mm) from the outside edge of the drip edge, or per local building code requirements.

C. Roof Deck
   1. On roofs with slope greater than 4:12, lap horizontal edges at least 2 inches (51 mm) and at least 2 inches (51 mm) over self-adhering ice and water barrier. Lap ends at least 4 inches (102 m). End laps in succeeding course should be located at least 6 ft (1.8 m) from end laps in the preceding course.
   2. On roofs with pitch between 2:12 to less than 4:12, see application instructions printed on each shingle wrapper, or follow local code requirements.
   3. Lap underlayment over valley protection at least 6 inches (152 mm).

D. Penetrations
   1. Vent pipes: Install a 24 in (610 mm) square piece of self-adhering ice and water barrier lapping over roof deck underlayment; seal tightly to pipe.
   2. Vertical walls: Install self-adhering ice and water barrier extending at least 3 in to 4 in (76 mm to 102 mm) up the wall and 12 in (305 mm) onto the roof surface. Lap the membrane over the roof deck underlayment.
   3. Chimneys: Install self-adhering ice and water barrier around entire chimney extending at least 6 in (152 mm) up the wall and 12 in (305 mm) on to the roof surface. Lap the membrane over the roof deck underlayment.

3.4 SHINGLE INSTALLATION

A. Install Owens Corning™ shingles (including started shingles as well as hip and ridge shingles) in accordance with Owens Corning installation instructions and in accordance with local building code requirements.

B. Install starter course at lowest roof edge and along rake with edge of shingles extending 1/4 in (6.4 mm) over edge of roof. Sealant strip should be closest to roof edge.

C. Install first and successive courses of shingles stepping diagonally up and across roof deck with Owens Corning recommended offset at each succeeding course. Maintain uniform exposure of shingles at each succeeding course. Use of a chalk line every other course is recommended.

D. Fasten shingles to deck with number of roofing nails per shingle and type of nails specified by Owens Corning, or in accordance specified by local Authority Having Jurisdiction.

E. All fasteners must be driven flush with the shingle surface and penetrate at least 3/4 in (19.1 mm) into the wood deck. Where the deck is less than 3/4 in (19.1 mm) thick, the

fastener should be long enough to penetrate fully and extend through the roof sheathing.

F. Install Owens Corning shingles at valleys, eaves, rakes, hips and ridges in accordance with Owens Corning installation instructions and local building code requirements.

3.5 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.:

END OF SECTION

# SECTION 07 06 00 – FLASHING AND SHEET METAL

## PART 1 GENERAL

### 1.1 THE REQUIREMENT

A. Section Includes: Flashing, sheet metal, and associated accessories, including roof curbs at roof hatches, gutters, downspouts, and flashings

### 1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Section 07920 – Sealants and Caulking

B. Section 09900 – Paintings and Coatings

### 1.3 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. ASTM International (ASTM):
   1. A 525 - Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process.
   2. B221 - Specification for Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes.
   3. D226 - Standard Specification For Asphalt-Saturated Organic Felt Used In Roofing And Waterproofing.

B. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA):
   1. Architectural Sheet Metal Manual, latest edition.

### 1.4 SUBMITTALS

A. Product Data.

B. Shop Drawings: Show fabrication details, material profiles, connections, jointing pattern, jointing details, fastening methods, isolation methods, and installation details.

C. Manufacturer’s Installation Instructions.

### 1.5 SEQUENCING AND SCHEDULING

A. Coordinate sheet metal installation with installation of materials specified in other Sections.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Stack preformed material to prevent twisting, bending, or abrasion, and to provide ventilation.

B. Prevent contact with materials during storage which may cause discoloration, staining, or damage.

PART 2 PRODUCTS

2.1 MATERIALS

A. Aluminum Extrusions: ASTM B 221, alloy 6063 T42.

B. Galvanized Steel Sheet: ASTM A 525, minimum 24-gage thick, with 1.25 ounce coating.

2.2 ACCESSORIES

A. Fasteners and Metal Washers: Types best suited for purpose, of same material as sheet metal being fastened or of composition that will not support electrolysis, such as Type 18 8 stainless steel for fastening aluminum.

B. Sealer Washers: Rubber type, minimum 0.040 inch thick.

C. Underlayment: ASTM D 226; Number 15 asphalt saturated roofing felt.

D. Protective Backing Paint: Bituminous.

E. Slip Sheet: Rosin sized building paper.

F. Roof Cement: ASTM D 4586, plastic asphaltic cement.

G. Solder for Galvanized Steel: ASTM B32; 50 percent tin, 50 percent lead, with rosin flux.

H. Elastomeric Sealant: ASTM C920, polyurethane or silicone sealant, of type and class required to seal joints in sheet metal flashing and trim, and remain watertight.

2.3 FABRICATION

A. Form sheet metal true to shape, accurate in size, square, and free from distortion or defects.

B. For, rises and angles into flashing true and straight, with exposed surfaces free from waves and buckles.

C. Fabricate cleats and starter strips of same material as sheet, minimum 2 inches wide, interlockable with sheet.

D. Form pieces in longest practical lengths. Size and space joints to provide adequate movement for thermal expansion and contraction.

E. Hem exposed edges on underside 1/2 inch; miter and seam corners.

F. Form materials with flat lock seams.

G. Solder and seal metal joints. After soldering, remove flux. Wipe and wash solder joints clean.

H. Fabricate corners from one piece with minimum 18 inch long legs; seam for rigidity, seal with sealant.

I. Fabricate vertical faces with bottom edge formed outward 1/4 inch and hemmed to form drip. Fabricate flashings to allow toe to extend 2 inches over roofing. Return and break edges.

2.4 FINISH

A. Exposed Surfaces: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for applying and designating finishes. Protect prepainted finishes on exposed surfaces with a strippable temporary protective covering.

B. Concealed Surfaces: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting with bituminous coating. Apply a minimum of 15 mils dry film thickness.

PART 3 EXECUTION

3.1 EXECUTION

A. Verify roof openings, curbs, pipes, sleeves, ducts, or vents through roof are solidly set, cant strips and reglets in place, and nailing strips located.

B. Verify membrane termination and base flashings are in place, sealed, and secure.

3.2 INSTALLATION

A. General: Apply all work to even, smooth, sound, thoroughly clean, and dry surfaces free from defects. Install all work plumb and securely fastened for watertight installation.

Provide accessories and other items essential to completion of work, though not specifically shown or specified.

B. Install sheet metal according to recommendations in SMACNA's "Architectural Sheet Metal Manual" and as indicated. Conform to drawing details included in SMACNA manual.

C. Attachments: In general, confine attachments of sheet metal less than 12 inches wide to one edge only. Space screws or nails evenly and approximately 4 inches apart. Where sheet metal is applied to surfaces other than wood, provide shop drawings to establish locations for sleepers and nailing strips required to secure the work properly.

D. Soldering: Solder metal joints watertight for full metal surface contact. After soldering, wash metal clean with neutralizing solution and rinse with water.

E. Expansion and Contraction: Provide expansion and contraction joints at all sheet metal work. Unless otherwise specified or indicated, make up long straight runs of sheet metal work in 12 foot lengths maximum; and connect together with 3-inch loose-lock slip-type joints; and fill with sealant as specified. For straight runs less than 12 feet but more than 8 feet, make a similar slip-type joint at center of run. Lock and solder seams of intermediate joints between expansion joints.

F. Flashings
   1. Provide flashings, where shown or required, to provide watertight protection; use galvanized sheet metal, unless otherwise indicated on Drawings.
   2. Secure flashings in place using concealed fasteners. Use exposed fasteners only in locations approved by ArchitectEngineer.
   3. Fit flashings tightly in place. Make corners square, surfaces true and straight in planes, and lines accurate to profiles.

G. Counterflashings
   1. Turn down counterflashings over base flashings not less than 4 inches; form to provide a spring action against base flashing.
   2. Overlap joints a minimum of 4 inches and bed with elastomeric sealant. Provide prefabicated end closures.

## 3.3 CLEANING AND PROTECTION

A. Clean off excess solder and sealants. Remove temporary protective coverings and strippable film as sheet metal flashing and trim are installed.

B. Protect dissimilar metals from contact with each other and from surfaces which cause corrosion of the metal by coating with bituminous coating or other approved isolator.

Paint faces of all sheet metal in contact with exposed pressure-treated wood with bituminous paint.

END OF SECTION

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# SECTION 07 21 03 – BATT AND BLANKET INSULATION

## PART 1 GENERAL

### 1.1 DESCRIPTION

A. Work Included: Provide all building insulation required for this work including, but not necessarily limited to:
   1. Insulation of Roof Rafter spaces.
   2. Insulation of Exterior Wall spaces.

B. Related work described elsewhere:
   1. Finish Carpentry: Section 06200 – Finish Carpentry.

### 1.2 SUBMITTALS

A. Comply with Section 01300 – Submittals

B. MSDS Data Sheets

### 1.3 QUALITY ASSURANCE

A. Quality of Installers and Applicator: Provide at least one person who shall be present at all times during the execution of each part of the work of this section and who shall be thoroughly familiar with the materials and methods

B. Applicators shall have installation experience with the specified materials for a minimum period of five (5) years

### 1.4 PRODUCT HANDLING

A. General protection:
   1. Store in dry area
   2. Protect insulation from physical damage and from becoming wet or soiled. Comply with manufacturers recommendations for handling, storage and protection during installation

PART 2 PRODUCTS

2.1 BUILDING INSULATION

A. Fiberglass Batt, Class A, mold and mildew-resistant, no formaldehyde, no VOCs, commercial building insulation, furnish in widths required to fit stud, joist, and rafter spacing.
   1. R-38 Ecotouch Pink Kraft faced Fiberglass Insulation by Owens Corning or equal.
   2. R-19 Ecotouch Pink Kraft faced Fiberglass Insulation by Owens Corning or equal.

PART 3 EXECUTION

3.1 INSPECTION AND PREPARATION

A. Installer must examine substrates and conditions under which insulation work is to be performed, and must notify the Contractor in writing of unsatisfactory conditions. Do not proceed with insulation work until unsatisfactory conditions have been corrected in manner acceptable to Installer

B. Clean substrates of substances harmful to insulations or vapor barriers, including removal of projections which might puncture vapor barriers

3.2 INSTALLATION

A. General:
   1. Comply with manufacturer's instructions for particular conditions of installation in each case. If printed instructions are not available or do not apply to project conditions, consult manufacturer's technical representative for specific recommendations before proceeding with work
   2. Extend insulation full thickness as shown over entire area to be insulated. Cut and fit tightly around obstructions

B. Ceilings:
   1. Attach to framing system to support insulation
   2. Butt end joints tight
   3. Cut and pack around pipes, etc.
   4. Tape insulation facing edge continuous around penetrating elements.

3.3 CLEAN UP

A. Sweep up debris daily. Remove excess materials and debris and dispose of in a legal manner.

END OF SECTION

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# SECTION 07 46 46 – SIDING

## PART 1 GENERAL

### 1.1 SECTION INCLUDES

A. Fiber cement lap siding, panels, shingle, trim, fascia, moulding, and accessories; James Hardie HZ10 Engineered for Climate Siding.

### 1.2 RELATED SECTIONS

A. Section 06 10 00 - Rough Carpentry.

B. Section 09 90 00 – Painting and Coatingsy.

### 1.3 REFERENCES

A. ASTM D3359 - Standard Test Method for Measuring Adhesion by Tape Test, Tool and Tape.

B. ASTM E136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 degrees C.

### 1.4 SUBMITTALS

A. Submit under provisions of Section 01 30 00 - Administrative Requirements.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.

C. Shop Drawings: Provide detailed drawings of atypical non-standard applications of cementitious siding materials which are outside the scope of the standard details and specifications provided by the manufacturer.

D. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.

E. Verification Samples: For each finish product specified, two samples, minimum size 4 by 6 inches (100 by 150 mm), representing actual product, color, and patterns.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Minimum of 2 years' experience with installation of similar products.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Store siding on edge or lay flat on a smooth level surface. Protect edges and corners from chipping. Store sheets under cover and keep dry prior to installing.

C. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.7 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.8 WARRANTY

A. Product Warranty: Limited, non-pro-rated product warranty.
   1. HardiePlank HZ10 lap siding for 30 years.
   2. HardieSoffit HZ10 panels for 30 years.
   3. HardieTrim HZ10 boards for 15 years.

B. Workmanship Warranty: Application limited warranty for 2 years.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: James Hardie Building Products, Inc., or equal

B. Requests for approval of equal substitutions will be considered in accordance with provisions of Section 01 60 00 - Product Requirements.

2.2 SIDING AND TRIM

A. HardiePlank HZ10 lap siding, HardieSoffit HZ10 panels and requirement for materials:
   1. Fiber-cement siding - complies with ASTM C 1186 Type A Grade II.
   2. Fiber-cement siding - complies with ASTM E 136 as a noncombustible material.

3. Fiber-cement siding - complies with ASTM E 84 Flame Spread Index = 0, Smoke Developed Index = 5.
4. CAL-FIRE, Fire Engineering Division Building Materials Listing - Wildland Urban Interface (WUI) Listed Product.
5. ICC-ES evaluation reports ESR-2290, ESR-1844, and ESR-2273 (IBC, IRC, CBC, CRC).
6. California DSA PA-019.

B. Lap Siding: HardiePlank HZ10 Lap as manufactured by James Hardie Building Products, Inc.
   1. Type: Select Cedarmill 8-1/4 inches (210 mm) with 7 inches (178 mm) exposure.
   2. Type: Select Cedarmill 9-1/4 inches (235 mm) with 8 inches (203 mm) exposure.
   3. Fire Characteristics:
      a. Tested in Accordance with ASTM E136: Classified as non-combustible.
      b. May be used in ASTM E119 fire resistance rated assemblies as listed by Warnock Hersey.
      c. Class A Material: Per FBC 2017 and 2020, and 2018 IBC Section 803.1.1 Surface Burning Characteristics when tested in accordance with ASTM E84:
         1) Flame Spread Index : 0. Smoke Developed Index: 0.
   4. Physical Properties:
      a. Test Method ASTM C1185: Passed.
         1) Dimensional Tolerances.
            a) Length: Plus or minus 0.5 percent or plus or minus1/4 inch (6 mm).
            b) Width: Plus or minus 0.5 percent or plus or minus1/4 inch (6 mm),
            c) Thickness: Plus or minus 0.04 inch (1 mm).
            d) Squareness: Less than1/32 inches per ft (2.6 mm per m) of length.
            e) Edge Straightness: Less than 1/32 inches per ft (2.6 mm per m) of length.
         2) Density: Less than 83 pounds per sq ft (4 kPa).
         3) Water Tightness: No drop formation; Pass.
         4) Flexural strength:
            a) Wet Conditioned, psi: Greater than 1015 psi (7 MPa); Pass.
            b) Equilibrium Conditioned, psi: Greater than 1450 psi (10 MPa); Pass.
         5) Warm Water Resistance, Observations: No structural alteration; Pass.
         6) Heat / Rain Resistance:
            a) Physical Observations Mass: No structural alteration; Pass.
            b) Loss Percentage: Less than or equal to 3.0 percent; Pass..
            c) Freeze/Thaw, percent strength retention: Greater than or equal to 80 percent; Pass.
      b. Fire Characteristics:
         1) ASTM E84: Surface Burning Characteristics
            a) Flame Spread Index (FSI) Smoke: 0.
            b) Developed Index (SDI): 0.

c) Fuel Contributed: 0.
d) International Building Code: A.
2) ASTM E136: Non-combustibility: Pass.

5. Trim Accessories:
   a. J Trim: Aluminum extrusion to be used as a trim at abutments; soffits, masonry, windows, etc.
   b. Low-Profile Outside Corner Trim: Aluminum extrusion to be used for outside corners.
   c. Vertical T Trim: Aluminum extrusion to be used along vertical butt joints. For horizontal panel orientations only.
   d. Base Trim: Aluminum extrusion to be used as a base edge solution.
   e. Base Outside Corner Trim: To be used as an outside corner connection for Base trim.
   f. Base Inside Corner Trim: To be used as an inside corner connection for Base trim.
   g. Base Jointer: To be used to connect Base trims.
   h. HardieTrim Boards: Fiber cement trim for corners and windows. Can be mounted horizontally or vertically.

C. Soffit Panels: HardieSoffit HZ10 Non-Vented Soffit Panel, as manufactured by James Hardie Building Products, Inc.
   1. Factory sealed on 5 sides.
   2. Thickness: 1/4 inch (6 mm).
   3. Type: Textured Cedarmill, 12 inches (305 mm) by 12 feet (3658 mm).
   4. Type: Textured Cedarmill, 16 inches (406 mm) by 12 feet (3658 mm).
   5. Type: Textured Cedarmill, 24 inches (610 mm) by 8 feet (2438 mm).
   6. Type: Textured Cedarmill, 16 inches (406 mm) by 12 feet (3658 mm).
   7. Type: Textured Cedarmill vented, 24 inches (610 mm) by 8 feet (2438 mm).
   8. Type: Smooth vented, 24 inches (610 mm) by 8 feet (2438 mm).
   9. Type: Textured Cedarmill, 12 inches (305 mm) by 12 feet (3658 mm).
   10. Type: Textured Cedarmill, 16 inches (406 mm) by 12 feet (3658 mm).
   11. Type: Textured Cedarmill, 24 inches (610 mm) by 8 feet (2438 mm).

D. Trim:
   1. HardieTrim HZ10 boards as manufactured by James Hardie Building Products, Inc.
      a. Product: Batten Boards, 2-1/2 inch (63 mm) width.
      b. Product: 4/4 Boards, 3-1/2 inch (89 mm) width.
      c. Product: 4/4 Boards, 5-1/2 inch (140 mm) width.
      d. Product: 4/4 Boards, 7-1/4 inch (184 mm) width.
      e. Product: 4/4 Boards, 9-1/4 inch (235 mm) width.
      f. Product: 4/4 Boards, 11-1/4 inch (286 mm) width.
      g. Product: 4/4 NT3 Boards, 3-1/2 inch (89 mm) width.

h. Product: 4/4 NT3 Boards, 5-1/2 inch (140 mm) width.
i. Product: 4/4 NT3 Boards, 7-1/4 inch (184 mm) width.
j. Product: 4/4 NT3 Boards, 9-1/4 inch (235 mm) width.
k. Product: 4/4 NT3 Boards, 11-1/4 inch (286 mm) width.
l. Product: 5/4 Boards, 3-1/2 inch (89 mm) width.
m. Product: 5/4 Boards, 5-1/2 inch (140 mm) width.
n. Product: 5/4 Boards, 7-1/4 inch (184 mm) width.
o. Product: 5/4 Boards, 9-1/4 inch (235 mm) width.
p. Product: 5/4 Boards, 11-1/4 inch (286 mm) width.
q. Product: 5/4 NT3 Boards, 3-1/2 inch (89 mm) width.
r. Product: 5/4 NT3 Boards, 4-1/2 inch (114 mm) width.
s. Product: 5/4 NT3 Boards, 5-1/2 inch (140 mm) width.
t. Product: 5/4 NT3 Boards, 7-1/4 inch (184 mm) width.
u. Product: 5/4 NT3 Boards, 11-1/4 inch (286 mm) width.
v. Texture: Smooth.
w. Texture: Rustic.
x. Texture: Wood Grained.
y. Length: 12 feet (3658 mm).
z. Thickness: 3/4 inch (19 mm).
aa. Thickness: 1 inch (24 mm).

2. HardieTrim HZ10 Fascia boards as manufactured by James Hardie Building Products, Inc.
3. Fiber-cement trim - complies with ASTM C 1186 Type A Grade II.
4. Fiber-cement trim - complies with ASTM E 136 as a noncombustible material.
5. Fiber-cement trim - complies with ASTM E 84 Flame Spread Index = 0, Smoke Developed Index = 5.
6. Intertek Product Listing.

E. 2X Smooth HardieTrim:
1. 2X Smooth HardieTrim manufactured by James Hardie Building Products, Inc.
2. Overall Thickness: 1-1/2 in (38 mm).
3. Width: 3-1/2 inch (89 mm).
4. Width: 5-1/2 inch (140 mm).
5. Width: 7-1/4 inch (184 mm).

## 2.3 FASTENERS

A. Wood Framing Fasteners:
1. Wood Framing: 4d common corrosion resistant nails.
2. Wood Framing: 6d common corrosion resistant nails.
3. Wood Framing: 8d box ring common corrosion resistant nails.

4. Wood Framing: 0.089 inch (2.2 mm) shank by 0.221 inch (5.6 mm) head by 2 inches (51 mm) corrosion resistant siding nails.
5. Wood Framing: 0.093 inch (2.4 mm) shank by 0.222 inch (5.6 mm) head by 2 inches (51 mm) corrosion resistant siding nails.
6. Wood Framing: 0.093 inch (2.4 mm) shank by 0.222 inch (5.6 mm) head by 2-1/2 inches (64 mm) corrosion resistant siding nails.
7. Wood Framing: 0.091 inch (2.3 mm) shank by 0.221 inch (5.6 mm) head by 1-1/2 inches (38 mm) corrosion resistant siding nails.
8. Wood Framing: 0.091 inch (2.3 mm) shank by 0.225 inch (5.7 mm) head by 1-1/2 inches (38 mm) corrosion resistant siding nails.
9. Wood Framing: 0.121 inch (3 mm) shank by 0.371 inch (9.4 mm) head by 1-1/4 inches (32 mm) corrosion resistant roofing nails.
10. Wood Framing: No. 11 gauge 1-1/4 inches (32 mm) corrosion resistant roofing nails.
11. Wood Framing: No. 11 gauge 1-1/2 inches (38 mm) corrosion resistant roofing nails.
12. Wood Framing: No. 11 gauge 1-3/4 inches (44 mm) corrosion resistant roofing nails.
13. Wood Framing: 16 gauge 1-1/2 inches (38 mm) stainless finish nails

2.4 FINISHES

A. Factory Primer: Provide factory applied universal primer.
   1. Primer: Factory primed by James Hardie.
   2. Topcoat: Refer to Section 09 90 00 - Painting and Coating and Exterior Finish Schedule.

B. Factory Finish: Refer to Exterior Finish Schedule.
   1. Product: ColorPlus Technology by James Hardie.
   2. Definition:Factory applied finish; defined as a finish applied in the same facility and company that manufactures the siding substrate.
   3. Process:
      a. Factory applied finish by fiber cement manufacturer in a controlled environment within the fiber cement manufacturer's own facility utilizing a multi-coat, heat cured finish within one manufacturing process.
      b. Each finish color must have documented color match to delta E of 0.5 or better between product lines, manufacturing lots or production runs as measured by photospectrometer and verified by third party.
   4. Protection: Factory applied finish protection such as plastic laminate that is removed once siding is installed
   5. Accessories: Complete finishing system includes pre-packaged touch-up kit provided

C. Factory Finish Color for Trim, Soffit and Siding Colors:
   1. Alpine Frost JH50-10.

2. Arctic White JH10-20.
3. Autumn Tan JH20-20.
4. Boothbay Blue JH70-20.
5. Chestnut Brown JH80-30.
6. Cobble Stone JH40-10.
7. Countrylane Red JH90-20.
8. Evening Blue JH70-30.
9. Frosted Green JH60-20.
10. Harris Cream JH80-10.
11. Heathered Moss JH50-20.
12. Iron Gray JH90-30.
13. Khaki Brown JH20-30.
14. Light Mist JH70-10.
15. Monterey Taupe JH40-20.
16. Mountain Sage JH50-30.
17. Navajo Beige JH30-10.
18. Parkside Pine JH60-30.
19. Sail Cloth JH20-10.
20. Sandstone Beige JH30-20.
21. Soft Green JH60-10.
22. Timber Bark JH40-30.
23. Traditional Red JH90-10.
24. Tuscan Gold JH80-20.
25. Woodland Cream JH10-30.
26. Woodstock Brown JH30-30.
27. Terra Cotta JH15-20.
28. Coral Coast JH25-20.
29. Aqua Marine JH35-20.
30. Cool Breeze JH45-20.
31. Pink Sand JH55-20.

## PART 3 EXECUTION

### 3.1 EXAMINATION IMPORT

A. Do not begin installation until substrates have been properly prepared.

B. If framing preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

C. Nominal 2 inch by 4 inch (51 m by 102 mm) wood framing selected for minimal shrinkage and complying with local building codes, including the use of water-resistive

barriers or vapor barriers where required. Minimum 1-1/2 inches (38 mm) face and straight, true, of uniform dimensions and properly aligned.

1. Install water-resistive barriers and claddings to dry surfaces.
2. Repair any punctures or tears in the water-resistive barrier prior to the installation of the siding.
3. Protect siding from other trades.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Install a water-resistive barrier is required in accordance with local building code requirements.

D. The water-resistive barrier must be appropriately installed with penetration and junction flashing in accordance with local building code requirements.

E. Install Engineered for Climate HardieWrap weather barrier in accordance with local building code requirements.

F. Use HardieWrap Seam Tape and joint and laps.

G. Install and HardieWrap flashing, HardieWrap Flex Flashing.

3.3 INSTALLATION - HARDIEPLANK HZ10 LAP SIDING

A. Install materials in strict accordance with manufacturer's installation instructions.

B. Starting: Install a minimum 1/4 inch (6 mm) thick lath starter strip at the bottom course of the wall. Apply planks horizontally with minimum 1-1/4 inches (32 mm) wide laps at the top. The bottom edge of the first plank overlaps the starter strip.

C. Allow minimum vertical clearance between the edge of siding and any other material in strict accordance with the manufacturer's installation instructions.

D. Align vertical joints of the planks over framing members.

E. Maintain clearance between siding and adjacent finished grade.

F. Locate splices at least one stud cavity away from window and door openings.

G. For proper fastener selection and fastening schedules for various wind load requirements and framing options, refer to the Technical Data Sheet at www.aspyredesign.com.

H. Face nail to sheathing.

I. Locate splices at least 12 inches (305 mm) away from window and door openings.

3.4 INSTALLATION - HARDIETRIM HZ10 BOARDS

A. Install materials in strict accordance with manufacturer's installation instructions. Install flashing around all wall openings.

B. Fasten through trim into structural framing or code complying sheathing. Fasteners must penetrate minimum 3/4 inch (19 mm) or full thickness of sheathing. Additional fasteners may be required to ensure adequate security.

C. Place fasteners no closer than 3/4 inch (19 mm) and no further than 2 inches (51 mm) from side edge of trim board and no closer than 1 inch (25 mm) from end. Fasten maximum 16 inches (406 mm) on center.

D. Maintain clearance between trim and adjacent finished grade.

E. Outside Corner Board Attach Trim on both sides of corner with 16 gage corrosion resistant finish nail 1/2 inch (13 mm) from edge spaced 16 inches (406 mm) apart, weather cut each end spaced minimum 12 inches (305 mm) apart.

F. Allow 1/8 inch gap between trim and siding.

G. Seal gap with high quality, paint-able caulk.

H. Shim frieze board as required to align with corner trim..

I. Fasten through overlapping boards. Do not nail between lap joints.

J. Overlay siding with single board of outside corner board then align second corner board to outside edge of first corner board. Do not fasten HardieTrim boards to HardieTrim boards.

K. Shim frieze board as required to align with corner trim.

L. Install HardieTrim Fascia boards to rafter tails or to sub fascia.

## 3.5 FINISHING

A. Finish unprimed siding with a minimum one coat high quality, alkali resistant primer and one coat of either, 100 percent acrylic or latex or oil based, exterior grade topcoats or two coats high quality alkali resistant 100 percent acrylic or latex, exterior grade topcoat within 90 days of installation. Follow paint manufacturer's written product recommendation and written application instructions.

B. Finish factory primed siding with a minimum of one coat of high quality 100 percent acrylic or latex or oil based exterior grade paint within 180 days of installation. Follow paint manufacturer's written product recommendation and written application instructions.

## 3.6 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

# SECTION 07 92 00 – SEALANTS AND CAULKING

## PART 1 GENERAL

### 1.1 SUMMARY

A. Section Includes: Joint sealants, sealant backup, vapor barriers and associated material.

B. Related Sections:
   1. Section 07600 – Flashing and Sheet Metal

### 1.2 QUALITY ASSURANCE

A. Reference Standards:
   1. Manufacturers' specifications and recommendations.

B. Stipulations:
   1. The sealant or caulking material and the corresponding cleaner, joint filler or bond breaker, and primer shall all be products of, or certified as compatible by, the approved manufacturer of the sealant or caulking material.
   2. All products shall be suitable and recommended by the manufacturer for the application.

C. Installer qualifications: The installer shall have a minimum of 5 years experience in applying sealant systems and shall have a successful record of joint and sealant application in similar work.

D. Application of sealants: Apply sealants in accordance with the manufacturer's written instructions. Check expiration date and shelf life of all products before use. Do not use expired products.

### 1.3 SUBMITTALS

A. All submittals shall be in accordance with the Section 1300.

B. Provide manufacturer's technical data describing each product and demonstrating compliance with this section's requirements.

C. Provide samples for each application of manufacturer's standard sealant colors for selection by engineer.

1.4 WARRANTY

A. Guarantee to make, at contractor’s expense, and repairs necessary due to ordinary wear and tear by the elements or due to faulty materials or workmanship, for a period of three (3) years following the notice of completion.

B. Exterior work that does not remain watertight and all work which does not retain all properties inherent in the product will be considered faulty.

PART 2 PRODUCTS

2.1 GENERAL – SEALANTS AND CAULKING COMPOUNDS

A. Sealant, Non-sag: Mameco "Vulkem 116", Sika Chemical "Sikaflex 1a", or equal, non-priming, non-sag, one-part polyurethane, colors as selected from manufacturer's standard colors.

B. Sealant, Self-leveling: Mameco "Vulkem 245", PRC "Rubber Calk 220", or equal, pourable, two-part polyurethane, colors as selected from manufacturer's standard colors.

C. Foam Sealer: Emseal Corporation "Grayflex", or equal, precompressed, self adhe¬sive polyurethane foam.

D. Caulking Compound: Gibson-Homans #2345, or Adco Products "Adcoseal AL-800", or Sonneborn Building Products "Sonolac", or Dap, Inc., "Acrylic Latex", colors as selected from manufacturer's standard colors.

E. Sealant or caulking color will vary with application point as directed by the Engineer.

2.2 ANCILLARY MATERIALS

A. Joint Fillers: Neoprene, butyl, EPDM, or silicone tubing, non-absorbent to water and gas, capable of remaining resilient at –26 degrees Fahrenheit. Provide products with low compression set and of size and shape to provide a secondary seal, to control sealant depth, and otherwise contribute to optimum sealant performance.

B. Bond Breakers: Polyethylene or plastic tape as recommended by the sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

C. Joint Cleaners, Primers, Tooling Liquids, and Clean-up Solvents: Per reference standards.

D. Backing Rods: Round, closed or open cell polyethylene, polyurethane, neoprene, or butyl foam rod, oversized 30 to 50-percent larger than joint width, as recommended by sealant manufacturer.

## PART 3 EXECUTION

### 3.1 PREPARATION

A. Mark adjacent surfaces where necessary to maintain neat edge and to prevent spillage onto adjacent surfaces.

B. Joints and spaces to be filled shall be clean, dry and free of dust, loose mortar and other foreign materials.

C. Apply primer to joint substrates where recommended by joint sealer manufacturer.

### 3.2 GENERAL SEALANT APPLICATION

A. Joint Dimensions.
   1. Depth of sealant shall be equal to or less than width of joint.
   2. Install joint fillers or bond breaker as required to obtain proper depth for sealant.

B. Where required by reference standards, prime sides of joints immediately prior to installing sealant.

C. Where sealant is indicated at horizontal surfaces, it shall be the self-leveling type; all other sealant shall be the non-sag type.

D. Install sealant in accordance with reference standards. Fill joint space completely from back to top, without voids, and tool slightly concave; finish uniformly smooth without laps, sags, or depressions.

### 3.3 SUB-SLAB VAPOR BARRIER

A. Install vapor barrier in accordance with ASTM E1643, unless otherwise instructed by manufacturer's written recommendations.

B. Apply vapor barrier over entire area to receive concrete slabs.

C. Lay membrane with seams perpendicular to, and lapped in the direction of the pour. Lap edges a minimum of 6 inches, unless otherwise instructed by manufacturer, and seal with tape. At perimeters, turn edges up to top of slab or down to bottom of footings.

D. Tape vapor barrier tightly to pipes, conduits, and penetrations of vapor barrier. Allow no screed supports or other items to penetrate vapor barrier.

3.4 FORM SEALER INSTALLATION

A. Size and install foam sealers in accordance with reference standards. Sealers shall be accurately aligned in indicated position. Install without stretching. End joints shall be scarfed.

3.5 CAULKING

A. At joints or spaces deeper than ½-inch [13-mm], install joint filler to provide depth of 3/8-inch to 5/8-inch [10–16-mm].

B. Fill space completely from back to top, without voids, flush or concave tooled as indicated, and finish uniformly smooth without laps, sags or depressions.

3.6 FINISHING

A. Work that is exposed to view shall have uniform surface with neat, straight edges and no excess material on adjacent surface.

END OF SECTION

# SECTION 08 11 00 – METAL DOORS AND FRAMES

## PART 1 GENERAL

### 1.1 SECTION INCLUDES

A. Steel doors

B. Steel door frames

### 1.2 REFERENCES SECTIONS

A. The following Sections are referenced in this Section
   1. Section 01 33 00 – Submittal Procedures
   2. Section 09 90 00 – Painting and Coatings

### 1.3 DEFINITIONS

A. Steel Sheet Thickness: Thickness dimensions, including those referenced in ANSI A250.8, are minimums as defined in referenced ASTM standards for both uncoated steel sheet and the uncoated base meta of metallic-coated steel sheets.

### 1.4 SUBMITTALS

A. Comply with Section 01 33 00.

B. Product Data: For each type of door and frame indicated, include door designation, type, level and model, material description, core description, construction details, label compliance, sound and fire-resistance ratings, and finishes.

C. Door Schedule: Use same reference designations indicated on Drawings in preparing schedule for doors and frames.

D. Oversize Construction Certificates: For door assemblies required to be fire-protection rated and exceeding size limitations of labeled assemblies.

### 1.5 QUALITY ASSURANCE

A. Steel Door and Frame Standard: Comply with ANSI A 250.8, unless more stringent requirements are indicated.

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver doors and frames cardboard-wrapped or crated to provide protection during transit and job storage. Provide additional protection to prevent damage to finish of factory-finished doors and frames.

B. Inspect doors and frames on delivery for damage and notify shipper and supplier if damage is found. Minor damages may be repaired provided refinished items match new work and are acceptable to Engineer. Remove and replace damaged items that cannot be repaired as directed.

C. Store doors and frames at building site under cover. Place units on minimum f-inch wood blocking. Avoid using non-vented plastic or canvas shelters that could create a humidity chamber. If door packaging becomes wet, remove cartons immediately. Provide minimum 1/4-inch between stacked doors to permit air circulation.

PART 2 PRODUCTS

2.1 MATERIALS

A. Hot-Rolled Steel Sheets: ASTM A 569, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.

B. Cold-Rolled Steel Sheets: ASTM A 366, Commercial Steel (CS), or ASTM A 620, Drawing Steel (DS), Type B; stretcher-leveled standard of flatness.

C. Metallic-Coated Steel Sheets: ASTM A 653, Commercial Steel (CS), Type B, with an A40 (galvannealed) coating; stretcher-leveled standard of flatness:
   1. For exterior installations.

D. Electrolytic Zinc=Coasted Steel Sheet: ASTM A 591, Commercial Steel (CS), Class B coating; mill phosphatized; suitable for unexposed applications; stretcher-leveled standard of flatness where used for face sheets.

2.2 DOORS

A. General: Provide doors of sizes, thicknesses, and designs indicated.

B. Exterior Doors: Provide doors complying with requirements indicated below by referencing ANSI A250.8 for level and model and ANSI A250.4 for physical-endurance level:
   1. Level 3 and Physical Performance Level A (Extra Heavy Duty), Model 2 (Seamless) (0.053 inch / 16 ga. thick).

## 2.3 FRAMES

A. General: Provide steel frames for doors, transoms, sidelights, borrowed lights, and other openings that comply with ANSI A250.8 and with details indicated for type and profile. Conceal fastenings, unless otherwise indicated.

B. Frames of 0.067-inch- (16 ga.) thick steel sheet for:
   1. Level 3 steel doors, unless otherwise indicated.

C. Door Silencers: Except on weather-stripped frames, fabricate stops to receive three silencers on strike jambs of single-door frames and two silencers on heads of double-door frames.

## 2.4 FABRICATION

A. General: Fabricate steel door and frame units to comply with ANSI A250.8 and to be rigid, neat in appearance, and free from defects including warp and buckle. Where practical, fit and assemble units in manufacturer's plant. Clearly identify work that cannot be permanently factory assembled before shipment, to assure proper assembly at Project site.

B. Exterior Door Construction: For exterior locations and elsewhere as indicated, fabricate doors, and frames from metallic-coated steel sheet. Close top and bottom edges of doors flush as an integral part of door construction or by addition of 0.053-inch- (16 ga.) thick, metallic-coated steel channels with channel webs placed even with top and bottom edges.

C. Core Construction: One of the following manufacturer's standard core materials that produce a door complying with SDI standards:
   1. Resin-impregnated kraft/paper honeycomb.
   2. Polyurethane (Insulation Doors).
   3. Vertical steel stiffeners.

D. Clearances for Non-Fire-Rated Doors: Not more than 1/8 inch at jambs and heads, except not more than 1/4 inch between pairs of doors. Not more than 3/4 inch at bottom.

E. Single-Acting, Door-Edge Profile: Square edge, unless beveled edge is indicated.

F. Tolerances: Comply with SDI 117, "Manufacturing Tolerances for Standard Steel Doors and Frames."

G. Fabricate concealed stiffeners, reinforcement, edge channels, louvers, and moldings from either cold or hot rolled steel sheet.

H. Exposed Fasteners: Unless otherwise indicated, provide countersunk flat or oval heads for exposed screws and bolts.

I. Thermal-Rated (Insulating) Assemblies: At exterior locations and elsewhere as shown or scheduled, provide doors fabricated as thermal-insulating door and frame assemblies and tested according to ASTM C 236 or ASTM C 976 on fully operable door assemblies:
   1. Unless otherwise indicated, provide thermal-rated assemblies with U-value of 0.41 Btu/sq. ft. x h x deg F (2.33 W/sq. m x K) or better.

J. Hardware Preparation: Prepare doors and frames to receive mortised and concealed hardware according to final door hardware schedule and templates provided by hardware supplier. Comply with applicable requirements in ANSI A250.6 and ANSI A115 Series specifications for door and frame preparation for hardware.

K. Frame Construction: Fabricate frames to shape shown:
   1. Fabricate frames with mitered and continuously welded corners and seamless face joints - knock down frames are acceptable as alternate.
   2. Fabricate all exterior door frames with integral metal drip.

L. Reinforce doors and frames to receive surface-applied hardware. Drilling and tapping for surface-applied hardware may be done at Project site.

M. Locate hardware as indicated on Shop Drawings or, if not indicated, according to ANSI A250.8.

2.5 FINISHES

A. Prime Finish: Manufacturer's standard, factory-applied coat of rust-inhibiting primer complying with ANSI A250.10 for acceptance criteria.

B. Field Finish: Refer to Section 09 90 00.

PART 3 EXECUTION

3.1 INSTALLATION

A. General: Install steel doors, frames, and accessories according to ANSI A250.8, manufacturer's data, and as specified.

B. Placing Frames: Comply with provisions in SDI 105, unless otherwise indicated. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is completed, remove temporary braces and spreaders, leaving surfaces smooth and undamaged:

1. Place frames before construction of enclosing walls and ceilings.

C. Door Installation: Comply with ANSI A250.8. Fit hollow-metal doors accurately in frames, within clearances specified in ANSI A250.8. Shim as necessary to comply with SDI 122 and ANSI/DHI A115.1G:

## 3.2 ADJUSTING AND CLEANING

A. Prime-Coat Touchup: Immediately after installation, sand smooth any rusted or damaged areas of prime coat and apply touch up of compatible air-drying primer.

B. Protection Removal: Immediately before final inspection, remove protective wrappings from doors and frames.

END OF SECTION

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# SECTION 08 31 13 – HORIZONTAL ACCESS DOORS

## PART 1 GENERAL

### 1.1 SUMMARY

A. Section includes:
   1. Vault Access Hatch

### 1.2 SUBMITTALS

A. Product Data: Provide manufacturer's product data for all materials in this specification.

B. Shop Drawings: Show profiles, accessories, location, and dimensions. Show installation methods.

### 1.3 PRODUCT HANDLING

A. All materials shall be delivered in manufacturer's original packaging.

B. Store materials in a dry, protected, well-vented area. The contractor shall thoroughly inspect product upon receipt and report damaged material immediately to delivering carrier and note such damage on the carrier's freight bill of lading.

### 1.4 QUALITY ASSURANCE

A. Manufacturer: A minimum of 5 years experience manufacturing similar products.

B. Installer: A minimum of 2 years installing similar products.

### 1.5 WARRANTY

A. The equipment manufacturer shall warrant the units being supplied to the City of Fort Bragg against defects in workmanship and material for a period of 5 years after date of shipment.

## PART 2 PRODUCTS

### 2.1 VAULT ACCESS HATCH

A. Manufacturers:
   1. Bilco
   2. Placer Waterworks Inc.
   3. Or approved equal.

B. Access Hatch Design: Aluminum welded construction; size as indicated on the Drawings; double leaf door.
   1. Cover: Diamond plate pattern aluminum, minimum ¼-inch with reinforced with structural stiffeners to support H20 loads and with non-slip heat resistant coating.
   2. Frame: Channel frame with bend down anchor tab around the perimeter.
   3. Hinges: Type 316 stainless steel.
   4. Lift Handle: Flush drop handle, removable type mounted in cover.
   5. Lifting Mechanism: Type 316 stainless steel compression or torsion springs with automatic hold open and dead stop to retain cover in open position. Cover springs to prevent contact by personnel entering utility structure.
   6. Latch Mechanism: Type 316 stainless steel lock with removable external handle and permanent internal release mechanism.
   7. Drain Coupling: Provide a 1-1/2-inch drain coupling located in one corner of the channel frame.
   8. Hardware: Type 316 stainless steel.
   9. Finish: Mill finish aluminum. Apply a bituminous coating to the embedded exterior surfaces of the frame.

C. Performance Characteristics:
   1. Covers: Reinforced to support H20 loading with a maximum deflection of 1/240th of the span. Manufacturer to provide structural calculations stamped by a registered professional engineer upon request.
   2. Operation of the covers shall be smooth and easy with controlled operation throughout the entire arc of opening and closing. Maximum force required to open or close is 50 lbs.
   3. Operation of the covers shall not be affected by temperature.

## PART 3 EXECUTION

### 3.1 INSPECTION

A. Verify that the vault access door installation will not disrupt other trades. Verify that the substrate is dry, clean, and free of foreign matter. Report and correct defects prior to any installation.

### 3.2 INSTALLATION

A. Check as-built conditions and verify the manufacturer's vault access door details for accuracy to fit the application prior to fabrication. The installer shall comply with the vault access door manufacturer's installation instructions.

B. Furnish mechanical fasteners consistent with the vault access door manufacturer's instructions.

C. Locate units level, plumb, and in proper alignment with adjacent work.

END OF SECTION

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SECTION 08 71 00 – DOOR HARDWARE

PART 1 GENERAL

1.1 THE REQUIREMENT

A. Section Includes:
   1. All necessary door hardware to complete the Project, except those items specifically mentioned to be furnished by other Sections.
   2. Wherever items of door hardware are not definitely specified but are required for proper completion and/or operation of doors, or a hardware item may no longer be available, furnish hardware in type, quality, and finish suitable for the service required and comparable to that specified for similar conditions, and notify the Engineer immediately.

B. Products Supplied But Not Installed Under This Section: Furnish templates to Sections 08360 for door and frame preparation.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Section 081100, Metal Doors and Frames

1.3 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Builders Hardware Manufacturers' Association (BHMA)

B. Door and Hardware Institute (DHI)

C. National Association of Architectural Metal Manufacturers (NAAMM)

1.4 SUBMITTALS

A. Hardware Schedule: Submit a complete schedule of door hardware for review. Reference items clearly to groups specified, door-type designations shown, location, and other pertinent data. Verify suitability, function, thickness of members, or other factors affecting appropriate selection. List manufacturer's names or suitable abbreviation to facilitate reviewing, opposite each item scheduled.
   1. List only readily obtainable hardware that appears in current catalogs. Do not deliver hardware until schedule has been accepted by the Engineer.
   2. After the hardware schedule is accepted by the Engineer, provide one copy of the accepted hardware schedule to each trade whose work may be affected.

B. Product Data: Submit catalog cuts and product data on each different type of hardware included in hardware schedule. Indicate locations and mounting heights of each type of hardware. Submit manufacturer's parts lists, templates, and installation instructions.

C. Samples: Prior to delivery of any hardware to the site, submit one sample of each class or type of hardware to the Engineer for final review. Affix labels to fully identify manufacturer, class or type, and location on the Project. After review, accepted samples may be obtained from the Engineer for installation on the Project, providing such samples are picked up within seven days of notification of acceptance.

D. Operation and Maintenance Data: Submit operation and maintenance data. Include data on operating hardware, lubrication requirements, and inspection procedures related to preventative maintenance.

1.5 QUALITY ASSURANCE

A. Supplier Qualifications: Company experienced and specializing in supplying commercial door hardware. The hardware supplier shall employ a member of the Door Hardware Institute (DHI) who is a Certified Architectural Hardware Consultant (AHC) to prepare the hardware schedule submittal and, upon completion of the building, check the installation and disclose any misapplication of hardware.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver hardware with items packed separately, complete and ready for installation with necessary fittings, trim, fasteners, and accessories. Mark packages clearly for identification in accordance with Hardware Schedule. Deliver hardware so that work may progress without delay or interruption.

B. Package all items of hardware and each lockset, latchset, exit device, and door control/closer in its individual package marked with manufacturer's name, type number, and name of item. Furnish each item complete with necessary fastenings, wrenches, spanners, installation instructions, and templates. Indelibly, legibly, and carefully mark each package with an item number corresponding to the door number and hardware group number as indicated on the opening schedule, the approved door Hardware Schedule, and the Drawings and details.

C. Protect hardware from damage before, during, and after installation.

1.7 COORDINATION

A. Coordinate work of this Section with other directly affected Sections involving manufacturer of any internal reinforcement for door hardware.

B. Manufacture all hardware to template. Provide templates and, if necessary, the physical hardware to fabricator of doors and frames in ample time to facilitate the work.

C. Coordinate electrical and security requirements of hardware items with related sections.

1.8 WARRANTY

A. Provide extended warranty for the following hardware items in accordance with requirements of Division 1. Warrant that hardware shall be free of defects in material and workmanship and that it will not deteriorate excessively, or otherwise fail to perform as required.
   1. Hinges: Life of building
   2. Locks: Five years

1.9 MAINTENANCE MATERIALS

A. Provide special wrenches and tools applicable to each different or special hardware component.

B. Provide maintenance tools and accessories supplied by hardware component manufacturer.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. General: Numbers in Hardware Schedule refer to those of the first named manufacturer below. Equivalent products by the other named manufacturers are also acceptable, or equal.

B. Butt Hinges: Stanley (STA), Hager, Lawrence, McKinney

C. Pivots: Rixson (RIX), Dor-O-Matic

D. Locksets and Latchsets: Schlage (SCH)

E. Cylinders: Schlage (SCH)

F. Overhead Closers: LCN, Dorma, Norton

G. Flush Bolts and Coordinators: Ives (IVE), Door Controls Inc.

H. Stops: Ives (IVE), Trimco.

I. Gasketing and Thresholds: Pemko (PEM), Reese, Zero

J. Protection Plates and Push/Pull Plates: Ives (IVE), Trimco.

2.2 HINGES

A. Standard: Meeting ANSI A156 1, Grade 1

B. Type: Butt hinges of the five-knuckle, full mortise type, minimum of two bearings, stainless steel pins, and as follows:
   1. Outswinging Doors:
      a. To the Exterior: Stainless steel or non-ferrous material, with nonremovable pins (NRP) of the setscrew type

C. Hinge Size:
   1. Doors 1-3/4" thick and up to 37" wide: 4-1/2 x 4-1/2 inch butt hinges provided with at least two ball bearings or life-span bearings.
   2. Doors over 1-3/4" thick or over 37" wide: 5 x 4-1/2 inch extra-heavy duty butt hinges provided with at least four ball bearings.
   3. Butt hinges for doors thicker than noted above or with unusual trim conditions which would interfere with the full opening of the door shall be provided with hinges of sufficient size to adequately support the door weight and of sufficient width to clear adjacent trim.

D. Number of Hinges Per Door Leaf:
   1. Doors up to 90 Inches High: Three hinges per door leaf.

2.3 MANUFACTURERS

A. Standards:
   1. Cylindrical Locks: Meeting ANSI A156.2, Series 4000, Grade 1

B. Lock Type: Where locksets or latchsets are scheduled, provide Schlage "ND" Series, cylindrical type locks, with backsets of 2-3/4 inches, unless otherwise noted. Provide all locks for the entire Project from the same manufacturer.

C. Design: Lever handles, Schlage "Rhodes" design, unless otherwise noted.

D. Strikes: Provide each lockset, latchset, or deadlock with a strike and a strike box. Provide standard type strikes with extended lips where required to protect adjacent trim from being marred by latch bolt. Verify cutout types provided in metal frames.

E. Construction Cylinders: Provide construction keying for cylinders as required and keys for use during construction. Remove construction plugs upon completion of project, allowing Agency to use final keyed cores.

2.4 DOOR CLOSERS

A. Standards: Meeting ANSI A156.4, Grade 1, and 2000 UBC Standard 7-2 - positive pressure test.

B. Type: Rack and pinion construction, steel spring, fully hydraulic action, non-handed, cast iron or cast aluminum body, non-gumming, non-freezing hydraulic fluid requiring no seasonal adjustment for temperature.

C. Closer Force: Capable of having spring force increased by 50 percent by adjustment without removing from the door, and effecting a maximum operating pressure on the door as follows:
   1. Exterior Doors: 8.5 pounds

D. Overhead Surface-Mounted Closers:
   1. Out-swinging Doors to the Exterior and into Corridors: Parallel arm closers, with the closer mounted on the inside of the door.

E. Features: Positive back-check action near the outer limit of the opening cycle, properly located so as to protect door, frame, trim, and hardware; separate adjustments for latch speed, general speed, and back check; hydraulic regulation by tamperproof, noncritical screw valves adjustable only with a hex wrench. Where called for, provide closers with built-in positive stop.

2.5 AUXILIARY HARDWARE

A. Standards: Meeting ANSI A156.16

B. Door Stops: Floor type or wall bumper type as scheduled. Provide each door leaf with a stop of proper size and height to prevent door from hitting wall or fixed objects. Built-in stops in door closers and overhead stops, where called for, shall satisfy this requirement.
   1. Wall Stops: No visible fasteners.

C. Silencers: Gray rubber, non-marring configuration for metal or wood doors. Provide each door with a pressed-metal frame with tamper resistant rubber silencers. Provide each single door with three silencers, each pair of doors with four. Omit at doors to receive gasketing.

2.6 THRESHOLDS, DOOR BOTTOMS, AND GASKETING

A. Provide as scheduled and detailed. Install with countersunk, flat-head screws, of same material and finish as item being attached at all applied thresholds, door bottoms, stops, and door gasketing.

2.7 DOOR PLATES

A. Standards: Meeting ANSI A156.6.

B. Protection Plates: Stainless steel, with beveled edges, as scheduled and detailed.
   1. Thickness: Minimum of 0.050-inch.
   2. Width: Protection plates shall be 1-1/2-inch less than door width at single doors, 1-inch less than leaf width at pairs of doors.
   3. Height: Kickplates shall be 10 inches high. At surface-applied drop seal conditions, extend kickplate from top of drop seal to 12 inches above finished floor.

C. Install plates using countersunk spanner-type stainless steel #6 oval head screws.

2.8 KEY AND KEYING

A. Meet with Agency to determine final keying requirements. Key the building to match Agency's existing system, as directed by Agency.

B. Key Type: Schlage 6-pin non-removable core system.

C. Number of Keys:
   1. Grand Master Key (Opens every door) 4 keys

D. Identification: Emboss face of each cylinder plug and key with minimum 3-digit visual key control system. Stamp all keys "DO NOT DUPLICATE".

E. Coordinate with Agency the changeover to permanent cores at completion of Project

F. Provide a construction keying system for Contractor's and/or Agency's use as required during construction. Remove temporary construction plugs upon completion of construction.

2.9 FINISHES

A. Typical Hardware
   1. Typical Interior Locations: BHMA 626 or 652 (US26D) – dull chromium-plated, unless noted otherwise

2. Exterior Locations: BHMA 630 (US32D) – satin stainless steel, unless otherwise noted

B. Thresholds: BHMA 719 – mill finish extruded aluminum

C. Weatherstripping and Gasketing: BHMA 628 (US28), clear anodized aluminum, unless otherwise noted

PART 3 EXECUTION

3.1 EXECUTION

A. Examine doors, frames, and other surfaces to receive door hardware and report all defects which might adversely affect the installation or function of the hardware. Do not begin installation until unsatisfactory conditions have been resolved.

B. Coordinate and be responsible for the proper fabrication of all work or material to receive hardware. No extra cost will be allowed because of changes or corrections necessary to facilitate the proper installation and operation of the hardware.

3.2 INSTALLATION

A. Install hardware in accordance with manufacturer's instructions and requirements of ANSI/NFPA 80, and DHI. Use templates provided by hardware item manufacturer.

B. Accessibility: Conform to CBC and ADAAG requirements for positioning and installing hardware.

C. Hardware: Provide with all necessary screws, bolts, and other devices or fastenings of suitable size and type to secure the hardware in position for heavy use and long life, harmonizing as to material and finish. Furnish fasteners, where necessary, with expansion shields or other approved anchors according to the material to which it is applied and as recommended by the manufacturer. Secure hardware to concrete with expansion sleeve anchors as indicated by best current practice; plastic or "Rawl" plugs will not be accepted. Provide full-threaded hardware screws of sufficient length to firmly engage backing. Screws shall have "Phillips" heads, finished to match hardware.

D. Thresholds. Set in bead of sealant.

E. Keying: Coordinate with the Agency the changeover to permanent cores at completion of Project.

3.3 MAINTENANCE RELATED ITEMS

A. Furnish one set of installation and adjusting tools and one set of maintenance manuals for locksets, exit devices, door controls/ closers, and floor hinges to the Agency.

3.4 ADJUSTMENTS AND INSPECTION

A. Closers: Regulate and adjust to comply with fire and accessibility requirements prior to final inspection.

B. During the installation of hardware a periodic inspection shall be made by the Contractor in company with a representative of the Engineer and the hardware supplier or his agent. Remove and reinstall hardware improperly installed, at no additional cost to the Agency. At completion of the work a final inspection shall be made by the above parties. Make adjustments recommended by any of the above parties.

3.5 HARDWARE SCHEDULE

A. General: The accompanying Hardware Schedule is furnished for whatever guidance and assistance it may afford the Contractor but shall not necessarily be considered as entirely inclusive. Examine the Drawings and the Specifications to determine the extent, quality, and function of hardware required. Furnish all necessary architectural finish hardware to complete the work.

B. Should any door or item be inadvertently omitted from the scheduled hardware, provide such door or item with the same hardware as required for similar purposes. Should it be determined that the hardware scheduled is not suitable due to detail or size of member, provide hardware of proper size, type and function, similar in operation and equivalent to that specified.

C. Whether listed or not, provide latching lockset, door closer, and smoke gasketing at all fire-labeled doors.

3.6 DOOR HARDWARE SCHEDULE

**Manufacturer List**

| **Code** | **Name** |
|---|---|
| MC | McKinney |
| SCH | Schlage |
| DM | Dorma Door Controls |
| PEM | Pemko |
| SH | dormakaba Commercial Hardware |

| | |
|---|---|
| NG | National Guard |

**Option List**

| Code | Description |
|---|---|
| 10-24 SSMS/LA | STAINLESS MACHINE SCREWS/LEAD ANCHOR |
| BF | Barrier Free |
| BF | Barrier Free Exit Device - 5lb Op. Force |
| CD | CYLINDER DOGGING |
| LAR | Length as Required |

**Finish List**

| Code | Description |
|---|---|
| 26D | Satin Chrome |
| 32D | Satin Stainless Steel |
| 626 | Satin Chromium Plated |
| 689 | Aluminum Painted |
| AL | Aluminum |
| GREY | Grey |

**Hardware Sets**

**Set #1**

| | | | | |
|---|---|---|---|---|
| 6 | Butt Hinge | T4A3386 | 32D | MC |
| 2 | Lockset | ND70PD RHODES | 626 | SCH |
| 2 | Door Closer | 669G | 689 | DM |
| 1 | Weatherstrip | 700 SA (Head & Jambs) | | NG |
| 1 | Flush Bolt | 555 | | RO |
| 2 | Door Sweep | 18100-NB | | PEM |
| 1 | Saddle Threshold | 1715 | AL | PEM |

**Opening List**

| Opening | Hardware Set |
|---|---|
| D01 | 1 |

END OF SECTION

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# SECTION 09 90 00 – PAINTING AND COATING

## PART 1 GENERAL

### 1.1 SUMMARY

A. The Work covered by this Section consists of furnishing all labor, equipment, and material necessary to perform surface preparation and to apply all paint, protective coatings, and finishes as specified and as indicated on the Drawings.

B. Section Includes:
   1. Paints and Coatings
   2. Preparation
   3. Application
   4. Coating Systems
   5. Coating System Schedule

### 1.2 REFERENCES

A. American Society for Testing and Materials (ASTM) Publication:
   1. ASTM D1653 Test Method for Water Vapor Permeability of Organic Coating Films
   2. ASTM D2200 Pictorial Surface Preparation Standards for Painting Steel Surfaces
   3. ASTM D3960 Practice for Determining Volatile Organic Contents (VOC) of Paints and Related Coatings
   4. ASTM D4258 Practice for Surface Cleaning Concrete for Coating
   5. ASTM D4259 Standard Practice for Abrading Concrete
   6. ASTM D4417 Field Measurement of Surface Profile of Blast Cleaned Steel
   7. ASTM D4585 Standard Practice for Testing Water Resistance of Coatings Using Controlled Condensation
   8. ASTM D7091 Standard Practice for Nondestructive Measurement of Dry Film Thickness
   9. ASTM D7127 Measurement of Surface Roughness of Abrasive Blast Cleaned Metal Surfaces Using a Portable Stylus Instrument
   10. ASTM E84 Test Method for Surface Burning Characteristics of Building Materials

B. Federal Specifications (Fed. Spec.) Publications:
   1. Fed. Spec. TT-C-555 Coating, Textured (for Interior and Exterior Masonry Surfaces)

C. The Society for Protective Coatings; formally known as Steel Structures Painting Council (SSPC) Specifications:
   1. SSPC-PA-2 Procedure for Determining Conformance to Dry Coating Thickness Requirements
   2. SSPC-SP-1 Solvent Cleaning
   3. SSPC-SP-2 Hand Tool Cleaning

4. SSPC-SP-5/NACE 1 White Metal Blast Cleaning
5. SSPC-SP-6/NACE 3 Commercial Blast Cleaning
6. SSPC-SP-7/NACE 4 Brush-Off Blast Cleaning
7. SSPC-SP-10/NACE 2 Near-White Blast Cleaning

D. California Green Building Code (CBC) 2010

1.3 SUBMITTALS

A. Product Data: Manufacturer's product data sheets including complete data on each type of paint, primer, and filler(s).

B. Material Safety Data Sheets (MSDS) for all products used in the Work of this Section.

C. Manufacturer's published storage, surface preparation, and application instructions.

D. Color charts for each paint for color selection by the Owner.

E. Data detailing all products' volatile organic compound (VOC) content and statement of compliance with all applicable VOC codes and ordinances.

F. Certificate of compliance with all regulations of CalEPA, California Air Resources Board (CARB), and the local Air Quality Management District (AQMD) for abrasive blast materials used for the Work of this Section.

G. Abrasive blast cleaning and application equipment list and complete procedures for its use.

H. Contractor's safety program to be employed on this project complying with the current requirements of Cal/OSHA, OSHA, and the Placer County Water Agency Standards.

I. Touch-up stock for Owner:
1. Provide a new, one gallon container of each paint and coating in each color used.
2. Label each container with color, texture, room locations, in addition to the manufacturer's label.

1.4 QUALITY ASSURANCE

A. Experience: The coating subcontractor(s) shall hold a current C-33 Painting and Decorating License and have a minimum of 5 years practical experience and successful history in the application of specified products to surfaces. He shall substantiate this requirement by furnishing a list of six references of similar projects completed in the last 10 years.

B. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total systems for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.
   1. Notify Engineer of problems anticipated using the materials specified.

1.5 DELIVERY AND STORAGE

A. All materials shall be delivered to the site in the manufacturer's sealed containers. Each container shall be labeled by the manufacturer, and the label shall be intact upon delivery. Labels shall give the manufacturer's name, brand, type of paint, batch number, color of paint, date of manufacture, storage life, and instructions for reducing. Job mixing or job tinting may be done when approved by the Owner for sample colors.

B. Where shop-primed or shop-finished items are to be shipped to the job site, protect coatings from damage by the use of battens, padded straps, and nonmetallic slings. Excessive shipping damage will be considered grounds for rejection of shop primers and shop finishes.

1.6 ENVIRONMENTAL REQUIREMENTS

A. Provide ambient temperatures recommended by manufacturer of material to be applied.

B. Provide adequate ventilation and safety measures for all personnel on-site.

C. Provide adequate illumination on all surfaces in areas to be painted, including floors, walls, and ceilings, even though they do not require painting.

D. Use temporary dust barriers to close off areas being painted from areas where other Work is being performed.

1.7 COMPLIANCE WITH REGULATORY REQUIREMENTS

A. All applicable federal, state, and local regulatory agency requirements shall be complied with during the course of the Work. The Contractor’s attention is directed to the following list of agency requirements that generally apply to coatings Work; the Contractor is responsible for identifying and complying with any other agencies or requirements not listed.
   1. OSHA - Personnel protection during all phases of Work, including exposure to airborne solvents, dust, and lead.
   2. CAL/OSHA - Personnel protection; requirements may supersede OSHA regulations.
   3. California Title 22 - Environmental requirements, including definition of abrasive blast materials and residue relative to hazardous waste disposal requirements.
   4. Local Air Quality Management District - Environmental requirements for limiting airborne emissions from equipment, products, and methods of operation.

1.8 MANUFACTUER'S REPRESENTATIVE

A. The coating manufacturer shall provide a representative to visit the job site at intervals during surface preparation and coating as may be required for product application quality assurance, and to determine compliance with manufacturer's instructions and these specifications, and as may be necessary to resolve field problems attributable to, or associated with, the manufacturer's products furnished under this contract.

PART 2 PRODUCTS

2.1 PAINTS AND COATINGS

A. Manufacturers:
   1. PPG Protective and Marine Coatings Group, Pittsburg, PA;
   2. Sherwin-Williams, Industrial Maintenance Coatings, Cleveland, OH;
   3. ICI-Devoe Coatings, Cleveland, OH;
   4. Carboline Company, St. Louis, MO.
   5. Substitutions: Permitted as approved by the Engineer.

B. Examples of paint systems from four manufacturers are listed in the following specifications. The "or approved equal" clause refers to dry film thickness (solids content), generic type of primer, paint, or coating, and ingredients in the coating system. The coating must be recommended for each service.

C. All paint and coating materials furnished for each coating system shall be new products of a single manufacturer.

D. Only compatible materials shall be used in the Work. Particular attention shall be directed to compatibility of primers, base materials, and finish coats.

E. Coating materials and additives applied to surfaces in contact with potable water shall comply with all requirements of NSF 61.

F. The volatile organic content (VOC) of the applied coatings, as determined in accordance with ASTM D3960, shall comply with prevailing air pollution regulations.

G. Regulations prohibit the manufacture, sale, or application of Architectural Coatings and Specialty Coatings having greater than stipulated levels of volatile organic compounds measured in grams per liter by weight of coating as applied, after January 1, 2004.

H. The Contractor shall base his own bid on using the products specified. If the specified products are not available in formulations that meet applicable regulations on VOC levels at time of application, the Contractor shall submit for review products of equivalent quality and function that comply with regulations in effect at that time.

I. If the Contractor applies any coatings, which do not meet regulations as referred to in this Section for VOC content, or if he applies coatings that have been modified or thinned other than as recommended by manufacturer, he shall be responsible for any fines, costs, remedies, or legal actions that may result.

J. No request for substitution for an "approved equal" will be considered which decreases the film thickness designated, the number of coats to be applied, solids content by volume, the general type of coating, paint, or primer, or the quantity, quality and type of ingredients in the coatings specified. The Contractor shall provide a list of references where coating of the same generic type has been applied on similar projects. The reference list shall give the project name, city, state, owner, phone number of owner, coating system reference and number, and year coating was applied. Paints not listed in these specifications shall be submitted with certified ingredients analysis so that a complete comparison between specified and proposed paint may be made by the Owner.

2.2 COMPONENTS

A. Coatings: Ready mixed except field catalyzed coatings of good flow and brushing properties, capable of drying or curing free of streaks or sags.

B. Accessory Materials: Linseed oil, shellac, turpentine, paint thinners and other materials required to achieve finishes specified.

PART 3 EXECUTION

3.1 COATINGS

A. General:
   1. Coating products shall not be used until the Construction Manager has inspected the materials. Adequate ventilation shall be used at all times. Adequate illumination shall be provided on all surfaces in areas to be painted.

B. Coating Systems:
   1. Shop Applied Prime Coat: Except as otherwise specified, prime coats may be shop or field applied. Shop applied primer shall be compatible with the specific coating system and shall be applied at the minimum dry film thickness recommended by the manufacturer. Approved submittal data identifying the shop primer used shall be provided to the onsite finish coat applicator and to the Construction Manager before delivery of items to the jobsite. Damaged, deteriorated, and poorly applied shop coatings that do not meet the requirements of this section shall be removed and replaced by a field coating. The field coating may consist of touching up the shop prime coat and then applying the finish coats to achieve the specified film thickness and continuity.

2. Field Coats: Field coats shall consist of one or more prime coats and one or more finish coats to build up the coating to the specified dry film thickness. Finish coats shall not be applied until other Work in the area is complete and until the prime and intermediate coats have been inspected by the Construction Manager.

C. Work not included:
   1. Do not paint moving parts of operating units; mechanical or electrical parts such as valve operators; linkages, sensing devices; and motor shafts, unless otherwise indicated.
   2. Do not paint over required labels or equipment identification, performance rating, name, or nomenclature plates.

3.2 PREPARATION

A. General:
   1. All surfaces to be coated or painted shall be in the proper condition to receive the material specified before any coating or painting is performed.
   2. Substrates shall be prepared in strict accordance with coating system manufacturer's requirements.
   3. Primers shall be used where coatings are not self-priming whether specified or not.
   4. No more abrasive blasting or surface preparation than can be coated or painted in a normal working day will be permitted unless approved in writing by the Construction Manager.
   5. All sharp edges, burrs, and weld spatter shall be removed.
   6. Repair all cracks and surface defects with compounds compatible with the paint system to follow. Fill, float, sand, and texture to match adjacent surfaces. Allow repair compounds to fully dry prior to priming and applying paint.
   7. Remove all hardware and accessories that are not to receive paint. Where removal is not possible, protect surfaces not to receive paint prior to surface preparation and cleaning.
   8. The following levels of surface preparation are subsequently referred to:
      a. White Metal Blast Cleaning (SSPC-SP-5): Removal of all visible rust, mill scale, paint, and foreign matter by blast cleaning by wheel or nozzle (dry) using sand, grit, or shot.
      b. Near-White Blast Cleaning (SSPC-SP-10): Blast cleaning nearly to white metal cleanliness until at least 95% of each element of surface area is free of all visible residues.
      c. Commercial Blast (SSPC-SP-6): Blast cleaning until at least 67% of each element of surface area is free of all visible residues.
      d. Brush-Off Blast Cleaning (SSPC-SP-7): Blast cleaning of all except tightly adhering residues of mill scale, rust, and coatings, exposing numerous evenly distributed flecks of underlying metal.
      e. Solvent Cleaning (SSPC-SP-1): Removal of all grease, oil and dirt.
         1) Clean cloths and clean fluids shall be used in solvent cleaning.

2) Cleaning and painting shall be scheduled so that dust and spray from the cleaning process will not fall on wet, newly painted surfaces.
3) Hardware, electrical fixtures, trims, fittings, and similar accessories shall be removed or masked during preparation and paint operations, or shall otherwise be satisfactorily protected.
4) Equipment adjacent to walls shall be disconnected and moved to permit cleaning and painting of equipment and walls and, following painting, shall be replaced and reconnected.

B. Metallic Surfaces:
   1. Metallic surfaces shall be prepared in accordance with applicable portions of surface preparation specifications of the Society for Protective Coatings, formally the Steel Structures Painting Council (SSPC) specified in each coating system. The solvent used in solvent cleaning operations shall be as recommended by the manufacturer.
   2. Preparation of metallic surfaces shall be based upon comparison with ASTM D2200, and as described in the Specifications. To facilitate inspection, on the first day of abrasive blasting operations, abrasive blast metal panels to the standards specified. Panels shall measure a minimum of 8 1/2 x 11 inches. Panels meeting the requirements of the specifications shall be initialized by the Contractor and the Construction Manager and coated with a clear non-yellowing finish. One of these panels shall be prepared for each type of abrasive blasting and shall be used as the comparison standard throughout the project.

C. Detailed Surface Preparation:
   1. Surface preparations for each type of surface shall be in accordance with the specific requirements of each coating system.
   2. In the absence of manufacturer's recommendation for anchor profile or other requirement in the Specifications or Drawings, prepare surface with an anchor profile between 20 and 25 percent of specified dry film thickness of the coating.

D. Existing Facilities – Touch Up and Recoating:
   1. Unless otherwise specified, existing coating systems damaged by new construction shall be repaired and coated in accordance with the appropriate system specified for new work.
   2. Contractor shall demonstrate that the existing coating is compatible with field coating by applying small test patches of specific paints over existing coatings. If the existing coating is not compatible with the field coat (it lifts or ripples), the existing coating shall be reprimed with a primer compatible with both the existing coating and the field applied paint, or replaced with the proper prime coat. The primer shall be as recommended by the manufacturer of the field applied paints.
   3. The Contractor has the option of completely removing the existing coating before applying the specified coating.

## 3.3 APPLICATION

A. Workmanship:
   1. Each coat of paint shall be of the consistency as supplied by the manufacturer, or thinned if necessary, and applied in accordance with the manufacturer's written instructions.
   2. Each coat shall be well brushed, rolled, or sprayed to obtain a uniform and evenly applied finish. Work shall be free from "runs", "bridges", "shiners", or other imperfections due to faulty intervals. Particular care shall be taken to obtain a uniform, unbroken coating over all bolts, threads, nuts, welds, edges, and corners.
   3. All weld splatter shall be removed and all welds neutralized with thinner.
   4. Paint both sides and edges of plywood backboards and all removable and hinged panels.
   5. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed during painting and coating operations.

B. Paint Properties, Mixing, and Thinning:
   1. Mix and prepare materials according to manufacturer’s instructions.
   2. Paint, when applied, shall provide a satisfactory film and smooth even surface, and glossy undercoats shall be lightly sanded to provide a surface suitable for the proper application and adhesion of subsequent coats.
   3. Paints shall be thoroughly stirred, strained, and kept at a uniform consistency during application.
   4. Coatings consisting of two or more components shall be mixed in accordance with the manufacturer's instructions.
   5. Unless otherwise specified, paint shall not be reduced more than necessary to obtain the proper application characteristics. Thinner shall be both type and amount as recommended by the coating manufacturer.

C. Environmental Conditions:
   1. Paints shall be applied only to surfaces that are dry, and only under such atmospheric conditions as will cause evaporation rather than condensation. Paint shall not be applied during rainy, misty weather, or to surfaces upon which there is frost or moisture condensation. During damp weather, when the temperature of the surface to be coated is within 5 degrees F of the dew point, the surfaces shall be heated to prevent moisture condensation. Bare metal surfaces, except those which may be warped by heat, may be dehydrated by flame-heating devices immediately prior to paint application. During painting, and for a period of at least 8 hours after the paint has been applied, the temperature of the surfaces to be painted, the painted surfaces, and the atmosphere in contact shall be maintained at or above 50 degrees F and not less than 10 degrees F above the dew point and specifically at manufacturer's recommended ambient temperatures and humidity ranges. Fans or heaters shall be used inside enclosed areas where conditions causing condensation are severe.

2. Paint shall not be applied on surfaces hotter than 120 degrees F.
3. No painting of concrete, masonry, plaster, or plasterboard is permitted until all construction activities involving moisture in adjacent areas have been completed, the moisture involved has been dissipated, and adjacent masses and the surface to be painted have reached a constant condition of humidity suitable for the application of paint.
4. Paint shall not be applied to masonry or concrete within 30 days of construction of same and if the moisture content is greater than 15 percent as measured on the Delmhorst moisture meter.

D. Protection of Coated Surfaces:
1. Items that have been coated shall not be handled, worked on, or otherwise disturbed, until the paint is completely dry and hard. After delivery at the site of permanent erection or installation, shop-coated metalwork shall be repainted or retouched with specified paint when it is necessary to maintain the integrity of the film.
2. Solvent clean shop primed equipment in accordance with SSPC-SP-1 or high pressure wash before applying finish coats in the field. Treat shop primed coating as an incompatible coating unless coating system over shop primed coating is approved by the coating manufacturer. If coating to be applied is incompatible with existing coating, apply an intermediate coating in accordance with the coating manufacturer's recommendations or completely remove the existing coating.

E. Method of Paint Application:
1. Where two or more coats are required, the alternate coats shall be of contrasting colors. Colors shall not contain lead, or any lead compound, which may be destroyed or affected by hydrogen sulfide or any other corrosive gas.
2. Electrical, instrumentation, and mechanical equipment, on which the manufacturer's coating is acceptable, shall be touch-up primed and painted with two coats of the specified coating system to match the color scheduled. This does not apply to electrical and instrumentation equipment specified in Divisions 26 and 40.
3. Only good, clean brushes and equipment shall be used; and all brushes, buckets, and spraying equipment shall be cleaned immediately at the end of each painting period.
4. If paint is applied by spray, the air pressure used shall be within the ranges recommended by both the paint and spray equipment manufacturers. Spray painting shall be conducted under controlled conditions, and the Contractor shall be fully responsible for any damage occurring from spray painting.
5. Care shall be exercised not to damage adjacent Work during abrasive blasting operations. Stainless steel shall not be abrasive blasted. Blasted surfaces shall be coated as soon as possible after being abrasive blasted and before any rust bloom occurs. If rust bloom occurs, abrasive blasting the surface must be repeated prior to coating. All dust shall be removed from the surfaces prior to painting.

F. Film Thickness and Continuity:
   1. Coating system thickness is the total thickness of primer and finish coats and does not include passivators or sealers.
   2. The surface area covered per gallon of paint for various types of surfaces shall not exceed those recommended by the manufacturer. The first coat (prime coat) on metal surfaces refers to the first full paint coat and not to conditioning, tie coats, sealers, or other pretreatment applications. Coatings shall be applied to the thickness specified and in accordance with these specifications. Unless otherwise specified, the average total thickness (dry) of any completed protective coating system on exposed metal surfaces shall be not less than 1.25 mils per coat, and the minimum thickness at any point shall not deviate more than 25 percent from the required average. Unless otherwise specified, no less than 2 coats shall be applied.
   3. In testing for continuity of coating about welds, projections (such as bolts and nuts), and crevices, the Construction Manager will determine the minimum conductivity for smooth areas of like coating where the dry mil thickness has been accepted. This conductivity shall then be taken as the minimum required for those rough or irregular areas. Pinholes and holidays shall be repainted to the required coverage.

G. Special Requirements:
   1. Hangers and supports shall be coated, except for the final coat, prior to the installation. Except for those to be filled with grout, the underside of ungalvanized equipment bases and supports shall be coated with at least one coat of primer specified for System C prior to setting the equipment in place. Bolts and bolt holes in flanges (such as those used with couplings or wafer type valves where holes and bolts as finally installed will be exposed to weather or moisture) shall be coated prior to assembly to prevent rusting of the unprotected metals.

H. Cleanup:
   1. As Work proceeds, promptly remove finishes where spilled, splashed, or spattered.
   2. Upon completion of coating, the Contractor shall remove surplus materials, protective coverings, and accumulated rubbish, and thoroughly clean all surfaces and repair any overspray or other paint related damage.

## 3.4 ELEVENTH MONTH INSPECTION

A. The Contractor shall guarantee all coating Work for a period of one year following the date of final acceptance by the Owner. The Contractor is hereby notified that the Owner will inspect the project during the eleventh month following the date of final acceptance. The Contractor shall be notified by certified letter as to the date and time of the eleventh month inspection and will be expected to attend with the coating subcontractor. All defects in workmanship and materials shall be repaired by the Contractor at no cost to the Owner in accordance with this specification and to the satisfaction of the Owner or their appointed representative.

## 3.5 COATING SYSTEMS

A. The coating systems used for different types of surfaces are listed below and followed by specification for each:

| Surface Type | Coating Description | System |
|---|---|---|
| Ferrous Metal - Continuously or Intermittently Submerged | Epoxy | A |
| Ferrous Metal - Exposure to Moisture or Fumes | Epoxy | B |
| Ferrous Metal - Interior and Exterior - Normal Exposure | Epoxy/Urethane | C |
| Metal - High Temperature Exposure | Inorganic Zinc | D |
| Metal - Galvanized, Aluminum, Copper, Brass | Pretreatment/Primer | E |
| Metal - Exposed with Bleeding Surfaces | Epoxy | F |
| Concrete, Plaster, and Masonry - Exterior - Normal Exposure | Acrylic | G |
| Concrete and Masonry - Subject to Chemical Attack Including Submerged Exteriors | Epoxy | H |
| Concrete and Masonry - Interior - Mild Exposure | Water-Based Catalyzed Epoxy | I |
| Concrete Floors | Epoxy | J |
| Woodwork - Interior and Exterior | Alkyd Primer Acrylic Coating | K |
| Gypsum Board | PVC/Acrylic Epoxy | L |
| Underground Piping Appurtenances | Coal Tar Epoxy | M |
| Plastic Pipe | Epoxy/Urethane | N |
| Fiberglass Piping, Ductwork and Equipment | Polyamide Epoxy | O |
| Concrete and Masonry - Interior - Normal Exposur | Epoxy/Acrylic | P |
| Fusion Epoxy Coated Fabrications | Epoxy | Q |
| Not Used | N/A | R |
| Petrolatum Tape System – Metallic Valves Below Grade | Tape | S |

1. System A - Ferrous Metal - Continuously or Intermittently Submerged
   a. General: All submerged metalwork, gates, equipment, valves, exposed pipe work, and all other metalwork within areas which will be submerged, except as specified otherwise, shall be painted with this coating system.
   b. Surface Preparation: All metal surfaces (non-galvanized) shall be field abrasive blasted according to SSPC-SP-10, to provide a surface profile of 1.5 to 2 mils. Where metal is galvanized, pretreat with Paint System E after Brush Blasting per SSPC-SP-7. Where metal has bleeding surfaces, pretreat with System F.
   c. Coatings:

1) PPG: Apply two coats of Amerlock 2 VOC Epoxy at 4 to 8 mils dry film thickness per coat. Total dry film thickness (DFT) for this system shall be a minimum of 13 mils. (Ensures VOC compliancy in all California Air Quality Management Districts.)
2) Sherwin-Williams: Prime coat shall consist of Macropoxy 646 to a minimum dry film thickness (DFT) of 5 mils. Finish coat shall consist of one or more coats of Macropoxy 646 to a dry film thickness of 8 mils. Total dry film thickness for this system shall be a minimum of 13 mils.
3) ICI/Devoe Coatings: Bar-Rust 235H – two coats at 6 to 8 mils dry film thickness per coat. Total dry film thickness to this system shall be a minimum of 13 mils
4) Carboline: Carboguard 890 – two coats at 6 to 8 mils per coat. Total dry film thickness for this system shall be a minimum of 13 mils.

2. System B - Ferrous Metal - Exposure to Moisture and Fumes
   a. Surface Preparation: All metal surfaces, except those with a factory pretreatment and primer (such as doors and frames), shall be abrasive blasted according to SSPC-SP 10. Where metal is galvanized, pretreat with Paint System E, after Brush Blasting per SSPC-SP-7. Where metal has bleeding surfaces, pretreat with System F.
   b. Coatings:
      1) PPG: Amerlock 2 VOC epoxy - two coats at 5 to 6 mils per coat, minimum 10 mils dry film thickness.
      2) Sherwin-Williams: Prime coat shall consist of Macropoxy 646 to a dry film thickness of 5 mils. Finish coat shall consist of one or more coats of Macropoxy 646 to a dry film thickness of 5 mils. Total dry film thickness for this system shall be a minimum of 10 mils.
      3) ICI/Devoe Coatings: Bar-Rust 235 epoxy – two coats at 4 to 8 mils per coat, dry film thickness. Total dry film thickness of this system shall be a minimum of 10 mils.
      4) Carboline: Carboguard 890 – two coats at 5 to 8 mils per coat. Total dry film thickness for this system shall be a minimum of 10 mils.
3. System C - Ferrous Metal - Interior and Exterior - Normal Exposure
   a. General: The Contractor shall paint all exposed steel work, exposed pipe work, fittings, all mechanical equipment, pumps, motors, doors, door frames, and window sash subject only to normal exposure conditions with this coating system.
      1) All metal work previously given a shop prime coat approved by the Construction Manager shall be touched up as required in the field with primers specified below.
   b. Surface Preparations: All metal surfaces shall be cleaned according to SSPC-SP- Where metal is galvanized, pretreat with Paint System E after Brush Blasting per SSPC-SP-7. Where metal has bleeding surfaces, pretreat with System F.
   c. Coatings:

1) PPG: Prime coat shall consist of Amerlock 2 VOC polyamide epoxy applied to a dry film thickness of 4 to 6 mils. Finish coat shall consist of Amershield VOC polyurethane applied to a dry film thickness of 3 mils. Total dry film thickness of this system shall be a minimum of 7 mils.
2) Sherwin-Williams: Apply one coat of Macropoxy 646 to a minimum dry film thickness of 4 mils. Finish coat shall consist of Hi-Solids Polyurethane to a dry film thickness of 4 mils. The total dry film thickness for this system shall be a minimum of 8 mils.
3) ICI/Devoe Coatings: Prime coat shall consist of Bar Rust 235H at 4 to 6 mils dry film thickness. One finish coat of Devthane 379H at 2 to 3 mils dry film thickness. Total dry film thickness of this system shall be a minimum of 7 mils.
4) Carboline: Prime coat shall consist of Carboguard 890 applied at 4 to 6 mils dry film thickness. Finish coat shall consist of Carbothane 134HG applied at 2 to 2.5 mils dry film thickness. Total dry film thickness for this system shall be a minimum of 7 mils.

4. System D - Metal - High Temperature Exposure
   a. General: Engine mufflers, exhaust systems and other metal surfaces subjected to high temperatures (up to 700 degrees F) shall be coated with this system.
   b. Surface Preparation: Surfaces shall be field abrasive blasted in accordance with SSPC SP 10.
   c. Coatings:
      1) PPG: Apply one coat of Dimetcote 9HS to a minimum 3 mils dry film thickness.
      2) Sherwin-Williams: Apply one coat of Zinc Clad II HS B69VZ3/ B69VZ1/ B69D11 to a minimum dry film thickness of 3 mils.
      3) ICI/Devoe Coatings: Apply one coat of Catha-Coat 304V at a minimum of 3 mils dry film thickness.
      4) Carboline: Apply one coat of Carbozinc 11HS at a minimum dry film thickness of 3 mils.
5. System E - Metal - Galvanized, Aluminum, Copper, Brass
   a. General: All galvanized metal, aluminum, copper, and brass to be painted shall be pretreated in accordance with this system.
   b. Surface Preparation: Surfaces shall be solvent cleaned in accordance with SSPC SP 1. Where metal is galvanized, Brush-off Blast Cleaned per SSPC-SP-7.
   c. Coatings:
      1) ICI/Devoe Coatings: Apply one coat of Devran 203 Universal Epoxy Primer to a dry film thickness of 2 to 3 mils.
      2) Sherwin-Williams: Apply one coat of DTM Wash Primer B71Y1 to a dry film thickness of 0.7 to 1.3 mils.
         a) Next, apply the recommended coating or paint for the particular surface to be painted.
6. System F - Metal - Exposed with Bleeding Surfaces

a. General: This paint system is intended to be applied to asphalt or coal tar coated (bleeding surface) pipe and metal before finish painting.
b. Surface Preparation: Surfaces shall be solvent cleaned in accordance with SSPC-SP 1.
c. Coatings:
    1) PPG: Apply two coats of Amerlock 2 VOC polyamide epoxy at a minimum dry film thickness of 4 to 8 mils per coat.
    2) Sherwin-Williams: Apply two coats of Epoxy Mastic Aluminum II B62S100 at a minimum dry film thickness of 4 mils per coat.
    3) ICI/Devoe Coatings: Apply two coats of Bar-Rust 235H at 4 to 6 mils per coat dry film thickness.
    4) Carboline: Apply two coats of Carbomastic 90 at 3 to 5 mils per coat dry film thickness.
        a) Next, apply the recommended coating or paint for this particular surface to be painted.

7. System G - Concrete - Exterior - Normal Exposure
    a. General: All exterior concrete surfaces subject to normal exposure shall be painted with this system.
    b. Surface Preparation: Surfaces shall be free of dirt, grease, or other deleterious matter before coating. All cracks and voids shall be filled with a caulking material compatible with the specified coating. Surface preparation and applications shall be in accordance with manufacturer's instructions.
    c. Performance Criteria:
        1) No cracking over concrete block after 15 freeze-thaw cycles.
        2) No blistering, softening, loss of film integrity, adhesion, or change of color after 2,000 hours of humidity testing per ASTM D4585.
        3) No water damage or dampness visible on back of lightweight block after 48 hours of wind-driven rain per Fed. Spec. TT-C-555 B, Section 4.4.7.3.
        4) Moisture vapor transmission average/meter2 in 24 hours shall be equal or less than 120 grams/meter2 out to in and 160 grams/meter2 in 24 hours inside substrate to outside per ASTM D1653.
    d. Coating:
        1) PPG: Two finish coats Perma-Crete High Build 100% Acrylic Masonry Coating, 4-22, 4 mils minimum dry film thickness each.
        2) Sherwin-Williams: Two finish coats of Loxon Exterior Masonry Acrylic Coating, A24W301, 5 mils minimum dry film thickness each.
        3) ICI/Dulux Coatings: Prime coat of #3030 Bond Prep Interior/Exterior Waterborne Bonding Primer at 350 to 450 square feet per gallon. Apply finish coat of Decra-Flex Elastomeric #2260 Smooth Finish at 6 to 12 mils dry film thickness per coat. Total dry film thickness of this system shall be a minimum of 10 mils.
        4) Carboline: Two finish coats of Carbocrylic 600 at 5 to 7 mils dry film thickness per coat.

8. System H - Masonry and Concrete - Subject to Chemical Attack Including Submerged Exteriors
    a. General: Surfaces subject to chemical attack, including submerged or intermittently submerged areas, shall be coated with this system unless indicated otherwise.
    b. Surface Preparation: All masonry surfaces shall be Brush-Off Blast Cleaned per SSPC-SP-7. All cavities and voids shall be repaired and trowelled smooth with epoxy putty.
    c. Coatings:
        1) Xypex: Prime coat shall be Xypex Concentrate slurry coat at 16 mils dry film thickness. Second coat shall be Xypex Modified or Xypex Concentrate slurry coat shall be applied within 48 hours of prime coat. Total dry film thickness of this system shall be a minimum of 40 mils.
        2) PPG: Prime coat shall be Amerlock 2 VOC, one coat at 4 mils dry film thickness. Finish shall be two coats Amerlock 2 VOC high solids epoxy at minimum dry film thickness of 6 mils per coat. Total dry film thickness of this system shall be a minimum of 16 mils.
        3) Sherwin-Williams: Prime coat shall be Macropoxy 920 Pre-Prime B58T101 at 1.5 to 2 mils dry film thickness. Two or more coats of Macropoxy 646 Series at a minimum dry film thickness of 5 mils per coat. Total dry film thickness of this system shall be a minimum of 16 mils.
        4) ICI/Devoe Coatings: Precoat with Pre-Prime 167 to a dry film thickness of 1 to 1.5 mils. Apply two coats of Bar-Rust 235H at 4 to 8 mils per coat dry film thickness. Total dry film thickness of this system shall be a minimum of 16 mils.
        5) Carboline: Apply three coats of Carboguard 890 at 4 to 6 mils per coat dry film thickness. Total dry film thickness of this system shall be a minimum of 16 mils.
9. System I - Concrete and Masonry - Interior - Mild Exposure
    a. Surface Preparation: All masonry surfaces shall be abrasive blast cleaned per SSPC-SP-7. All large cavities and voids shall be repaired and trowelled smooth with epoxy putty. Clean sand may be added to the putty to fill large cavities and voids.
    b. Coatings: When a pinhole free surface is required, concrete block walls shall be filled with an epoxy or cementitious block filler prior to painting. Latex block fillers are not acceptable. Unless noted, otherwise on the plans or finish schedule, a pinhole free surface is not required.
        1) PPG: One or more finish coats of Amercoat 335 waterbased epoxy to achieve a minimum dry film thickness of 3 to 5 mils.
        2) Sherwin-Williams: One or more finish coats of Water-based Tile Clad B73-100 Series to achieve a minimum dry film thickness of 5 mils.
        3) ICI/Devoe Coatings: One or more finish coats of Tru-Glaze 4408 to achieve a minimum dry film thickness of 5 mils.

4) Carboline: One or more finish coats of Carboguard Water based Epoxy to achieve a minimum dry film thickness of 5 mils.

10. System J - Concrete Floors
    a. General: Includes specified concrete floors subject to moisture and pedestrian traffic.
    b. Surface Preparation: Surfaces to be coated must be abrasive blasted in accordance with SSPC-SP-7, to remove all cement glaze and residue or other agents and provide a uniform surface profile depth of approximately 1 mil.
    c. Coatings:
        1) PPG: Prime coat shall be Amerlock Epoxy Sealer applied at 1.5 mils dry film thickness. Finish shall be one coat of Amerlock 2 VOC for a total system dry film thickness of 8 mils minimum.
        2) Sherwin-Williams: Prime coat shall be Armorseal 33 Primer/Sealer B58AQ33 applied to a minimum dry film thickness of 8 mils. Finish coat shall be ArmorSeal 650SL 100% solids, self-leveling epoxy applied to a minimum dry film thickness of 10 mils.
        3) ICI/Devoe Coatings: Prime coat shall be Pre-Prime 167 at 1.0-1.5 dry film thickness. Finish coat shall be Bar Rust 235H at 6-8 mils dry film thickness.
        4) Carboline: Prime coat shall be Carboguard 1340 at 2 to 3 mils dry film thickness. Finish coat shall consist of one coat of Carboguard 890 at 6 to 8 mils for a total system dry film thickness of 8 mils minimum.
            a) Add 5 lb of 50 mesh dry, washed silica to each gallon of mixed topcoat material for a non-skid finish.
11. System K - Woodwork - Interior and Exterior
    a. General: Paint or stain all interior and exterior wood including, but not limited to, doors, frames, panel, sash, and trim.
    b. Surface Preparation: Wood surfaces to be painted shall be cleaned of dirt, oil or other foreign substances with mineral spirits, scrapers, sandpaper, or wire brushes. Finished surfaces exposed to view shall, if necessary, be made smooth by planing and sanding. Millwork shall be sanded where necessary and given a coat of the specified primer on all sides before installation.
        1) Small, dry, seasoned knots shall be surface scraped, sanded and thoroughly cleaned, and shall be given a thin coat of WP-578 Western Pine Association knot sealer before application of the priming coat.
        2) Large, open unseasoned knots, and all beads or streaks of pitch shall be scraped off; or if the pitch is still soft, it shall be removed with mineral spirits or turpentine and the resinous area shall be thinly coated with knot sealer. After priming, all holes and imperfections shall be filled with putty or plastic wood (colored to match the finish coat), allowed to dry, and sanded smooth. Painting of interior wood surfaces shall proceed as far as practical, only after masonry work has dried.
    c. Coatings:

1) PPG: One coat Sealgrip 100 percent Acrylic Primer 17-921, applied at 1.5-2 mils dry film thickness. Finish coats shall be two coats Speedhide Latex Semi-Gloss Enamel 6-500, applied at 1.5-2 mils dry film thickness each.
2) Sherwin-Williams: Prime coat shall be PrepRite ProBlock Interior/Exterior Latex Primer Sealer B51W20 applied to a minimum dry film thickness of 1.5 mils. Finish coat shall be Metalatex Semi-Gloss Coating B42W101 applied to a minimum dry film thickness of 4 mils.
3) ICI/Devoe Coating: Apply one coat ICI/Dulux Ultra-Hide #3210 Gripper Primer/Sealer at 300 to 450 square feet per gallon. Apply one or two coats of #4216 Lifemaster Pro HB Acrylic Semi-gloss enamel at 2 to 4 mils dry film thickness per coat.
4) Carboline: Prime coat shall be Carbocrylic 120 applied at 1 to 2 mils. Finish coat shall be Carbocrylic 3359 applied at 2 to 3 mils per coat in one or more coats.

12. System L - Gypsum Board
    a. General: Gypsum board shall be primed with this system and finish painted with System I (Concrete and Masonry, Interior, Mild Exposure) per the schedule.
    b. Surface Preparation: Sand and feather joint compound. Apply texture where noted Specifications or Drawings.
    c. Coatings
        1) PPG: One coat Speedhide Latex Wall Sealer 6-2 applied at 1.5 mils dry film thickness.
        2) Sherwin-Williams: One coat of PrepRite 200 Latex Wall Primer B28W200 to a minimum dry film thickness of 1-2 mils.
        3) ICI/Devoe Coatings: One coat of Gripper at 1 mil dry film thickness.
        4) Carboline: One coat of Carbocrylic 120 at 1 to 2 mils dry film thickness.
13. System M - Underground Piping Appurtenances
    a. General: Unless otherwise specified in the specific pipe and valve sections, buried pipeline items, such as valves, couplings and bolts, shall be coated with this system.
    b. Surface Preparation: Apply only to clean, dry surfaces. Remove rust, paint and other foreign matter by sand blasting (SSPC-SP-6), wire brushing, or scraping.
    c. Coating:
        1) PPG: Two coats of Amercoat 78HB coal tar epoxy applied at 8 to 10 mils dry film thickness per coat. Total dry film thickness of this system shall be a minimum of 20 mils.
        2) Sherwin-Williams: Two coats of TarGuard Epoxy B69B60/B69V60, 8 to 16 mils each coat. Total dry film thickness of this system shall be a minimum of 20 mils.
        3) ICI/Devoe Coatings: Two coats of Devtar 247 at 10 to 13 mils dry film thickness per coat. Total dry film thickness of this system shall be a minimum of 20 mils.

4) Carboline: Two coats of Bitumastic 300M at 10 to 12 mils dry film thickness per coat. Total dry film thickness of this system shall be a minimum of 20 mils.

14. System N - Plastic Pipe
    a. General: Plastic piping exposed to view shall be painted with this system.
    b. Surface Preparation: Plastic shall be solvent cleaned per SSPC SP 1, and scuff sanded with light grit sandpaper.
    c. Coatings:
        1) PPG:
            a) Interior: Apply one coat of Amerlock 2 VOC epoxy at 4 mils dry film thickness.
            b) Exterior: Apply one coat of Amershield VOC high solids polyurethane at 4 mils dry film thickness.
        2) Sherwin-Williams:
            a) Interior: Apply one coat of Macropoxy 646 at 3 mils dry film thickness.
            b) Exterior: Apply one coat of Hi-Solids Polyurethane Series at 3 mils dry film thickness.
        3) ICI/Devoe Coatings: Apply one coat of Devthane 379H at 2 to 3 mils dry film thickness.
        4) Carboline: Apply one coat of Carboguard 890 at 4 mils dry film thickness. Finish coat shall be Carbothane 134HG at 2 to 2.5 mils dry film thickness.
15. System O - Fiberglass Piping, Ductwork, Vessels, and Equipment
    a. General: All exposed fiberglass piping, ductwork, vessels, and equipment shall be painted with this system.
    b. Surface Preparation: SSPC-SP-1. Solvent shall not damage fiberglass reinforced plastics. Lightly sand with 150 grit paper.
    c. Coatings:
        1) PPG:
            a) Interior: Apply one coat of Amerlock 2 VOC epoxy at 4 mils dry film thickness.
            b) Exterior: Apply one coat of Amershield VOC high solids polyurethane at 4 mils dry film thickness.
        2) Sherwin-Williams: Apply one coat of Macropoxy 646 Series at a minimum dry film thickness of 3 mils.
        3) ICI/Devoe Coatings: Apply one coat of Bar-Rust 235H at 4 to 6 mils dry film thickness.
        4) Carboline: Apply one coat of Carboguard 890 at 4 to 6 mils dry film thickness.
16. System P - Concrete and Masonry - Interior - Normal Exposure
    a. Surface Preparation: All masonry surfaces shall be Brush-Off Blast Cleaned per ASTM 04259. All large cavities and voids shall be repaired and trowelled smooth with epoxy putty. Clean sand may be added to the putty to fill large cavities and voids.

b. Coatings: When a pinhole free surface is required, concrete block walls shall be filled with an epoxy or cementitious block filler prior to painting. Latex block fillers are not acceptable. Unless noted otherwise on the Drawings or finish schedule, a pinhole free surface is not required.
    1) PPG: One or more coats of Amerlock 2 VOC epoxy shall be applied to achieve a minimum dry film thickness of 6 mils.
    2) Sherwin-Williams: Apply one or more coats of Epo-Plex Multi-Mil Water Based Epoxy B71-100 to achieve a minimum dry film thickness of 8 mils.
    3) ICI/Devoe Coatings: One or more finish coats of Tru-Glaze 4408 Waterbourne Polyamide Epoxy to achieve a minimum dry film thickness of 6 mils.
    4) Carboline: Apply one or more finish coats of Carboguard 890 to achieve a minimum dry film thickness of 6 mils.

17. System Q - Fusion Epoxy Coated Fabrications
    a. General: All fusion epoxy-coated pipe fabrication shall be painted with this coating system.
    b. Surface Preparation: All surfaces shall be cleaned and brushed-blasted, if necessary, to provide good adhesion.
    c. Test Section: After substrate is prepared, a small test section shall be coated. Contractor will inspect the section no sooner than 72 hours. Contractor must certify satisfactory performance of the test section to the Construction Manager before completing the Work.
    d. Coatings:
        1) Sherwin-Williams: Prime coat shall consist of Macropoxy 646 to dry film thickness of 4 to 8 mils. Finish coat of Macropoxy 646 at dry film thickness of 4 to 8 mils. Total dry film thickness of this system shall be a minimum of 8 mils.
        2) ICI/Devoe Coatings: Apply two coats of Bar-Rust 235H at 4 to 8 mils dry film thickness per coat. Total dry film thickness of this system shall be a minimum of 8 mils.
        3) Carboline: Apply two coats of Carboguard 890 at 4 to 6 mils dry film thickness per coat. Total dry film thickness of this system shall be a minimum of 8 mils.
        4) PPG: Two coats of Amerlock 2 VOC Epoxy shall be applied to achieve a minimum dry film thickness of 8 mils.
18. System R – Not used
19. System S – Petrolatum Tape – Metallic Valves Below Grade
    a. Metallic valves below grade shall use a petrolatum tape wrapping system.
    b. Tape wrapping shall apply to new valves.
    c. Remove dirt, grease, and oil including excessive moisture and frost in accordance with the requirements of SSPC-SP-1, “Solvent Cleaning”.
    d. Remove loose rust, paint, and foreign matter by hand and/or power tool cleaning in accordance with SSPC-SP-2, or SP-3, “Hand Tool Cleaning” or “Power Tool Cleaning” respectively.

e. Follow the Denso Flange & Valve Wrapping Specification Guide for Denso Petrolatum Tape System to apply
    1) Application of Denso Paste or Denso Paste S105: Apply Denso Paste or Denso Paste S105 by hand, brush, glove, rag, or roller. Apply a thin uniform film over the entire surface to be wrapped.
    2) Application of Denso Profiling Mastic: Fill all voids with Denso Profiling Mastic and build up the profile around the valve flanges and shoulders so that there are no sharp angles. This is to facilitate easy tap wrapping, minimize wrinkles/folds and reduce air entrainment.
    3) Application of Denso Petrolatum Tape:
        a) Measure and cut the first pieces of tape and then apply them to the valve body. The vertical tape pieces go right around the bottom of the valve and up the opposite side forming a “U” shape. When applied in this manner the tape forms a double layer over the center of the valve body. The number of tape pieces used in this stage should be adjusted in accordance with the width of the tape used and the size of the valve. The horizontal piece of tape is spirally wrapped around the valve top. Starting from below the valve shoulder and covering the ends of the vertical tape pieces in a weatherboard manner and then working up towards the top of the valve. Make sure the tape does not interfere with the movement of the valve wheel or mechanism. Smooth down the tape and its edges to remove air and form a seal.
        b) Next, the tape is applied directly from the roll in one continuous piece. The tape should be applied using a 55% overlap to give a double layer. Starting at the top of the center of the flange on one side and moving towards the valve body, wrap the first few turns vertically whilst gradually moving to a diagonal direction as the tape approaches and overlaps onto the previously applied tape pieces. Take the tape diagonally across the center of the valve and continue on the other side working towards the opposite flange in a repeat of the first side. Smooth down the tape and its edges to remove air and form a seal. The number of circumferential wraps used in this stage should be adjusted in accordance with the width of the tape used and size of the valve.
        c) The final tape wrap starts on the top of the center of the flange and overlaps onto the previous tape. Working away from the flange onto the connected pipework in a vertical motion, the tape is applied using a 55% overlap to give a double thickness. This application is repeated on the other side of the valve to complete the wrapping. Smooth down the tape and its edges to remove air and form a seal.
    4) Application of Denso Tape Outerwrap:
        a) Measure and cut the first pieces of tape and then apply them to the valve body. The vertical tape pieces go right around the bottom of the valve and up the opposite side forming a “U” shape. When applied in

this manner the tape forms a double layer over the center of the valve body. The number of tape pieces used in this stage should be adjusted in accordance with the width of the tape used and the size of the valve. The horizontal piece of tape is spirally wrapped around the valve top. Starting from below the valve shoulder and covering the ends of the vertical tape pieces in a weatherboard manner and then working up towards the top of the valve. Make sure the tape does not interfere with the movement of the valve wheel or mechanism. Smooth down the tape and its edges to remove air and form a seal.

b) Next, the tape is applied directly from the roll in one continuous piece. The tape should be applied using a 55% overlap to give a double layer. Starting at the top of the center of the flange on one side and moving towards the valve body, wrap the first few turns vertically whilst gradually moving to a diagonal direction as the tape approaches and overlaps onto the previously applied tape pieces. Take the tape diagonally across the center of the valve and continue on the other side working towards the opposite flange in a repeat of the first side. Smooth down the tape and its edges to remove air and form a seal. The number of circumferential wraps used in this stage should be adjusted in accordance with the width of the tape used and size of the valve.

c) The final tape wrap starts on the top of the center of the flange and overlaps onto the previous tape. Working away from the flange onto the connected pipework in a vertical motion, the tape is applied using a 55% overlap to give a double thickness. This application is repeated on the other side of the valve to complete the wrapping. Smooth down the tape and its edges to remove air and form a seal.

## 3.6 COATING SYSTEMS SCHEDULE

A. Specific coating systems, colors and finishes for rooms, galleries, piping, equipment, and other items which are painted or have other architectural finishes are specified in the following coating system schedule. Unless otherwise specified in the coating system schedule, the word "interior" shall mean the inside of a building or structure, and the word "exterior" shall mean outside exposure to weather elements. Whenever a color is not specified, the Construction Manager shall select the color from the coating manufacturer's standard colors.

COATING SYSTEM SCHEDULE

| Surface/Location | Coating System Identification | Color |
|---|---|---|
| Equipment and Metal Appurtenances | | |
| 1. Equipment, unless otherwise specified | | See Note 1 |
| a) Interior | B | Submit choices |

COATING SYSTEM SCHEDULE

| Surface/Location | Coating System Identification | Color |
|---|---|---|
| b) Exterior | C | Submit choices |
| 2. Exterior surface of submerged equipment including any appurtenances | A | Submit choices |
| 3. Exterior surface of high temperature equipment operable at over 200°F | D | Submit choices |
| 4. Fiberglass vessels and exposed ductwork | O | Submit choices |
| 5. HVAC diffusers and grilles on coated surfaces, unless otherwise specified (not including louvers) | Factory Coated | Match background color |
| 6. Electrical switchgear panels, unit substations, motor control centers, power transformers, distribution centers, and relay panels (interior an exterior) | See Division 26 | Standard ANSI 61 Grey (outside); flat White (inside) |
| 7. Instrumentation panels, indicating and transmitting field panels, unless otherwise specified | See Division 40 | Standard ANSI 61 Grey (outside); flat White (inside) |
| 8. Stainless steel, aluminum, factory finished aluminum storefronts, and metal panels, unless otherwise specified | Uncoated | -- |
| Conduit, Piping and Ductwork | | |
| 1. Cast iron or steel piping, including galvanized, unless otherwise specified | | Gunmetal Gray |
| a) Submerged and within 12 in. of water | A | Submit choices |
| b) Not submerged | B | Gunmetal Gray |
| 2. Plastic piping, exposed, interior and exterior | N | Gunmetal Gray |
| 3. Conduit, outlet and junction boxes, appurtenant hangers, clamps and supports on uncoated surfaces, unless otherwise specified | B | Match background color |
| 4. Lighting transformers, lighting, communication, small power panels, and control stations | Standard factory coating | Standard factory color |
| 5. Fiberglass piping | O | Submit choices |
| 6. Racked conduits and cable trays | Uncoated | -- |
| 7. Insulated pipe jacketing | Uncoated | -- |
| 8. High temperature piping operable at over 200°F | D | Submit choices |
| 9. Stainless steel | Uncoated | -- |
| 10. Buried valves, couplings, fittings, bolts, etc., unles otherwise specified | M | Black |
| 11. Fusion epoxy-coated fabrications | Q | Submit choices |
| Concrete, Grout, Masonry, and Gypsum Board | | |
| 1. Inside of all tanks and channel walls exposed to | Uncoated | -- |

COATING SYSTEM SCHEDULE

| Surface/Location | Coating System Identification | Color |
|---|---|---|
| view, to 12 in. below minimum water level unless specified otherwise | | |
| 2. Submerged inside tank and channel walls unless otherwise specified | Uncoated | -- |
| 3. Building walls and ceilings (unless otherwise note on the finish schedule) | | |
| a) Interior Walls, unless otherwise specified | P | Submit choices |
| b) Interior Ceilings, unless otherwise specified | Uncoated | Submit choices |
| c) Exterior Walls Above Grade (except as noted i "d") | G | Clear |
| d) Exterior Face of Exterior CMU Walls Above Grade | -- | Submit choices |
| 4. Concrete equipment bases, unless otherwise specified | Uncoated | Match adjacent wall color |
| 5. Concrete tank exterior, unless specified otherwis in this section | H | -- |
| Door and Door Frames | | |
| 1. Ferrous metal | | |
| a) Interior | B | Submit choices |
| b) Exterior | B | Submit choices |
| 2. Wood | K | Submit choices |
| Structural Steel and Miscellaneous Metal | | |
| 1. Submerged | A | Submit choices |
| 2. Not Submerged | B | Submit choices |
| Handrails, Grating, Floor Plates, Manhole Covers, and Hatches | Uncoated | -- |
| Metal Stairs, Ladders, Platforms, and Supports, Excep Treads and Grating | | |
| 1. Interior | B | Submit choices |
| 2. Exterior | B | Submit choices |
| 3. Aluminum and Stainless Steel | Uncoated | -- |
| Aluminum Flashing, Light Standards, Supports and Louvers | | |
| 1. Interior and exterior, unless otherwise specified | Uncoated | -- |
| Precast Concrete Metalwork | | |
| 1. Fasteners, anchors, supports, etc. | B | Match wall |
| Wood | | |
| 1. Interior | K | Submit choices |

COATING SYSTEM SCHEDULE

| Surface/Location | Coating System Identification | Color |
|---|---|---|
| 2. Exterior | K | Submit choices |

1. Notes:
2. (1) Equipment shall match attached piping service color unless otherwise specified.

B. (2) Where color is to be selected, coating supplier shall submit complete line to Construction Manager.

3.7 PIPELINE COLOR CODING

A. Where pipelines are specified to be painted they shall be of the color selected by the Owner.

B. After painting, all pipelines, including tubing, above ground, inside or outside buildings and structures, in concrete trenches or tunnels, in boxes, etc., and in pipe trays shall be marked with a removable identification marker, as specified, indicating contents of the pipe and direction of flow.

END OF SECTION

SECTION 26 05 00 – ELECTRICAL WORK, GENERAL

PART 1 GENERAL

1.1 SECTION INCLUDES

A. The Contractor shall provide electrical work, complete and operable, in accordance with the Contract Documents.

B. The provisions of this Section apply to all sections in Division 26, except as indicated otherwise. The work of this Section is required for operation of electrically-driven equipment provided under specifications in other Divisions. The Contractor's attention is directed to the requirement for proper coordination of the work of this Section with the work of equipment specifications, the work of Division 40.

C. All concrete, excavation, backfill, and steel reinforcement work required for encasement, installation, or construction of the work of the various sections of Division 26 is included as a part of the work under the respective sections, including ductbanks, handholes, slabs on grade, housekeeping pads, antenna mast, and equipment stanchion supports.

D. Contractor shall provide all utility work shown on Contract Drawings, Utility Drawings, and per Pacific Gas and Electric's (PG&E) Greenbook, Specifications and Standards. The Contractor is responsible for coordination with, and obtaining permits and inspections, as required by PG&E. Work includes, but is not limited to, as applicable: service pole and weatherhead with cables, metering panel with main disconnect, all as applicable to utility design drawings and PG&E standards. Contractor to coordinate with PG&E for required inspections. Owner is coordinating with PG&E for overhead line extension, and three phase, 480/277 VAC service for the Newman Pump Station project.

E. Contractor shall provide lighting, receptacles, and controls for heaters and fans within outdoor electrical equipment. Motor Control Centers (MCC) shall be NEMA 3R rated, painted steel, non-walk-in exterior enclosures with sloped roof. Equipment will sit on housekeeping pads integral to slabs on grade. Slabs on grade shall be sized with minimum 48" clearance of concrete slab, measured from front edge of housekeeping pad, and 6" from pad on sides and back for anchoring clearances.

F. Contractor shall provide PLC Panel, integral to MCC line up. Contractor shall provide programmable logic controller (PLC), operator interface terminal (OIT), radio, antenna, antenna mast, and coaxial antenna cable, for remote communication systems. Programming of the PLC and OIT and radios shall be provided by Contractor. Refer to

Control Descriptions. Antenna mounting heights shall be per radio path study. Contractor shall install and orient antenna.

G. Contactor shall provide electrical work at the Newman Pump Station including: flowmeters, Newman Reservoir level system, pressure  lighting and receptacles, pump disconnects, high pressure switches, for a complete and operable pumping system.

H. Owner shall provide programming at Owner's existing Supervisory Control and Data Acquisition (SCADA) system, outside of this contract. Contractor shall provide support for field testing of PLC and OIT logic, and for verification of inputs and outputs from the PLC and OIT back to Owner's SCADA system. Contractor to coordinate with Owner for scheduling of PLC and OIT and SCADA testing. Contractor to include one day at site for such testing on the schedule.

I. The Contractor shall coordinate location of antenna mast in field with Owner. Contractor shall provide, install, connect, and orient antennas per Owner's radio path study. Contractor to include in bid scope to move antenna mast 10' in any direction from where shown on Contract Drawings, as no additional cost to Owner.

J. Contractor is responsible for daily redlining of drawings. Redlined drawings subject to review by Owner and Engineer.

K. Electrical equipment shall not be energized until sequence steps 1 through 6 of Section 260573 Paragraph 3.1.C, are completed and approved by Owner and Engineer.

1.2 APPLICABLE CODES, STANDARDS, PERMITS, AND REQUIREMENTS

A. Perform all work; furnish, install, and test all materials and equipment in full accordance with the latest applicable editions, rules, regulations, requirements, and specifications of the following:
   1. Title 8, Subchapter 5, California Administrative Code – Electrical Safety Orders.
   2. Local Laws and Ordinances.
   3. State and Federal Laws.
   4. Local and State Fire Marshal.
   5. Underwriters' Laboratories (UL).
   6. National Electrical Safety Code (NESC).
   7. American National Standards Institute (ANSI).
   8. National Electrical Manufacturer's Association (NEMA).
   9. National Electrical Contractors' Association (NECA) Standard of Installation.
   10. Institute of Electrical and Electronics Engineers (IEEE).
   11. Insulated Cable Engineers Association (ICEA).
   12. Occupational Safety and Health Act (OSHA).
   13. National Electrical Testing Association (NETA).

14. American Society for Testing and Materials (ASTM).
15. National Fire Protection Association (NFPA).
16. National Electrical Code (NEC).
17. California Electrical Code (CEC).
18. Pacific Gas and Electric Company (PG&E).
19. City of Fort Bragg (Owner, City).

B. All electrical equipment shall be listed by and shall bear the label of Underwriters' Laboratories, Inc. (UL), or by an independent testing laboratory acceptable to the local code enforcement agency having jurisdiction.

C. Installation of electrical equipment and materials shall comply with Occupational Safety and Health Administration (OSHA) Safety and Health Standards, state building standards, and applicable local codes and regulations.

D. Where the requirements of the specifications conflict with UL, National Electrical Manufacturers Association (NEMA), National Fire Protection Association (NFPA), or other applicable standards, the more stringent requirements shall govern as approved by the local authority having jurisdiction. Conflicts that may exist between the above items will be resolved at the discretion of the Engineer at no extra cost by the Contractor.

E. Wherever the requirements of the Specifications or Drawings exceed those of the above items, the requirements of the Specifications or Drawings govern. Code compliance is mandatory. Construe nothing in the Contract Documents as permitting work not in compliance with these codes.

F. Obtain all permits and pay all fees required by any governmental agency or utility having jurisdiction over the work. Arrange all inspections required by these agencies. On completion of the work, furnish satisfactory evidence to the Engineer that the work is acceptable to the regulatory authorities having jurisdiction. PG&E fees will be paid by the Owner.

1.3 SIGNAGE

A. Provide danger, caution, and warning signs and equipment identification markings in accordance with applicable federal, state, OSHA, and NEC requirements. The Contractor shall provide the following signage at a minimum, unless otherwise stated in individual equipment specifications sections. Nameplates and Warning Signs shall be screwed on with stainless steel screws. Arc Flash Labels may be adhesive.
    1. Arc Flash Labels – Provide Arc Flash labels as required per NEC Article 110.16 and these Specifications. Inscribe the Arc Flash label with the maximum available fault current at Metering Panel main breaker, including date of calculation, per NEC

Article 110.24. Provide Arc Flash label at MCC main breaker. Provide Arc Flash labels at each motor starter section and lighting panelboard main breaker. Adhesive arc flash labels are acceptable. Arc flash labels shall be durable materials and rated for outdoor, marine environments.

2. Local Disconnect Switches – Each local disconnect switch, shall include engraved phenolic, marked to indicate its voltage, number of phases, source, and equipment served (description and tag number as applicable). Phenolic nameplates to have minimum ¼-inch lettering, black engraved to white core, and attached with stainless steel screws.
3. Equipment Nameplates – Provide engraved phenolic equipment nameplates on all electrical and instrumentation equipment. Nameplate to be inscribed with equipment name and equipment tag number, at a minimum. Submit listing of equipment nameplates complete with inscriptions for review. Phenolic nameplates to have minimum ¼-inch lettering, black engraved to white core, and attached with stainless steel screws, unless shown otherwise.
4. Warning Signs:
    a. Provide electrical shock hazard signs on the exterior doors of the Metering Panel and MCC enclosures.

1.4 PERMITS AND INSPECTION

A. Permits shall be obtained and inspection fees shall be paid by Contractor as applicable.

B. Contractor shall coordinate with serving electrical utility (PG&E) for required inspections and approvals.

1.5 INSPECTION OF THE SITE AND EXISTING CONDITIONS

A. Before submitting a bid, visit the sites and determine conditions at the sites and at all existing structures in order to become familiar with all existing conditions and electrical systems which will, in any way or manner, affect the work required under this Contract. No subsequent increase in Contract cost will be allowed for additional work required because of the Contractor's failure to fulfill this requirement.

B. Protect all existing aboveground and underground utilities during construction. Pay for all repairs without increase in Contract cost should damage to underground utilities occur during construction. This includes the existing underground conduit system for the Summers Lake Reservoir shed.

C. Replace existing surface (asphalt, concrete) in kind where work is performed, unless Contract Drawings show otherwise.

D. Coordinate location of Newman Reservoir level system with the Owner.

## 1.6 RESPONSIBILITY

A. The Contractor shall be responsible for:
   1. Complete electrical system that is functionally operational in accordance with the intent of these Contract Documents. This includes demolition, procurement, installation, testing, start-up, and training.
   2. Coordinating the details of facility and process equipment layouts and construction for all Specification Divisions which affect the work covered under Divisions 26 and 40.
   3. Coordinate, provide and install all PG&E utility requirements for new electrical services.
   4. Furnishing and installing all incidental items not actually shown or specified, but which are required by good practice to provide complete functional systems.
   5. Coordination with other Divisions for equipment electrical, wiring and cable requirements.
   6. Satisfying all requirements of Owner's standards.
   7. PLC's and OIT's and radios programming and configuration and field testing, plus verification of PLC input and output points back to Owner's SCADA system (typical of all three sites), and AWPF SCADA system (Willowbrook Site).
   8. Coordination with the Owner to provide complete work as described in Specifications and shown on Drawings and attachments. This includes coordination with Owner's SCADA programmer and Contractor's PLC and OIT and radio programmer.
   9. Submit to the Owner a complete copy of red line as-builts every month after the Notice to Proceed date for Owner information and review in accordance with the Record Drawing requirements.

## 1.7 INTENT OF DRAWINGS

A. The Contract Drawings indicate the extent, general location, and arrangement of equipment. Ductbank and conduit runs are diagrammatic and may not show the exact locations for installation. The Contractor shall verify the locations of conduit stub-ups based upon conduit entry space of equipment furnished from the manufacturer's certified shop drawings and by inspection of the actual equipment to be installed. Coordinate with serving utilities and Owner for exact location of substructures, or point of interconnections. Include in bid all costs to modify locations shown on Drawings by ten feet in any direction.

B. In general, where the background on Contract Drawings has been screened, the area screened is work other than electrical, unless otherwise noted. Work under Division 26 and 40 is shown heavier for contrast.

C. Standard details are typical for all locations which apply, regardless of whether a callout is shown on the Drawing.

D. Electrical design is based on minimum horsepower and current ratings. If the manufacturer and/or the Contractor provides equipment with a larger horsepower or current rating, the Contractor shall be responsible for making all necessary changes to accommodate the larger unit, with the approval of the Engineer. Contractor shall pay for all such changes, including engineering design by a professional electrical engineer currently registered in the state of California. Contractor to provide conduits with sufficient dimensions, per NEC, for conduits filled with manufacturer cables.

E. Number and size of wires which shall be installed in runs of conduit where not shown on the Contract Drawings shall be determined from the one-line, schematics, connection, interconnection, and control diagrams of actual equipment furnished. Cable quantity and size and type shall be based on submitted and approved Interconnect Diagram, refer to Division 40 for Interconnect Diagram requirements.

F. Final layout of panels, equipment, lights, etc. shall be approved by Owner and Engineer in field prior to construction. The Contractor shall make an appointment with the Owner and Engineer to review such locations and shall not commence construction until the locations have been approved by the Owner and Engineer. A minimum of three working days is required to schedule review.

1.8 CONTRACTOR SUBMITTALS

A. General
   1. Submittals shall be specific for each facility.
   2. Provide manufacturers' descriptive information and shop drawings for all equipment, material, and devices furnished under Divisions 26 and 40, including raceway routing drawings, schematic (elementary) diagrams, equipment dimensional drawings, interconnection and connection diagrams, grounding diagrams, catalog cut sheet information, and calculations in accordance with Specifications. Device designations and symbols for schematic (elementary) connection or interconnection diagrams shall conform to the latest edition of NEMA ICS 1.
   3. Provide separate submittals for the following equipment: Metering Panel with Main Disconnect, Motor Control Center with integral PLC Panel, Interconnect Drawings, Protective Device Studies, disconnect switches, conduits, cables, light system and fixtures, wiring devices, grounding system components, and instrumentation. Prepare separate submittals for Protective Device Studies, and Electrical Testing. Submittals shall be per Specification Section.
   4. Submit complete electrical drawings for all equipment furnished in accordance with other Divisions that interface with electrical equipment. These drawings shall

contain panel elevation, bill of materials, control schematic diagrams (complete with terminal numbers, device names, field equipment descriptions and tag numbers, cable colors, ladder rung numbers, etc.) to provide complete identification of the circuits and provide coordination between the equipment. Both AutoCAD and PDF-type files are required for submitted drawings.

5. Check submittals for proper number of copies, adequate identification, correctness and compliance with Drawings and Specifications, and initial all copies indicating this has been done.
6. If the equipment installed during construction is not the exact same equipment that was approved by the Engineer before construction, then the Contractor shall resubmit all documentation related to the installed equipment as required herein for the Engineer's approval.
7. Review of submittal information by the Engineer shall not relieve the Contractor from responsibility for deviations from Contract Drawings and Specifications, unless Contractor has received written approval from the Engineer for specific deviations at the time of the submission request. Review of submittal information shall not relieve the Contractor from responsibility for errors and omissions in shop drawings or literature.
8. Manufacturer's standardized schematic diagrams will not be acceptable.
9. Catalog cut sheets shall be highlighted to designate the exact model number of proposed equipment. Cross out all non-applicable equipment on submitted sheets.
10. Submit understanding of Control Descriptions, and color OIT screens in hard copy (PDF) format.
11. Operation and Maintenance (O&M) Manuals per Specification. Provide with completed O&M Manual Review Checklist Form (attached). Provide minimum of four hard copies and one electronic copy of all Division 26 O&M Manuals, unless noted otherwise.

B. Submit certified shop drawings and diagrams as follows:
   1. Layouts indicating conformity with space requirements, including front and rear access requirements.
   2. Detailed anchoring requirements, including stamped and signed seismic calculations confirming anchor type, size and depth.
   3. Assembly drawings in sufficient detail to identify every part of the specified equipment, including bills of material.
   4. General dimension, outline, and panel, cubicle, and structure layout drawings showing the principal dimensions of the equipment, the location of all devices therein, and the size of electrical conduit windows and cable connections. Include front, rear, side elevations and top view. Include front and rear access requirements. Provide finish and materials, temperature limitations, and grounding requirements. Provide nameplate inscription schedule. Provide manufacturer anchoring requirements to confirm seismic results and equipment weights.

5. In AutoCAD format and PDF format, submit the following: Single Line Drawings, Equipment Elevation Drawings, Schematic Diagrams, Interconnection Drawings, PLC Panel Drawings. Drawings shall be 11 inches x 17 inches. Submit drawings in PDF format and AutoCAD format.
6. Installation details for the following: Conduit Crossings at the Spillway, Newman Reservoir level transducer with stilling well, both flowmeters, and discharge high pressure switches.

C. Submit manufacturer's certified shop drawings and information on the following:
   1. Metering Panel with Main Disconnect including all components.
   2. Submit proof of PG&E approval of Metering Panel, including metering sections and installed equipment.
   3. Motor Control Center including all components.
   4. PLC Panel (integral to MCC) including all components, PLC, OIT, and radio hardware.
   5. Motor Disconnect Switches, 3 pole switch at pump station.
   6. In addition to submittals for the specific items mentioned above, furnish shop drawings and catalog cut information on the following items:
      a. Conduits, fittings, device boxes.
      b. Warning tape and pull tape.
      c. Lighting fixtures
      d. Antenna mast, and reinforced concrete base design.
      e. Handholes.
      f. Wires, cables, grounding conductors.
      g. Wiring devices (switches and receptacles).
      h. Tagging and labeling materials, with inscriptions, for conduits, cables, instruments, panels, switches, and equipment.
      i. Protective Device Studies: Arc Flash, Short Circuit, Coordination.
      j. Grounding system components.
      k. Submit hardcopy of all Contractor configurations of equipment. This applies to VFD configurations, instrumentation settings and calibrations, and all other configured devices.
      l. Instrument installation details for: both magmeters, pressure switches, Newman Reservoir level system.
      m. Testing Procedures, and Certified Results for: Factory Acceptance Testing (FAT), Pre-Demonstration start-up, Demonstration Testing.
      n. Submit NETA Testing agency, NETA testing procedures, and certified NETA testing results stamped by California professional engineer, for approval.
      o. Equipment as listed in individual specification sections.

D. Seismic
   1. Submit proof of compliance that the following electrical equipment items are seismically anchored: MCC with PLC Panel. Proof of compliance shall include

complete anchorage details coordinated with equipment mounting provisions showing weights, calculations, anchoring points, anchor bolts size and type, and any special considerations. Proof of compliance for each listed piece of equipment is to be prepared, stamped and signed by a licensed structural engineer in the state of California. Listing is not inclusive and is applicable for all electrical equipment 400 pounds and greater that is floor-mounted, and equipment 50 pounds and greater that is wall-mounted.

E. Operation and Maintenance Manuals shall be submitted per Specifications. Include completed O&M Manual Review Checklist with each O&M Manual submittal. Refer to O&M Manual Review Checklist at end of this Section.

1.9 AREA DESIGNATIONS

A. General
   1. Raceway system enclosures shall comply with Sections 260533 and 260543.
   2. Electric work specifically indicated in sections within any Division of the Specifications shall comply with those requirements.
   3. Other electrical work not included in 1.10.A.1 and 1.10.A.2 shall comply with this Paragraph 1.10.A.3.
      a. The following (Table 1) lists the type of electrical equipment and materials to be used based on applied area, unless shown otherwise on Contract Drawings.

**Table 1**
**Electrical Equipment and Materials**

| Applied Area Classification | Enclosure, Pullbox or J-Box NEMA Rating | Device Box or Small Enclosure | Strut and Mounting Hardware | Exposed Conduit System | Concrete Encased Conduit System |
|---|---|---|---|---|---|
| Interior Damp | NEMA 4/3R | Cast Steel | 316 stainless steel struts, and stainless steel hardware | Galvanized Rigid Steel | PVC Sch 40 with PVC boxes |
| Exterior Wet | NEMA 4X 316 stainless steel, unless noted otherwise | PVC coated cast steel | 316 stainless steel struts, and stainless steel hardware | PVC coated galvanized rigid steel conduits and fittings | PVC Sch 40 conduits and fittings |

b. The following (Table 2) identifies area classification.

| Table 2<br>Areas Classifications By Building/Facility and Room | | |
|---|---|---|
| **Building/Facility** | **Room** | **Area Classification** |
| Pump Station | Interior | Interior Damp |
| General Site | All exterior Site Areas not otherwise designated | Exterior Wet |

B. Material Requirements
   1. NEMA 3R enclosures shall be painted steel, ANSI 61, unless noted otherwise.
   2. Notes on Contract Drawings takes precedence over material requirements in Table 1.

1.10 TESTS

A. The Contractor shall be responsible for all factory and field tests required by specifications in Divisions 26 and 40, and by the Engineer and Owner and other authorities having jurisdiction. The Contractor shall furnish all necessary testing equipment and pay all costs of tests, including all replacement parts and labor, due to damage resulting from damaged equipment or from testing and correction of faulty installation.

B. Factory Acceptance Testing (FAT), NETA Testing, Pre-Demonstration Testing and Demonstration Testing shall be per Specifications and performed by Contractor via submitted and approved procedures. Submit results. Include certified results with O&M submittal. PLC Panel FAT shall include verification of Contractor's programming for PLC, OIT, and radio configuration.

C. Factory Acceptance Testing shall take place within 250 miles of project site. If Factory Acceptance Testing is greater than 250 miles, Contractor shall reimburse Owner and Engineer for travel and lodging expenses for four people at no extra cost to the Owner.

D. Any equipment or material which fails a test shall be removed and replaced at no additional cost to the Owner.

E. Submit all test forms for approval four weeks prior to testing.

F. Provide a minimum of two weeks notification of Field Tests to the Engineer. Field Tests shall be witnessed and signed off by the Engineer in order to be considered valid. Any test results without the Engineer's signature are considered invalid.

G. NETA testing to be performed prior to energizing equipment. NETA testing on Metering Panel(main breaker and grounding system) shall be completed prior to letter of acceptance of PG&E metering section by inspector to PG&E to set meter and energize.

1.11 TEMPORARY LIGHTING

A. The Contractor shall provide temporary lighting for all trades. The average lighting level (foot-candle) shall meet OSHA and CAL-OSHA.

1.12 DEFINITIONS (APPLICABLE TO SPECIFICATIONS AND DRAWINGS)

A. Above Grade – Not buried in ground and not embedded in concrete slab on ground.

B. Below Grade – Buried in ground and below floor slab as applicable, and not embedded in concrete slab on ground.

C. Certified: – Confirmed to be accurate, or as represented, or as meeting standards.

D. Concealed – Inside building above grade and located within walls, furred spaces, crawl spaces, attics, above suspended ceiling, etc. In general, any item not visible or directly accessible.

E. Connect – Complete hookup of item with required services, including conduits, wires, and other accessories.

F. Exposed – Either visible or subject to mechanical or weather damage, indoor or outdoor. In general, any item that is directly accessible without removing walls, panels, ceilings or other parts of structure.

G. Underground – Buried in ground, including under building slabs.

H. Wiring – Electrical conduit, raceway, conductors and connections.

1.13 WARRANTY

A. The warranty for all provided equipment shall be not less than two years after approved and witnessed startup and receipt of approved as-built drawings and O&M Manuals, or Owner beneficial use, whichever is later. Warranty shall include all costs for repairs, parts, travel and living expenses, and labor. This warranty, provided by the Contractor, shall cover all equipment, including but not limited to: Metering Panel, MCC and integral

PLC Panel complete, wires and cables, miscellaneous control panels, motors, controls, and instrumentation (flowmeters, switches, level measuring system).

B. Contractor is responsible to reimburse Owner for all materials, labor, and indirect costs incurred by Owner to support warranty repairs.

## PART 2 PART 2 PRODUCTS

### 2.1 GENERAL

A. All equipment and materials shall be new, shall be listed by UL, and shall bear the UL label where UL requirements apply. All equipment and materials shall be the products of experienced and reputable manufacturers in the industry. Similar items in the work shall be products of the same manufacturer. All equipment and materials shall be of industrial grade standard of construction.

B. Where a NEMA enclosure type is indicated in a non-hazardous location, the Contractor shall utilize that type of enclosure, despite the fact that certain modifications such as cutouts for control devices may negate the NEMA rating.

C. All equipment shall be NEMA rated and UL listed. IEC rated equipment will not be allowed.

D. All equipment shall be rated for, and include surface protection, as applicable for marine environment.

### 2.2 MOUNTING HARDWARE

A. Miscellaneous Hardware
   1. All nuts, bolts, and washers shall be 316 stainless steel.
   2. Strut materials, including all bases, brackets, angles, etc., shall be per Table 1 above.
   3. Where contact with concrete or dissimilar metals may cause galvanic corrosion, suitable non-metallic insulators shall be utilized to prevent such corrosion. Where ends are exposed from cutting, coat ends of strut with zinc rich galvanizing compound.
   4. Anchors for attaching equipment to concrete walls, slabs, and housekeeping pads shall be 316 stainless steel chemical (epoxy) anchors unless Contract Drawing details call for cast in place anchorage. Anchor size and embedment requirements shall be per approved seismic calculations.

## 2.3 ELECTRICAL IDENTIFICATION

A. Contractor is responsible to submit list of electrical equipment with associated tag inscription and tag materials for approval by Owner and Engineer.

B. All conduits, cables, and individual wires shall be labeled. Power wiring insulation shall be color coded. All terminal blocks shall be labeled.

C. All equipment, control devices, and panels shall include nameplate with description and tag number.

## 2.4 EQUIPMENT FINISH

A. Provide equipment with manufacturers, standard finish application system with ANSI 61, light grey color, except for outdoor equipment and panels which shall be colored as specified. Some exterior equipment shall have further finish applied, refer to individual specifications.

B. Equipment finish shall be suitable for marine environment.

## 2.5 EQUIPMENT RATINGS

A. Provide equipment and devices capable of continuous operation within an ambient temperature range of 0° C to 40° C. Equipment must be capable of proper operation at rated output continuously in this ambient temperature range in direct sun.

B. Provide any additional equipment such as enclosures, sunshades, heaters, ventilation fans, removable filtered louvers, and cooling equipment, so that this performance requirement can be met.

C. Equipment to be rated for elevation installed, roughly 500’ above sea level.

# PART 3 PART 3 EXECUTION

## 3.1 GENERAL

A. Incidentals: The Contractor shall provide all materials and incidentals required for a complete and operable system, even if not required explicitly by the Specifications or the Drawings. Typical incidentals are terminal lugs not furnished with vendor supplied equipment, compression connectors for cables, splices, junction and terminal boxes, and control wiring required by vendor furnished equipment to connect with other equipment indicated in the Contract Documents.

B. Field Control of Location and Arrangement: The Drawings diagrammatically indicate the desired location and arrangement of lighting, receptacles, conduit runs, equipment, and other items. Exact locations shall be determined by the Contractor in the field based on the physical size and arrangement of equipment, finished elevations, and other obstructions.
   1. Where "home runs" are shown, the Contractor shall route the conduits in accordance with the indicated installation requirements. Routings shall be below grade unless otherwise indicated.
   2. All conduit and equipment shall be installed in such a manner as to avoid all obstructions, maximize working clearances, and keep passageways clear. Lighting pole locations shall be adjusted to avoid obstructions.
   3. No conduits shall be routed within the wall of the Pump Station. All conduits to be routed exposed on the interior, or under the slab, not through the slab.

C. Workmanship: All materials and equipment shall be installed in strict accordance with the printed recommendations of the manufacturer. Installation shall be accomplished by workers skilled in the work. Installation shall be coordinated in the field with other trades to avoid interferences.

D. Protection of Equipment and Materials: The Contractor shall fully protect all materials and equipment against damage from any cause. All materials and equipment, both in storage and during construction, shall be covered in such a manner that no finished surfaces will be damaged, marred, or splattered with water, foam, dust, dirt, plaster, or paint. All moving parts shall be kept clean and dry. The Contractor shall replace or refinish all damaged materials or equipment, including face plates of panels, at no additional expense to the Owner.

E. Cap and label all spare conduits. Include pull tape in all spare conduits and conduits designated for future equipment. Pull tape to extend through plastic threaded conduit cap, and knotted.

## 3.2 CONCRETE SLAB ON GRADE

A. Concrete slab on grade shall be provided for electrical equipment. Free-standing electrical equipment shall be anchored to housekeeping pad which are integral to slab on grade. Slab on grade shall be four inches above the surrounding grade and extend 6” from equipment sides and back of installed equipment and 48” in front. Housekeeping pads shall extend approximately 2” above slab on grade, and be 2” larger than installed equipment on all sides.

## 3.3 EQUIPMENT ANCHORING

A. Floor-supported, wall-mounted, or ceiling-hung equipment and conduits shall be anchored in place by methods that will meet project seismic requirements. Wall or stanchion mounted panels, that weigh more than 200 pounds, shall be provided with fabricated steel support pedestals.

B. Anchoring methods and leveling criteria specified in the printed recommendations of the equipment manufacturers are a part of the work of this Contract. Such recommendations shall be submitted as shop drawings.

## 3.4 EQUIPMENT IDENTIFICATION

A. General: Equipment and Devices shall be Identified as Follows:
   1. Nameplates shall be provided for all equipment and instruments. Equipment description and equipment tag number (as assigned by Contractor and/or noted on Drawings), and electrical power source shall be utilized on all nameplates. If no tag number is given, the Contractor shall assign and submit a number for approval.
   2. All conduits and cables shall be labeled. It is the Contractor's responsibility to provide conduit tag, cable tag and wire tag label inscriptions. If no tag number is given, the Contractor shall assign and submit a number for approval.
   3. The Contractor shall furnish typewritten circuit directories for panelboard; the circuit directory shall accurately reflect the load description connected to each circuit.

## 3.5 CUTTING AND PATCHING

A. Lay out work carefully in advance. Do not cut, drill, or notch any structural member or building surface without the specific approval of the Engineer. Carefully carry out any cutting, channeling, chasing, or drilling of floors, walls, partitions, ceilings, paving, or other surfaces required for the installation, support, or anchorage of conduit, raceways, or other electrical materials and equipment. Following such work, restore surfaces neatly to original condition. Use skilled craftsmen of the trades involved.

B. Where core drill through existing below grade concrete wall, provide water tight mechanical seal fitting on interior or accessible side and grout pack void on exterior or concealed side.

## 3.6 LOAD BALANCE

A. The Contract Drawings and Specifications indicate circuiting to electrical loads and distribution equipment. Balance electrical load between phases as nearly as possible on panelboard.

## 3.7 MOTOR ROTATION

A. After final service connections are made, check and correct the rotation of all motors.

B. Coordinate rotation checks with the Engineer and supplier responsible for the driven equipment for their witnessing.

## 3.8 CLEANING AND TOUCHUP PAINTING

A. Keep the premises free from an accumulation of waste material or rubbish. Upon completion of the work, remove all materials, scraps, and debris from the premises and from the interior and exterior of all devices and equipment. Touch up scratches, scrapes, or chips in interior and exterior surfaces of devices and equipment with finishes matching as nearly as possible the type, color, consistency, and surface of the original finish. If extensive damage is done to equipment paint surfaces, refinish the entire equipment in a manner that provides a finish equal to or better than the factory finish, that meets the requirements of the Specifications, and that is acceptable to the Engineer.

B. The interior of all electrical equipment and panels and enclosures, including windings of dry type transformers, shall be vacuumed and wiped free of dust just before final acceptance. Shutting off equipment to clean and wipe down shall be done at times as approved by the Engineer.

C. Wipe down exterior of all conduits and lighting fixtures and poles.

## 3.9 INSPECTION

A. Allow materials, equipment, and workmanship to be inspected at any time by the Engineer and Owner or their representatives.

B. Correct the work, materials, or equipment not in accordance with these Contract Documents or found to be deficient or defective in a manner satisfactory to the Engineer.

## 3.10 OPERATION AND MAINTENANCE MANUALS

A. Provide Operation and Maintenance Manuals in hard cover, 3-ring binders, separately bound volumes, number as required to accommodate material 8½-inch x 11-inch for text and 11-inch x 17-inch half-sized drawings and also in accordance with provisions of specifications. Provide the number of copies specified. Electrical and Instrumentation O&Ms shall include the following as a minimum:
   1. Operation, maintenance, recommended spare parts, and renewal parts information for all equipment furnished under this Section.

2. Provide separate O&M Manual for each specification section.
3. Set of complete, final, as-reviewed and accepted manufacturers or vendors descriptive information.
4. As-built electric schematics, equipment, elevations, layouts, and installation drawings showing equipment as it was actually installed and connected. Provide PDF and AutoCAD formats on portable USB drive within O&Ms.
5. Index of all equipment suppliers with a list of current names, addresses, and telephone numbers of those who should be contacted for service, information, and assistance.
6. All factory and field test results.
7. Instrument calibration ISA data sheets.
8. Information listed under individual specification submittal requirements.
9. Complete facility Interconnection Diagrams for all equipment except lighting and receptacles. Show field wiring from equipment origin numbered terminal to destination numbered terminal in block diagram format. Include wire labels, cable labels, conduit numbers, handholes, junction boxes, etc.
10. Use only clean, legible material.
11. Submit material to the Engineer for review prior to delivery of the final Operation and Maintenance Manuals to the Owner. O&M Manuals to be approved prior to start of Demonstration Period and 30 days prior to training. Make additions or changes required by the reviewer.
12. Electronic versions of programming files for PLCs, and OITs.
13. Completed O&M Manual Review Checklist form. Checklist attached.
14. O&M Manuals shall be approved and supplied before training can begin. Include training materials within O&M Manual.

## 3.11 RECORD DRAWINGS

A. Provide number sets of full-sized marked-up as-built Contract Drawings in accordance with specifications. Show all departures from original Drawings, underground cable, conduit, or duct runs dimensioned from established building lines, and all electrical work revisions. As-built drawings shall be initialed by the Engineer prior to submission for drafting. Obtain new, clean sets of Contract Drawings for as-built production after each as-built submittal. Contractor shall pay all costs for as-built drawing reproduction.

## 3.12 SERVICE CONTINUITY, START-UP AND SHUTDOWNS

A. Make no outages without the prior written authorization of the Owner and Engineer. Include all costs for temporary wiring and overtime work required in the contract price. Remove all temporary wiring at the completion of the work.

B. Shutdowns, tie-ins, and startups shall be scheduled two weeks in advance, upon approval from the Owner and the Engineer. Schedule of shutdowns and startups shall

be limited between Tuesday and Thursday from 9:00 a.m. to 3:00 p.m., unless prior approval has been given from the Owner and the Engineer.

## 3.13 TESTING

A. Contractor shall submit testing procedures for Engineer and Owner review a minimum of two weeks prior to testing.

B. A representative from the Engineer or Owner must be present for all testing. Any unwitnessed testing is not valid. Contractor shall provide a minimum of three working days notification for testing.

C. Any remedial action due to testing failure and re-testing shall be at the Contractor's expense.

D. A manufacturer's representative shall be present for all equipment initial start-up and field testing.

E. All testing shall be witnessed by the Engineer and/or Owner. All testing sheets shall be signed off by the Engineer and/or Owner to be considered valid. Refer to Specifications for further testing requirements.

F. Contractor shall perform miscellaneous electrical testing and provide results to third party NETA testing organization for evaluation and inclusion in testing submittal.
   1. Miscellaneous Testing to Include:
      a. Cable megger
      b. Wiring Devices: Demonstrate that circuits are powered by named breaker per Panelboard schedule and drawings.
      c. VFDs shall be tested by MCC supplier, not part of NETA testing organization scope.

G. Pre-Demonstration period for electrical work shall include Factory Acceptance Testing, Manufacturer certification, Instrumentation Supplier certification, NETA Field Testing, equipment start-up, instrumentation simulation, PLC and OIT programming and operation, approval of electrical and instrumentation O&M Manuals, and electrical and instrumentation training. Perform Pre-Demonstration Testing prior to start up testing and Demonstration period.

H. Demonstration period for electrical work shall include 7-day functional testing of facilities, and Contractor field instructions.

## 3.14 O&M MANUAL REVIEW CHECKLIST

A. Contractor and Manufacturer's Representative to complete one Checklist form per manufacturer equipment O&M submittal. Checklist form provided on following pages.

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# SECTION 26 05 19– WIRES AND CABLES

## PART 1 GENERAL

### 1.1 SECTION INCLUDES

A. The Contractor shall provide wires and cables, complete and operable, in accordance with the Contract Documents.

B. The requirements of Section 260500 – Electrical Work, General apply to this Section.

C. Single Manufacturer: Like products shall be the end product of one manufacturer in order to achieve standardization of appearance, operation, maintenance, spare parts and manufacturer's services.

### 1.2 REFERENCE SPECIFICATION, CODES, AND STANDARDS

A. Reference Codes: All work specified herein shall conform to or exceed the applicable requirements of the National Electrical Code (NEC); provided that, where a local code or ordinance is in conflict with the NEC, the provisions of said local code or ordinance shall take precedence. For additional requirements, see Section 260500 – Electrical Work, General.

B. Commercials Standards
   1. ANSI/IEEE C2 National Electrical Safety Code.
   2. ANSI/NFPA 70 National Electrical Code.
   3. ICEA S-95-658 Insulated Cable Engineers Association
   4. NEMA WC70 National Electrical Manufacturers Association

### 1.3 CONTRACTOR SUBMITTALS

A. General: The Contractor shall submit Shop Drawings in accordance with Specifications and Section 260500 – Electrical Work, General.

B. Shop Drawings
   1. Product Data: Provide complete catalog cuts of all cables, wires, terminations, splices, fittings, identification systems, and tape. This applies to vendor-supplied cables, down level transducer, and remote flow meter.
   2. Test Reports: Indicate results of the cable megger tests for all 600 VAC rated cables.

C. Tags and Labels: Contractor to submit overall cable tag and individual conductor labels. Submit tag materials and label materials.

D. Contractor shall provide as-built cable lengths for all 480 VAC power conductors on Conduit and Cable Schedule as-built drawings. Same information shall be used for Final and Record sets of Protective Device Studies.

1.4 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the products specified in this Section and with a minimum of 15 years of documented experience.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect, and handle products to site under provisions of Section 260500 – Electrical Work, General.

B. Accept cable and accessories on site in manufacturer’s packaging. Inspect for damage.

C. Store and protect in accordance with manufacturer’s instructions.

D. Protect from weather. Provide adequate ventilation to prevent condensation.

PART 2 PART 2 PRODUCTS

2.1 GENERAL

A. All conductors, including grounding conductors, shall be stranded copper. Aluminum conductor wire and cable will not be permitted. Insulation shall bear the UL label and the manufacturer's trademark, and shall identify the type, voltage, and conductor size. All conductors (except flexible cords and cables, fixture wires, and conductors that form an integral part of equipment) shall conform to the requirements of Article 310 of the National Electric Code, latest edition, for current carrying capacity. Flexible cords and cables shall conform to Article 400, and fixture wires shall conform to Article 402. The use of the manufacturer’s name and model or catalog number is for the purpose of establishing the standard of quality and general configuration desired.

B. Provide and install utility primary and secondary cables as shown on Utility Drawings in Appendices. Cables shall be per drawings and PG&E standards.

2.2 LOW VOLTAGE WIRES AND CABLES

A. Power, Lighting, Control, and Equipment Grounding Conductors - Single Conductors:
   1. All power and lighting conductors shall be rated 600 volts, Class B stranded copper, UL-listed, with XHHW-2 insulation rated for 90°C in wet or dry locations. Insulation colors shall be per Contract Documents, and as stated on approved Interconnect

Drawings. Only conductors #4 AWG and larger may be identified with colored phase taped over black insulation. Conductors #6 AWG and smaller shall have insulation colors based on table within this Section.

2. All equipment grounding conductors shall be rated 600 volts, Class B stranded copper, UL-listed, with XHHW-2 insulation rated for 90°C in wet or dry locations, and colored green.
3. Acceptable products include: Okonite X-Olene Type XHHW-2 90 degrees C wet, or approved equal.

B. Instrumentation Cables – Single Pair Cables (Type TC):
1. Instrumentation cable shall be rated at 600 volts, 90°C wet or dry locations. Individual conductors shall be No. 16 AWG stranded copper. Insulation shall be color-coded polyethylene, black and white. Instrumentation cables shall be composed of the individual conductors, an aluminum polyester foil tape with 100-percent coverage, stranded tinned copper drain wire, and a PVC outer jacket with a thickness of 0.045 inches. Cable shall meet UL 1277 standards.
2. Acceptable products include: Okonite Okoseal-N Type P-OS Type TC Instrumentation Cable, or approved equal.

C. VFD Cable
1. Provide multiconductor VFD Cable to connect VFD load side terminals to motor leads. VFD Cable shall be rated 1000 volts, multiconductor with three power conductors and three symmetrical ground wires. Conductors shall be stranded copper, Class B, ASTM B-3 and B-8. Insulation on each conductor shall be NEC Type XHHW-2, 90° C dry, 75° C wet, with overall XLPE jacket, Type TC. Cable shall be per UL-1277, with color coding. Cable shall include copper braid shield and foil shield.
2. Acceptable products include: Lutze Driveflex A220, or approved equal.

## 2.3 GROUNDING ELECTRODE CONDUCTORS

A. Provide bare concentric stranded copper conductors conforming to ASTM B-8, size as indicated on the drawings, or minimum size as specified in Section 260526 – Grounding, for the grounding electrode conductor system. Solid conductors are not acceptable.

B. Acceptable Products: Southwire Bare Copper Wire, or approved equal.

## 2.4 ANTENNA CABLE AND CONNECTORS

A. Antenna cable shall be 1/2" coaxial. Provide all antenna cable connectors and weatherproof splice kit, and miscellaneous hardware for complete and operable radio system, including antenna mounts and antenna mast weatherhead.

B. Acceptable Products: Antenna cable by Andrew 1/2-inch Heliax Model LDF4-50A, or approved equal. Connectors and weatherproof splice kit by Andrew, or approved equal.

2.5 600V CABLE TERMINATIONS

A. Compression connectors shall be Burndy "Hi Lug", Thomas & Betts "Sta-Kon,", or approved equal. Threaded connectors shall be split bolt type of high strength copper alloy.

B. Pump motor cable to field cables shall be spliced together with Polaris ITG Series connectors. Tape wrap over connectors with Scotch Super 33+ rubber insulation type, or approved equal, for three full wraps.

C. Pressure type, twist-on connectors are only acceptable for light and receptacle circuits and pump motor control circuits. Connectors shall be waterproof type, UL-486D listed, silicon based, Ideal Model #60, or approved equal. Tape wrap over connector with Scotch Super 33+ rubber insulation type, or approved equal, for three full wraps.

D. General purpose insulating tape shall be Scotch No. 33, Plymouth "Slip-knot", or approved equal. High temperature tape shall be polyvinyl as manufactured by Plymouth, 3M, or approved equal.

2.6 CONDUCTOR LABELS AND CABLE TAGS

A. Tags relying on adhesives or taped-on markers are not acceptable.

B. Conductor labels for individual wires, installed at each termination point shall be white heat-shrink with thermal transfer printing, 3-to-1 shrink ratio, two inches long, and meet UL 224. Inscription shall be per approved Interconnect Diagrams, based on origin/destination format. Acceptable products include: Raychem Tyco Shrink Mark Heat Shrinkable Sleeves, or approved equal.

C. Cable tags, for each feeder circuit, branch circuit, manufacturer cable, multiconductor cable, etc. shall be installed at each end and at every handhole. Cable tags shall be engraved 2” diameter phenolic, red with 1/2-inch white lettering, and attached with black nylon cable tie, Ty-Rap, or approved equal. Inscription shall be per approved Interconnect Diagrams, based on Contract Drawing Conduit and Cable Schedule.

2.7 ELECTRICAL TAPE FOR COLOR PHASE CODING

A. Electrical tape shall be premium grade, not less than seven mils thick, rated for 90°C minimum, flame-retardant, weather resistant, and available in suitable colors for color coding. The tape shall be resistant to abrasion, ultraviolet rays, moisture, alkalies, solvents, acids, and suitable for indoor and weather-protected outdoor use. The tape

shall be suitable for use with PVC and polyethylene jacketed cables, and meet or exceed the requirements of UL 510. Phase color coding tape may only be used on conductors #4 AWG and larger, otherwise wire insulation shall be colored. Provide minimum 3" length of phase tape wraps.

B. Acceptable products include: 3M Scotch No. 35 Scotch Vinyl Electrical Tape for Color Coding, or approved equal.

PART 3 PART 3 EXECUTION

3.1 GENERAL

A. The Contractor shall provide and terminate all power, control, and instrumentation conductors, except where indicated.

B. Power and equipment field installed conductors shall have the following insulation colors:

| **System** | **Conductor** | **Insulation Color** |
|---|---|---|
| All Systems | Equipment Grounding Conductor | Green |
| | Grounding Electrode Conductor | Bare Copper |
| 120/240 VAC, Single Phase, Three Wire | Phase A | Black |
| | Phase B | Red |
| | Neutral | White |
| 277/480 VAC, Three Phase, Four Wire | Phase A | Brown |
| | Phase B | Orange |
| | Phase C | Yellow |
| | Neutral | White |

C. Control and Signal field installed conductors shall have the following insulation colors:

| **Service** | **Color** |
|---|---|
| AC Control Power (L) | Black |
| AC Control Neutral (N) | White |

| | |
|---|---|
| AC Controls | Red |
| Foreign Voltage | Yellow |
| DC 24VDC Positive | Blue |
| DC 24VDC Common | Blue with White Stripe |
| DC Controls | Blue |
| DC Digital Inputs | Blue |
| DC Digital Outputs | Blue |
| Shielded Pair (+/-) | (Black/White) |
| Intrinsically Safe Wiring | Lt. Blue |
| Equipment Grounding Conductor | Green |

3.2 INSTALLATION

A. No conductors shall be installed until Interconnect Diagrams have been submitted and approved, and conduits have been completed, mandrel tested, rag swabbed, and labeled.

B. If mechanical means are used to pull cable, the pulling tension shall be monitored, recorded and submitted to the Engineer.

C. Tighten terminal bolts using torque type wrenches and/or drivers to tighten to the inch-pound requirements of the NEC and UL.

D. Instrumentation wire shall not be run in the same raceway with power and control wiring except where specifically indicated.

E. Wire in panels, cabinets, and wireways shall be neatly grouped using nylon tie straps, and shall be fanned out to terminals.

F. Install bare ground conductor 36-inches below finished grade. Reference Section 260526 – Grounding, for further requirements.

3.3 SPLICES AND TERMINATIONS

A. General:
   1. There shall be no cable splices without the approval of the Engineer, except for site lighting circuits, or as noted on Drawings.
   2. Stranded conductors shall be terminated directly on connectors or terminals, making sure that all conductor strands are confined within the lug. Use forked-tongue lugs where equipment box lugs have not been provided.

3. Excess control and instrumentation conductors shall be terminated as spares.

B. Pump Motor Connectors
   1. Pump motor cable connections to field installed conductors shall be made within the motor terminal box, with connectors suitable for VFD cable type (fine stranding dependent).

C. Control Wire and Cable:
   1. Control conductors shall be terminated only at the locations indicated and only on terminal strips or terminal lugs of vendor furnished equipment.
   2. All control wire and spare wire shall be terminated to terminal strips in junction boxes, motor control centers, enclosures and control panels.

D. Shielded instrumentation cables shall be grounded at one end only, at the PLC Panel.

## 3.4 CONDUCTORS AND CABLES IDENTIFICATION

A. All cables and conductors shall be identified. All conductors shall have wire labels at each termination point. Labels shall be permanent, waterproof, legible, and heat shrink applied. All cables shall be identified by a round phenolic cable tag at each end and at every handhole, junction boxes, terminal boxes, panels, pullboxes, etc.

B. Conductor labels and cable tags shall be per submitted and approved Interconnect Diagrams.

C. Conductors and cables shall be labeled and tagged prior to beginning Field Testing.

## 3.5 GROUPING OF WIRES AND CABLES

A. All wires and cables shall be neatly grouped in pull boxes, junction boxes, terminal boxes, and handholes. Wires and cables shall be grouped so that the wires of the individual circuits are together and tagged with the cable number.

B. Cables passing through handholes shall be looped at least once along every wall. Loops shall be organized, trained, and neatly installed.

C. Single conductors and cables in handholes and other indicated locations shall be bundled with nylon cable ties placed at intervals not exceeding 18 inches on centers.

## 3.6 FIELD TESTING

A. Cable Testing:
   1. Cables – shall be tested by Contractor after pulling and prior to termination:

a. Power and Control Conductor Test – After installation provide megger testing at 1000V for conductor to conductor, and conductor to ground. Test all field installed cables #12 AWG and larger.
b. Provide cable testing per these specifications and the latest NETA standards.

2. All field testing shall be done after cables are installed in the raceways, labeled and tagged, and prior to energizing or terminating. Disconnect equipment that might be damaged by this test.
3. Cable field testing shall be witnessed and signed off by the Engineer. Cable field testing results shall be submitted to the Engineer for review and acceptance.
4. Provide cable testing results to third party NETA testing agency for review and final approval of cables. Refer to Section 260800 – Electrical Testing.

END OF SECTION

# SECTION 26 05 26 – GROUNDING

## PART 1 GENERAL

### 1.1 SECTION INCLUDES

A. The Contractor shall provide the electrical grounding system, complete and operable, in accordance with the Contract Documents.

B. The requirements of Section 260500 – Electrical Work, General apply to this Section.

C. Single Manufacturer: Like products shall be the end product of one manufacturer in order to achieve standardization of appearance, operation, maintenance, spare parts and manufacturer's services.

D. The grounding system is intended to provide a low resistance path to earth ground. Acceptable ground system resistance is 5 ohms or less.

E. Coordinate, provide and install grounding system at the Metering Panel. Provide utility grounding and bonding systems per PG&E Greenbook requirements.

F. Provide grounding to magmeter flow tubes by connecting grounding electrode conductor to ground rings and bonding to magmeter body, and also grounding of pressure transmitters, per Contract Drawings and manufacturer requirements.

G. Bond transformer neutrals to grounding electrode conductor directly, as well as provide supply side bonding jumper between neutral and transformer equipment ground.

### 1.2 CONTRACTOR SUBMITTALS

A. General: The Contractor shall submit Shop Drawings in accordance with Specifications and Section 260500 – Electrical Work, General.

B. Shop Drawings: Manufacturer's product information for connections, clamps, and grounding system components, showing compliance with the requirements of this Section.

## PART 2 PART 2 PRODUCTS

### 2.1 GENERAL

A. All components of the grounding electrode system shall be manufactured in accordance with American National Standards Institute (ANSI)/UL 467 – Standard for Safety

Grounding and Bonding Equipment, and shall conform to the applicable requirements of National Electrical Code (NEC) Article 250 and local codes. The minimum size shall be as outlined in National Electrical Code.

B. There shall be an equipment grounding conductor in each raceway, even if not called for on Contract Drawing Conduit and Cable Schedule, except conduits with manufacturer power cables.

2.2 GROUNDING ELECTRODE SYSTEM

A. Grounding electrode conductors shall be bare annealed stranded copper conductors suitable for direct burial. Conductors shall be #4/0, unless indicated otherwise. Refer to Section 260519 – Wires and Cables, for grounding electrode conductor specifications.

B. Ground rods shall be copper-clad steel, 3/4-inch diameter and 10 feet long conforming to UL 467. Electrolyte copper 10 mils thick shall be mechanically bonded to the rigid steel core. Ground rod to grounding electrode conductor connections shall be exothermic weld, or irreversible compression connection.

C. Exothermic connections shall consist of a molecular weld utilizing the reaction of copper oxide and aluminum powder in a semi-permanent graphite mold. Exothermic connectors shall be as manufactured by Erico Products Cadweld, Thermoweld, or approved equal.

D. Irreversible compression connectors shall be Burndy HYGROUND, or approved equal.

2.3 GROUND ROD BOXES

A. Boxes shall be precast, high density, reinforced concrete, traffic rated, measuring a 10-inch interior diameter at the top and 12 inches deep. Covers shall be cast iron, and include special marking: “GROUND”.

B. Boxes and covers shall be manufactured by Christy Concrete G03, or approved equal.

PART 3 PART 3 EXECUTION

3.1 GROUNDING

A. General: When sizes are not specifically indicated on the Contract Drawings, grounding cable shall be sized by the Contractor in accordance with all applicable code requirements. The location of ground rods shall be as indicated. The lengths of rods forming an individual ground array shall be equal and shall be of the quantity required to obtain a ground resistance of no more than five ohms. Measured resistance may be

required to be less than five ohms where specific code or utility requirements apply. The grounding system shall be in strict accordance with Article 250 of the NEC.

B. Install grounding systems for electrical utility service per latest PG&E Greenbook.

C. Equipment Grounding System: Ground continuity throughout the facility shall be maintained by means of equipment grounding conductor run in all conduits. Equipment grounding conductors which are run in conduit shall be insulated copper conductors, sized in accordance with the NEC, or the Contract Drawings, whichever is larger. Equipment grounding conductors shall meet the specification requirements of Section 260519 – Wires and Cables.
   1. Make connections of any equipment grounding conductors to motors 10 hp and above, or circuits 20 amps or above, by a solderless terminal and a 5/16-inch minimum bolt tapped to the motor frame or equipment housing. Ground connections to smaller motors or equipment may be made by fastening the terminal to a connection box.
   2. Connect junction boxes and wiring device boxes to the equipment grounding system with a 3/8-inch machine screw.
   3. Insulated throat grounding fittings shall be employed for all equipment grounding connections. Route equipment grounding conductor through insulated throat grounding fitting, or bond fitting to equipment ground bus with same size jumper.
   4. Completely remove all paint, dirt, or other surface coverings at equipment grounding conductor connection point, if no ground bus provided, so that good metal-to-metal contact is made.
   5. Bond doors of MCC, PLC Panel, and panels, to equipment ground bus, with #12 AWG equipment grounding conductor. Attach with mechanical means.

D. Grounding Electrode System: The Contractor shall install the grounding electrode conductor system, with all required components in strict accordance with National Electrical Code Article 250 and the Contract Drawings.
   1. Connections to grounding electrodes conductors shall be exothermic or irreversible compression type where concealed or below grade, and shall be bolted mechanical lug type connector where exposed and above grade or within ground well. Bolted connectors shall be assembled wrench tight to manufacturer's requirements.
   2. Grounding electrode conductors that make up the ground grid, shall have a minimum buried depth of 36 inches below finished grade.
   3. Provide ufer ground within concrete slabs on grade, even if not shown on Contract Drawings. Provide minimum of twenty feet of #2 AWG grounding electrode conductor within middle third of slab. Connect both ends to MCC ground bus.
   4. Bond all exposed structural members, fences, antenna masts, and metallic enclosures of electrical equipment to ground grid, even if not shown on Contract Drawings. This including fences and gates (two places with #2 AWG grounding

electrode conductor). Provide such connections even if not shown on Contract Drawings. Connections to fences and gates shall be mechanical type.

5. Unless otherwise indicated on the Contract Drawings, the ground connections from the grounding electrode system to the equipment shall be the following: No. 4/0 AWG for equipment rated 480 Volts; No. 2 AWG for equipment rated 240 volts and to fencing and gates; and No. 6 for 120-volt equipment and instrumentation.
6. Route all exposed (above ground) grounding electrode conductors within galvanized rigid steel conduit sleeve, from 24" below grade. Include threaded conduit bushing at exposed conduit end.
7. Main bonding jumper and system bonding jumpers shall be sized as shown and, if not shown, shall be sized per the requirements of National Electrical Code Article 250.
8. Bond neutral at Metering Panel, and dry type transformer neutral in MCC, to equipment ground bus, and also bond neutral directly to the grounding electrode conductor that is routed from the ground grid. Each neutral to have two grounding electrode conductor connections, one to ground bus and one to ground grid.
9. In ground rod boxes, install ground rods with end minimum six inches above drain rock, with connection of grounding electrode conductor fully visible and accessible from top.

E. Shield Grounding
   1. Shielded instrumentation cable shall be grounded at one end only; at the PLC Panel or receiving end of the signal.
   2. Termination of each shield drain wire shall be on its own terminal screw. All of these terminal screws in one rack shall be jumpered with No. 16 solid tinned bare copper wire. The connection to the ground shall be accomplished with a No. 12 green insulated conductor to the panel ground bus.

F. Provide UFER ground at each light pole and antenna mast base. UFER ground to be #4 AWG bare copper grounding electrode conductor, minimum 20' long, coiled and cast as part of concrete base. Connect #4 AWG grounding electrode conductor to ground lug within pole.

3.2 FIELD TESTS

A. All grounding systems shall be installed complete prior to field testing.

B. All field tests to be witnessed and signed off by the Engineer.

C. In the Engineer's presence, test the ground resistance of the grounding system using the Institute of Electrical and Electronics Engineers (IEEE) "Fall of Potential Method." Test grounds at Metering Panel ground bus, MCC ground bus and Pump No. 2 motor casing. Total of three ground tests.

D. Test all ground fault interrupter (GFCI) receptacles and/or GFCI circuit breakers for proper connection and operation with methods and instruments prescribed by the manufacturer.

E. Provide copies of reports of all grounding system tests for inclusion in Operation and Maintenance Manuals and for review by the Engineer.

F. Refer to Specification 260800 – Electrical Testing for further testing requirements.

G. Grounding tests shall be completed and approved prior to energizing electrical equipment.

END OF SECTION

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# SECTION 26 05 33 – ELECTRICAL RACEWAY SYSTEMS

## PART 1 GENERAL

### 1.1 SECTION INCLUDES

A. The Contractor shall provide electrical raceway systems, complete and in place, in accordance with the Contract Documents.

B. The requirements of Section 260500 – Electrical Work, General apply to this Section.

C. The Contractor shall provide electrical raceway systems sized for submitted and approved cables, including vendor supplied cables, based on the National Electrical Code or as shown on Contract Drawings, whichever is larger.

### 1.2 CONTRACTOR SUBMITTALS

A. General: The Contractor shall submit Shop Drawings in accordance with Specifications and Section 260500 – Electrical Work, General.

B. Shop Drawings: Complete catalog cuts of all raceways, fittings, boxes, supports, and mounting hardware, marked where applicable to show proposed materials and finishes.

C. Conduit Tags: Submit tag materials, and listing of inscriptions, for approval.

D. Submit dimensioned Installation Detail of conduit crossing at spillway.

### 1.3 QUALITY ASSURANCE

A. Seismic Design Requirements: All raceway systems to be furnished under this Section shall be designed and constructed to meet the seismic requirements of these Specifications.

## PART 2 PART 2 PRODUCTS

### 2.1 GENERAL

A. Pull and junction boxes, fittings, and other indicated enclosures which are dedicated to the raceway system, shall comply with the requirements of this Section.

B. Set screw type couplings, bushings, elbows, nipples and other fittings are not allowed.

C. No conduit shall be smaller than 3/4-inch. All underground conduits shall be a minimum of 1-inch.

D. Conduits containing manufacturer cables shall be sized based on approved manufacturer cable at minimum 40-percent fill, unless approved by the Engineer.

E. No conduits shall be routed within the wall of the Pump Station. All conduits to be routed exposed on the interior, or under the slab, not through the slab.

## 2.2 CONDUITS

A. Rigid Galvanized Steel (RGS) Conduit
   1. Rigid steel conduit shall be mild steel, hot-dip galvanized inside and out.
   2. Rigid steel conduit and all appurtenances shall be manufactured in accordance with ANSI C80.1 – Rigid Steel Conduit, Zinc Coated, and UL-6.
   3. Manufacturers, or approved equal:
      a. Allied Conduit
      b. Western Tube and Conduit

B. Rigid Non-Metallic (PVC) Conduit
   1. Rigid non-metallic conduit shall be Schedule 40 PVC, sunlight resistant, UL listed for concrete encasement. Conduit shall have factory-formed bell on one end.
   2. Rigid PVC conduit shall be manufactured in accordance with NEMA TC-2 – Electrical Plastic Tubing and Conduit, and UL-651 – Standard for Rigid Non-metallic Conduit standards.
   3. Conduit shall be marked for use with conductors having 90° C insulation.
   4. Manufacturers, or approved equal:
      a. Carlon Plus Rigid PVC
      b. PW Pipe

C. Rigid PVC Coated Galvanized Steel (PVC RGS) Conduit
   1. The conduit, prior to PVC coating, shall meet the requirements for RGS conduit above.
   2. A PVC coating shall be bonded to the outer surface of the galvanized conduit. The bond between the coating and the conduit surface shall be greater than the tensile strength of the coating.
   3. PVC coating thickness shall be not less than 40 mils. Interior coating shall be minimum 2 mil urethane. All male threads on conduit, elbows and nipples shall be protected by urethane coating.
   4. PVC RGS shall be manufactured in accordance with the following standards:
      a. UL-6
      b. ANSI C80.1

c. NEMA RN1 – PVC Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit
d. Federal Specification WW-C-581E.

5. Conduits shall be suitable for conductors with 75° C insulation.
6. Manufacturers:
   a. Robroy Plasti-Bond Red
   b. T&B OCAL-Blue Double-Coat
   c. Perma-Cote Industries Supreme Conduit

D. Liquidtight Flexible Metal Conduit
1. Liquidtight flexible metal conduit shall be constructed of a flexible galvanized metal core with a sunlight resistant thermoplastic outer jacket.
2. Liquidtight flexible metal conduit shall be manufactured in accordance with UL-360 - Steel Conduits, Liquid-Tight Flexible.
3. Conduits shall have insulated throat and stainless steel sealing O-ring.
4. Manufacturers, or approved equal:
   a. Anaconda, "Sealtite" Type UA
   b. Electriflex, "Liquatite" Type LA

E. Electrical Metallic Tubing and Intermediate Metallic Conduit, and associated type fittings and connectors, will not be accepted.

F. Provide conduit or riser for secondary electrical service as required by PG&E. Refer to PG&E Greenbook for requirements.

2.3 FITTINGS AND CONDUIT BODIES

A. General
1. All cast and malleable iron fittings for use with metallic conduit shall be the threaded type with five full threads.
2. All fittings and conduit bodies shall have neoprene gaskets and non-magnetic stainless steel screws. All covers shall be attached by means of holes tapped into the body of the fitting. Covers for fittings attached by means of clips or clamps will not be allowed.
3. Conduit, fittings, and conduit bodies in hazardous locations shall be suitable for the Class and Division indicated.
4. Provide Form 8 conduit bodies only. Form 7 conduit bodies are not acceptable.

B. Fittings and Conduit Bodies for Rigid Galvanized Steel Conduit
1. Use insulated throat grounding bushings for all rigid steel conduit ends. Bushings shall be threaded zinc-plated malleable iron grounding bushings with bonding screw and insulated throat rated for 150 degrees C. Acceptable products include: Thomas

& Betts Grounding and Bonding Bushings, OZ Gedney Type BLG, Appleton Threaded Grounding Bushings, or approved equal.

2. Watertight hubs for rigid steel conduit shall be male thread type zinc-plated malleable iron with recessed “O” ring sea, insulated throat and ground bonding locknut. Acceptable products: OZ Gedney Type CHM-T, Myers STG series, or approved equal.
3. For conduits bodies for rigid steel conduit sized as required by the NEC, use cast iron conduit bodies and covers with captive stainless steel screws and neoprene gaskets. Acceptable products include: Crouse-Hinds Form 8 threaded condulets, OZ Gedney Form 8 threaded conduit bodies, or approved equal.

C. Fittings for Liquidtight Flexible Metal Conduit
   1. Liquidtight flexible metal conduit fittings shall have cadmium-plated malleable iron body and gland nut with cast-in lug, brass grounding ferrule threaded to engage conduit spiral and o-ring seals around the conduit and box connection and insulated throat. Straight, 45 degree and 90 degree fittings shall be used where applicable.

D. Fittings for PVC Schedule 40 Conduits
   1. All fittings for use with rigid non-metallic conduit shall be PVC, solvent welded type.
   2. Provide all welding solvent as required for installation of non-metallic conduit and fittings.
   3. Manufacturers, or approved equal:
      a. Carlon
      b. Crouse-Hinds

E. Fittings and Conduit Bodies for PVC Coated Rigid Steel Conduit
   1. Use insulated throat grounding bushings for PVC Coated Rigid Steel conduit. Provide threaded zinc-plated malleable iron grounding bushings with bonding screw and insulated throat rated for 150° C. Acceptable products include: Thomas & Betts Grounding and Bonding Bushings, OZ Gedney Type BLG, Appleton Threaded Grounding Bushings, or approved equal.
   2. Watertight and corrosion resistant hubs for PVC Coated Rigid Steel conduit shall have a minimum 40 mil PVC exterior coating, a urethane interior coating, and pressure sealing sleeves. Acceptable products include: Robroy Plasti-Bond Red Type ST Hub, Perma-Cote Industries Supreme Type ST Hub, T&B OCAL-Blue Double-Coat Type ST Hub, or approved equal.
   3. For conduit bodies for use with PVC Coated Rigid Steel conduit, sized as required by the NEC, use cast iron conduit bodies and covers with captive stainless steel screws, a 40 mil minimum PVC exterior coating and nominal 2 mil internal urethane coating, and pressure sealing sleeves on all conduit openings. Acceptable products include: Robroy Plasti-Bond Red Form 8 Conduit Bodies, T&B OCAL-Blue Double-Coat Form 8

Conduit Bodies, Perma-Cote Industries Supreme Form 8 Conduit Bodies, or approved equal.

2.4 JUNCTION AND PULL BOXES

A. Junction and pull boxes shall be provided by the Contractor as required to make the installation in accordance with NEC. Size junction and pull boxes in accordance with the NEC for the number of conductors enclosed in the box.

B. Where outlet boxes are used as junction or pull boxes, use materials as specified in Section 262726 – Wiring Devices.

C. Where boxes larger than outlet or device boxes are required for junction of pull boxes, provide the following:
   1. Furnish 14-gauge or 16-gauge 316 stainless steel enclosures with continuously welded seams, continuous door hinge, external fast operating clamp cover, external mounting feet, oil-resistant gasket and adhesive. NEMA rating per Section 260500 – Electrical Work, General. Acceptable products include: Hoffman Bulletin A51S Boxes, or approved equal.

2.5 CONDUIT TAGS

A. Provide permanent, 316 stainless steel, 2-inch diameter conduit tags with conduit number laser engraved onto the tag. Conduit tag letters and numbers shall be 1/2-inch minimum.

B. Conduit tags in underground installations, including within handholes, shall be 2” diameter black phenolic tags, with 1/2-inch lettering engraved to white core.

2.6 SUPPORTS AND FITTINGS

A. Strut and mounting hardware shall be per Table 1 in Section 260500 – Electrical Work, General.

B. Strut and mounting hardware shall be sized to meet seismic requirements.

C. 316 stainless steel strut and mounting hardware; all supports and fittings shall be of same material as conduit, including pipe straps, clamp back spacers, beam clamps, and other supports and fittings. For example, if conduits are PVC coated galvanized rigid steel, all conduit clamp back spacers shall be PVC coated galvanized rigid steel. Bolts and hardware shall be stainless steel.

D. Acceptable products include: Unistrut, B-Line, Power Strut, or approved equal.

## 2.7 CONDUIT PENETRATION SEALS AND SLEEVES

A. Conduit penetration seals shall be a modular, mechanical type, consisting of interlocking synthetic rubber links shaped to continuously fill the annular space between the conduit and the opening. The elastomeric element shall be sized and selected per the manufacturer's recommendations and shall be suitable for use in standard service applications.

B. Sleeves shall be the thermoplastic type with water stops, suitable for poured wall construction.

C. Conduit penetration seals and sleeves shall be complete assemblies supplied by a single manufacturer.

D. Acceptable products include: Thunderline Corporation Link-Seal and Plastic Sleeves, Calpico Inc. Pipe Linx and Plastic Sleeves, or approved equal.

## 2.8 DUCT SEAL

A. Duct seal shall be a non-hardening compound designed as a waterstop and moisture barrier for sealing the annular space between conduit and electrical conductors and cables.

B. Acceptable products include: O-Z Gedney DUX, or approved equal.

## 2.9 PULL TAPE

A. Pull tape shall be 1/2-inch in width, suitable for 1,250 pounds of pull strength.

B. Acceptable products include: Neptco Muletape WP1250P, or approved equal.

# PART 3 PART 3 EXECUTION

## 3.1 GENERAL

A. Raceway systems shall be electrically and mechanically complete before conductors are installed. Bends and offsets shall be smooth and symmetrical, and shall be accomplished with tools designed for this purpose. Factory elbows shall be utilized wherever possible.

B. Raceway sizes shown on Drawings are minimum dimensions based on designed equipment. Contractor to provide conduits as shown or larger based on submitted and approved equipment; at no extra cost to the Owner.

C. No conduits shall be routed within slab on grade. Conduits shall be routed under the slab and footing and stubbed through the slab.

D. Underground conduits shall be installed per Section 260543 – Underground Raceway Systems.

E. Where raceways are indicated but routing is not shown, such as home runs or on conduit schedules; raceway routing shall be the Contractor's choice and in strict accordance with the NEC.

F. Routings shall be adjusted to avoid obstructions. Coordinate with all other trades prior to installation of raceways. Lack of such coordination shall not be justification for extra compensation, and removal and re-installation to resolve conflicts shall be at no extra cost to the Owner.

G. Wherever contact with concrete or dissimilar metals can produce galvanic corrosion of equipment, suitable insulating means shall be provided to prevent such corrosion.

H. Provide all necessary sleeves and chases required where conduits pass through poured walls; otherwise provide mechanical seals on the interior and grout pack the exterior to seal all openings and finish to match adjacent surfaces.

I. Provide all raceways as required by PG&E for electrical service, per PG&E Greenbook.

J. Support
   1. Support raceways at intervals not exceeding NEC requirements unless otherwise indicated.
   2. Support all raceways from structural members only. Do not support from pipe hangers or rods or another conduit.
   3. Support flexible metal conduit with conduit clamps, per NEC, except where the flexible metal conduit length is less than two feet in length.

K. Bends
   1. Make changes in the direction of runs with symmetrical bends or cast metal fittings. Make bends and offsets of the longest practical radius. Avoid field-made bends and offsets where possible; but, where necessary, make with an acceptable hickey or conduit bending machine.
   2. Make bends in parallel or banked runs of raceways from the same center or centerline so that bends are parallel and of neat appearance. Factory elbows may be used in parallel or banked raceways if there is a change in the plane of the run and the raceways are of the same size. Otherwise, make field bends in parallel runs.
   3. For PVC Schedule 40 conduits, use factory made elbows for all bends 30 degrees or larger.

4. Make no bends in flexible conduit that exceed allowable bending radius of the cable to be installed or that significantly restricts the conduits flexibility.

L. Insulated Throat Grounding Bushings and Conduit to Enclosure Connections
   1. Where conduit enters metal enclosure, install an insulated throat grounding bushing on the end of each conduit. For all other areas install insulated throat grounding hub, unless threaded connection. Install a bonding jumper from the bushing to equipment ground bus or ground pad, or route equipment grounding conductor through bushing ground. Interconnection of bonding jumpers from each conduit grounding bushing to the equipment ground bus or ground pad is acceptable. If neither a ground bus or ground pad exists, connect the bonding jumper to the metallic enclosure with a bolted-lug connection.
   2. All NEMA 3R/4 enclosures without integral watertight hubs shall be connected with insulated throat grounding hubs. The conduit connections shall maintain the integrity of the enclosure NEMA rating. Liquid-tight PVC jacketed flexible metal conduit connections shall be corrosive resistant, watertight hub.

M. PVC Schedule 40 Conduit: Solvent weld PVC conduit joints with solvent recommended by the conduit manufacturer. Follow manufacturer's solvent welding instructions and provide watertight joints. Use acceptable PVC terminal adapters when joining PVC conduit to metallic fittings. Use acceptable PVC female adapters when joining PVC conduit to PVC coated rigid steel conduit.

N. PVC Coated Rigid Steel Conduit: Install in strict accordance with the manufacturer's instructions. Touch up any damage to the coating with conduit manufacturer acceptable patching compound. PVC boot shall cover all threads. Leave no metallic threads uncovered. Clean field threads with solvent and coat with urethane touch-up.

O. Penetrations
   1. Conduits shall not be cast as part of cast-in-place structures. Cast-in-place structures shall include sleeves, and conduits shall pass through the sleeves to penetrate the structures. Coordinate sleeve installation with structural work.

P. Install duct seal in all conduits that are routed below grade, at Metering Panel, MCC, Motor Terminal Boxes, handholes, disconnect switches, and conduits connected to field instruments.

## 3.2 CONDUIT

A. All exposed conduit shall be as noted in Area Designations per Section 260500 – Electrical Work, General.

B. PVC coated RGS elbow and PVC coated RGS conduit for vertical run, shall be utilized for transition from underground concrete ductbank to exposed conduit riser. Conduit shall emerge from the ductbank perpendicular to the surface whenever possible. Extend PVC coated rigid steel conduit up to a minimum of 24 inches above the finished grade, or completely to the electrical enclosure if the enclosure is less than 54 inches above the finished grade.

C. Exposed conduits shall be 3/4-inch minimum trade size. Below grade conduits shall one-inch minimum trade size, unless shown otherwise.

D. All threads shall be coated with a conductive lubricant before assembly. Acceptable products include: Appleton Type TLC, Thomas & Better KOPR-Shield, or approved equal.

E. Joints shall be tight, thoroughly grounded, secure, and free of obstructions in the pipe. All conduits shall be adequately reamed to prevent damage to the wires and cables inside. Strap wrenches and vises shall be used to install conduits to prevent wrench marks on the conduits. Conduits with wrench marks shall be replaced at no additional cost.

3.3 REQUIRED RACEWAY TYPE FOR SPECIAL LOCATIONS AND INSTALLATION METHOD

A. Final Connection to Certain Equipment: Make final connection to pressure transmitters, flow meters, pressure switches, valve actuators, and other equipment where flexible connection is required, to facilitate removal or adjustment of equipment with liquidtight flexible metal conduit. Liquidtight flexible metal conduit shall be of 12-inch minimum to 24-inch maximum lengths, unless otherwise approved by the Engineer or as noted on Contract Drawing.

3.4 PREPARATION FOR PULLING IN CONDUCTORS

A. Ream all raceways, remove burrs, and clean raceway interiors. Immediately after installation, plug or cap all raceway ends with watertight and dust-tight seals.

B. Pull a bristle brush and then mandrel through each raceway to remove any debris and clean raceway prior to pulling conductors. The diameter of the mandrel shall be approximately 1/4-inch less than the raceway inside diameter, through each raceway. For conduits one inch and less, pull a rag through to clean and remove debris prior to pulling conductors.

C. For all raceways which contain less than 50 percent of the NEC allowed fill, install a pull tape along with the conductors.

## 3.5 EMPTY RACEWAYS

A. Certain raceways will have no conductors pulled in as part of this Contract. Identify with conduit tags at each end and at any intermediate pull point of each such empty raceway. Provide a removal cap over each end of empty raceways. Provide a pull tape in each empty raceway.

## 3.6 JUNCTION AND PULL BOXES

A. Where indicated on the Contract Drawings, and where necessary, redirect multiple conduit and cable runs and provide and install appropriately-sized junction boxes. Furnish and install pull boxes where necessary in the raceway system to facilitate conductor installation.

B. Make all boxes accessible. Do not install boxes in finished areas unless accepted in writing by the Engineer. Mount all boxes plumb and level.

C. PVC coated conduit bodies (condulets) may be used for junction or pull boxes as long as sized for installation.

## 3.7 ELECTRICAL CONTINUITY

A. The entire electrical raceway system shall form a continuous metallic electrical conductor from the service point to every outlet and shall be grounded by connection to the main service ground.

B. Rigid steel conduits shall have threads coated with conductive sealant before screwing into fittings.

C. An equipment grounding conductor shall be installed in all conduits. Conduits shall not be substituted for the grounding wire. Bond together the conduit system, enclosures, grounding system, and equipment bus bars.

## 3.8 CONDUIT IDENTIFICATION

A. All conduits shall be identified with minimum of two tags, one at each end. In addition, all conduits shall be tagged at intermediate pull points like handholes or pull boxes. Use correct type of tag based on installed location. Tags shall be inscribed as designated on the Contract Drawing Conduit and Cable Schedule and per approved Interconnect Diagrams.

B. Exposed and Above Grade Conduits: Attach stamped stainless steel tags to conduits with 316 stainless steel tie wire at end of the conduit.

C. Below Grade Conduits: black phenolic conduit tags shall be applied with epoxy to the wall of the handhole above the conduit entrance, or attached to conduit with black nylon cable tie if conduit is accessible.

D. Conduits shall be tagged prior to Field Testing.

END OF SECTION

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# SECTION 26 05 43 – UNDERGROUND RACEWAY SYSTEMS

## PART 1 GENERAL

### 1.1 SECTION INCLUDES

A. The Contractor shall provide underground raceway systems, complete and in place, in accordance with the Contract Documents.

B. The requirements of Section 260500 – Electrical Work, General apply to this Section.

C. The Contractor shall provide underground raceway systems sized for submitted and approved cables, including vendor supplied cables, or ultimate equipment size, or as shown on Contract Drawings, whichever is larger. Conduit sizes shall be as required by National Electrical Code.

D. Contractor to provide handholes as required for cable pulling means, even if not shown on Contract Drawings as dependent on Contractor's routing. Handholes shall be sized per NEC requirements.

E. Refer to Section 260533 – Electrical Raceway Systems for conduit tag requirements.

### 1.2 CONTRACTOR SUBMITTALS

A. General: The Contractor shall submit Shop Drawings in accordance with Specifications and Section 260500 – Electrical Work, General.

B. Shop Drawings: Complete catalog cuts of all underground raceway systems, including handholes, conduits, ductbanks, trenches, etc.

C. Provide surveyed as-built drawings of all installed ductbanks providing top-of-ductbank elevation, ductbank width, handholes, and routing. Include cross-section information for all ductbank sections.

## PART 2 PART 2 PRODUCTS

### 2.1 GENERAL

A. Handholes, underground conduits and fittings which are dedicated to the underground raceway system, shall comply with the requirements of this Section.

B. No conduits shall be routed within the wall of the Pump Station. All conduits to be routed exposed on the interior, or under the slab, not through the slab.

## 2.2 HANDHOLES

A. Handholes and special marking covers shall be designed for AASHTO M309 H-20 traffic loading. Boxes shall include extensions for interior dimension shown on Contract Drawings. Handhole covers shall be checker plate, hot-dip galvanized after fabrication and provided with security “Penta” style, stainless steel bolts. Coat bolts with Tripac 2000 Blue coating system, or approved equal.

B. Handholes shall have identification letters one-inch high and 3/4-inch wide minimum, indicating “ELECTRIC” or “SIGNAL”, as applicable, plus handhole identification number, “HH-E1” for example, as shown on Contract Drawings. Electric handholes are all handholes with AC voltage cables. Signal handholes are all handholes with DC voltage cables.

C. Acceptable products include: Christy Concrete B1017, B1324, H20 rated handholes with extensions, checker plated hot dipped galvanized covers, solid bottoms, and coated stainless steel security bolts, or equal. Size as noted on Contract Drawings. Provide with identification lettering and inscribed handhole tag number inscribed on hot dipped galvanized cover.

## 2.3 CONDUITS, CONCRETE CAP, AND DUCTBANK SPACERS

A. Underground conduits shall be Schedule 40 PVC, except where conduit transition from horizontal to vertical, or through structure walls, when it will be PVC coated rigid steel. Refer to Section 260533 – Electrical Raceway Systems for conduit specifications. Provide end bells on all PVC Schedule 40 conduit ends. Provide insulated throat grounding bushings on all PVC coated rigid conduit ends.

B. Concrete cap shall be minimum 2000 psi, red colored, concrete.

C. Install conduit spacers in ductbanks, where four or more conduits are provided. Conduit spacers shall be Carlon Snap-Loc Spacers, or equal, with minimum 1-1/2” duct separation and installed at five foot on center intervals. Provide 3” separation between the power, or control conduits (“P”, or “C”) and the signal conduits (“S”).

## 2.4 WARNING TAPE

A. Provide heavy-gauge, red, non-adhesive polyethylene tape of six-inch minimum width, four-mil nominal thickness, with black lettering, for use in trenches containing electric circuits. Use tape with the following printed warning: “CAUTION-ELECTRIC LINE BURIED BELOW”.

B. Acceptable products include: Harris Industries, Inc. Underground Tape Catalog No. UT-29, or equal.

## 2.5 CONDUIT PENETRATION SEALS AND SLEEVES

A. Conduit penetration seals shall be a modular, mechanical type, consisting of interlocking synthetic rubber links shaped to continuously fill the annular space between the conduit and the opening. The elastomeric element shall be sized and selected per the manufacturer's recommendations and shall be suitable for use in standard service applications.

B. Sleeves shall be the thermoplastic type with water stops, suitable for poured wall construction.

C. Conduit penetration seals and sleeves shall be complete assemblies supplied by a single manufacturer.

D. Acceptable products include: Thunderline Corporation Link-Seal and Plastic Sleeves, Calpico Inc. Pipe Linx and Plastic Sleeves, or equal.

## 2.6 DUCT SEAL

A. Duct seal shall be a non-hardening compound designed as a waterstop and moisture barrier for sealing the annular space between conduit and electrical conductors and cables.

B. Acceptable products include: O-Z Gedney DUX, or equal.

## 2.7 GROUND ROD BOXES

A. Refer to Section 260526 – Grounding for ground rod boxes.

# PART 3 EXECUTION

## 3.1 GENERAL

A. Raceway systems shall be electrically and mechanically complete before conductors are installed. Bends and offsets shall be smooth and symmetrical, and shall be accomplished with tools designed for this purpose. Factory elbows shall be utilized wherever possible.

B. Raceway sizes shown on Drawings are minimum dimensions based on designed equipment. Contractor to provide conduits as shown or larger based on submitted and approved equipment; at no extra cost to the Owner.

C. No conduits shall be routed within slabs on grade. Conduits shall be routed under the slab and footing and stubbed through the slab.

D. All conduits located underground in ductbanks or trenches shall be concrete capped. Include ductbanks with 1-1/2” conduit spacers at five foot on center intervals.

E. Do not backfill ductbanks until they have been inspected by the Engineer.

F. Warning Tapes: Bury warning tapes approximately 12 inches above top-of-conduits in all underground conduit runs or duct banks. Align parallel to and within six inches of the centerline of runs that are 12 inches wide or less. Provide two rows of tape and align parallel to and within six inches of the centerline of each side of runs that are more than 12 inches wide.

G. Install duct seal in all conduits that are routed below grade, at Metering Panel, MCC, Motor Terminal Box, disconnect switches, handholes, and conduits connected to field instruments.

H. Bypass Flowtube: route conduits with flowmeter manufacturer cables 2” inside vault. Install insulated throat bushing on conduit end and route manufacturer cables to flow tube. Provide cord grip fittings on flow tube cable entries. Installation shall be rated for NEMA 6 submergence.

3.2 TRENCHING

A. Verify the location of all existing cables, conduits, piping, and other equipment in or near the areas to be trenched, prior to starting trenching. Repair any equipment damaged during trenching. Call an Underground Service firm before trenching. Trenches shall not be left unattended unless the area is fenced or barricaded to restrict entry to the area.

3.3 DUCTBANKS AND TRENCHING

A. Separation and Support
   1. Separate parallel runs of four or more raceways in a single trench with preformed, nonmetallic spacers designed for the purpose. Install conduit spacers at intervals of five feet.
   2. Support raceways installed in fill areas to prevent accidental bending until backfilling is complete. Tie raceways to supports, and raceways and supports to the ground, so that raceways will not be displaced when concrete encasement or earth backfill is placed.
   3. Provide 6” separation between power and control conduits and signal conduits.

B. Arrangement and Routing
   1. Arrange multiple conduit runs substantially in accordance with any details shown on the drawings.

2. Make minor changes in the location or cross-section as necessary to avoid obstructions or conflicts. Where raceway runs cannot be installed substantially as shown on submitted and approved layout drawings because of conditions not discoverable prior to digging of trenches, refer the condition to the Engineer for instructions before further work is done. Determine exact alignment and depth as required to avoid other utilities.
3. Where other utility piping systems are encountered or being installed along a raceway route, maintain a 12-inch minimum vertical separation between raceways and other systems at crossings. Do not place raceways over valves or couplings in other piping systems. Refer conflicts with these requirements to the Engineer for instructions before further work is done.
4. Ductbank and trenching alignments shown on Drawings are diagrammatic. Actual alignments shall contain no sharp bends and shall be installed with minimum radius bends as required in the NEC or installed cable, whichever requires a larger radius bend.
5. Provide bell-ends on all PVC conduits entering handholes.

C. Concrete Cap and Backfill
1. Cap all underground conduits with 4-inches of concrete cap. Concrete to be red colored, 2000 PSI minimum.
2. Backfill material above concrete cap, may be selected from the excavated material if it contains no particles larger than three inches in diameter and is free from roots or debris. Imported material meeting these same requirements may be used in lieu of material from the excavation. Compact backfill in maximum 12-inch layers to at least 95 percent of the maximum density at optimum moisture content as determined by AASHTO T 180.

## 3.4 HANDHOLES

A. Provide excavation, backfilling, compaction and grading, etc., in accordance with requirements specified in Contract Documents and manufacturer requirements for traffic rated handholes. Refer to Oldcastle Christy Concrete Traffic Rated Installation Guide for installation details

B. Do not install handholes until final conduit grading, including field changes necessitated by underground interferences, has been determined. Set frames just above final grade so that the site drains away from the handholes.

C. Make the installation so that raceways enter handholes at nearly right angles and as near as possible to one end of a wall, unless otherwise indicated.

D. Provide for over-excavation of the handhole foundation area and furnish minimum of one-foot depth of 3/4-inch drain rock 12-inches below the handhole base, and 6-inch wide concrete collar on all sides down to top of bottom handhole slab.

E. Bolt down covers with stainless steel Penta bolts. Provide anti-seize coating on Penta bolts.

## 3.5 CONDUIT IDENTIFICATION

A. Refer to Section 260533 – Electrical Raceway Systems for conduit tag specification.

B. All conduits shall be identified with minimum of two tags, one at each end. In addition, all conduits shall be tagged at intermediate pull points like handholes and pull boxes and junction boxes. Use correct type of tag based on installed location. Tags shall be inscribed as designated on the Contract Drawing Conduit and Cable Schedule and per approved Interconnect Diagrams.

C. All underground conduits shall be tagged within handholes, and where stub up into equipment.

D. Exposed and Above Grade Conduits: Attach stainless steel tags to conduits with 316 stainless steel tie wire at end of the conduit.

E. Below Grade Conduits: black phenolic conduit tags shall be applied with epoxy to the wall of the handhole, above the conduit entrance, or attached to conduit with black nylon cable tie if conduit is accessible.

F. Conduits shall be tagged prior to Field Testing.

## 3.6 PREPARATION FOR PULLING IN CONDUCTORS

A. Ream all raceways, remove burrs, and clean raceway interiors. Immediately after installation, plug or cap all raceway ends with watertight and dust-tight seals.

B. Pull a bristle brush and then a mandrel through each raceway to remove any debris and clean the raceway prior to pulling conductors. Mandrel diameter shall be approximately 1/4-inch less than the raceway inside diameter, through each raceway. For conduits of one inch and less, pull a rag through to swab clean and remove debris prior to pulling the conductors.

C. For all raceways which contain less than 50 percent of the NEC allowed fill, install a pull tape along with the conductors.

D. Provide phenolic tags on cables, attached with nylon tie wires inside the handholes.

## 3.7 EMPTY RACEWAYS

A. Certain raceways will have no conductors pulled in as part of this Contract. Identify them with conduit tags at each end and at any intermediate pull point of each such empty raceway. Provide a removal cap over each end of empty raceways. Provide a pull tape in each empty raceway.

## 3.8 TRENCH SETTLING

A. If, at any time during a period of one year dating from the date of final acceptance of the project, there shall be any settlement of conduit trenches, the Engineer may notify the Contractor to immediately provide additional fill and to make such repairs or replacements in paving, planting, or structures, as may be deemed necessary at the Contractor's expense.

END OF SECTION

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# SECTION 26 05 73 – PROTECTIVE DEVICE STUDIES

## PART 1 GENERAL

### 1.1 SECTION INCLUDES

A. The Contractor shall perform the following four studies for the electrical power system in accordance with the Contract Documents: Short Circuit Studies (Preliminary and Final versions), Arc Flash Study, and Protective Device Coordination Study.

B. The studies shall cover the maximum available 3-Phase Faults and line-to-ground faults to calculate minimum equipment ratings, to establish personnel protective wear, and to coordinate over-current settings and ground-fault settings for proper coordination and protection. The studies shall include all portions of the electrical distribution system for normal utility power source down to and including the 120/240V lighting panelboard main breaker.

C. It is the responsibility of the Contractor to obtain from PG&E the information required to perform all of the studies. The Contractor shall contact PG&E and obtain the short circuit contribution and impedance values in writing for the facility that is needed for these studies and submit to the Engineer.

D. It is the responsibility of the Contractor to obtain from appropriate vendors the information required to perform all the studies. The Contractor shall contact the protective device manufacturers and obtain the ratings and time current curves for all protective devices including fuses, circuit breakers, motor circuit protectors, relays and overload protective elements.

E. A Preliminary Short Circuit Study shall be prepared and submitted early in the project to verify the suitability of submitted equipment's short circuit and arc flash ratings, and allow for Engineer review. The Contractor shall use the first named supplier for the Preliminary Short Circuit Study. The Contractor may estimate cable lengths for the Preliminary Short Circuit Study.

F. The Contractor shall perform all needed field investigation and inspections to properly identify equipment including motors and transformers and any appropriate settings and nameplate data to get the correct information to work with including impedance values, voltage ratings, base kVA ratings, cable lengths, and/or current ratings for Final studies submittal. The Contractor shall perform all needed field investigation and inspections to properly identify all cable and wire sizes, types, sizes and materials for use in the Final and Record set of studies.

G. The Protective Device Coordination Study shall be submitted and approved prior to Field Testing. Device settings shall be verified during the Field Testing.

H. The Arc Flash Study shall be submitted and approved prior to energizing and any Field Testing. Arc Flash labels must be installed prior to energizing equipment. Refer to Section 260500 – Electrical Work, General for additional warning label and signage requirements.

I. After the facilities are built and operating, all comments on the studies and studied equipment shall be addressed and all corrections made to input data and the three studies submittals for Record Set. The Record Set of the studies shall include all calculations rerun, coordination plots remade, copies of arc flash labels, tabulations corrected, and reports adjusted reflecting the post Field Tested as-built equipment with as left settings. Provide electronic files of study from SKM or ETAP software to the Owner. Submit per O&M Manual guidelines per Contract Specifications.

1.2 QUALIFICATIONS

A. Studies shall utilize the latest SKM or ETAP software for making 3-Phase Fault duty calculations.

B. The Preliminary, Final and Record Set of studies shall be thoroughly reviewed, stamped and signed by an electrical engineer who is registered in the state of California, who has experience performing short circuit and coordination studies, and who directly supervised the collection of information, the creation of the studies and the furnishing of reports.

1.3 CONTRACTOR SUBMITTALS

A. Studies shall be submitted and approved prior to final project acceptance in accordance with Specifications and Section 260500 – Electric Work, General.

B. Preliminary Short Circuit Study shall be submitted and approved prior to approval of any electrical equipment and vendor panels.

C. Copy of Arc Flash labels inscriptions with a description of the installed location. Labels shall meet OSHA, ANSI, NFPA, NEC, and Owner requirements.

D. The protective device studies, reports, settings, calculations, plots and tabulations shall be performed, including two rounds of submittals (Final and Record Set), in addition to the Preliminary Study to allow approval of distribution equipment short circuit protective devices. The Final Studies (after the Preliminary Study) as a part of normal construction, setup and startup of the facilities to be approved prior to Field Testing. The Record Set with the O&M Manual submittal process as a separate submittal after all

comments, corrections, updated input data, and as left settings have been inserted into the software programs to produce an as-built set of studies, reports, settings, calculations, labels, plots and tabulations.

E. Provide a portable USB thumb drive with the Record Set of studies, reports, single line, calculations, plots, protective device settings, and tabulations utilizing SKM or ETAP software. Also include the original source format of input data used as direct input to the selected software to perform the calculations, generate the reports, generate the tabulations, plot the curves and graphs, and list the device settings for the as-built facilities.

1.4 SERVICES OF MANUFACTURERS

A. Contractor shall furnish the services of a third party InterNational Electrical Testing Association (NETA) testing firm to set all over-current protective devices. This shall include circuit breaker trip unit settings, motor solid state starter settings, motor solid state overload settings, and as recommended in the protective device coordination study. Refer to Section 260800 – Electrical Testing.

PART 2 PART 2 PRODUCTS (NOT USED)

PART 3 PART 3 EXECUTION

3.1 GENERAL

A. The study shall include single-line and impedance diagrams of the power system. This diagram shall identify all components considered in the study and the ratings of all power devices, including transformers, circuit breakers, relays, fuses, busses, and cables. The resistance and reactance of all cables shall be identified in the impedance diagram. The study shall contain all written data from the electric utility company regarding maximum available short circuit current, voltage, and X/R ratio of the utility power system.

B. The study shall include all protective devices and feeders included under this Contract. The PG&E short circuit information and overcurrent protective device and ground fault protective device shall be used as a fixed reference and starting point for these studies.

C. The work shall be performed in the following sequence:
   1. A Preliminary Short Circuit Study, approved by the Owner and the Engineer.
   2. Submit electrical equipment with short circuit rating greater than maximum available fault current per Preliminary Short Circuit Study.

3. Final Protective Device Studies submitted: Short Circuit Study, Arc Flash Study, and Protective Device Coordination Study, approved by the Owner and the Engineer.
4. Set all adjustable protective devices.
5. Install approved arc flash labels on equipment.
6. Provide Electrical Testing per Section 260800 – Electrical Testing.
7. Energize equipment. Equipment shall not be energized until Sequence Steps 1 through 6 above are completed and approved by the Owner and the Engineer.
8. Provide further testing including, but not limited to manufacturer recommended field testing, Pre Demonstration testing, Demonstration 7-day functional testing, and as required by the Specifications.
9. Update and replace arc flash labels on equipment if protective device settings are modified during testing and start-up phase.
10. Complete Record Set of Protective Device Studies, approved by the Owner and the Engineer.

## 3.2 SHORT CIRCUIT STUDY

A. The Short Circuit Study shall be performed with the aid of a digital computer program, and shall be in accordance with:
   1. ANSI/IEEE 141 – Recommended Practice for Electrical Power Distribution for Industrial Plants
   2. ANSI/IEEE 242 – Recommended Practice for Protection, and Coordination of Industrial, and Commercial Power Systems
   3. ANSI/IEEE C 37.13 – Low-Voltage AC Power Circuit Breakers Used in Enclosures

B. The Short Circuit Study shall be performed to determine the adequacy of circuit breakers, molded case switches, and fuses. Any problem areas or inadequacies in the equipment due to prospective short-circuit currents shall be promptly brought to the Engineer's attention.

C. Do not utilize series-rated circuit breakers to meet short circuit requirements for this project. Devices shall be fully rated to withstand available fault currents.

D. The Contractor shall as-built the Short Circuit Study and rerun and adjust all the reports, calculations, device settings and output tabulations for all the protective devices reflecting the as-built facilities after all corrections have been inserted into the input data and all previous comments have been addressed.

## 3.3 PROTECTIVE DEVICE COORDINATION STUDY

A. A Protective Device Coordination Study shall be performed to provide the necessary calculations required to select protective device settings.

B. As a minimum, the time/current coordination curves for the power distribution system shall include the following on 5-cycle log-log graph paper:
   1. Time/current curves for each protective relay, circuit breaker, or fuse showing graphically that the settings will provide protection and selectivity within industry standards. Each curve shall be identified, and tap and time dial settings shall be specified. Provide individual curves for each feeder unless identical to others.
   2. Time/current curves for each device shall be positioned to provide the maximum selectivity to minimize system disturbances during fault clearing. Where selectivity cannot be achieved, the Engineer shall be notified as to the cause. Recommendations shall be included for alternate methods that would improve selectivity.
   3. Time/current curves and points for cable and equipment damage.
   4. Circuit interrupting device operating and interrupting times.
   5. Indicate maximum fault values on the graph.
   6. Sketch of bus and breaker arrangement.
   7. Magnetizing inrush points of transformers.
   8. Thermal limits of dry type and liquid insulated transformers. (American National Standards Institute (ANSI) damage curve).

C. The Contractor shall indicate suggested changes to the protection scheme or settings that will result in improved system reliability, and safety.

D. All restrictions of the ANSI and National Electrical Code shall be followed, and proper coordination intervals and separation of characteristics curves shall be maintained.

E. The Contractor shall as-build the Protective Device Coordination Study, rerun and adjust all the reports and calculations, and plot the final curves for all the protective devices reflecting the as-built facilities after all corrections have been inserted into the input data and all previous comments have been addressed.

## 3.4 ARC FLASH STUDY

A. The Arc Flash Study shall be performed with the aid of a digital computer program to cover the whole power distribution system. The Arc Flash Study shall calculate, determine and report the “Arc Flash Boundary” incident energy at 18 inches expressed in cal/sq-cm, voltage shock hazard, limited shock approach boundary, restricted shock approach boundary, prohibited shock approach boundary and “Personal Protective Equipment” (PPE) level. The Arc Flash Study shall calculate and determine these items for electrical equipment in the power distribution system study. The Arc Flash Study shall be performed in conjunction with short circuit calculations and protective device coordination. The Arc Flash Study shall be done for worst-case analysis, considering minimum/maximum utility fault current and with motors either on or off. All calculation shall be performed in accordance with IEEE 1584. The use of thumb rules is not

acceptable in place of a calculated value as shown in IEEE 1584. The Arc Flash Study shall be in accordance with the latest version of:

1. NFPA 70E – Standard for Electrical Safety Requirements for Employee Workplaces
2. IEEE 1584 – Institute of Electrical and Electronics Engineers (IEEE) guide for performing Arc Flash Hazard Calculations
3. OSHA (29 CFR PART 1910) – Occupational Safety and Health Standards for General Industry
4. ANSI Z535.1 – Safety Color Code
5. ANSI Z535.3 – Criteria for Safety Symbols
6. ANSI Z535.4 – Product Safety Signs and Labels

B. The study shall determine and report the following: The recommended values for the "Arc Flash Boundary" incident energy at 18 inches expressed in cal/sq-cm, voltage shock hazard, limited shock approach boundary, restricted shock approach boundary, prohibited shock approach boundary and PPE levels, based on the Arc Flash Study results. These results shall be tabulated with all identified equipment or short circuit interrupting items in the short circuit and coordination study.

C. Provide arc flash calculations for main breaker at Metering Panel. Apply arc flash labels that include calculations on the Metering Panel near the main breaker, and on the exterior of the Metering Panel enclosure. Include arc flash labels on the MCC near the main breaker, and each individual MCC vertical section, and on the exterior of the MCC enclosure near the doors, as applicable to arc flash information based on equipment within. Each Metering Panel exterior door and each MCC exterior door shall have an arc flash label, with matching label on the interior dead front.

D. The study shall recommend the Personal Protective Equipment (PPE) that the Owner should maintain for standard maintenance and operations expected to be conducted for this electrical system. The study shall recommend the safety label design that should be posted on electrical equipment. The study shall recommend the specific information that should be typewritten as part of the safety label. Label information shall also be coordinated with Owner requirements during submittal period. These recommendations shall be based on the National Electrical Code (NEC) requirements, Occupational Safety and Health Administration (OSHA) standards, and National Fire Protection Association (NFPA) recommended practices. The Contractor shall furnish and install the field markings required by the NEC for Flash Protection on all power distribution equipment. The field marking shall be the approved recommended safety label.

E. The Contractor shall as-build the Arc Flash Study and rerun and adjust all the reports, calculations, and adjust the PPE recommendation reflecting the as-built facilities after all

corrections have been inserted into the input data and all previous comments have been addressed.

3.5 RECORD SET

A. The results of the power system studies shall be summarized in a Record Set. Submittal shall follow guidelines of O&M Manual and as described below. The Record Set shall include the following:
   1. Single-line diagram with field measured 480V cable lengths.
   2. Impedance diagram for 3-Phase Faults.
   3. Impedance diagram for line to ground faults.
   4. Tabulation of all protective devices for 3-Phase Faults, which shall be identified on the single line diagram.
   5. Tabulation of all protective devices for line to ground faults, which shall be identified on the single line diagram.
   6. Time/current coordination curves for 3-Phase Fault protective settings.
   7. Time/current coordination curves for line to ground fault protective settings.
   8. Computerized 3-Phase Fault current calculations.
   9. Computerized line to ground fault current calculations.
   10. Recommended settings to achieve < 8 cal/sq-cm; or specific recommendations on how to mitigate all locations to < 8 cal/sq-cm.
   11. Transformer energization inrush points plotted on the associated time current protective curves
   12. Motor starting inrush current plotted on the associated time current protective curves.
   13. Sensing instrumentation, condition, and connections, as applicable, for each study.
   14. Arc Flash Study report including tabulations, label design and recommendations.
   15. Tabulation of all power distribution measuring, control, monitoring, and setup device settings.
   16. Specific recommendations shall include how to potentially reduce the arc-flash incident-energy levels for each location having more than 8 cal/sq-cm present. Include a budgetary estimate for implementing any proposed change.

B. The Record Set shall include information concerning the computer program used for the study and also shall include a general discussion of the procedure, items, and data considered in preparing the study.

C. The Record Set shall include portable USB thumb drive as well as hard paper copy form of all input data, all calculation reports, all plotted curves, all drawings, all output data, and all device settings in tabulated organized form. The Contractor shall submit the final SKM or ETAP model with scenarios in original source format on the USB Drive that can be utilized by the Owner.

END OF SECTION

# SECTION 26 08 00 – ELECTRICAL TESTING

## PART 1 GENERAL

### 1.1 SECTION INCLUDES

A. This Section specifies the work necessary to test, commission and demonstrate that the electrical work and equipment satisfies the criteria of these specification, InterNational Electric Testing Association's (NETA) latest Acceptance Testing Specifications, and also functions as required by the Contract Documents.

B. Electrical Testing shall be completed by NETA certified testing agency. Results shall be reviewed and stamped by registered California professional electrical engineer, employed by the NETA testing agency. Stamped results shall be submitted, for approval by Engineer, prior to energizing any equipment. Unstamped and unsigned results that are submitted shall be returned without review.

C. Electrical equipment shall not be energized until sequence steps 1 through 6 of Section 260573, Paragraph 3.1.C are completed and approved by Owner and Engineer.

### 1.2 GENERAL

A. The work of this Section includes furnishing the labor, equipment, and power required to support the testing specified in this and other sections of the Specification. Electrical testing specified in Division 26 and functional testing of all power and controls not tested under Division 40 shall be completed before commencement of start-up testing. This scope of work may require the Contractor to activate circuits, shutdown circuits, run equipment, take electrical measurements, replace blown fuses, install temporary jumpers, etc.

B. The Contractor shall provide support to disconnect and reconnect cables, portable power source, and perform any other functions required to test electrical equipment at no extra cost to the Owner. The Contractor is responsible for all work, equipment damage, power interruptions and schedule delays caused by the testing agency.

C. Electrical tests shall be performed by third party, NETA certified, testing agency hired by the Contractor. Testing Agency shall meet the qualifications of this Section. All electrical testing shall be witnessed by the Owner and Engineer to be considered valid. All equipment that has successfully been tested shall include testing agency sticker with date of test and initials of tester.

D. All electrical testing performed per this Section shall be done during Pre Demonstration period. Refer to Specifications on facility startup for further testing requirements.

## 1.3 SUBMITTALS

A. Submit testing forms for approval. Testing forms shall be based on InterNational Electric Testing Association's (NETA) latest Acceptance Testing Specifications procedures, having space for a sign-off (tester and witness), pass/fail status, and a data field for each line item covered by NETA's Acceptance Testing Specifications latest edition.

B. Stamped and signed results of all testing shall be submitted to the Engineer prior to final project acceptance. Results to be included as part of final O&M Manuals. Results shall describe test conditions, weather (including temperature and humidity), test date, duration of test, test equipment, tested equipment, testing technician, "as found" and "as-left" results, expected results, actual results, pass/fail status based on listed testing standards and a registered Professional Engineers stamp and signature; registered in Electrical Engineering in the state of California.

C. Testing agency engineer to submit confirmation that "equipment is ready to be energized". Confirmation shall be on company letterhead with name, signature and stamp of responsible Professional Engineer of NETA testing agency.

## 1.4 TESTING AGENCY QUALIFICATION

A. NETA testing shall be performed by a separate and independent subcontractor who has been regularly engaged in the testing of equipment for a period of at least five (5) years. All testing shall be conducted under the direct supervision of an electrical engineer, registered in the state of California. This registered electrical engineer will prepare and sign test reports with values, recommendations, comments, pass/fail status, as well as ready for energization confirmation letter.

B. Testing equipment required to conduct the specified tests shall be furnished by the NETA testing agency. Testing equipment shall be in good working condition and comply with the requirements of this Specification and applicable industry standards.

C. Testing equipment shall have valid calibration sticker.

D. Testing shall be done in accordance with the manufacturer's instructions, these Specifications, and latest NETA Acceptance Testing Specifications. All testing shall be done in the presence of the Engineer, and forms shall include space for Engineer sign-off at time of test. Test shall be giving a PASS/FAIL grade at time of test by certified NETA tester.

E. NETA testing agency shall be Associated Power Solutions, or approved equal.

F. The NETA testing agency shall be responsible for testing, and verification of results of Contractor performed testing, of equipment listed below:

1. Metering Panel and Motor Control Center: Including bus, grounding, breakers (all mains and breakers 100 amps and above), transformers, and panelboards.
2. Cables – shall be tested by Contractor after pulling and prior to termination. Refer to Section 260519 – Wires and Cables. Testing organization is responsible to review results, provide pass/fail evaluation and include results submittal.
3. Electric Motors (10 hp and up). May be performed by pump supplier.
4. Grounding System.
5. Miscellaneous Testing – shall be performed by Contractor.

1.5 NETA FIELD TESTING

A. The following test requirements are intended to supplement test and acceptance criteria that may be stated elsewhere:
   1. Metering Panel:
      a. Perform Field Testing per NETA Acceptance Testing Specifications on: Metering Panel including main circuit breaker and grounding system.
   2. Motor Control Center:
      a. Perform Field Testing per NETA Acceptance Testing Specifications on: MCC including bus, main circuit breaker, circuit breakers 100 amps and above, panelboard main breaker, motor circuit protectors 50 amps and above, panelboard, dry type transformer, and grounding system.
      b. Perform manufacturer recommended Field Testing on: VFD's. Manufacturer or MCC supplier shall field test and configure the VFD's.
   3. Cables – to be performed by Contractor:
      a. Perform Field Testing per NETA Acceptance Testing Specifications.
      b. Refer to Section 260519 – Wires and Cables for additional testing.
   4. Electric Motors (10 hp and up) – may be performed by pump supplier.
      a. Perform Field Testing per NETA Acceptance Testing Specifications and pump motor manufacturer standard field testing procedures.
   5. Grounding System:
      a. Perform Field Testing per NETA Acceptance Testing Specifications.
      b. Test Grounding System at Metering Panel ground bus, and at MCC ground bus and at Pump No. 2 casing.
   6. Miscellaneous Testing– to be performed by Contractor:
      a. Refer to Section 260500 – Electrical Work, General.

1.6 TESTING SEQUENCE

A. Refer to Section 260573 Paragraph 3.01.C for sequence.

B. Metering Panel and connected grounding system, shall be successfully NETA tested prior to PG&E setting meter and prior to energizing.

PART 2 PART 2 PRODUCTS (NOT USED)

PART 3 PART 3 EXECUTION

3.1 TESTING

A. All testing shall be witnessed and signed-off by the Owner and the Engineer to be considered valid. Each test sheet must be signed-off prior to submittal.

B. After equipment is tested and approved, testing organization shall apply sticker on equipment noting date of test and initial of tester.

C. Pre-Demonstration period shall include all NETA Field Testing, and manufacturer recommended testing and testing requirements listed in equipment specification sections.

D.

END OF SECTION

# SECTION 26 24 13 – 480V METERING PANEL

## PART 1 GENERAL

### 1.1 SECTION INCLUDES

A. The Contractor shall provide the Metering Panel, complete and operable, in accordance with the Contract Documents. Metering Panel shall be NEMA 3R, painted steel exterior enclosure, NEMA 3R, with main disconnect and suitable for pole mounting.

B. The pull section and metering section of the Metering Panel shall meet PG&E service meter requirements for ampacity as shown on the Contract Drawings, 480/277 VAC, three phase, four wire, 60 Hz service. Refer to PG&E Greenbook. Metering Panel submittal drawings shall be approved by PG&E prior to work. Provide submittal with listing of applicable EUSERC numbers for PG&E review.

C. The requirements of Section 260500 – Electrical Work, General, apply to the Work of this Section.

D. Provide arc flash labels and maximum available fault current (with date) on the Metering Panel main circuit breaker. Provide nameplates, warning labels, and arc flash labels, on the Metering Panel, both on exterior doors and matching label on interior dead front doors. Provide additional electrical hazard warning signs on exterior doors of Panel enclosure. Refer to Section 260500 – Electrical Work, General for additional warning labels and signage requirements.

### 1.2 CONTRACTOR SUBMITTALS

A. General: The Contractor shall submit Shop Drawings in accordance with Specifications and Section 260500 – Electrical Work, General.

B. Shop Drawings for Metering Panels:
   1. Enclosure National Electrical Manufacturers Association (NEMA) rating
   2. Bus ampacity, voltage rating and interrupting capacity. Include materials of construction.
   3. Ground bus size and material of construction.
   4. Conduit entrance provisions for top feed and bottom load conduits
   5. Utility incoming line entry provision (top) for Metering Panel.
   6. Metering sections, and equipment per PG&E and EUSERC standards. Submit proof of approval by PG&E to Engineer.
   7. Nameplate schedule.
   8. Main circuit breaker type, frame and electronic trip unit.
   9. Schematics Drawings and Elevation Drawings.

10. Short circuit rating of the complete assembly.
11. Factory Test procedures and certified results.

C. Operation and Maintenance Manuals: The Contractor shall submit Operation and Maintenance Manuals per Specifications. Refer to Section 260500 – Electrical Work, General for O&M Manual requirements.

1.3 APPLICABLE CODES AND REQUIREMENTS

A. As specified in Section 260500 – Electrical Work, General.

1.4 MAINTENANCE AND GUARANTEE, WARRANTY

A. After completion the Contractor shall furnish to the Owner the supplier's written guarantees, that the systems will operate within the published accuracies and ranges and meet these Specifications.

B. The Contractor shall also furnish the manufacturer's warranties as published in its literature, and submit within the O&M Manuals.

C. The warranty for all provided equipment shall be not less than two years after initial startup or Owner beneficial use, whichever is later, and shall include all costs for repairs, parts, travel and living expenses, and labor.

PART 2 PRODUCTS

2.1 GENERAL

A. Metering Panel shall be rated for 65k AICS.

B. Metering Panel including all components shall be rated for 40° Celsius at full load. Panel and components shall be rated for marine environment.

C. Metering Panel wiring shall be labeled, color coded, and furnished per applicable codes and standards requirements.

D. Metering Panel shall be products of Eaton, Millbank, or approved equal, with exterior NEMA 3R, painted steel enclosure. Enclosure painting (coating) system shall be suitable and provide protection for marine environment. Exterior paint color shall be ANSI 61.

2.2 METERING PANEL DESIGN, CONSTRUCTION, AND MATERIAL REQUIREMENTS

A. Metering Panel shall be 600-volt class suitable for operation on a three-phase, four-wire, and 60-Hz system.

B. Metering Panel shall receive power from PG&E service, three phase, four wire system. Metering Panel shall include provision for termination of the incoming neutral conductor in conformance to NEC requirements for service entrance. Hence load connection between Metering Panel and MCC shall be 480 VAC, three-phase, three-wire, plus ground.

C. Metering Panel exterior enclosure shall be NEMA 3R painted steel, ANSI 61. Exterior door shall be padlockable at main disconnect breaker.

D. Size and Arrangement
   1. Metering Panel shall contain PG&E incoming pull section, meters and test switches, all as required by PG&E and EUSERC.
   2. Metering Panel shall contain the main circuit breaker with thermal trip.

E. Enclosure
   1. Structural members shall be fabricated of not less than 12-gauge steel and side and top panels and doors shall be not less than 14-gauge steel.
   2. Provide screwed nameplates on all sections.

2.3 MAIN CIRCUIT BREAKER

A. Main circuit breaker shall be molded case with thermal trip element. Main circuit breaker shall be Eaton Series C F-Frame Type HFD with thermal unit, or approved equal. The interrupting capacity shall be a minimum of 65,000 RMS symmetrical amperes at operating voltage.

B. Provide breaker with load side cable lugs as required per Contract Drawings.

PART 3 PART 3 EXECUTION

3.1 GENERAL

A. The Contractor shall install Metering Panels in accordance with supplier's published instructions conforming to these Contract Documents.

B. Metering Panels shall be handled carefully to avoid damage to components, enclosure, and finish. Damage shall be repaired before installation.

3.2 INSTALLATION

A. Metering Panels shall be installed on pole, anchored per manufacturer recommendations.

B. The Contractor shall:
   1. Torque all bus bar bolts to supplier's recommendations; tighten all sheet metal and structure assembly bolts.
   2. After equipment is installed, touch up scratches and verify that nameplate, and other identification is accurate.
   3. Install duct seal within conduit stubbing up within Metering Panel.
   4. After equipment is installed, touch up scratches and verify that nameplate, and other identification is accurate.

3.3 FIELD TESTS AND CERTIFICATION

A. Visual and mechanical inspection after installation shall include:
   1. Inspect for physical damage, proper anchorage and grounding.
   2. Check tightness of bolted connections.

B. Provide NETA field testing as outlined in Specification 260800 - Electrical Testing.

C. All testing shall be witnessed by the Engineer and/or Owner. All testing sheets shall be signed off by the Engineer and/or Owner to be considered valid.

D. Refer to Specifications on facility start up for further testing requirements.

E. Pre-Demonstration period for Metering Panel testing shall include NETA Field Testing, equipment start-up, and approval of O&M Manuals.

END OF SECTION

# SECTION 26 24 19 - LOW VOLTAGE MOTOR CONTROL CENTER

## PART 1 GENERAL

### 1.1 SECTION INCLUDES

A. The Contractor shall provide the Motor Control Center (MCC), complete and operable, in accordance with the Contract Documents. The MCC's shall be rated NEMA 3R, painted steel, exterior rated enclosure, non-walk-in type with sloped roof, and mounted to concrete housekeeping pad affixed to slab on grade.

B. The requirements of Section 260500 – Electrical Work, General, and Section 262913 – Local Control Stations, apply to the Work of this Section. PLC Panel, which is integral to MCC, has components specified in Section 409513 – Process Control Panels and Hardware.

C. In the event that motors provided are larger horsepower than motors indicated, raceways, conductors, starters, overload elements, and branch circuit protectors shall be revised as necessary to control and protect the increased motor horsepower.

D. Provide arc flash labels and maximum available fault currents on the incoming section to the MCC, both on exterior doors and matching label on interior dead front doors. Provide arc flash labels on each motor starter section, and each feeder breaker and main breaker to lighting panelboard, both on exterior doors and matching label on interior dead front doors. Provide additional electrical hazard warning signs on exterior doors of MCC. Refer to Section 260500 – Electrical Work, General for additional warning labels and signage requirements.

### 1.2 CONTRACTOR SUBMITTALS

A. General: The Contractor shall submit Shop Drawings in accordance with Specifications and Section 260500 – Electrical Work, General.

B. Shop Drawings for MCC:
   1. Enclosure National Electrical Manufacturers Association (NEMA) rating and exterior paint color samples. Paint color shall be ANSI 61.
   2. Horizontal and vertical bus ampacity, voltage rating and interrupting capacity. Include materials of construction.
   3. Ground bus size and material of construction.
   4. Conduit entrance provisions.
   5. Transformer.
   6. Panelboard with breakers and nameplate schedule.
   7. Surge Protective Device (SPD).

8. Control unit nameplate schedule.
9. All circuit breakers, types, frames, and trip units.
10. Power Fail Relay (PFR).
11. Variable Frequency Drives (VFD). Submit manufacturer recommended field testing procedures and results for VFD's.
12. Relays, timers, pilot devices, control transformer VA and fuse sizes.
13. PLC Panel. Refer to Section 409513 for PLC Panel components.
14. Schematics Drawings and Elevation Drawings. Custom MCC schematic diagrams for each pump VFD starter and MCC component. Only custom schematics shall be furnished, no typical diagrams. Diagrams shall show terminal blocks and field wiring to devices located in the field or PLC Panel, etc.
15. Short circuit rating of the complete assembly.
16. Complete Bill of Materials with Replacement Parts lists.
17. Seismic design certification of the anchoring system.
18. Shipping splits and weights.
19. Time-current curves for all protective devices.
20. Configuration parameters for VFD's, and other configurable devices for review prior to energizing. Provide programming manuals for same, submitted with configuration parameters.
21. Factory Test procedures and certified results.
22. Spare Parts. Spare parts to be coordinated with Sections 262913 and 409513.

C. Training Outline for VFD, including configuration and operation.

D. Operation and Maintenance Manuals: The Contractor shall submit Operation and Maintenance Manuals per Specifications. Refer to Section 260500 – Electrical Work, General for O&M Manual requirements.

1.3 APPLICABLE CODES AND REQUIREMENTS

A. As specified in 260500 – Electrical Work, General.

B. IEEE - Institute of Electrical and Electronic Engineers.

C. NEMA – National Electrical Manufacturers' Association.
   1. ICS 18-2001 – Motor Control Centers.

D. UL – Underwriters' Laboratories.
   1. 50 – Standards for Enclosures for Electrical Equipment.
   2. 845 – Motor Control Centers.

1.4 MAINTENANCE AND GUARANTEE, WARRANTY

A. After completion the Contractor shall furnish to the Owner the supplier's written guarantees, that the systems will operate within the published accuracies and ranges and meet these Specifications.

B. The Contractor shall also furnish the manufacturer's warranties as published in its literature, and submit within the O&M Manuals.

C. The warranty for all provided equipment shall be not less than two years after initial startup or Owner beneficial use, whichever is later, and shall include all costs for repairs, parts, travel and living expenses, and labor.

1.5 SEISMIC CERTIFICATION

A. All equipment to be furnished under this contract shall be designed, constructed, and installed in accordance with the earthquake regulations of the California Building Code, Title 24, and the International Building Code (IBC).

B. The Contractor shall provide equipment anchorage calculations and details, coordinated with the equipment mounting provision, prepared and stamped by a licensed structural or civil engineer in the state of California.

1.6 DUTIES OF THE MANUFACTURER'S QUALIFIED FACTORY REPRESENTATIVE

A. A manufacturer's engineering representative for the equipment specified herein shall be present at the jobsite for the frequency and minimum duration (travel time excluded) as specified below to perform the following manufacturer's services:
   1. A minimum of one trip, for inspection, assistance during installation and alignment, and certification of proper installation. The certificate of installation shall be submitted.
   2. A minimum of one trip, for assistance and witnessing of system testing by the Contractor and any required troubleshooting.
   3. A minimum of one trip for two-hour session for operation and maintenance training of Owner's personnel on the MCC, especially review of VFD operation.

B. The manufacturer's engineering representative shall provide a minimum of three separate trips to the jobsite to fulfill the above requirements.

PART 2 PRODUCTS

2.1 GENERAL

A. Devices of the same type shall be products of the same manufacturer and supplier.

B. MCC's shall conform to the standards for NEMA Class IIS, type B diagrams and wiring.

C. MCC's shall be rated for 65k AICS.

D. MCC's including all components shall be rated for 40° Celsius at full load. MCC and components shall be rated for marine environment.

E. MCC wiring shall be labeled, color coded, and furnished per applicable codes and standards requirements.

F. MCC's shall be products of Eaton Freedom 2100, Square D 6 Series, or approved equal, with exterior NEMA 3R, painted steel non walk-in enclosure.

G. MCC's may be assembled by UL listed shop. MCC's may be assembled by Tesco Controls, Inc., (Mr. Shain Thomas 916-395-8800), Technical Systems Inc., (Mr. Jon Rogers 707-678-1111), or approved equal, using approved products specified within.

2.2 MCC DESIGN, CONSTRUCTION, AND MATERIAL REQUIREMENTS

A. MCC's shall be 600-volt class suitable for operation on a three-phase, three-wire, and 60-Hz system.

B. MCC exterior enclosure shall be rated NEMA 3R painted steel, non-walk-in type. Exterior paint color shall be ANSI 61. Exterior doors shall be padlockable, three-point latch type. Interior dead front compartment doors shall be interlocked with compartment circuit breakers. The interlock shall be fitted with a maintenance override. No door shall open, with breaker closed (energized), without interlocking feature.

C. Size and Arrangement
   1. The MCC shall contain lugs, VFD's, transformer, lighting panelboard, circuit breakers, and miscellaneous loads (thermostat controlled heaters, lights). MCC shall be of mechanical groupings of control center units, assembled into a lineup of vertical control center sections. Each internal vertical section shall be nominally 90 inches tall by minimum 20 inches deep, with top and bottom wireways.
   2. MCC shall be designed to not exceed the space requirements as indicated on the Contract Drawings, including spaces, spares and future compartments.

3. Equipment within the MCC may be rearranged at the discretion of the manufacturer, providing the MCC provides the spares, space and future provisions indicated.
4. All switches and circuit breakers used as switches shall be located so that the center of the grip of the operating handle of the switch or circuit breaker, when in its highest position, will not be more than six feet seven inches above grade, including the height of the housekeeping pad.

D. Components
1. Busses:
   a. Continuous copper ground buses shall be provided with full width of the MCC line-up. Ground bus shall be located at bottom of MCC.
   b. The main horizontal bus shall be tin-plated copper, located within an isolated compartment. The bus shall be rated as shown on the Contract Drawings.
   c. The vertical bus in each section shall consist of a single tin-plated copper conductor per phase with a current capacity of not less than 200 amps. The vertical bus shall be completely isolated and insulated in a polyester reinforced sandwich or interlocking labyrinth barrier to prevent the spread of faults in starter to vertical or horizontal bus, and shall extend the full height of the section.
   d. All power buses shall be braced to withstand 65,000 RMS symmetrical amperes, minimum.
2. Wireways: A separate vertical wireway shall be provided adjacent to each vertical unit, and shall be covered by a hinged door. Each individual unit compartment shall be provided with a side barrier to permit pulling wire in the vertical wireway without disturbing adjacent unit components.
3. Heaters and Thermostat: provide 120 VAC heaters and thermostat controls, within each of the vertical sections as noted on Contract Drawings.
4. Lights shall be LED, 120VAC, with switches and located within area between exterior door and internal dead front door. Provide quantity of lights and type of lighting fixtures as shown on Contract Drawings.
5. Provide GFCI receptacle on interior dead front door per Contract Drawings.

E. Enclosure
1. Structural members shall be fabricated of not less than 12-gauge steel and side and top panels and doors shall be not less than 14-gauge steel.
2. Spaces designated as "SPACE" or "BLANK" shall include blank hinged doors, with shutter mechanisms providing future unit insertion access to all vertical bus bars – power, control, and communication.
3. Control units inside compartments shall be clearly identified with engraved phenolic nameplates.

4. Each control unit including spares, spaces, and blanks, lights and devices shall be identified by an engraved nameplate. Identification shall include circuit number as indicated.
5. MCC shall be fitted with the manufacturer's nameplate which shall include the NEMA Standard electric rating and other pertinent data, including manufacturer, sales order number, date of manufacturer, and place of manufacture.
6. Provide screwed nameplates on all sections.
7. Provide drawing pocket on inside of exterior enclosure door.

F. Nameplates
1. Nameplates shall be provided for front of each cubicle and for major devices thereon, such as VFD's, surge protective device, breakers, etc. Nameplates shall also be provided for major internal devices such as relays, instrument and control power transformers, circuit breakers and fuse blocks. Cubicle nameplates shall be 3-layer laminated phenolic plastic, black front, engraved to show white lettering. Lettering shall be upper case as follows:
   a. 1-inch high for MCC identification.
   b. 7/16-inch high for compartment identification.
   c. 1/8-inch high for component nameplate.
2. Nameplates 1-1/2 inches tall and smaller shall be 1/16-inch thick. Nameplates larger than 1-1/2 inches tall shall be 1/8-inch thick. Edges of nameplates shall be beveled. Nameplates shall be fastened by black anodized screws.
3. Provide nameplates on exterior enclosure doors of equipment within specific door. Match information noted on Contract Drawings for exterior doors and interior dead front equipment doors.

G. Terminal Blocks
1. Terminal blocks for all external control connections shall be 600V, barrier type, having a minimum rating of 20 amperes with marker strips identifying all internal and external wiring. Terminal blocks shall be sized to have at least 20 percent unused spare connections after completion of wiring.

H. Control Wiring
1. Control wiring shall be provided to all auxiliary relays and devices indicated to be furnished with the equipment. Control buses and wiring for each vertical section shall be enclosed in Panduit or in compartments isolated from the primary circuits.
2. All control wiring shall be brought to identified terminal blocks; every cubicle containing control wiring which extends to other cubicles shall have terminal blocks. Connection made on terminal blocks and on internal devices shall be by means of locking spade-type pre-insulated terminals.
3. Control and secondary wiring shall be 600V flame-retardant switchboard type, minimum size No. 14 AWG, stranded tinned copper. Hinge wiring shall be extra-

flexible stranding. The wire shall be SIS, with both ends of the wire identified with labels.

## 2.3 MOTOR STARTERS

A. Motor starters and motor circuit protectors, or thermal breakers, shall be sized as shown or larger if required by submitted and approved motors.

B. Starters shall have auxiliary contacts as required by electrical motor control diagrams including normally open (N-O) and normally closed (N-C) contacts as indicated, plus one each spare N-O and N-C contact.

C. Each starter unit shall have its own control power transformer. It shall have a 115-volt grounded secondary. One secondary breaker and two primary fuses shall be provided. Control power transformers shall be sized to accommodate the control devices indicated. Local control devices shall be mounted independently of the cover door. Starters shall be provided with devices as indicated in the Schematic Diagrams. All cubicle control wires shall be terminated at a pull apart disconnecting terminal block at the cubicle.

D. The motor control center manufacturer shall be responsible for identifying each control wire within each motor starter unit with heat shrink permanent plastic markers. Each control wire shall be identified at both ends.

E. VFD:
   1. Components: The adjustable frequency drive system shall consist of a converter, inverter, programmable controller, as follows:
      a. Converter section consisting of a three-phase full wave phase controlled rectifier to convert incoming ac power to variable voltage dc.
      b. DC bus capacitors and/or inductors necessary to filter rectification ripple.
      c. Three-phase full wave inverter to construct an ac wave form, with minimum harmonic content, at any frequency between zero and 60 Hz to control motor speed. Motor terminal voltage shall be controlled in proportion to output frequency such that the voltage to frequency ratio remains essentially constant.
      d. All electrical components shall be sized for continuous operation of the driven equipment or pump motors specified herein at 15 percent above rated full load. The minimum VFD efficiency shall be 95 percent at 100 percent speed and 85 percent at 50 percent speed. The power factor of VFD unit shall be 92 percent minimum at 100 percent speed without using any power factor correction capacitor.
      e. Cable from VFD to motor shall be VFD type, braided and foil shielded type cable, minimum size per Contract Drawings.

2. Performance: The VFD shall vary both the ac voltage and frequency simultaneously to provide the constant volt/Hz necessary to operate the ac motor at the desired variable speed. The VFD shall be specifically designed for use with variable torque equipment or pumping loads, fully capable of at least a 3:1 infinitely adjustable speed range. The control shall vary the output frequency between 20 and 60 Hz. Soft-start control circuitry shall limit inrush current, not to exceed 100 percent of motor full load current, under all manual and automatic operating conditions. When power outage occurs, the drive system shall shut down in an orderly manner. Upon restoration of ac power, the motor shall restart sequentially and run at a rate depending upon the reference requirements, by the sequencing logic controller.
3. Protection: The VFD controller shall be provided with integral circuitry capable of protecting itself and the connected motors against the following conditions. Amber lights are to be provided for each of the following faults:
    a. Input line monitor to protect against single phasing, power outages, and reverse phase rotation.
    b. Undervoltage - restart upon restoration of normal voltage.
    c. Motor overvoltage.
    d. Instantaneous over-current trip to continuously monitor peak current at output and input. It shall provide instantaneous shutdown without fuse failure to protect the machine and drive during adverse starting and running conditions.
    e. Inverter fault shutdown circuit.
    f. Short-circuit protection without isolation transformer.
    g. Thermal overload protection for motors.
    h. Logic power supply failure.
    i. Overtemperature: Thermal detectors mounted on semiconductor heat sinks shall detect high temperature caused by excessive current or loss of cooling air and cause controller shutdown.
    j. Over frequency.
    k. Phase-to-phase ground faults without the need for isolation transformer.

F. VFD shall be sized for 1.15 times motor full load amps at a minimum, or per Contract Drawings, whichever is larger.

G. VFD shall be Square D Altivar 630, or approved equal.

2.4 VFD CONTROL DEVICES, LINE REACTOR, SPD, AND DV/DT FILTERING

A. VFD starter control devices shall be per Section 26 29 13 – Local Control Stations.

B. Coordinate with pump supplier for motor monitoring relay. Refer to Contract Drawings.

C. Line reactor shall be 3% of motor full load amps times service factor, rated for 480 VAC, three phase. Line reactors to be MTE RL Line, or approved equal.

D. SPD shall be rated 30kA, rated for 480 VAC, three phase. SPD shall be Raycap Strikesorb 30 series, or approved equal.

E. Dv/dt filter shall be per VFD manufacturer to filter harmonics. Filter to be sized for full load amps times service factor, rated for 480 VAC, three phase. Dv/dt filters to be MTE dV Sentry, or approved equal.

2.5 CIRCUIT BREAKERS

A. General: The interrupting capacity of all main, and feeder circuit breakers and motor circuit protectors, shall be a minimum of 65,000 RMS symmetrical amperes at operating voltage. Provide breakers with cable lugs as required for project.

B. Main circuit breaker shall be molded case with thermal trip element. Main circuit breaker shall be Eaton Series C F-Frame Type HFD with thermal unit, or approved equal. The interrupting capacity shall be a minimum of 65,000 RMS symmetrical amperes at operating voltage.

C. Circuit breakers having a frame size less than 225 amperes shall be molded case type with thermal magnetic non-interchangeable, trip-free, sealed trip units. Thermal magnetic molded case circuit breakers shall be Eaton Series C F-Frame Type HFD, or approved equal.

2.6 FAIL RELAY

A. Power Fail Relay (PFR) shall detect phase loss, phase reversal and low voltage. PFR shall be automatic reset type, with SPDT 10 amp rated contact. Include base for relay.

B. Provide with line side fuses in finger safe fuse holder, three pole, indicating type, Allen-Bradley 1492-FB series or equal.

C. PFR shall be Time Mark A258B, or approved equal.

2.7 SURGE PROTECTIVE DEVICE (SPD)

A. MCC shall have an UL 845, UL 1449 and UL 1283 listed integrated surge protective device installed and shall be UL labeled for such use.

B. SPD shall be installed with twelve inches or less of connecting cable from the bus to the surge electronics. SPD shall be rated for 480 volt three-phase service at 250 kA per phase. SPD shall have a built-in diagnostic package with flashing trouble light, display for the status of each phase, and have a counter and display to indicate the number of surges that have caused the device to operate.

C. SPD shall be Eaton SPD-250-480D-3-J, or approved equal.

2.8 TRANSFORMER WITHIN MCC

A. General
1. The transformer shall be dry-type, designed, manufactured, and tested in accordance with the latest applicable standards of ANSI and NEMA.
2. Transformer shall be UL-listed and bear the UL label.
3. Transformer shall be noise isolating type with shield between primary and secondary windings.

B. Ratings
1. KVA and voltage ratings shall be as indicated.
2. Transformer shall be designed for continuous operation at rated kVA, for 24 hours a day, 365 days a year operation, with normal life expectancy as defined in ANSI C57.96 - Guide for Loading Dry Type Distribution and Power Transformers.
3. Transformer sound levels shall not exceed the following ANSI and NEMA levels for self-cooled ratings:
   a. Up to 9 kVA; 40 dB
   b. 10 to 50 kVA; 45 dB

C. Construction
1. Insulation Systems:
   a. Transformer shall be insulated as follows:
      1) 2 kVA and below: 150° C insulation system based upon 80° C rise.
      2) 3 to 15 kVA: 185° C insulation system based upon 115° C rise.
      3) 15 kVA and above: 220° C insulation system based upon 150° C rise.
   b. Required performance shall be obtained without exceeding the above indicated temperature rise in a 40° C maximum ambient.
   c. All insulation materials shall be flame-retardant and shall not support combustion as defined in ASTM D 635 - Test Method for Rate of Burning and/or Extent and Time of Burning of Self-Supporting Plastics in a Horizontal Position.
   d. Transformer shall have copper windings on both primary and secondary.
   e. 120 dB common mode noise rejection.
   f. 60 dB transverse mode noise rejection.
2. Provide with vibration isolation pads.
3. Transformer shall have four 2½-percent taps, two above and two below 480 volts.

D. Manufacturers
1. Transformer shall be Eaton, GE Guard II, Allen-Bradley, or approved equal.

## 2.9 PANELBOARD WITHIN MCC

A. General: Panelboard shall be dead front factory assembled; UL listed. Panelboard shall comply with NEMA PB-1-Panelboards, as well as the provisions of UL 50 - Safety Enclosures for Electrical Equipment and UL 67 - Safety Panelboards.

B. Ratings
   1. Panelboard rated 240 VAC or less shall have short circuit ratings not less than 10,000 amperes RMS symmetrical or as indicated on Contract Drawings, whichever is greater.
   2. Panelboard shall be labeled with a UL short circuit rating. Series ratings are not acceptable.

C. Construction
   1. All panelboards shall have copper busbars.
   2. Breakers shall be one, two, or three poles as indicated, with ampere trip ratings as required by the equipment. Breakers shall be quick-make and quick-break, inverse time trip characteristics, to trip free on overload or short circuit, and to indicate trip condition by the handle position. Breakers to be bolt on type only.
   3. The panelboard shall have hinged doors with combination catch and latch. The front panels shall be so arranged that when the plates are removed, the gutters, terminals and wiring will be exposed and accessible. The doors shall be inner doors within the plates to have only the breaker operating mechanism exposed when they are opened. Live conductors and terminals shall be concealed behind the plates.
   4. Panelboard shall be rated for the intended voltage.
   5. All circuit breakers shall be interchangeable and capable of being operated in any position as well as being removable from the front of the panelboard without disturbing adjacent units. No plug-in circuit breakers will be acceptable, bolt on only.
   6. Panel board shall have the necessary barriers, supports, and liberal wiring gutters. Trim screws shall be stainless steel. Panelboard parts of metal other than copper, aluminum, or stainless steel shall be cadmium plated.
   7. Provide a lock out device for each type of breaker; main, two pole, and single pole. Total of three lock out devices.

D. Manufacturers
   1. Panelboard shall be Eaton, Square D, or approved equal.

## 2.10 CONTROL DEVICES

A. All control devices shall conform to the requirements and specifications of Section 262913 – Local Control Stations.

B. Provide elapsed time meters and start counters for all motor starters connected to motors larger than 2 horsepower, even if not shown on electrical schematics.

C. Provide yellow disconnecting type terminal blocks for all terminal blocks connected to foreign voltage sources. Refer to electrical schematics for foreign voltage sources. In addition to foreign voltage sources, provide disconnecting type terminal blocks to all terminals connected with wiring to/from PLC Panel equipment.

D. Refer to Specification 262913 for wire insulation colors. Provide the following color schemes as part of the MCC equipment:

| Device Description | Color and Equipment |
|---|---|
| Motor “Run” | GREEN indicating lens |
| Motor “Alarm” or “Fault” | AMBER indicating lens |
| Control Power “On”, Motor Heater “On” | WHITE indicating lens |
| Motor “Power Fail” | RED indicating lens |

2.11 FUSES, 0 TO 600 VOLTS

A. Circuits shall be fused only where shown, otherwise provide circuit breakers on all AC and DC circuits.

B. Fuses shall only be allowed as approved by Engineer.

C. Fuses shall be:
1. For 0- to 600-volt motor and transformer circuits, 0 to 600 amps, UL Class RK-1 with time delay, Bussmann Type LPS-RK, Shawmut Type A6D-4, or approved equal.
2. For 0- to 250-volt motor and transformer circuits, 0 to 600 amps, UL Class RK-1 with time delay, Bussmann Type LPN-RK, Shawmut Type A2D-R, or approved equal.
3. For 0- to 600-volt feeder and service circuits, 0 to 600 amps, UL Class RK-1, Bussmann Type KTS-R, Shawmut Type A6K-R, or approved equal.
4. For 0- to 250-volt feeder and service circuits, 0 to 600 amps, UL Class RK-1, Bussmann type KTN-R, Shawmut Type A2K-R, or approved equal.

D. Supply a set of three (3) spare fuses of each type and each current rating installed, per MCC.

2.12 FACTORY ACCEPTANCE TESTS

A. MCC’s and its components shall be given Manufacturer's standard electrical and mechanical production tests and inspections. The tests shall include electrical continuity check, dielectric tests for each circuit, and inspection for proper functioning of all components including controls, protective devices, metering, and alarm devices. Factory

Acceptance Testing shall utilize submitted and approved schematics and prove in rung-by-rung method. Factory Acceptance Testing procedures shall be submitted for approval.

B. Factory Acceptance Testing shall be witnessed by Engineer and Owner, up to four people.

## 2.13 SPARE PARTS

A. The Contractor shall furnish the following for MCC, and provide three rubber storage box (Rubbermaid Action Packer Storage Box 24 gallons, or approved equal) to be provided to Owner. Each rubber tub storage box to include, typical for each site:
   1. One control power transformer of each size furnished, per MCC.
   2. One Power Fail Relay, per MCC.
   3. Three fuses of each size and type installed, per MCC.
   4. One can touch up paint, per MCC.
   5. One control relay of each type furnished, per MCC. Specification per Section 262913.
   6. One timer relay of each type furnished, per MCC. Specification per Section 262913.
   7. Three fuses of each size and type installed in PLC Panel. Specification per Section 409513.
   8. One control relay of each type furnished in PLC Panel. Specification per Section 409513.

B. Spare parts shall be in manufacturer carton, and identified by type, size, and manufacturer.

# PART 3 EXECUTION

## 3.1 GENERAL

A. The Contractor shall install MCC's in accordance with supplier's published instructions conforming to these contract documents. Conduit installation shall be coordinated with supplier's as-fabricated drawings so that all conduit stub-ups are within the area allotted for conduit. Conduit shall be stubbed up in the section that contains the devices to which conductors are terminated.

B. If stored at the site, MCC shall be stored in a clean, dry space. Factory wrapping shall be maintained or an additional heavy plastic cover shall be provided to protect units from dirt, water, construction debris, and traffic. Storage space shall be heated.

C. MCC's shall be handled carefully to avoid damage to components, enclosure, and finish. Damage shall be repaired before installation.

## 3.2 INSTALLATION

A. MCC shall be installed on housekeeping pad affixed to slab on grade; refer to Drawings and details. The seismic calculations shall be approved prior to the installation. If housekeeping pad does not meet MCC supplier's requirement for level, Contractor shall replace at no additional cost. Provide slab on grade extended a minimum 48" clearance in front of MCC's housekeeping pad, refer to Contract Drawings.

B. The Contractor shall:
   1. Torque all bus bar bolts to Manufacturer's recommendations; tighten all sheet metal and structure assembly bolts.
   2. Adjust all Motor Circuit Protector (HMCP) devices. HMCP shall be set to the instantaneous trip setting position recommended for the actual horsepower and full load amps of the motor. Verify that overload devices are proper for equipment installed.
   3. Configure and set: VFD's, and power fail relay.
   4. After equipment is installed, touch up scratches and verify that nameplate, and other identification is accurate.
   5. Install duct seal within all conduits stubbing up within MCC and PLC Panel.

C. Provide caulking, Vulkem 116 or approved equal, around bottom edge of MCC, sealing between MCC enclosure and concrete housekeeping pad.

## 3.3 FIELD TESTS AND CERTIFICATION

A. Visual and mechanical inspection after installation shall include:
   1. Inspect for physical damage, proper anchorage and grounding.
   2. Verify that the settings of the VFD motor protection match the installed motor's full-load current nameplate data.
   3. Set motor overload relays per nameplate data.
   4. Verify that the settings of the VFD's and PFR.
   5. Check tightness of bolted connections.

B. Provide NETA field testing as outlined in Specification 260800 - Electrical Testing. Set breaker trip unit per approved Protective Device Study.

C. All testing shall be witnessed by the Engineer and/or Owner. All testing sheets shall be signed off by the Engineer and/or Owner to be considered valid.

D. Manufacturer shall review installation. Manufacturer shall provide written certification letter on company letterhead, that equipment meets intent of design, is properly installed without void of warranty, has successfully completed Factory and Field Testing, and ready for energizing. Submit letters to the ENGINEER prior to energizing.

E. Refer to Specifications on facility start up for further testing requirements.

F. Pre Demonstration period for MCC testing shall include Factory Acceptance Testing, Manufacturer certification, NETA Field Testing, equipment start-up, approval of O&M Manuals and Training.

3.4 TRAINING

A. Field Training: Provide for 2 hours (one 2 hour class) of field training on MCC for Owner personnel. Classes shall stress troubleshooting, repair, calibration, and other technical aspects. Training shall provide detailed information on the VFD's and discuss arc flash label information. Training shall be provided by MCC supplier.

B. The field training classes shall be scheduled a minimum of three (3) weeks in advance of when they are to be given. Proposed training material, including a resume for the proposed instructor(s) (indicating previous instructional experience), and a detailed outline of each lesson shall be submitted to the Engineer at least 20 days in advance of when the lesson is to be given. The Engineer shall review the submitted data for suitability and provide comments that shall be incorporated into the course.

C. Within 10 days after the completion of field training class the Contractor shall present to the Engineer the following:

D. A list of Owner personnel that attended the class.

E. A copy of the text utilized during the class with all notes, diagrams, and comments.

F. Include training materials within O&M Manual.

END OF SECTION

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# SECTION 26 27 26 – WIRING DEVICES

## PART 1 GENERAL

### 1.1 SECTION INCLUDES

A. The Contractor shall provide wiring devices, complete and operable, in accordance with the Contract Documents.

B. Single Manufacturer: Like products shall be the end product of one manufacturer in order to achieve standardization of appearance, operation, maintenance, spare parts, and manufacturer's services.

### 1.2 CONTRACTOR SUBMITTALS

A. General: The Contractor shall submit Shop Drawings in accordance with Specifications and Section 260500 – Electrical Work, General.

B. Shop Drawings
   1. Complete catalog cuts of equipment, with enclosures, covers, and appurtenances, marked to clearly identify proposed materials.
   2. Shop drawings for Disconnect Switches including dimensions, materials, nameplates, installation details.
   3. Documentation showing that proposed materials comply with the requirements of NEC and UL.

## PART 2 PRODUCTS

### 2.1 GENERAL

A. All devices shall carry the UL label.

### 2.2 LIGHTING SWITCHES

A. Light switches shall be heavy duty, industrial, toggle type, 20-amp, 125 VAC-rated, self-grounding, and back and side wired. Light switch handles shall be brown. Contact arm spring and terminal plate shall be copper alloy. Contact points shall be silver cadmium oxide. Ground terminal shall be nickel-plated steel with brass screw. Switches shall conform to UL 20. Provide single and three way switches as required.

B. Acceptable products: Hubbell 1221B, Hubbell 1223B, or approved equal.

2.3 GENERAL PURPOSE RECEPTACLES

A. Duplex receptacles shall be 125 VAC, 20 amperes, polarized three-wire type, NEMA 5-20R confirming to UL 498. Receptacles shall be brown. Receptacles shall conform to UL 498. External wiring shall be provided by side mounted terminal screws. Acceptable products: Hubbell 5362B, or approved equal.

B. Ground-fault circuit interrupting receptacles (GFCIs) shall be installed at outdoor locations. GFCIs shall be rated 125 V, 20 amperes NEMA 5-20R, conforming to UL 498 and UL 943, and brown. Acceptable products: Hubbell GF-5362SG, or approved equal.

2.4 OUTLET AND DEVICE BOXES

A. Outlet and Device boxes are specified in Section 260533 – Electrical Raceway Systems.

2.5 DEVICE COVERS

A. While in use covers shall be UL listed, NEMA 3R, metallic, neoprene gaskets, heavy duty, deep depth, lockable type. While in use covers shall be TayMac #MX3200, or approved equal.

2.6 NAMEPLATES

A. Provide nameplates on switches, motor switches, and receptacles wall plates stating panelboard (or lighting control panel) and circuit number feeds to the device. For example, a receptacle nameplate may be inscribed “LP-1, Circuit 3”.

2.7 PUMP STATION INTRUSION SWITCHES

A. Provide industrial grade, encapsulated SPDT magnetic contact switch. Switch shall be NEMA 3R, with mounting brackets as required. Switch to include stainless steel flexible conduit, 3’ long. Gap distance to make, up to 3”. Housing to be anodized aluminum or stainless steel.

B. Intrusion switch shall be GE Sentrol 2507A, or approved equal.

2.8 NON-FUSED PUMP DISCONNECT SWITCHES

A. Provide disconnect switches in NEMA rated enclosures as specified in Section 26 05 00 – Electrical Work. Provide switches that can be locked in the “OFF” position. Interlock enclosure and switches to prevent opening the cover with the switch in the “ON” position. Provide switches which are quick-make, quick-break, motor rated, load-break, heavy-duty (HD) type, having external marking clearly indicating “ON” and “OFF” positions. Furnish switches meeting the requirements of NEMA KS 1. Provide switches

suitable for use with 75 degrees C wire at full NEC 75 degrees C ampacity. Switches shall be rated for 15 hp, or 30 amps, whichever is greater.

B. Provide disconnect switches with factory installed, engraved, laminated nameplates (black background with white lettering) citing the name of the equipment serving.

C. Acceptable Products: Eaton Heavy Duty Safety Switches, or approved equal.

2.9 PUMP STATION - 3 POLE DISCONNECT SWITCH

A. Provide 3 Pole disconnect switch to disconnect the three 120 VAC circuits coming into the Pump Station. Switch shall be rated 30 amps.

B. Provide disconnect switches with factory installed, engraved, laminated nameplates (black background with white lettering) citing the name of the equipment serving.

C. Acceptable Products: Eaton Heavy Duty Safety Switch, or approved equal.

2.10 PUMP STATION – SIGNAL J-BOX

A. Signal J-Box shall be NEMA 12, painted steel, fully hinged, padlockable handle, back panel, grounding lug, and minimum 6” H x 16” W x 6” D (or as required based on installed conduit dimensions and per NEC requirements), connectors, and splices.

B. Signal J-Box shall be Hoffman Products Bulletin A51SE with back panel, or approved equal.

PART 3 EXECUTION

3.1 GENERAL

A. Perform work in accordance with the National Electrical Code (NEC).

B. Outdoor receptacles shall be GFCI type, with while in use covers.

3.2 CONNECTION

A. Rigidly attach wiring devices in accordance with manufacturer instructions.

B. Securely fasten nameplates using epoxy glue centered under or on the device, unless otherwise indicated.

## 3.3 GROUNDING

A. Ground all devices, including switches and receptacles, in accordance with NEC and Section 260526 – Grounding.

B. Ground switches and associated metal plates through switch mounting yoke, outlet box, and raceway system.

C. Ground flush receptacles and their metal plates through positive ground connections to the outlet box and grounding system. Maintain ground to each receptacle by spring-loaded grounding contact to mounting screw or by grounding jumper, each making positive connection to the outlet box and grounding system at all times.

D. Exterior receptacles shall be 24” above grade, unless shown otherwise.

## 3.4 FIELD TESTING

A. Provide checkout, field, and functional testing of wiring devices in accordance with Section 260800 – Electrical Testing.

B. Test each receptacle for polarity and ground integrity with a standard receptacle tester.

C. Wiring devices testing shall be completed during Pre Demonstration period.

END OF SECTION

# SECTION 26 29 13 – LOCAL CONTROL STATIONS

## PART 1 GENERAL

### 1.1 SECTION INCLUDES

A. The Contractor shall provide complete local control stations, also called local control panels, as shown and as specified herein or in other Sections of the Specification.

B. Control devices as part of the motor control centers (MCC's), shall meet requirements of this Section. PLC Panel's control devices shall meet requirements of Section 409513 – Process Control Panels and Hardware.

C. Provide nameplates on all stations, panels, panel mounted devices, and internal components. Nameplates to include equipment description and equipment tag number and be screwed on.

D. Outdoor panels and doors shall be padlockable. Panels and components shall be suitable for marine environments. Outdoor panels shall have thermostat controlled space heaters and fans, even if not shown on Contract Drawings.

### 1.2 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Local control stations shall comply with the requirements of NEC, NEMA, and UL. Stations shall be built by UL listed panel shop, and contain UL listed shop sticker displaying such.

### 1.3 CONTRACTOR SUBMITTALS

A. General: The Contractor shall submit Shop Drawings in accordance with Specifications and Section 260500 – Electrical Work, General.

B. Schematic diagrams and written descriptions explaining diagrams operation and system operation shall be provided with shop drawings. Provide sizes on all protective devices.

C. Provide scaled layout drawings showing panel front and internal layout. Include nameplate nomenclature, tagging and terminal labels.

D. Provide catalog cuts of all control equipment including enclosures, overcurrent devices, indicators, relays, control devices, terminations, and wire troughs.

E. Operations and Maintenance Manuals: The Contractor shall submit Operations and Maintenance Manuals for the Local Control Stations in accordance with specifications.

F. Spare Parts. Spare parts to be coordinated with Section 262419.

## PART 2 PRODUCTS

### 2.1 GENERAL

A. The Contractor shall provide the local control stations to satisfy the functional requirements specified in the relevant mechanical equipment Specifications, and as shown on the Contract Drawings. Each station shall be fabricated with UL labeled components, by a UL-508A listed shop. Stations not specifically specified as being provided in other Sections of these Specification shall be furnished and installed under this Section. All stations shall be wired per this Section.

B. The controls shall be 120 volts maximum. Where the electrical power supply is 480 VAC 3 phase, as shown on the electrical drawings, the local control station shall be provided with a control power transformer. Control conductors shall be provided in accordance with the requirements specified in Section 260519 – Wires and Cables.

C. Each local control station shall be provided with identified field terminal strips for the connection of all external conductors. The Contractor shall provide sufficient terminal blocks to connect all spare wiring, plus 20 percent additional terminal blocks for future use. Termination points shall be identified in accordance with accepted shop drawings. All equipment associated with the stations shall be ready for service after connection of conductors to equipment, controls, and stations.

D. All internal wiring shall be factory-installed and shall be contained in plastic raceways or troughs having removable covers. Wiring to door-mounted devices shall be extra flexible and anchored to doors using wire anchors cemented in place. Exposed terminals of door-mounted devices shall be guarded to prevent accidental personnel contact with energized terminals.

E. Enclosures
   1. In exterior wet locations enclosures shall be NEMA 4X, 316 stainless steel, unless noted otherwise on Contract Drawings or individual specification sections.
   2. Provide fast operating clamps assemblies where box is larger than four inches in either dimension, unless otherwise noted or specified. Screw clamps are not acceptable. Outdoor enclosures shall be padlockable.
   3. Enclosures shall be freestanding, wall-mounted, or equipment skid-mounted, as specified or shown. Internal control components shall be mounted on a removable mounting pan. Mounting pan shall be finished white. All enclosures shall have stainless steel hinges and padlockable handle.

F. Identification of panel-mounted devices, conductors, and electrical components shall meet the requirements specified in Section 260500 – Electrical Work, General.

G. Provide tags for individual wires at each termination ends for wires 1/0 AWG and smaller. Tags shall be white heat shrink with thermal transfer printing, 3 to 1 shirk ratio, two inches long, and meet UL 224.
   1. Acceptable products include: Raychem Tyco Shrink Mark Heat Shrinkable Sleeves, or approved equal.

## 2.2 PUMP STATION E-STOP CONTROL STATION

A. Provide E-Stop pushbutton control station for each pump. E-Stop pushbutton shall be push type, with twist to release, mounted on NEMA 12 or 3R control station
   1. Acceptable products include: Schneider Electric #XALK198H7, or approved equal.

## 2.3 CONTROL DEVICES AND COMPONENTS

A. Control Relays
   1. General purposes relays shall be enclosed octal plug-in units. Relays shall be UL listed, indicating type, and push to test. Relay contact ratings shall be minimum 7.5 amps at 110 VAC, and minimum 5 amps at 30 VDC. DC relays shall be internal diodes, indicating type. Two- and three-pole relays shall be IDEC Series RR, or approved equal. Four-pole relays shall be IDEC Series RH, or approved equal.
   2. Time delay functions shall be accomplished with pin type, true time delay relays. Units shall be adjustable time delay relays with the number of contacts and contract arrangements, as shown. A neon status-indicating light shall be provided with each relay. Contacts shall be rated for 7.5 A at 120 VAC. Integral knob with calibrated scale shall be provided for adjustment of time delay. Initial setting shall be as shown with time delay range approximately three times the initial setting. Delay range ability shall be at least 10:1. Timing relays shall be solid state pulse-count type utilizing a high frequency resistance-capacitance (RC) oscillator and integrated circuit counter for timing. Time delay on relays shall be IDEC Series GT3A, or approved equal. Time delay off relays shall be IDEC Series GT3F (true off), or approved equal.
   3. All relays shall have a screw terminal interface with the wiring. Terminals shall have a permanent, legible identification. Relays shall be mounted so that the terminal identifications are clearly visible and the terminals are readily accessible.
   4. Relays connected to motor contactors shall have ratings of 150% of contactor requirements for pull in and maintaining.

B. Pilot Lights:
   1. Shall be heavy duty, NEMA 4X, with round, plastic lens, and jumbo legend plate. Each shall be push-to-test, LED lamp, transformer type.

2. Colors shall be, unless noted otherwise on Contract Drawings:
    a. Power On - White
    b. Auto, Running - Green
    c. Alarms - Red
3. Acceptable products: Allen-Bradley Bulletin 800H, or approved equal

C. Pushbuttons:
1. Shall be heavy duty, NEMA 4X, bootless, flush head pushbutton, momentary contact, with jumbo legend plate.
2. Colors shall be, unless noted otherwise on Contract Drawings:
    a. Reset - Black
    b. Start - Green
    c. Stop - Red
3. Acceptable Products: Allen-Bradley Bulletin 800H, or approved equal.

D. Selector Switches:
1. Position switches shall be maintained contact type, rated 20 A minimum at 120 VAC. Control knob shall be black, NEMA 4X, and shall show clearly the control switch position.
2. Selector switch shall be complete with jumbo legend plate, and with contact blocks.
3. Acceptable products: Allen-Bradley Bulletin 800H, or approved equal.

E. Pump run hour meter and start counter shall be combination meter, 120 VAC, non-resettable, suitable for cubicle door or front panel mounting.
1. Timer/Counter meter shall be Eaton CEC-55PM-406, or approved equal.

F. Circuit breakers shall be din rail mounted, thermal magnetic, tease-free, trip-free, snap action mechanism with two button operations. Circuit breakers shall be din rail mounted, thermal magnetic, miniature type.
1. Breakers shall be Allen-Bradley 1492 (DC) and 1489 (AC), or approved equal.

## 2.4 PANEL ELECTRICAL

A. Interior Panel Wiring
1. Wiring shall be supported independently of terminations by lacing to panel support structure or by slotted flame-retardant plastic wiring channels. Wiring channels shall comply with UL 94, Type V-1. Wiring channel fill shall not exceed 40 percent of cross-section area. Only one wire per terminal block with exception of a comb jumper in addition to the single wire.
2. Power and control wiring shall be single conductor. Stranded copper, NFPA No. 70 Type MTW, No. 16 AWG minimum.
3. Wiring shall comply with the requirements of NEC as a minimum.

4. Analog signal cables shall be No. 18 AWG, 7 x 28 stranded copper, twisted shielded pairs, rated 60 degree C, 600 V.
5. Plug strips with grounding type receptacles shall be provided for 120 VAC power supply connections. Each piece of equipment requiring ac power shall be provided with an NEC Type SJ cord with molded-on grounding type plug for ac power connection. Panel work shall contain no exposed connections, and adjustments to equipment shall be made without exposing these terminals. Power and control wiring operating above 80 VAC or DC shall be carried in covered channels separate from low voltage signal circuits.
6. Power and Control Insulation Colors: Power and control conductors within panels shall have the following insulation colors per NFPA 70 and NFPA 79:

| **Conductor** | **Insulation Color** |
|---|---|
| AC Power | Black |
| Neutral | White |
| AC Control | Red |
| Foreign AC Voltage | Yellow |
| Equipment Grounding Conductor | Green |

7. Signal Insulation Colors: Signal conductors within panels shall have the following insulation colors per NFPA 70 and NFPA 79:

| **Service** | **Color** |
|---|---|
| AC Power | Black |
| AC Neutral | White |
| AC Controls | Red |
| Foreign AC Voltage | Yellow |
| DC 24VDC Positive | Blue |
| DC 24VDC Common | Blue with White Stripe |
| DC Controls | Blue |
| DC Digital Inputs | Blue |
| DC Digital Outputs | Blue |
| Shielded Pair (+/-) | (Black/White) |
| Intrinsically Safe Wiring | Lt. Blue |
| Equipment Grounding Conductor | Green |

8. Terminal blocks: Terminal blocks for panels, consoles, racks, and cabinets shall meet the following requirements:

a. Provide sufficient terminations to accommodate both present and future needs. Wire all spare or unused panel mounted elements to their panels' terminal blocks. Provide the greatest of 20 percent of all connected terminals or four unused spare terminals.
b. Provide 600-volt screw type terminal blocks. Use yoke that guides all stands of wire into the terminal. All field terminal blocks shall be the knife switch disconnecting type terminal blocks. Supply terminals that allow connection of wire without any preparation other than stripping. Rail mount individual terminals to create a complete assembly. Provide terminals constructed such that jumpers can be installed with no loss of space on terminal or rail.
c. Each terminal strip shall have a unique identifying alphanumeric code at one end and a vinyl marking strip running the entire length of the terminal strip with a unique number of each terminal. Numbers shall be machine printed and 1/8-inch high. Terminal strip codes and terminal numbers shall comply with numbers listed on the wiring diagram.
d. Size all terminal block components to allow insertion of all necessary wire sizes and types. Supply terminal blocks with marking system allowing the use of preprinted or field-marked tags.
e. Field connections shall be to separate terminal blocks. Terminal blocks for field terminations shall be in a separate part of the panel close to where the field cables enter the panel. Provide sufficient space between terminal blocks and wireways to facilitate wire labels.
f. Provide screw connection, knife switch disconnecting type, terminal blocks manufactured by Wago, Weidmuller, or approved equal.

9. Circuits shall be fused only where shown, otherwise provide circuit breakers on all AC and DC circuits. Fuses shall only be allowed as approved by Engineer.
   a. Fuses shall measure ¼-inch by 1¼-inches.
   b. Fuses on 120 VAC circuits shall be ceramic tube type with 25,000 amperes interrupting capacity at 125 volts and neon blown fuse indicator lamps. Fuse holders for 120 VAC shall be draw out type and molded from melamine plastic.
   c. Fuses for 24 V DC shall be fast-acting glass tube type rated 1/8 amp for 4-20 loops and 3 amps for the power supply to individual instruments.
10. Two ¼-inch by 3-inch copper buses shall be provided in the panels: one for signal and shield grounding and one for equipment and cabinet grounding. The signal ground bus shall be mounted on insulated stand-offs and the entire signal ground system bonded to the cabinet ground system at a single point.

B. Signal distribution within panels:
   1. 4 to 20 mA signals shall be distributed within panels as 4 to 20 mA signals.
   2. Signals distributed outside panels shall be isolated 4 to 20 mA signals.

PART 3 EXECUTION

3.1 INSTALLATION

A. Local Control Stations shall be installed in accordance with the requirements specified in Section 260500 – Electrical Work, General, and in accordance with the Manufacturer's recommendations. Panel mounting height shall be maximum 5 feet 6 inches to top of enclosure unless shown otherwise.

B. Local Control Stations shall be protected at the jobsite from loss, damage, and the effects of weather. Local Control Stations shall be stored in an indoor, dry location. Heating shall be provided in areas subject to corrosion and humidity.

C. Local Control Stations interiors and exteriors shall be cleaned, and coatings shall be touched up to match original finish upon completion of the work.

D. Conduit, conductors, and terminations shall be installed in accordance with the requirements specified in Section 260500– Electrical Work, General.

3.2 FIELD TESTING

A. Each Local Control Station shall be field tested at the site and witnessed by the Engineer and Owner for functional operation after the connection of external conductors yet prior to equipment startup. Manufacturer of system shall certify installation of system. Field testing shall prove controls based on rung-by-rung verifications of the submitted and approved schematics. Field testing of Local Control Stations shall be performed during Pre-Demonstration period.

B. Refer to Specifications for facility start up and testing for further requirements.

END OF SECTION

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# SECTION 26 50 00 – LIGHTING

## PART 1 GENERAL

### 1.1 SECTION INCLUDES

A. The Contractor shall provide MCC enclosure lighting fixtures, Pump Station interior lighting, lighting switches, conductors, and conduits for complete and operable electrical equipment lighting system, in accordance with the Contract Documents.

### 1.2 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Without limiting the generality of other requirements of these specifications, all work hereunder shall conform to the applicable requirements of the referenced portions of the following documents, to the extent that the requirements therein are not in conflict with the provisions of this Section.
   1. National Electric Code (NEC)
   2. Underwriters Laboratories (UL)

### 1.3 CONTRACTOR SUBMITTALS

A. General: The Contractor shall submit Shop Drawings in accordance with Specifications and Section 260500 – Electrical Work, General.
   1. Shop drawings and catalog data.
   2. Catalog literature for each fixture and pole.
      a. Materials of construction, type of diffusers, hardware, gaskets, reflector and chassis, finish, LED type and distribution pattern.
   3. Lamps: Submit manufacturer's catalog data, including voltages, colors, approximate hours, life, approximate initial lumens, lumen maintenance curve, lamp type, and base.

B. Substitutions for specified fixtures: The Contractor shall provide a sample of the specified luminaries and the proposed substituted luminaries for each proposed substitution. Substitutions will be accepted only if judged equal or better in performance characteristics, construction quality, ease of maintenance, and aesthetic appearance by the Owner and the Engineer.

C. Provide seismic conformance computations carried out by a professional engineer registered in the state of California. Submit calculations that verify the anchoring requirements and pole base reinforcement design.

1.4 QUALITY ASSURANCE

A. Lighting fixtures shall be stored in their original cartons from the manufacturers until the time of installation.

1.5 CLEANUP

A. Fixture lenses, diffusers, and reflectors shall be cleaned just prior to the system Demonstration test.

B. Fixture trim, including poles and support brackets, where finish has been damaged, shall be refinished to level acceptable to Engineer.

PART 2 PRODUCTS

2.1 FIXTURES - GENERAL

A. Provide luminaires as shown in Fixture Schedule, with proper hardware, supports, fasteners, etc., as necessary for complete installation.

B. Special Requirements
   1. Contractor shall install appropriate fittings provided by the luminaries' manufacturer to make the assembly complete.

2.2 LIGHTING FIXTURES

A. Refer to Fixture Schedule on Contract Drawings.

PART 3 EXECUTION

3.1 LUMINAIRES

A. General
   1. Install each luminaire in a manner recommended by the luminaire manufacturer and accepted by the Engineer.
   2. Be responsible for handling the luminaires, installing plumb and level, and keeping luminaires clean.
   3. After construction of total project is completed, remove all labels and other markings, wash dirty luminaires inside and out with a nonabrasive mild soap or cleaner. Clean luminaries' plastic lenses with antistatic cleaners only. Touch up all painted surfaces of luminaires with high-grade exterior enamel, and poles with paint supplied by manufacturer.

4. All stored equipment shall be protected in accordance with the manufacturer's recommendations and as specified. All equipment shall be covered with heavy-gauge polyethylene sheeting or canvas while stored and during construction to protect the equipment from dust and moisture until accepted, or as directed by the Engineer.
5. Install fixtures in such a manner as to avoid obstructions and to give proper illumination result. Verify layouts with the Engineer.
6. Provide and install all fixtures complete and ready for service. Deliver all warranty paperwork to Engineer.

3.2 FIELD TESTS

A. Test all lighting systems for proper operation and conformity to these specifications and as shown on the Contract Drawings. Perform field testing to verify operation of light fixtures. Verify lighting circuits match Panelboard schedule.

B. Lighting system testing shall be witnessed by the Engineer and Owner for functional operation.

END OF SECTION

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# SECTION 31 05 13 – SOILS FOR EARTHWORK

## PART 1 GENERAL

### 1.1 SUMMARY

A. Section Includes:
   1. Subsoil materials.
   2. Topsoil materials.

### 1.2 SUBMITTALS

A. Materials Source: Name of imported materials source.

B. Manufacturer's Certificate: Products meet or exceed specified requirements.

### 1.3 QUALITY ASSURANCE

A. Furnish each topsoil & subsoil material from single source throughout Work.

## PART 2 PRODUCTS

### 2.1 SUBSOIL MATERIALS

A. Subsoil Type S1:
   1. Excavated and re-used material.
   2. Graded.
   3. Free of rocks larger than 3 inches and debris.
   4. Conforming to ASTM D2487 Group Symbol CL.

B. Subsoil Type S2:
   1. Structural Backfill
   2. Per City of Fort Bragg Specification 19-1.07.

### 2.2 TOPSOIL MATERIALS

A. Topsoil Type S3:
   1. Excavated and reused material.
   2. Graded.
   3. Free of roots, rocks larger than ½ inch, subsoil, debris, large weeds, and foreign matter.
      a. Screening: Single screened.

B. Topsoil Type S4:
   1. Imported borrow.
   2. Friable loam.
   3. Reasonably free of roots, rocks larger than ½ inch, subsoil, debris, large weeds, and foreign matter.
      a. Screening: Single screened.
   4. Acidity range (pH) of 5.5 to 7.5.
   5. Containing minimum of 4 percent and maximum of 25 percent inorganic matter.
   6. Conforming to ASTM D2487 Group Symbol PT.

2.3 SOURCE QUALITY CONTROL

A. Testing and Analysis of Subsoil Material: Perform according to ASTM D698.

B. Testing and Analysis of Topsoil Material: Perform according to ASTM D698.

C. When tests indicate materials do not meet specified requirements, change material and retest.

D. Furnish materials of each type from same source throughout Work.

PART 3 EXECUTION

3.1 EXCAVATION

A. Excavate subsoil and topsoil from areas designated. Strip topsoil to full depth of topsoil in designated areas.

B. Stockpile excavated material meeting requirements for subsoil materials and topsoil materials.

C. Remove excess excavated materials not intended for reuse, from Site.

D. Remove excavated materials not meeting requirements for subsoil materials and topsoil materials from Site.

3.2 STOCKPILING

A. Stockpile materials on Site at locations designated by Engineer.

B. Stockpile in sufficient quantities to meet Project schedule and requirements.

C. Separate differing materials with dividers or stockpile apart to prevent mixing.

D. Stockpile topsoil 8 feet high, maximum.

E. Prevent intermixing of soil types or contamination.

F. Direct surface water away from stockpile site to prevent erosion or deterioration of materials.

G. Stockpile unsuitable materials on impervious material and cover to prevent erosion and leaching, until disposed of.

3.3 STOCKPILE CLEANUP

A. Remove stockpile, leave area in clean and neat condition. Grade Site surface to prevent free standing surface water.

B. When borrow area is indicated, leave area in clean and neat condition. Grade Site surface to prevent free standing surface water.

END OF SECTION

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SECTION 31 05 16 – AGGREGATES FOR EARTHWORK

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Coarse aggregate materials.
   2. Fine aggregate materials.

1.2 SUBMITTALS

A. Materials Source: Name of imported materials suppliers.

B. Manufacturer's Certificate: Products meet or exceed specified requirements.

1.3 QUALITY ASSURANCE

A. Furnish each aggregate material from single source throughout Work.

PART 2 PRODUCTS

2.1 COARSE AGGREGATE MATERIALS

A. Coarse Aggregate Type A1: Aggregate Sub base – Class 4 shall have a minimum sand equivalent of 21, a minimum R value of 50 and shall conform to the following grading:
   1. Percent Passing per Sieve Size:
      a. 3 inches: 100.
      b. 1-1/2 inch: 90 to 100.
      c. 3/4 inch: 50 to 90.
      d. No. 4: 25 to 55.
      e. No. 200: 2 to 11.

B. Coarse Aggregate Type A2 (Gravel): Crushed: Angular crushed stone; free of shale, clay, friable material and debris; graded according to ASTM C136; within following limits:
   1. Percent Passing per Sieve Size:
      a. 2 inches: 100.
      b. 1 inch: 95.
      c. 3/4 inch: 95 to 100.
      d. 5/8 inches: 75 to 100.
      e. 3/8 inches: 55 to 85.
      f. No. 4: 35 to 60.

g. No. 16: 15 to 35.
h. No. 40: 10 to 25.
i. No. 200: 5 to 10.

C. Aggregate Type A4 (Pea Gravel): Natural stone; washed, free of clay, shale, organic matter; graded according to ASTM C136 to following limits:
1. Minimum Size: 1/4 inch.
2. Maximum Size: 5/8 inch.

2.2 FINE AGGREGATE MATERIALS

A. Fine Aggregate Type A5: Conforming to Caltrans standards.

B. Fine Aggregate Type A6 (Sand): Natural river or bank sand; washed; free of silt, clay, loam, friable or soluble materials, and organic matter; graded according to ASTM C136; within following limits:
1. Percent Passing per Sieve Size:
a. No. 4: 100.
b. No. 14: 10 to 100.
c. No. 50: 5 to 90.
d. No. 100: 4 to 30.
e. No. 200: Zero.

2.3 SOURCE QUALITY CONTROL

A. Coarse Aggregate Material - Testing and Analysis: Perform according to ASTM C136.

B. Fine Aggregate Material - Testing and Analysis: Perform according to ASTM C136.

C. When tests indicate materials do not meet specified requirements, change material and retest.

PART 3 EXECUTION

3.1 EXCAVATION

A. Excavate aggregate materials from on-Site locations designated by Engineer as specified in Section 31 22 13.

B. Stockpile excavated material meeting requirements for coarse aggregate materials and fine aggregate materials.

C. Remove excess excavated coarse aggregate materials and fine aggregate materials not intended for reuse, from Site.

D. Remove excavated materials not meeting requirements for coarse aggregate materials and fine aggregate materials from Site.

3.2 STOCKPILING

A. Stockpile materials on Site at locations designated by City.

B. Stockpile in sufficient quantities to meet Project schedule and requirements.

C. Separate different aggregate materials with dividers or stockpile individually to prevent mixing.

D. Direct surface water away from stockpile site to prevent erosion or deterioration of materials.

E. Stockpile unsuitable materials on impervious material and cover to prevent erosion and leaching, until disposed of.

3.3 STOCKPILE CLEANUP

A. Remove stockpile, leave area in clean and neat condition. Grade Site surface to prevent free-standing surface water.

B. When borrow area is indicated, leave area in clean and neat condition. Grade Site surface to prevent free standing surface water.

END OF SECTION

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# SECTION 31 10 00 – SITE CLEARING

## PART 1 GENERAL

### 1.1 SUMMARY

A. Section Includes:
   1. Removing surface debris.
   2. Removing designated paving, and curbs.
   3. Removing designated trees, shrubs, and other plant life.
   4. Removing abandoned utilities.
   5. Excavating topsoil.

### 1.2 SUBMITTALS

A. Product Data: Herbicide; indicate compliance with applicable codes for environmental protection, and permits.

### 1.3 QUALITY ASSURANCE

A. Conform to applicable code for environmental requirements, disposal of debris, and use of herbicides.

## PART 2 PRODUCTS

### 2.1 MATERIALS

A. Herbicide: Type, approved by authority having jurisdiction.

## PART 3 EXECUTION

### 3.1 EXAMINATION

A. Verify existing plant life designated to remain is tagged or identified.

B. Identify waste area for placing removed materials.

### 3.2 PREPARATION

A. Call local utility line information service at 811 not less than three working days before performing Work.

1. Request underground utilities to be located and marked within and surrounding construction areas.

3.3 PROTECTION

A. Locate, identify, and protect utilities indicated to remain from damage.

B. Protect benchmarks, survey control points, and existing structures from damage or displacement.

3.4 CLEARING

A. Clear areas required for access to Site and execution of Work to minimum depth of 6 inches.

B. Remove trees and shrubs indicated. Remove stumps, main root ball, root system to depth of 48 inches, and surface rock.

C. Clear undergrowth and deadwood, without disturbing subsoil.

D. Apply herbicide to remaining stumps to inhibit growth.

3.5 REMOVAL

A. Remove debris, rock, and extracted plant life from Site.

B. Partially remove paving, and curbs as indicated. Neatly saw cut edges at right angle to surface.

C. Remove abandoned utilities. Indicated removal termination point for underground utilities on record documents.

D. Continuously clean-up and remove waste materials from Site. Do not allow materials to accumulate on Site.

E. Do not burn or bury materials on Site. Leave Site in clean condition.

3.6 TOPSOIL EXCAVATION

A. Excavate topsoil from areas to be further excavated, relandscaped, or regraded, without mixing with foreign materials for use in finish grading.

B. Do not excavate wet topsoil.

C. Stockpile in area designated on Site to depth not exceeding 8 feet and protect from erosion. Stockpile material on impervious material until disposal.

D. Remove excess topsoil not intended for reuse from Site.

END OF SECTION

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# SECTION 31 22 13 – ROUGH GRADING

## PART 1 GENERAL

### 1.1 SUMMARY

A. Section Includes:
   1. Excavating topsoil.
   2. Excavating subsoil.
   3. Cutting, grading, and compacting Site.

### 1.2 SUBMITTALS

A. Materials Source: Name of imported materials suppliers.

B. Manufacturer's Certificate: Products meet or exceed specified requirements.

### 1.3 CLOSEOUT SUBMITTALS

A. Project Record Documents: Record actual locations of utilities remaining by horizontal dimensions, elevations or inverts, and slope gradients.

### 1.4 QUALITY ASSURANCE

A. Perform Work according to ASTM C136, ASTM D2419, and ASTM D2434.

## PART 2 PRODUCTS

### 2.1 MATERIALS

A. Topsoil: Type S3 and S4 as specified in Section 31 05 13.

B. Subsoil Fill: Type S1 and S2 as specified in Section 31 05 13.

C. Structural Fill: As Specified in the City of Fort Bragg Standard Specifications.

D. Granular Fill: Type A1 as specified in Section 31 05 16.

## PART 3 EXECUTION

### 3.1 EXAMINATION

A. Verify survey benchmark and intended elevations for Work are as indicated.

## 3.2 PREPARATION

A. Call local utility line information service at 811 not less than three working days before performing Work.
   1. Request underground utilities to be located and marked within and surrounding construction areas.

B. Identify required lines, levels, contours, and datum.

C. Notify utility company to remove utilities.

D. Protect utilities indicated to remain from damage.

E. Protect plant life, lawns, rock outcropping and other features remaining as portion of final landscaping.

F. Protect benchmarks, survey control point, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

## 3.3 TOPSOIL EXCAVATION

A. Excavate topsoil from areas to be further excavated, relandscaped, or regraded, without mixing with foreign materials for use in finish grading.

B. Do not excavate wet topsoil.

C. Stockpile in area designated on Site to depth not exceeding 8 feet and protect from erosion. Stockpile material on impervious material until disposal.

D. Remove excess topsoil not intended for reuse from Site.

## 3.4 SUBSOIL EXCAVATION

A. Excavate subsoil from areas to be further excavated, relandscaped, or regraded.

B. Do not excavate wet subsoil or excavate and process wet material to obtain optimum moisture content.

C. When excavating through roots, perform Work by hand and cut roots with sharp axe.

D. Remove excess subsoil not intended for reuse, from Site.

E. Benching Slopes: Horizontally bench existing slopes greater than 1: 4 to key placed fill material to slope to provide firm bearing.

F. Stability: Replace damaged or displaced subsoil as specified for fill.

3.5 FILLING

A. Fill areas to contours and elevations with unfrozen materials.

B. Place material in continuous layers as follows:
   1. Subsoil Fill: Maximum 12 inches compacted depth.
   2. Structural Fill: Maximum 8 inches compacted depth.
   3. Granular Fill: Maximum 8 inches compacted depth.

C. Maintain optimum moisture content of fill materials to attain required compaction density.

D. Make grade changes gradual. Blend slope into level areas.

E. Repair or replace items indicated to remain damaged by excavation or filling.

3.6 TOLERANCES

A. Top Surface of Subgrade: Plus or minus 1/10 foot from required elevation.

3.7 FIELD QUALITY CONTROL

A. Perform laboratory material tests according to ASTM D698.

B. Perform in place compaction tests according to following:
   1. Density Tests: ASTM D1556, ASTM D2167, or ASTM D6938.
   2. Moisture Tests: ASTM D6938.

C. When tests indicate Work does not meet specified requirements, remove Work, replace and retest.

D. Frequency of Tests: 1 every 2,000 sq. yd. and test compaction at every 8 in of thickness.

END OF SECTION

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# SECTION 31 23 16 – EXCAVATION

## PART 1 GENERAL

### 1.1 SUMMARY

A. Section Includes:
   1. Soil densification.
   2. Excavating for building foundations.
   3. Excavating for slabs on grade.
   4. Excavating for Site structures.

### 1.2 SUBMITTALS

A. Excavation Protection Plan: Describe sheeting, shoring, and bracing materials and installation, as required, to protect excavations and adjacent structures and property. Include structural calculations to support plan.

B. Shop Drawings: Indicate soil densification grid for each size and configuration footing requiring soils densification.

### 1.3 QUALITY ASSURANCE

A. Licensed Professionals Qualifications: Professional engineer experienced in design of specified Work and licensed in State of California.

## PART 2 PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

A. Perform Work according to:
   1. The State of California Department of Transportation standards.
   2. The Municipality of City of Fort Bragg Department of Public Works standards.

## PART 3 EXECUTION

### 3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, installation tolerances <Insert other specific conditions> and other conditions affecting performance of the Work.

## 3.2 PREPARATION

A. Call local utility line information service at 811 not less than three working days before performing Work.

B. Request that underground utilities be located and marked within and immediately surrounding construction areas.

C. Identify required lines, levels, contours, and data.

D. Existing Utilities: Protect from damage utilities indicated to remain.

E. Protect plant life, lawns, and other features designated to remain as portion of final landscaping.

F. Protect benchmarks, existing structures, fences, sidewalks, paving, curbs, and survey control points from excavating equipment and vehicular traffic.

G. Erect and maintain temporary barriers and security devices, including warning signs, warning lights, and similar measures, for protection of public, and existing improvements indicated to remain.

## 3.3 SOIL DENSIFICATION BY VIBRO-COMPACTION

A. Before excavating Site, vibro-compact substrates below bearing surfaces for footings as indicated.

B. Densify existing subsoils with existing relative density rating of "compact to dense" to attain relative density rating of "very dense."

C. Densify subsoils to depth of 1.5 feet.

D. Depth Vibrator:
   1. Type: Poker.
   2. Follower Tubes: Furnish visible marking every 12 inches to enable insertion depth measurement.
   3. Motion: Radial in horizontal plane.
   4. Data Acquisition System: Record amps or pressure of vibrator motor over time and depth.

E. Procedure: Perform densification in presence of geotechnical engineer, directly under each footing, with vibrator inserted in grid pattern at maximum 6 feet o.c.
   1. Arrange compaction grid for each footing for maximum number of insertion points, and with outermost insertion points within bearing area of footings.

2. Insert vibrator to maximum specified depth, densify soils for 30 seconds or other amount of time as directed by geotechnical engineer, and withdraw vibrator every 12 inches while repeating densification at each increment.

## 3.4 TOLERANCES

A. Maximum Deviation from Center of Completed Compaction: 8 inches from indicated position.

B. Maximum Deviation from Vertical: 4 degrees during vibrator insertion.

## 3.5 EXCAVATION

A. Underpin adjacent structures which may be damaged by excavation Work.

B. Excavate subsoil to accommodate building foundations, slabs on grade, Site structures, and construction operations.

C. Excavate to working elevation for piling Work.

D. Compact disturbed load-bearing soil in direct contact with foundations to original bearing capacity as specified in Section 31 23 23 "Fill" and Section 31 23 16.13 "Trenching".

E. Slope banks with machine to angle of repose or less until shored.

F. Do not interfere with 45-degree bearing splay of foundations.

G. Removal of Deleterious Materials:
   1. Remove lumped subsoil, boulders, and rock up to 1/3 cu. yd., measured by volume.
   2. Remove larger material as specified in Section 31 23 23 "Fill".
   3. Remove excess and unsuitable material from Site.

H. Correct over-excavated areas as specified in Section 31 23 23 "Fill".
   1. Remove excavated material from Site.
   2. Stockpile subsoil in area designated on Site to depth not exceeding 8 feet and protect from erosion.
   3. Stockpile excavated material in area designated on Site as specified in Section 31 05 13 "Soils for Earthwork".

I. Repair or replace items indicated to remain that have been damaged by excavation.

## 3.6 FIELD QUALITY CONTROL

A. Request visual inspection of bearing surfaces by Engineer before installing subsequent Work.

## 3.7 PROTECTION

A. Prevent displacement or loose soil from falling into excavation and maintain soil stability.

B. Protect bottom of excavations and soil adjacent to and beneath foundation from freezing.

C. Protect structures, utilities, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards that may be created by earth operations.

END OF SECTION

SECTION 312316.13 – TRENCHING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Compacted fill from top of utility bedding to subgrade elevations.
   2. Fill materials.
   3. Trench shoring shields or boxes.
   4. Temporary steel plates.
   5. Backfilling and compaction.

1.2 DEFINITIONS

A. Excavator: Any entity including, but not limited to, a person, partnership, joint venture, trust, corporation, association, public utility, company, or state or local government body or public agency which performs excavation operations, including the excavation of trenches.

B. Trench: An excavation which is narrow in relation to its length and deeper than it is wide, made more than three feet below grade, with width no greater than 15 feet as measured from the bottom.

C. Trench Shoring: The methods and equipment, including shores and props, used to brace the walls of a trench during excavation work and to prevent the trench walls from collapsing into the trench. Also referred to as trench bracing or trench lining.

D. Utility: Any buried pipe, duct, conduit, or cable.

1.3 SUBMITTALS

A. Excavation Protection Plan: Describe sheeting, trench shoring shields, and bracing materials and installation required to protect excavations and adjacent structures and property; include structural calculations to support plan.

B. Product Data: Submit data for sheeting, shoring, trench shoring shields, and geotextile fabric indicating fabric and construction.

C. Source Quality-Control Reports: For subsoil.

D. Material Test Reports: For each fill material, by a qualified testing agency.

E. Field Quality-Control Reports: For fill material placement and compaction.

1.4 QUALITY ASSURANCE

A. Furnish each coarse- and fine-aggregate material from single source throughout Work.

1.5 PROTECTION OF UNDERGROUND FACILITIES

A. The Contractor will conduct an investigation to assure that no damage to existing structures, drainage lines, utilities, or conduits will occur.

B. The Contractor is required to use caution when encountering active or abandoned utility structures to avoid possibly disturbing or damaging asbestos-containing materials (ACM), which may be present.

C. While the excavation is open, protect, support, or remove underground installations as necessary.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Perform Work according to:
   1. The State of California Department of Transportation standards.
   2. The Municipality of City of Fort Bragg Department of Public Works standards.
   3. Standards required by applicable permitting.

2.2 FILL MATERIALS

A. Subsoil Fill: Type S1 as specified in Section 31 05 13 "Soils for Earthwork".

B. Structural Fill: Type S2 as specified in Section 31 05 13 "Soils for Earthwork".

C. Granular Fill: Class 2 AB.

2.3 TRENCH SHORING SHIELDS OR BOXES

A. Provide professional engineer-certified, single-wall or double-wall modular trench shields or box shoring system.

B. Manufacturers:
   1. American Shoring Inc.
   2. ESC Trench Shoring.
   3. PRO-TEC Equipment.

4. Trench Shoring Company.

C. TEMPORARY STEEL PLATES
   1. Place temporary steel plates over all saw cuts and trenches in roadway areas that will be subjected to traffic during installations.
   2. Design the steel plates to size and thickness capable of supporting HS-20 loading, but not less than one inch thick.
   3. Submit design criteria and calculations that determine the sizes to be used to Engineer for approval.

## PART 3 EXECUTION

### 3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, installation tolerances and other conditions affecting performance of the Work.

### 3.2 LINES AND GRADES

A. Lay pipes and conduit to lines and grades as indicated.

B. Use laser-beam instrument with qualified operator to establish lines and grades.

C. Maintain grade alignment of pipe and conduit using string line parallel with grade line and vertically above centerline of pipe or conduit.
   1. Establish string line on level batter boards at intervals of not more than 25 feet.

### 3.3 PREPARATION

A. Call local utility line information service not less than three working days before performing Work.
   1. Request underground utilities to be located and marked within and surrounding construction areas.
   2. Provide adequate means of protecting utilities to remain in place during trench excavation operations.
   3. Should uncharted or incorrectly charted piping or other utilities be encountered during trench excavation, consult Architect/Engineer immediately for directions. Keep respective services and facilities in operation. Repair damaged utilities to the satisfaction of Engineer and Owner.

B. Establish temporary traffic control when trenching is performed in public right-of-way. Relocate controls and reroute traffic as required during progress of Work.

## 3.4 TRENCHING

A. Excavate subsoil required for utilities.

B. Remove lumped subsoil, boulders, and rock more than 1/6 cu. yd., measured by volume.

C. Perform excavation within 24 inches of existing utility service according to utility's requirements.

D. Do not advance open trench more than 200 feet ahead of installed pipe or conduit.

E. Cut trenches to width as indicated. Remove water or materials that interfere with Work according to OSHA 29 CFR 1926.650.

F. Provide uniform and continuous bearing and support for bedding material and pipe.

G. Do not interfere with 45-degree bearing splay of trench or foundations.

H. Slope side walls of excavation starting 2 feet above top of pipe or conduit. When side walls cannot be sloped, provide sheeting and trench shoring shields to protect excavation.

I. When subsurface materials at bottom of trench are loose or soft, excavate to greater depth as directed by Architect/Engineer until suitable material is encountered.

J. Correct over-excavated areas with compacted backfill as specified for authorized excavation or replace with fill concrete as directed by Engineer.

K. Remove from Site excess subsoil not intended for reuse.

L. Remove subsoil from Site.

M. Stockpile subsoil in area designated on Site to depth not exceeding 8 feet and protect from erosion.

N. Stockpile excavated material in area designated on Site according to Section 31 05 13 "Soils for Earthwork."

## 3.5 SHEETING, SHORING, AND TRENCH SHORING SHIELDS

A. Utilize sheeting, shoring, and trench shoring shields and brace excavations to prevent danger to persons, structures, and adjacent properties and to prevent caving, erosion, and loss of surrounding subsoil.

B. Support trenches more than 5 feet deep excavated through unstable, loose, or soft material. Provide sheeting, shoring, bracing, trench shoring shields, or other protection to maintain stability of excavation.

C. When sheeting is used, drive it ahead of the excavation operations to avoid the loss of material from behind the sheeting. Fill voids that occur outside of the sheeting with gravel borrow, thoroughly compacted.

D. Assemble and place trench shoring shields according to manufacturer's written instructions.

E. Design sheeting and shoring to be removed at completion of excavation Work.

F. Repair damage to new and existing Work from settlement, water pressure, earth pressure, or other causes resulting from inadequate sheeting, shoring, trench shoring shields, or bracing.

## 3.6 BACKFILLING

A. Backfill trenches to contours and elevations with unfrozen fill materials.

B. Place fill material in continuous layers and compact according to City of Fort Bragg Standard Detail Number 300.

C. Employ placement method that does not disturb or damage foundation perimeter drainage, and utilities in trench.

D. Protect open trench to prevent danger to the public.

## 3.7 FIELD QUALITY CONTROL

A. Perform laboratory material tests according to ASTM D1557.

B. Perform in place compaction tests according to the following:
   1. Density Tests: ASTM D1556, ASTM D2167, or ASTM D6938.
   2. Moisture Tests: ASTM D6938.

C. When tests indicate Work does not meet specified requirements, remove Work, replace, compact, and retest.

## 3.8 PROTECTION OF FINISHED WORK

A. Reshape and recompact fills subjected to vehicular traffic during construction.

END OF SECTION

# SECTION 31 23 19 – DEWATERING

## PART 1 GENERAL

### 1.1 SUMMARY

A. Section Includes:
   1. Dewatering equipment.
   2. Monitoring equipment.
   3. Accessories.

### 1.2 DEFINITIONS

A. Contractor's Engineered Design: A design prepared on behalf of Contractor by a registered Professional Engineer licensed in the State where the Project resides.

B. Dewatering:
   1. The lowering of ground water table and intercepting horizontal water seepage to prevent ground water from entering excavations, trenches, and tunnels.
   2. The reduction of piezometric pressure within strata to prevent failure or heaving of excavations, trenches, and tunnels.
   3. The disposal of removed water.

C. Ground Water Observation Well: A screened or slotted pipe with solid riser pipe installed in a drilled hole with the annulus around the pipe backfilled with sand and bentonite fill. Near-surface ground water levels are measured in the well.

D. NPDES: National Pollutant Discharge Elimination System.

E. Piezometer: A tube inserted into a vessel or pipe to indicate the height (pressure) that a liquid can rise in the tube.

F. Pitometer: A measuring device that transforms a differential pressure into an electrical output current proportional to the flow rate.

G. Surface Water Control: The removal of surface water within open excavations.

H. US EPA: United States Environmental Protection Agency.

### 1.3 SEQUENCING

A. Obtain required permits before start of dewatering operations.

B. Install and test monitoring systems minimum seven days before testing and operating dewatering systems.

C. Install and test dewatering and surface water control systems minimum seven days before starting excavation, trenching, and tunneling.

## 1.4 SUBMITTALS

A. Product Data:
   1. Dewatering equipment.
   2. Monitoring equipment.
   3. Accessories for dewatering and monitoring equipment.
   4. Submit sizes, capacities, priming method, and motor characteristics for dewatering pumps.

B. Shop Drawings:
   1. Indicate dewatering system layout, well depths, well screen lengths, dewatering pump locations, pipe sizes and capacities, grades, filter sand gradations, surface water control devices, valves, and water disposal method and location.
   2. Indicate primary and standby power system location and capacity.
   3. Indicate layout and depth of monitoring wells, piezometers, and flow measuring devices for system performance measurement.

C. Delegated Design Submittals:
   1. Submit signed and sealed Shop Drawings with design calculations and assumptions for dewatering equipment, monitoring equipment, and accessories.

D. Field Quality-Control Reports: For dewatering equipment, monitoring equipment, and accessories.

## 1.5 QUALITY ASSURANCE

A. Comply with authorities having jurisdiction for following:
   1. Drilling and abandoning of wells used for dewatering systems.
   2. Water discharge and disposal from pumping operations.

B. Obtain permit from EPA under National Pollutant Discharge Elimination System (NPDES) for stormwater discharge from Site.

C. Manufacturers Qualifications: Company specializing in manufacturing products specified in this Section with minimum three years' experience.

D. Installers Qualifications: Company specializing in performing Work of this Section with minimum three years' experience.

E. Licensed Professionals Qualifications:
   1. Professional engineer experienced in design of specified Work and licensed in State of California.
   2. Surveyor experienced in specified Work and licensed in State of California.

## PART 2 PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS AND DESIGN CRITERIA

A. Perform Work according to:
   1. The State of California Department of Transportation standards.
   2. The Municipality of City of Fort Bragg Department of Public Works standards.

B. Design:
   1. Comply with federal, state, and local codes, ordinances, regulations, and permits for disposal of discharge effluent and collected sediment.
   2. Provide means and measures to maintain total suspended solids and pH within permit requirements. Utilize sedimentation tanks, bag filters, or a combination thereof.
   3. Lower water table within areas of excavation to three feet below bottom of excavation to permit Work to be completed on dry and stable subgrade.
   4. Relieve hydrostatic pressures in confined water bearing strata below excavation.
   5. Prevent damage to adjacent properties, buildings, structures, utilities, and other facilities from construction operations.
   6. Prevent loss of fines, quick condition, or softening of foundation subgrade.
   7. Maintain stability of sides and bottoms of excavations and trenches, and face, walls, and bottoms of tunnels.
   8. Surface Water Control System: Collect and remove surface water and seepage entering excavation.

### 2.2 SYSTEM DESCRIPTION

A. Furnish dewatering and surface water control systems to permit Work to be completed on dry and stable subgrade.

B. Provide monitoring wells and monitoring equipment to obtain meaningful observations of conditions affecting excavation, adjacent structures.

C. Standby Equipment:
   1. Store at Site and ready for immediate use upon failure of dewatering equipment.
   2. Portable Electric Generators: One for each installed pump.

## 2.3 DEWATERING EQUIPMENT

A. Select dewatering equipment to meet specified performance requirements.

B. Dewatering Pumps, Option 1:
   1. Type: Portable centrifugal.
   2. Driver: Diesel engine.

C. Dewatering Pumps, Option 2:
   1. Type: Deep-well turbine.
   2. Driver: Power unit.

D. Dewatering Pumps, Option 3:
   1. Type: Submersible.
   2. Driver: Electric.

E. Dewatering Pumps, Option 4:
   1. Type: Jet eductor.
   2. Driver: Pressure pump.

F. Surface Water Pumps:
   1. Type:
      a. Self-priming.
      b. Centrifugal, with semi-open, clog-resistant impeller.
      c. Driver: Engine.
   2. Accessories:
      a. Screened suction hose.
      b. Discharge hoses as required.

G. Well Pump Power Units:
   1. Designed and equipped for continuous operation.
   2. Drive:
      a. Direct connection.
      b. Driver: Diesel engine, Gasoline engine, or Electric motor.

H. Drive and Coupling:
   1. Right-angle gear drive with 1:1 gear ratio.
   2. Coupling: Flexible type with flanged ends.

I. Pressure Header, Riser, and Return Pipe:
   1. Material: Steel.
   2. Wall Thickness: Schedule 40 Minimum.
   3. Strainer: Mounted at top of pressure riser.

4. Furnish valves to isolate each well and to pump of each well separately.

J. Pressure Pump and Recirculation Tank:
   1. As selected by Contractor to operate jet eductor pumps.
   2. Furnish pressure gages and tank overflow to measure flow from wells.

K. Well Point: Self-jetting type with integral well screen and ball valve or Sand-casing type.

L. Well Head: Furnish fitting at top of riser pipe, swing joint, flexible connection, and elbow fitting to header pipe.

M. Observation Pipe: Furnish minimum 12-inch length of transparent pipe between riser pipe and header pipe.

N. Pipe for Observation Wells: ASTM D1785, PVC Schedule 40 in minimum interior diameter of 2 inches and machine slotted having a maximum slot size of 0.020 inch.

O. Sedimentation Tanks and Bag Filters: Provide of sufficient size and capacity according to all permits obtained for the Project. Provide tanks containing baffles capable of reducing velocities.

P. Provide pH neutralization systems of sufficient size and capacity to handle the dewatering flows, and to maintain pH of the dewatering effluent according to the permits.

## 2.4 MONITORING EQUIPMENT

A. Piezometers:
   1. Sand filter or Push-in installation to monitor water elevation.
   2. Type: Standpipe, Pneumatic, Strain gage or Vibrating wire.
   3. Accessories: Signal cable and data recorder.

B. Flow Measurement Devices:
   1. Pitometer installed on discharge of pipe from each well.

C. Sonic Water Level Meter:
   1. Provide portable sonic water level meter with acoustic ranging instrument designed to measure depths up to 2,000 feet.
   2. Manufacturers:
      a. Solinst.
      b. Eno Scientific LLC.
      c. Global Waters.

## 2.5 ACCESSORIES

A. Valves and Fittings: Furnish valves and fittings as required to isolate each well from header pipe and to prevent loss of pump prime.

B. Grout: Mixture of portland cement and bentonite clay or sand suitable for sealing abandoned wells and piping.

C. Flowable Fill: Mix and deliver flowable fill according to ASTM C94, Option C. Provide cement content of 75 to 100 lb./cu. yd.

# PART 3 EXECUTION

## 3.1 EXAMINATION

A. Examine substrates, areas, and conditions for compliance with requirements installation tolerances and other conditions affecting performance of the Work.

B. Utility Service Locator:
   1. Call local utility service line information at 811 not less than three working days before performing Work.
   2. Request that underground utilities be located and marked within and immediately surrounding construction areas.

## 3.2 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by dewatering operations.

B. Install dewatering system to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.

## 3.3 MONITORING WELLS

A. Install monitoring wells at locations as indicated on Shop Drawings approved by Licensed Professional.

B. Test each monitoring well point to verify that installation is performing properly.

C. Install, calibrate, and test piezometers for proper operation.

D. Maintain accessibility to monitoring wells continuously during construction operations.

E. Maintain monitoring wells until ground water is allowed to return to normal level.

## 3.4 DEWATERING SYSTEM

A. Install dewatering system according to Licensed Professional approved Shop Drawings.
   1. Drilling:
   2. Drill wells in sizes and to depths as indicated.

B. Provide temporary surface casing if required.

C. Install sand casing in sizes as indicated by driving and jetting to indicated depth.

D. Install self-jetting well points in sizes as indicated by driving and jetting to indicated depth.

E. Fluid:
   1. While drilling and installing well, keep bore hole filled with natural or organic drilling fluid.
   2. Bentonite clay drilling fluid is not permitted.

F. Riser Pipe:
   1. Attach well screen to riser pipe.
   2. Insert well screen and riser pipe into well to indicated elevation.

G. Development:
   1. Test well for proper water flow through well screen and for pumping rate.
   2. Continue to develop well until it meets performance requirements.
   3. Cover and seal top of well until pump is installed.

H. Pumps:
   1. Install according to manufacturer instructions.
   2. Connect pumps to discharge header.
   3. Install valves to permit pump isolation.

## 3.5 SURFACE WATER CONTROL SYSTEM

A. Provide ditches, berms, and other devices to divert and drain surface water from excavation area.

B. Divert surface water and seepage water within excavation areas into sumps and pump water into storm drains according to requirements of authorities having jurisdiction.

C. Control and remove unanticipated water seepage into excavation.

## 3.6 SYSTEM OPERATION AND MAINTENANCE

A. Provide 24-hour supervision of dewatering system by personnel skilled in operation, maintenance, and replacement of system components.

B. System Failure: If dewatering system cannot control water within excavation, notify Architect/Engineer and stop excavation Work.

C. Modify dewatering and surface water control systems if operation causes or threatens to cause damage to new construction, existing Site improvements, adjacent property, or adjacent water wells.

D. Do not discontinue dewatering operations without approval of Engineer.

## 3.7 WATER DISPOSAL

A. Obtain discharge permit for water disposal from authorities having jurisdiction.

## 3.8 SYSTEM REMOVAL

A. Remove dewatering and surface water control systems after dewatering operations are discontinued.

B. Remove piezometers and monitoring wells.

C. Abandoned Wells:
   1. Fill with sand to within 15 feet of finished grade.
      a. Fill remainder of wells with grout.
   2. Cut off and cap abandoned wells minimum 36 inches below completed subgrade elevation.
      a. Fill abandoned piping with grout.

D. Repair damage caused by dewatering and surface water control systems.

## 3.9 FIELD QUALITY CONTROL

A. Testing:
   1. After dewatering system is installed, perform pumping test.
   2. Adjust pump speed, discharge volume, or both to ensure proper operation of each pump.

B. Monitoring and Recording:
   1. Daily:

a. Note average discharge flow rate for each deep well, eductor header, well point, and ground water elevation.
b. Continue monitoring daily until steady state conditions occur, then monitor and record conditions weekly.

2. Sand Content:
   a. Monitor ground water discharge for sand content.
   b. Sample and test water from each well weekly for sand content.
   c. Maximum Permitted Sand Content: 5 ppm.
3. Contaminates:
   a. Monitor ground water discharge for contamination while performing pumping in vicinity of potentially contaminated Sites.
   b. Sample and test water weekly for contaminates.
4. Existing Adjacent Buildings, Structures, and Improvements:
   a. Survey weekly during dewatering.
   b. Notify Engineer immediately of measured movement.

## 3.10 PROTECTION

A. Protect monitoring well standpipes from damage by construction operations.

END OF SECTION

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# SECTION 31 23 23 – FILL

## PART 1 GENERAL

### 1.1 SUMMARY

A. Section Includes:
   1. Fill.

### 1.2 SUBMITTALS

A. Product Data: For fill materials and geotextiles.

B. Source Quality-Control Reports: For subsoil.

### 1.3 QUALITY ASSURANCE

A. Manufacturers Qualifications: Company specializing in manufacturing products specified in this Section with minimum three years' documented experience.

B. Installers Qualifications: Company specializing in performing Work of this Section with minimum three years' experience.

C. Licensed Professionals Qualifications: Professional engineer experienced in design of specified Work and licensed in State of California.

## PART 2 PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

A. Perform Work according to:
   1. The State of California Department of Transportation standards.
   2. The Municipality of City of Fort Bragg Department of Public Works standards.

### 2.2 FILL

A. Subsoil Fill: Type S1, as specified in Section 31 05 13 "Soils for Earthwork".

B. Structural Fill: Type S2, as specified in Section 31 05 13 "Soils for Earthwork".

C. Granular Fill: Type A1, as specified in Section 31 05 16 "Aggregates for Earthwork".

D. Concrete:

1. Lean concrete.
2. Structural concrete.

## PART 3 EXECUTION

### 3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for, installation tolerances and other conditions affecting performance of the Work.

B. Verify inspection of subdrainage, dampproofing, and waterproofing installations.

C. Verify structural integrity of unsupported walls.

### 3.2 PREPARATION

A. Call local utility line information service at 811 not less than three working days before performing Work.
   1. Request underground utilities to be located and marked within and surrounding construction areas.

B. Identify required lines, levels, contours, and datum.

C. Protect utilities indicated to remain free from damage.

D. Compact subgrade to specified density requirements for subsequent backfill materials.

E. Soft Subgrade:
   1. Cut out soft areas of subgrade not capable of compaction in place.
   2. Backfill with structural fill and compact to density equal to or greater than specified requirements for subsequent fill material.

F. Protect benchmarks, survey control point, existing structures, fences, sidewalks, paving, and curbs during construction.

### 3.3 BACKFILLING

A. Backfill areas to contours and elevations.

B. Systematically backfill to allow maximum time for natural settlement.

C. Do not backfill over porous, wet, frozen, or spongy subgrade surfaces, and do not backfill with frozen materials.

D. Place fill material in continuous layers and compact according to City of Fort Bragg Standard Detail Number 300.

E. Use placement method that does not disturb or damage foundation perimeter drainage, or utilities in trench.

F. Maintain optimum moisture content of fill materials to attain required compaction density.

G. Structures:
   1. Backfill against supported foundation walls.
   2. Backfill simultaneously on each side of unsupported foundation walls until supports are in place.
   3. Slope grade away from building according to plans.

H. Make gradual grade changes and blend slope into level areas.

I. Remove surplus backfill materials from Site.

J. Leave fill material stockpile areas free of excess fill materials.

K. Install Work according to City of Fort Bragg standards.

3.4 TOLERANCES

A. Top Surface of Backfilling within Building Areas: Plus or minus 1 inch from required elevations.

B. Top Surface of Backfilling under Paved Areas: Plus or minus 1 inch from required elevations.

C. Top Surface of General Backfilling: Plus or minus 1 inch from required elevations.

3.5 FIELD QUALITY CONTROL

A. Inspections: Request visual inspection of bearing surfaces by Engineer before installing subsequent Work.

B. Testing:
   1. Laboratory Material Testing: Comply with ASTM D1557.
   2. In-Place Compaction Testing:
      a. Density Tests: Comply with ASTM D1556, D2167, or D6938.
      b. Moisture Tests: Comply with ASTM D6031.

3. If tests indicate that Work does not meet specified requirements, remove Work, replace, compact, and retest.
4. Proof-roll compacted fill surfaces under slabs on grade.

3.6 PROTECTION

A. Reshape and recompact fills subjected to vehicular traffic during construction.

END OF SECTION

# SECTION 32 12 16 – ASPHALT PAVING

## PART 1 GENERAL

### 1.1 SUMMARY

A. Section Includes:
   1. Asphalt materials.
   2. Aggregate materials.
   3. Aggregate subbase.
   4. Asphalt paving base course, binder course, and wearing course.
   5. Asphalt paving overlay for existing paving.
   6. Surface slurry.

### 1.2 SUBMITTALS

A. Product Data:
   1. Submit product information for asphalt and aggregate materials.
   2. Submit mix design with laboratory test results supporting design.

### 1.3 QUALITY ASSURANCE

A. Mixing Plant: Conform to City of Fort Bragg and Caltrans standards.

B. Obtain materials from same source throughout.

C. Perform Work in accordance with City of Fort Bragg and Caltrans standards.

### 1.4 AMBIENT CONDITIONS

A. Do not place asphalt when ambient air or base surface temperature is less than 40 degrees F, or surface is wet or frozen.

B. Place bitumen mixture when temperature is not more than 15 degrees F below bitumen supplier's bill of lading and not more than maximum specified temperature.

## PART 2 PRODUCTS

### 2.1 ASPHALT PAVING

A. Performance / Design Criteria:

B. Paving: Design for 60,000 lbs.

C. Asphalt Materials:
   1. Asphalt Binder: CALTRANS Standard Specifications Section 92, grade PG 64-16.
   2. Asphaltic Emulsion: CALTRANS Standard Specifications Section 94, grade PG 64-16.

D. Aggregate Materials:
   1. Aggregate for asphaltic concrete shall conform to Section 39 of the CALTRANS Standard Specifications.

E. Aggregate Subbase: conform to the Caltrans Standard Specifications.

2.2 MIXES

A. Hot Mix Asphalt:
   1. The bituminous concrete shall consist of mineral aggregate, uniformly mixed with bituminous material in a central plant in accordance with CALTRANS Standard Specifications Section 39. The mixing plant shall conform to the requirements of CALTRANS Standard Specifications Section.
   2. Asphalt Cement: Minimum 6 percent by weight.
   3. Reclaimed Asphalt Pavement (RAP): Not permitted.
   4. Mix Temperature: 275 - 375 degrees F.

B. Seal and Tack Coat Mixes:
   1. Aggregate for Slurry and Sand Seals:
      a. Clean natural or crushed sand, and mineral filler if required.
      b. As defined by Caltrans Standard Specifications, 100 percent passing No. 4 sieve.
   2. Slurry Seal Mix: mineral filler, and as follows:
      a. Asphalt Content: 20-25 percent by weight of dry aggregate.
      b. Water Content: 10-15 percent by weight of dry aggregate.
      c. Make sufficiently fluid to flow into cracks when applied.
   3. Fog Seal Mix: emulsified asphalt and water in ratio of 1:1.
   4. Sand Seal Mix: Fine aggregate in compliance with CALTRANS Standard Specifications Section 90 applied over asphaltic emulsion Grade CSS-1.
   5. Prime Coat Mix:
      a. Liquid asphalt from crude petroleum.
      b. Comply with CALTRANS Standard Specifications Section 93 and shall be grade SC-250.
      c. Prime coat must be 140 – 230 degrees F when applied.
   6. Tack Coat Mix:
      a. Emulsified asphalt and water in ratio of 1:3.
      b. Comply with CALTRANS Standard Specifications Section 94 and shall be type SS1 or RS1.
      c. Tack coat must be 285 – 350 degrees F when applied.

## 2.3 ACCESSORIES

A. Herbicide: Non-selective, approved by the Agency having jurisdiction.

B. Manhole and valve column adjustment rims: in accordance with the Drawings.

C. Paint
   1. Paint shall comply with Fed. Spec. TT-P-115, Type III, color as indicated.

# PART 3 EXECUTION

## 3.1 PREPARATION FOR BASE

A. Protection:
   1. Concrete walks, curbs and bases, and other improvements adjacent to the operations shall be protected.
   2. Contractor shall be responsible for damage caused by his employees or equipment and shall make necessary repairs.

B. Prepare subgrade surfaces in accordance with Section 31 23 23 – Fill and Compaction and 31 23 16 – Excavation.

C. Pavement Sawcutting:
   1. Initial Sawcutting:
      a. All initial pavement sawcutting shall be to the full width required for the excavation or base disturbance, and to the full depth of the pavement, regardless of depth. All pavement material inside the sawcut limits shall be completely removed.
      b. Initial pavement sawcuts shall be straight and shall provide clean, solid, vertical faces free from loose or cracked material. All damaged or disturbed adjoining pavement shall be sawcut and removed.
   2. Final Sawcutting:
      a. Final sawcutting is required where trenches, excavations, or road damage have disturbed the base beneath the pavement elevation.
      b. All final sawcutting shall be made 6" wider on all sides than the width of the excavation or disturbed base, to the full depth of the pavement, regardless of depth, and after excavations have been backfilled.
      c. All pavement material inside the sawcut limits shall be completely removed.
      d. Final sawcutting shall be performed on all cross-street and cross-corner culverts, curbs, gutters, sidewalks, driveways, as shown on the Plans, and as directed by the Engineer.

e. Final pavement sawcuts shall be straight and shall provide clean, solid, vertical faces free from loose or cracked material. All damaged or disturbed adjoining pavement shall be sawcut and removed. When possible, sawcuts shall be either parallel or perpendicular to the roadway centerline.
f. The number of jogs in the sawcut lines shall be held to minimum and shall be subject to approval by the Engineer. The Contractor may be required to remove additional undisturbed pavement if, in the opinion of the Engineer, the lines are too erratic or contain too many jogs.

## 3.2 SUBGRADE EXAMINATION

A. Verify compacted subgrade is dry and ready to support paving and imposed loads.

B. Proof-roll subgrade with two perpendicular passes to identify soft spots.

C. Remove soft subgrade and replace with compacted fill as specified in Section 31 23 23 – Fill and Compaction.

D. Verify subgrade has been inspected, gradients and elevations are correct.
1. Correct irregularities in subgrade gradient and elevation by scarifying, reshaping, and re-compacting.
2. Do not place sub-base on soft, muddy, or frozen surfaces.

## 3.3 AGGREGATE PLACEMENT

A. Sub-base:
1. Place and compact sub-base in accordance with Section 31 23 23 – Fill and Compaction.
2. Level and contour surfaces to elevations, profiles, and gradients indicated.
3. Use mechanical tamping equipment in areas inaccessible to compaction equipment.

B. Base:
1. Place base in accordance with requirements of Section 26 of the Standard Specifications and to the thickness shown in the Drawings.
2. Finish Surface:
a. Surface tolerance shall comply with Section 26 of the Standard Specifications.
b. The finish surface of base course, when tested for uniformity of slope, shall not deviate at any point more than 5/8 inch from bottom of a 10 foot straight edge laid in any direction.
c. When base course is constructed in more than one layer, specified smoothness requirements shall apply to top surface.

## 3.4 PREPARATION FOR PAVEMENT

A. Weed Control:
   1. One day before the application or placement of bituminous material on the base, the surface shall be sterilized with herbicide.
   2. Apply herbicide per manufacturer's recommendations.

B. Prime Coat:
   1. Prior to the application of the asphaltic concrete, apply a prime coat on the prepared compacted base at a uniform rate of 0.25 gal/sq yd in accordance with Sections 39 and 93 of the Standard Specifications.
   2. Apply liquid asphalt by pressure distributors.
   3. Use clean sand to blot excess primer.
   4. Allow sufficient time before placing the asphalt concrete to permit the prime coat asphalt to penetrate the prepared compacted base.

C. Tack Coat:
   1. Prior to placing tack coat on existing pavement surfaces, the existing surface shall be swept clean of all dirt and dust.
   2. Tack coat shall be applied to all paved surfaces against which new asphalt concrete pavement is to be placed.
   3. When being applied for paving fabric installation, tack coat shall extend 3 inches beyond the width of the paving fabric on all sides.
   4. Apply tack coat on asphalt or concrete surfaces at uniform rate of 0.1 gal/sq yd.
   5. Apply tack coat to contact surfaces of curbs, gutters, and other surfaces that pavement abuts.
   6. Coat surfaces of manhole catch basin, and valve frames with oil to prevent bond with asphalt pavement. Do not tack-coat these surfaces.

D. Protection:
   1. Protect concrete work, buildings, and other surfaces from overspray.

## 3.5 ASPHALT CONCRETE PAVEMENT

A. General
   1. The production, hauling, placing, compacting, and finishing of asphalt concrete shall conform to Section 39, Asphalt Concrete, of the Standard Specifications.
   2. Asphalt concrete placed within 3 feet of buildings shall be sloped a minimum of 2 percent to drain water away from structures unless shown otherwise on the Drawings.
   3. Deliver bituminous mixtures to the roadbed at temperatures specified in Section 39 of the Standard Specifications. Spread in accordance with Section 39 of the

Standard Specifications. Cover all loads with tarpaulin or other material during transportation.

4. Place asphalt in maximum 3 inch lifts.
5. Delivery and Placing Temperatures:
    a. Deliver and place asphalt concrete at 250 and 325 degrees F.
    b. Do not heat asphalt concrete above 350 degrees F.

B. Headerboards:
1. Boards shall be 2 x 6 inches secured in place using 2 x 4 x 24 inch minimum length stakes spaced not more than 6 feet apart.
2. All forms shall be set to true alignment and grade.
3. Headerboard and stakes shall be either redwood (rough sawn construction heart grade), Western red cedar or pressure treated Douglas fir, conforming to PS-20. Untreated headerboards shall be scored to prevent warping.
4. Earth shall be placed against the outside shoulder of the forms and compacted sufficiently to prevent forms from spreading during the compaction of the pavement.

C. Installation - Asphalt Pavement Single Course: for use in private ways and private parking areas.
1. Place asphalt within 24 hours of applying tack coat.
2. Place wearing course to 4 inch compacted thickness.
3. Install gutter drainage grilles and frames, manhole frames, and valve cover frames in correct position and elevation.
4. Compact pavement by rolling to specified density. Do not displace or extrude pavement from position. Hand compact in areas inaccessible to rolling equipment.
5. Perform rolling with consecutive passes to achieve even and smooth finish without roller marks.
6. Apply sand seal coat.

D. Installation - Placing Asphalt Pavement Double Course: for use in publicly travelled ways and publicly accessed parking areas.
1. Place asphalt binder course within 24 hours of applying primer or tack coat.
2. Place binder course to 3 1/2 inch.
3. Place wearing course within 24 hours of placing and compacting binder course. When binder course is placed more than 24 hours before placing wearing course, clean surface and apply tack coat before placing wearing course.
4. Place wearing course to 1 1/2 inch compacted thickness.
5. Install gutter drainage grilles and frames, manhole frames, and valve cover frames in correct position and elevation.
6. Compact each course by rolling to specified density. Do not displace or extrude pavement from position. Hand compact in areas inaccessible to rolling equipment.

7. Perform rolling with consecutive passes to achieve even and smooth finish, without roller marks.
8. Apply fog seal coat.

E. Paving at Catch Basins, Manholes, and Valves:
1. Ensure surface drainage to catch basins.
2. Ensure that surface runoff will not drain into manholes and valve chambers.
3. Do not pave over manholes or valve chambers. Adjust valve chambers and manhole rims to finished adjacent pavement elevation as indicated on Drawings.

F. Compaction
1. Initial or breakdown rolling and the final rolling of the uppermost layer of the asphalt concrete shall be in accordance with Section 39 of the Standard Specifications.
2. Compaction shall be completed before the temperature of the mixture drops below 200 degrees F.
3. The completed surface shall be thoroughly compacted, smooth, and free from ruts, humps, depressions, or irregularities. Any ridges, indentations or other objectionable marks left in the surface of the asphalt concrete by rollers, rakes, or other equipment shall be eliminated immediately.
4. Compaction by vehicular traffic shall not be permitted.

G. Protection of Pavement
1. After final rolling, no vehicular traffic of any kind shall be permitted on the pavement until it has cooled and hardened and in no case less than six hours.

## 3.6 SEALING

A. Fog Seal:
1. Apply fog seal at rate of 0.1 gal/sq yd, using pressure distributor.
2. Ensure seal is applied evenly.

B. Slurry Seal:
1. Wet surface immediately before application of slurry mixture.
2. Apply slurry mixture with spreader to depth not exceeding 1/4 inch.
3. Apply mixture evenly. Ensure penetration into scaled areas and cracks. Roll if necessary.

C. Sand Seal:
1. Apply asphalt material at rate of 0.04 gal/sq yd, using a pressure distributor.
2. Apply sand uniformly at rate of 0.10 cu ft/sq yd, using a mechanical spreader.
3. Roll sand until smooth and thoroughly compacted surface is obtained.

4. Apply sand seal continuously over seams where existing pavement meets new asphalt; extend the sand seal 6 inches over the existing pavement.

3.7 CLEAN UP

A. Remove loose pavement and aggregate from site.

B. Remove all spillage and over spray of liquid asphalt from pavement, sidewalks, buildings and other features.

C. Clean out manhole pits and ensure free operation of valves after completion of paving operations.

3.8 PAVED SURFACE TOLERANCES

A. Tolerances from design grades:
   1. Maximum variation from flat surface: 1/4 inch measured with 10 foot straight edge.
   2. Maximum variation from thickness: 1/4 inch.
   3. Maximum variation from elevation: 1/2 inch.

B. All surfaces must be sloped to achieve positive drainage without forming puddles.

C. Surface Tolerance for Streets:
   1. The finished surface of all permanent asphalt concrete shall not vary more than 0.01-foot in 12 feet when measured in a direction parallel to centerline. The transverse slope of the finished surface shall be uniform to a degree such that no depressions greater than 0.02 foot are present when tested with a straightedge 12 feet long laid in a direction transverse to the center line and extending from edge to edge of a 12 foot traffic lane.
   2. Any surfaces which fail to conform to this tolerance shall be removed by grinding in accordance with Section 42, “Groove and Grind Pavement,” of the Standard Specifications until the tolerance is met.

3.9 FIELD QUALITY CONTROL

A. Compaction testing will be performed by the Engineer.

B. When tests indicate Work does not meet specified requirements, remove Work, replace and retest.

C. Frequency of Tests: One test for every 1,000 sq yd of each layer compacted aggregate.

## 3.10 PROTECTION OF COMPLETED WORK

A. Keep vehicular traffic off newly paved areas until pavement surface temperature has cooled below 100 degrees F. Do not permit stationary loads on pavement until 24 hours after placement.

## 3.11 PAVEMENT REPAIRS

A. Cut existing pavement back to sound material in accordance with Part 3.1, C of this Section.

B. Excavate broken pavement and unsuitable base materials to a depth of 6 inches below design finished grade. Compact remaining gravel or subgrade to 95 percent relative compaction.

C. Place base material compacted to 95 percent relative compaction to underside of existing pavement or, if a thicker pavement layer is required by this Section, to a lower grade to accommodate the thicker pavement layer.

D. Spray tack coat on prepared gravel base and on vertical pavement edges at a rate of 0.05 gal/sq yd, using a pressure distributor.

E. Place hot mix asphalt in accordance with Part 3.5, C of this Section. Wearing course compacted thickness shall be the greater of 4 inches and the existing pavement thickness.

## 3.12 STRIPING PARKING AREA PAVEMENTS

A. Weather Limitations:
   1. Apply paint only when the pavement is dry. Paint shall not be applied when the atmospheric temperature is below 50 degrees F or under unfavorable wind conditions.

B. Preparation of Surface for Painting
   1. Allow new pavement surfaces to cure for a period of 21 days before paint application.
   2. Immediately before applying the paint, the pavement surface shall be thoroughly cleaned of all dust, dirt, scale, water, oil, grease or other objectionable matter. Solvent material that will damage pavement shall not be used as cleaning agents.
   3. Clean all pavement surfaces immediately prior to painting with a power broom and a power blower using compressed air following the sweeping.

C. Tolerances
   1. Marking and striping shall be within 2 inches of the alignment as shown.

2. Size of markings and strips shall be within 1/2 inch of the dimensions shown on the plans.

D. Application
   1. Immediately following the preparation of the pavement surface, the paint shall be applied with a traffic stripe-painting machine. The paint shall be applied at the rate of 100-110 sq ft/gal of paint. The stripe-painting machine shall have a compressor capacity of at least 105 cu ft and be capable of operating at an air pressure of 125 psi.

E. Paint
   1. The paint shall be mechanically agitated while the machine is in operation.
   2. The striping machine shall be equipped with a pointer so designed that the machine will hold exactly to the alignment.
   3. Clean paint container and spray nozzles on the machine before starting each day's work. The stripe shall be of the required width, with clean true edges and without sharp breaks.
   4. Repaint to the applicable specifications at Contractor's expense, any portion of the stripe damaged by any type of traffic within 24 hours after the stripe has been applied.

END OF SECTION

# SECTION 32 92 19 – SEEDING

## PART 1 GENERAL

### 1.1 SUMMARY

A. Section Includes:
   1. Fertilizing.
   2. Seeding.
   3. Hydroseeding.
   4. Mulching.
   5. Maintenance.

### 1.2 DEFINITIONS

A. Weeds: Vegetative species other than specified species to be established in given area.

### 1.3 SUBMITTALS

A. Product Data: Seed mix, fertilizer, mulch, and other accessories.

B. Manufacturer's Certificate: Products meet or exceed specified requirements.

### 1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: Include maintenance instructions.

### 1.5 QUALITY ASSURANCE

A. Provide seed mixture in containers showing percentage of seed mix, germination percentage, inert matter percentage, weed percentage, year of production, net weight, date of packaging, and location of packaging.

B. Perform Work according to City of Fort Bragg and Permitting standards.

C. Seed Supplier: Company specializing in manufacturing products specified in this Section with three years' experience.

D. Installer: Company specializing in performing Work of this Section with minimum three years' experience.

### 1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver seed mixture in sealed containers. Seed in damaged packaging is not acceptable.

B. Deliver fertilizer in waterproof bags showing weight, chemical analysis, and name of manufacturer.

1.7 MAINTENANCE SERVICE

A. Maintain seeded areas for three months from date of Substantial Completion.

PART 2 PRODUCTS

2.1 SEED MIXTURE

A. Furnish materials according to Permit Requirements and City of Fort Bragg standards.

2.2 ACCESSORIES

A. Mulching Material: Free from weeds, foreign matter detrimental to plant life, and dry.

B. Fertilizer: As required by the permits.

C. Lime: As required by the permits.

D. Water: Clean, fresh and free of substances or matter capable of inhibiting vigorous growth.

E. Erosion Fabric: Jute matting, open weave.

F. Stakes: Softwood lumber, chisel pointed.

G. String: Inorganic fiber.

2.3 SOURCE QUALITY CONTROL

A. Analyze to ascertain percentage of nitrogen, phosphorus, potash, soluble salt content, organic matter content, and pH value.

B. Provide recommendation for fertilizer and lime application rates for specified seed mix as result of testing.

C. Testing is not required when recent tests and certificates are available for imported topsoil. Submit these test results to testing laboratory. Indicate, by test results, information necessary to determine suitability.

## PART 3 EXECUTION

### 3.1 EXAMINATION

A. Verify prepared soil base is ready to receive Work of this Section.

### 3.2 FERTILIZING

A. Apply lime at application rate recommended by soil analysis.

B. Apply fertilizer at application rate recommended by soil analysis.

C. Apply after smooth raking of topsoil.

D. Do not apply fertilizer at same time or with same machine used to apply seed.

E. Mix fertilizer thoroughly into upper 2 inches of topsoil.

F. Lightly water soil to aid dissipation of fertilizer. Irrigate top level of soil uniformly.

### 3.3 SEEDING

A. Apply seed at rate recommended by permitting or manufacturer. Rake in lightly.

B. Do not seed areas in excess of that which can be mulched on same day.

C. Do not sow immediately following rain, when ground is too dry, or when winds are over 12 mph.

D. Roll seeded area with roller not exceeding 112 lb/linear ft.

E. Immediately following seeding, apply mulch to thickness of 1/8 inch. Maintain clear of shrubs and trees.

F. Apply water with fine spray immediately after each area has been mulched. Saturate to 4 inches of soil.

### 3.4 HYDROSEEDING

A. Apply fertilizer, mulch and seeded slurry with hydraulic seeder at rate of 6 – 8 lb per 1,000 sq ft evenly in one pass.

B. After application, apply water with fine spray immediately after each area has been hydroseeded. Saturate to 4 inches of soil and maintain moisture levels 2 to 4 inches.

## 3.5 SEED PROTECTION

A. Cover seeded slopes where grade is 4 inches per foot or greater with erosion fabric. Roll fabric onto slopes without stretching or pulling.

B. Lay fabric smoothly on surface, bury top end of each section in 6-inch-deep excavated topsoil trench. Overlap edges and ends of adjacent rolls minimum 12 inches. Backfill trench and rake smooth, level with adjacent soil.

C. Secure outside edges and overlaps at 36 inch intervals with stakes.

D. Lightly dress slopes with topsoil to ensure close contact between fabric and soil.

E. At sides of ditches, lay fabric laps in direction of water flow. Lap ends and edges minimum 6 inches.

## 3.6 MAINTENANCE

A. Water to prevent soil from drying out.

B. Immediately reseed areas showing bare spots.

C. Repair washouts or gullies.

D. Protect seeded areas with warning signs during maintenance period.

END OF SECTION

# SECTION 33 05 05.31 – HYDROSTATIC TESTING

## PART 1 GENERAL

### 1.1 SUMMARY

A. Section Includes: Hydrostatic testing of pressure piping.

### 1.2 SUBMITTALS

A. Submit following items prior to start of testing:
   1. Testing procedures.
   2. List of test equipment.
   3. Testing sequence schedule.
   4. Provisions for disposal of flushing and test water.
   5. Certification of test gage calibration.

B. Test and Evaluation Reports: Indicate results of piping tests.

C. Qualifications Statement:
   1. Qualifications for applicator.

### 1.3 QUALITY ASSURANCE

A. Perform Work according to City of Fort Bragg standard specifications.

B. Applicator: Company specializing in performing Work of this Section with three years' experience.

## PART 2 PRODUCTS

### 2.1 HYDROSTATIC TESTING

A. Equipment:
   1. Pressure pump.
   2. Pressure hose.
   3. Water meter.
   4. Test connections.
   5. Pressure relief valve.
   6. Pressure Gage: Calibrated to 0.1 psi.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that piping is ready for testing.

B. Verify that trenches are backfilled.

C. Verify that pressure piping thrust restraints have been installed.

3.2 FIELD QUALITY CONTROL

A. Testing of Pressure Piping:
   1. Test system according to AWWA C600 and following:
      a. Each valved section of pipe, or combined sections shall be subjected to a hydrostatic pressure of not less than 285 psi for 15 minutes, then 235 psi for 30 minutes for a total of 45 minutes.
      b. Slowly fill with water portion of piping to be tested, expelling air from piping at high points.
      c. Install corporation cocks at high points.
      d. Close air vents and corporation cocks after air is expelled.
      e. Raise pressure to specified test pressure.
      f. Observe joints, fittings, and valves undergoing testing.
      g. Remove and renew cracked pipes, joints, fittings, and valves that show visible leakage.
      h. Retest.
      i. Correct visible deficiencies and continue testing at same test pressure for additional two hours to determine leakage rate.
      j. Maintain pressure within plus or minus 5.0 psi of test pressure.
      k. Leakage is defined as quantity of water supplied to piping necessary to maintain test pressure during period of testing.
      l. Suitable means shall be provided by the Contractor so that the City can determine the quantity of water leakage under the test pressure.
   2. If testing of piping indicates leakage, locate source of leakage, make corrections, and retest until all leakage is stopped.

END OF SECTION

SECTION 33 05 07 – TRENCHLESS INSTALLATION OF UTILITY PIPING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Casing and jacking pipe.
   2. Steel tunnel liner.
   3. Carrier pipe.
   4. Excavation for approach trenches and pits.

1.2 SUBMITTALS

A. Product Data: Manufacturer information regarding tunnel liner plate, showing sizes, shapes, methods of attachment, connection details, and details of grout holes.

B. Shop Drawings:
   1. Details of casing, jacking head, sheeting, and other falsework for trenches and pits, and support for facility, field sketches, and other details to complete Work.
   2. Indicate relationship of proposed installation to natural features over installation, angle of installation, right-of-way lines, and general layout of built facilities.
   3. Cross-section(s) from field survey, showing installation in relation to actual profile of ground.
   4. Description of proposed construction plan, dewatering plan, and plan to establish and maintain vertical and horizontal alignments.

C. Manufacturer's Certificate: Products meet or exceed specified requirements.

D. Welder Certificates: Certify welders and welding procedures employed on Work, verifying AWS qualification within previous 12 months.

E. Delegated Design Submittals: Submit signed and sealed Shop Drawings with design calculations and assumptions for tunnel liner.

F. Submit Caltrans occupancy permit for installations under public throughways.

G. Submit emergency response procedures to handle situations when conduit is compromised and jeopardizes safety or integrity of installation.

H. Submit written report results of visual check of entire length of liner prior to installation of carrier to verify that there are no voids or defective joints.

I. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.

J. Qualifications Statements:
   1. Qualifications for installer and licensed professional.
   2. Welders: Qualify procedures and personnel according to AWS D1.1.

1.3 CLOSEOUT SUBMITTALS

A. Project Record Documents: Record actual locations of casing or tunnel liner, carrier pipe, and invert elevations.

1.4 QUALITY ASSURANCE

A. Perform Work according to AREMA, NUCA, and Caltrans guidelines.

B. Obtain occupancy permit when boring, jacking, or tunneling under or within rights-of-way of California highways and roads.

C. Installer: Company specializing in performing Work of this Section with minimum three years' experience.

D. Welders: AWS qualified within previous 12 months for employed weld types.

E. Licensed Professional: Professional engineer experienced in design of specified Work and licensed in State of California.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Storage:
   1. Store products according to manufacturer instructions.
   2. Use wooden shipping braces between layers of stacked pipe.
   3. Stack piping lengths no more than three layers high.
   4. Store field joint materials in original shipping containers.

B. Protection:
   1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
   2. Provide temporary end caps and closures on piping and fittings and maintain in place until installation.
   3. Protect piping systems from entry of foreign materials and water by installing temporary covers, completing sections of Work, and isolating parts of completed system.
   4. Provide additional protection according to manufacturer instructions.

1.6 AMBIENT CONDITIONS

A. Storage Temperature: Maintain 60 to 85 degrees F.

1.7 EXISTING CONDITIONS

A. Field Measurements:
   1. Verify field measurements prior to fabrication.
   2. Indicate field measurements on Shop Drawings.

PART 2 PRODUCTS

2.1 CASING AND JACKING PIPE

A. Manufacturers:
   1. Pipe Industries Corporation
   2. Southland Pipe & Supply Co
   3. Valiant Steel and Equipment, Inc.
   4. Or approved equal.

B. Steel Casing Pipe:
   1. Comply with ASTM A53.
   2. Minimum Yield Strength: 30,000 psi.
   3. Minimum Wall Thickness: 1/4 inch.
   4. Welded Joints:
      a. Comply with AWS D1.1.
      b. Full circumference.

C. Concrete Casing Pipe:
   1. Pipe:
      a. Comply with ASTM C76, Class V wall.
      b. Loading: Type C.
      c. Type: Reinforced.
   2. Joints:
      a. Comply with ASTM C443.
      b. Joints: Butt.
      c. Collar Bands: Steel or fiberglass-reinforced pipe.
      d. Sealing Ring: Elastomeric material.

D. Performance and Design Criteria:
   1. Casing Pipe and Tunnel Liner: Leakproof.

2. Bracing, Backstops, and Jacks: Of sufficient rating for continuous jacking without stopping except to add pipe sections, and to minimize tendency of ground material to freeze around casing pipe.

2.2 CARRIER PIPE

A. Site Water Distribution System Piping: As specified in Section 40 05 31.

2.3 MATERIALS

A. Soil Backfill for Trench Approaches and Pits to Finish Grade:
   1. Subsoil with no rocks 3 inches in diameter or greater, frozen earth, or foreign matter.

B. Filling and Sealing Grout at Pipe Ends: Concrete grout fill as specified in Section 03 60 00 - Grouting.

C. Pressure-Grout Mix: One part portland cement and six parts mortar sand, mixed with water to consistency applicable for pressure grouting.

D. Mortar Sand: Comply with ASTM C33.

E. Portland Cement:
   1. Comply with ASTM C150.
   2. Type: II.

2.4 ACCESSORIES

A. Timber Supports and Insulators:
   1. Description:
      a. Furnish notches to accommodate fastening.
      b. Treat notches at time of pipe installation.
   2. Wood Preservative or Pressure Treatment: Creosote; AASHTO M133.
   3. Species: Redwood.

B. Steel Strapping: Comply with ASTM A36.

C. Tunnel Liner Coating: Bituminous.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that connection to existing piping system, sizes, locations, and invert elevations are as indicated.

3.2 PREPARATION

A. Identify required lines, levels, contours, and datum locations.

B. Existing Utilities:
   1. Locate and identify utilities indicated to remain and protect from damage.
   2. Notify utility company to remove and relocate utilities.

C. Establish elevations of tunnel with not less than 3 feet of cover.

D. Maintain access to existing facilities and other active installations requiring access.

3.3 INSTALLATION

A. Dewatering:
   1. Intercept and divert surface drainage precipitation and ground water away from excavation through use of dikes, curb walls, ditches, pipes, sumps, or other methods.
   2. Comply with requirements of local and state authorities for dewatering to any watercourse, prevention of stream degradation, and erosion and sediment control.

B. Pits or Approach Trenches:
   1. Excavate approach trenches or pits according to installation plan, and as Site conditions require.
   2. Ensure that tunnel entrance faces as near perpendicular in alignment as conditions permit.
   3. Install excavation supports as specified in Section 31 23 16 - Excavation.

C. Casing Pipe:
   1. Boring:
      a. Push pipe into ground with boring auger rotating within pipe to remove soil.
      b. Do not advance cutting head ahead of casing pipe, except for distance necessary to permit cutting teeth to maintain clearance for pipe.
      c. Arrange machine bore and cutting head to be removable from within pipe.
      d. Arrange face of cutting head to provide barrier to free flow of soft material.

e. If unstable soil is encountered during boring, retract cutting head into casing to permit balance between pushing pressure and ratio of pipe advancement to quantity of soil.
f. Grout to fill voids if voids develop greater than OD of pipe by approximately 1/2 inch.
g. If boring is obstructed, relocate jack or tunnel as directed by Engineer.

2. Jacking:
   a. Construct adequate thrust wall normal to proposed line of thrust.
   b. Impart thrust load to pipe through suitable thrust ring sufficiently rigid to ensure uniform distribution of thrust load on full pipe circumference.
3. Drilling and Jacking:
   a. Use oil-field-type rock roller bit or plate bit made up of individual roller cutter units solidly welded to pipe.
   b. Turned and push pipe for its entire length by drilling machine to give bit necessary cutting action.
   c. Inject high-density slurry (oil field drilling mud) to head as cutter lubricant.
   d. Inject slurry at rear of cutter units to prevent jetting action ahead of pipe.
4. Mining and Jacking: Use manual hand-mining excavation from within casing pipe as casing is advanced with jacks, allowing minimum ground standup time ahead of casing pipe.

D. Carrier Pipe:
1. Clean, and inspect pipe.
2. Placement:
   a. Prevent damage to pipe joints as carrier pipe is placed in casing.
3. Supports:
   a. Support pipeline within casing such that no external loads are transmitted to carrier pipe.
   b. Attach supports to barrel of carrier pipe; do not rest carrier pipe on bells.
4. Grout ends of casing to seal.

## 3.4 TOLERANCES

A. Excavation: Do not overcut excavation by more than 3/8 inch greater than OD of casing pipe.

B. Casing Pipe Vertical and Horizontal Alignment: Plus or minus 3 inches prior to installation of carrier pipe.

C. Pipe Bells: Minimum 1/8-inch clearance to casing.

## 3.5 FIELD QUALITY CONTROL

A. Compaction Testing:
   1. Comply with ASTM D698.
   2. If tests indicate Work does not meet specified requirements, remove Work, replace, and retest.

## 3.6 CLEANING

A. Remove temporary facilities for installation and tunneling operations as specified in Section 01 50 00 - Temporary Facilities and Controls.

## 3.7 PROTECTION

A. Protect plant life, lawns, and other features.

B. Protect bench marks, survey control points, and fences from excavating equipment and vehicular traffic.

END OF SECTION

# SECTION 33 05 09.33 – THRUST RESTRAINT FOR UTILITY PIPING

## PART 1 GENERAL

### 1.1 SUMMARY

A. Section Includes:
   1. Tied joint restraint system.

### 1.2 SUBMITTALS

A. Product Data: Manufacturer catalog information for restrained joint details and installation instructions.

B. Shop Drawings:
   1. Restrained joint details and materials being used.
   2. Layout drawings showing piece numbers and locations.
   3. Restrained joint locations.

C. Manufacturer's Certificate: Products meet or exceed specified requirements.

D. Delegated Design Submittals:
   1. Submit signed and sealed Shop Drawings with design calculations and assumptions for restrained lengths.
   2. Submit joint restraint details.
   3. Use joint restraint devices specifically designed for applications described in manufacturer information.

E. Manufacturer Instructions: Installation requirements, including storage and handling procedures.

F. Qualifications Statement:
   1. Qualifications for manufacturer, fabricator, and licensed professional.

### 1.3 CLOSEOUT SUBMITTALS

A. Project Record Documents: Record actual locations of joint restraints.

### 1.4 QUALITY ASSURANCE

A. Perform Work according to City of Fort Bragg Standards

B. Manufacturer: Company specializing in manufacturing products specified in this Section with three years' experience.

C. Fabricator: Company specializing in fabricating products specified in this Section with three years' experience.

D. Licensed Professional: Professional engineer experienced in design of specified Work and licensed in State of California.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store materials according to manufacturer instructions.

B. Protection:
   1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
   2. Provide additional protection according to manufacturer instructions.

1.6 EXISTING CONDITIONS

A. Field Measurements:
   1. Verify field measurements prior to fabrication.
   2. Indicate field measurements on Shop Drawings.

PART 2 PRODUCTS

2.1 PERFORMANCE AND DESIGN CRITERIA

A. Provide pressure pipeline with restrained joints at each bend, tee, and change in direction.

2.2 TIED JOINT RESTRAINT SYSTEMS

A. Manufacturers:
   1. EBAA Iron, Inc.
   2. Romac Industries, Inc.
   3. Or approved equal.

B. Tie Bolts:
   1. Mechanical Joints or Mechanical and Flanged Joints on Pipe:
      a. Comply with ASTM A536.

C. Tie Nut:
   1. Description: Hex nut for each tie bolt and tie rods.
   2. Comply with ASTM A536.

D. Tie Coupling:
   1. Description: Extension of continuous-threaded rods.
   2. Provide with center stop to aid installation.

E. Tie Clamp:
   1. Description: Retainer clamp for ductile iron, asbestos-cement, and PVC push-on pipe.
   2. Location: In front of bell.

F. Tie Rod:
   1. Description: Continuous-threaded rod for cutting to desired lengths.

G. Tie Bar:
   1. Description: Steel bar used to restrain push-in plugs.

H. Tie Washer:
   1. Description: Round flat washers.

## PART 3 EXECUTION

### 3.1 EXAMINATION

A. Verify that pipe and fittings are ready to receive Work.

B. Field measure and verify conditions for installation of Work.

### 3.2 PREPARATION

A. Clean surfaces of pipe and fittings that are to receive tied joint restraint systems.

### 3.3 INSTALLATION

A. According to AWWA C600.

B. Install joint restraint system such that joints are mechanically locked together to prevent joint separation.

END OF SECTION

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# SECTION 33 05 63 – CONCRETE VAULTS AND CHAMBERS

## PART 1 GENERAL

### 1.1 SUMMARY

A. Section Includes
   1. Precast concrete vaults and chambers.
   2. Access hatches.

### 1.2 SUBMITTALS

A. Product Data: Manufacturer information regarding frames and covers, component construction, features, configuration, and dimensions.

B. Shop Drawings:
   1. Vault or chamber locations, elevations, sections, equipment supports, piping, conduit, and sizes and elevations of penetrations.
   2. Design, construction and installation details, typical reinforcement and additional reinforcement at openings and for each type, size, and configuration.

C. Concrete mix design for each different mix.

D. Manufacturer's Certificate: Products meet or exceed specified requirements.

E. Welder Certificates: Certify welders and welding procedures employed on Work, verifying AWS qualification within previous 12 months.

F. Delegated Design Submittals: Submit signed and sealed Shop Drawings with design calculations and assumptions for custom fabrications.

G. Manufacturer Instructions: Installation requirements, including storage and handling procedures.

H. Source Quality-Control Submittals: Indicate results of factory tests and inspections.

I. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.

J. Qualifications Statements:
   1. Qualifications for manufacturer, installer, and licensed professional.
   2. Manufacturer's approval of installer.
   3. Welders: Qualify procedures and personnel according to AWS D1.1.

## 1.3 QUALITY ASSURANCE

A. Obtain precast concrete vaults and chambers from single source.

B. Perform structural design according to ACI 318.

C. Perform Work according to NPCA Quality Control Manual for Precast and Prestressed Concrete Plants.

D. Material and Fabrication:
   1. Single-Cell Box Culverts: Comply with ASTM C1433.
   2. Other Structures: Comply with ASTM C913.

E. Welding:
   1. Structural Steel: Comply with AWS D1.1.
   2. Reinforcing Steel: Comply with AWS D1.4.

F. Perform Work according to City of Fort Bragg standards.

G. Manufacturer: Company specializing in manufacturing products specified in this Section with three years' experience.

H. Installer: Company specializing in performing Work of this Section with three years' experience.

I. Welders: AWS qualified within previous 12 months for employed weld types.

J. Licensed Professional: Professional engineer experienced in design of specified Work and licensed in State of California.

## 1.4 DELIVERY, STORAGE, AND HANDLING

A. Concrete Products: Do not deliver products until concrete has cured 7 days or has attained minimum 75 percent of specified 28-day compressive strength.

B. Storage:
   1. Store materials according to manufacturer instructions.
   2. Store vaults and chambers to prevent damage to Owner's property or other public or private property.
   3. Repair property damaged from materials storage.

C. Protection:
   1. Protect materials in clean location remote from construction operations areas.
   2. Provide additional protection according to manufacturer instructions.

1.5 EXISTING CONDITIONS

A. Field Measurements:
   1. Verify field measurements prior to fabrication.
   2. Indicate field measurements on Shop Drawings.

1.6 WARRANTY

A. Furnish five-year manufacturer's warranty for concrete vaults, chambers, and appurtenances.

PART 2 PRODUCTS

2.1 PERFORMANCE AND DESIGN CRITERIA

A. Minimum Loading: Comply with ASTM C857 and ASTM C890.

B. Roof Live Load, with Impact Loading:
   1. Heavy Traffic:
      a. Comply with AASHTO HB-17; HS20-44.
   2. Medium Traffic:
      a. Comply with AASHTO HB-17; HS15-44.
   3. Light Traffic:
      a. Comply with AASHTO HB-17; HS10.
   4. Walkway Traffic:
      a. Comply with ASTM C857; A-0.3.
      b. Maximum Loading: 300 psf.

2.2 PRECAST CONCRETE VAULTS AND CHAMBERS

A. Fabricator List:
   1. Oldcastle infrastructure
   2. Jensen Precast
   3. Or approved equal.

B. Material of Construction: Reinforced precast concrete.

2.3 ACCESS HATCHES

A. Manufacturers:
   1. BILCO Company
   2. U.S.F. Fabrication
   3. Or approved equal.

B. Description:
   1. Materials of Construction: Aluminum; welded.
   2. Size: As indicated.
   3. Door Configuration: As Indicated.
   4. Cover:
      a. Fabrication: Diamond plate.
      b. Reinforce with structural stiffeners as required to support indicated loads.
   5. Frame:
      a. Type: Channel.
      b. Furnish integral seat to support cover stiffeners.
   6. Hinge Material: Stainless steel.
   7. Lift Handle:
      a. Type: Flush drop; non-removable.
      b. Mounting: In cover.
   8. Lifting Mechanism:
      a. Compression Springs: Stainless steel.
      b. Furnish automatic hold-open and dead stop to retain cover in open position.
      c. Cover springs to prevent contact by personnel entering vault or chamber.
   9. Latch Mechanism:
      a. Lock: Stainless steel.
      b. Furnish external handle and permanent internal release mechanism.
   10. Hardware: Stainless steel.
   11. Finishes: Galvanized after fabrication.

## 2.4 MATERIALS

A. Concrete:
   1. Portland Cement:
      a. Comply with ASTM C150.
      b. Type: II.
   2. Fine and Coarse Aggregates: Comply with ASTM C33, except that gradation requirements do not apply.
   3. Water: Clean and not detrimental to concrete.

B. Admixtures:
   1. Manufacturers:
      a. Furnish materials according to FAA AC 150/5320-6E and FAA AC 150/5370-10F.
   2. Air Entrainment: Comply with ASTM C260.
   3. Chemical Admixtures:
      a. Comply with ASTM C494.
   4. Fly Ash: Comply with ASTM C618, Class F.
   5. Blast Furnace Slag: Comply with ASTM C989, Grade 100.

C. Concrete Reinforcement:
   1. Reinforcing Steel:
      a. Comply with ASTM A615.
      b. Yield Grade: 60 ksi.
      c. Billet Bars: Deformed.
      d. Finish: Galvanized.
   2. Reinforcing Wire:
      a. Plain Wire:
         1) Comply with ASTM A1064.
         2) Finish: Unfinished.
      b. Deformed Wire:
         1) Comply with ASTM A1064.
         2) Finish: Unfinished.
   3. Welded Steel Wire Fabric:
      a. Plain Wire:
         1) Comply with ASTM A1064.
         2) Finish: Unfinished.
      b. Deformed Wire:
         1) Comply with ASTM A1064.
         2) Finish: Unfinished.

2.5 FABRICATION

A. Comply with ACI 318 and NPCA Quality Control Manual for Precast and Prestressed Concrete Plants.

B. Fabricate vaults, chambers, and openings to size and configuration as indicated.

C. Forms:
   1. Fabricate to provide uniform precast concrete units with consistent dimensions.
   2. Clean after each use.

D. Reinforcing:
   1. Install reinforcement by tying or welding to make rigid assemblies.
   2. Position reinforcement to maintain minimum 3-inch cover.
   3. Secure reinforcement to prevent displacement while placing concrete.

E. Position and secure embedded items to prevent displacement while placing concrete.

F. Deposit concrete in forms and consolidate concrete without segregating aggregate.

G. Provide initial curing by retaining moisture using one of following methods:
   1. Cover with PE sheets.

2. Cover with burlap or other absorptive material and keep continually moist.
3. Apply curing compound according to manufacturer instructions.

H. Provide final curing according to manufacturer's standard.

I. Remove forms without damaging concrete.

2.6 MIXES

A. Concrete:
1. Normal Weight: Select proportions according to ACI 2111.1 and 318.
2. Concrete Criteria:
a. Compressive Strength: 3,000 psi at 28 days.
b. Water-Cement Ratio:
1) Concrete Exposed to Freezing and Thawing: Maximum 0.45 percent by mass.
2) Watertight Concrete Not Exposed to Freezing and Thawing: Maximum 0.6 percent by mass.
3) Concrete Exposed to Corrosive Conditions: 0.4 percent by mass.
c. Air Content:
1) Maximum Aggregate Size: According to ACI 318
3. Admixtures:
a. Provide admixture types and quantities indicated in concrete mix designs approved through submittal process.
b. Do not use calcium chloride.

2.7 FINISHES

A. Reinforcing Steel:
1. Galvanized Finish: Comply with ASTM A767, Class I.
2. Epoxy-Coated Finish: Comply with ASTM A775.

B. Wire and Wire Fabric:
1. Epoxy-Coated Finish: Comply with ASTM A884, Class A.

C. Concrete:
1. Formed Surfaces Not Exposed to View: As formed.
2. Unformed Surfaces:
a. Finish with vibrating screed or hand float.
b. Items Permitted: Color variations, minor indentations, chips, and spalls.
c. Items Not Permitted: Major imperfections, honeycomb, or other such defects.

D. Steel:

1. Galvanizing:
    a. Comply with ASTM A123.
    b. Hot-dip galvanize after fabrication.

## 2.8 ACCESSORIES

A. Grout:
1. Cement Type: Portland cement, sand, and water mixture with stiff consistency to suit intended purpose.
2. Non-shrink Type:
    a. Description: Premixed compound consisting of nonmetallic aggregate, cement, and water-reducing and plasticizing agents.
    b. Comply with ASTM C1107.
    c. Minimum Compressive Strength: 5,000 psi in 48 hours, and 15,000 psi in 28 days.

B. Touch-Up Primer for Galvanized Surfaces:
1. SSPC Paint 20, Type II Organic.
2. Comply with ASTM A780.

## 2.9 SOURCE QUALITY CONTROL

A. Testing:
1. Perform following tests for each 75 cu. yd. of concrete placed with minimum one set of tests each week:
    a. Slump: Comply with ASTM C143.
    b. Compressive Strength: ASTM C31 and ASTM C39.
    c. Air Content: Comply with ASTM C231 or ASTM C173.
    d. Unit Weight: Comply with ASTM C138.
2. Make test results available to Engineer upon request.

B. Inspection:
1. Visually inspect completed vaults and chambers for defects.
2. Repair defects on surfaces exposed to view to achieve uniform appearance.
3. Repair honeycomb by removing loose material and applying grout to produce smooth surface flush with adjacent surface.
4. Repair major defects only if permitted by Engineer.

C. Certificate of Compliance:
1. If manufacturer is approved by authorities having jurisdiction, submit certificate of compliance indicating Work performed at manufacturer's facility conforms to Contract Documents.

2. Specified shop tests are not required for Work performed by approved manufacturer.

## PART 3 EXECUTION

### 3.1 EXAMINATION

A. Verify that items provided by other Sections of Work are properly sized and located.

B. Verify correct size and elevation of excavation.

C. Verify that subgrade is properly prepared, compacted, and ready to receive Work of this Section.

### 3.2 PREPARATION

A. Mark each vault or chamber by indentation or using waterproof paint showing date of manufacture, manufacturer, and identifying symbols and numbers to indicate its intended use.

B. Coordinate placement of inlet and outlet pipe or duct sleeves required by other Sections.

C. Do not install vault or chamber if Site conditions induce loads exceeding weight capacity of vault or chamber.

D. Inspect vaults and chambers immediately prior to placement in excavation to verify that they are internally clean and free from damage; remove and replace damaged units.

### 3.3 INSTALLATION

A. According to ASTM C891.

B. Conduct operations not to interfere with, interrupt, damage, destroy, or endanger integrity of surface structures or utilities in immediate or adjacent areas.

C. While lowering vaults or chambers into excavations and joining pipe to units, take precautions to ensure that interiors of pipeline and structure remain clean.

D. Install vaults and chambers to elevation and alignment as indicated.

E. Excavating:
   1. As specified in Section 31 23 16 - Excavation and in indicated locations and depths.

2. Provide clearance around sidewalls of manhole or structure for construction operations.
3. If ground water is encountered, prevent accumulation of water in excavations; place manhole or structure in dry trench.
4. Remove large stones or other hard matter impeding consistent backfilling or compaction.
5. Where possibility exists of watertight manhole or structure becoming buoyant in flooded excavation, anchor manhole or structure to avoid flotation as approved by Engineer.
6. Correct over-excavation with fine aggregate.

F. Base and Alignment:
1. Install vaults and chambers supported at proper grade and alignment on compacted crushed-stone bedding.
2. Grout base of shaft to achieve slope to drain, trowel smooth, and contoured as indicated.

G. Assembly of Multi-section Structures:
1. Lower each section into excavation.
2. Clean joint surfaces.
3. Install watertight joint seals according to manufacturer instructions using gasket joints, external sealing bands, preformed joint sealants, or elastomeric joint sealants.

H. Frame and Cover and Access Hatch:
1. Set level, without tipping, to elevations as indicated.
2. Set cover and access hatch 2 inches above finished grade for structures located within unpaved areas to allow area to be graded away from cover.
3. Connect drain from access hatch frame to storm drainage system.
4. Touch up damaged galvanized coatings.

I. Installation Standards: Install Work according to FAA AC 150/5320-6E and FAA AC 150/5370-10F.

## 3.4 FIELD QUALITY CONTROL

A. Testing:
1. Vacuum Test: Comply with ASTM C1244.
2. Hydrostatic Exfiltration Test: According to manufacturer instructions.

END OF SECTION

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# SECTION 33 14 13 – PUBLIC WATER UTILITY DISTRIBUTION PIPING

## PART 1 GENERAL

### 1.1 SUMMARY

A. Section Includes:
   1. Pipe and fittings for public line, including raw water line.
   2. Pipe support systems.
   3. Bedding and cover materials.

### 1.2 SUBMITTALS

A. Product Data: Manufacturer information regarding pipe materials, pipe fittings, and valves.

B. Manufacturer's Certificate: Products meet or exceed specified requirements.

C. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.

D. Preconstruction Photographs: Digital files of photographs of Work areas and material storage areas.

E. Qualifications Statements:
   1. Qualifications for manufacturer and installer.

### 1.3 CLOSEOUT SUBMITTALS

A. Project Record Documents: Record actual locations of piping mains, valves, connections, thrust restraints, and [invert] [centerline] elevations.

B. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

### 1.4 QUALITY ASSURANCE

A. Valves: Mark valve body with manufacturer's name and pressure rating.

B. Materials in Contact with Potable Water: Certified according to NSF 61 and NSF 372.

C. Perform Work according to City of Fort Bragg standards.

D. Manufacturer: Company specializing in manufacturing products specified in this Section with three years' experience.

E. Installer: Company specializing in performing Work of this Section with three years' experience in installation of liner materials.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Storage:
   1. Store materials according to manufacturer instructions.
   2. Block individual and stockpiled pipe lengths to prevent moving.
   3. Do not place pipe or pipe materials on private property or in areas obstructing pedestrian or vehicle traffic.
   4. Store PE and PVC materials out of sunlight.

B. Protection:
   1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
   2. Provide additional protection according to manufacturer instructions.

1.6 EXISTING CONDITIONS

A. Field Measurements:
   1. Verify field measurements prior to fabrication.
   2. Indicate field measurements on Shop Drawings.

1.7 WARRANTY

A. Furnish five-year manufacturer's warranty for valves.

PART 2 PRODUCTS

2.1 WATER PIPING

A. Ductile-Iron Pipe:
   1. Comply with AWWA C151.
   2. Bituminous Outside Coating: Comply with AWWA C151.
   3. Pipe Lining: Comply with City of Fort Bragg Standards
   4. PE Encasement: Comply with AWWA C105.
   5. Pipe Class:
      a. Comply with AWWA C151.
      b. Class 50.
   6. Fittings:

a. Material: Ductile iron; comply with AWWA C110.
b. Coating and Lining:
1) Bituminous Coating: Comply with AWWA C110.
2) Cement-Mortar Lining: Comply with AWWA C104; double thickness.
3) Above ground piping – coat per Section 09 90 00 – Painting and Coatings.

7. Joints:
a. Mechanical and Push-on Joints: Comply with AWWA C111.
b. Restrained Joints: Boltless, push-on type, joint restraint independent of joint seal.
8. Jackets: PE; comply with AWWA C105.

B. PVC:
1. Comply with AWWA C900, Class 235.
2. Fittings: Comply with AWWA C900.
3. Joints:
a. Comply with ASTM D3139.
b. Seals: PVC flexible elastomeric.
c. Solvent-cement couplings are not permitted.

## 2.2 VALVES AND FIRE HYDRANTS

A. As specified in Section 33 14 19 - Valves and Hydrants for Water Utility Service.

## 2.3 PIPE SUPPORTS AND ANCHORING

A. Metal for Pipe Support Brackets:
1. Material: Structural steel.
2. Finish: Unfinished.
3. Coating: As specified in Section 09 90 00 – Painting and Coatings.

B. Metal Tie Rods and Clamps or Lugs:
1. Material: Galvanized steel.
2. Size: Comply with NFPA 24.
3. Coating: As specified in Section 09 90 00 – Painting and Coatings.

## 2.4 MATERIALS

A. Bedding and Cover:
1. Bedding: According to City of Fort Bragg Standard Detail No. 300.
2. Cover: According to City of Fort Bragg Standard Detail No. 300.
3. Soil Backfill from above Pipe to Finish Grade: According to City of Fort Bragg Standard Detail No. 300.

2.5 FINISHES

A. Steel: Hot-dip galvanized after fabrication, according to ASTM A123.

B. Protective Coating: As specified in Section 09 90 00 – Painting and Coatings.

2.6 ACCESSORIES

A. Thrust Restraints: As specified in Section 33 05 09.33 - Thrust Restraint for Utility Piping.

B. Air-Release Valves: According to City of Fort Bragg Standard Detail No. 530.

C. Vaults: As specified in Section 33 05 63 - Concrete Vaults and Chambers.

D. Steel Rods, Bolt, Lugs, and Brackets:
   1. Comply with ASTM A36 or A307.
   2. Material: Carbon steel, Grade A.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that existing utility water main size, location, and invert are as indicated.

3.2 PREPARATION

A. Preconstruction Site Photos:
   1. Take photographs along centerline of proposed pipe trench; minimum one photograph for each 100 feet of pipe trench.
   2. Show mailboxes, curbing, lawns, driveways, signs, culverts, and other existing Site features.
   3. Include Project description, date taken, and sequential number on back of each photograph.

B. Pipe Cutting:
   1. Cut pipe ends square, ream pipe and tube ends to full pipe diameter, and remove burrs.
   2. Use only equipment specifically designed for pipe cutting; use of chisels or hand saws is not permitted.
   3. Grind edges smooth with beveled end for push-on connections.

C. Remove scale and dirt on inside and outside before assembly.

D. Prepare pipe connections to equipment with flanges or unions.

## 3.3 INSTALLATION

A. Bedding:
   1. Excavation:
      a. As specified in Section 31 23 16 - Excavation.
      b. Hand trim for accurate placement of pipe to elevations as indicated.
   2. Dewater excavations to maintain dry conditions and to preserve final grades at bottom of excavation.
   3. Place bedding material at trench bottom, level fill materials according to City of Fort Bragg Standard Detail No. 300.

B. Piping:
   1. Comply with AWWA C605.
   2. Handle and assemble pipe according to manufacturer instructions.
   3. Steel Rods, Bolts, Lugs, and Brackets: Coat buried steel before backfilling.
   4. Dissimilar metals must maintain separation to prevent cathodic corrosion.
   5. Maintain horizontal separation between water main and sewer piping according to City of Fort Bragg code.
   6. Ductile-Iron Piping and Fittings: Comply with AWWA C600.
   7. Field Welding Materials: Comply with AWWA C206.
   8. Route pipe in straight line, and re-lay pipe that is out of alignment or grade.
   9. Bearing:
      a. Maintain bearing along entire length of pipe.
      b. Do not lay pipe in wet or frozen trench.
   10. Prevent foreign material from entering pipe during placement.
   11. Allow for expansion and contraction without stressing pipe or joints.
   12. Close pipe openings with watertight plugs during Work stoppages.
   13. Cover:
      a. Establish elevations of buried piping with not less than 3 feet of cover.
      b. Measure depth of cover from final surface grade to top of pipe barrel.

C. Valves and Hydrants: As specified in Section 33 14 19 - Valves and Hydrants for Water Utility Service

D. Tapping Sleeves and Valves: As indicated and according to manufacturer instructions.

E. PE Encasement:
   1. Encase piping in PE to prevent contact with surrounding backfill material.
   2. Comply with AWWA C105.

F. Thrust Restraints: As specified in Section 33 05 09.33 - Thrust Restraint for Utility Piping.

G. Backfilling:

1. Backfill around sides and to top of pipe with cover fill according to City of Fort Bragg Standard Detail No. 300.
2. Maintain optimum moisture content of bedding material to attain required compaction density.

H. Pipe Hangers:
1. Materials:
   a. Coating: Hot Dip Galvanized
2. Accessories:
   a. Each Pipe Bracket must use Iso Iso-Pipe tape to prevent galvanic reaction.

I. Installation Standards: Install Work according to City of Fort Bragg standards.

3.4 TOLERANCES

A. Install pipe to indicated elevation within tolerance of 1 inch.

3.5 FIELD QUALITY CONTROL

A. Testing:
1. Perform pressure test on piping according to City of Fort Bragg standards.
2. Compaction Testing:

B. Comply with City of Fort Bragg Standards.

C. Frequency of Compaction Tests: 1 every 2,000 sq yd and test compaction at every 8 in. of thickness.

D. If tests indicate Work does not meet specified requirements, remove Work, replace, and retest.

E.

END OF SECTION

# SECTION 33 14 19 – VALVES AND HYDRANTS FOR WATER UTILITY SERVICE

## PART 1 GENERAL

### 1.1 SUMMARY

A. Section Includes:
   1. Valves.
   2. Valve boxes.

### 1.2 SUBMITTALS

A. Product Data: Manufacturer information regarding component materials, fittings, assembly and parts diagram, and accessories.

B. Manufacturer's Certificate: Products meet or exceed specified requirements.

C. Manufacturer Instructions: Installation requirements, including storage and handling procedures.

D. Source Quality-Control Submittals: Indicate results of factory tests and inspections.

E. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.

F. Qualifications Statements:
   1. Qualifications for manufacturer and installer.
   2. Manufacturer's approval of installer.

### 1.3 CLOSEOUT SUBMITTALS

A. Project Record Documents: Record actual locations of valves.

### 1.4 MAINTENANCE MATERIAL SUBMITTALS

A. Tools: One tee wrench of required length to Owner.

### 1.5 QUALITY ASSURANCE

A. Materials in Contact with Potable Water: Certified according to NSF 61 and NSF 372.

B. Cast manufacturer's name, pressure rating, and year of fabrication into valve body.

C. Perform Work according to City of Fort Bragg standards.

D. Manufacturer: Company specializing in manufacturing products specified in this Section with three years' experience.

E. Installer: Company specializing in performing Work of this Section with three years' experience.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store materials according to manufacturer instructions.

B. Protection:
   1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
   2. Provide additional protection according to manufacturer instructions.

PART 2 PRODUCTS

2.1 VALVES

A. Performance and Design Criteria:
   1. Pressure Rating: 305 psig.
   2. End Connections: Mechanical joint.
   3. Coatings:
      a. Comply with AWWA C550.
      b. Application: Interior and exterior.

B. Resilient-Wedge Gate Valves:
   1. Manufacturers:
      a. Furnish materials according to City of Fort Bragg standards.
   2. Description:
      a. Comply with AWWA C509.
      b. Body: Ductile iron.
      c. Seats: Resilient.
      d. Stem:
         1) Type: Non-rising.
         2) Material: Bronze.
      e. Operation:
         1) Square operating nut.
         2) Opening Direction: Counterclockwise.

C. Swing Check Valves:
   1. Manufacturers:
      a. Apco CVS 6000

b. Or approved equal.

2. Description:
   a. Type: Swing, resilient seated, with outside lever and adjustable weight
   b. Size: 3 inches and larger.
   c. Comply with AWWA C508.
   d. Minimum Working Pressure: 150 psig.
   e. Maximum Fluid Temperature: 160 deg. F.
   f. Flow Area: Full open, equal to connecting nominal pipe diameter.
   g. Mounting: Horizontal.
   h. End Connections: Flanged, ASME B16.1 or Mechanical joint.
3. Materials:
   a. Body and Cover: Ductile iron, ASTM A536.
   b. Disc: Ductile iron, ASTM A536.
   c. Seat: Field replaceable, Type 316 stainless steel.
   d. Connecting Hardware: Type 316 stainless steel.

D. Plug Valve
1. Manufacturers:
   a. Clow Valve Company; a subsidiary of McWane, Inc.
   b. DeZURIK.
   c. Henry Pratt Company; a Mueller brand.
   d. Kennedy Valve Company; a division of McWane, Inc.
   e. Or approved equal
2. Description:
   a. Type:
      1) Non-lubricated.
      2) Eccentric.
   b. Minimum Port Area: 100 percent of nominal pipe area.
   c. Stem Bearings: Self-lubricating
   d. Stem Seals:
      1) Type: V-ring.
      2) Material: Neoprene.
   e. Packing and Gland: Accessible and externally adjustable.
3. Materials:
   a. Body: Cast Iron, ASTM A126.
   b. Plug: Ductile Iron, ASTM A-536.
   c. Seats:
   d. Stem: Type 316 Stainless Steel.
   e. Stem Bearings: Stainless Steel.
   f. Seals: PTFE.
   g. Connecting Hardware: Type 316 Stainless Steel.
4. Finishes: As specified in 09 90 00 – Painting and Coatings.

2.2 VALVE BOXES

A. Manufacturers:
   1. Furnish materials according to City of Fort Bragg standards.

2.3 ACCESSORIES

A. Thrust Restraints: As specified in Section 33 05 09.33 - Thrust Restraint for Utility Piping.

B. Valve Box Aligner: High-strength plastic device designed to automatically center valve box base and to prevent it from shifting off center during backfilling.

2.4 SOURCE QUALITY CONTROL

A. Provide shop inspection and testing of completed assembly.

B. Certificate of Compliance:
   1. If manufacturer is approved by authorities having jurisdiction, submit certificate of compliance indicating Work performed at manufacturer's facility conforms to Contract Documents.
   2. Specified shop tests are not required for Work performed by approved manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

A. Determine exact location and size of valves from Drawings.

B. Identify required lines, levels, contours, and datum locations.

C. Verify elevations prior to excavation and installation of valves.

3.2 PREPARATION

A. Locate, identify, and protect from damage utilities to remain.

B. Do not interrupt existing utilities without permission and without making arrangements to provide temporary utility services.
   1. Notify Engineer and City not less than 14 days in advance of proposed utility interruption.
   2. Do not proceed without written permission from Engineer.

## 3.3 INSTALLATION

A. Install valves in conjunction with pipe laying.

B. Provide buried valves with valve boxes installed flush with finished grade.

C. Provide support blocking and drainage gravel while installing fire hydrants; do not block drain hole.

D. Orientation:
   1. Set valves plumb.

E. Installation Standards: Install Work according to City of Fort Bragg standards.

F. Disinfection of Water Piping System: Flush and disinfect valves with water mains as specified in City of Fort Bragg Standards.

## 3.4 FIELD QUALITY CONTROL

A. Testing: Pressure test valves with water mains as specified in Section 33 14 13 - Public Water Utility Distribution Piping.

END OF SECTION

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# SECTION 40 90 00 – PROCESS CONTROL AND INSTRUMENTATION SYSTEMS

## PART 1 GENERAL

### 1.1 SECTION INCLUDES

A. The Contractor shall provide all Process Control and Instrumentation Systems (PCIS) complete and operable, in accordance with the Contract Documents. The Contractor shall provide the programming for the programmable logic controller (PLC), and configure the operator interface terminal (OIT), and radios. The on-site control system shall be complete and operable, without input from Owner's SCADA.

B. The Contractor shall provide Factory and Field Testing of the PLC Panel and associated hardware, including communication networks. Contractor shall have the PLC's and OIT's programmed and configured at the Factory Acceptance Test.

C. The requirements of Division 26 apply to all components of Division 40.

D. The requirements of this Section apply to all components of the PCIS unless indicated otherwise. PCIS shall include configuration and communication of data between radio and PLC via serial communications.

E. Responsibilities:
   1. The Contractor, through the use of an Instrumentation Supplier and qualified electrical and mechanical installers, shall be responsible for the furnishing of the PCIS and the integration of the PCIS with field instrumentation and control devices, and verification of their operation.
   2. The Contractor, via the Instrumentation Supplier, is responsible for all PLC Panel hardware and software programming, and for verification of PLC hardware inputs and outputs, and verification from field devices, and communication network cabling, and automatic operation and alarms and timers and counters and totalizers and OIT operation.
   3. The Instrumentation Supplier shall be responsible to the Contractor for the integration of the PCIS with devices provided under this and other sections, with the objective of providing a completely integrated control system free of signal and or communication incompatibilities. Owner is responsible for integration of facilities to off site SCADA system, but testing of communication system and verification of SCADA datapoints with PLC datapoints, shall be coordinated with and provided by Contractor.
   4. As a minimum, the Instrumentation Supplier shall perform the following work:
      a. Implementation of the PCIS.
         1) Prepare hardware and panel submittals.

2) Provide the PLC, OIT, radio, antenna cable, and antenna.
3) Program the PLC. Configure the OIT and radio.
4) Design, develop, and electronically draft Interconnect Diagrams, Instrument Installation Details, and PLC Panel Drawings (Elevation Drawing, Back Panel Layout Drawing, Schematic Diagrams, and Wiring Diagrams). Prepare drawings for submittal review and as-built record drawings. All drawings shall be done in PDF and AutoCAD format, and included as such for all submittals. Provide drawings specific for each site; typical drawings are not allowed.
5) Interconnect Diagrams shall include information required for installation of field cables between equipment. Interconnect Diagrams shall include cable quantities, cable insulation color, cable gauge, cable labeling information, termination block labels, conduit size, and conduit labels information. Show all pull boxes, handholes, j-boxes, etc. No wiring shall be pulled or terminated prior to approval of Interconnect Drawings. Interconnect Diagrams shall include same cables that are further detailed in Wiring Diagrams; hence Wiring Diagrams shall not be used for Interconnect Diagrams, and Interconnect Diagrams shall not be used for Wiring Diagrams.
6) Wiring Diagrams shall include information for each device connected to PLC input and output modules. Wiring Diagrams shall be provided for all discrete and analog signals, complete from field device, thru intermediate panels as applicable to final destination within PLC Panel. Wiring Diagrams shall include cable labeling information and termination block labels. If contact comes from motor control center schematic or vendor drawing, include reference of that as-built drawing number. Provide information for each instrument on Wiring Diagrams including manufacturer, model number, options, ranges, power supply and source.
7) Procure hardware and spare parts.
8) Fabricate panels in UL-508A listed facility. Provide factory UL-508A sticker in each panel.
9) Provide and submit PLC I/O List, with internal PLC register assignments for SCADA use, including any updates during the Construction phase and final approved edition.
10) Prepare and submit the PLC Panel Factory Acceptance Test procedures and certified results.
11) Prepare and submit Pre-Demonstration Testing procedures and results to confirm PLC inputs and outputs to field devices are functional.
12) Submit manufacturer certifications for installation of panels and instruments.
13) Submit Instrument Installation Details.
14) Submit Instrumentation Supplier certifications.

15) Prepare and submit Demonstration Testing (7 day) procedures and results to confirm facilities are functional.
16) Submit all testing results for review and inclusion in O&M Manuals.
17) Submit the training plan.
18) Perform instrumentation calibration and certify instrument installation and calibration by applying calibration sticker on instrument.
19) Document and certify: PLC hardware and programming, OIT hardware and configuration, PLC input and output testing, wiring (loop) testing, radio hardware and configuration, communication systems, and PCIS commissioning for readiness.
20) Work with Owner to verify control, monitoring and commands from Owner's remote site SCADA system. Include minimum of 1 day of electrical sub-contractor and minimum of 1 day of Instrumentation Supplier, to cover this verification work.
21) Prepare as-built drawings.
22) Prepare Operation and Maintenance Manuals in hardcopy and electronic (PDF) formants. As-built drawings shall be provided in PDF and AutoCAD formats. Include Factory and Field Test sheets in O&M Manuals. Refer to Section 260500 – Electrical Work, General for O&M formatting and complete checklist.
23) Conduct training classes on PLC Panel (PLC logic, OIT screens) and field instrumentation (configuration, maintenance).

b. Integration of the PCIS with instrumentation and control devices being provided under other sections including all vendor supplied equipment and systems;
   1) Design, develop and electronically draft Interconnection Diagrams and Wiring Diagrams associated with equipment provided under this and other Divisions of these Specifications.
   2) Resolve signal, power, or functional incompatibilities between the PCIS and interfacing devices.

5. The Instrumentation Supplier shall be Tesco Controls, Inc., Mr. Shain Thomas (916) 395-8800, Technical Systems Inc., Mr. Jon Rogers (707) 678-1111, Aqua Sierra Controls, or approved equal. To be an "approved equal" potential suppliers must submit company qualifications, and proof of three similar projects, with the three project owner's contact information, to the Owner and Engineer for review and possible approval. Qualification and experience submittal must be received no later than 14 calendar days prior to bid opening data and time to be considered for review.

1.2 CONTRACTOR SUBMITTALS

A. General: The Contractor shall submit Shop Drawings in accordance with Specifications and Section 260500 – Electrical Work, General, and as follows:
   1. The Contractor shall coordinate the instrumentation work so that the complete instrumentation and control system will be provided and will be supported by accurate shop drawings and record drawings.
   2. Symbology and Nomenclature: In these Contract Documents, all systems, all meters, all instruments, and all other elements are represented schematically, and are designated by symbology as derived from Instrument Society of America Standard ANSI/ISA S5.1 – Instrumentation Symbols and Identification. The nomenclature and numbers designated herein and, on the Drawings, shall be employed exclusively throughout shop drawings, and similar materials.

B. Shop Drawings
   1. General:
      a. All shop drawings shall include the letter head or title block of the Instrumentation Supplier. The title block shall include, as a minimum, the Instrumentation Supplier's registered business name and address, project name, drawing name, revision level, and personnel responsible for the content of the drawing.
      b. Organization of the shop drawing submittals shall be compatible with eventual submittals for later inclusion in the O&M Manual.
      c. Shop drawing information shall be bound in standard size, 3-ring, loose leaf, vinyl plastic, hard cover binders suitable for bookshelf storage. Binder ring size shall not exceed three (3) inches.
      d. All shop drawings shall be in hardcopy and electronic PDF along with AutoCAD drawings. Electronic submittal shall have both PDF and AutoCAD versions of all drawings.
   2. Hardware Submittal: The Contractor shall submit PCIS hardware submittals including:
      a. A complete index which lists each device as developed by the Contractor. A separate technical brochure or bulletin shall be included with each instrument data sheet. The data sheets shall be indexed in the submittal by specification section.
      b. Instrument Installation Details, showing mounting and anchoring details for each specific instrument shall be submitted in PDF format and an electronic AutoCAD version. Each instrument shall have a dedicated 8½-inch x 11-inch detail which only pertains to the specific instrument. Each detail shall be certified by the instrument manufacturer that the proposed installation is in accordance with the instrument manufacturer's recommendations and is fully warrantable.

c. Fully executed instrument data sheets according to ISA-S20 – Specification Forms for Process Measurement and Control Instruments, Primary Elements and Control Valves, for each component, together with a technical product brochure or bulletin. The technical product brochures shall be complete enough to verify conformance to all Contract Document requirements. The instrument data sheets, as a minimum, shall show:
    1) Component functional description.
    2) Manufacturer's model number or other product designation.
    3) Instrument tag number generated by the Contractor, or per Contract Drawings if shown.
    4) Project location or assembly at which the component is to be installed.
    5) Input and output characteristics.
    6) Scale, range, units, and mounting height.
    7) Requirements for electric supply (if any), communication protocol (if any), signals.
    8) Materials of component parts to be in contact with or otherwise exposed to process media and corrosive ambient air.
    9) Special requirements or features.
    10) Local supplier including contact name, phone number, and address.
d. Priced list of manufacturers recommended spare parts for all devices.
e. Priced list of Contractor-supplied spare parts for all devices.

3. Submit Drawings including: Interconnect Diagrams, PLC Panel Drawings (Elevation Drawing, Back Panel Layout Drawing, Schematic Diagrams, and Wiring Diagrams) and Instrument Installation Details. All drawings shall be done in 11-inch x 17-inch PDF and AutoCAD formats.
4. Submit PLC I/O List. Update and submit during construction phase when changes are made. Lists shall be done on Excel spreadsheets.
5. Submit understanding of Control Descriptions used for PLC programming, and color OIT screens in hard copy (PDF) format.
6. Submit electronic versions of programming and configuration files for PLCs and OITs.
7. Test Procedure Submittals: Submit the Factory Acceptance Test procedures, Pre-Demonstration testing procedures and Demonstration period testing procedures for approval. Submit results for review and inclusion in O&M Manuals. Include testing from SCADA system. All testing results to include an Owner or Engineer signature as witness.
8. Training Submittals: Submit a training plan which includes a schedule of training courses including dates, durations, and locations of each class. Provide resume of the instructor who will actually implement the plan.

C. Operation and Maintenance Manual

1. General: Information in the O&M Manual shall be based upon the approved shop drawing submittals as modified for conditions encountered in the field during the work. O&M Manual shall also include as-built Installation Details, and ISA Data sheets.
2. The O&M Manuals shall be organized and contain information as outlined herein and Section 260500 – Electrical Work, General.
3. Signed results from all Testing shall be included in O&M Manuals.
4. Training materials shall be included in O&M Manuals.
5. Completed O&M Manual Checklist, refer to Section 260500 – Electrical Work, General.

D. As-Built Drawings
1. All such drawings shall be submitted for review prior to beginning of Demonstration Testing.

PART 2 PRODUCTS

2.1 GENERAL

A. Code and Regulatory Compliance: All PCIS work shall conform to the Standards and Codes listed in Section 260500 – Electrical Work, General. Conflicts between the requirements of the Contract Documents and any codes or referenced standards or specifications shall be brought to the attention of the Engineer.

B. Hardware Commonality: All instruments which utilize a common measurement principle (for example, magmeters, float switches, hydrostatic level transducers, pressure transmitters) shall be furnished by a single manufacturer. All panel mounted instruments shall have matching style and general appearance. Instruments performing similar functions shall be of the same type, model, or class, and shall be from a single manufacturer.

C. Instrument and Loop Power: Power requirements and input/output connections for all components shall be verified. Power for transmitted signals shall, in general, originate in and be supplied by the PLC Panel devices. The use of "2-wire" transmitters is preferred, and use of "4-wire" transmitters shall be minimized.

D. Loop Isolators and Convertors: Signal isolators shall be provided as required to ensure adjacent component impedance match where feedback paths may be generated, or to maintain loop integrity during the removal of a loop component. Dropping precision wire wound resistors shall be installed at all field side terminations in the PLC Panels to ensure loop integrity. Signal conditioners and converters shall be provided where

required to resolve any signal level incompatibilities or provide required functions. Include isolation of all signal commons from the ground plane.

E. Environmental Suitability: All PLC Panels and instrument enclosures shall be suitable for operation in the ambient conditions associated with the locations designated in the Contract Documents. Heating, cooling, and dehumidifying devices shall be provided in order to maintain all instrumentation devices 20 percent within the minimums and maximums of their rated environmental operating ranges. The Contractor shall provide all power wiring for these devices. Enclosures suitable for the environment shall be furnished.

F. PLC Panel Power Supplies: PLC Panels shall be provided with parallel, two 24VDC batteries, and battery charger.

G. PLC Panels shall have field wiring terminal strip, dedicated to terminate all field wiring. Field wiring shall not be wired direct to control devices or PLC, but terminate on field terminal strip.

H. PLC hardware digital output shall be wired to interposing relays. Interposing relays shall have ampacity ratings of 150% of connected load.

I. Block and Bleed: All pressure gauges, pressure switches, and pressure transmitters, shall be furnished with valves such that the device may be blocked off from the process stream and the trapped fluid and/or air bled off. Block and bleed valves are not shown on drawings but required for all installations of pressure gauges, pressure switches, and pressure transmitters.

## 2.2 OPERATING CONDITIONS

A. The PCIS shall be designed and constructed for satisfactory operation and long, low maintenance service under the following conditions:
   1. Environment – raw water pump station. Marine atmosphere. 500’ Elevation.
   2. Temperature Range – 20 through 104 degrees F
   3. Relative Humidity – 20 through 90 percent, non-condensing

## 2.3 SPARE PARTS AND SPECIAL TOOLS

A. All spare parts and special tools shall be provided on site before startup commences, suitably wrapped and identified.

B. Refer to Section 261419 – Low Voltage Motor Control Center for further spare part requirements.

## 2.4 FACTORY ACCEPTANCE TESTING

A. The Contractor shall arrange for the manufacturers of the equipment and fabricators of PLC Panels supplied under this Section to allow the Engineer and Owner to inspect and witness the testing of the equipment at the site of fabrication. Equipment shall include the PLC Panel (includes PLC, OIT, radio), and other pertinent systems and devices.

B. A minimum of 10 working days' notification shall be provided to the Engineer prior to witnessed testing. No shipments shall be made without the Engineer's approval.

C. PLC program and OIT configuration shall be functional as part of PLC Panel Factory Acceptance Test (FAT). PLC registers shall be confirmed with Owner for their off-site SCADA system configuration.

D. Verification of the previously submitted and approved PLC I/O List shall be done during FAT. Owner shall provide desired instrument ranges and setpoints at the FAT for field configuration of instruments.

E. FAT shall verify operation of the facility based on Process Control Descriptions and submitted and approved understanding and OIT screens.

F. FAT shall confirm communications between PLC and OIT, PLC and radio.

## 2.5 INSTRUMENT IDENTIFICATION AND NAMEPLATES

A. The Contractor is responsible to submit list of field instruments, each with tag inscription and tag materials for approval by the Owner and the Engineer. Tags shall be engraved stainless steel plates, with 1/8-inch lettering, unless shown otherwise.

B. PLC Panels, panel devices, and all panel mounted equipment shall have engraved phenolic nameplates. Inscriptions and nameplate materials shall be provided during submittal review stage.

## 2.6 FIELD TESTING

A. The Contractor shall arrange for the manufacturers of the equipment and fabricators of PLC Panels supplied under this Section and other Divisions, to facilitate in field testing.

B. Submit all test forms for approval three weeks prior to testing. Testing to confirm operation, monitoring, control, setpoints, alarms for every input and output and SCADA database point.

C. Provide two weeks (minimum) notification of Field Tests to Engineer. Field tests shall be witnessed and signed off by the Engineer to be considered complete. Any test results without the Engineer's signature are considered invalid and will be done again.

## PART 3 EXECUTION

### 3.1 PRODUCT HANDLING

A. Shipping Precautions: After completion of shop assembly, and acceptable factory testing, all equipment and panels shall be packed in protective crates and enclosed in heavy duty polyethylene envelopes or secured sheeting to provide complete protection from damage, dust and moisture. Dehumidifiers and desiccants, shall be placed inside the polyethylene coverings. The equipment shall then be skid-mounted for final transport. Lifting rings shall be provided for moving without removing protective covering. Boxed weight shall be shown on shipping tags together with instructions for unloading, transporting, storing and handling at the job site.

B. Special Instructions: Special instructions for proper field handling, storage and installation required by the manufacturer shall be securely attached to each piece of equipment prior to packaging and shipment.

C. Storage: Equipment shall not be stored outdoors. Equipment shall be stored in dry permanent shelters, including in-line equipment, and shall be adequately protected against mechanical injury. If any apparatus has been damaged, such damage shall be repaired by the Contractor at no additional cost to the Owner. If any apparatus has been subject to possible injury by water, it shall be replaced, at no cost to the Owner, even if stored on premise with approval.

### 3.2 MANUFACTURER'S SERVICES

A. The Contractor shall furnish the following manufacturer's services for the instrumentation listed below provided during the Pre-Demonstration period:
   1. Perform bench and field calibrations.
   2. Submit for approval installation details for all instruments. Verify criteria prior to installation which shall affect operation such as: upstream/downstream straight pipe lengths for flow meters, stilling wells, pressure switch settings, mounting hardware, etc.
   3. Oversee installation. Verify installation of installed instrument. Certify installation and reconfirm the manufacturer's accuracy statement. Apply company certification sticker on instrument.
   4. Coordinate and conduct testing, prepare testing sheets, and certify testing.

5. Train the Owner personnel on configuration and maintenance of field instrumentation.

B. Manufacturer's services shall be furnished for the following equipment:
   1. All in line flow measuring devices, Specification 409100 –Process Measurement Devices.
   2. All level measuring systems, Specification 409100 – Process Measurement Devices.
   3. All pressure measuring systems, Specification 409100 – Process Measurement Devices.

3.3 INSTALLATION

A. General
   1. All instrumentation, including instrumentation furnished under other Divisions, shall be installed under Division 40 and the manufacturers' instructions. All instruments and equipment shall be tagged.
   2. Equipment Locations: The monitoring and control system configurations indicated are diagrammatic. The locations of equipment are approximate. The exact locations and routing of conduit and cables shall be governed by structural conditions and physical interferences and by the location of electrical terminations on equipment. All equipment shall be located and installed so that it will be readily accessible for operation and maintenance. Where job conditions require reasonable changes in approximated locations and arrangements, or when the Owner exercises the right to require changes in location of equipment which do not impact material quantities or cause material rework, the Contractor shall make such changes without additional cost to the Owner.

B. Conduit, Cables, and Field Wiring
   1. All conduit shall be provided under Division 26 without delay to the Work of Division 40.
   2. All 4-20 mA signal circuits, process equipment control wiring, signal wiring to field instruments, PLC input and output wiring, and other field wiring and cables shall be provided under Division 26.
   3. All conduits within panels shall be duct sealed.

C. Instrumentation Tie-Downs: All instruments, PLC Panels, and equipment shall be anchored by methods which comply with seismic requirements applicable to the site.
   1. Battery chargers, batteries, and radios shall be strapped down to shelves, installed within PLC Panels. Straps to be removable so components can be replaced.

D. Ancillary Devices: The Contractor shall be responsible for providing any additional or different type connections as required by the instruments and specific installation requirements at no additional cost to the Owner to provide a complete and operational

system. All such additions and all such changes, including the proposed method of installation, shall be submitted to the Engineer for approval prior to commencing the work. Such changes shall not be a basis of claims for extra work or delay.

E. Installation Criteria and Validation: All field-mounted components and assemblies shall be installed and connected according to the requirements below:
   1. Installation personnel have at least one copy of the approved shop drawings and installation detail.
   2. All mounting stands and bracket materials and workmanship shall comply with requirements of the Contract Documents.
   3. Verify the correctness of each installation, including polarity of electric power and signal connections, and making sure all process connections are free of leaks. The Contractor shall certify in writing that for each loop or system checked out, all discrepancies have been corrected.
   4. Confirm that communication networks are installed properly. Communication networks functionality shall be confirmed by Owner.

## 3.4 CALIBRATION

A. General: All devices provided under Division 40 shall be calibrated and ranges set, according to the manufacturer's recommended procedures to verify operational readiness and ability to meet the indicated functional and tolerance requirements. Work shall be completed during Pre-Demonstration period.

B. Calibration Points: Each instrument shall be calibrated at 0, 10, 50, 90 and 100 percent of span using test instruments to simulate inputs. The test instruments shall have accuracies traceable to National Institute of Testing Standards.

C. Field Calibration: Instruments shall be calibrated in the field to ensure proper operation in accordance with the instrument loop diagrams or specification data sheets.

D. Calibration Sheets: Calibration sheets to be submitted prior to start-up of any system or subsystem. Each instrument calibration sheet shall provide the following information and a space for sign-off on individual items and on the completed unit:
   1. Project name.
   2. Tag number.
   3. Manufacturer.
   4. Model number.
   5. Serial number.
   6. Calibration range.
   7. Calibration data: Input, output, and error at 10 percent, 50 percent and 90 percent of span.
   8. Switch setting, contact action, and deadband for discrete elements.

9. Space for comments. Confirm conduit, cable tags, and instrument tags are installed.
10. Space for approval sign-off by Instrumentation Supplier and date. Provide sticker on instrument that it has been calibrated by supplier and ready for service.

3.5 FIELD TESTING

A. Field shall be provided by the Contractor and approved by the Owner and Engineer. The Contractor shall notify the Engineer of scheduled tests a minimum of 10 calendar days prior to the testing date. The Field testing shall be witnessed by the Owner and Engineer. Field testing shall not begin until NETA Field Testing per Division 26 has been completed, conduits tagged, cables labeled, and instruments calibrated. Field Testing shall be completed during Pre-Demonstration period. Contractor to show on schedule two weeks for Owner to program off-site SCADA system prior to Field Testing but after the site is completely wired, NETA tested, and energized. Owner programming work shown on Contractor schedule, shall not overlap between facilities.

B. Interlocks: All hardware and software interlocks between the instrumentation and the motor control circuits, control circuits, interlocks, and packaged equipment controls shall be checked to the maximum extent possible.

C. Field Loop Testing shall be provided by the Contractor and Instrumentation Supplier. All control loops shall be checked under simulated operating conditions by impressing input signals at the primary control elements and observing appropriate responses of the respective control and monitoring elements, virtual points, final control elements, and back to Owner's SCADA system. Actual signals shall be used wherever available. Following any necessary corrections, the loops shall be retested. Specified accuracy tolerances for each analog network are defined as the root-mean-square-summation of individual component accuracy requirements. Individual component accuracy requirements shall be as indicated by Contract requirements or by published manufacturer accuracy specifications, whenever Contract accuracy requirements are not indicated. Each analog network shall be tested by applying simulated analog or discrete inputs to the first element of an analog network. For networks which incorporate analog elements, simulated sensor inputs corresponding to 0, 10, 50, 90 and 100 percent of span shall be applied, and the resulting element outputs monitored to verify compliance to accuracy tolerance. Provisional settings shall be made on controllers and alarms during analog loop tests.

D. Loop Testing shall be provided for each instrument or device. Loop Testing shall also be provided for each PLC I/O hardwired point. Loop Testing shall be considered approved once forms have been initialed from Contractor's tester and the Owner or Engineer. Loop Testing shall utilize approved Schematic Diagrams, Interconnect Diagrams, and PLC Wiring Diagrams as part of testing procedures and verification process.

## 3.6 PRE-COMMISSIONING ACTIVITIES

A. General: Pre-commissioning activities shall commence after acceptance of all Field testing and all inspections have demonstrated that the instrumentation and control systems comply with all Contract requirements. Pre-commissioning shall demonstrate proper operation of all systems with process equipment operating over full operating ranges under conditions as closely resembling actual operating conditions as possible.

B. Pre-commissioning Operational Validation: Where feasible, pre-commissioning activities shall establish service conditions that simulate, to the greatest extent possible, normal final control element operating conditions in terms of applied process loads, operating ranges, normal and back-up controls and power sources, and environmental conditions. All hardwired and software control circuit interlocks and alarms shall be operational. The control of final control elements and ancillary equipment shall be tested using both manual and automatic control circuits.

C. Pre-commissioning Certification: The Contractor shall submit an instrumentation and control system pre-commissioning completion report which shall state that all Contract requirements have been met and shall include a listing of all instrumentation and control system maintenance and repair activities conducted during the pre-commissioning testing. Acceptance of the instrumentation and control system pre-commissioning testing must be provided in writing by the Engineer before the Demonstration Testing may begin.

## 3.7 ON-SITE SUPERVISION

A. The Contractor shall furnish the services of an on-site engineer or technician to supervise and coordinate installation, adjustment, testing, programming, configuration, and start-up of the PCIS.

## 3.8 TRAINING

A. General: The Contractor shall train the Owner’s personnel on the operation, maintenance, calibration and repair of some instrumentation provided under this Contract, as well as overview of control system including OIT screen operations.

B. Instructions: The training shall be performed by qualified representatives of the equipment manufacturers and shall be specific to each piece of equipment.

C. Duration: Each training class shall be a minimum of four hours in duration and shall cover, as a minimum, operational theory, maintenance, troubleshooting/repair, and calibration. Training classes shall be provided for flow meters, hydrostatic level

transducer, pressure switches, and overview of facility control system; for a total of two 4-hour classes. Classes shall not be held on same day.

D. Schedule: Training shall be performed during the pre-commissioning phase of the project. The training sessions shall be scheduled a minimum of two weeks in advance of when the courses are to be initiated. The Owner and the Engineer will review the course outline for suitability and provide comments that shall be incorporated.

E. Agenda: The training shall include operation and maintenance procedures, troubleshooting with necessary test equipment, and changing set points, and calibration for that specific piece of equipment.

F. Documentation: Within 10 days after the completion of each session, the Contractor shall submit the following:
   1. A list of all Owner personnel that attended the session.
   2. An electronic copy of the training materials utilized during the lesson with all notes, diagrams, and comments.

3.9 ACCEPTANCE

A. For the purpose of this Section, the following conditions shall be fulfilled before the Work is considered complete and start of 7 day Demonstration period:
   1. All submittals have been completed and approved.
   2. The PCIS has been programmed, configured, calibrated, tested and demonstrated. PCIS is completely functional and operational. PLC I/O List is completed and approved by Owner.
   3. Owner had provided confirmation of radio communication systems, and facility is completely monitored and controlled by Owner's SCADA system.
   4. The training has been performed.
   5. All spare parts have been delivered to the Owner.
   6. All punch-list items have been corrected.
   7. Revisions to the O&M Manuals that may have resulted from the field tests have been made and reviewed.
   8. All as-built and record drawings and PLC and OIT programs, in both hard copy and electronic formats, have been submitted and approved.
   9. All debris associated with installation of instrumentation has been removed.
   10. All panels, probes, elements, sample lines, transmitters, tubing, and enclosures have been cleaned and are in like-new condition. Cleaning to include vacuuming interior of PLC Panels, wipe down of exteriors, and paint touch up as required by the Owner and Engineer.

END OF SECTION

# SECTION 40 91 00 – PROCESS MEASUREMENT DEVICES

## PART 1 GENERAL

### 1.1 SECTION INCLUDES

A. The Contractor, thru the use of approved Instrumentation Supplier, shall provide process measuring systems, complete and operable, in accordance with the Contract Documents. Contractor is responsible to provide all instruments as shown on the Contract Documents per these Specification.

B. Vendor supplier instruments shall meet these specification requirements.

C. Work includes designing for, providing and installing flowmeter, level transducer, stilling well, and pressure switches. Contractor shall provide installation details for each instrument, and submit for approval. Coordinate location of level measuring system with Owner.

D. Instrumentation Supplier (IS) to provide instrument calibration, device tag, installation verification, testing, start-up and certification of all instruments, including vendor supplier instruments. IS shall also provide training on instruments.

E. The requirements of Division 26 apply to all components of Division 40.

F. The requirements of Section 409000 – Process Control and Instrumentation Systems apply to this section.

G. Configure flowmeter. Coordinate configured ranges of flowmeter, and level transducers with Owner's programmer of PLC's, OIT's, and SCADA system.

H. Set pressure switches trip points and deadband, per Engineer in field.

### 1.2 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. ISA – S51 Instrumentation Symbols and Identification

### 1.3 CONTRACTOR SUBMITTALS

A. General: The Contractor shall submit Shop Drawings in accordance with Specifications and Section 260500 – Electrical Work, General, and Section 409000 – Process Control and Instrumentation Systems.

B. Submit catalog cut sheets of instruments, with all options highlighted.

C. Submit stilling well details

D. Submit installation details for each instrument.

E. Submit ISA forms, completed with calibrated ranges, float trip points, and switch set points.

F. Operation and Maintenance Manuals. Refer to Section 260500 – Electrical Work, General for O&M Manual requirements.

G. Training outlines and trainer resume.

1.4 QUALITY ASSURANCE

A. Inspection and Testing Requirements: After installation, the Contractor shall obtain the services of a technical representative to inspect and test all instruments for proper performance and installation. Verify accuracies. This may be the Instrumentation Supplier.

B. Accuracy Requirements: Unless otherwise specified herein, the instrumentation shall be guaranteed to an accuracy of 0.5 percent of the range specified, unless specified otherwise.

1.5 MAINTENANCE AND GUARANTEES, WARRANTY

A. After completion the Contractor shall furnish to the Owner the Instrumentation Supplier’s written guarantees, that the systems will operate within the published accuracies and ranges and meet these Specifications.

B. The Contractor shall also furnish the manufacturer's warranties as published in its literature, and submit within the O&M Manuals.

C. The warranty for all provided equipment shall be not less than two years after initial startup or Owner beneficial use, whichever is later, and shall include all costs for repairs, parts, travel and living expenses, and labor.

1.6 DUTIES OF THE MANUFACTURER’S QUALIFIED FACTORY REPRESENTATIVE

A. A manufacturer's engineering representative for the equipment specified herein, or qualified representative from Instrumentation Supplier, shall be present at the jobsite for the frequency and minimum duration (travel time excluded) as specified below to perform the following manufacturer's services:

1. A minimum of one trip for inspection, assistance during installation and alignment, and certification of proper installation. The certificate of installation shall be submitted.
2. A minimum of one trip for assistance and witnessing of system testing by the Contractor and any required troubleshooting.
3. A minimum of one trip for two hour training class for operation and maintenance training of Owner's personnel on the flowmeter, pressure switches, and level transducer.

B. The manufacturer's engineering representative shall provide a minimum of four separate trips to the jobsite to fulfill the above requirements.

## PART 2 PRODUCTS

### 2.1 GENERAL

A. All devices specified herein shall conform to the requirements of Section 409000 – Process Control and Instrumentation Systems. Typical for each facility.

B. Instrument Supplier shall provide Instrument Installation Details, calibration, configuration, start-up, testing, and training. Refer to Section 409000 – Process Control and Instrumentation Systems, for Instrument Supplier responsibilities.

C. Instruments to be rated for raw water applications, with pH of 6.2.

### 2.2 MAGNETIC FLOW MEASURING SYSTEM

A. General: Magnetic flow measuring system shall be of the low frequency electromagnetic induction type and produce a 4-20 mA DC signal directly proportional to and linear with the liquid flow rate. Flow measuring system shall have signals routed to PLC for flow measurement. Magnetic flow metering system shall include a metering tube, flow transmitter, and grounding rings. Flow tube materials shall be as recommended by manufacturer for non-potable well water. Submit Installation Details for magmeter flow tube.

B. Pump Station magnetic flow measuring system shall include integral mounted flow transmitter.

C. Flow transmitter shall include complete zero stability shall be an inherent characteristic of the flowmeter system. Flowmeter shall include low flow cutoff.

D. Metering Flow Tube

1. Flange Type Magnetic Flowmeter Element: In-line flow element (metering flow tube) with no constrictions in flow of fluid through meter consisting of metallic tube with ANSI B16.5, Class 150, flanged ends for diameter and bolt drilling pattern. Flange material shall be compatible with the process piping material and be corrosion resistant.
2. Liner and Electrode Materials: Fully compatible with process fluid, as recommended by flow meter manufacturer. Recommended polyurethane liner and stainless steel electrodes.
3. Pump Station flow tube shall be NEMA 4X. Mounted above grade.
4. Ground Rings: material shall be 316 stainless steel. Provide two grounding rings per flow tube.

E. Microprocessor-Based Transmitter
1. Micro-processor based transmitter shall display instantaneous flow, and local flow totalization indicator, scaled in engineering units. Flow rate shall be configured for GPM units, 0-XXXX GPM, and totalizer shall be configured for XXXXX.X MG units. Coordinate final ranges with Owner at FAT.
2. Power Supply: 120 VAC.
3. Flow Signal: 4-20 mA signal with Hart protocol.

F. System Accuracy: Within 0.5 percent of actual flow rate for 10-100 percent full scale where velocity is between 0.3 and 30 feet per second.

G. Flow metering system shall be hydraulically calibrated at a facility which is traceable to the National Institute of Standards and Technologies. The calibrations procedure shall conform to the requirements of MIL-STD-45662A.

H. Flow Meter:

| Facility | Flow Tube Size | Rating | Range |
|---|---|---|---|
| Pump Station (Integral) | 6” | NEMA 4X | 0-1000 GPM |

I. Manufacturers, no equals:
1. Siemens Sitrans FM MAG 5100W Flow Tube with MAG 6000 Transmitter, grounding rings.
2. Endress + Hauser Proline Promag W400 with transmitter, flow tube, ground rings.
3. Rosemount 8750W with remote transmitter, flow tube, ground rings.
4. Spare Parts: None

2.3 HYDROSTATIC LEVEL TRANSDUCER – NEWMAN RESERVOIR

A. The continuous level transducer shall be of the hydrostatic pressure type, suitable for non-potable water applications. The transducers shall be comprised of 3” diameter clog-resistant sensing diaphragm in durable 316 stainless steel housing with Hytrel jacketed

cable. Cable length shall be sufficient from level transducer, to the PLC Panel without splicing. Bid to include 100' of level transducer cable. The Contractor is responsible for actual cable length required as dependent on conduit routing. Provide with transmitter manufacturer's junction box with hydrophobic vent filter (desiccant or bellows), to be mounted within PLC Panel.

B. Stilling well shall be PVC Sch 80, 6" conduit, refer to Contract Drawings. Submit Installation Detail showing stilling well and level transducer and pipe from stilling well into Newman Reservoir. Provide manufacturer's molded plastic cable hanger for level transducer, to strap on underside of blind flange.

C. Transducer Probe:
   1. Stainless steel housing
   2. Cable length to be field measured by the Contractor. Splices will not be allowed.
   3. Output: 4-20 mA, loop powered.

D. Accessories:
   1. Cable Hanger
   2. Junction Box with terminals and vent filter

E. Level Transducer:

| Facility | Location | Range |
|---|---|---|
| Pump Station | Newman Reservoir | 0-15 Feet of H2O |

F. Manufacturers, or approved equal:
   1. Blue Ribbon Model BC001 Birdcage Level Transducer with cable length as needed. Provide Junction Box #BCJ4000 including vent filter, and Cable Hanger #BCH2000.
   2. Spare Parts: None

2.4 PRESSURE SWITCHES

A. Pressure switch system shall consist of adjustable pressure switch, and block and bleed valves as specified within. Submit Installation Detail for each switch.

B. Adjustable pressure switches shall be in watertight NEMA 4X enclosure. Adjustable pressure switches shall be suitable for marine environment, diaphragm-actuated, dual adjustment pressure switches with SPDT contacts rated for a minimum of 15 Amps at 120 VAC. The actuator seal shall be Teflon, and the lower housing shall be stainless steel with a 1/2-inch bottom sensing connection, unless otherwise indicated. Connection shall be stainless steel. Process connection shall be 1/2" NPT female.

C. Setpoint shall be factory set, but adjustable in the field. The dead band shall be field adjustable, and set per table below. Pressure switch adjustable range shall be such that

the setpoint shown below falls between 20 and 80 percent of the allowable adjustable range.

D. Pressure Switches:

| Facility | Rating | Setpoint (Rising) | Deadband (Falling) |
|---|---|---|---|
| Pump Station | NEMA 4X | 90 PSI | 5 PSI |

E. Manufacturer, or approved equal:
   1. Ashcroft N-Series (NEMA 4X), Ashcroft A-Series (NEMA 6)
   2. Allen-Bradley 836 Series (836-C4J or 836-C7J) (NEMA 4X)
   3. Spare Parts: None.

2.5 BLOCK AND BLEED VALVES

A. Process block and bleed valves shall be stainless steel ball valves with 1/2" NPT threaded female connections. Provide for on-off control with directional handle. Capsule seat packing to be PTFE.

B. Provide 1/2" stainless steel threaded “T”, stainless steel close nipples, and stainless steel threaded cap per Contract Documents.

C. Ball Valve Manufacturer, or approved equal:
   1. Swagelok #SS-45F8.
   2. Spare Parts: None.

PART 3 EXECUTION

3.1 INSTALLATION

A. The Contractor shall assemble and install all equipment specified herein, in strict accordance with the manufacturer's published instructions, under the supervision of the manufacturer's representative and per submitted and approved Installation Details. All installations shall be accomplished by competent craftsmen in a workmanlike manner.

B. Installation of instruments shall be approved by manufacturer such that rated accuracy and repeatability is met. Installation shall be provided to maintain warranty.

3.2 FIELD TESTING

A. Each item shall be subjected to an operating test over the total range of the instrument.

B. Field verify with Engineer as witness the pressure switch trip settings. Include scope to revise pressure switch setting, per Engineer in field, for each switch, at no additional cost to Owner.

C. Refer to Section 409000 – Process Control and Instrumentation Systems, for testing requirements.

D. Confirm instruments have engraved phenolic tags installed, connected conduits have tag, and conductors are labeled.

E. Confirm analog signals are grounded.

F. All Field Testing shall be completed during Pre-Demonstration period.

3.3 TRAINING

A. Manufacturer shall provide training on flow meter, level transducer, and pressure switches to Owner as specified in Section 409000 – Process Control and Instrumentation Systems. All training shall be completed during Pre-Demonstration period. Training shall cover operation and maintenance, as well as process control impacts of each instrument, defining its function and implications if instrument is not functioning properly.

END OF SECTION

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# SECTION 40 95 13 – PROCESS CONTROL PANELS AND HARDWARE

## PART 1 GENERAL

### 1.1 SECTION INCLUDES

A. The Contractor shall provide all Process Control and Instrumentation Systems (PCIS) complete and operable, in accordance with the Contract Documents. The Contractor shall provide the programming for the programmable logic controller (PLC), and configure the operator interface terminal (OIT) and radio. Refer to Process Control Descriptions. The on-site control system shall be complete and operable, without input from Owner's SCADA.

B. Contractor's Instrumentation Supplier shall design and provide PLC Panel back panel, and all equipment, including the components to be mounted on the PLC Panel front door. The PLC Panel is integral to the MCC lineup.

C. The requirements of Division 26 apply to all components of Division 40.

D. The requirements of Section 409000 – Process Control and Instrumentation Systems, apply to this section.

E. The requirements of this Section apply to all components of the PCIS unless indicated otherwise. This includes vendor supplied panels.

F. Panels shall be built by a UL-listed shop. Provide shop UL-508A nameplate within each panel.

### 1.2 CONTRACTOR SUBMITTALS

A. General: The Contractor shall submit Shop Drawings in accordance with Specifications and Section 260500 – Electrical Work, General and Section 409000 – Process Control and Instrumentation Systems.

B. PLC Panel Engineering Submittal: The Contractor shall submit a PLC Panel engineering submittal (CPES). The CPES shall completely define and document the construction, finish, layout elevations, power circuits, control schematics, signal and safety grounding circuits, over current protection, and wiring.
   1. Catalog cuts of all components and devices.
   2. Complete and detailed bills of materials: A bill of material list, including quantity, description, manufacturer, and part number, shall be submitted for each component.
   3. Nameplates for wiring devices and overall PLC Panels.

4. Installation instructions and anchoring requirements.
5. Refer to Specification Section 262419 – Low Voltage Motor Control Centers, for other PLC Panel submittal requirements as panel is integral to MCC enclosure.
6. Spare Parts. Spare parts to be coordinated with Section 262419.

C. PLC programming documentation and OIT screens. Refer to Process Control Descriptions. Provide hard copy (PDF) and electronic versions. Bid to include 10 OIT screens including but not limited to: Pump Status and Data, Instrument Summary (flows, level), Alarm Set Points and Summary, Process Set Points (flow rate setting, hours of operation), Totalizer (flows, run times, starts), at a minimum.

D. Submit PLC I/O list (Excel spreadsheet).

E. Training Outline for PLC Panel including Control Descriptions and OIT screens.

F. Operation and Maintenance (O&M) Manuals. Refer to Section 260500 – Electrical Work, General for O&M Manual format and content requirements, and O&M Manual Checklist.

1.3 GUARANTEES, WARRANTIES

A. After completion the Contractor shall furnish to the Owner the supplier’s written guarantees, that the panels will operate and meet these Specifications.

B. The Contractor shall also furnish the manufacturer's warranties as published in its literature, and submit within the O&M Manuals.

C. The warranty for all provided panels shall be not less than two years after initial startup or Owner beneficial use, whichever is later, and shall include all costs for repairs, parts, travel and living expenses, and labor.

PART 2 PRODUCTS

2.1 GENERAL

A. All devices specified herein shall conform to the requirements of Section 409000 – Process Control and Instrumentation Systems.

B. All panels and devices shall have phenolic engraved nameplates with tag number and description. Attach with stainless steel screws, adhesive is not acceptable.

C. The PLC Panel shall be the source of power for any 24 VDC or 120 VAC power supplies to field instrumentation, unless shown otherwise on the Contract Drawings.

D. Panels shall be rated per Division 26, and UL-508A. Supplier shall include UL-508A sticker within panels.

E. PLC Panel to include LED light, and thermostat controlled heater.

F. Each source of foreign voltage shall be isolated by providing disconnecting knife type terminal blocks, and include yellow insulating conductors.

G. PLC Panel shall be equipped with field terminal strip to land all field wiring.

H. PLC Panel shall have PLC discrete outputs with isolation relays wired to disconnecting knife type terminal blocks, PLC analog inputs and analog outputs shall be wired to fused terminal blocks, and PLC discrete inputs wired to disconnecting knife type terminal blocks.

I. PLC Panels shall include level transducer vent filters. Refer to Section 409100 – Process Measurement Devices.

J. Quality Assurance:
   1. The panel construction and all wiring shall be in strict accordance with the National Electric Code (NEC), state and local codes, and in conformance with applicable specifications of NEMA, ANSI, and UL.
   2. All panels and enclosures shall be completely fabricated, and instruments installed, wired, and tested at the Instrument Suppliers shop.
   3. All panels and enclosures shall bear a UL label stating “suitable for use as an industrial panel” and built by a UL-508A listed shop, and a shop label is included within panel.
   4. Panel and components shall be rated for marine environment.

2.2 PANELS

A. Materials
   1. PLC Panel is integral to MCC, refer to Section 262419 – Low Voltage Motor Control Center. PLC Panel doors (interior to weatherproof enclosure) shall include 3-point latch, or approved equal.
   2. Provide back panel in all panels. Provide side panel for mounting level transducer junction box with vent filter.
   3. Construction: Dimensions shall be as required to layout equipment with sufficient clearances as required by installed components manufacturers. Provide sufficient space between terminals and wireways for reading wire labels. Elevations and horizontal spacing shall be subject to Engineer’s review and approval.

B. Electrical Requirements

1. The Contractor shall provide conduit, wireways, switches, wire, and electrical fittings for all 120 VAC and 24V DC circuits to instruments and other electrical devices as required for a complete and operable installation.
2. Labeling and Tagging: Each terminal connection shall have a plastic plate with a terminal and instrument tag number. All wiring shall be identified with stamped tubular wire end markers. All panel mounted devices shall have phenolic tag with inscriptions that match approved shop drawings and referenced in bill of materials.
3. Panels shall be so sized as to adequately dissipate heat generated by equipment mounted in or on the panel. Provide fans with replaceable filtered louvers. Provide thermostat controlled heater.
4. Provide a door-activated switch controlled light and a breaker protected 125-volt, 20-amp duplex receptacle mounted on the back panel of the PLC Panel.
5. Wiring, methods and materials for all panels shall be in accordance with the NEC and UL requirements. Provide din rail mounted circuit breakers for AC power distribution unless shown otherwise.
6. For grounding, panels shall be provided with a ¼-inch by 1-inch copper ground bus complete with solderless connector for one stranded copper ground electrode conductor.
7. Power Supply:
    a. PLC Panel shall each be fed by two 120 VAC circuits supplied from the panelboard. One of two circuits shall operate fans, lights, receptacle, heater, etc. The other circuit shall connect to the battery chargers and provide power to PLC, OIT, magmeters, digital displays, radio, and field instrumentation per Contract Drawings.
    b. Unless otherwise indicated, controls shall operate on 120 VAC circuits. Instruments and alarm circuits shall be 24 VDC, powered from batteries.
    c. Provide circuit breakers instead of fuses for equipment and circuit protection within panels.

C. Labor and Workmanship: All panels shall be fabricated, piped, and wired by fully qualified workmen who are properly trained, experienced, and supervised.

D. PLC Panel shall include the following major components:
1. PLC Panel to include PLC, OIT, battery charger and batteries. OIT to be mounted on door front. Battery charger and batteries to be mounted on shelves to free up bottom of PLC Panel for conduit and cable entry.
2. PLC Panel to house level transducer terminal box with vent filter (desiccant or bellows). Refer to Section 409100 – Process Measurement Devices.

## 2.3 PANEL WIRING

A. Interior panel wiring:

1. Wiring shall be supported independently of terminations by lacing to panel support structure or by slotted flame-retardant plastic wiring channels. Wiring channels shall comply with UL 94, Type V-1. Wiring channel fill shall not exceed 40 percent of cross-section area. Only one wire per terminal block with the exception of a comb jumper in addition to the single wire.
2. Power and control wiring shall be single conductor. Stranded copper, NFPA No. 70 Type MTW.
3. Wiring shall comply with the requirements of NEC as a minimum.
4. Analog signal cables shall be No. 18 AWG, 7 x 28 stranded copper, twisted shielded pairs, rated 60 degree C, 300 V.
5. Panel wiring insulation colors shall be per Specification 262913.
6. Plug strips with grounding type receptacles shall be provided for 120 VAC power supply connection for battery charger. Each piece of equipment requiring ac power shall be provided with an NEC Type SJ cord with molded-on grounding type plug for ac power connection. Panel work shall contain no exposed connections, and adjustments to equipment shall be made without exposing these terminals. Power and control wiring operating above 80 VAC shall be carried in covered channels separate from low voltage DC signal circuits.
7. PLC Panel shall have field wiring terminal strip, dedicated to terminate all field wiring. Field wiring shall not be wired direct to control devices or PLC, but terminate on field terminal strip.
8. Terminal blocks: Terminal blocks for panels, consoles, racks, and cabinets shall meet the following requirements:
    a. Provide sufficient terminations to accommodate both present and future needs. Wire all spare or unused panel mounted elements to their panels' terminal blocks. Provide terminal blocks for all spare conductors. Provide 20 percent spare terminal blocks for future use.
    b. Provide 600-volt screw type terminal blocks. Use yoke that guides all stands of wire into the terminal. All terminal blocks shall be the knife switch disconnecting type terminal blocks. Supply terminals that allow connection of wire without any preparation other than stripping. Rail mount individual terminals to create a complete assembly. Provide terminals constructed such that jumpers can be installed with no loss of space on terminal or rail.
    c. Each terminal strip shall have a unique identifying alphanumeric code at one end and a vinyl marking strip running the entire length of the terminal strip with a unique number of each terminal. Numbers shall be machine printed and 1/8-inch high. Terminal strip codes and terminal numbers shall comply with numbers listed on the wiring diagram.
    d. Size all terminal block components to allow insertion of all necessary wire sizes and types. Supply terminal blocks with marking system allowing the use of preprinted tags.

e. Field connections shall be to separate field terminal block strips. Terminal blocks for field terminations shall be in a separate part of the panel close to where the field cables enter the panel. All discrete field terminal blocks shall be the knife switch disconnecting type terminal blocks. All analog field terminal blocks shall be fused type disconnecting terminal blocks.
f. Foreign voltage terminal blocks shall be yellow.
g. Grounding terminal blocks shall be green.
h. Provide screw connection type terminal blocks manufactured by Wago, Weidmuller, or approved equal.

9. Circuits shall be fused only where shown, otherwise provide circuit breakers on all AC and DC circuits. Fuses shall only be allowed as approved by Engineer.
   a. Fuses shall measure ¼-inch by 1¼-inches.
   b. Fuses on 120 VAC circuits shall be ceramic tube type with 25,000 amperes interrupting capacity at 125 volts and neon blown fuse indicator lamps. Fuse holders for 120 VAC shall be draw out type and molded from melamine plastic.
   c. Fuses for 24 V DC shall be fast-acting glass tube type rated 1/8 amp for 4-20 loops and 3 amps for the power supply to individual instruments.
10. Two ¼-inch by 3-inch copper buses shall be provided in the panels: one for signal and shield grounding and one for equipment and cabinet grounding. The signal ground bus shall be mounted on insulated stand-offs and the entire signal ground system bonded to the cabinet ground system at a single point.

B. Analog signal distribution:
   1. The 4 to 20 mA signals shall be distributed within panels as 4 to 20 mA signals.
   2. Signals distributed outside panels shall be isolated 4 to 20 mA signals.

## 2.4 CONTROL DEVICES

A. Control Relays:
   1. General purposes relays shall be enclosed octal plug-in units. Relays shall be UL listed, indicating type, and push to test. Relay contact ratings shall be minimum 7.5 amps at 110 VAC, and minimum 5 amps at 30 VDC. DC relays shall be internal diodes, indicating type. Two- and three-pole relays shall be IDEC Series RR, or approved equal. Four-pole relays shall be IDEC Series RH, or approved equal.
   2. Time delay functions shall be accomplished with pin type, true time delay relays. Units shall be adjustable time delay relays with the number of contacts and contract arrangements, as shown. A neon status-indicating light shall be provided with each relay. Contacts shall be rated for 7.5 A at 120 VAC. Integral knob with calibrated scale shall be provided for adjustment of time delay. Initial setting shall be as shown with time delay range approximately three times the initial setting. Delay range ability shall be at least 10:1. Timing relays shall be solid state pulse-count type utilizing a high frequency resistance-capacitance (RC) oscillator and integrated

circuit counter for timing. Time delay on relays shall be IDEC Series GT3A, or approved equal. Time delay off relays shall be IDEC Series GT3F (true off), or approved equal.

3. All relays shall have a screw terminal interface with the wiring. Terminals shall have a permanent, legible identification. Relays shall be mounted so that the terminal identifications are clearly visible and the terminals are readily accessible.

B. Pilot Lights:
   1. Shall be heavy duty, NEMA 4X, with round, plastic lens, and jumbo legend plate. Each shall be push-to-test, LED lamp, transformer type.
   2. Colors shall be:
      a. Power On - White
      b. Auto, Running - Green
      c. Alarms - Red
   3. Acceptable products: Allen-Bradley Bulletin 800H, or approved equal

C. Pushbuttons:
   1. Shall be heavy duty, NEMA 4X, bootless, flush head pushbutton, momentary contact, with jumbo legend plate.
   2. Colors shall be:
      a. Reset - Black
      b. Start - Green
      c. Stop - Red
   3. Acceptable Products: Allen-Bradley Bulletin 800H, or approved equal.

D. Selector Switches:
   1. Position switches shall be maintained contact type, rated 20 A minimum at 120 VAC. Control knob shall be black, NEMA 4X, and shall show clearly the control switch position.
   2. Selector switch shall be complete with jumbo legend plate, and with contact blocks.
   3. Acceptable products: Allen-Bradley Bulletin 800H, or approved equal.

E. Circuit breakers shall be din rail mounted, thermal magnetic, tease-free, trip-free, snap action mechanism with two button operation. Circuit breakers shall be din rail mounted, thermal magnetic, miniature type. Breakers shall be Allen-Bradley 1492 (DC) and 1489 (AC), or approved equal.

F. Corrosion Inhibitors:
   1. For panels located outdoors, install corrosion inhibitors inside panels to protect the given enclosure volume Corrosion inhibitors shall produce corrosion inhibiting vapors that provide a molecular film on metal surfaces. The film shall not affect electrical or mechanical operations of contacts, relays, or other devices.

2. The corrosion inhibitors shall provide protection from humidity, salt and other corrosive agents for up to 24 months.
3. The corrosion inhibitors shall be as manufactured by nVent Hoffman, or approved equal.

2.5 PLC PANEL PROGRAMMABLE LOGIC CONTROLLER SYSTEM (PLC, OIT, RADIO)

A. Contractor is responsible to program the PLC hardware to provide automatic controls and remote monitoring, alarming, totalizing, counting, etc., and configuration of OIT, per Process Control Descriptions. Contractor to configure radio for communication with PLC hardware and Owner offsite SCADA system. Contractor to coordinate PLC data packets and register assignments with Owner's SCADA system programmer.

B. Provide the following Allen-Bradley components to match Owner's standards, or approved equal.
1. Processor: Allen-Bradley (5069-L320ER Compact Logix 5380).
2. 24VDC Input Modules: Allen-Bradley, (5069-IB16).
3. 24VDC Output Modules: Allen-Bradley, (5069-OB16).
4. 4-20 mA Analog Input Module: Allen-Bradley, (5069-IF8).
5. 4-20 mA Analog Output Modules: Allen-Bradley, (5069-OF8).
6. Communication Module: Allen-Bradley 5069-SERIAL module for the CompactLogix PLC to enable the PLC to communicate with the District's radio system.
7. OIT: 10" color touchscreen, 24VDC, Ethernet, Maple Systems #HMI5103L.
8. Radio: GE MDS SD4 with Ethernet and Serial communications. Provide shelves to mount radio.
9. Ethernet Switch: with minimum 6 ports, N-Tron 508TX-A, or equal.

C. All hardware to have conformal coating to mitigate corrosion in marine atmosphere, as available by listed manufacturer.

D. PLC hardware digital output shall be wired to interposing relays. Interposing relays shall have ampacity ratings of 150% of connected load. Provide DPDT control relays, at each PLC digital output, including the unused digital outputs. Wire normally open and normally closed contact from each relay to field terminal strip.

E. Contractor responsible for PLC and OIT application software to be used for programming and configuring. Contractor shall submit hardcopies and electronic versions of the PLC programs and OIT configuration files, as part of this work. Engineer and Owner reserves the right to make minor adjustments to Control Descriptions at the PLC Panel FAT; Contractor to have programmer attend the FAT and ready to make such edits.

## 2.6 RADIO ANTENNA SYSTEM

A. The radio antenna and cable system shall consist of the following equipment model numbers, or approved equal.
   1. Coaxial pigtail jumper from radio to lightning surge arrestor.
   2. Lightning surge arrestor: Polyphaser IS-50NX-C2 with ground lug.
   3. Antenna: 450 MHz Yagi antenna. Antenna shall be based on radio study and one of the following:
      a. Laird/Antenex #Y4506 10dB gain, or #Y4503 7dB gain
      b. Telewave #ANT450Y7-WR 7dB gain
      c. PcTel/Maxrad #BMYD450K 10dB gain
      d. Or equal.
   4. Antenna Cable – Refer to Specification 260519.
   5. Weatherproof antenna connection kits and grounding connections.

B. Provide all antenna cables, connectors and weatherproof connection kit, and miscellaneous hardware for complete and operable radio system. Provide mounting bracket for antenna to mast connection.

C. Provide minimum 20’ mast to mount antenna. Antenna conduit from PLC Panel shall be routed through center of reinforced concrete, and function as mast. Provide weatherhead on top of conduit. Refer to Contract Drawings.

## 2.7 BATTERY CHARGER

A. Provide 120 VAC to 24 VDC battery charger and power converter. Amperage as required for connected load and charging batteries, minimum 15 amps. 120VAC to 24VDC converter and charger shall provide clean, steady output for efficient battery charging and power to DC equipment. Provide with Dual State Charging, tight Line/Load Control and Switch-Mode design. Equip with mounting feet for back panel mounting.

B. Battery charger shall be manufactured by IOTA DLS-27-15-X, or equal.

## 2.8 BATTERIES

A. Provide 24 VDC battery system, two 24 VDC batteries connected in parallel for each PLC Panel. Batteries shall be rated minimum 50 amp-hours, rechargeable lithium, Bluetooth enabled, low maintenance type, in ABS plastic. Provide with intelligent battery management system to protect from over-charge and over-discharge.

B. Batteries shall be PowerSonic PSL-BTP-24500, or equal.

2.9 TIME CLOCK – DISCHARGE PUMP AUTO FLOAT MODE

A. Time Clock shall be electronic, 24 hour, 365 days including holidays, two circuits, 120 VAC, 2 SPST, with 100 hour capacitive back up. Include with two hour override. Time clock shall be suitable for mounting on back panel.

B. Time Clock shall be Intermatic #ET2125C, or equal.

2.10 ALTERNATING RELAY– DISCHARGE PUMP AUTO FLOAT MODE

A. Alternating Relay shall be 120 VAC, solid state, heavy duty, with load selection toggle and relay status lights. Alternating Relay to be single pole, connecting to float switch for control switch. Provide with 8 pin base for din rail mounting.

B. Alternating Relay shall be Time-Mark #261-ST-120, or equal.

2.11 PANEL LIGHTS AND RECEPTACLES

A. Panel lights shall be LED type, activated by door switch. Provide two lights. Panel lights shall be Hoffman LED #LEDA1S35, or approved equal.

B. Panel receptacles shall be duplex, 125 VAC, 20 amperes, polarized three-wire type, NEMA 5-20R confirming to UL 498. Receptacles shall be brown. Receptacles shall conform to UL 498. External wiring shall be provided by side mounted terminal screws. Acceptable products: Hubbell #5362B, or approved equal.

2.12 PLC PANEL SPARE PARTS

A. Provide three spare fuses of each size and type installed in PLC Panel, per PLC Panel.

B. Provide one spare control relay of each type, and one spare time delay relay of each type installed in PLC Panel, per PLC Panel.

C. Provide spare parts within rubber tub storage box provided with respective MCC, as specified in Section 262419.

PART 3 EXECUTION

3.1 INSTALLATION

A. Preparation for Shipment and Shipping
   1. All panels are to be crated for shipment using a heavy framework and skids. The panel sections shall be cushioned to protect the finish of the instruments and panel during shipment. All instruments which are shipped with the panel shall further

have suitable shipping stops and cushioning material installed to protect parts which could be damaged due to mechanical shock. Each separate panel unit shall be provided with removable lifting lugs to facilitate handling.

2. PLC Panel Factory Acceptance Testing shall be witnessed by the Engineer and Owner prior to shipping.

B. Panels shall be installed in accordance with Section 409000 – Process Control and Instrumentation Systems, and supplier's instructions.

C. Provide duct seal within all conduits at panels, that are routed underground.

D. Mount, direct and orient (horizontal or vertical alignment orientation) antennas on antenna mast per Owner.

3.2 PANEL SIGNAL AND CONTROL CIRCUIT WIRING

A. Wiring Installation: All wires shall be run in plastic wireways except field wiring and wiring to panel-mounted components. Wiring run from components on a swing-out panel to other components on a fixed panel shall be made up in tied bundles. These bundles shall be tied with nylon wire ties and shall be secured to panels at both sides of the "hinge loop" so that conductors are not strained at the terminals.

B. Wiring run to control devices on the front panels shall be tied together at short intervals with nylon wire ties and be secured to the inside face of the panel using adhesive mounts.

C. Wiring to rear terminals on panel-mount instruments shall be in plastic wireways secured to horizontal brackets above or below the instruments in about the same plane as the rear of the instruments.

D. Shop drawings shall show conformance to the above wiring installation requirements.

3.3 FACTORY TESTING

A. Testing shall be performed in accordance with Section 409000 – Process Control and Instrumentation Systems.

B. Factory Acceptance Testing (FAT):
   1. FAT shall include suppliers' standard test procedures that have been submitted and approved.
   2. In addition to the standard test procedures, provide testing of each schematic drawing in a rung-by-rung fashion.
   3. Test PLC and OIT to confirm all Process Control Descriptions. Make sure each PLC hardwired input and output is viewable on OIT screen.

4. Verify operation of all alarms, setpoints, totalizers and counters. Test all alarms and interlocks.
5. Confirmation of instrument ranges and setpoints with Owner for programming coordination between field instrument, PLC and OIT, and offsite SCADA.
6. Finalize PLC I/O List with ranges and registers.

3.4 FIELD TESTING

A. Testing shall be performed in accordance with Section 409000 – Process Control and Instrumentation Systems.

B. Field Testing shall be based on submitted and approved testing procedures. Procedures shall be similar to FAT procedures, tested on installed equipment and process. Contractor shall confirm field connections to PLC input and output modules.

C. Verification of SCADA communication and controls must be verified as part of Field Testing. Contractor shall work with Owner's SCADA programmer.

D. Confirm instruments have nameplates, and connected conduits and conductors are labeled.

E. All Field Testing shall be completed during Pre-Demonstration period.

3.5 TRAINING

A. Field Training: Provide for field training on PLC Panel overview, control strategies, OIT screens, alarms, setpoints, and field instrumentation. It is expected the training will be four hours.

B. The field training classes shall be scheduled a minimum of three (3) weeks in advance of when they are to be given. Proposed training material, including a resume for the proposed instructor(s) (indicating previous instructional experience), and a detailed outline of each lesson shall be submitted to the Engineer at least 20 days in advance of when the lesson is to be given. The Engineer shall review the submitted data for suitability and provide comments that shall be incorporated into the course.

C. Within 10 days after the completion of field training class the Contractor shall present to the Engineer the following:
1. A list of Owner personnel that attended the class.
2. A copy of the hard copy text utilized during the class with all notes, diagrams, and comments.

END OF SECTION

SECTION 43 23 31.23 – OVERHUNG CLOSE-COUPLED VERTICAL END SUCTION PUMPS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes: Vertical non-clog pumps.

B. Vertical non-clog pumps to be installed in a dry arrangement without the benefit of any process water to be used for cooling.

1.2 SUBMITTALS

A. Product Data: Manufacturer information, including installation instructions, accessories, performance curves with specified operating point plotted, capacities and pressure differentials, power, rpm, sound power levels for both inlet and outlet at rated capacity, electrical characteristics, and connection requirements.

B. Shop Drawings:
   1. Diagrams showing complete layout of system, including equipment, piping, valves, wiring and ladder diagrams, controls, and control sequences.
   2. Size and configuration of assembly, mountings, weights, and accessory connections.
   3. Manufacturer's specified displacement tolerances for vibration at operational speed as specified for pumps.

C. Manufacturer's Certificate: Products meet or exceed specified requirements for the designed installation conditions.

D. Manufacturer Instructions: Installation requirements, including storage and handling procedures, anchoring, and layout.

E. Source Quality-Control Submittals: Indicate results of factory tests and inspections.

F. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.

G. Qualifications Statements:
   1. Qualifications for manufacturer and installer.
   2. Manufacturer's approval of installer.

1.3 CLOSEOUT SUBMITTALS

A. Project Record Documents: Record actual locations and final orientation of pumps and appurtenances.

1.4 QUALITY ASSURANCE

A. Perform Work according to City of Fort Bragg standards.

B. Manufacturer: Company specializing in manufacturing products specified in this Section with three years' experience.

C. Installer: Company specializing in performing Work of this Section with three years' experience and approved by manufacturer.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store materials according to manufacturer instructions.

B. Protection:
   1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
   2. Provide additional protection according to manufacturer instructions.

1.6 WARRANTY

A. Furnish five-year manufacturer's warranty for pumps.

PART 2 PRODUCTS

2.1 VERTICAL NON-CLOG PUMPS

A. Manufacturers:
   1. Flygt NT 3153 HT 3~ 463
   2. Or approved equal.

B. Description: Centrifugal, vertical non-clog pump, with electric motor suitable for variable frequency driver. Pump and motor to be designed with cooling jacket and otherwise suitable in every way for a dry installation.

C. Performance and Design Criteria:
   1. Design Flow Rate: 300 gpm.
   2. Design Flow Total Dynamic Head: 100 feet.
   3. Minimum Overall Efficiency at Design Flow Rate: 54 percent.

4. Net Positive Suction Head Available: 30 feet.

D. Casing:
   1. Material: Grey cast iron, ASTM A48, Class 35B.

E. Impeller:
   1. Material: Hard Iron, ASTM A532 (Alloy III A), 25% chrome.
   2. Design to pass sand, grit, and solids normally encountered in a raw water pumping without clogging.
   3. Statically and dynamically balanced after assembly.

F. Shaft:
   1. Material: Steel, AISI 431

G. Electrical:
   1. Electrical Characteristics:
      a. Motor driver as specified in Section 26 24 19 - Low Voltage Motor Control Center
      b. Rated motor horsepower: 14 hp
      c. Nameplate voltage: 460 VAC, three phase, 60 Hz.
      d. Motor: Inverter rated, suitable for operation on VFD. Refer to Contract Drawings.
      e. Provide motor monitoring relay, Flygt MiniCAS, or approved equal. Coordinate with MCC supplier to install at motor starter cubicles.
   2. Controls: Refer to Contract Drawings

H. Fabrication:
   1. Pump and Drive Mating Surfaces: Machine finished.

## 2.2 SOURCE QUALITY CONTROL

A. Provide shop inspection and testing of completed assembly.

B. Certificate of Compliance:
   1. If manufacturer is approved by authorities having jurisdiction, submit certificate of compliance indicating Work performed at manufacturer's facility conforms to Contract Documents.
   2. Specified shop tests are not required for Work performed by approved manufacturer.

PART 3 EXECUTION

3.1 INSTALLATION

A. According to manufacturer instructions.

3.2 FIELD QUALITY CONTROL

A. Inspection:
   1. Ensure that pumps have been installed correctly and that there is no objectionable heat or vibration.
   2. Check pump and motor alignment, proper motor rotation, and pump and drive units for proper lubrication.

B. Testing:
   1. Operate pump at design point for continuous period of two hours in presence of Engineer.
   2. Verify pump performance using the downstream pressure gauge and flow meter.

C. Equipment Acceptance: Adjust, repair, modify, or replace components failing to perform as specified and rerun tests.

3.3 ADJUSTING

A. Check control functions and adjust as required.

3.4 DEMONSTRATION

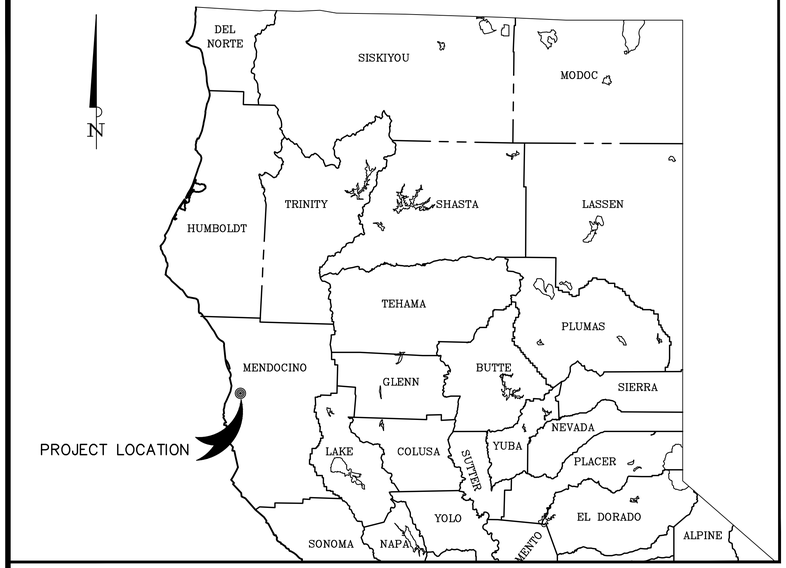
A. Demonstrate equipment startup, shutdown, routine maintenance, alarm condition responses, and emergency repair procedures to Owner's personnel.:

END OF SECTION

CITY OF FORT BRAGG

# RAW WATER LINE REPLACEMENT PROJECT, SEGMENTS 2-5
# CITY PROJECT NO.: 2019-02

FINAL PLANS




VICINITY MAP
NO SCALE

## INDEX OF SHEETS

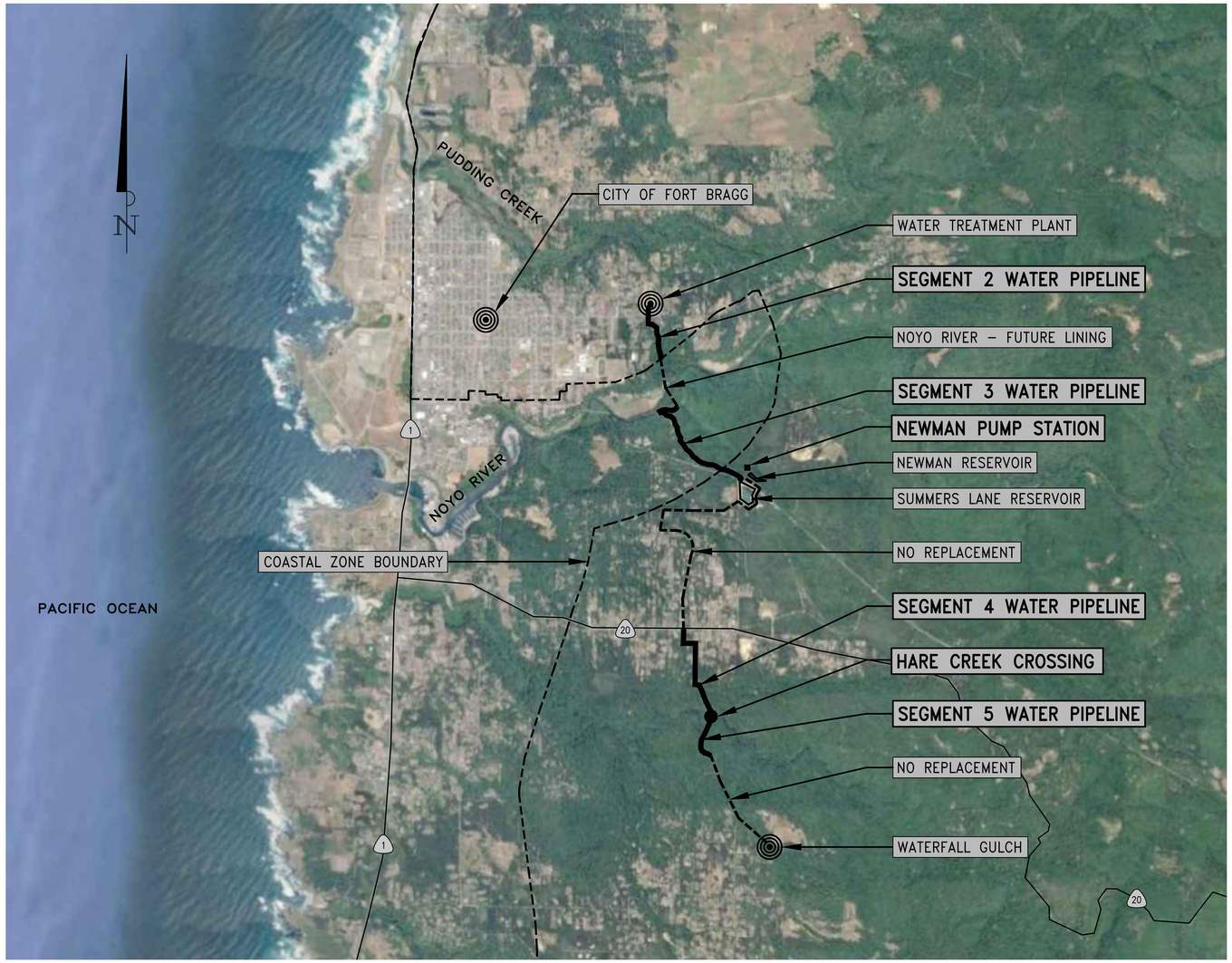

**GENERAL PLANS:**
G1. COVER SHEET
G2. GENERAL NOTES
G3. PROJECT NOTES, LEGEND & ABBREVIATIONS

**CIVIL PLANS:**
C1. SEGMENT 2 SHEET LAYOUT PLAN
C2. SEGMENT 3 SHEET LAYOUT PLAN
C3. SEGMENTS 4 AND 5 SHEET LAYOUT PLAN
C4. RAW WATER PIPELINE PLAN – SEGMENT 2 STA 0+00 – 6+00
C5. RAW WATER PIPELINE PLAN – SEGMENT 2 STA 6+00 – 12+00
C6. RAW WATER PIPELINE PLAN – SEGMENT 2 STA 12+00 – 18+00
C7. RAW WATER PIPELINE PLAN – SEGMENT 2 STA 18+00 – 24+00
C8. RAW WATER PIPELINE PLAN – SEGMENT 2 STA 24+00 – 29+59
C9. RAW WATER PIPELINE PLAN – SEGMENT 3 STA 44+53 – 49+00
C10. RAW WATER PIPELINE PLAN – SEGMENT 3 STA 49+00 – 55+00
C11. RAW WATER PIPELINE PLAN – SEGMENT 3 STA 55+00 – 61+00
C12. RAW WATER PIPELINE PLAN – SEGMENT 3 STA 61+00 – 67+00
C13. RAW WATER PIPELINE PLAN – SEGMENT 3 STA 67+00 – 73+00
C14. RAW WATER PIPELINE PLAN – SEGMENT 3 STA 73+00 – 79+00
C15. RAW WATER PIPELINE PLAN – SEGMENT 3 STA 79+00 – 84+50
C16. RAW WATER PIPELINE PLAN – SEGMENT 3 STA 84+50 – 88+70±
C17. RAW WATER PIPELINE PLAN – SEGMENT 4 STA 95+00 – 101+00
C18. RAW WATER PIPELINE PLAN – SEGMENT 4 STA 101+00 – 107+00
C19. RAW WATER PIPELINE PLAN – SEGMENT 4 STA 107+00 – 113+00
C20. RAW WATER PIPELINE PLAN – SEGMENT 4 STA 113+00 – 119+00
C21. RAW WATER PIPELINE PLAN – SEGMENT 4 STA 119+00 – 125+00
C22. RAW WATER PIPELINE PLAN – SEGMENT 5 STA 125+00 – 131+00
C23. RAW WATER PIPELINE PLAN – SEGMENT 5 STA 131+00 – 137+00
C24. RAW WATER PIPELINE PLAN – SEGMENT 5 STA 137+00 – 142+50
C25. RAW WATER PIPELINE PLAN – SEGMENT 5 STA 142+50 – 144+85±
C26. NEWMAN PUMP STATION SITE LAYOUT
C27. NEWMAN PUMP STATION PLAN, SECTION, AND DETAILS
C28. NEWMAN PUMP STATION FORCE MAIN – STATION 88+70 – 92+59
C29. CIVIL DETAILS–1
C30. CIVIL DETAILS–2
C31. CIVIL DETAILS–3
C32. CIVIL DETAILS–4
C33. CIVIL DETAILS–5
C34. STANDARD DETAILS–1
C35. STANDARD DETAILS–2
C36. CONSTRUCTION STAGING AREAS & ACCESS ROUTES
C37. HARE CREEK CROSSING CONSTRUCTION

**ARCHITECTUAL PLANS:**
A1. NEWMAN PUMP STATION: ARCHITECTUAL FLOOR PLAN
A2. NEWMAN PUMP STATION: ARCHITECTUAL ROOF PLAN
A3. NEWMAN PUMP STATION: ARCHITECTUAL REFLECTED CEILING PLAN
A4. NEWMAN PUMP STATION: ARCHITECTUAL ELEVATIONS, SECTIONS
A5. NEWMAN PUMP STATION: ARCHITECTUAL DETAILS

**STRUCTURAL PLANS:**
S1.0. GENERAL NOTES
S1.1. TYPICAL DETAILS 1
S1.2. TYPICAL DETAILS 2
S2.0. FOUNDATION PLAN
S2.1. ROOF FRAMING PLAN
S3.0. SECTIONS & DETAILS

**ELECTRICAL PLANS:**
GE1. ABBREVIATIONS AND SYMBOLS
GE2. DETAILS – SHEET 1 OF 4
GE3. DETAILS – SHEET 2 OF 4
GE4. DETAILS – SHEET 3 OF 4
GE5. DETAILS – SHEET 4 OF 4
E1. SINGLE LINE DIAGRAM, LOAD CALCULATIONS
E2. EQUIPMENT ELEVATIONS
E3. OVERALL ELECTRICAL SITE PLAN
E4. ELECTRICAL SITE PLAN
E5. PUMP VFD SCHEMATIC – SHEET 1 OF 2
E6. PUMP VFD SCHEMATIC – SHEET 2 OF 2
E7. CONDUIT AND CABLE, AND FIXTURE SCHEDULES
E8. NEWMAN PUMP STATION – POWER AND CONTROL PLAN
E9. NEWMAN PUMP STATION – LIGHTING AND RECEPTACLE PLAN
E10. PLC I/O LIST, PANELBOARD SCHEDULE
E11. MISCELLANEOUS SCHEMATICS – SHEET 1 OF 2
E12. MISCELLANEOUS SCHEMATICS – SHEET 2 OF 2


LOCATION MAP
SCALE: 1"=2000'

811 Know what's below. Call 811 before you dig.
1-800-642-2444
Underground Service Alert (USA)
NOTICE TO CALL A MIN.
48 HOURS PRIOR TO CONSTRUCTION

CITY OF FORT BRAGG APPROVAL:

SIGNATURE _____ DATE _____


COLEMAN ENGINEERING
COLEMAN ENGINEERING
1223 PLEASANT GROVE BLVD
SUITE 100
ROSEVILLE, CA 95678
(916) 791-1188


BAR IS ONE INCH AT FULL SCALE
0 1"
IF NOT ONE INCH ON THIS SHEET SCALE ACCORDINGLY

| NO. | REVISIONS | BY | APP | DATE |
|---|---|---|---|---|
| 6 | | | | |
| 5 | | | | |
| 4 | | | | |
| 3 | | | | |
| 2 | | | | |
| 1 | | | | |

**RAW WATER LINE REPLACEMENT PROJECT**

COVER SHEET

**CITY OF FORT BRAGG** **CALIFORNIA**

DESIGNED UNDER THE DIRECTION OF:
Chad R. Coleman 10/6/23
CHAD R. COLEMAN DATE
R.C.E. No. 56490 - REGISTRATION EXPIRES 06-30-25

| | | |
|---|---|---|
| DESIGN: | MS | DATE: 10/6/23 |
| DRAWN: | WCJ | DATE: 10/6/23 |
| CHECKED: | CRC | DATE: 10/6/23 |

REGISTERED PROFESSIONAL ENGINEER CHAD R. COLEMAN No. C56490 CIVIL STATE OF CALIFORNIA
10/6/23

SCALE: AS SHOWN
DRAWING NUMBER: G1
SHEET NUMBER: 1 OF 68 SHEETS

10/9/23 S:_PROJECTS\TBG18-001 - RAW WATER LINE REPLACEMENT PROJECT\CADD\SEGMENTS 2-5 FULL SET\G1 - COVER SHEET.DWG

## GENERAL

1. THESE STANDARD NOTES APPLY TO ALL DRAWINGS.
2. DEVIATIONS OR CHANGES TO THESE PLANS OR ACCOMPANYING SPECIFICATIONS WITHOUT THE WRITTEN APPROVAL OF THE DESIGN ENGINEER SHALL ABSOLVE THE DESIGN ENGINEER OF ANY AND ALL RESPONSIBILITY FOR SAID DEVIATION OR CHANGE.
3. NO WORK SHALL BE STARTED WITHOUT FIRST NOTIFYING THE ENGINEER 48 HOURS PRIOR TO COMMENCEMENT OF WORK. THE CONTRACTOR SHALL BE IN RECEIPT OF APPROVED PLANS PRIOR TO BEGINNING ANY WORK.
4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR SCHEDULING REQUIRED INSPECTIONS AND SHALL GIVE 48 HOURS NOTIFICATION TO THE ENGINEER.
5. CONSTRUCTION BIDS SHALL BE BASED ON THE WORK REQUIRED BY THIS PLAN SET, WHETHER OR NOT SPECIFICALLY ITEMIZED ON THE BID SHEET.
6. THE CONTRACT DRAWINGS AND SPECIFICATIONS REPRESENT THE FINISHED PRODUCT. THEY DO NOT INDICATE THE METHOD OF CONSTRUCTION, UNLESS SPECIFICALLY INDICATED OTHERWISE.
7. ALL WORK SHALL CONFORM TO THE CONTRACT SPECIFICATIONS AND TO THE OWNER'S DESIGN STANDARDS. WHERE NO SPECIFIC DETAILS ARE SHOWN, CONSTRUCTION SHALL CONFORM TO SIMILAR WORK ON THE PROJECT AND TO APPLICABLE CODES. WHERE THE PLANS OR SPECIFICATIONS DESCRIBE PORTIONS OF THE WORK IN GENERAL BUT NOT IN COMPLETE DETAIL, IT IS UNDERSTOOD THAT ONLY THE BEST GENERAL PRACTICE IS TO PREVAIL AND THAT ONLY MATERIALS AND WORKMANSHIP OF THE FIRST QUALITY ARE TO BE USED. IN CASE OF CONFLICT, THE MOST STRINGENT REQUIREMENT SHALL APPLY.
8. WORK DESCRIBED IN THE SPECIFICATIONS AND NOT SHOWN ON THE DRAWINGS, OR SHOWN ON THE DRAWINGS AND NOT DESCRIBED IN THE SPECIFICATIONS, SHALL BE OF LIKE EFFECT AS IF SHOWN OR DESCRIBED IN BOTH. IN CASE OF DIFFERENCES BETWEEN SPECIFICATIONS AND DRAWINGS, THE MORE STRINGENT REQUIREMENT SHALL GOVERN.
9. DIMENSIONS TAKE PRECEDENCE OVER SCALE OF PLANS.
10. IT IS THE CONTRACTOR'S RESPONSIBILITY TO INFORM THE DESIGN ENGINEER OF ANY CONFLICTS WHICH MAY BECOME APPARENT DURING CONSTRUCTION AND TO SEE THAT THEY ARE RESOLVED PRIOR TO PROCEEDING ON WITH THE AFFECTED CONSTRUCTION.
11. NO CONSTRUCTION VEHICLES OR EQUIPMENT SHALL CROSS EXISTING BURIED IMPROVEMENTS EXCEPT AT LOCATIONS WHERE APPROVED PROTECTION FACILITIES ARE INSTALLED.
12. CONTOURS ARE SHOWN IN ONE FOOT INCREMENTS UNLESS OTHERWISE NOTED.
13. PIPELINES SHALL SLOPE UNIFORMLY BETWEEN ELEVATION SHOWN ON PLANS AND PROFILES.
14. SPOT ELEVATIONS SHOWN ARE TOP OF FINISHED GRADE UNLESS OTHERWISE NOTED.
15. THE CONTRACTOR SHALL KEEP A DAILY RECORD OF AS-BUILT CONDITIONS ON A DESIGNATED PLAN SET. FOLLOWING COMPLETION OF CONSTRUCTION, THE CONTRACTOR SHALL SUBMIT THE AS-BUILT PLAN SET TO THE ENGINEER.

## REGULATIONS AND PERMITS

1. THE CONTRACTOR SHALL OBTAIN ALL NECESSARY CONSTRUCTION PERMITS, APPROVALS, AND LICENSES PRIOR TO BEGINNING THE WORK.
2. WORKMANSHIP, MATERIALS AND METHODS OF CONSTRUCTION SHALL CONFORM TO THE MOST CURRENT EDITIONS OF THE I.B.C., U.M.C., U.P.C., N.E.C., AND N.F.P.A. AS WELL AS APPLICABLE STATE AND LOCAL CODES, TRADE ASSOCIATION STANDARDS, AND MANUFACTURER'S STANDARDS.
3. ALL WORK SHALL BE IN COMPLIANCE WITH APPLICABLE ORDINANCES AND REGULATIONS OF ANY AUTHORITY HAVING JURISDICTION. IF THE CONTRACT DOCUMENTS ARE IN VARIANCE THEREWITH, THE CONTRACTOR SHALL NOTIFY THE ENGINEER PRIOR TO PERFORMING SUCH WORK.
4. ALL MATERIALS AND INSTALLATIONS FOR BUILDINGS ACCESSIBLE TO THE PUBLIC SHALL BE IN CONFORMANCE WITH A.D.A. REQUIREMENTS.
5. CONTRACTOR SHALL COMPLY WITH ALL ENVIRONMENTAL MITIGATION AND MONITORING REQUIREMENTS IN ACCORDANCE WITH ALL APPLICABLE PROJECT ENVIRONMENTAL DOCUMENTATION.
6. CONTRACTOR SHALL FULFILL ALL REQUIREMENTS OF THE STORM WATER POLLUTION PREVENTION PLAN (SWPPP) PRIOR TO COMMENCEMENT OF AND DURING CONSTRUCTION. IF NO SWPPP IS INCLUDED IN THE DESIGN DOCUMENTS OR OTHERWISE PROVIDED TO THE CONTRACTOR, THE CONTRACTOR IS REQUIRED TO APPLY FOR AND OBTAIN A SWPPP PRIOR TO COMMENCING WORK.
7. CONTRACTOR SHALL OBTAIN ANY ENCROACHMENT PERMITS REQUIRED FOR WORK WITHIN PUBLIC RIGHT OF WAY.
8. CONTRACTOR SHALL COORDINATE UTILITY RELATED REQUIREMENTS, INCLUDING APPLICATION FOR SERVICE, WITH UTILITY COMPANIES.

## EXISTING CONDITIONS

1. THE CONTRACTOR SHALL EXAMINE THE PROJECT WORK AREA PRIOR TO BIDDING TO SATISFY HIMSELF AS TO THE NATURE AND EXTENT OF EXISTING SITE CONDITIONS THAT WILL BE ENCOUNTERED.
2. ALL MEASUREMENTS OF EXISTING AND PROPOSED TOPOGRAPHY, GROUND ELEVATIONS, STRUCTURES AND UTILITIES ARE SUBJECT TO VERIFICATION IN THE FIELD BY THE CONTRACTOR PRIOR TO THE START OF CONSTRUCTION. THE CONTRACTOR SHALL NOTIFY THE ENGINEER IN WRITING OF ANY DISCREPANCIES ON THE DRAWINGS PRIOR TO FABRICATION OR CONSTRUCTION. THE CONTRACTOR WILL BE RESPONSIBLE FOR ANY ERRORS WHICH MAY HAVE BEEN AVOIDED BY FIELD VERIFICATION.
3. THE CONTRACTOR SHALL REMOVE EXISTING STRUCTURES, INCLUDING PAVING, SIDEWALKS, CURBS, GUTTERS, PIPELINES, AND RIP RAP, AS MAY BE NECESSARY FOR THE PERFORMANCE OF THE WORK AND SHALL REBUILD THE STRUCTURES THUS REMOVED IN AS GOOD A CONDITION AS FOUND WITH THE REQUIREMENTS SPECIFIED. CONCRETE STRUCTURES SUCH AS CURBS AND GUTTERS SHALL BE REPLACED FROM JOINT TO JOINT OR AS DIRECTED BY THE CONSTRUCTION MANAGER. THE CONTRACTOR SHALL ALSO REPAIR EXISTING STRUCTURES THAT MAY BE DAMAGED AS A RESULT OF THE WORK UNDER THIS CONTRACT.
4. DO NOT INTERRUPT EXISTING UTILITIES SERVING OCCUPIED OR USED FACILITIES, EXCEPT WHEN AUTHORIZED BY THE ENGINEER. THE CONTRACTOR WILL PROVIDE TEMPORARY SERVICES DURING INTERRUPTIONS TO EXISTING UTILITIES AS REQUIRED.
5. THE CONTRACTOR SHALL RESTORE THE EXISTING GROUND, REPLACE IN KIND ALL EXISTING STRUCTURES, PAVING, LANDSCAPING, AND FINISH SURFACE DISTURBED BY CONSTRUCTION TO THE ORIGINAL CONTOURS AND ELEVATION UNLESS OTHERWISE NOTED ON THE PLANS.
6. THE CONTRACTOR SHALL NOT DISTURB ANY PERMANENT SURVEY MONUMENT WITHOUT THE CONSENT OF THE ENGINEER. A LICENSED SURVEYOR SHALL REPLACE ALL MONUMENTS DISTURBED AT THE CONTRACTOR'S EXPENSE. THE CONTRACTOR SHALL REESTABLISH ANY PROPERTY MARKER, BENCHMARK, ETC. DISTURBED DURING CONSTRUCTION TO ITS ORIGINAL LOCATION.
7. ALL AREAS OF CONSTRUCTION DISTURBANCE WHERE NATURAL COVER AND VEGETATION HAVE BEEN REMOVED SHALL BE HYDRO-SEEDED FOR EROSION CONTROL IN ACCORDANCE WITH THE SPECIFICATIONS.

## SAFETY

1. THE CONTRACTOR SHALL BE REQUIRED TO ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING CONSTRUCTION OF THE PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY.
2. NOTIFY UNDERGROUND SERVICE ALERT (U.S.A.) AT (800) 227-2600 AT LEAST TWO WORKING DAYS PRIOR TO ANY EXCAVATION.
3. CONTRACTOR SHALL PROVIDE AN EMERGENCY CONTACT TELEPHONE NUMBER TO THE DESIGN ENGINEER, OWNER, AND ALL PARTIES LISTED ON SHEET G1 PRIOR TO STARTING ANY WORK.
4. THE CONTRACTOR SHALL COMPLY WITH THE RULES AND REGULATIONS OF THE STATE CONSTRUCTION SAFETY ORDER.
5. THE CONTRACTOR SHALL COMPLY WITH ALL OSHA SAFETY REQUIREMENTS.
6. SHEETING, SHORING, AND BRACING OF TRENCHES GREATER THAN 5-FEET IN DEPTH IS REQUIRED. THE CONTRACTOR SHALL DESIGN SHEETING, SHORING, AND BRACING IN ACCORDANCE WITH ARTICLE 6 OF THE CAL/OSHA AND THE CALIFORNIA LABOR CODE.
7. ALL EXCAVATION SHALL BE COMPLETE OR BACKFILLED AT THE END OF THE DAY OR COVERED WITH PLATING, UNLESS ALTERNATIVE PROTECTION MEASURES ARE APPROVED BY THE ENGINEER.
8. THE CONTRACTOR SHALL PROVIDE ALL LIGHTS, SIGNS, BARRICADES, FLAG PERSONS, OR OTHER DEVICES NECESSARY TO PROVIDE PUBLIC SAFETY AND TO MAINTAIN TRAFFIC CONTROL AT ALL TIMES.
9. CONTRACTOR SHALL COMPLY WITH ALL LOCAL, STATE, AND FEDERAL LAWS, ORDINANCES, AND REGULATIONS REGARDING NOISE GENERATED BY CONSTRUCTION OPERATIONS. CONSTRUCTION EQUIPMENT THAT OPERATES AT A NOISE LEVEL IN EXCESS OF 85 DECIBELS (MEASURED ON THE A-WEIGHTED SCALE DEFINED IN ANSI-1.4), AT A DISTANCE OF 100 FEET FROM THE EQUIPMENT, IS PROHIBITED UNLESS AUTHORIZED BY THE ENGINEER.
10. THE CONTRACTOR SHALL CONTACT AND COORDINATE WITH ALL UTILITY COMPANIES FOR THE LOCATION AND PLACEMENT OF UTILITIES DURING CONSTRUCTION. NO EXCAVATION IS PERMITTED WITHIN 24 INCHES OF A GAS MAIN WITHOUT A REPRESENTATIVE OF THE GAS UTILITY PRESENT.

## CIVIL, PIPELINES AND OTHER UTILITIES

1. THE TYPE, SIZE, LOCATION, AND DEPTH OF EXISTING UNDERGROUND UTILITIES SHOWN ON THESE DRAWINGS WERE OBTAINED FROM SOURCES OF VARYING RELIABILITY. NO RESPONSIBILITY FOR THE COMPLETENESS AND/OR ACCURACY OF THE DELINEATION OF SUCH UNDERGROUND UTILITIES, WHICH MAY BE ENCOUNTERED, IS ASSUMED BY THE ENGINEER OR OWNER. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY THE EXISTENCE AND LOCATION OF ALL UNDERGROUND UTILITIES PRIOR TO COMMENCEMENT OF CONSTRUCTION.
2. THE CONTRACTOR SHALL ESTIMATE ALL EARTHWORK QUANTITIES PRIOR TO THE START OF CONSTRUCTION AND SHALL INCLUDE IMPORT OF REQUIRED MATERIAL OR EXPORT OF EXCESS MATERIAL IN HIS BID AS REQUIRED TO COMPLETE CONSTRUCTION AS DEPICTED ON THE PLANS. NO ADDITIONAL COMPENSATION WILL BE MADE FOR IMPORT OR EXPORT OF MATERIAL THAT IS REQUIRED.
3. ANY EXISTING UTILITIES SHALL BE EXPOSED USING APPROPRIATE MEANS AND METHODS REQUIRED TO PREVENT DAMAGE. EXPOSED UTILITIES AND STRUCTURES SHALL BE PROTECTED AND/OR SUPPORTED TO PREVENT DAMAGE OR DEFECTION FROM ORIGINAL CONDITION. ANY DAMAGE OR LOSS OF SERVICE RESULTING FROM CONSTRUCTION ACTIVITIES SHALL BE CORRECTED IMMEDIATELY TO PRE-CONSTRUCTION CONDITION AT CONTRACTOR'S EXPENSE.
4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATING ALL UTILITIES, WHETHER PUBLIC OR PRIVATE, PRIOR TO EXCAVATION. THE INFORMATION AND DATA SHOWN WITH RESPECT TO EXISTING UNDERGROUND FACILITIES AT OR CONTIGUOUS TO THE SITE IS APPROXIMATE AND BASED ON INFORMATION FURNISHED BY THE OWNER OF SUCH UNDERGROUND FACILITIES OR ON PHYSICAL APPURTENANCES OBSERVED IN THE FIELD. THE OWNER AND ENGINEER SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF ANY SUCH INFORMATION OR DATA. THE CONTRACTOR SHALL HAVE FULL RESPONSIBILITY FOR REVIEWING AND CHECKING ALL SUCH INFORMATION AND DATA, FOR LOCATING ALL UNDERGROUND FACILITIES, FOR COORDINATION OF THE WORK WITH THE OWNERS OF SUCH UNDERGROUND FACILITIES DURING CONSTRUCTION, AND FOR THE SAFETY AND PROTECTION THEREOF AND REPAIRING ANY DAMAGE THERETO RESULTING FROM THE WORK. THE COST FOR POTHOLING TO LOCATE EXISTING UNDERGROUND UTILITIES SHOWN ON THE DRAWINGS SHALL BE INCLUDED IN THE ASSOCIATED BID ITEMS IN THE CONTRACTOR'S BID. THE CONTRACTOR SHALL NOTIFY ANY AFFECTED UTILITY COMPANIES OR AGENCIES IN WRITING AT LEAST 48 HOURS PRIOR TO CONSTRUCTION.
5. CONTRACTOR IS RESPONSIBLE FOR PROVIDING PIPE FITTINGS (WHETHER OR NOT SHOWN ON THE DRAWINGS) TO PLACE THE ALIGNMENT OF THE PIPELINES AS CLOSE AS PRACTICABLE TO THAT SHOWN ON THE DRAWINGS.
6. PROVIDE 12 INCHES MINIMUM VERTICAL CLEARANCE BETWEEN EXISTING AND/OR NEW BURIED PIPELINE UTILITIES, UNLESS NOTED OTHERWISE.
7. NOT USED.
8. DEFLECT JOINTS ON STANDARD FITTINGS OR ADJACENT HDPE PIPE TO OBTAIN VERTICAL AND HORIZONTAL CURVES SHOWN ON THE DRAWINGS. DO NOT DEFLECT HDPE PIPE WITHIN 10 FEET OF ANY FABRICATED FITTING OR HDPE FLANGE CONNECTION.
9. LINE VALVES SHALL BE SHOP TESTED TO SEAT IN BOTH DIRECTIONS TO FACILITATE FIELD PRESSURE TESTING.
10. ALL CONCRETE VAULTS AND COVERS IN TRAFFIC OR PARKING AREAS SHALL BE DESIGNED FOR H-20 LOADINGS UNLESS SPECIFICALLY NOTED OTHERWISE ON THE PLANS.
11. ALL PIPES SHALL BE CONSTRUCTED TO RESIST THRUST FORCES DEVELOPED DURING PRESSURE TESTING AND OPERATION. THRUST FORCES ARE DEVELOPED AT CHANGES IN HORIZONTAL AND VERTICAL DIRECTIONS, CHANGES IN PIPELINE DIAMETER, CLOSED VALVES, AND DEAD ENDS.
12. THRUST BLOCKS ARE NOT ALLOWED FOR PIPE AND FITTING RESTRAINT, UNLESS NOTED OTHERWISE. FITTINGS AND PIPE JOINTS SHALL BE MECHANICALLY RESTRAINED IN ACCORDANCE WITH THE SPECIFICATIONS AND AS SHOWN ON THE DRAWINGS.
13. ALL UNDERGROUND FACILITIES INSTALLED BY THE CONTRACTOR SHALL BE ACCEPTED BY THE APPLICABLE AGENCIES PRIOR TO CONSTRUCTION OF CURBS, FINAL PREPARATION OF SUB-GRADE, AND PLACEMENT OF BASE MATERIAL.
14. CONTRACTOR SHALL BE RESPONSIBLE TO IMPLEMENT DUST CONTROL MEASURES AS CONDITIONS WARRANT AND AS REQUIRED. DAMAGE DUE TO DUST OR EROSION RESULTING FROM THE WORK IS THE RESPONSIBILITY OF THE CONTRACTOR.
15. IF SAW CUT IS WITHIN 2 FEET OF AN EXISTING PAVEMENT EDGE OR EXISTING PAVEMENT PATCH, REMOVE EXISTING PAVEMENT TO THAT EDGE AND REPLACE THE ENTIRE PAVEMENT.
16. ALL PIPE PENETRATIONS THROUGH WALLS AND SLABS SHALL BE PROVIDED WITH WALL SLEEVES, UNLESS NOTED OTHERWISE.
17. CONTRACTOR SHALL KEEP EXCAVATIONS FREE FROM WATER DURING CONSTRUCTION. STATIC WATER LEVEL SHALL BE DRAWN DOWN A MINIMUM OF 4 FEET BELOW BOTTOM OF EXCAVATIONS. DISPOSAL OF WATER SHALL NOT DAMAGE PROPERTY OR CREATE A PUBLIC NUISANCE. DISPOSAL OF WATER SHALL BE IN ACCORDANCE WITH PROJECT ENVIRONMENTAL DOCUMENTATION.
18. ALL SOIL FILLING OR DISPOSAL ONSITE WILL BE COMPACTED TO 95% RELATIVE COMPACTION UNLESS NOTED OTHERWISE.

## MECHANICAL EQUIPMENT AND PIPING

1. EQUIPMENT LAYOUT SHOWN ON THE DRAWINGS IS FOR A SINGLE AND SPECIFIC MANUFACTURER. CONTRACTOR SHALL MAKE ALL NECESSARY STRUCTURAL, MECHANICAL, ELECTRICAL, AND BUILDING MODIFICATIONS NECESSARY TO ACCOMMODATE ALTERNATIVE EQUIPMENT AT NO ADDITIONAL COST TO THE OWNER.
2. THE CONTRACTOR SHALL PROVIDE ALL APPURTENANCES REQUIRED FOR PROPER OPERATION OF EQUIPMENT, IN ACCORDANCE WITH THE SPECIFICATIONS, WHETHER OR NOT THEY ARE SHOWN ON THE DRAWINGS.
3. NOT ALL PIPE FITTINGS OR SUPPORTS ARE SHOWN ON THE DRAWINGS. FURNISH AND INSTALL ALL FITTINGS AND SUPPORTS, AS REQUIRED FOR THE EQUIPMENT FURNISHED IN ACCORDANCE WITH THE SPECIFICATIONS AND TYPICAL DETAILS AND AT NO ADDITIONAL COST TO THE OWNER.
4. PIPING CONNECTIONS TO EQUIPMENT SHALL BE VERIFIED AND ADJUSTED TO MATCH ACTUAL EQUIPMENT FURNISHED AT NO ADDITIONAL COST TO THE OWNER.
5. SUCTION AND DISCHARGE PIPING FOR PUMPS, BLOWERS, ETC. SHALL BE SUPPORTED SO THAT THE WEIGHT OF THE PIPING IS NOT DISTRIBUTED TO THE EQUIPMENT.
6. PROVIDE WARNING SIGNS IN ACCORDANCE WITH THE SPECIFICATIONS FOR ALL REMOTELY CONTROLLED EQUIPMENT.
7. DUCTILE IRON PIPE SHALL COMPLY WITH ANSI A21.51 (AWWA C151). PIPE WALL THICKNESS FOR PUSH-ON JOINT AND MECHANICAL JOINT PIPE SHALL BE CLASS 51 FOR PIPE 4-INCHES AND SMALLER, AND CLASS 50 FOR LARGER PIPE.
8. NOT USED.
9. PROVIDE CATHODIC PROTECTION ON ALL DUCTILE IRON FITTINGS, VALVES AND OTHER METALLIC FITTINGS OR APPURTENANCES IN ACCORDANCE WITH THE OWNERS STANDARDS, CATHODIC PROTECTION ENGINEER RECOMMENDATIONS, OR PLANS.
10. ALL DIFFERING PIPE MATERIAL SHALL BE DIELECTRICALLY SEPARATED.
11. ALL BURIED DUCTILE IRON PRESSURE PIPE AND FITTINGS SHALL BE ENCASED IN 8-MIL POLYETHYLENE IN ACCORDANCE WITH AWWA C-105.
12. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING ACCURATE VERTICAL AND HORIZONTAL CONTROL THROUGHOUT THE PROJECT.

## MATERIALS AND PRODUCTS

1. IT IS INTENDED THAT THESE PLANS REQUIRE ALL LABOR AND MATERIALS NECESSARY AND PROPER FOR THE WORK CONTEMPLATED AND THAT THE WORK BE COMPLETED IN ACCORDANCE WITH ITS TRUE INTENT AND PURPOSE. THE CONTRACTOR SHALL NOTIFY THE ENGINEER IMMEDIATELY REGARDING ANY DISCREPANCIES OR AMBIGUITIES WHICH MAY EXIST IN THE PLANS. THE ENGINEERS INTERPRETATION THEREOF SHALL BE CONCLUSIVE.
2. ALL PRODUCTS AND MATERIALS SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS AND RECOMMENDATIONS. IF CONTRACT DOCUMENTS ARE IN VARIANCE THEREWITH, NOTIFY ENGINEER PRIOR TO BEGINNING WORK.
3. ALL MATERIALS AND EQUIPMENT FURNISHED SHALL BE NEW AND FREE FROM DEFECTS. MATERIALS USED MUST HAVE THE MANUFACTURER'S WARRANTED SUPPORT.
4. MATERIALS, EQUIPMENT, ETC. NOT INDICATED ON THE DRAWINGS OR SPECIFIED, WHICH ARE MANIFESTLY OR REASONABLY REQUIRED, OR NECESSARY FOR A SUCCESSFUL, EFFICIENT AND COMPLETE INSTALLATION, SHALL NOT RELIEVE THE CONTRACTOR FROM PERFORMING SUCH WORK. THEY SHALL BE HELD TO BE IMPLIED, AND SHALL BE FURNISHED AND INSTALLED AT NO ADDITIONAL COST TO THE OWNER.
5. WHERE REFERENCE IS MADE TO VARIOUS TEST STANDARDS AND MATERIALS, SUCH STANDARDS SHALL BE THE LATEST EDITION AND/OR ADDENDUM.
6. ALL BUILDING COMPONENTS, BUILDING SYSTEMS, AND BUILDING PRODUCTS ARE TO BE LOCATED, FURNISHED, PROVIDED, AND INSTALLED WITH NECESSARY ACCESSORIES INCLUDING BUT NOT LIMITED TO EXPANSION/CONTRACTION CONTROL, BRACING, FLASHING, ELECTRONIC DEVICES, VALVES, ACCESSORIES, SUPPORTS, CONNECTIONS, DRAINAGE, VENTILATION, ETC. FOR A COMPLETE AND WORKING ASSEMBLY, PER CODES, DRAWINGS, AND SPECIFICATIONS, AND PER THE RECOMMENDATIONS OF ALL MANUFACTURERS, INCLUDING THOSE DIRECTLY INVOLVED AND THOSE RELATED OR INTERFACING.
7. CONTRACTOR SHALL VERIFY ALL CONTROLLING DIMENSIONS PRIOR TO PREPARATION OF SHOP DRAWINGS AND ORDERING OF MATERIALS.
8. CONTRACTOR SHALL BE REQUIRED TO ARRANGE FOR ALL STORAGE/STAGING AREAS, WHICH MAY NOT BE SHOWN ON THE DRAWINGS, AND PROVIDE SECURITY AT NO ADDITIONAL COST TO THE OWNER.
9. ALL STAINLESS STEEL SHALL BE TYPE 304 OR 316, UNLESS NOTED OTHERWISE.
10. ALL NUTS AND BOLTS TO BE INSTALLED UNDERGROUND, ENCASED, BURIED, AND INSIDE MANHOLES SHALL BE STAINLESS STEEL TYPE 316, UNLESS NOTED OTHERWISE.
11. ISOLATE ALL COPPER PIPE FROM OTHER MATERIALS WITH PVC TAPE.
12. SEPARATE DISSIMILAR METALS AND ALUMINUM IN CONTACT WITH CONCRETE, WITH BITUMINOUS PAINT OR AN ALTERNATIVE PRODUCT APPROVED BY THE ENGINEER.
13. ALL MATERIALS AND PRODUCTS TO BE INSTALLED IN THAT WILL BE IN CONTACT WITH DRINKING WATER SYSTEM SHALL BE NSF- 61 CERTIFIED.

## WORKMANSHIP

1. CONTRACTOR DAMAGED WORK MUST BE REPLACED AT NO ADDITIONAL COST TO THE OWNER. REPAIRED OR REPLACED CONSTRUCTION DAMAGE TO EXISTING FACILITIES AND UTILITIES IS THE CONTRACTOR'S RESPONSIBILITY.
2. THE ENGINEER RESERVES THE RIGHT TO DIRECT THE CONTRACTOR TO REMOVE AND REINSTALL WORK, WHICH IN THE ENGINEER'S OPINION DOES NOT MAINTAIN WORKMANSHIP AND CRAFTSMANSHIP STANDARDS.
3. THE CONTRACTOR SHALL PROVIDE ALL MEASURES NECESSARY TO PROTECT BUILDINGS AND STRUCTURES DURING CONSTRUCTION. SUCH MEASURES SHALL INCLUDE, BUT ARE NOT LIMITED TO, BRACING AND SHORING. OBSERVATION VISITS TO THE SITE BY THE DESIGN ENGINEER SHALL NOT INCLUDE INSPECTION OF THE ABOVE ITEMS.
4. CONSTRUCTION MATERIAL SHALL BE SPREAD OUT IF PLACED ON FRAMING FLOORS OR ROOF. TEMPORARY LOADING OF CONSTRUCTION MATERIAL SHALL NOT EXCEED THE DESIGN LIVE LOAD.
5. CONTRACTOR SHALL MAINTAIN THE JOB SITE IN CLEAN, SAFE AND USABLE CONDITION THROUGHOUT THE COURSE OF CONSTRUCTION. ALL SPILLS OF SOIL, ROCK, CONSTRUCTION DEBRIS, ETC. SHALL BE REMOVED IMMEDIATELY FROM PUBLIC ACCESS AREAS. ALL TRASH, CONSTRUCTION DEBRIS AND MATERIALS SHALL BE CONTAINED WITHIN THE CONSTRUCTION AREA UNTIL OFF-SITE DISPOSAL CAN BE ARRANGED.

## SURVEY

1. SURVEY COMPLETED BY CINQUINI & PASSARINO INC. REFERENCES TO SURVEY ON THESE PLANS ARE BASED ON INFORMATION PROVIDED BY CINQUINI & PASSARINO INC.
2. NOT USED.

## GEOTECHNICAL

1. GEOTECHNICAL REPORT PREPARED BY CRAWFORD & ASSOCIATES INC. SEE REPORT DATED OCTOBER 2020 AND FINAL GEOTECHNICAL MEMORANDUM DATED 3/30/2022.
2. ALL GRADING, EXCAVATION, FILL, ETC. SHALL BE COMPLETED IN ACCORDANCE WITH THE REQUIREMENTS AND RECOMMENDATIONS MADE IN THE GEOTECHNICAL REPORT.

## ELECTRICAL

1. SEE ELECTRICAL DRAWINGS FOR GENERAL NOTES ON ELECTRICAL, INSTRUMENTATION, AND CONTROLS CONSTRUCTION.

## STRUCTURAL

1. SEE STRUCTURAL DRAWINGS FOR GENERAL NOTES ON STRUCTURAL DETAILS.

## ARCHITECTURAL

1. SEE ARCHITECTURAL DRAWINGS FOR GENERAL NOTES ON BUILDING CONSTRUCTION.

COLEMAN ENGINEERING
COLEMAN ENGINEERING
1223 PLEASANT GROVE BLVD
SUITE 100
ROSEVILLE, CA 95678
(916) 791-1188

BAR IS ONE INCH AT FULL SCALE
0 1"
IF NOT ONE INCH ON THIS SHEET SCALE ACCORDINGLY

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**RAW WATER LINE REPLACEMENT PROJECT**

# GENERAL NOTES

**CITY OF FORT BRAGG** **CALIFORNIA**

DESIGNED UNDER THE DIRECTION OF:
Chad R. Coleman 10/6/23
CHAD R. COLEMAN DATE
R.C.E. No. 56490 - REGISTRATION EXPIRES 06-30-25

| | | |
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| DESIGN: | WCJ | DATE: 10/6/23 |
| DRAWN: | WCJ | DATE: 10/6/23 |
| CHECKED: | CRC | DATE: 10/6/23 |

REGISTERED PROFESSIONAL ENGINEER CHAD R. COLEMAN No. C56490 CIVIL STATE OF CALIFORNIA
10/6/23

SCALE AS SHOWN
DRAWING NUMBER G2
SHEET NUMBER 2 OF 68 SHEETS

10/6/23 S:_PROJECTS\FB0618-001 - RAW WATER LINE REPLACEMENT PROJECT\CADD\SEGMENTS 2-5 FULL SET\G2 - GENERAL NOTES.DWG

# CITY OF FORT BRAGG WATER MAIN CONSTRUCTION NOTES

1. ALL MATERIAL, WORKMANSHIP, AND CONSTRUCTION DETAILS SHALL CONFORM TO THE CITY OF FORT BRAGG "STANDARD SPECIFICATIONS," INCLUDING ALL ADDENDA, STANDARD PLAN REVISIONS AND SPECIAL PROVISIONS.
2. START EXCAVATION BY EXPOSING END OF EXISTING MAIN TO DETERMINE ITS LINE AND GRADE. START NEW MAIN 8–10 FEET FROM, AND ON SAME LINE AND GRADE AS EXISTING MAIN. PIPE LAYING SHALL THEN BE ADJUSTED SO THE DEPTH OF NEW MAIN CONFORMS TO NOTE #3.
3. MINIMUM DEPTH OF COVER FROM FINISHED GRADE SHALL BE: 32" FOR 6" MAINS; 36" FOR 8" MAINS, 44" FOR 12" MAINS, AND 48" FOR 14" AND LARGER MAINS. 4" AND ~~10" MAINS MUST BE SPECIFICALLY APPROVED BY THE DIRECTOR OF PUBLIC WORKS.~~ 4" THROUGH 16" MAIN LINE VALVES SHALL BE RESILIENT SEAT GATE. 18" AND LARGER MAINLINE VALVES SHALL BE BUTTERFLY VALVES. BLOW OFF VALVES SHALL BE 2" OR 3" BALL VALVES WITH ROTATION STOPS.
4. NO. 10 INSULATED COPPER WIRE SHALL BE LAID ON TOP OF AND ALONG ENTIRE LENGTH OF ALL NON–METALLIC MAINS AND SHALL BE EXTENDED TO THE SURFACE AT ALL VALVE LOCATIONS, BLOWOFFS AND METER BOXES SUFFICIENT FOR LOCATOR EQUIPMENT TO BE ATTACHED. FASTEN THE WIRE TO THE TOP OF THE PIPE SO AS NOT TO BE DISPLACED BY BACKFILLING PROCEDURE (ONE METHOD OF ACCOMPLISHING THIS IS TO AFFIX THE WIRE TO THE TOP OF THE PIPE WITH DUCT TAPE AT APPROXIMATELY 10 FEET INTERVALS).
5. MAINS TO BE CONSTRUCTED WITHIN 10' OF SEWER PIPE REQUIRE SPECIAL INSTALLATION AND DESIGN MUST BE SPECIFICALLY APPROVED BY THE DIRECTOR OF PUBLIC WORKS.
6. ALL TRENCHING, BACKFILL AND RESURFACING REQUIRED FOR INSTALLATION OF WATER SYSTEM FACILITIES SHALL BE PER CITY STANDARD 300.
7. ONLY CITY PERSONNEL SHALL OPERATE VALVES ON EXISTING WATER MAINS OR WATER SERVICES.
8. SERVICE LATERALS OTHER THAN THOSE SHOWN OR NOTED ON THE PLANS SHALL NOT BE INSTALLED PRIOR TO OBTAINING CITY APPROVAL.
9. UNLESS OTHERWISE SHOWN ON THE PLANS, 1" WATER SERVICE LATERALS FOR 1" METER INSTALLATIONS SHALL BE INSTALLED IN RESIDENTIAL DEVELOPMENTS AND 2" OR LARGER WATER SERVICE LATERALS SHALL BE INSTALLED IN COMMERCIAL DEVELOPMENTS. WHERE SERVICE LENGTHS ARE OVER 40 FEET FROM METER TO MAIN LINE, 1 1/4" SERVICE LATERALS SHALL BE USED. FOR SERVICE LENGTHS OVER 60 FEET, SERVICE LATERAL SIZE SHALL BE APPROVED BY THE CITY ENGINEER.
10. NO MORE THAN ONE WATER SERVICE SHALL BE PLACED WITHIN A TRENCH.
11. WATER AND SEWER SERVICE LATERALS SHALL BE SEPARATED HORIZONTALLY BY A MINIMUM OF 5 FEET.
12. AT THE LOCATION OF EACH WATER SERVICE LATERAL, THE LETTER "W" SHALL BE INSCRIBED INTO THE FACE OF THE CURB. THE LETTER "W" SHALL BE 4" HIGH AND COMPLETELY LEGIBLE.
13. ALL COPPER WATER SERVICE TUBING SHALL BE IN CONFORMANCE WITH THE LATEST AWWA STANDARDS AS DESCRIBED IN ANSI/AWWA C800 OR THE LATEST REVISION, AND WITH ASTM B88, AND SHALL BE TYPE "K" SOFT TEMPER TUBING FOR 1" TUBING AND TYPE "K" HARD TEMPER FOR 1 1/2" AND 2" TUBING.
14. ALL METER BOXES, VAULTS AND PITS SHALL BE BEDDED ON 3" MINIMUM THICK, 3/4" DRAIN ROCK, AB–2, OR OTHER CLEAN MATERIAL WITH TYPICAL SAND EQUIVALENT OF 20 MINIMUM, UNCONTAMINATED BY NATIVE SOIL, AGAINST COMPACTED OR UNDISTURBED BASE. THE GRAVEL BED SHALL EXTEND TO A 4" MINIMUM BEYOND ALL SIDES OF THE METER BOX. BOX SHALL BE SET FLUSH WITH TOP OF CURB, OR SIDEWALK WHICHEVER IS APPLICABLE. LOT NUMBERS MUST BE NOTED ON TOP SIDE OF METER BOX WITH A PERMANENT MARKING PEN.
15. METER BOXES SHALL BE LOCATED OUT OF TRAFFIC LOADING AREAS WHENEVER POSSIBLE.
16. METER BOXES AND VAULTS SHALL BE SET SO THAT THE READING LIDS ARE ALIGNED OVER THE METER REGISTERS AS CLOSELY AS POSSIBLE.
17. UNLESS OTHERWISE APPROVED BY THE DIRECTOR OF PUBLIC WORKS, THE ON–SITE WATER LINE SHALL BE THE SAME SIZE AS THE WATER METER.
18. FOR SERVICES LARGER THAN 1", IF EITHER THE WATER SERVICE LATERAL OR THE ON–SITE BUILDING LINE IS ALREADY EXISTING WITHIN THE TOLERANCES SPECIFIED ON THE STANDARD PLAN, THE LAST ONE INSTALLED SHALL BE ON THE SAME LINE AND GRADE AS THE EXISTING ONE.
19. ITEMS SPECIFIED ON THE STANDARD PLANS, OR THE ENGINEER'S APPROVED LIST, ARE APPROVED FOR USE BY THE DIRECTOR OF PUBLIC WORKS. ALL OTHERS SHALL BE SUBMITTED TO THE DIRECTOR OF PUBLIC WORKS FOR APPROVAL.
20. METER MANIFOLDS MUST BE DETAILED AND APPROVED BY THE DIRECTOR OF PUBLIC WORKS. IN GENERAL, MANIFOLDS WHERE ALL FITTINGS ARE 2" OR LESS, SHALL BE CONSTRUCTED FROM THREADED BRASS PIPES AND FITTINGS FROM THE END OF THE SERVICE LATERAL TO THE METER CONNECTION. NO PLASTIC PIPE SHALL BE USED IN CONSTRUCTING MANIFOLDS OF ANY SIZE. NO MORE THAN SIX METERS MAY BE MANIFOLDED OFF A SINGLE WATER SERVICE LATERAL, WITH NO MORE THAN 3 ON EITHER SIDE OF THE SERVICE.
21. GASKETS FOR FLANGE FITTINGS SHALL CONFORM TO AWWA STD. C115.
22. TO ABANDON A WATER SERVICE, EXPOSE AND TURN OFF CORPORATION STOP, THEN SEVER THE LATERAL CONNECTION.
23. THERE SHALL BE NO UNMETERED CONNECTIONS TO THE CITY OF FORT BRAGG WATER SYSTEM, INCLUDING CONNECTIONS BYPASSING METER FOR TESTING ON–SITE PLUMBING OR FOR OBTAINING CONSTRUCTION WATER. PRESSURE TESTING AGAINST VALVES WILL NOT BE ALLOWED. WHEN A SUBDIVISION WATER MAIN HAS BEEN ACCEPTED AND TIED–IN, THE INDIVIDUAL CURB STOPS WILL CONSTITUTE A STRAIGHT TIE–IN CONNECTION. SUCH CONNECTIONS WILL BE SERVED BY THE CITY AND WILL RESULT IN PENALTIES INCLUDING PAYMENT OF FINES AND ESTIMATED WATER USAGE FEES.
24. UPON APPLICATION, THE CONTRACTOR SHALL INSTALL A 2" TEMPORARY CHECK VALVE ON THE END OF THE EXISTING MAIN FOR CONSTRUCTION WATER (SEE STANDARD), OR AT THE OPTION OF THE DIRECTOR OF PUBLIC WORKS, THE CONTRACTOR MAY HAVE A FIRE HYDRANT METER INSTALLED BY CITY PERSONNEL.
25. BEFORE COMBUSTIBLE MATERIALS MAY BE STORED OR CONSTRUCTED ON SITE, THE FIRE DEPARTMENT MUST APPROVE FIRE FLOW AND ACCESS. BEFORE A FIRE HYDRANT MAY BE PLACED IN SERVICE, A HIGH VELOCITY FLUSHING OF THE HYDRANT LATERAL SHALL BE WITNESSED AND APPROVED BY CITY PERSONNEL. HIGH VELOCITY FLUSHING SHALL CONSIST OF REMOVING THE HYDRANT AND REPLACING IT WITH A SUITABLE ELBOW AND DIFFUSER. UNDER CITY SUPERVISION, THE HYDRANT LATERAL IS FLUSHED UNTIL CITY PERSONNEL ARE SATISFIED THAT THE LINES ARE CLEAR OF DEBRIS. PRIOR TO ACCEPTANCE OF THE ON–SITE WATER MAIN BY THE CITY, 6" METER AND DOUBLE–CHECK VALVE ASSEMBLY, CERTIFIED BY THE CITY, MAY BE INSTALLED PER 526.
26. UPON COMPLETION OF CONSTRUCTION, FINAL CONNECTION WILL BE MADE BY THE CONTRACTOR AT THE DEVELOPER'S EXPENSE UNDER INSPECTION BY A CITY REPRESENTATIVE, UNLESS OTHERWISE SPECIFIED ON THE PLANS.
27. WHEN A CONNECTION IS REQUIRED TO AN EXISTING WATER MAIN, THE CONTRACTOR SHALL PROVIDE ALL EXCAVATION, SHORING, BACKFILL AND TRENCH RESURFACING PER CITY STANDARD 300. WHERE THE CONNECTION IS TO BE A "HOT TAP," THE CONTRACTOR SHALL PROVIDE AND INSTALL THE TAPPING VALVE AND SLEEVE, AND ANY OTHER HARDWARE REQUIRED AND WILL MAKE THE TAP AT THE DEVELOPER'S EXPENSE. NO HOT TAP SHALL BE MADE WITHIN 4 FEET OF A JOINT (MEASURED FROM JOINT TO CENTERLINE OF INTERSECTING PIPE). THE JOINT SHALL BE REMOVED, AND THE PROPOSED HOT TAP SHALL BE REPLACED WITH A "CUT–IN" TEE. WHEN A "CUT–IN" TEE AND VALVE(S) ASSEMBLY IS REQUIRED ON THE PLANS, THE CONTRACTOR SHALL PROVIDE AND INSTALL THE ENTIRE ASSEMBLY (INCLUDING VALVES), AND ANY OTHER HARDWARE NECESSARY UNDER CITY INSPECTION, AND SHALL PROVIDE ALL OTHER WORK AND MATERIALS NECESSARY TO COMPLETE THE INSTALLATION TO CITY STANDARDS.
28. THE CONTRACTOR SHALL COORDINATE ALL WATER MAIN CONNECTION WORK WITH THE DIRECTOR OF PUBLIC WORKS AT (707) 961–2823 A MINIMUM OF 72 HOURS PRIOR TO COMMENCING WORK IN ACCORDANCE WITH CITY POLICY.
29. AFTER A STREET HAS BEEN OVERLAID, ALL WATER VALVE BOXES WILL BE MARKED IN WHITE PAINT BEFORE THE CLOSE OF THAT WORK DAY.
30. WITHIN 48 HOURS OF PAVING, ALL WATER VALVE BOXES WILL BE BROUGHT TO GRADE AND INSPECTED.
31. ALL FIRE HYDRANT FLOW TESTING PERFORMED ON CITY FIRE HYDRANTS SHALL BE PERFORMED BY THE CITY OF FORT BRAGG PUBLIC WORKS DEPARTMENT. THOSE DESIRING FLOW TESTS SHALL NOTIFY THE CITY ENGINEER. PRIOR TO TESTING AND ACCEPTANCE OF HYDRANTS, BURLAP SACKS SHALL BE PLACED OVER HYDRANTS.

# STANDARD SYMBOLS LEGEND

| PROPOSED | | EXISTING |
|---|---|---|
| SD | STORM DRAIN & SIZE | SD |
| SS | SANITARY SEWER & SIZE | SS |
| FM | SEWER FORCE MAIN & SIZE | FM |
| W | WATER MAIN & SIZE | W |
| W | RESTRAINED LENGTH OF PIPE | W |
| X"W | WATER LINE & SIZE | X"W |
| FM | FORCE MAIN | FM |
| ● | MANHOLE | ● |
| ⊕ | MANHOLE W/GRATE TOP | ⊕ |
| ▤ | DRAIN INLET | ■ |
| ● | YARD DRAIN | ● |
| ⊸ | FIRE HYDRANT | ⊸ |
| ⋈ | GATE VALVE | ⋈ |
| ⋈ | CHECK VALVE | ⋈ |
| ⋈ | BUTTERFLY VALVE | ⋈ |
| ⋈ | BLOW OFF VALVE | ⋈ |
| ⋈ | PLUG VALVE | ⋈ |
| ◂ | AIR RELEASE VALVE | ◂ |
| ⊢ | REDUCER | ⊢ |
| ■ | WATER METER | ■ |
| N/A | UTILITY POLE | ⊸ |
| N/A | GUY WIRE | C |
| N/A | ELECTRICAL (UNDERGROUND) | E |
| N/A | TELEPHONE (UNDERGROUND) | T |
| N/A | UTILITY (OVERHEAD) | OHU |
| N/A | ELECTRICAL (OVERHEAD) | OHE |
| N/A | TELEPHONE (OVERHEAD) | OHT |
| N/A | GAS (UNDERGROUND) | G |
| N/A | CABLE (UNDERGROUND) | CATV |
| N/A | FIBER OBPTIC (UNDERGROUND) | FO |
| N/A | JOINT TRENCH | JT |
| | PROPERTY LINE | |
| | RIGHT OF WAY | |
| | CENTERLINE | |
| | POST & CABLE BARRIER | |
| x x x x | FENCE | x x x x |
| 10 | INDEX CONTOUR LINE | 10 |
| 2 | INTERMEDIATE CONTOUR LINE | 2 |
| N/A | NATURAL GROUND ELEVATION | x–ELEV |
| 10.0 | PROP GROUND ELEVATION | 10.0 |
| 10.00 | FINISH GRADE ELEVATION | 10.00 |
| P= | PAD ELEVATION | P= |
| FF= | FINISH FLOOR ELEVATION | FF= |
| | DITCH DRAINAGE FLOW | |
| FL= | FLOWLINE ELEVATION | FL= |
| | SHEET DRAINAGE FLOW | |
| | SLOPE (CUT or FILL) | |
| A / M1 | SECTION REFERENCE (NUMBER/SHEET LOCATION) | N/A |
| 1 / M1 | DETAIL REFERENCE (NUMBER/SHEET LOCATION) | N/A |
| A | UTILITY STATION | A |
| N/A | TREE | |
| N/A | TREE (TO BE REMOVED) | |

# ABBREVIATIONS

| | |
|---|---|
| AB | AGGREGATE BASE |
| AC | ASPHALTIC CONCRETE |
| AGG | AGGREGATE |
| ALUM | ALUMINUM |
| AMSL | ABOVE MEAN SEA LEVEL |
| ARV | AIR RELEASE VALVE |
| AVRV | AIR/VACUUM RELEASE VALVE |
| AUX | AUXILIARY |
| BC | BEGINNING OF CURVE |
| BOC | BOTTOM OF CONCRETE |
| BW | BOTTOM OF WALL |
| BOV | BLOW OFF VALVE |
| BTM | BOTTOM |
| BLDG | BUILDING |
| BFV | BUTTERFLY VALVE |
| C | CONDUIT |
| CI | CAST IRON |
| CIP | CAST IRON PIPE |
| CJ | CONTROL JOINT |
| CLR | CLEAR |
| CMP | CORRUGATED METAL PIPE |
| CMU | CONCRETE MASONRY UNIT |
| CNTRL | CONTROL |
| CONC | CONCRETE |
| CONN | CONNECTION |
| CONST | CONSTRUCTION |
| CONT | CONTINUOUS |
| CIRC | CIRCULAR |
| D | DRAIN |
| DDCV | DOUBLE DETECTOR CHECK VALVE |
| DET | DETAIL |
| ø/DIA | DIAMETER |
| DIP | DUCTILE IRON PIPE |
| DWG | DRAWING |
| E | EASTING |
| EA | EACH |
| EC | END OF CURVE |
| EF | EACH FACE |
| EFF | EFFLUENT |
| EL/ELEV | ELEVATION |
| ELEC | ELECTRICAL |
| ENGR | ENGINEER |
| ENGR'D | ENGINEERED |
| EOP | EDGE OF PAVEMENT |
| (E) | EXISTING |
| EQUIP | EQUIPMENT |
| EW | EACH WAY |
| FT | FEET |
| FG | FINISHED GRADE |
| FCA | FLANGED COUPLING ADAPTOR |
| FL | FLANGED/FLOWLINE/FULL LENGTH |
| FD | FLOOR DRAIN |
| FTG | FOOTING |
| FM | FORCE MAIN |
| FR | FOREST ROAD |
| GAL | GALLONS |
| GPD,H,M | GALLONS PER DAY, HOUR, MINUTE |
| GALV | GALVINIZED |
| GV | GATE VALVE |
| GA | GAUGE |
| GR | GRATE |
| GND | GROUND (ELEC) |
| HSS | HOLLOW STRUCTURE SECTIONS |
| HT | HEIGHT |
| HORZ | HORIZONTAL |
| HP | HORSEPOWER |
| HWY | HIGHWAY |
| ID | INNER DIAMETER |
| IE | INVERT ELEVATION |
| IMPS | IMPROVEMENTS |
| INFO | INFORMATION |
| INV | INVERT |
| IRRG | IRRIGATION |
| L | LENGTH |
| LF | LINEAR FEET |
| LT | LEFT |
| M | MOTOR |
| MAX | MAXIMUM |
| MFR | MANUFACTURER |
| MH | MANHOLE |
| MCC | MOTOR CONTROL CENTER |
| MIN | MINIMUM |
| MJ | MECHANICAL JOINT |
| MSTR | MASTER |
| N | NORTHING |
| (N) | NEW |
| NO | NUMBER |
| NPT | NATIONAL PIPE THREAD |
| NTS | NOT TO SCALE |
| OC | ON CENTER |
| OD | OUTSIDE DIAMETER |
| PH | PHASE (ELEC)/PUMP |
| PL | PLATE |
| PE | PLAIN END |
| PVC | POLYVINYL CHLORIDE |
| PCC | PORTLAND CEMENT CONCRETE |
| POLY | POLYETHYLENE |
| PSF | POUNDS PER SQUARE FOOT |
| PSI | POUNDS PER SQUARE INCH |
| PT | POINT |
| PT | PRESSURE TREATED |
| R | RADIUS |
| REINF | REINFORCING |
| REQ'D | REQUIRED |
| RL | RESTRAINED LENGTH |
| ROW | RIGHT OF WAY |
| RPBP | REDUCED PRESSURE BACKFLOW PREVENTION |
| RT | RIGHT |
| RWD | REDWOOD |
| SS | SANITARY SEWER |
| SCH | SCHEDULE |
| SD | STORM DRAIN |
| SEC | SECTION |
| SST | STAINLESS STEEL |
| STA | STATION |
| STL | STEEL |
| SQ | SQUARE |
| SF | SQUARE FEET |
| THK | THICK |
| T.A. | TAN OAK |
| XFMR | TRANSFORMER |
| THD | THREADED |
| TW | TOP OF WALL |
| TYP | TYPICAL |
| UGE | UNDERGROUND ELECTRIC |
| UNC | UNIFIED COARSE THREADS |
| UNO | UNLESS NOTED OTHERWISE |
| VERT | VERTICAL |
| VFD | VARIABLE FREQUENCY DRIVE |
| V | VOLTS |
| W | WATER |
| WL | WATER LEVEL |
| WM | WATER MAIN |
| W/ | WITH |
| XING | CROSSING |


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COLEMAN ENGINEERING
1223 PLEASANT GROVE BLVD
SUITE 100
ROSEVILLE, CA 95678
(916) 791–1188


BAR IS ONE INCH AT FULL SCALE
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IF NOT ONE INCH ON THIS SHEET SCALE ACCORDINGLY

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**RAW WATER LINE REPLACEMENT PROJECT**

## PROJECT NOTES, LEGEND & ABBREVIATIONS

**CITY OF FORT BRAGG** **CALIFORNIA**

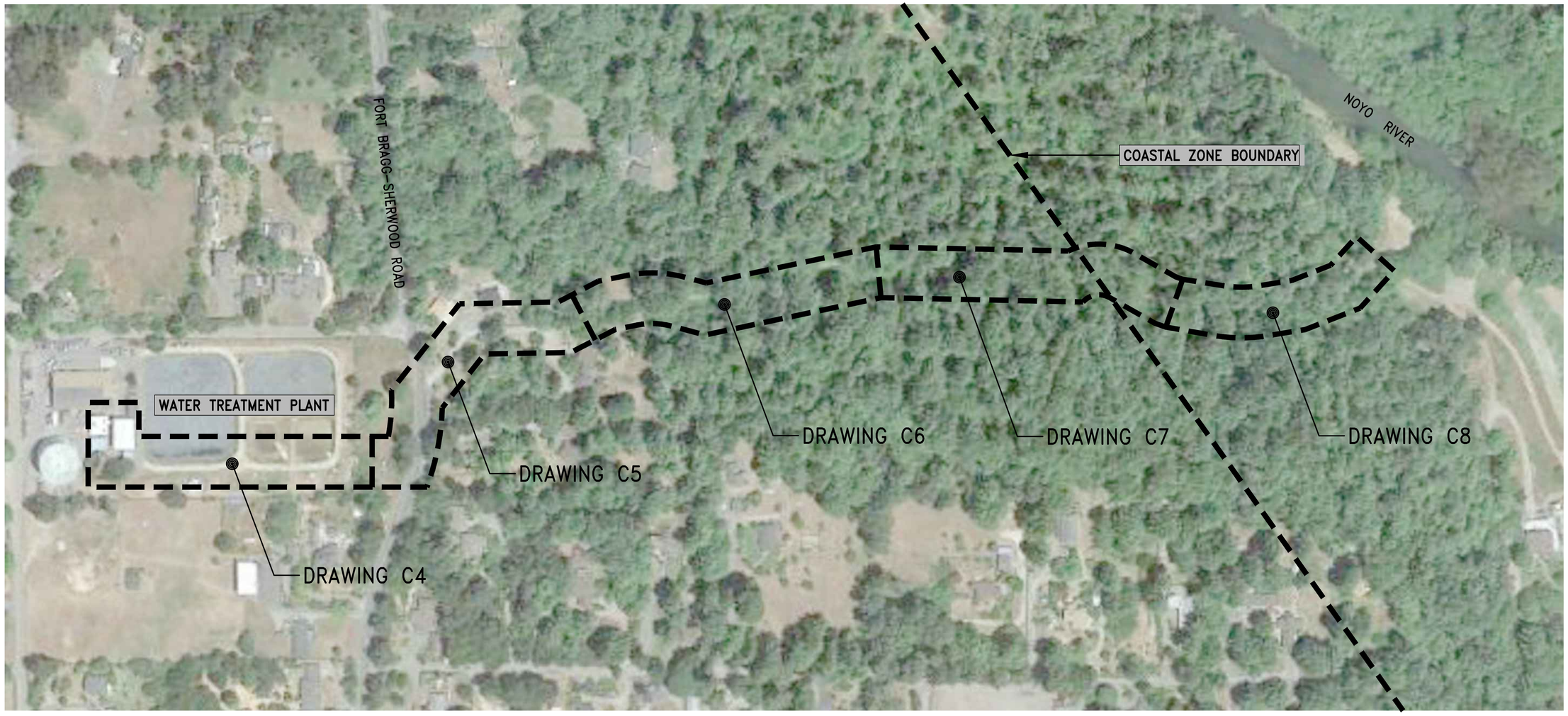
DESIGNED UNDER THE DIRECTION OF:
Chad R. Coleman 10/6/23
CHAD R. COLEMAN DATE
R.C.E. No. 56490 - REGISTRATION EXPIRES 06-30-25

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| DESIGN: WCJ | DATE: 10/6/23 |
| DRAWN: WCJ | DATE: 10/6/23 |
| CHECKED: CRC | DATE: 10/6/23 |

REGISTERED PROFESSIONAL ENGINEER — CHAD R. COLEMAN — C86490 — CIVIL — STATE OF CALIFORNIA — 10/6/23

SCALE AS SHOWN
DRAWING NUMBER G3
SHEET NUMBER 3 OF 68 SHEETS


10/9/23 S:_PROJECTS\TBD18-001 - RAW WATER LINE REPLACEMENT PROJECT\CADD\SEGMENTS 2-5 FULL SET\G3 - PROJECT NOTES, LEGEND & ABBREVIATIONS.DWG




## SEGMENT 2 PLANS

SCALE: 1"=100'

10/9/23 S:_PROJECTS\TBR18-001 - RAW WATER LINE REPLACEMENT PROJECT\CADD\SEGMENTS 2-5 FULL SET\C1 - RAW WATER PIPELINE LAYOUT PLAN - 1.DWG

COLEMAN ENGINEERING

COLEMAN ENGINEERING
1223 PLEASANT GROVE BLVD
SUITE 100
ROSEVILLE, CA 95678
(916) 791-1188

CITY OF FORT BRAGG CALIFORNIA

BAR IS ONE INCH AT FULL SCALE
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**RAW WATER LINE REPLACEMENT PROJECT**

# SEGMENT 2 SHEET LAYOUT PLAN

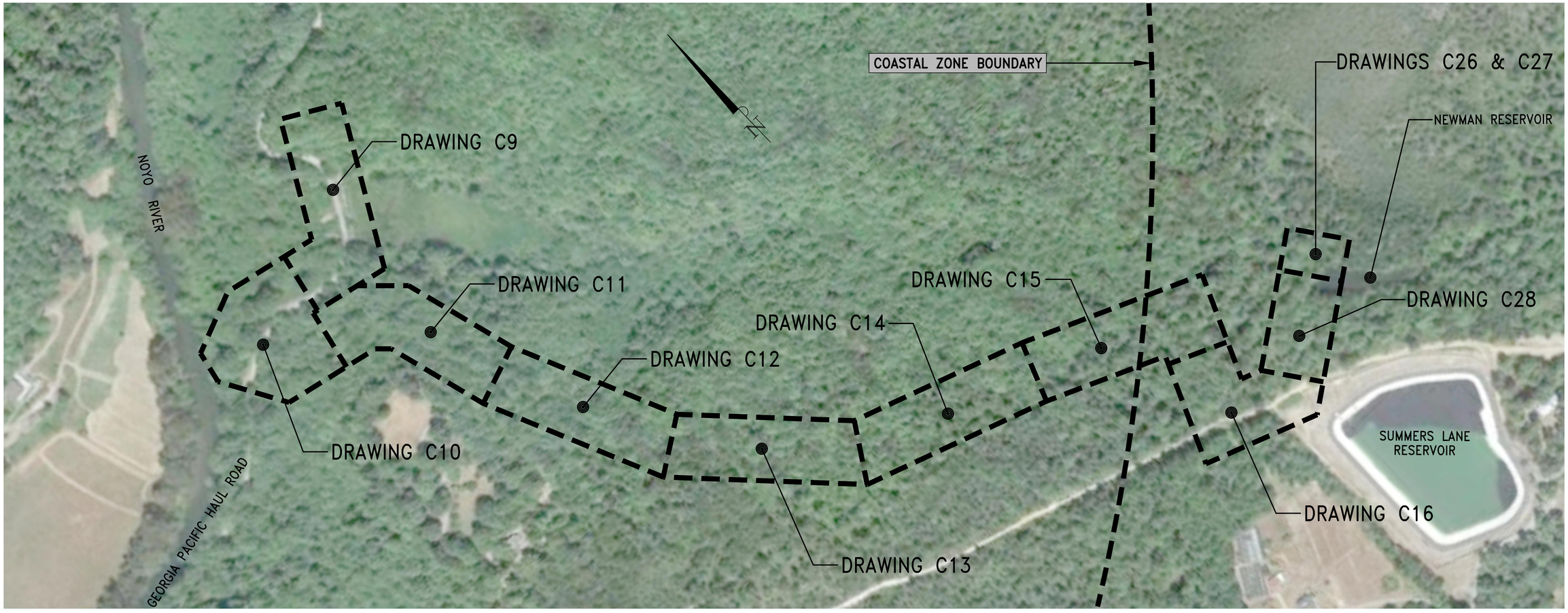
**CITY OF FORT BRAGG** **CALIFORNIA**

DESIGNED UNDER THE DIRECTION OF:
Chad R. Coleman 10/6/23
CHAD R. COLEMAN DATE
R.C.E. No. 56490 - REGISTRATION EXPIRES 06-30-25

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| CHECKED: | CRC | DATE: 10/6/23 |

REGISTERED PROFESSIONAL ENGINEER CHAD R. COLEMAN C86490 CIVIL STATE OF CALIFORNIA 10/6/23

SCALE AS SHOWN
DRAWING NUMBER C1
SHEET NUMBER 4 OF 68 SHEETS




## SEGMENT 3 PLANS

SCALE: 1"=150'

10/3/23 S:_PROJECTS\FTBG18-001 - RAW WATER LINE REPLACMENT PROJECT\CAD\SEGMENTS 2-5 FULL SET\C2 - RAW WATER PIPELINE LAYOUT PLAN - 2.DWG


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(916) 791-1188


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IF NOT ONE INCH ON THIS SHEET SCALE ACCORDINGLY

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**RAW WATER LINE REPLACEMENT PROJECT**

# SEGMENT 3 SHEET LAYOUT PLAN

**CITY OF FORT BRAGG** **CALIFORNIA**

DESIGNED UNDER THE DIRECTION OF:
Chad R. Coleman 10/6/23
CHAD R. COLEMAN DATE
R.C.E. No. 56490 - REGISTRATION EXPIRES 06-30-25

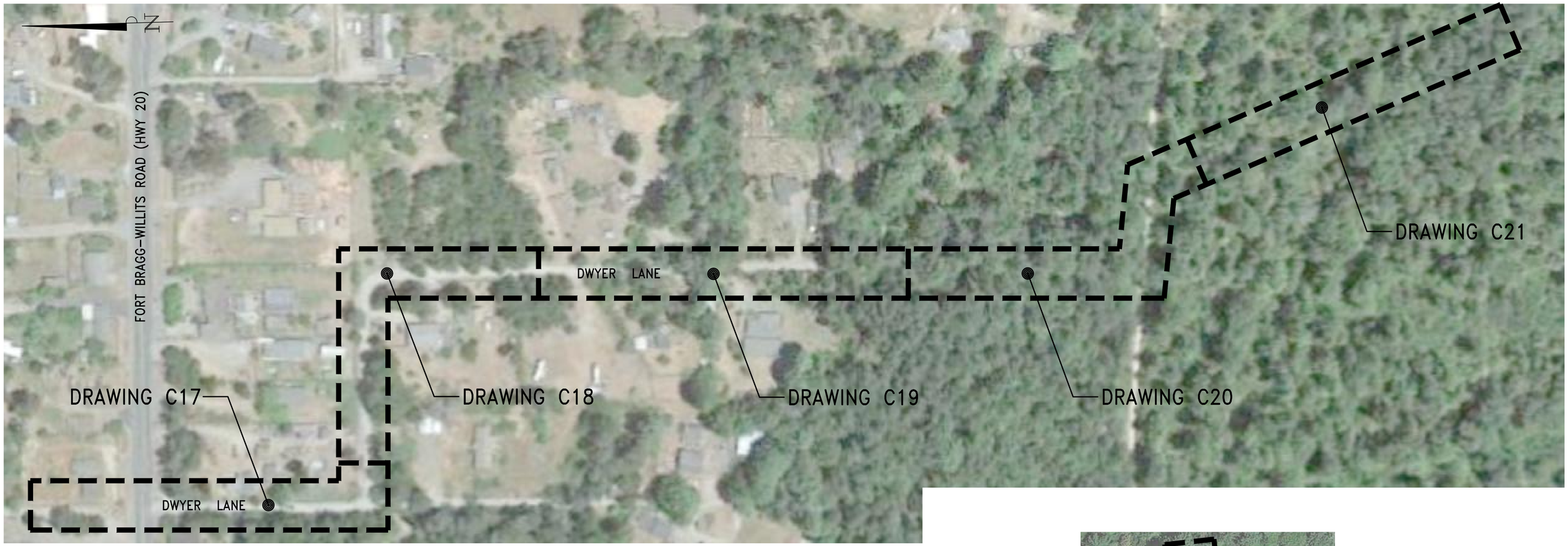
| | | |
|---|---|---|
| DESIGN: | WCJ | DATE: 10/6/23 |
| DRAWN: | WCJ | DATE: 10/6/23 |
| CHECKED: | CRC | DATE: 10/6/23 |

REGISTERED PROFESSIONAL ENGINEER CHAD R. COLEMAN C66490 CIVIL STATE OF CALIFORNIA 10/6/23

SCALE AS SHOWN

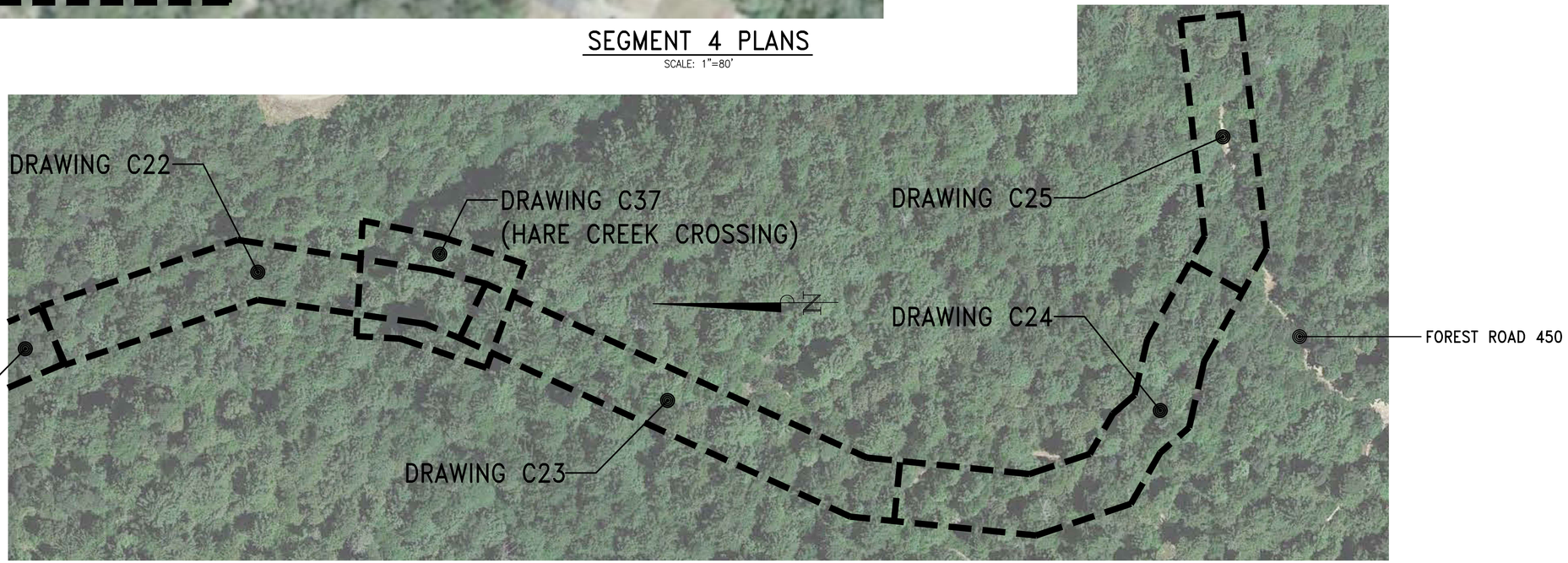
DRAWING NUMBER C2

SHEET NUMBER 5 OF 68 SHEETS




SEGMENT 4 PLANS

SCALE: 1"=80'




SEGMENT 5 PLANS

SCALE: 1"=80'

COLEMAN ENGINEERING

COLEMAN ENGINEERING
1223 PLEASANT GROVE BLVD
SUITE 100
ROSEVILLE, CA 95678
(916) 791-1188

BAR IS ONE INCH AT FULL SCALE

0 1"

IF NOT ONE INCH ON THIS SHEET SCALE ACCORDINGLY

| NO. | REVISIONS | BY | APP | DATE |
|---|---|---|---|---|
| 6 | | | | |
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| 3 | | | | |
| 2 | | | | |
| 1 | | | | |

**RAW WATER LINE REPLACEMENT PROJECT**

# SEGMENTS 4 AND 5 SHEET LAYOUT PLAN

**CITY OF FORT BRAGG** **CALIFORNIA**

DESIGNED UNDER THE DIRECTION OF:
Chad R. Coleman 10/6/23
CHAD R. COLEMAN DATE
R.C.E. No. 56490 - REGISTRATION EXPIRES 06-30-25

| | | |
|---|---|---|
| DESIGN: | WCJ | DATE: 10/6/23 |
| DRAWN: | WCJ | DATE: 10/6/23 |
| CHECKED: | CRC | DATE: 10/6/23 |

REGISTERED PROFESSIONAL ENGINEER CHAD R. COLEMAN C86490 CIVIL STATE OF CALIFORNIA 10/6/23

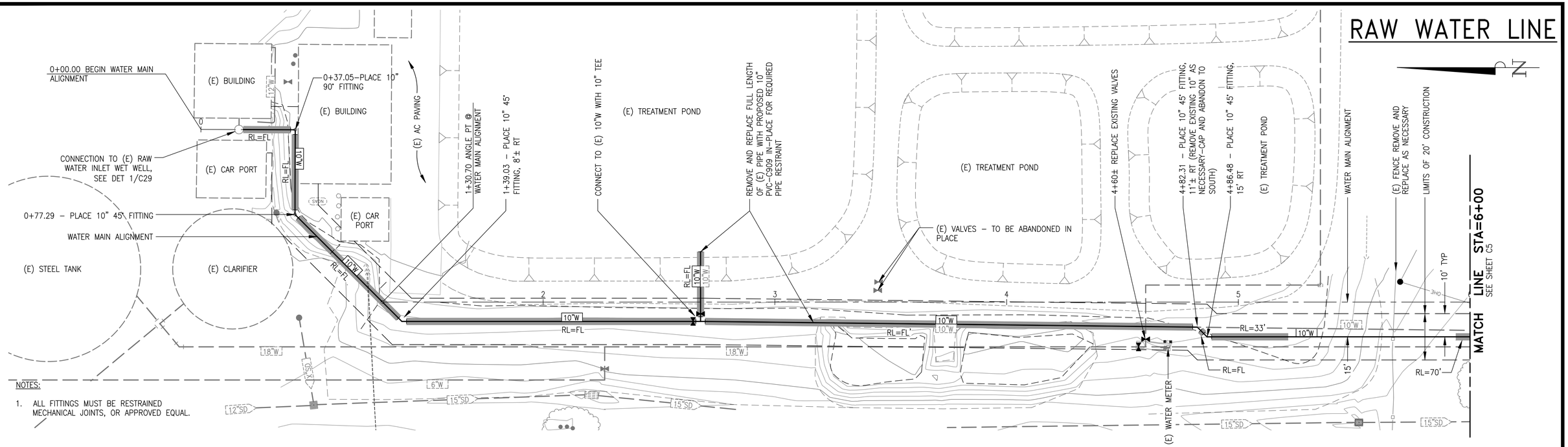
SCALE: AS SHOWN

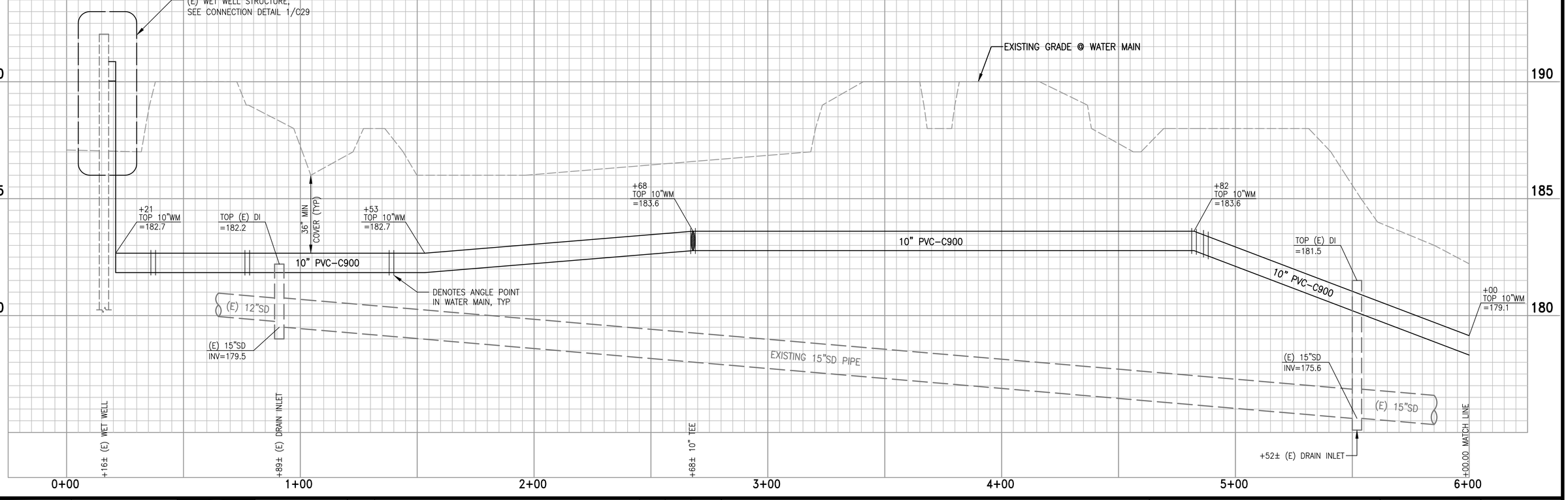
DRAWING NUMBER: C3

SHEET NUMBER: 6 OF 68 SHEETS

10/3/23 S:_PROJECTS\FTB618-001 - RAW WATER LINE REPLACEMENT PROJECT\CAD\SEGMENTS 2-5 FULL SET\C3 - RAW WATER PIPELINE LAYOUT PLAN - 3.DWG

# RAW WATER LINE





COLEMAN ENGINEERING

COLEMAN ENGINEERING
1223 PLEASANT GROVE BLVD
SUITE 100
ROSEVILLE, CA 95678
(916) 791-1188


BAR IS ONE INCH AT FULL SCALE

0 1"

IF NOT ONE INCH ON THIS SHEET SCALE ACCORDINGLY

| NO. | REVISIONS | BY | APP | DATE |
|---|---|---|---|---|
| 6 | | | | |
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| 3 | | | | |
| 2 | | | | |
| 1 | | | | |

**RAW WATER LINE REPLACEMENT PROJECT**

## RAW WATER PIPELINE PLAN – SEGMENT 2
STATION 0+00 – 6+00

**CITY OF FORT BRAGG** **CALIFORNIA**

DESIGNED UNDER THE DIRECTION OF:
Chad R. Coleman 10/6/23
CHAD R. COLEMAN DATE
R.C.E. No. 56490 - REGISTRATION EXPIRES 06-30-25

| | |
|---|---|
| DESIGN: WCJ | DATE: 10/6/23 |
| DRAWN: WCJ | DATE: 10/6/23 |
| CHECKED: CRC | DATE: 10/6/23 |

REGISTERED PROFESSIONAL ENGINEER CHAD R. COLEMAN No. C66490 CIVIL STATE OF CALIFORNIA 10/6/23

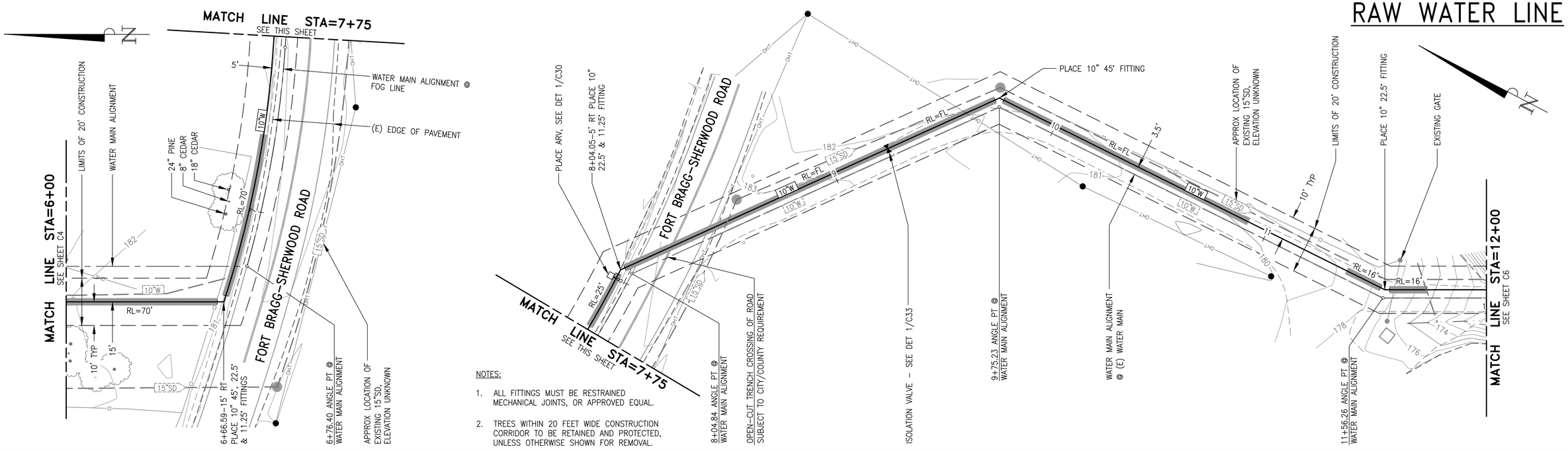
SCALE HORZ: 1"=20' VERT: 1"=2'

DRAWING NUMBER C4

SHEET NUMBER 7 OF 68 SHEETS

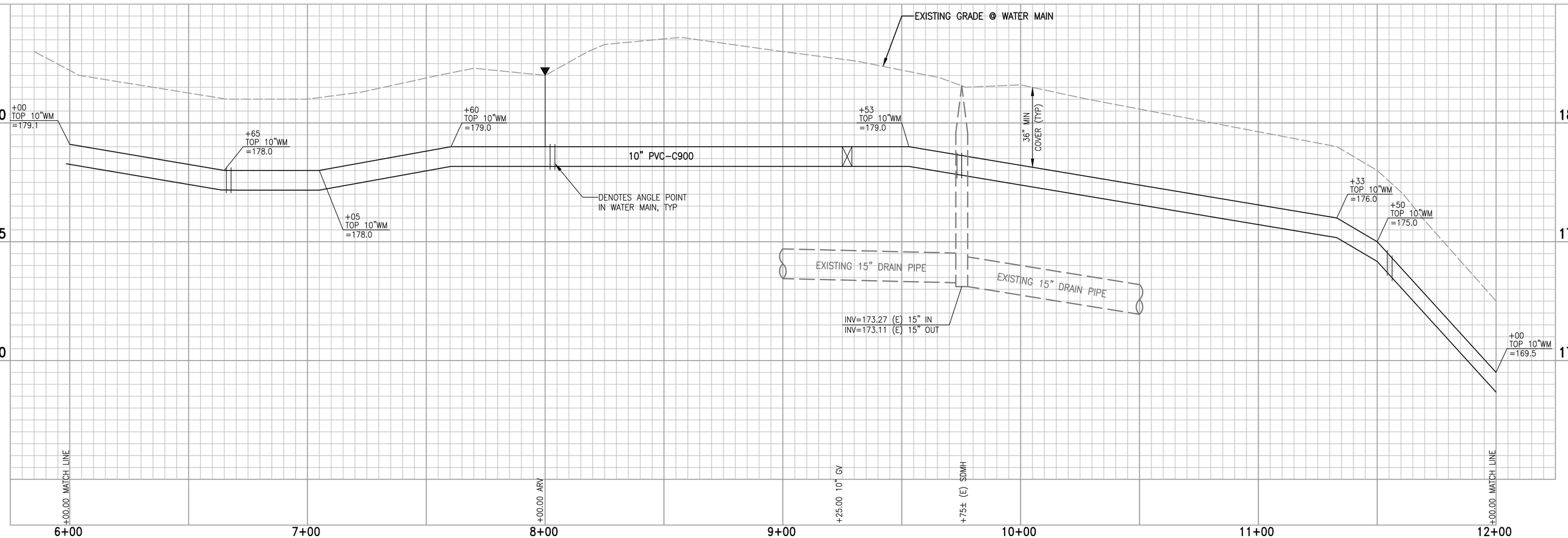
10/3/23 S:_PROJECTS\TIBC18-001 - RAW WATER LINE REPLACEMENT PROJECT\CADD\SEGMENTS 2-5 FULL SET\C4 - RAW WATER PIPELINE PLAN & PROFILE 1.DWG

# RAW WATER LINE




NOTES:

1. ALL FITTINGS MUST BE RESTRAINED MECHANICAL JOINTS, OR APPROVED EQUAL.
2. TREES WITHIN 20 FEET WIDE CONSTRUCTION CORRIDOR TO BE RETAINED AND PROTECTED, UNLESS OTHERWISE SHOWN FOR REMOVAL.





COLEMAN ENGINEERING
COLEMAN ENGINEERING
1223 PLEASANT GROVE BLVD
SUITE 100
ROSEVILLE, CA 95678
(916) 791-1188


BAR IS ONE INCH AT FULL SCALE
0 1"
IF NOT ONE INCH ON THIS SHEET SCALE ACCORDINGLY

| NO. | REVISIONS | BY | APP | DATE |
|---|---|---|---|---|
| 6 | | | | |
| 5 | | | | |
| 4 | | | | |
| 3 | | | | |
| 2 | | | | |
| 1 | | | | |

**RAW WATER LINE REPLACEMENT PROJECT**

## RAW WATER PIPELINE PLAN – SEGMENT 2
STATION 6+00 – 12+00

**CITY OF FORT BRAGG** **CALIFORNIA**

DESIGNED UNDER THE DIRECTION OF:
Chad R. Coleman 10/6/23
CHAD R. COLEMAN DATE
R.C.E. No. 56490 - REGISTRATION EXPIRES 06-30-25

| | | |
|---|---|---|
| DESIGN: | WCJ | DATE: 10/6/23 |
| DRAWN: | WCJ | DATE: 10/6/23 |
| CHECKED: | CRC | DATE: 10/6/23 |

REGISTERED PROFESSIONAL ENGINEER CHAD R. COLEMAN No. C56490 CIVIL STATE OF CALIFORNIA
10/6/23

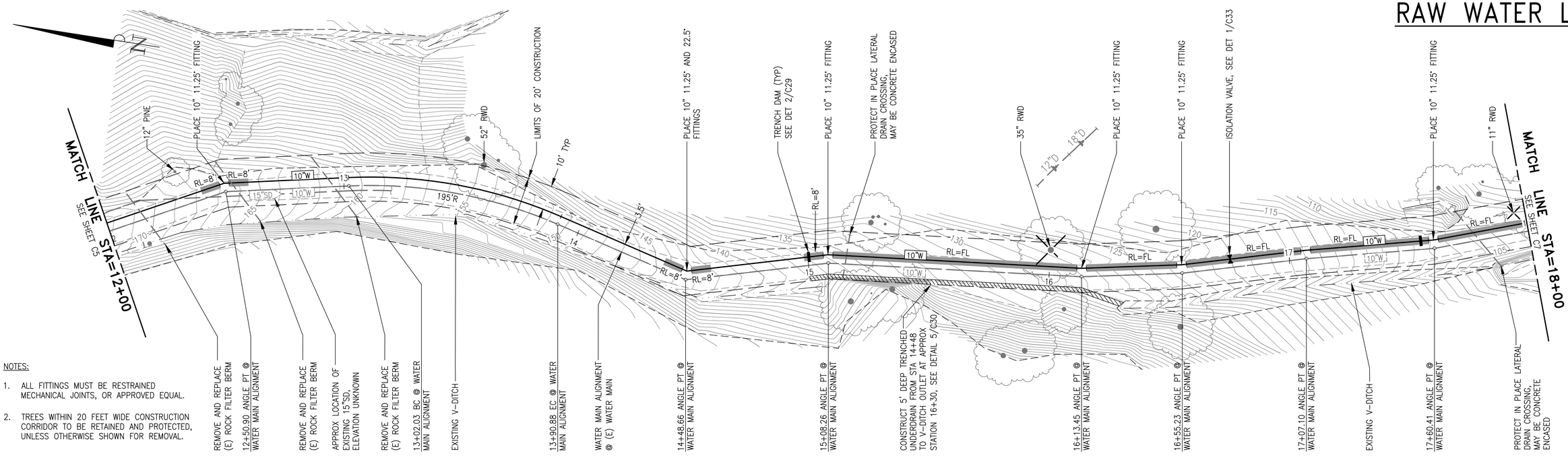
SCALE
HORZ: 1"=20'
VERT: 1"=2'

DRAWING NUMBER
C5

SHEET NUMBER
8 OF 68 SHEETS

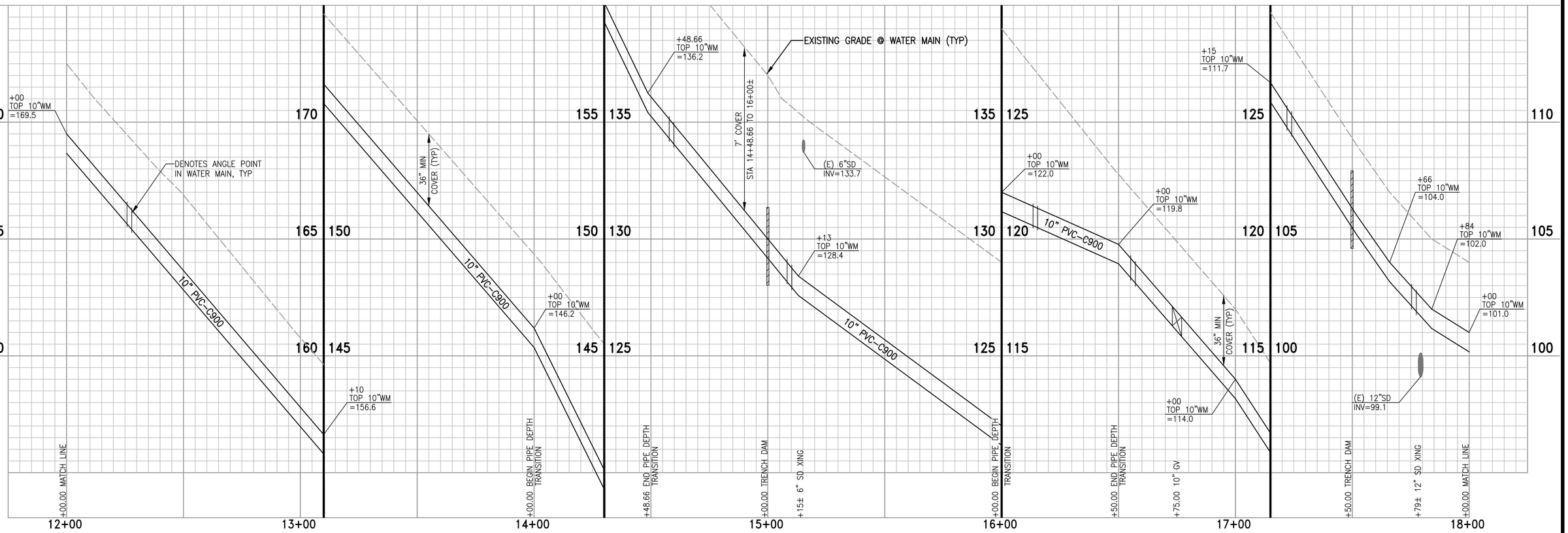
10/9/23 S:_PROJECTS\FTBC18-001 - RAW WATER LINE REPLACEMENT PROJECT\CAD\SEGMENTS 2-5 FULL SET\C5 - RAW WATER PIPELINE PLAN & PROFILE 2.DWG

# RAW WATER LINE




NOTES:

1. ALL FITTINGS MUST BE RESTRAINED MECHANICAL JOINTS, OR APPROVED EQUAL.
2. TREES WITHIN 20 FEET WIDE CONSTRUCTION CORRIDOR TO BE RETAINED AND PROTECTED, UNLESS OTHERWISE SHOWN FOR REMOVAL.





COLEMAN ENGINEERING
COLEMAN ENGINEERING
1223 PLEASANT GROVE BLVD
SUITE 100
ROSEVILLE, CA 95678
(916) 791-1188


BAR IS ONE INCH AT FULL SCALE
0 1"
IF NOT ONE INCH ON THIS SHEET SCALE ACCORDINGLY

| NO. | REVISIONS | BY | APP | DATE |
|---|---|---|---|---|
| 6 | | | | |
| 5 | | | | |
| 4 | | | | |
| 3 | | | | |
| 2 | | | | |
| 1 | | | | |

**RAW WATER LINE REPLACEMENT PROJECT**

# RAW WATER PIPELINE PLAN – SEGMENT 2
## STATION 12+00 – 18+00

**CITY OF FORT BRAGG** **CALIFORNIA**

DESIGNED UNDER THE DIRECTION OF:
Chad R. Coleman 10/6/23
CHAD R. COLEMAN DATE
R.C.E. No. 56490 - REGISTRATION EXPIRES 06-30-25

| | | |
|---|---|---|
| DESIGN: | WCJ | DATE: 10/6/23 |
| DRAWN: | WCJ | DATE: 10/6/23 |
| CHECKED: | CRC | DATE: 10/6/23 |

REGISTERED PROFESSIONAL ENGINEER CHAD R. COLEMAN No. C56490 CIVIL STATE OF CALIFORNIA
10/6/23

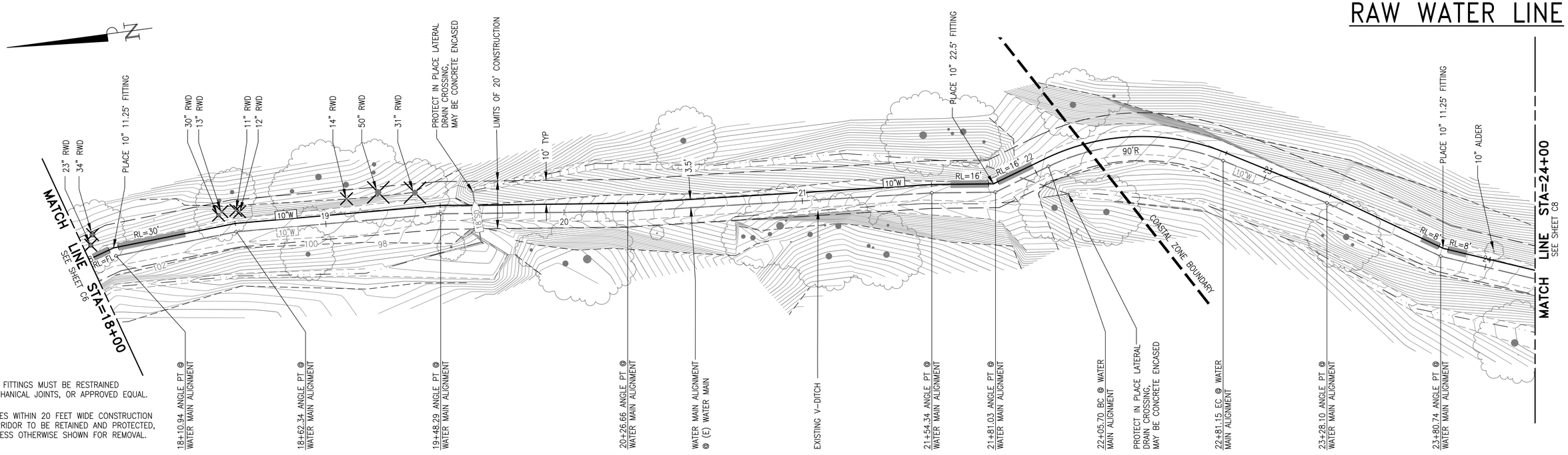
SCALE
HORZ: 1"=20'
VERT: 1"=2'

DRAWING NUMBER
C6

SHEET NUMBER
9 OF 68 SHEETS

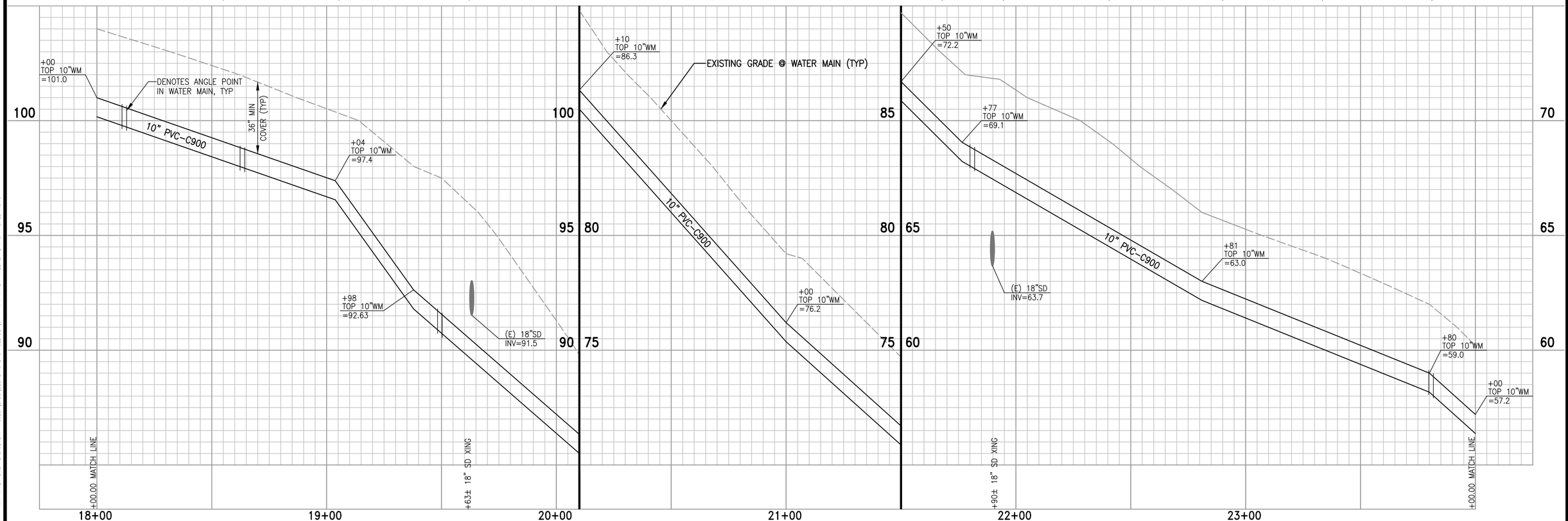
10/6/23 S:_PROJECTS\FTBC18-001 - RAW WATER LINE REPLACEMENT PROJECT\CAD\SEGMENTS 2-5 FULL SET\C6 - RAW WATER PIPELINE PLAN & PROFILE 3.DWG

# RAW WATER LINE




NOTES:

1. ALL FITTINGS MUST BE RESTRAINED MECHANICAL JOINTS, OR APPROVED EQUAL.
2. TREES WITHIN 20 FEET WIDE CONSTRUCTION CORRIDOR TO BE RETAINED AND PROTECTED, UNLESS OTHERWISE SHOWN FOR REMOVAL.





COLEMAN ENGINEERING

COLEMAN ENGINEERING
1223 PLEASANT GROVE BLVD
SUITE 100
ROSEVILLE, CA 95678
(916) 791-1188


BAR IS ONE INCH AT FULL SCALE

0 1"

IF NOT ONE INCH ON THIS SHEET SCALE ACCORDINGLY

| NO. | REVISIONS | BY | APP | DATE |
|---|---|---|---|---|
| 6 | | | | |
| 5 | | | | |
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| 1 | | | | |

**RAW WATER LINE REPLACEMENT PROJECT**

# RAW WATER PIPELINE PLAN – SEGMENT 2
## STATION 18+00 – 24+00

**CITY OF FORT BRAGG** **CALIFORNIA**

DESIGNED UNDER THE DIRECTION OF:
Chad R. Coleman 10/6/23
CHAD R. COLEMAN DATE
R.C.E. No. 56490 - REGISTRATION EXPIRES 06-30-25

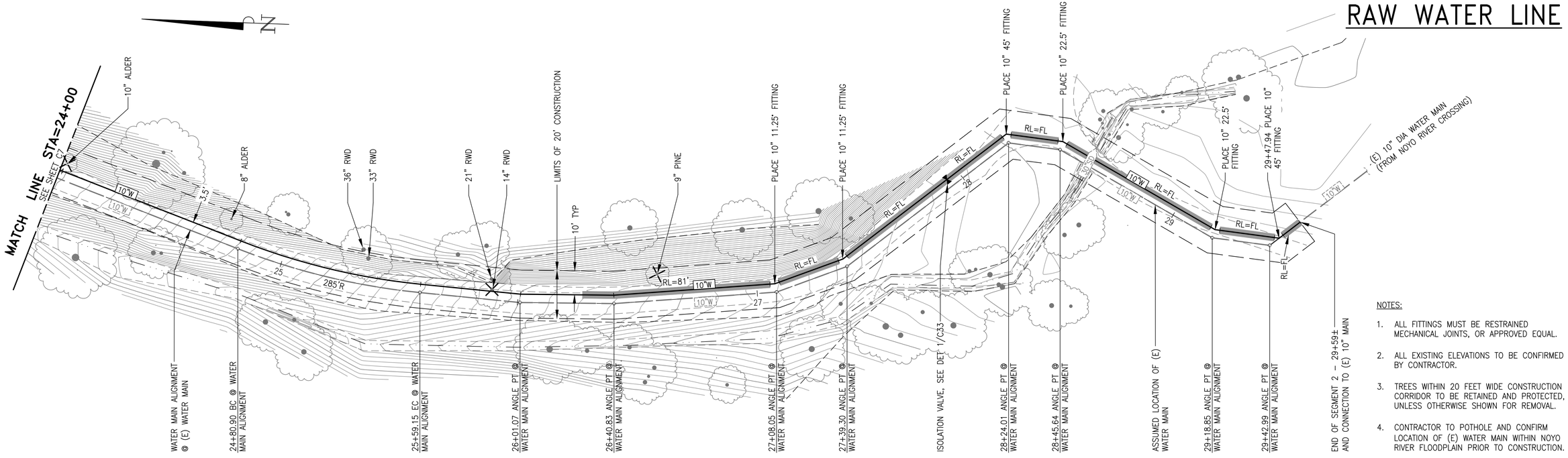
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|---|---|---|
| DESIGN: | WCJ | DATE: 10/6/23 |
| DRAWN: | WCJ | DATE: 10/6/23 |
| CHECKED: | CRC | DATE: 10/6/23 |

REGISTERED PROFESSIONAL ENGINEER CHAD R. COLEMAN C56490 CIVIL STATE OF CALIFORNIA
10/6/23

SCALE HORZ: 1"=20' VERT: 1"=2'
DRAWING NUMBER C7
SHEET NUMBER 10 OF 68 SHEETS

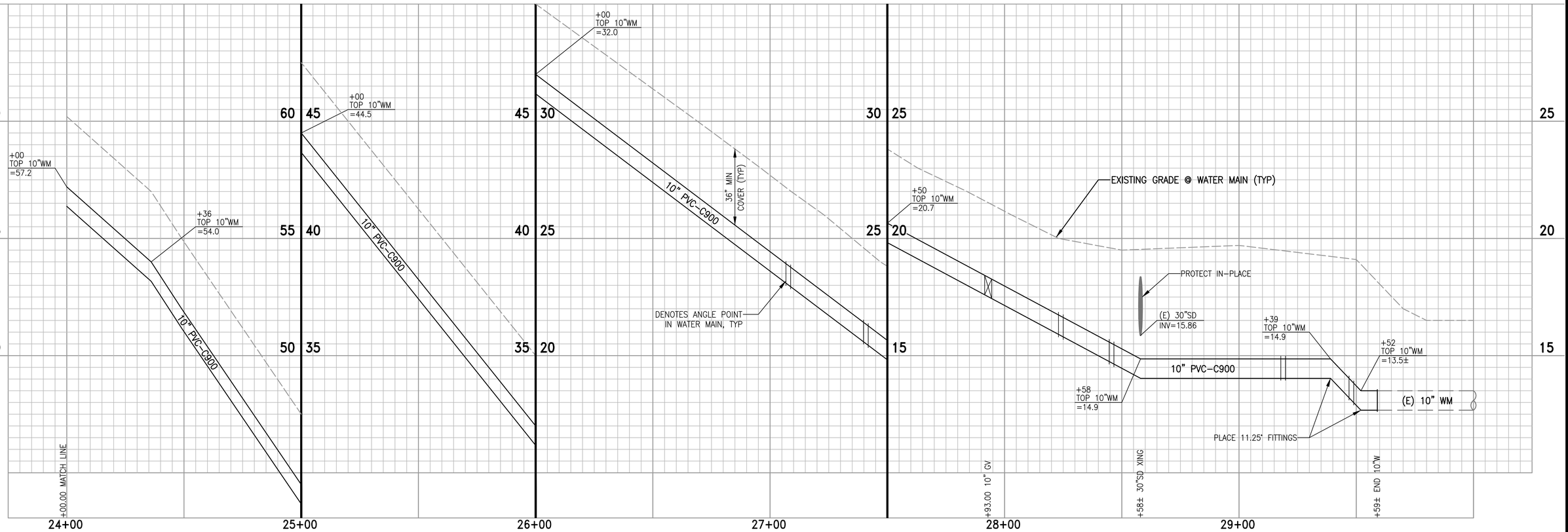
10/6/23 S:_PROJECTS\FTB\18-001 - RAW WATER LINE REPLACEMENT PROJECT\CAD\SEGMENTS 2-5 FULL SET\C7 - RAW WATER PIPELINE PLAN & PROFILE 4.DWG

# RAW WATER LINE




NOTES:

1. ALL FITTINGS MUST BE RESTRAINED MECHANICAL JOINTS, OR APPROVED EQUAL.
2. ALL EXISTING ELEVATIONS TO BE CONFIRMED BY CONTRACTOR.
3. TREES WITHIN 20 FEET WIDE CONSTRUCTION CORRIDOR TO BE RETAINED AND PROTECTED, UNLESS OTHERWISE SHOWN FOR REMOVAL.
4. CONTRACTOR TO POTHOLE AND CONFIRM LOCATION OF (E) WATER MAIN WITHIN NOYO RIVER FLOODPLAIN PRIOR TO CONSTRUCTION.





COLEMAN ENGINEERING

COLEMAN ENGINEERING
1223 PLEASANT GROVE BLVD
SUITE 100
ROSEVILLE, CA 95678
(916) 791-1188


BAR IS ONE INCH AT FULL SCALE

0 1"

IF NOT ONE INCH ON THIS SHEET SCALE ACCORDINGLY

| NO. | REVISIONS | BY | APP | DATE |
|---|---|---|---|---|
| 6 | | | | |
| 5 | | | | |
| 4 | | | | |
| 3 | | | | |
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| 1 | | | | |

**RAW WATER LINE REPLACEMENT PROJECT**

# RAW WATER PIPELINE PLAN – SEGMENT 2
## STATION 24+00 – 29+59

**CITY OF FORT BRAGG** **CALIFORNIA**

DESIGNED UNDER THE DIRECTION OF:
Chad R. Coleman 10/6/23
CHAD R. COLEMAN DATE
R.C.E. No. 56490 - REGISTRATION EXPIRES 06-30-25

| | | |
|---|---|---|
| DESIGN: | WCJ | DATE: 10/6/23 |
| DRAWN: | WCJ | DATE: 10/6/23 |
| CHECKED: | CRC | DATE: 10/6/23 |

REGISTERED PROFESSIONAL ENGINEER CHAD R. COLEMAN No. C56490 CIVIL STATE OF CALIFORNIA 10/6/23

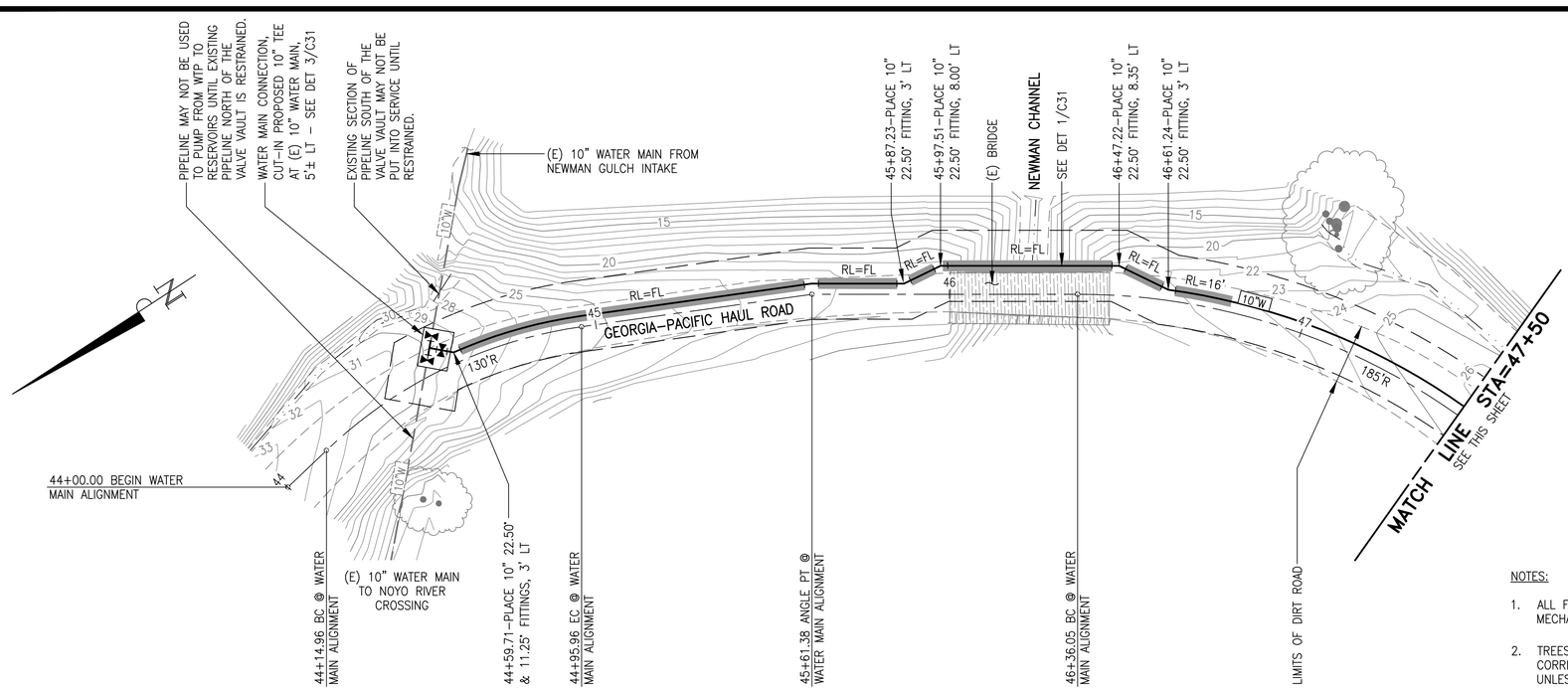
SCALE
HORZ: 1"=20'
VERT: 1"=2'

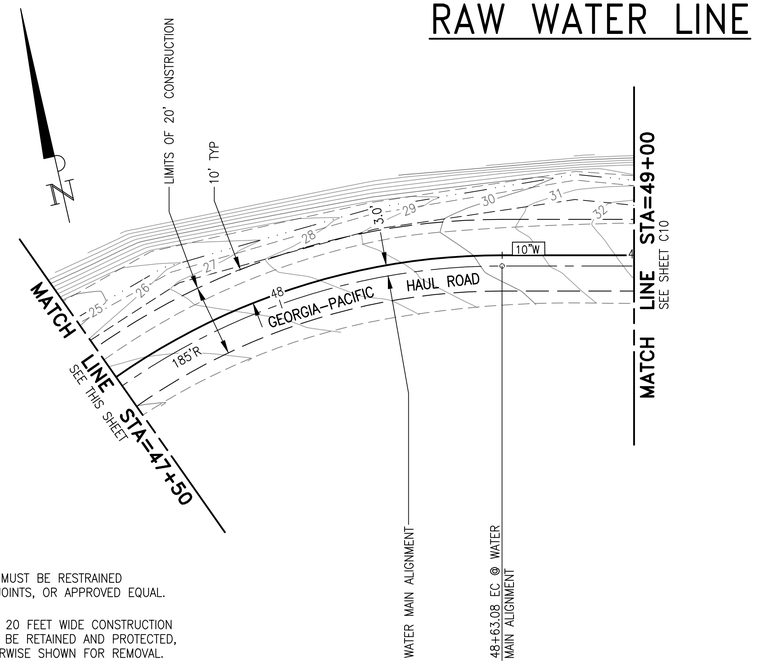
DRAWING NUMBER
C8

SHEET NUMBER
11 OF 68 SHEETS

10/9/23 S:_PROJECTS\FTBC18-001 - RAW WATER LINE REPLACEMENT PROJECT\CAD\SEGMENTS 2-5 FULL SET\C8 - RAW WATER PIPELINE PLAN & PROFILE 5.DWG

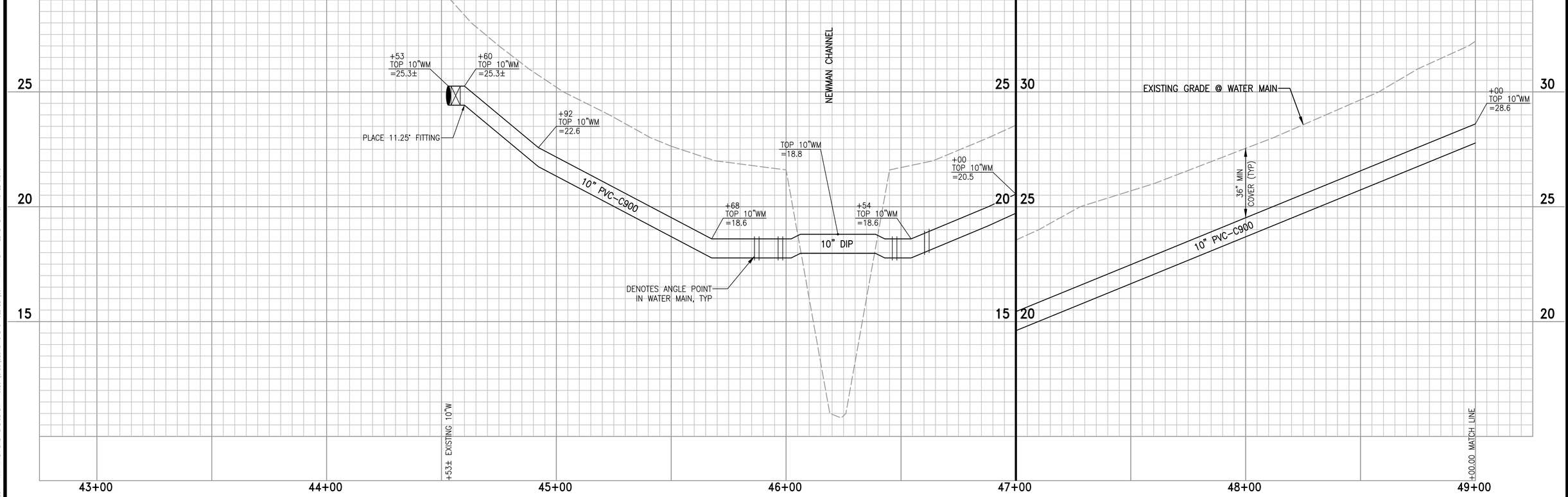
# RAW WATER LINE




NOTES:

1. ALL FITTINGS MUST BE RESTRAINED MECHANICAL JOINTS, OR APPROVED EQUAL.
2. TREES WITHIN 20 FEET WIDE CONSTRUCTION CORRIDOR TO BE RETAINED AND PROTECTED, UNLESS OTHERWISE SHOWN FOR REMOVAL.





COLEMAN ENGINEERING

COLEMAN ENGINEERING
1223 PLEASANT GROVE BLVD
SUITE 100
ROSEVILLE, CA 95678
(916) 791–1188


BAR IS ONE INCH AT FULL SCALE

0 1"

IF NOT ONE INCH ON THIS SHEET SCALE ACCORDINGLY

| NO. | REVISIONS | BY | APP | DATE |
|---|---|---|---|---|
| 6 | | | | |
| 5 | | | | |
| 4 | | | | |
| 3 | | | | |
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| 1 | | | | |

**RAW WATER LINE REPLACEMENT PROJECT**

## RAW WATER PIPELINE PLAN – SEGMENT 3
STATION 44+53 – 49+00

**CITY OF FORT BRAGG** **CALIFORNIA**

DESIGNED UNDER THE DIRECTION OF:
Chad R. Coleman 10/6/23
CHAD R. COLEMAN DATE
R.C.E. No. 56490 - REGISTRATION EXPIRES 06-30-25

| | | |
|---|---|---|
| DESIGN: | WCJ | DATE: 10/6/23 |
| DRAWN: | WCJ | DATE: 10/6/23 |
| CHECKED: | CRC | DATE: 10/6/23 |

REGISTERED PROFESSIONAL ENGINEER CHAD R. COLEMAN C56490 CIVIL STATE OF CALIFORNIA 10/6/23

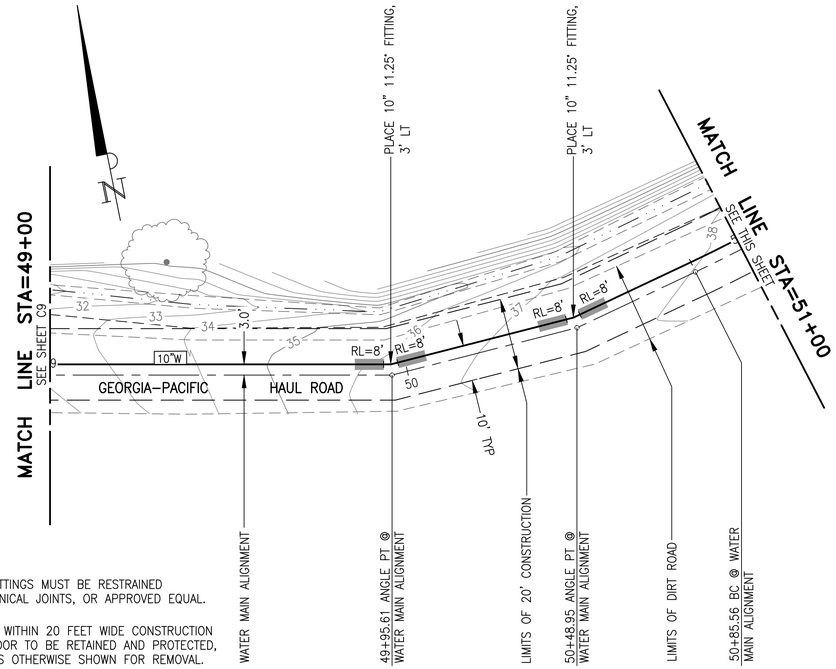
SCALE HORZ: 1"=20' VERT: 1"=2'

DRAWING NUMBER C9

SHEET NUMBER 12 OF 68 SHEETS

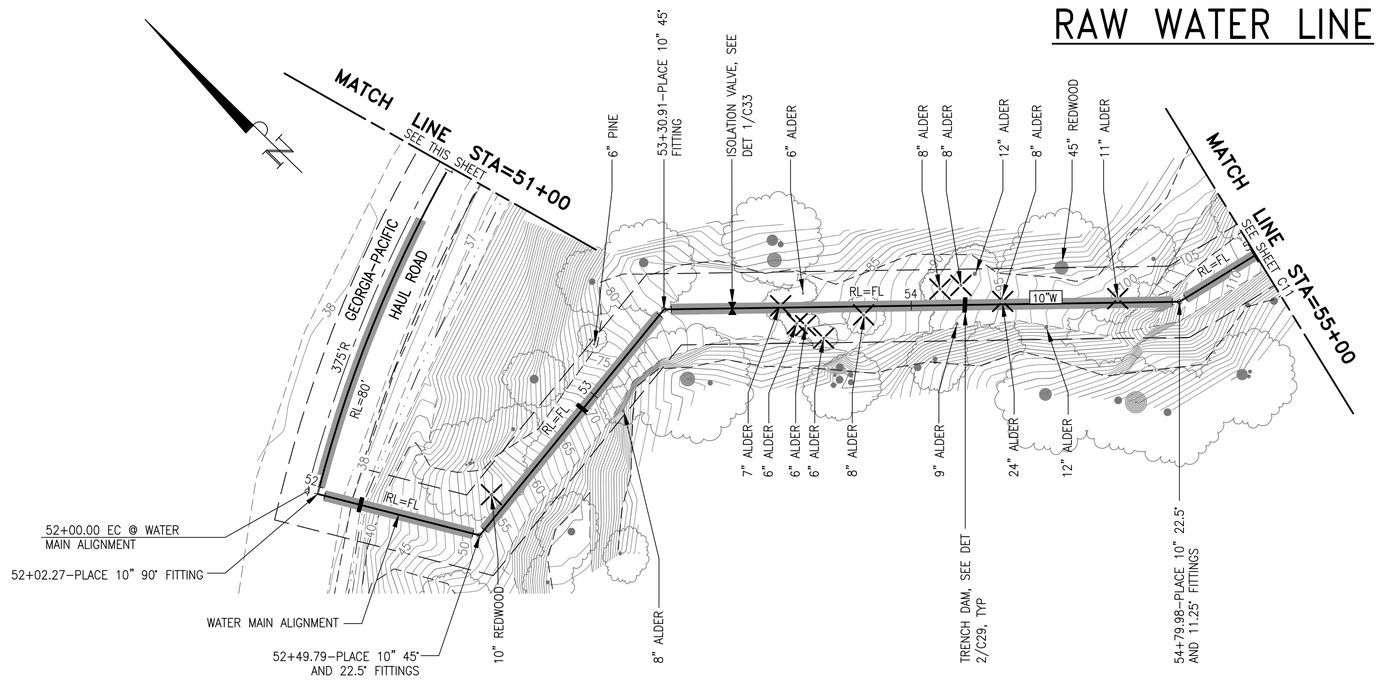
10/3/23 S:_PROJECTS\FTB\18-001 – RAW WATER LINE REPLACMENT PROJECT\CAD\SEGMENTS 2-5 FULL SET\C9 – RAW WATER PIPELINE PLAN & PROFILE 6.DWG

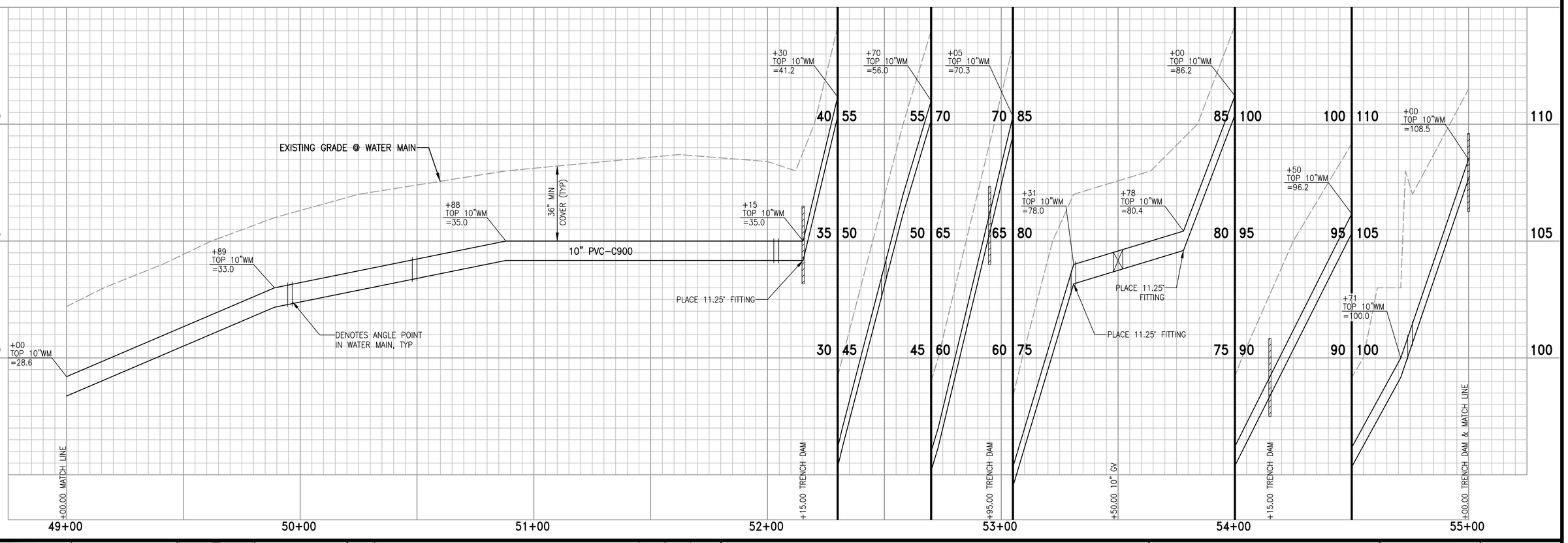
# RAW WATER LINE




NOTES:

1. ALL FITTINGS MUST BE RESTRAINED MECHANICAL JOINTS, OR APPROVED EQUAL.
2. TREES WITHIN 20 FEET WIDE CONSTRUCTION CORRIDOR TO BE RETAINED AND PROTECTED, UNLESS OTHERWISE SHOWN FOR REMOVAL.





COLEMAN ENGINEERING
COLEMAN ENGINEERING
1223 PLEASANT GROVE BLVD
SUITE 100
ROSEVILLE, CA 95678
(916) 791–1188


CITY OF FORT BRAGG CALIFORNIA

BAR IS ONE INCH AT FULL SCALE
0 1"
IF NOT ONE INCH ON THIS SHEET SCALE ACCORDINGLY

| NO. | REVISIONS | BY | APP | DATE |
|---|---|---|---|---|
| 6 | | | | |
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| 3 | | | | |
| 2 | | | | |
| 1 | | | | |

**RAW WATER LINE REPLACEMENT PROJECT**

# RAW WATER PIPELINE PLAN – SEGMENT 3
## STATION 49+00 – 55+00

**CITY OF FORT BRAGG** **CALIFORNIA**

DESIGNED UNDER THE DIRECTION OF:
Chad R. Coleman 10/6/23
CHAD R. COLEMAN DATE
R.C.E. No. 56490 - REGISTRATION EXPIRES 06-30-25

| | | |
|---|---|---|
| DESIGN: | WCJ | DATE: 10/6/23 |
| DRAWN: | WCJ | DATE: 10/6/23 |
| CHECKED: | CRC | DATE: 10/6/23 |

REGISTERED PROFESSIONAL ENGINEER CHAD R. COLEMAN C56490 CIVIL STATE OF CALIFORNIA
10/6/23

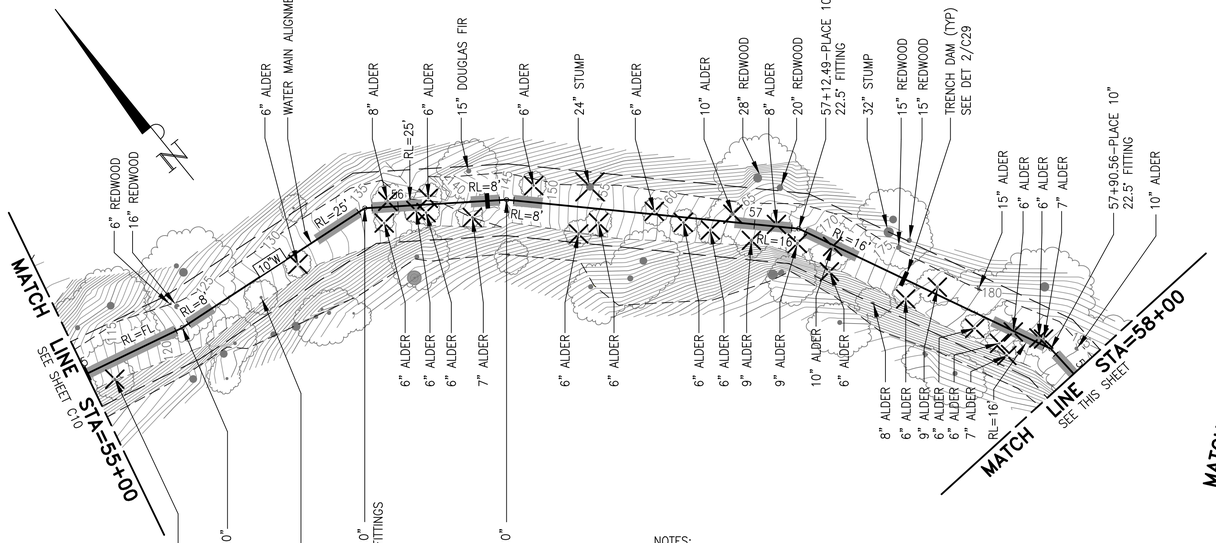
SCALE
HORZ: 1"=20'
VERT: 1"=2'

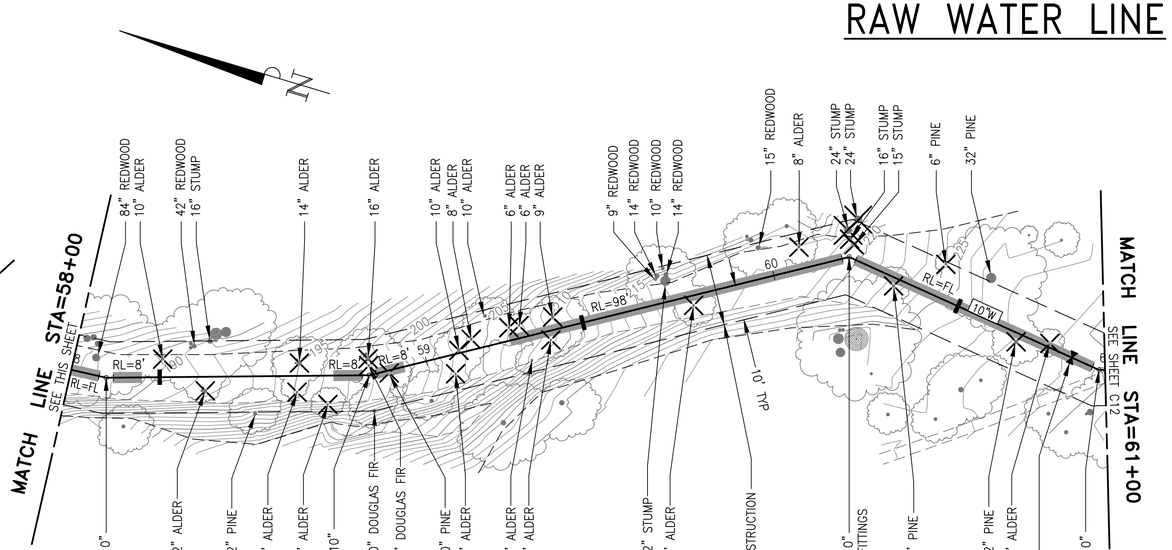
DRAWING NUMBER
C10

SHEET NUMBER
13 OF 68 SHEETS


10/6/23 S:_PROJECTS\FTBG18-001 – RAW WATER LINE REPLACMENT PROJECT\CADD\SEGMENTS 2-5 FULL SET\C10 – RAW WATER PIPELINE PLAN & PROFILE 7.DWG

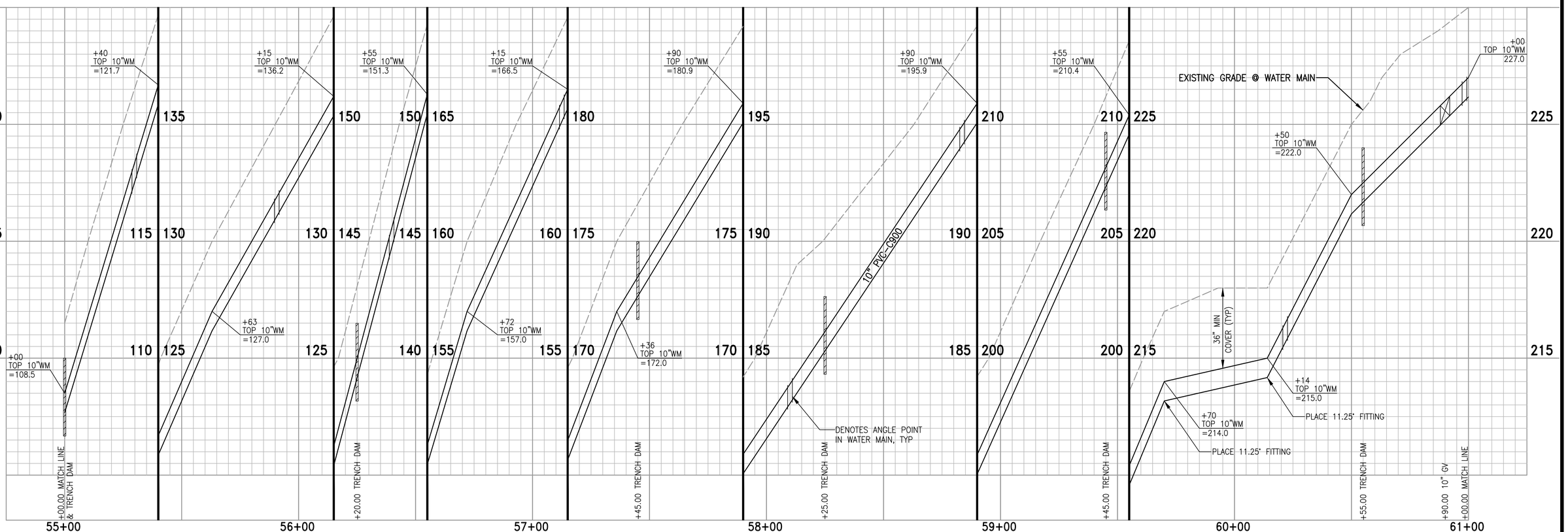
# RAW WATER LINE




NOTES:

1. ALL FITTINGS MUST BE RESTRAINED MECHANICAL JOINTS, OR APPROVED EQUAL.
2. TREES WITHIN 20 FEET WIDE CONSTRUCTION CORRIDOR TO BE RETAINED AND PROTECTED, UNLESS OTHERWISE SHOWN FOR REMOVAL.





COLEMAN ENGINEERING

COLEMAN ENGINEERING
1223 PLEASANT GROVE BLVD
SUITE 100
ROSEVILLE, CA 95678
(916) 791-1188


BAR IS ONE INCH AT FULL SCALE

0 1"

IF NOT ONE INCH ON THIS SHEET SCALE ACCORDINGLY

| NO. | REVISIONS | BY | APP | DATE |
|---|---|---|---|---|
| 6 | | | | |
| 5 | | | | |
| 4 | | | | |
| 3 | | | | |
| 2 | | | | |
| 1 | | | | |

**RAW WATER LINE REPLACEMENT PROJECT**

## RAW WATER PIPELINE PLAN – SEGMENT 3
STATION 55+00 – 61+00

**CITY OF FORT BRAGG** **CALIFORNIA**

DESIGNED UNDER THE DIRECTION OF:
Chad R. Coleman 10/6/23
CHAD R. COLEMAN DATE
R.C.E. No. 56490 - REGISTRATION EXPIRES 06-30-25

| | | |
|---|---|---|
| DESIGN: | WCJ | DATE: 10/6/23 |
| DRAWN: | WCJ | DATE: 10/6/23 |
| CHECKED: | CRC | DATE: 10/6/23 |

REGISTERED PROFESSIONAL ENGINEER CHAD R. COLEMAN No. C56490 CIVIL STATE OF CALIFORNIA
10/6/23

SCALE
HORZ: 1"=20'
VERT: 1"=2'

DRAWING NUMBER
C11

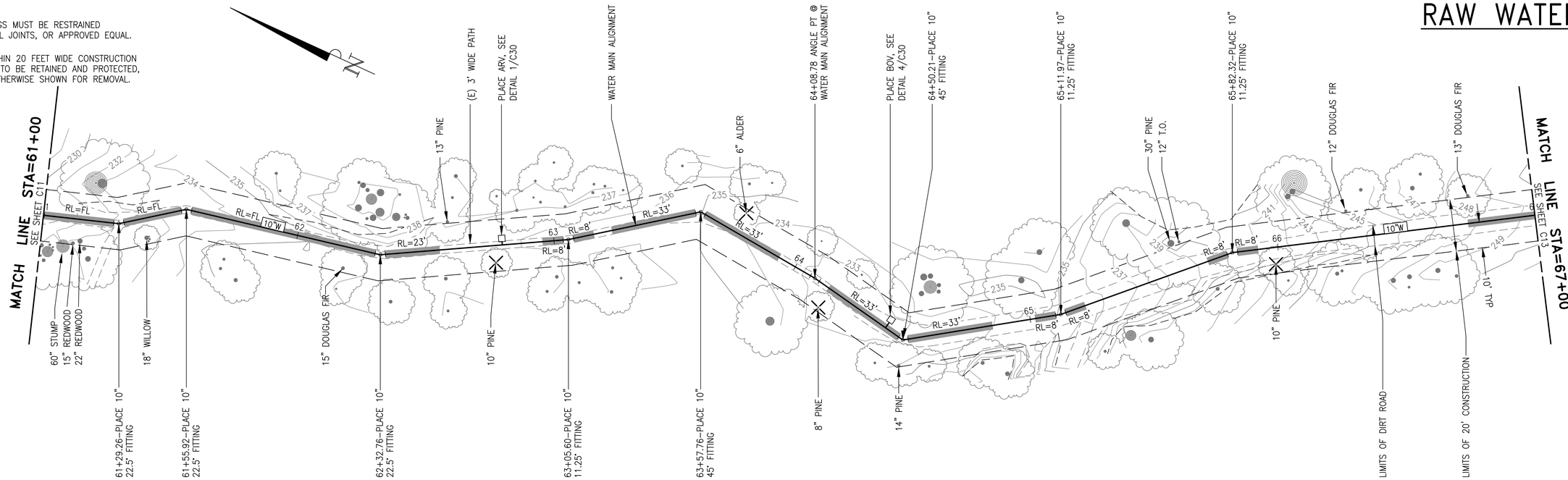
SHEET NUMBER
14 OF 68 SHEETS

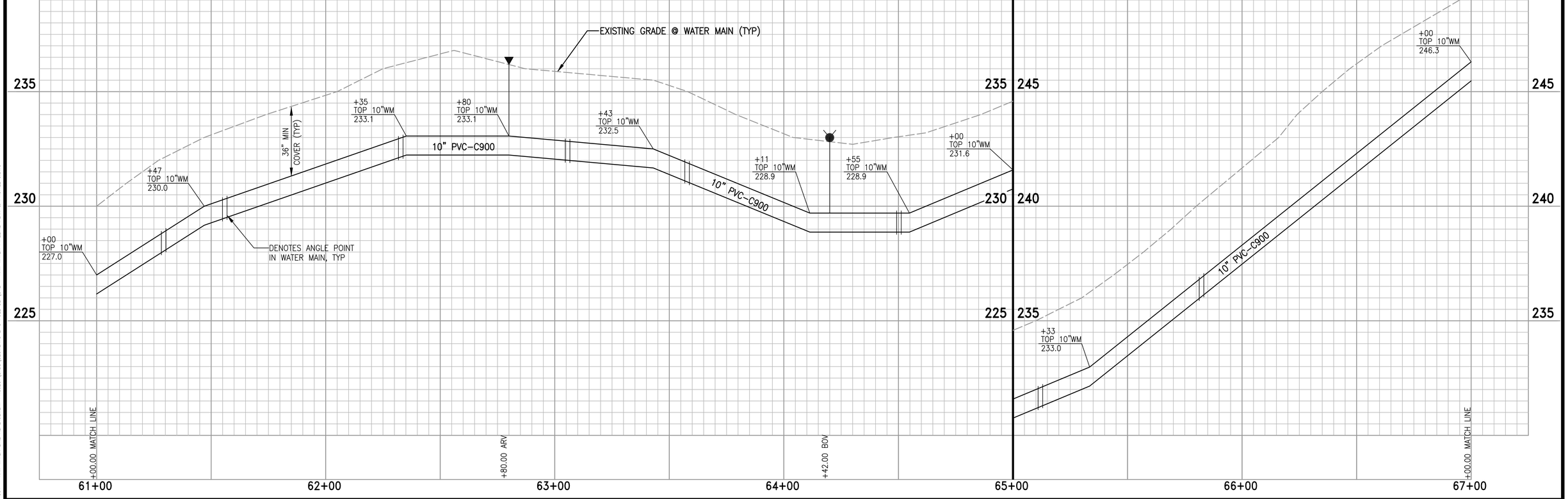

10/9/23 S:_PROJECTS\FTB018-001 - RAW WATER LINE REPLACEMENT PROJECT\CADD\SEGMENTS 2-5 FULL SET\C11 - RAW WATER PIPELINE PLAN & PROFILE 3.DWG

# RAW WATER LINE

NOTES:

1. ALL FITTINGS MUST BE RESTRAINED MECHANICAL JOINTS, OR APPROVED EQUAL.
2. TREES WITHIN 20 FEET WIDE CONSTRUCTION CORRIDOR TO BE RETAINED AND PROTECTED, UNLESS OTHERWISE SHOWN FOR REMOVAL.





COLEMAN ENGINEERING

COLEMAN ENGINEERING
1223 PLEASANT GROVE BLVD
SUITE 100
ROSEVILLE, CA 95678
(916) 791-1188


BAR IS ONE INCH AT FULL SCALE

0 — 1"

IF NOT ONE INCH ON THIS SHEET SCALE ACCORDINGLY

| NO. | REVISIONS | BY | APP | DATE |
|---|---|---|---|---|
| 6 | | | | |
| 5 | | | | |
| 4 | | | | |
| 3 | | | | |
| 2 | | | | |
| 1 | | | | |

**RAW WATER LINE REPLACEMENT PROJECT**

## RAW WATER PIPELINE PLAN – SEGMENT 3
STATION 61+00 – 67+00

**CITY OF FORT BRAGG** **CALIFORNIA**

DESIGNED UNDER THE DIRECTION OF:
Chad R. Coleman 10/6/23
CHAD R. COLEMAN DATE
R.C.E. No. 56490 - REGISTRATION EXPIRES 06-30-25

| | | |
|---|---|---|
| DESIGN: | WCJ | DATE: 10/6/23 |
| DRAWN: | WCJ | DATE: 10/6/23 |
| CHECKED: | CRC | DATE: 10/6/23 |

REGISTERED PROFESSIONAL ENGINEER — CHAD R. COLEMAN — C86490 — CIVIL — STATE OF CALIFORNIA — 10/6/23

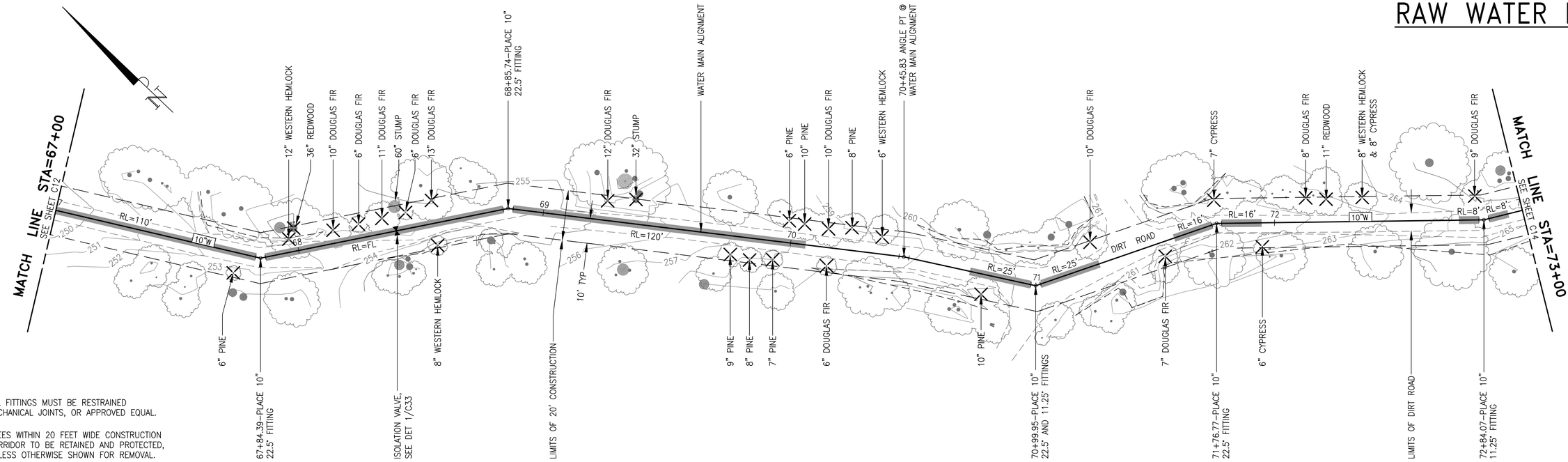
SCALE
HORZ: 1"=20'
VERT: 1"=2'

DRAWING NUMBER
C12

SHEET NUMBER
15 OF 68 SHEETS

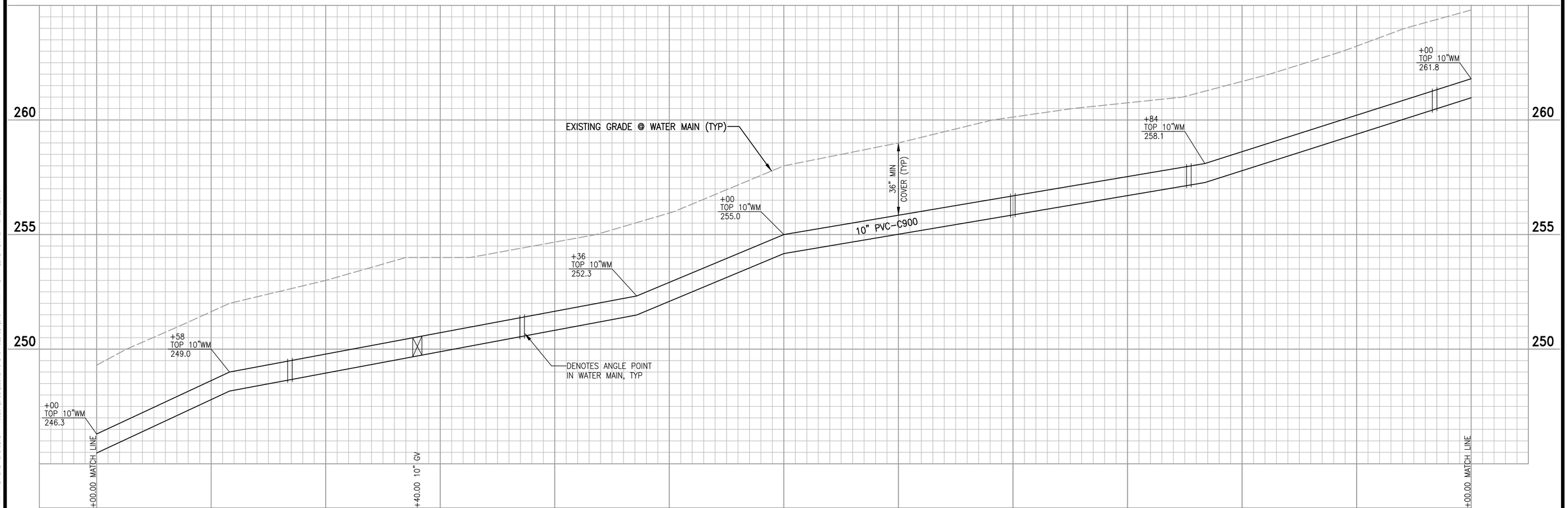
10/9/23 S:_PROJECTS\FTB\18-001 - RAW WATER LINE REPLACEMENT PROJECT\CAD\SEGMENTS 2-5 FULL SET\C12 - RAW WATER PIPELINE PLAN & PROFILE 9.DWG

# RAW WATER LINE




NOTES:

1. ALL FITTINGS MUST BE RESTRAINED MECHANICAL JOINTS, OR APPROVED EQUAL.
2. TREES WITHIN 20 FEET WIDE CONSTRUCTION CORRIDOR TO BE RETAINED AND PROTECTED, UNLESS OTHERWISE SHOWN FOR REMOVAL.





COLEMAN ENGINEERING

COLEMAN ENGINEERING
1223 PLEASANT GROVE BLVD
SUITE 100
ROSEVILLE, CA 95678
(916) 791-1188


BAR IS ONE INCH AT FULL SCALE

0 1"

IF NOT ONE INCH ON THIS SHEET SCALE ACCORDINGLY

| NO. | REVISIONS | BY | APP | DATE |
|---|---|---|---|---|
| 6 | | | | |
| 5 | | | | |
| 4 | | | | |
| 3 | | | | |
| 2 | | | | |
| 1 | | | | |

**RAW WATER LINE REPLACEMENT PROJECT**

# RAW WATER PIPELINE PLAN – SEGMENT 3
## STATION 67+00 – 73+00

**CITY OF FORT BRAGG** **CALIFORNIA**

DESIGNED UNDER THE DIRECTION OF:
Chad R. Coleman 10/6/23
CHAD R. COLEMAN DATE
R.C.E. No. 56490 - REGISTRATION EXPIRES 06-30-25

| | | |
|---|---|---|
| DESIGN: | WCJ | DATE: 10/6/23 |
| DRAWN: | WCJ | DATE: 10/6/23 |
| CHECKED: | CRC | DATE: 10/6/23 |

REGISTERED PROFESSIONAL ENGINEER CHAD R. COLEMAN No. C56490 CIVIL STATE OF CALIFORNIA
10/6/23

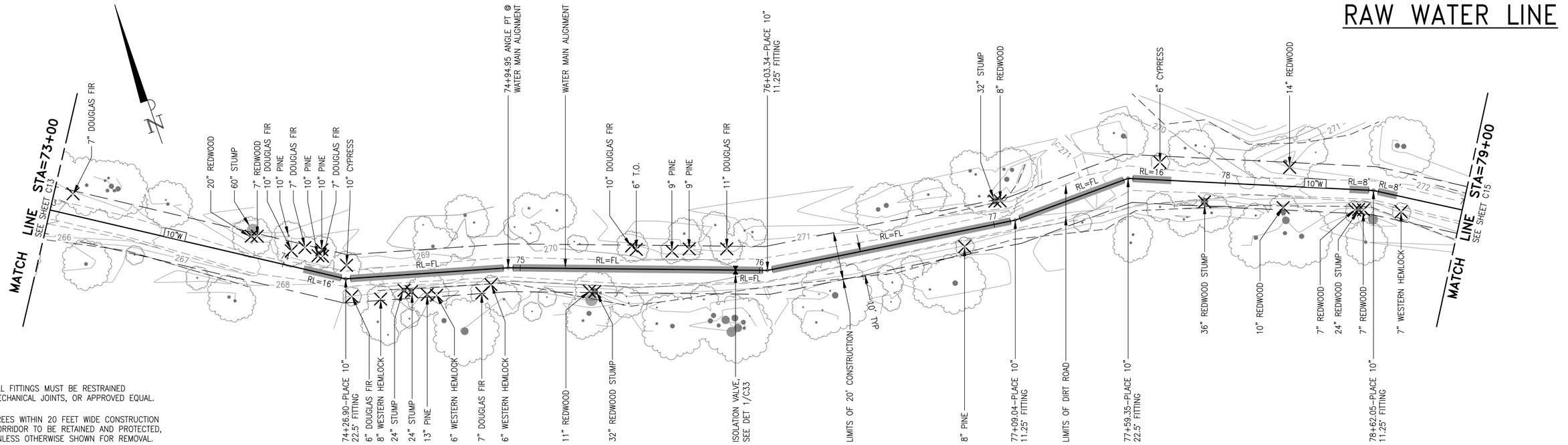
SCALE
HORZ: 1"=20'
VERT: 1"=2'

DRAWING NUMBER
C13

SHEET NUMBER
16 OF 68 SHEETS

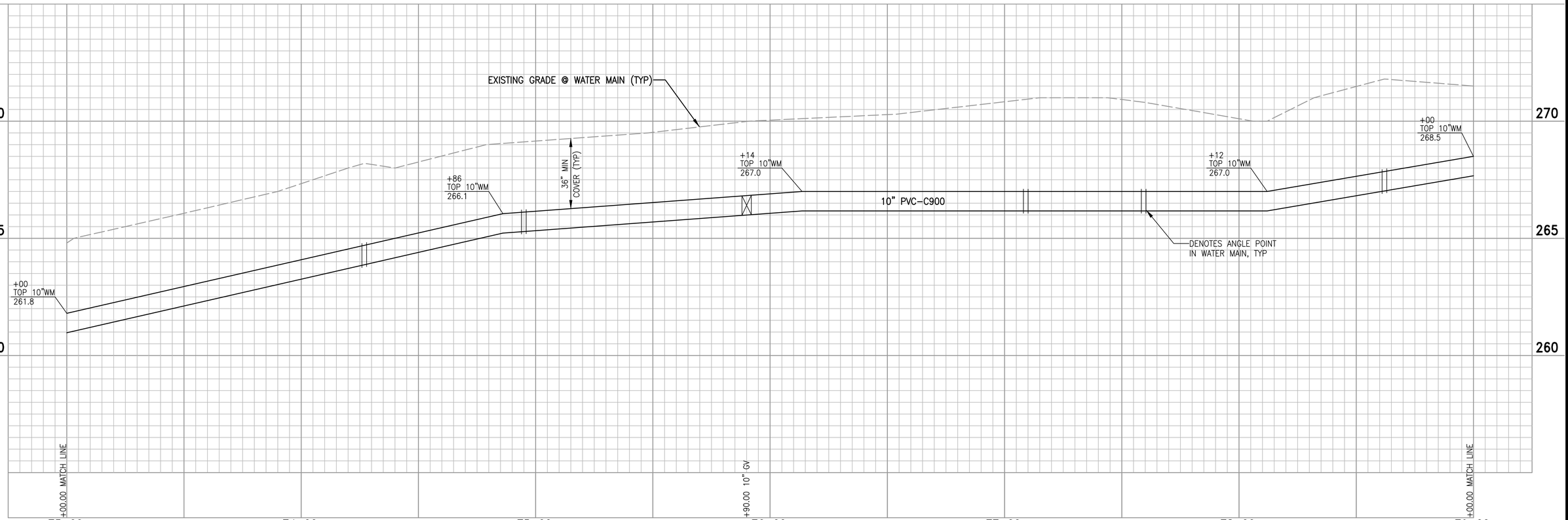
10/9/23 S:_PROJECTS\FTBG18-001 - RAW WATER LINE REPLACEMENT PROJECT\CAD\SEGMENTS 2-5 FULL SET\C13 - RAW WATER PIPELINE PLAN & PROFILE 10.DWG

# RAW WATER LINE




NOTES:

1. ALL FITTINGS MUST BE RESTRAINED MECHANICAL JOINTS, OR APPROVED EQUAL.
2. TREES WITHIN 20 FEET WIDE CONSTRUCTION CORRIDOR TO BE RETAINED AND PROTECTED, UNLESS OTHERWISE SHOWN FOR REMOVAL.





COLEMAN ENGINEERING

COLEMAN ENGINEERING
1223 PLEASANT GROVE BLVD
SUITE 100
ROSEVILLE, CA 95678
(916) 791-1188


BAR IS ONE INCH AT FULL SCALE

0 1"

IF NOT ONE INCH ON THIS SHEET SCALE ACCORDINGLY

| NO. | REVISIONS | BY | APP | DATE |
|---|---|---|---|---|
| 6 | | | | |
| 5 | | | | |
| 4 | | | | |
| 3 | | | | |
| 2 | | | | |
| 1 | | | | |

**RAW WATER LINE REPLACEMENT PROJECT**

## RAW WATER PIPELINE PLAN – SEGMENT 3
STATION 73+00 – 79+00

**CITY OF FORT BRAGG** **CALIFORNIA**

DESIGNED UNDER THE DIRECTION OF:
Chad R. Coleman 10/6/23
CHAD R. COLEMAN DATE
R.C.E. No. 56490 - REGISTRATION EXPIRES 06-30-25

| | | |
|---|---|---|
| DESIGN: | WCJ | DATE: 10/6/23 |
| DRAWN: | WCJ | DATE: 10/6/23 |
| CHECKED: | CRC | DATE: 10/6/23 |

REGISTERED PROFESSIONAL ENGINEER CHAD R. COLEMAN No. C86490 CIVIL STATE OF CALIFORNIA
10/6/23

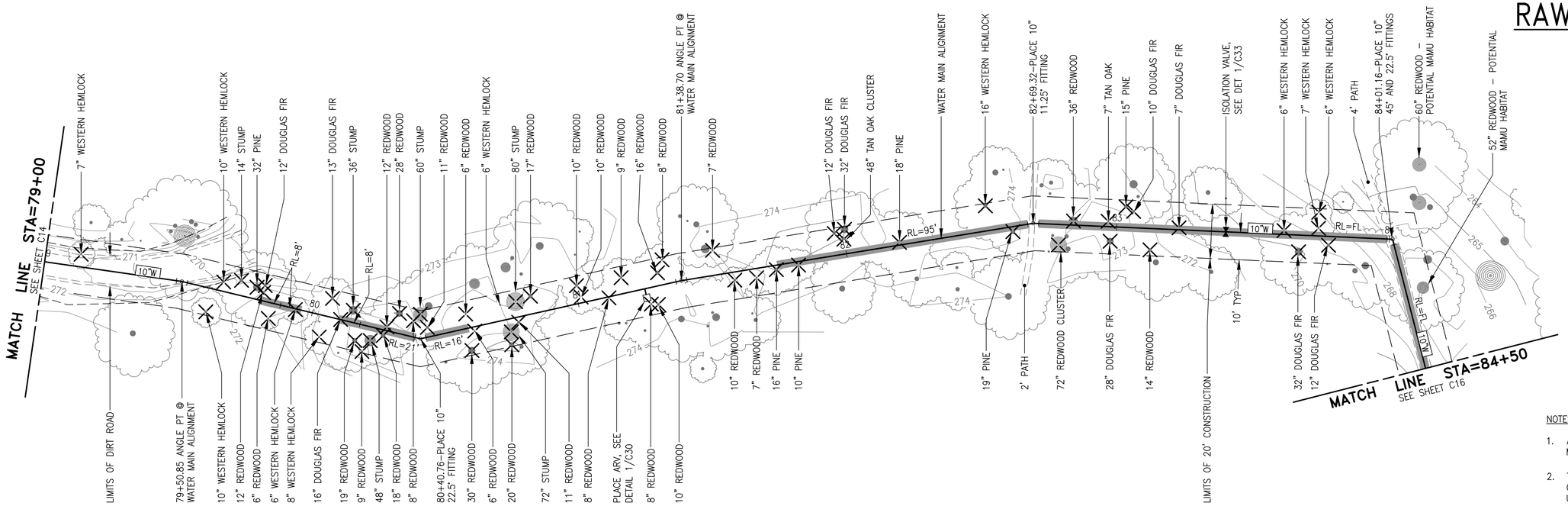
SCALE
HORZ: 1"=20'
VERT: 1"=2'

DRAWING NUMBER
C14

SHEET NUMBER
17 OF 68 SHEETS

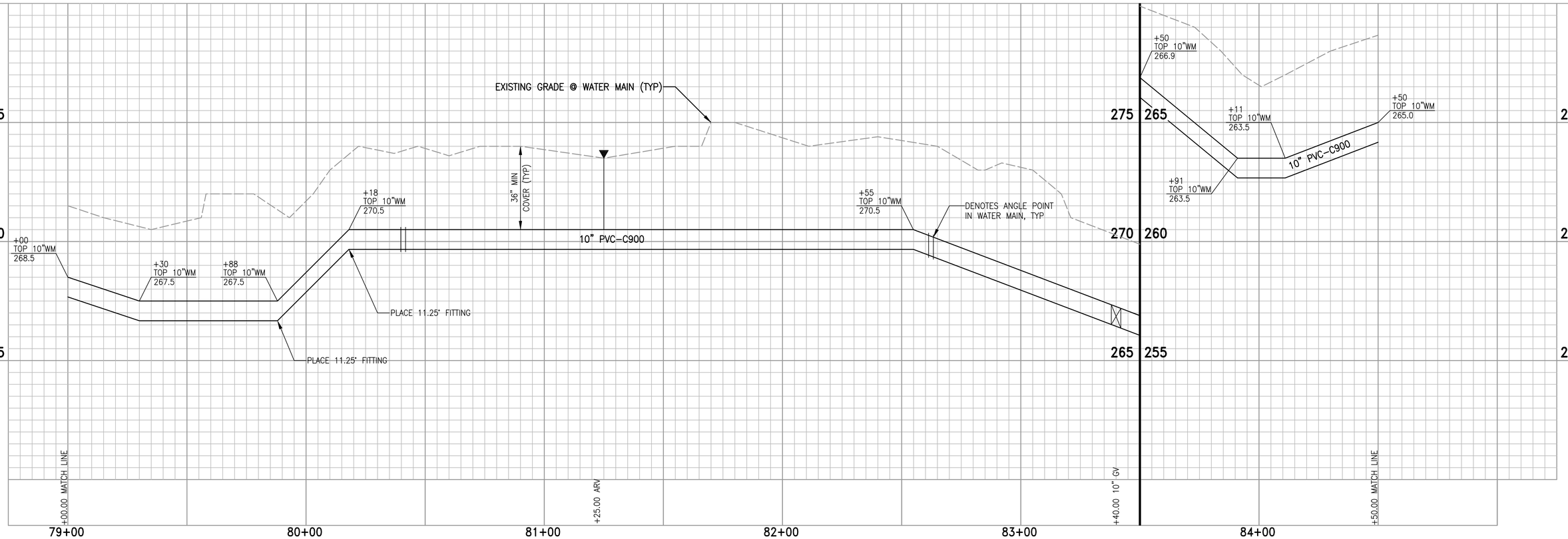
10/9/23 S:_PROJECTS\FTBG18-001 - RAW WATER LINE REPLACEMENT PROJECT\CAD\SEGMENTS 2-5 FULL SET\C14 - RAW WATER PIPELINE PLAN & PROFILE 11.DWG

# RAW WATER LINE




NOTES:

1. ALL FITTINGS MUST BE RESTRAINED MECHANICAL JOINTS, OR APPROVED EQUAL.
2. TREES WITHIN 20 FEET WIDE CONSTRUCTION CORRIDOR TO BE RETAINED AND PROTECTED, UNLESS OTHERWISE SHOWN FOR REMOVAL.





COLEMAN ENGINEERING
COLEMAN ENGINEERING
1223 PLEASANT GROVE BLVD
SUITE 100
ROSEVILLE, CA 95678
(916) 791-1188


BAR IS ONE INCH AT FULL SCALE
0 1"
IF NOT ONE INCH ON THIS SHEET SCALE ACCORDINGLY

| NO. | REVISIONS | BY | APP | DATE |
|---|---|---|---|---|
| 6 | | | | |
| 5 | | | | |
| 4 | | | | |
| 3 | | | | |
| 2 | | | | |
| 1 | | | | |

**RAW WATER LINE REPLACEMENT PROJECT**

## RAW WATER PIPELINE PLAN – SEGMENT 3
STATION 79+00 – 84+50

CITY OF FORT BRAGG CALIFORNIA

DESIGNED UNDER THE DIRECTION OF:
Chad R. Coleman 10/6/23
CHAD R. COLEMAN DATE
R.C.E. No. 56490 - REGISTRATION EXPIRES 06-30-25

| | | |
|---|---|---|
| DESIGN: | WCJ | DATE: 10/6/23 |
| DRAWN: | WCJ | DATE: 10/6/23 |
| CHECKED: | CRC | DATE: 10/6/23 |

REGISTERED PROFESSIONAL ENGINEER CHAD R. COLEMAN C86490 CIVIL STATE OF CALIFORNIA
10/6/23

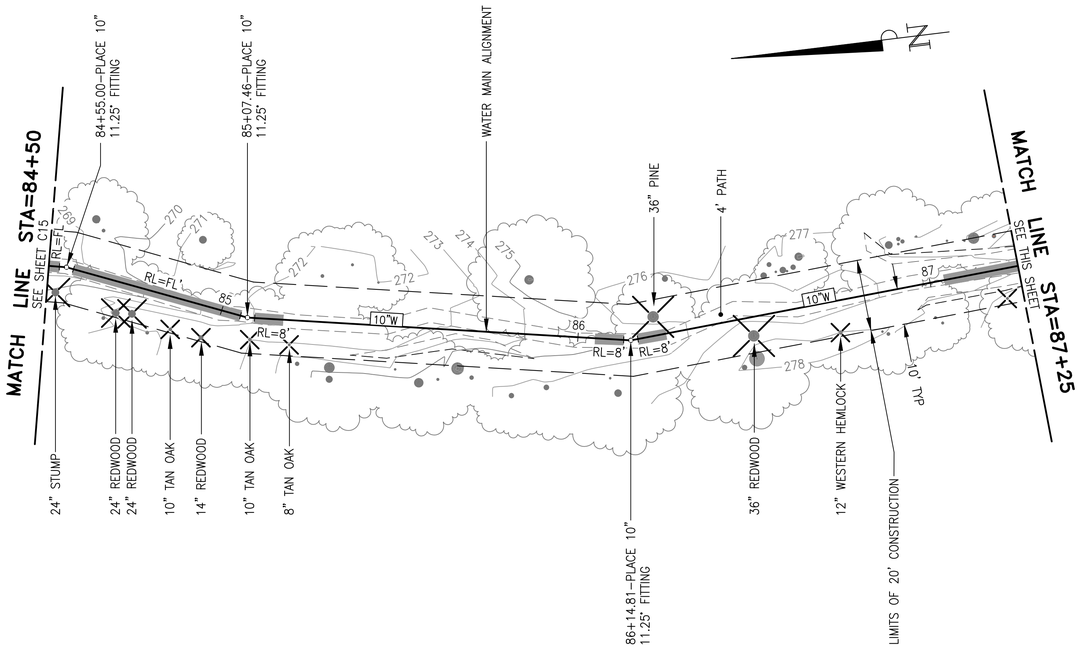
SCALE
HORZ: 1"=20'
VERT: 1"=2'

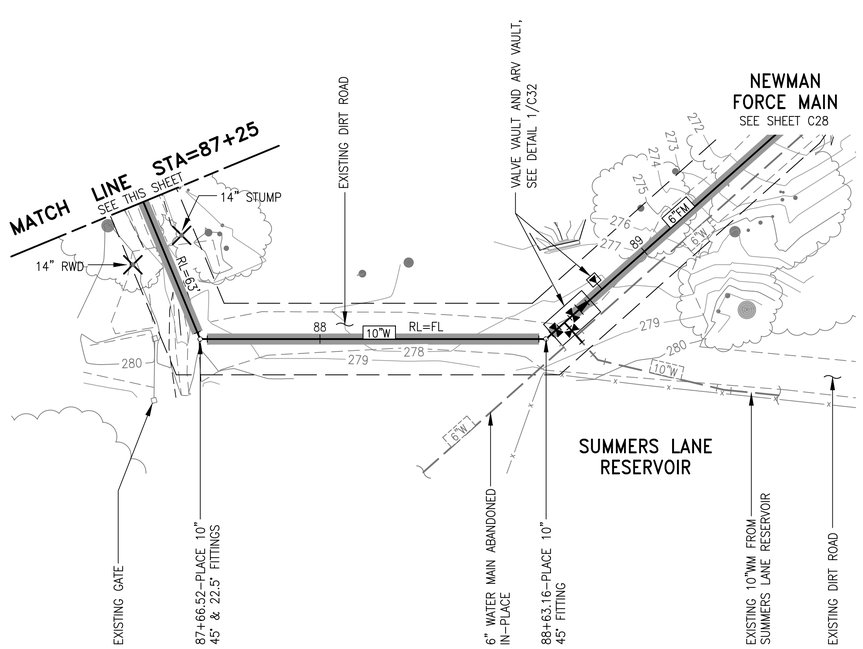
DRAWING NUMBER
C15

SHEET NUMBER
18 OF 68 SHEETS

10/6/23 S:_PROJECTS\FTBG18-001 - RAW WATER LINE REPLACEMENT PROJECT\CAD\SEGMENTS 2-5 FULL SET\C15 - RAW WATER PIPELINE PLAN & PROFILE 12.DWG

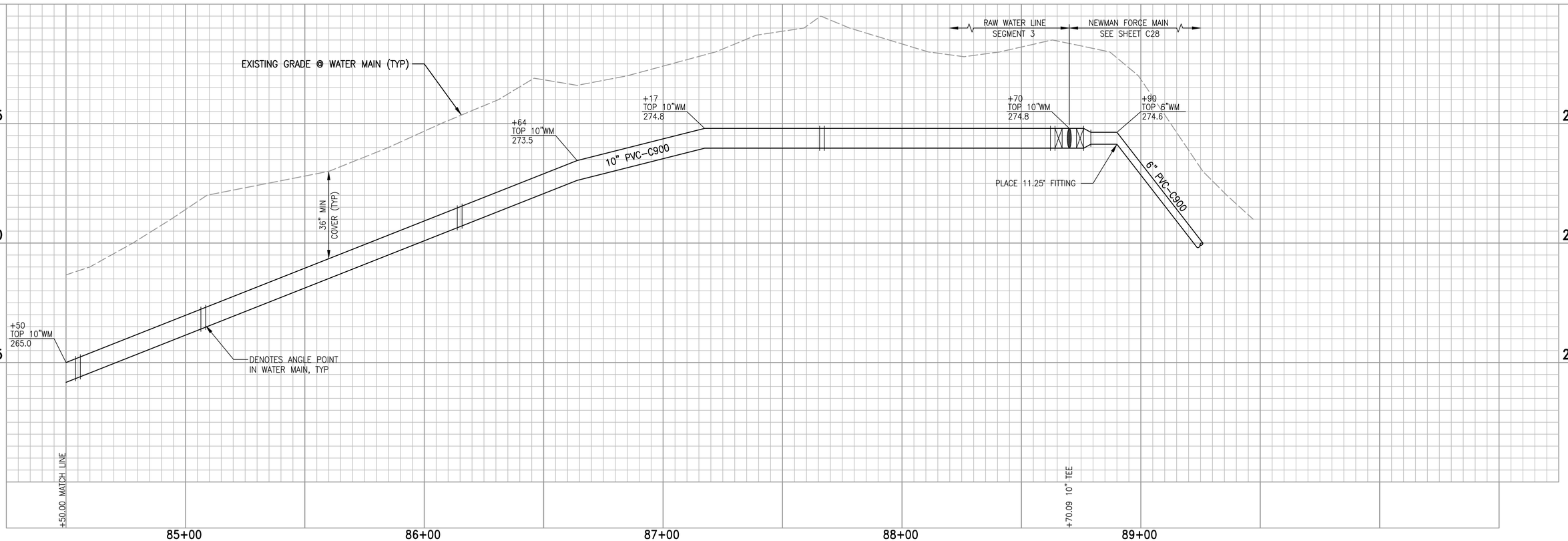
# RAW WATER LINE




NOTES:

1. ALL FITTINGS MUST BE RESTRAINED MECHANICAL JOINTS, OR APPROVED EQUAL.
2. TREES WITHIN 20 FEET WIDE CONSTRUCTION CORRIDOR TO BE RETAINED AND PROTECTED, UNLESS OTHERWISE SHOWN FOR REMOVAL.





COLEMAN ENGINEERING

COLEMAN ENGINEERING
1223 PLEASANT GROVE BLVD
SUITE 100
ROSEVILLE, CA 95678
(916) 791-1188


BAR IS ONE INCH AT FULL SCALE

0 — 1"

IF NOT ONE INCH ON THIS SHEET SCALE ACCORDINGLY

| NO. | REVISIONS | BY | APP | DATE |
|---|---|---|---|---|
| 6 | | | | |
| 5 | | | | |
| 4 | | | | |
| 3 | | | | |
| 2 | | | | |
| 1 | | | | |

**RAW WATER LINE REPLACEMENT PROJECT**

# RAW WATER PIPELINE PLAN – SEGMENT 3

STATION 84+50 – 88+70±

**CITY OF FORT BRAGG** **CALIFORNIA**

DESIGNED UNDER THE DIRECTION OF:
Chad R. Coleman 10/6/23
CHAD R. COLEMAN DATE
R.C.E. No. 56490 - REGISTRATION EXPIRES 06-30-25

| | |
|---|---|
| DESIGN: WCJ | DATE: 10/6/23 |
| DRAWN: WCJ | DATE: 10/6/23 |
| CHECKED: CRC | DATE: 10/6/23 |

REGISTERED PROFESSIONAL ENGINEER CHAD R. COLEMAN C56490 CIVIL STATE OF CALIFORNIA
10/6/23

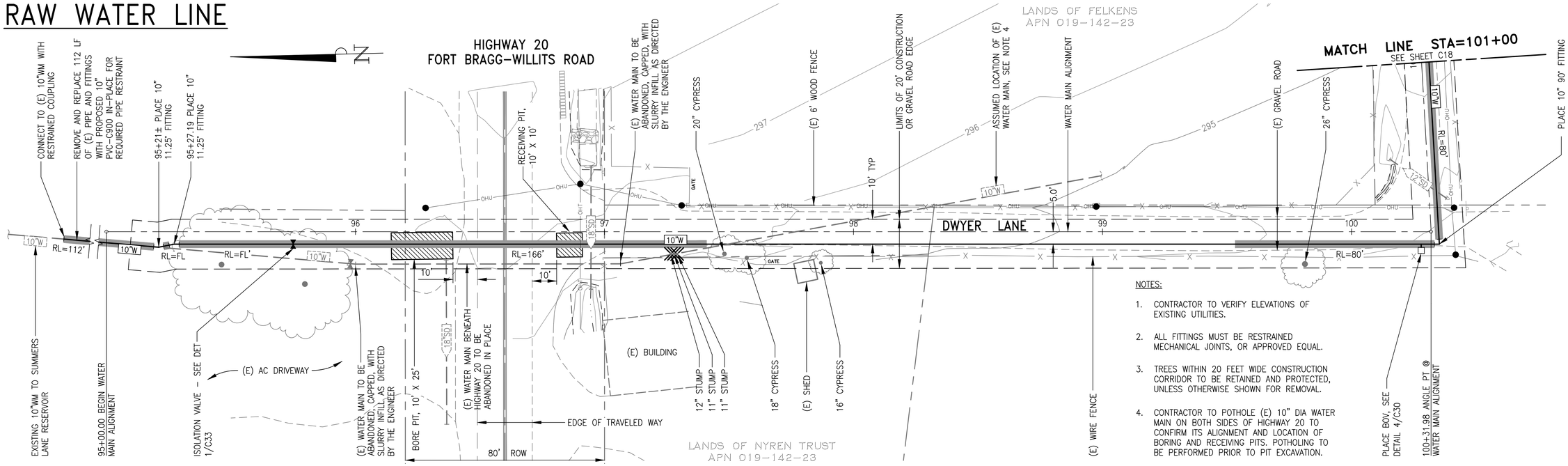
SCALE HORZ: 1"=20' VERT: 1"=2'

DRAWING NUMBER C16

SHEET NUMBER 19 OF 68 SHEETS

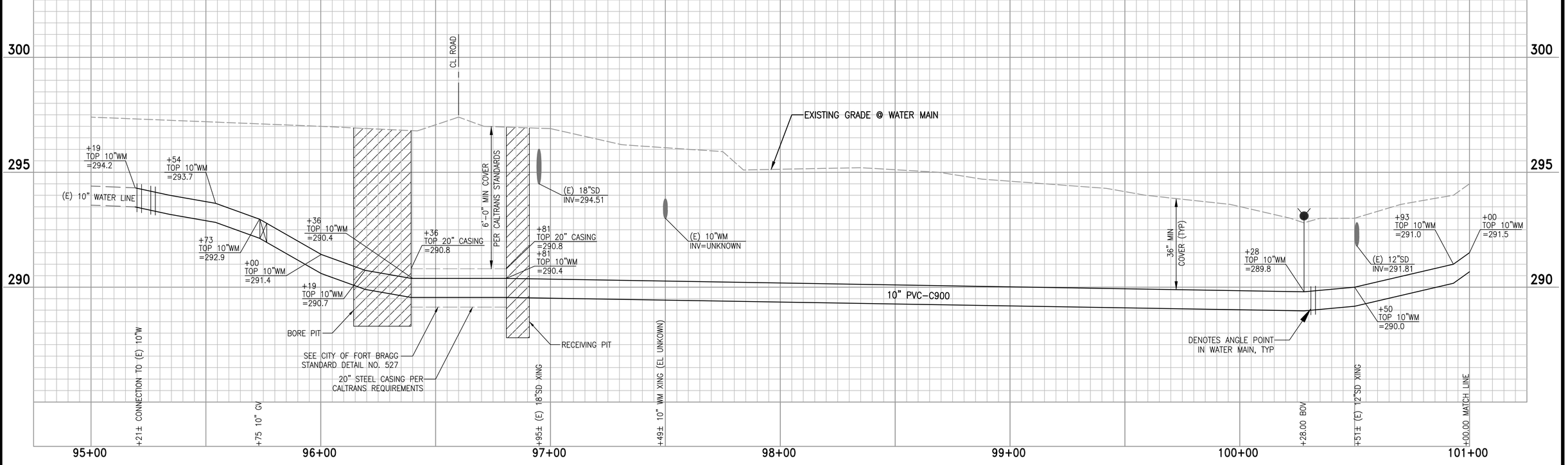
10/3/23 S:_PROJECTS\FTB\18-001 - RAW WATER LINE REPLACEMENT PROJECT\CAD\SEGMENTS 2-5 FULL SET\C16 - RAW WATER PIPELINE PLAN & PROFILE 13.DWG

# RAW WATER LINE




NOTES:

1. CONTRACTOR TO VERIFY ELEVATIONS OF EXISTING UTILITIES.
2. ALL FITTINGS MUST BE RESTRAINED MECHANICAL JOINTS, OR APPROVED EQUAL.
3. TREES WITHIN 20 FEET WIDE CONSTRUCTION CORRIDOR TO BE RETAINED AND PROTECTED, UNLESS OTHERWISE SHOWN FOR REMOVAL.
4. CONTRACTOR TO POTHOLE (E) 10" DIA WATER MAIN ON BOTH SIDES OF HIGHWAY 20 TO CONFIRM ITS ALIGNMENT AND LOCATION OF BORING AND RECEIVING PITS. POTHOLING TO BE PERFORMED PRIOR TO PIT EXCAVATION.





COLEMAN ENGINEERING

COLEMAN ENGINEERING
1223 PLEASANT GROVE BLVD
SUITE 100
ROSEVILLE, CA 95678
(916) 791–1188


BAR IS ONE INCH AT FULL SCALE
0 1"
IF NOT ONE INCH ON THIS SHEET SCALE ACCORDINGLY

| NO. | REVISIONS | BY | APP | DATE |
|---|---|---|---|---|
| 6 | | | | |
| 5 | | | | |
| 4 | | | | |
| 3 | | | | |
| 2 | | | | |
| 1 | | | | |

**RAW WATER LINE REPLACEMENT PROJECT**

## RAW WATER PIPELINE PLAN – SEGMENT 4
STATION 95+00 – 101+00

**CITY OF FORT BRAGG** **CALIFORNIA**

DESIGNED UNDER THE DIRECTION OF:
CHAD R. COLEMAN 10/6/23
CHAD R. COLEMAN DATE
R.C.E. No. 56490 - REGISTRATION EXPIRES 06-30-25

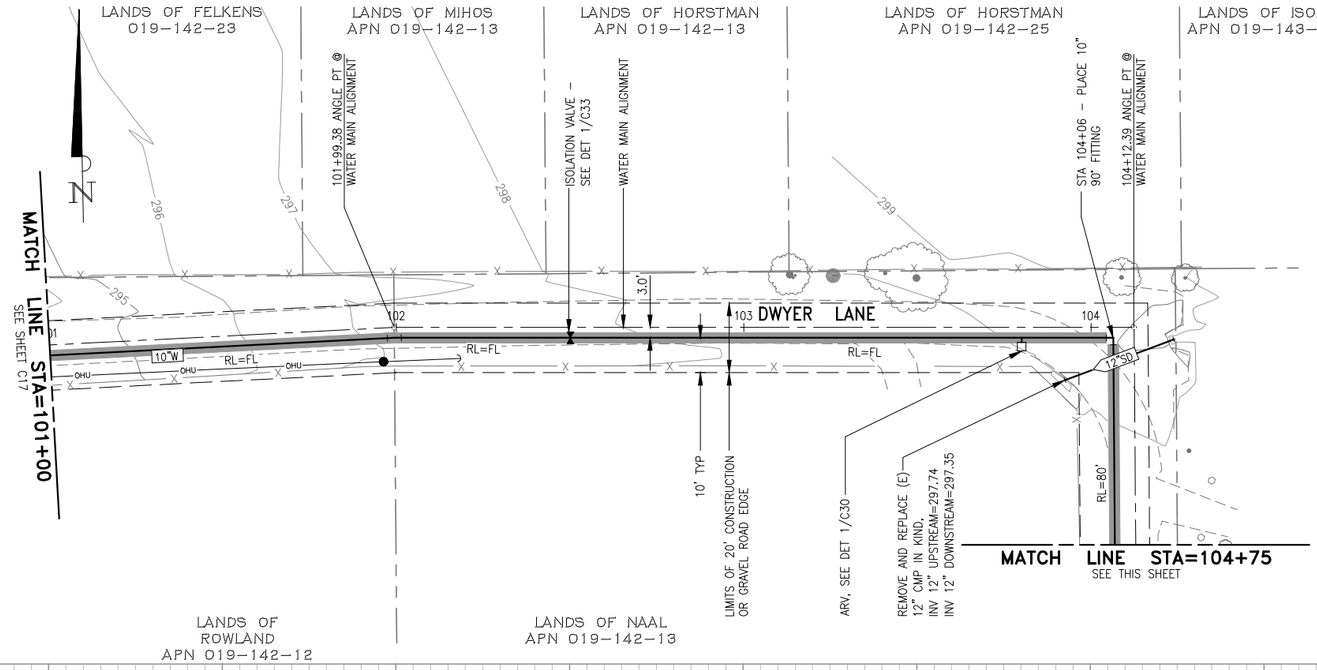
| | |
|---|---|
| DESIGN: WCJ | DATE: 10/6/23 |
| DRAWN: WCJ | DATE: 10/6/23 |
| CHECKED: CRC | DATE: 10/6/23 |

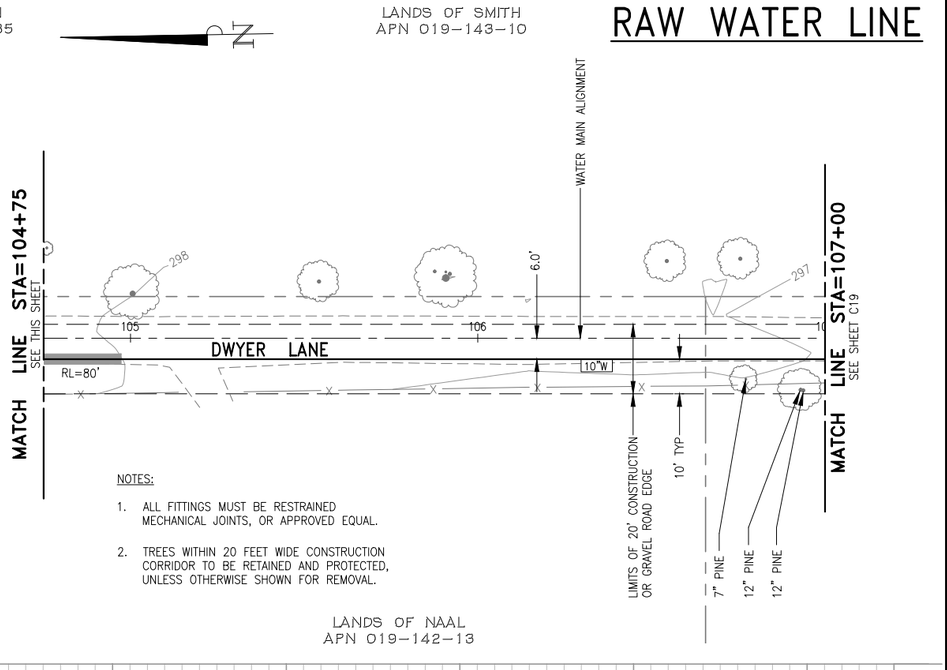
REGISTERED PROFESSIONAL ENGINEER CHAD R. COLEMAN No. C56490 CIVIL STATE OF CALIFORNIA
10/6/23

SCALE HORZ: 1"=20' VERT: 1"=2'
DRAWING NUMBER C17
SHEET NUMBER 20 OF 68 SHEETS

10/6/23 S:_PROJECTS\TBD18-001 – RAW WATER LINE REPLACEMENT PROJECT\CADD\SEGMENTS 2-5 FULL SET\C17 – RAW WATER PIPELINE PLAN & PROFILE 14.DWG

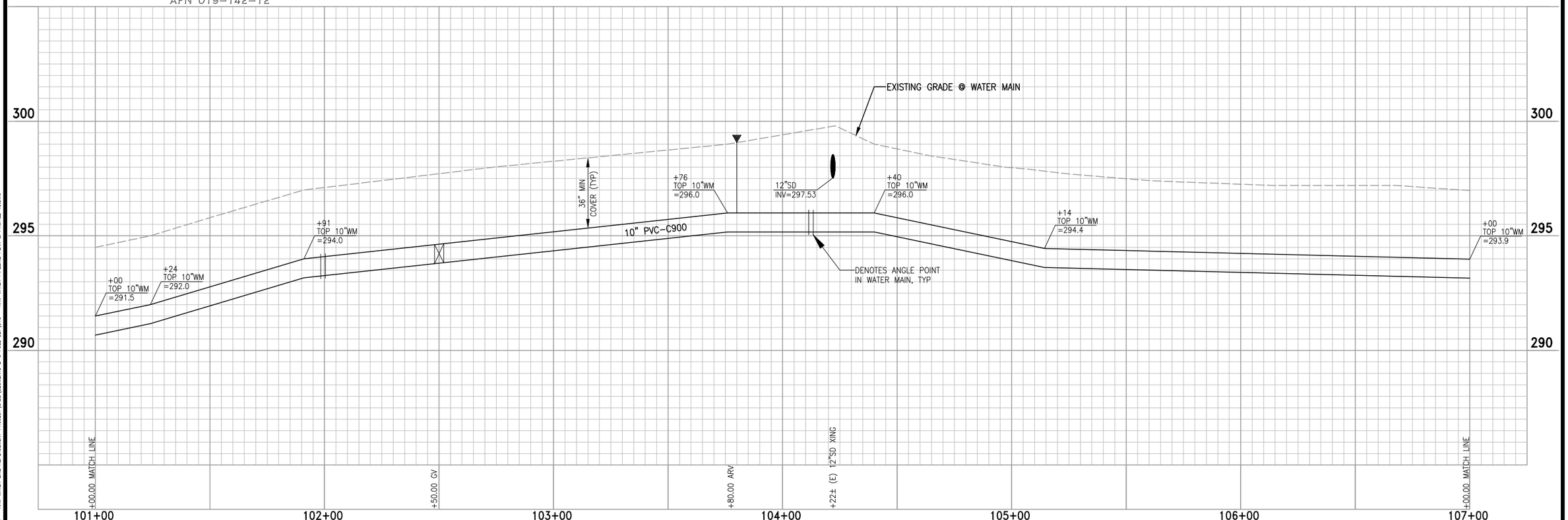
# RAW WATER LINE




NOTES:

1. ALL FITTINGS MUST BE RESTRAINED MECHANICAL JOINTS, OR APPROVED EQUAL.
2. TREES WITHIN 20 FEET WIDE CONSTRUCTION CORRIDOR TO BE RETAINED AND PROTECTED, UNLESS OTHERWISE SHOWN FOR REMOVAL.





COLEMAN ENGINEERING

COLEMAN ENGINEERING
1223 PLEASANT GROVE BLVD
SUITE 100
ROSEVILLE, CA 95678
(916) 791-1188


BAR IS ONE INCH AT FULL SCALE

0 1"

IF NOT ONE INCH ON THIS SHEET SCALE ACCORDINGLY

| NO. | REVISIONS | BY | APP | DATE |
|---|---|---|---|---|
| 6 | | | | |
| 5 | | | | |
| 4 | | | | |
| 3 | | | | |
| 2 | | | | |
| 1 | | | | |

**RAW WATER LINE REPLACEMENT PROJECT**

## RAW WATER PIPELINE PLAN – SEGMENT 4
101+00 – 107+00

**CITY OF FORT BRAGG** **CALIFORNIA**

DESIGNED UNDER THE DIRECTION OF:
Chad R. Coleman 10/6/23
CHAD R. COLEMAN DATE
R.C.E. No. 56490 - REGISTRATION EXPIRES 06-30-25

| | | |
|---|---|---|
| DESIGN: | WCJ | DATE: 10/6/23 |
| DRAWN: | WCJ | DATE: 10/6/23 |
| CHECKED: | CRC | DATE: 10/6/23 |

REGISTERED PROFESSIONAL ENGINEER CHAD R. COLEMAN No. C56490 CIVIL STATE OF CALIFORNIA 10/6/23

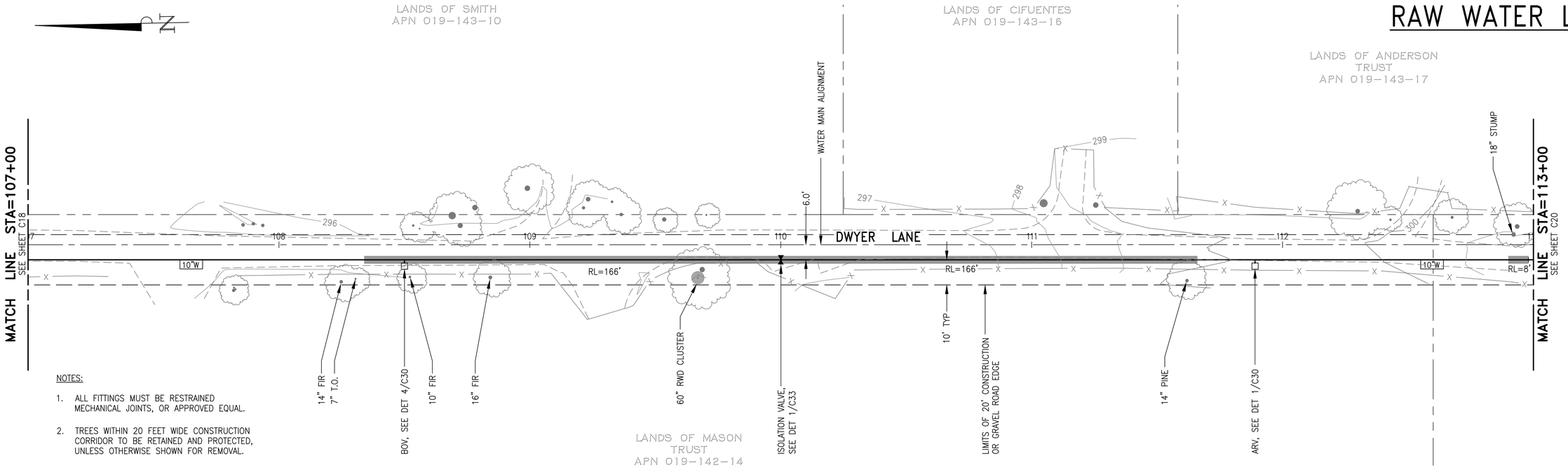
SCALE
HORZ: 1"=20'
VERT: 1"=2'

DRAWING NUMBER
C18

SHEET NUMBER
21 OF 68 SHEETS

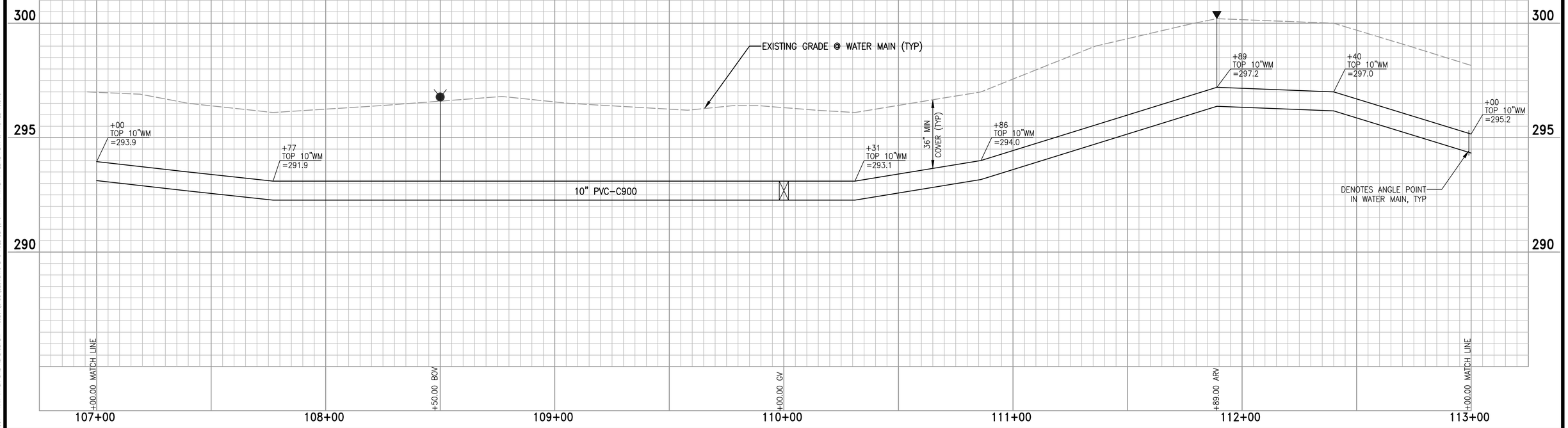
10/26/23 S:_PROJECTS\FTBG18-001 - RAW WATER LINE REPLACEMENT PROJECT\CADD\SEGMENTS 2-5 FULL SET\C18 - RAW WATER PIPELINE PLAN & PROFILE 15.DWG

# RAW WATER LINE




NOTES:

1. ALL FITTINGS MUST BE RESTRAINED MECHANICAL JOINTS, OR APPROVED EQUAL.
2. TREES WITHIN 20 FEET WIDE CONSTRUCTION CORRIDOR TO BE RETAINED AND PROTECTED, UNLESS OTHERWISE SHOWN FOR REMOVAL.




10/9/23 S:_PROJECTS\TR0118-001 - RAW WATER LINE REPLACEMENT PROJECT\CAD\SEGMENTS 2-5 FULL SET\C19 - RAW WATER PIPELINE PLAN & PROFILE 16.DWG

COLEMAN ENGINEERING

COLEMAN ENGINEERING
1223 PLEASANT GROVE BLVD
SUITE 100
ROSEVILLE, CA 95678
(916) 791-1188

BAR IS ONE INCH AT FULL SCALE
0 1"
IF NOT ONE INCH ON THIS SHEET SCALE ACCORDINGLY

| NO. | REVISIONS | BY | APP | DATE |
|---|---|---|---|---|
| 6 | | | | |
| 5 | | | | |
| 4 | | | | |
| 3 | | | | |
| 2 | | | | |
| 1 | | | | |

**RAW WATER LINE REPLACEMENT PROJECT**

# RAW WATER PIPELINE PLAN – SEGMENT 4
## 107+00 – 113+00

**CITY OF FORT BRAGG** **CALIFORNIA**

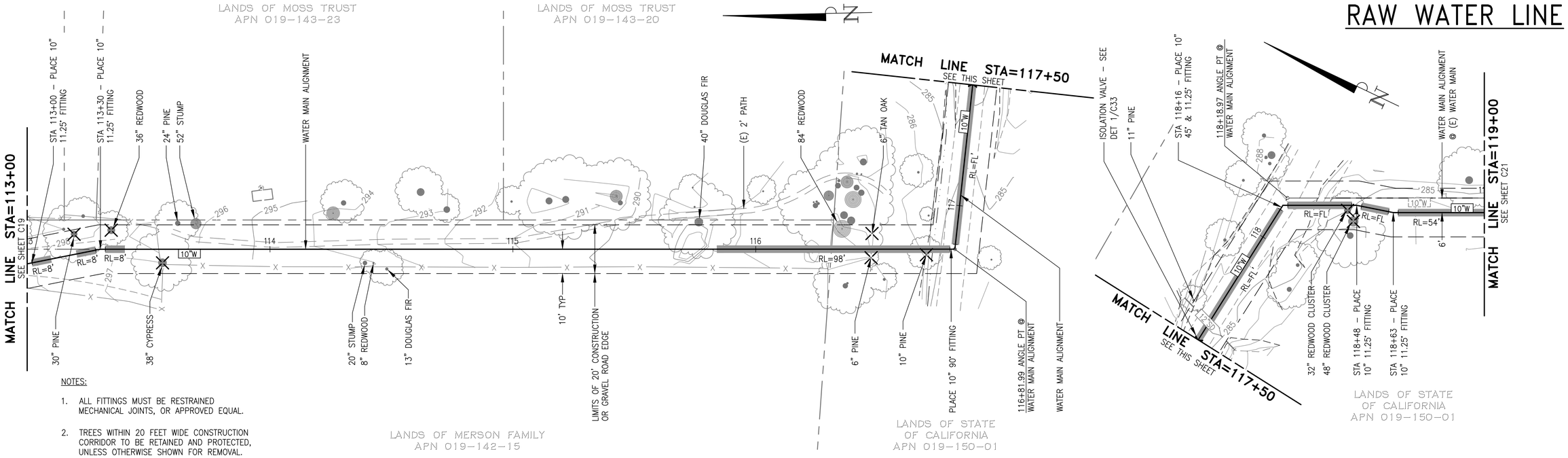
DESIGNED UNDER THE DIRECTION OF:
Chad R. Coleman 10/6/23
CHAD R. COLEMAN DATE
R.C.E. No. 56490 - REGISTRATION EXPIRES 06-30-25

| | | |
|---|---|---|
| DESIGN: | WCJ | DATE: 10/6/23 |
| DRAWN: | WCJ | DATE: 10/6/23 |
| CHECKED: | CRC | DATE: 10/6/23 |

REGISTERED PROFESSIONAL ENGINEER CHAD R. COLEMAN C56490 CIVIL STATE OF CALIFORNIA
10/6/23

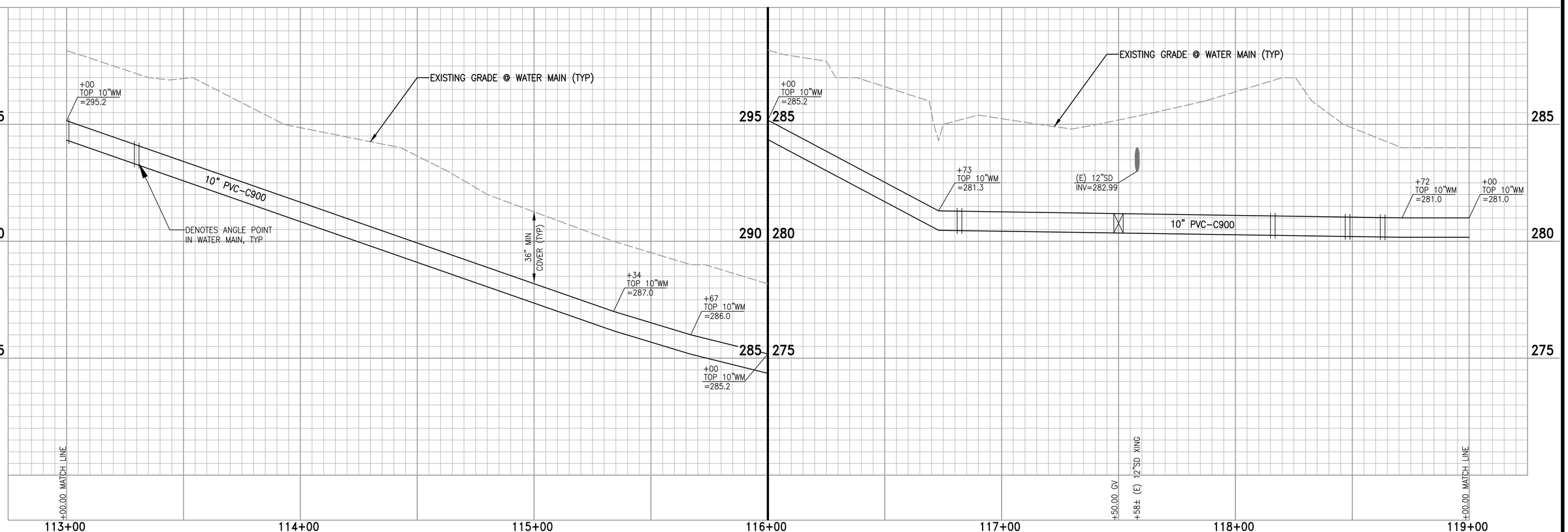
SCALE HORZ: 1"=20' VERT: 1"=2'
DRAWING NUMBER C19
SHEET NUMBER 22 OF 68 SHEETS

# RAW WATER LINE




NOTES:

1. ALL FITTINGS MUST BE RESTRAINED MECHANICAL JOINTS, OR APPROVED EQUAL.
2. TREES WITHIN 20 FEET WIDE CONSTRUCTION CORRIDOR TO BE RETAINED AND PROTECTED, UNLESS OTHERWISE SHOWN FOR REMOVAL.





COLEMAN ENGINEERING
COLEMAN ENGINEERING
1223 PLEASANT GROVE BLVD
SUITE 100
ROSEVILLE, CA 95678
(916) 791-1188


CITY OF FORT BRAGG CALIFORNIA

BAR IS ONE INCH AT FULL SCALE
0 1"
IF NOT ONE INCH ON THIS SHEET SCALE ACCORDINGLY

| NO. | REVISIONS | BY | APP | DATE |
|---|---|---|---|---|
| 6 | | | | |
| 5 | | | | |
| 4 | | | | |
| 3 | | | | |
| 2 | | | | |
| 1 | | | | |

**RAW WATER LINE REPLACEMENT PROJECT**

## RAW WATER PIPELINE PLAN - SEGMENT 4
STATION 113+00 - 119+00

**CITY OF FORT BRAGG** **CALIFORNIA**

DESIGNED UNDER THE DIRECTION OF:
Chad R. Coleman 10/6/23
CHAD R. COLEMAN DATE
R.C.E. No. 56490 - REGISTRATION EXPIRES 06-30-25

| | |
|---|---|
| DESIGN: WCJ | DATE: 10/6/23 |
| DRAWN: WCJ | DATE: 10/6/23 |
| CHECKED: CRC | DATE: 10/6/23 |

REGISTERED PROFESSIONAL ENGINEER CHAD R. COLEMAN No. C56490 CIVIL STATE OF CALIFORNIA
10/6/23

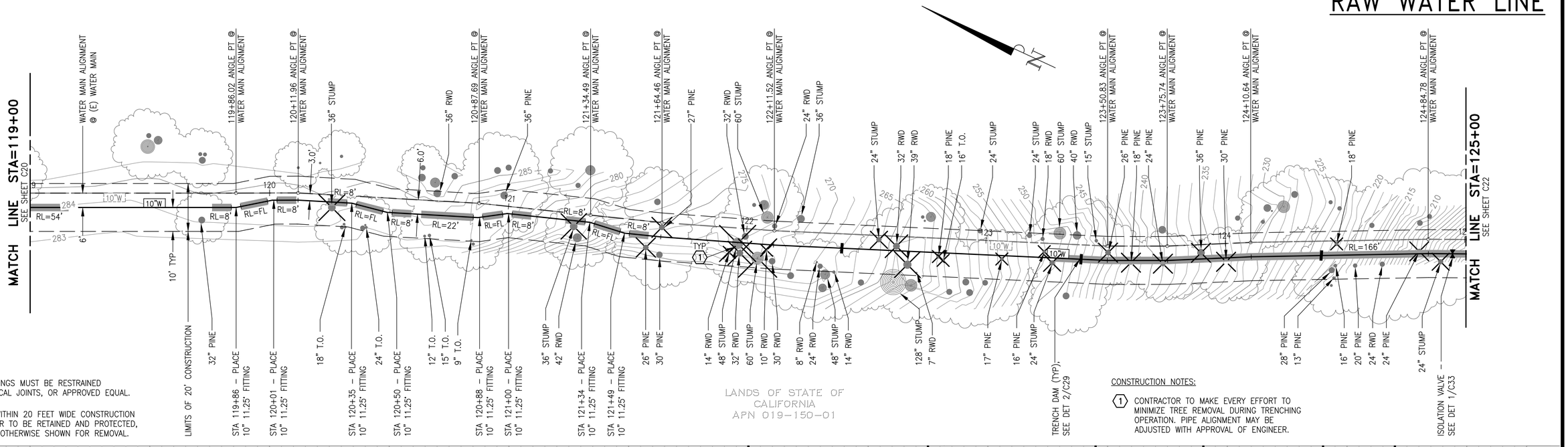
SCALE
HORZ: 1"=20'
VERT: 1"=2'

DRAWING NUMBER
C20

SHEET NUMBER
23 OF 68 SHEETS

10/3/23 S:_PROJECTS\TTBG18-001 - RAW WATER LINE REPLACEMENT PROJECT\CADD\SEGMENTS 2-5 FULL SET\C20 - RAW WATER PIPELINE PLAN & PROFILE 17.DWG

# RAW WATER LINE

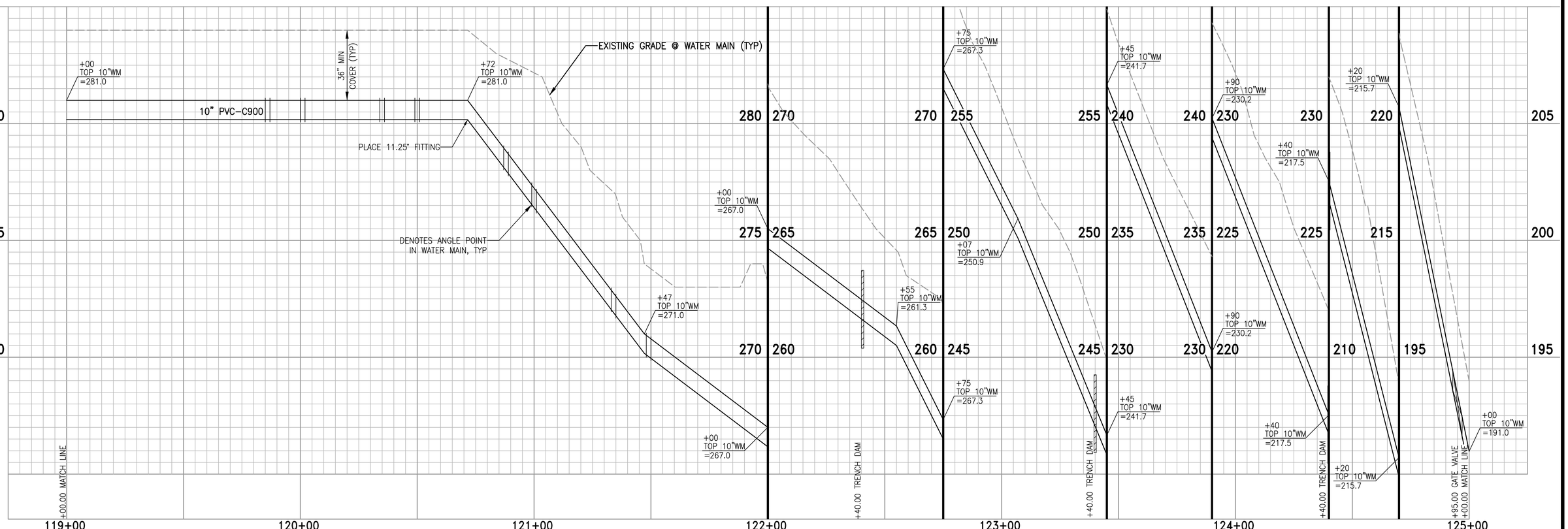



NOTES:

1. ALL FITTINGS MUST BE RESTRAINED MECHANICAL JOINTS, OR APPROVED EQUAL.
2. TREES WITHIN 20 FEET WIDE CONSTRUCTION CORRIDOR TO BE RETAINED AND PROTECTED, UNLESS OTHERWISE SHOWN FOR REMOVAL.

CONSTRUCTION NOTES:

(1) CONTRACTOR TO MAKE EVERY EFFORT TO MINIMIZE TREE REMOVAL DURING TRENCHING OPERATION. PIPE ALIGNMENT MAY BE ADJUSTED WITH APPROVAL OF ENGINEER.





COLEMAN ENGINEERING

COLEMAN ENGINEERING
1223 PLEASANT GROVE BLVD
SUITE 100
ROSEVILLE, CA 95678
(916) 791-1188


BAR IS ONE INCH AT FULL SCALE
0 1"
IF NOT ONE INCH ON THIS SHEET SCALE ACCORDINGLY

| NO. | REVISIONS | BY | APP | DATE |
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**RAW WATER LINE REPLACEMENT PROJECT**

## RAW WATER PIPELINE PLAN – SEGMENT 4
STATION 119+00 – 125+00

**CITY OF FORT BRAGG** **CALIFORNIA**

DESIGNED UNDER THE DIRECTION OF:
Chad R. Coleman 10/6/23
CHAD R. COLEMAN DATE
R.C.E. No. 56490 - REGISTRATION EXPIRES 06-30-25

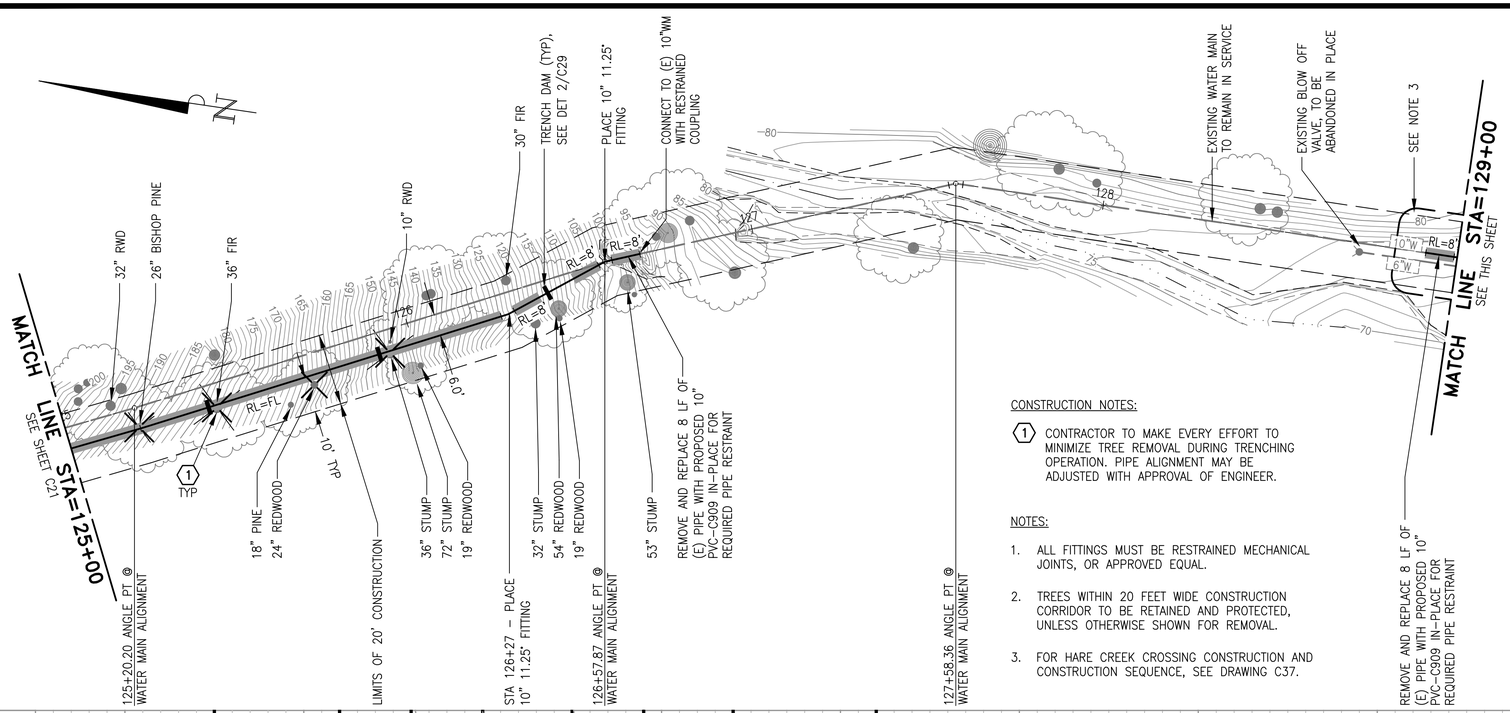
| | |
|---|---|
| DESIGN: WCJ | DATE: 10/6/23 |
| DRAWN: WCJ | DATE: 10/6/23 |
| CHECKED: CRC | DATE: 10/6/23 |

REGISTERED PROFESSIONAL ENGINEER CHAD R. COLEMAN No. C66490 CIVIL STATE OF CALIFORNIA 10/6/23

SCALE HORZ: 1"=20' VERT: 1"=2'
DRAWING NUMBER C21
SHEET NUMBER 24 OF 68 SHEETS

10/6/23 S:_PROJECTS\TBG18-001 – RAW WATER LINE REPLACEMENT PROJECT\CADD\SEGMENTS 2-5 FULL SET\C21 – RAW WATER PIPELINE PLAN & PROFILE 1&5.DWG

# RAW WATER LINE

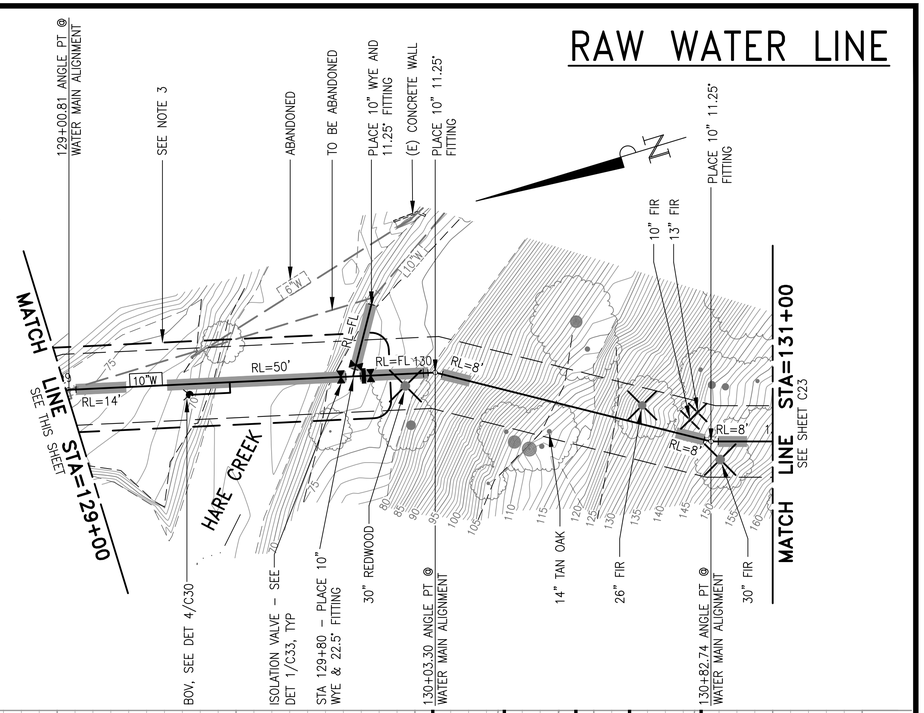


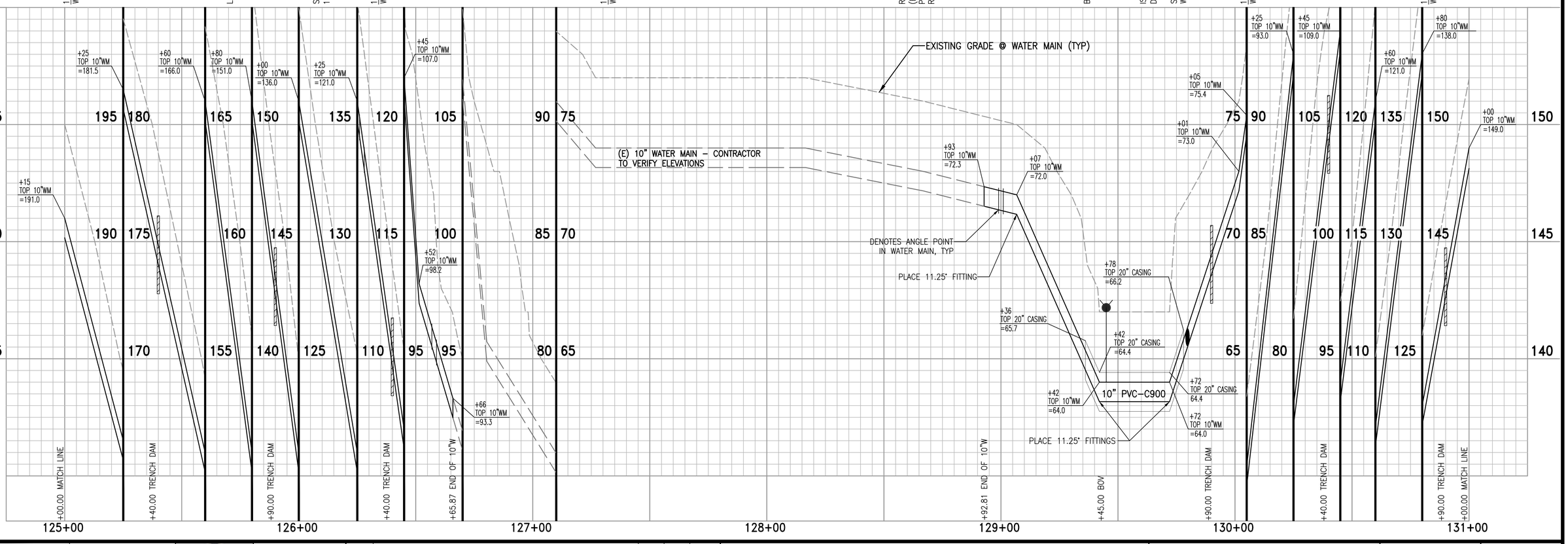

CONSTRUCTION NOTES:

1. CONTRACTOR TO MAKE EVERY EFFORT TO MINIMIZE TREE REMOVAL DURING TRENCHING OPERATION. PIPE ALIGNMENT MAY BE ADJUSTED WITH APPROVAL OF ENGINEER.

NOTES:

1. ALL FITTINGS MUST BE RESTRAINED MECHANICAL JOINTS, OR APPROVED EQUAL.
2. TREES WITHIN 20 FEET WIDE CONSTRUCTION CORRIDOR TO BE RETAINED AND PROTECTED, UNLESS OTHERWISE SHOWN FOR REMOVAL.
3. FOR HARE CREEK CROSSING CONSTRUCTION AND CONSTRUCTION SEQUENCE, SEE DRAWING C37.





COLEMAN ENGINEERING

COLEMAN ENGINEERING
1223 PLEASANT GROVE BLVD
SUITE 100
ROSEVILLE, CA 95678
(916) 791-1188


BAR IS ONE INCH AT FULL SCALE

0 1"

IF NOT ONE INCH ON THIS SHEET SCALE ACCORDINGLY

| NO. | REVISIONS | BY | APP | DATE |
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**RAW WATER LINE REPLACEMENT PROJECT**

## RAW WATER PIPELINE PLAN – SEGMENTS 4 & 5
STATION 125+00 – 131+00

CITY OF FORT BRAGG — CALIFORNIA

DESIGNED UNDER THE DIRECTION OF:
Chad R. Coleman 10/6/23
CHAD R. COLEMAN DATE
R.C.E. No. 56490 - REGISTRATION EXPIRES 06-30-25

| | | |
|---|---|---|
| DESIGN: | WCJ | DATE: 10/6/23 |
| DRAWN: | WCJ | DATE: 10/6/23 |
| CHECKED: | CRC | DATE: 10/6/23 |

REGISTERED PROFESSIONAL ENGINEER — CHAD R. COLEMAN — No. C66490 — CIVIL — STATE OF CALIFORNIA — 10/6/23

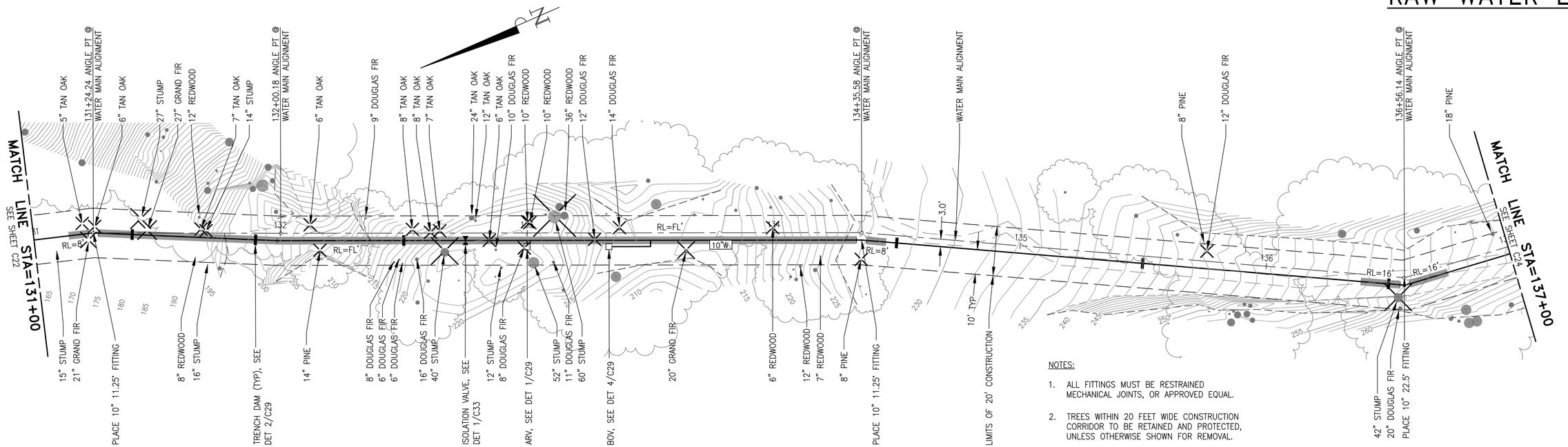
SCALE
HORZ: 1"=20'
VERT: 1"=2'

DRAWING NUMBER
C22

SHEET NUMBER
25 OF 68 SHEETS

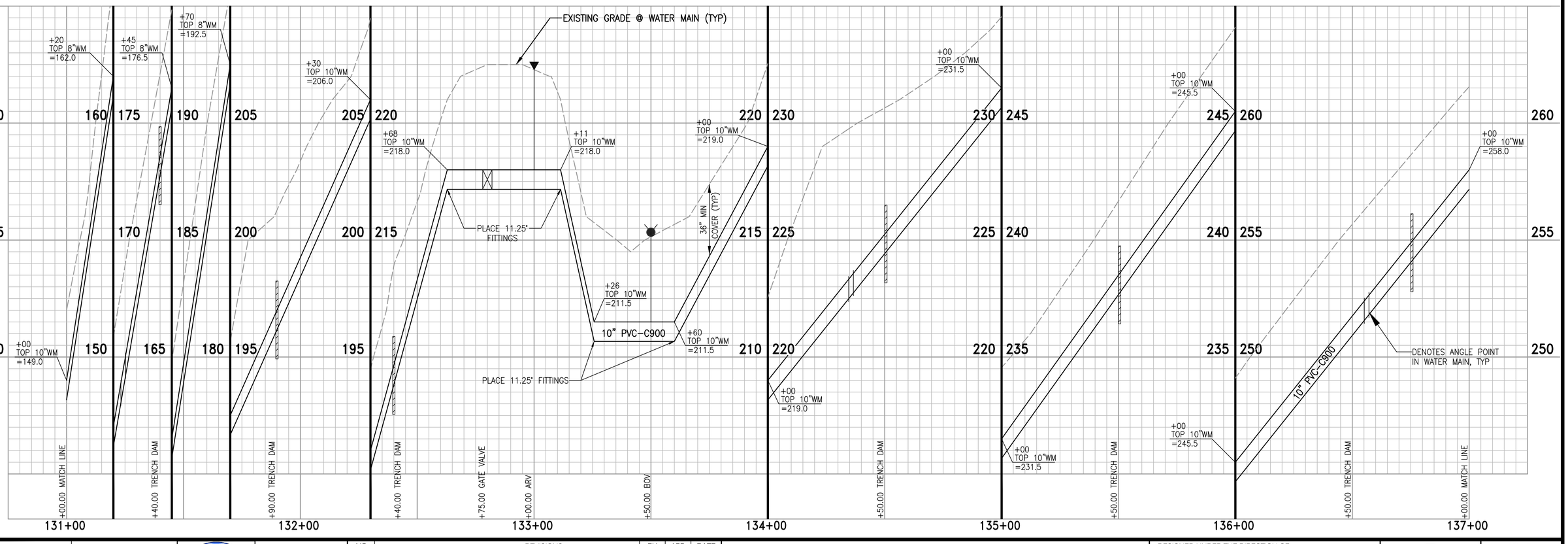
10/5/23 S:_PROJECTS\FTBG18-001 – RAW WATER LINE REPLACMENT PROJECT\CAD\SEGMENTS 2-5 FULL SET\C22 – RAW WATER PIPELINE PLAN & PROFILE 19.DWG

# RAW WATER LINE




NOTES:

1. ALL FITTINGS MUST BE RESTRAINED MECHANICAL JOINTS, OR APPROVED EQUAL.
2. TREES WITHIN 20 FEET WIDE CONSTRUCTION CORRIDOR TO BE RETAINED AND PROTECTED, UNLESS OTHERWISE SHOWN FOR REMOVAL.





COLEMAN ENGINEERING
COLEMAN ENGINEERING
1223 PLEASANT GROVE BLVD
SUITE 100
ROSEVILLE, CA 95678
(916) 791-1188


CITY OF FORT BRAGG CALIFORNIA

BAR IS ONE INCH AT FULL SCALE
0 1"
IF NOT ONE INCH ON THIS SHEET SCALE ACCORDINGLY

| NO. | REVISIONS | BY | APP | DATE |
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**RAW WATER LINE REPLACEMENT PROJECT**

## RAW WATER PIPELINE PLAN – SEGMENT 5
STATION 131+00 – 137+00

**CITY OF FORT BRAGG** **CALIFORNIA**

DESIGNED UNDER THE DIRECTION OF:
Chad R. Coleman 10/6/23
CHAD R. COLEMAN DATE
R.C.E. No. 56490 - REGISTRATION EXPIRES 06-30-25

| | | |
|---|---|---|
| DESIGN: | WCJ | DATE: 10/6/23 |
| DRAWN: | WCJ | DATE: 10/6/23 |
| CHECKED: | CRC | DATE: 10/6/23 |

REGISTERED PROFESSIONAL ENGINEER CHAD R. COLEMAN No. C66490 STATE OF CALIFORNIA CIVIL
10/6/23

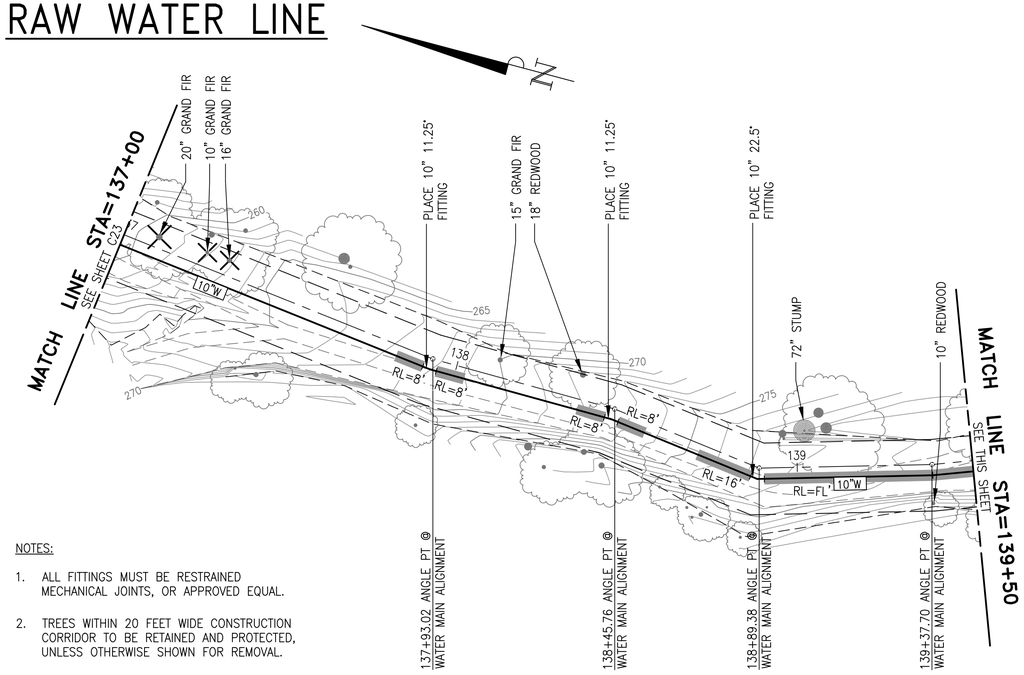
SCALE
HORZ: 1"=20'
VERT: 1"=2'

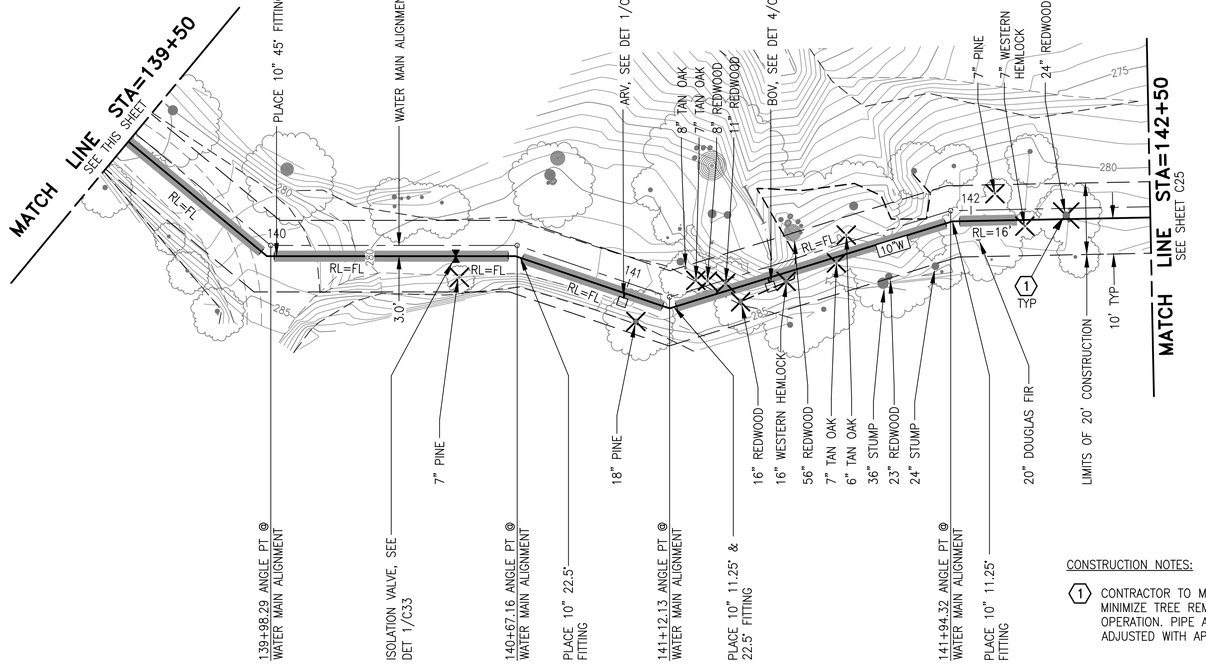
DRAWING NUMBER
C23

SHEET NUMBER
26 OF 68 SHEETS

10/6/23 S:_PROJECTS\FTBG18-001 - RAW WATER LINE REPLACMENT PROJECT\CADD\SEGMENTS 2-5 FULL SET\C23 - RAW WATER PIPELINE PLAN & PROFILE 20.DWG

# RAW WATER LINE



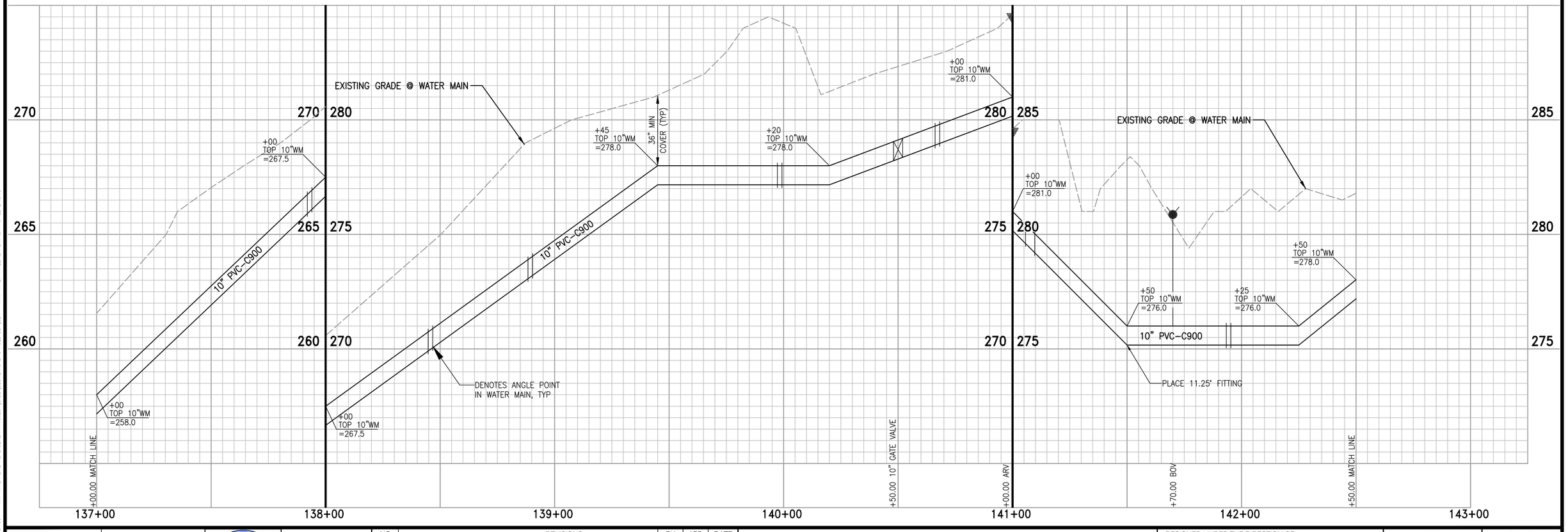




NOTES:

1. ALL FITTINGS MUST BE RESTRAINED MECHANICAL JOINTS, OR APPROVED EQUAL.
2. TREES WITHIN 20 FEET WIDE CONSTRUCTION CORRIDOR TO BE RETAINED AND PROTECTED, UNLESS OTHERWISE SHOWN FOR REMOVAL.

CONSTRUCTION NOTES:

(1) CONTRACTOR TO MAKE EVERY EFFORT TO MINIMIZE TREE REMOVAL DURING TRENCHING OPERATION. PIPE ALIGNMENT MAY BE ADJUSTED WITH APPROVAL OF ENGINEER.





COLEMAN ENGINEERING
COLEMAN ENGINEERING
1223 PLEASANT GROVE BLVD
SUITE 100
ROSEVILLE, CA 95678
(916) 791-1188


CITY OF FORT BRAGG CALIFORNIA

BAR IS ONE INCH AT FULL SCALE
0 1"
IF NOT ONE INCH ON THIS SHEET SCALE ACCORDINGLY

| NO. | REVISIONS | BY | APP | DATE |
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**RAW WATER LINE REPLACEMENT PROJECT**

# RAW WATER PIPELINE PLAN – SEGMENT 5
## STATION 137+00 – 142+50

**CITY OF FORT BRAGG** **CALIFORNIA**

DESIGNED UNDER THE DIRECTION OF:
Chad R. Coleman 10/6/23
CHAD R. COLEMAN DATE
R.C.E. No. 56490 - REGISTRATION EXPIRES 06-30-25

| | | |
|---|---|---|
| DESIGN: | WCJ | DATE: 10/6/23 |
| DRAWN: | WCJ | DATE: 10/6/23 |
| CHECKED: | CRC | DATE: 10/6/23 |

REGISTERED PROFESSIONAL ENGINEER CHAD R. COLEMAN C56490 CIVIL STATE OF CALIFORNIA
10/6/23

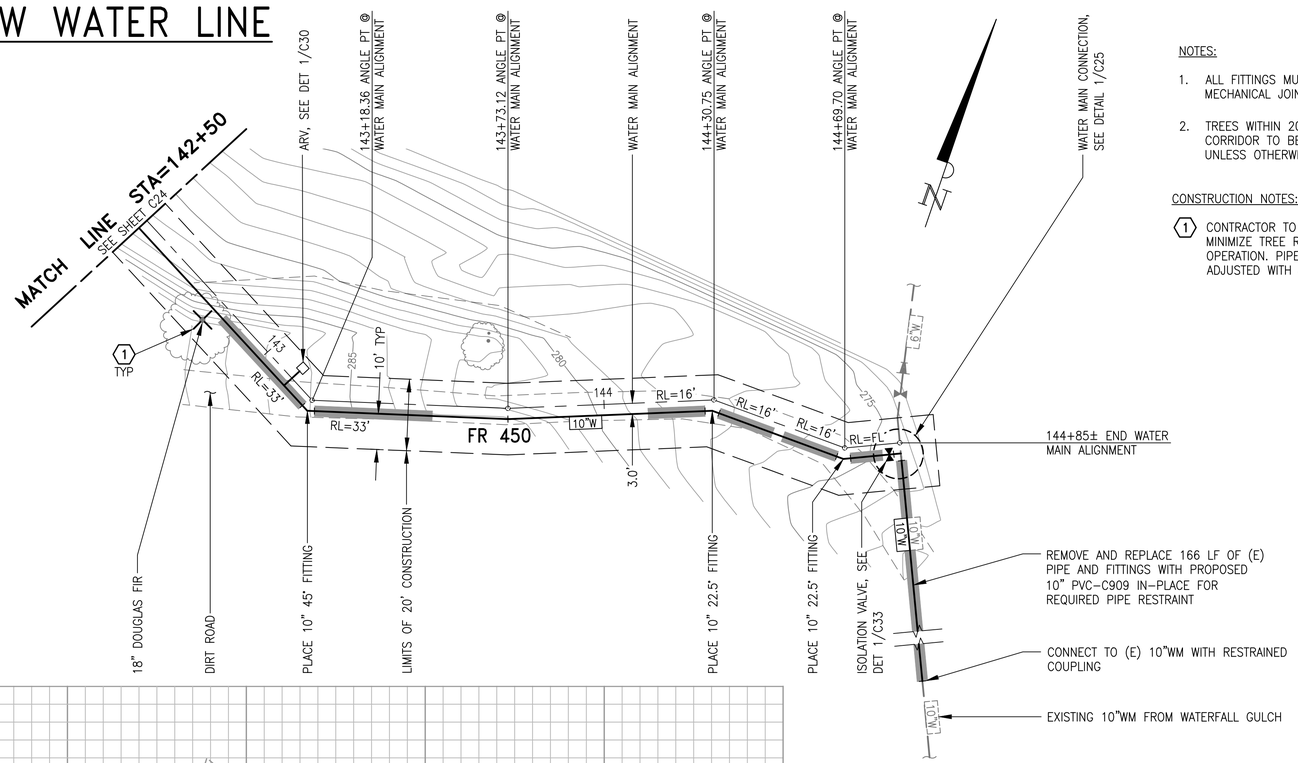
SCALE
HORZ: 1"=20'
VERT: 1"=2'

DRAWING NUMBER
C24

SHEET NUMBER
27 OF 68 SHEETS

10/6/23 S:_PROJECTS\FTBG18-001 - RAW WATER LINE REPLACMENT PROJECT\CADD\SEGMENTS 2-5 FULL SET\C24 - RAW WATER PIPELINE PLAN & PROFILE 21.DWG

# RAW WATER LINE

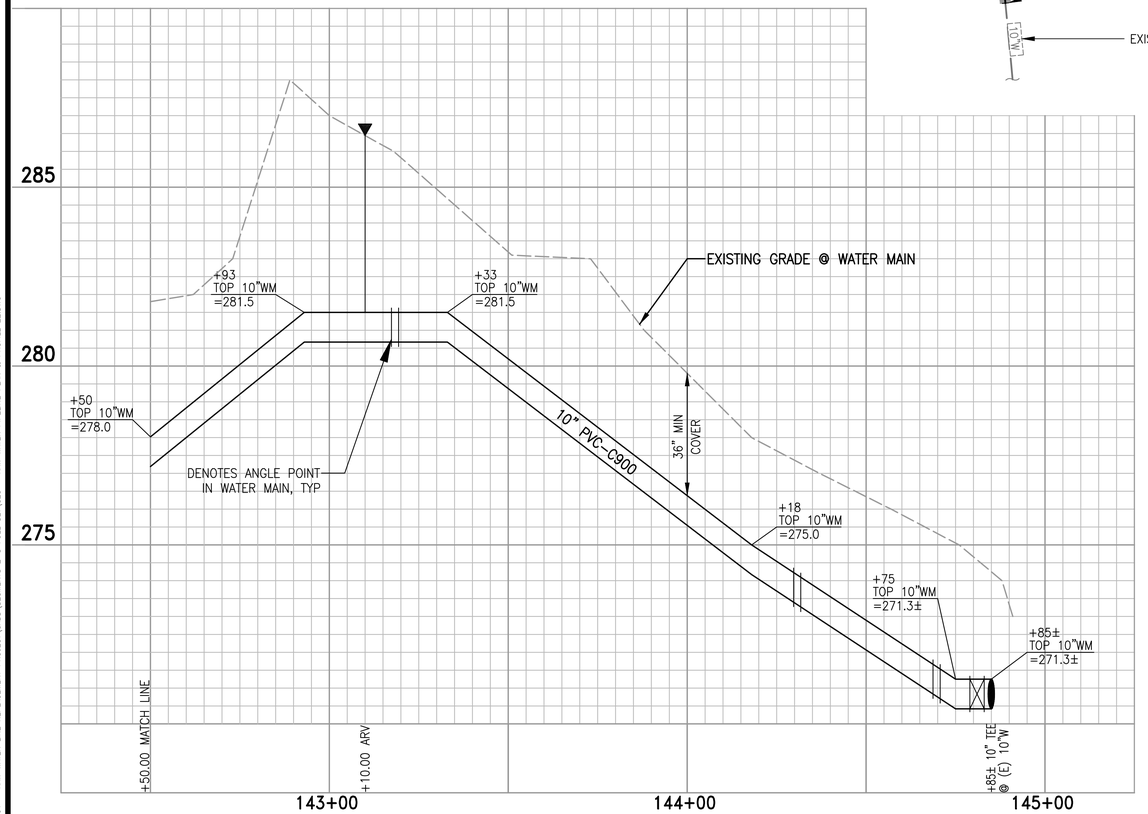


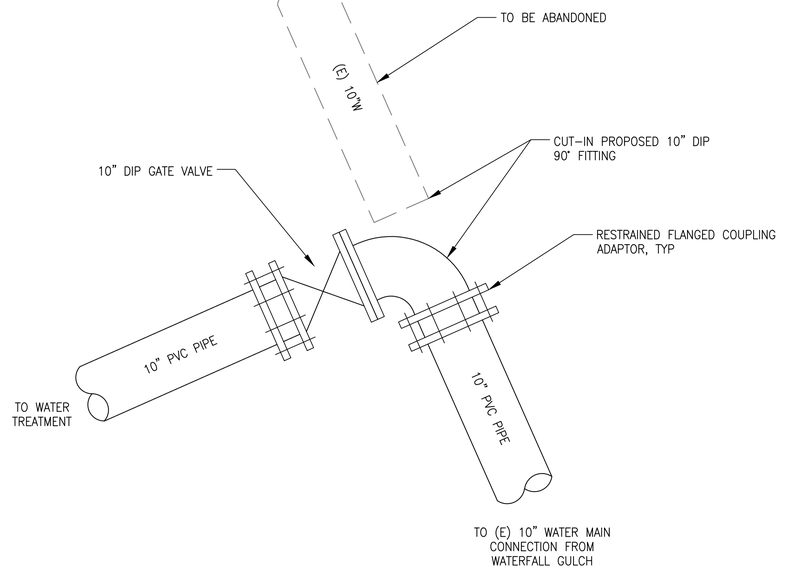

NOTES:

1. ALL FITTINGS MUST BE RESTRAINED MECHANICAL JOINTS, OR APPROVED EQUAL.
2. TREES WITHIN 20 FEET WIDE CONSTRUCTION CORRIDOR TO BE RETAINED AND PROTECTED, UNLESS OTHERWISE SHOWN FOR REMOVAL.

CONSTRUCTION NOTES:

1 CONTRACTOR TO MAKE EVERY EFFORT TO MINIMIZE TREE REMOVAL DURING TRENCHING OPERATION. PIPE ALIGNMENT MAY BE ADJUSTED WITH APPROVAL OF ENGINEER.




1 WATER CONNECTION DETAIL 1
NO SCALE

10/3/23 S:_PROJECTS\TBC18-001 - RAW WATER LINE REPLACEMENT PROJECT\CADD\SEGMENTS 2-5 FULL SET\C25 - RAW WATER PIPELINE PLAN & PROFILE 22.DWG


COLEMAN ENGINEERING

COLEMAN ENGINEERING
1223 PLEASANT GROVE BLVD
SUITE 100
ROSEVILLE, CA 95678
(916) 791-1188


BAR IS ONE INCH AT FULL SCALE
0 — 1"
IF NOT ONE INCH ON THIS SHEET SCALE ACCORDINGLY

| NO. | REVISIONS | BY | APP | DATE |
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**RAW WATER LINE REPLACEMENT PROJECT**

# RAW WATER PIPELINE PLAN – SEGMENT 5
## STATION 142+50 – 144+85

**CITY OF FORT BRAGG** **CALIFORNIA**

DESIGNED UNDER THE DIRECTION OF:
Chad R. Coleman 10/6/23
CHAD R. COLEMAN DATE
R.C.E. No. 56490 - REGISTRATION EXPIRES 06-30-25

| | | |
|---|---|---|
| DESIGN: | WCJ | DATE: 10/6/23 |
| DRAWN: | WCJ | DATE: 10/6/23 |
| CHECKED: | CRC | DATE: 10/6/23 |

REGISTERED PROFESSIONAL ENGINEER CHAD R. COLEMAN C56490 CIVIL STATE OF CALIFORNIA 10/6/23

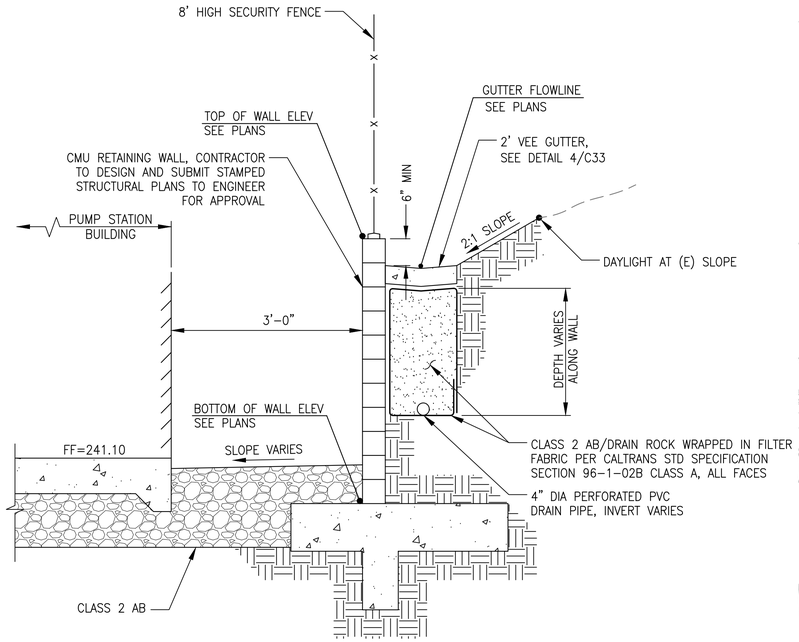
SCALE
HORZ: 1"=20'
VERT: 1"=2'

DRAWING NUMBER
C25

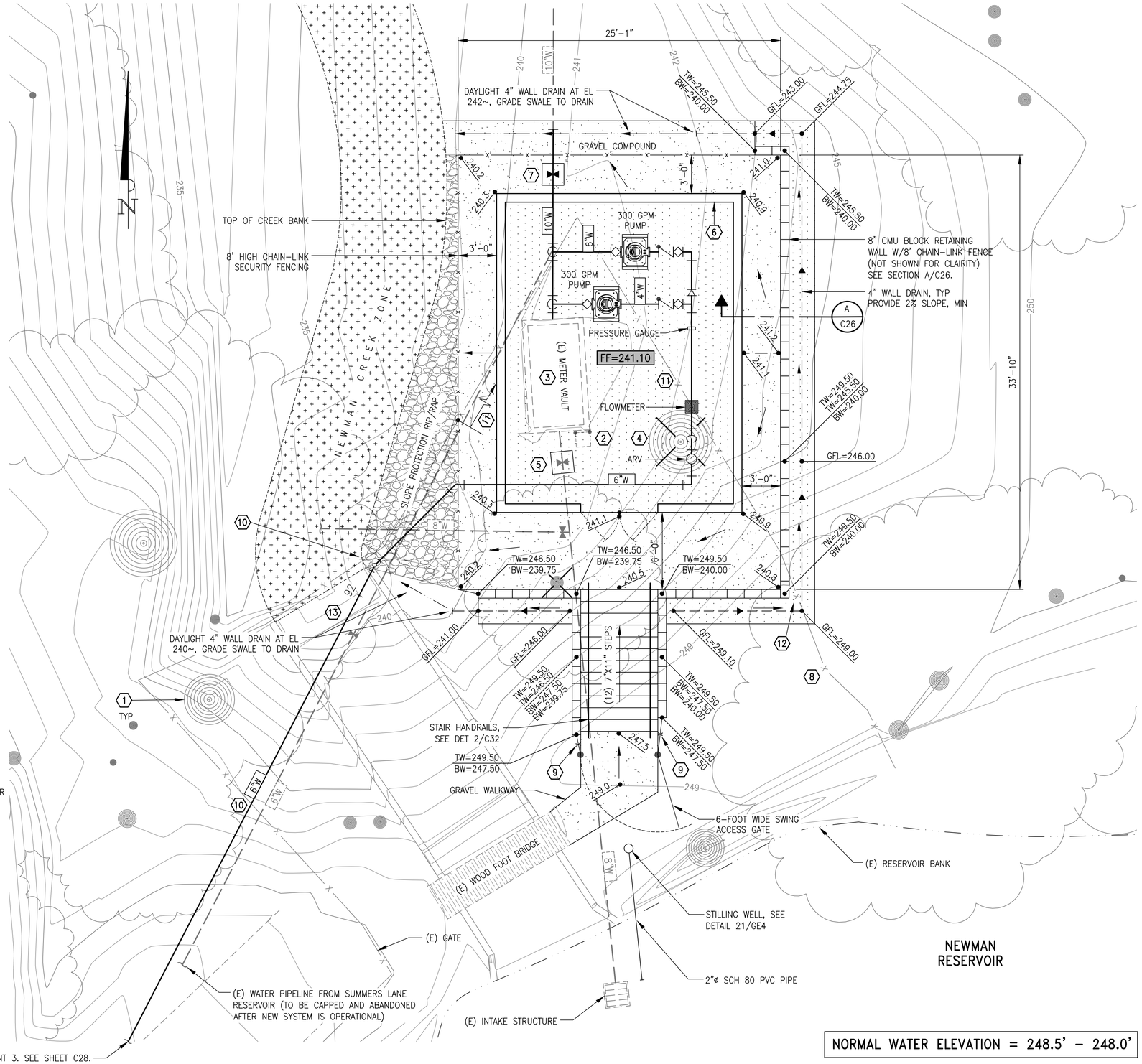
SHEET NUMBER
28 OF 68 SHEETS

## CONSTRUCTION NOTES:

1. CONTRACTOR TO MAKE EVERY EFFORT TO MINIMIZE TREE REMOVAL DURING TRENCHING OPERATION. PIPE ALIGNMENT MAY BE ADJUSTED WITH APPROVAL OF ENGINEER.
2. EXISTING ELECTRICAL BOX TO BE REMOVED. DISCONNECT AND REMOVE ANY EXISTING WIRES OR CONDUITS.
3. CONTRACTOR TO MATCH EXISTING VAULT TOP (VARIES 241.10 TO 241.15) LOCALLY TO NEW FINISHED FLOOR ELEVATION OF 241.10. SEE A/C26.
4. EXISTING 60" TRUNK TO BE REMOVED.
5. PROVIDE ACCESS TO EXISTING VALVE WITH SURFACE BOX. SET VALVE BOX RIM FLUSH WITH FINISHED FLOOR AT ELEV 241.10.
6. TIMBER-FRAME BUILDING ON CONCRETE PAD FOUNDATION. FOR DETAILS SEE DRAWING C27, AND STRUCTURAL AND ARCHITECTURAL PLANS.
7. NEW IN-LINE VALVE WITH SURFACE BOX TO MAINTAIN PUMP STATION INLET SUBMERGENCE (NORMALLY CLOSED). COULD POTENTIALLY BE USED TO DIVERT FLOWS INTO EXISTING PIPELINE. SEE DET 1/C33.
8. RECONSTRUCT EXISTING GATE AS REQUIRED.
9. CONSTRUCT 8' HIGH SECURITY FENCE FROM FENCE POSTS TO RETAINING WALL.
10. REMOVE AND RECONSTRUCT EXISTING CHAIN LINK FENCE AS NECESSARY DURING PIPE CONSTRUCTION OPERATIONS.
11. REMOVE EXISTING CHAIN LINK FENCE AS NECESSARY.
12. TIE-IN TO (E) GATE TO PROPOSED SECURITY FENCE.
13. CONTRACTOR TO SUBMIT ENGINEERED DESIGN FOR DETAILS ON AERIAL SPILLWAY CROSSING FOR APPROVAL.




A — GRADING SECTION
NO SCALE




NORMAL WATER ELEVATION = 248.5' - 248.0'


COLEMAN ENGINEERING
COLEMAN ENGINEERING
1223 PLEASANT GROVE BLVD
SUITE 100
ROSEVILLE, CA 95678
(916) 791-1188


CITY OF FORT BRAGG CALIFORNIA

BAR IS ONE INCH AT FULL SCALE
0 — 1"
IF NOT ONE INCH ON THIS SHEET SCALE ACCORDINGLY

| NO. | REVISIONS | BY | APP | DATE |
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**RAW WATER LINE REPLACEMENT PROJECT**

# NEWMAN PUMP STATION
## SITE LAYOUT

**CITY OF FORT BRAGG** **CALIFORNIA**

DESIGNED UNDER THE DIRECTION OF:
Chad R. Coleman 10/6/23
CHAD R. COLEMAN DATE
R.C.E. No. 56490 - REGISTRATION EXPIRES 06-30-25

| | |
|---|---|
| DESIGN: ABY | DATE: 10/6/23 |
| DRAWN: WCJ | DATE: 10/6/23 |
| CHECKED: CRC | DATE: 10/6/23 |

REGISTERED PROFESSIONAL ENGINEER CHAD R. COLEMAN C56490 CIVIL STATE OF CALIFORNIA 10/6/23

SCALE 1"=4'
DRAWING NUMBER C26
SHEET NUMBER 29 OF 68 SHEETS

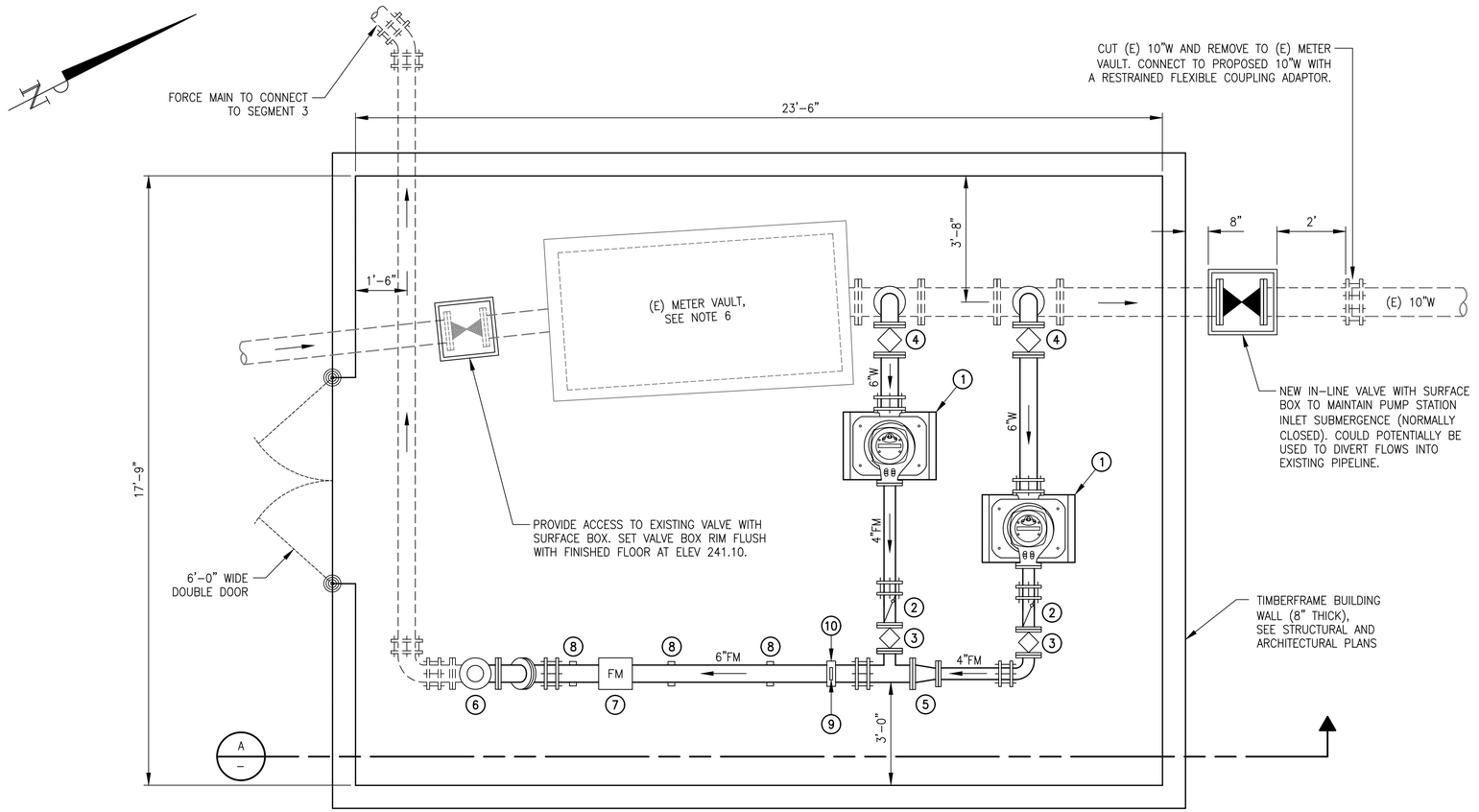
10/3/23 S:_PROJECTS\FTB\18-001 - RAW WATER LINE REPLACEMENT PROJECT\CAD\SEGMENTS 2-5 FULL SET\C26 - NEWMAN PUMP STATION.DWG

NOTES:

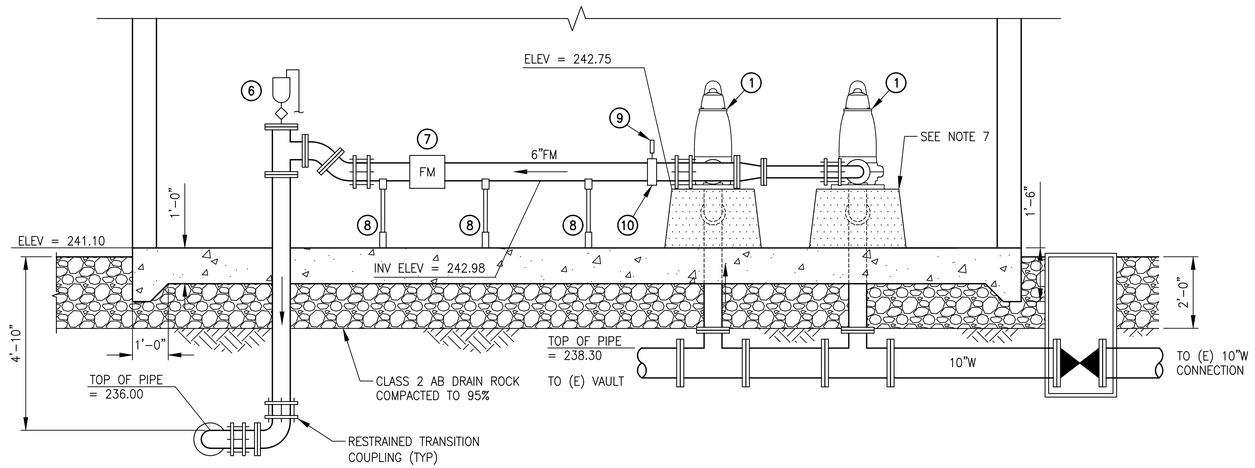
1. ALL EQUIPMENT DETAILED IN THE EQUIPMENT LIST IS THE BASIS OF DESIGN AND HAS BEEN APPROVED BY THE ENGINEER.
2. ANY MODIFICATIONS TO LISTED EQUIPMENT MUST BE APPROVED BY THE ENGINEER.
3. CONTRACTOR TO PROVIDE NECESSARY PIPE SUPPORTS, HARNESSES, STRAPS, ETC. AS REQUIRED TO SECURE PIPING AND EQUIPMENT, PER CODE, STRUCTURAL, VALVE/APPURTENANCES AND MANUFACTURE REQUIREMENTS.
4. CONTRACTOR TO COORDINATE WITH PUMP MANUFACTURER FOR BASE MOUNTING DETAILS AND ELECTRICAL CABLE RETAINING MECHANISM.
5. ALL ABOVEGROUND PIPING SHALL BE RESTRAINED DUCTILE IRON PIPE.
6. CONTRACTOR SHALL OPEN AND EXPOSE EXISTING UTILITY VAULT CONTENTS, AND SUBMIT A PROPOSED PIPING/FITTING CONFIGURATION TO ENGINEER DETAILING CONNECTION OF EXISTING 8" WATER MAIN TO PROPOSED 10" WATER MAIN.
7. CONCRETE PUMP PEDESTAL MAY BE EXCHANGED FOR THE FLYGT ADJUSTABLE STAND UNIT PER MANUFACTURER.

## EQUIPMENT LIST

| ITEM | NAME | MANUFACTURER | MODEL NO. | DESCRIPTION | QTY |
|---|---|---|---|---|---|
| 1 | VERTICAL SOLIDS HANDLING PUMP | FLYGT | NT 3153 HT 3~463 | 300 GPM @ 100 FT TDH | 2 |
| 2 | 4" CHECK VALVE | – | – | SEE SPECIFICATIONS | 2 |
| 3 | 4" PLUG VALVE | – | – | SEE SPECIFICATIONS | 2 |
| 4 | 6" PLUG VALVE | – | – | SEE SPECIFICATIONS | 2 |
| 5 | 6" X 4" CONCENTRIC REDUCER | – | – | SEE SPECIFICATIONS | 1 |
| 6 | 2" AIR/VACUUM VALVE | VAL–MATIC | 302ADISVLPX | THREADED, NPT CONNECTION | 1 |
| 7 | 6" FLOW METER | SIEMENS | SITRANS MAG 5100W | – | 1 |
| 8 | PIPE SUPPORTS | EATON | B3088T & B3092 OR B3094 | SEE DETAIL 2/C31 | 3 |
| 9 | PRESSURE GAUGE | ASHCROFT | 8008S | ORDER NO. 638008S4G02LP0L60# OR APPROVED EQUAL | 1 |
| 10 | SERVICE SADDLE | ROMAC | 202NS | PER CITY OF FORT BRAGG STANDARDS | 1 |




1 – FOUNDATION SLAB PLAN
SCALE: 1"=2'




A – SECTION
SCALE: 1"=2'

COLEMAN ENGINEERING
COLEMAN ENGINEERING
1223 PLEASANT GROVE BLVD
SUITE 100
ROSEVILLE, CA 95678
(916) 791–1188

BAR IS ONE INCH AT FULL SCALE
0 1"
IF NOT ONE INCH ON THIS SHEET SCALE ACCORDINGLY

| NO. | REVISIONS | BY | APP | DATE |
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**RAW WATER LINE REPLACEMENT PROJECT**

# NEWMAN PUMP STATION
## PLAN, SECTION, AND DETAILS

**CITY OF FORT BRAGG** **CALIFORNIA**

DESIGNED UNDER THE DIRECTION OF:
Chad R. Coleman 10/6/23
CHAD R. COLEMAN DATE
R.C.E. No. 56490 - REGISTRATION EXPIRES 06-30-25

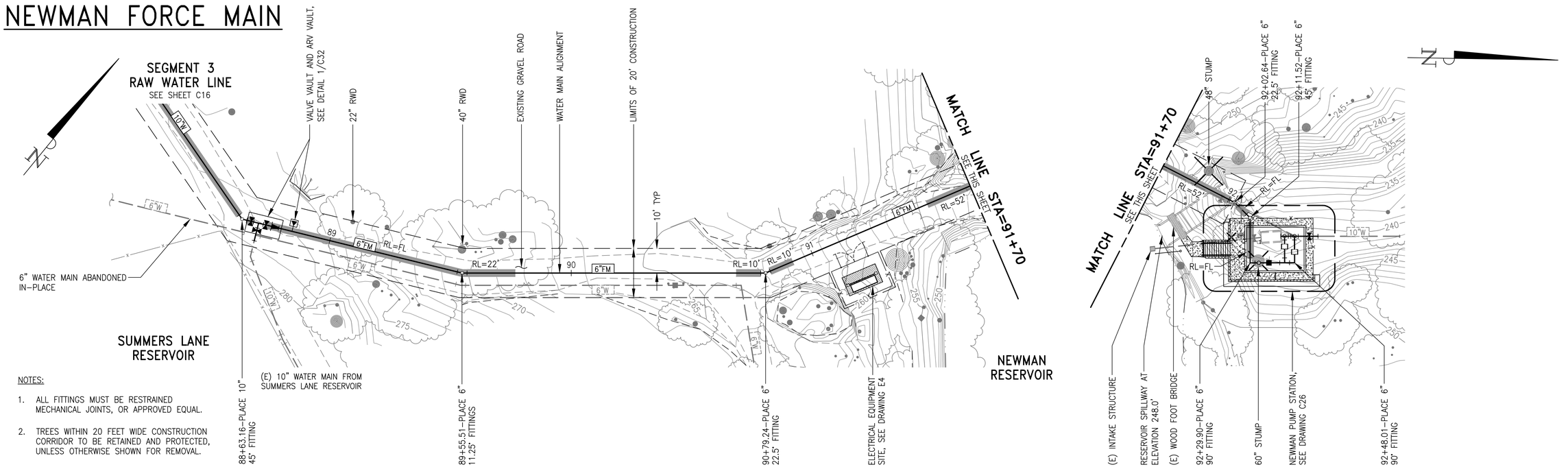
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| DESIGN: ABY | DATE: 10/6/23 |
| DRAWN: WCJ | DATE: 10/6/23 |
| CHECKED: CRC | DATE: 10/6/23 |

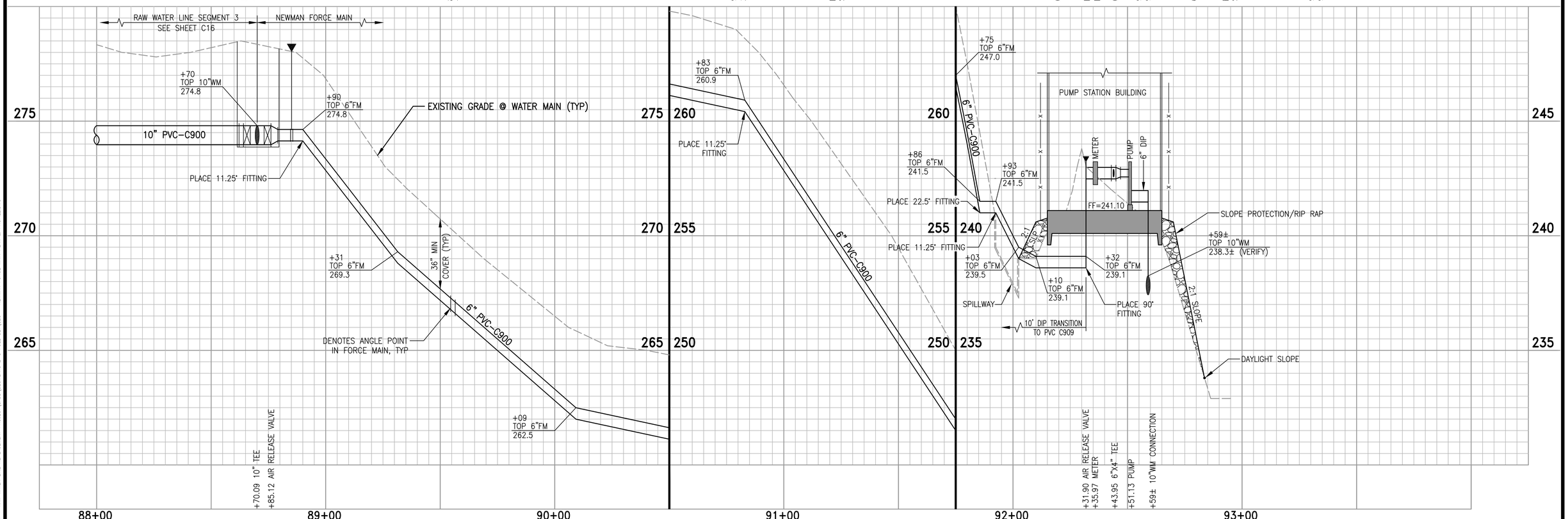
REGISTERED PROFESSIONAL ENGINEER CHAD R. COLEMAN No. C56490 CIVIL STATE OF CALIFORNIA
10/6/23

SCALE AS SHOWN
DRAWING NUMBER C27
SHEET NUMBER 30 OF 68 SHEETS

10/9/23 S:_PROJECTS\FTBC18-001 – RAW WATER LINE REPLACEMENT PROJECT\CADD\SEGMENTS 2–5 FULL SET\C27 – PUMP STATION DETAILS.DWG

# NEWMAN FORCE MAIN





COLEMAN ENGINEERING
COLEMAN ENGINEERING
1223 PLEASANT GROVE BLVD
SUITE 100
ROSEVILLE, CA 95678
(916) 791-1188


BAR IS ONE INCH AT FULL SCALE
0 1"
IF NOT ONE INCH ON THIS SHEET SCALE ACCORDINGLY

| NO. | REVISIONS | BY | APP | DATE |
|---|---|---|---|---|
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**RAW WATER LINE REPLACEMENT PROJECT**

## NEWMAN PUMP STATION FORCE MAIN
STATION 88+70 – 92+59

**CITY OF FORT BRAGG** **CALIFORNIA**

DESIGNED UNDER THE DIRECTION OF:
Chad R. Coleman 10/6/23
CHAD R. COLEMAN DATE
R.C.E. No. 56490 - REGISTRATION EXPIRES 06-30-25

| | | |
|---|---|---|
| DESIGN: | WCJ | DATE: 10/6/23 |
| DRAWN: | WCJ | DATE: 10/6/23 |
| CHECKED: | CRC | DATE: 10/6/23 |

REGISTERED PROFESSIONAL ENGINEER CHAD R. COLEMAN No. C66490 CIVIL STATE OF CALIFORNIA 10/6/23

SCALE
HORZ: 1"=20'
VERT: 1"=2'

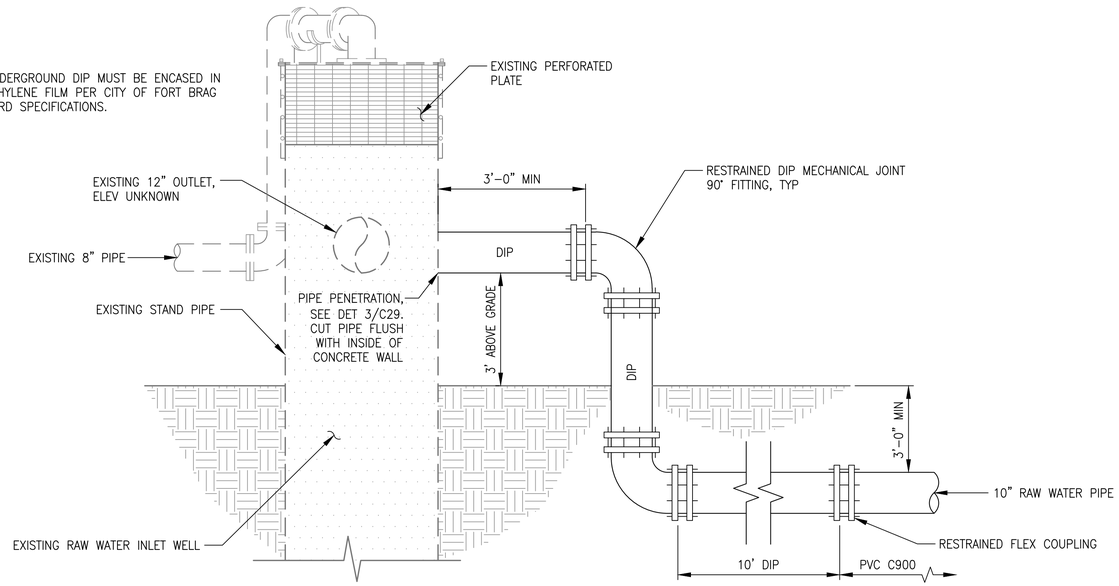
DRAWING NUMBER
C28

SHEET NUMBER
31 OF 68 SHEETS

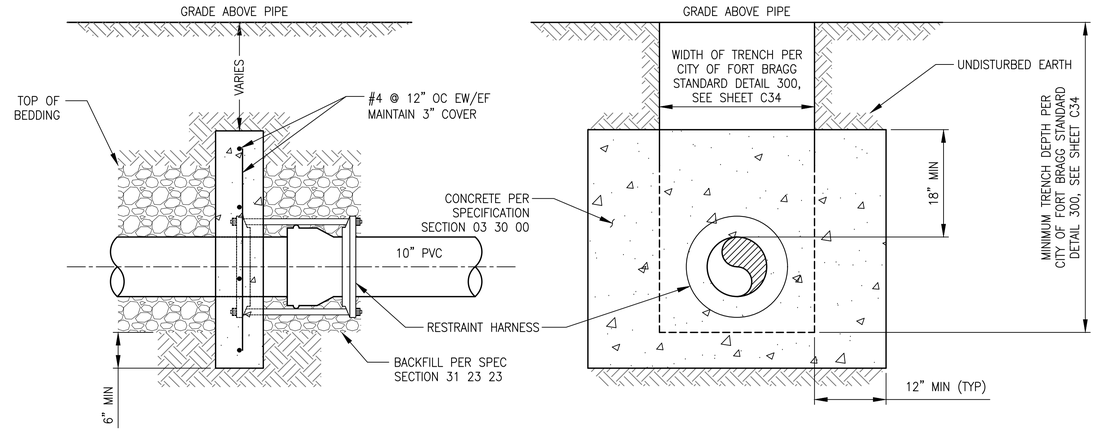
10/3/23 S:_PROJECTS\FTBG18-001 - RAW WATER LINE REPLACEMENT PROJECT\CADD\SEGMENTS 2-5 FULL SET\C28 - NEWMAN FORCE MAIN PLAN & PROFILE.DWG

NOTES:

1. ALL UNDERGROUND DIP MUST BE ENCASED IN POLYETHYLENE FILM PER CITY OF FORT BRAG STANDARD SPECIFICATIONS.




1 — **RAW WATER CONNECTION POINT**
NO SCALE

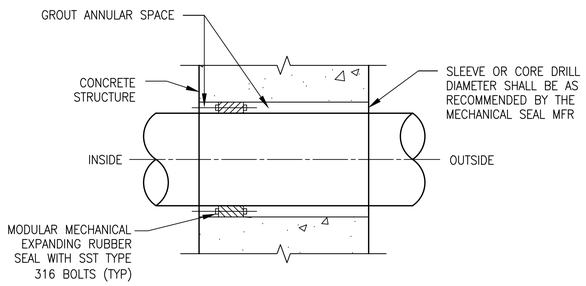



**PLAN** **SECTION**

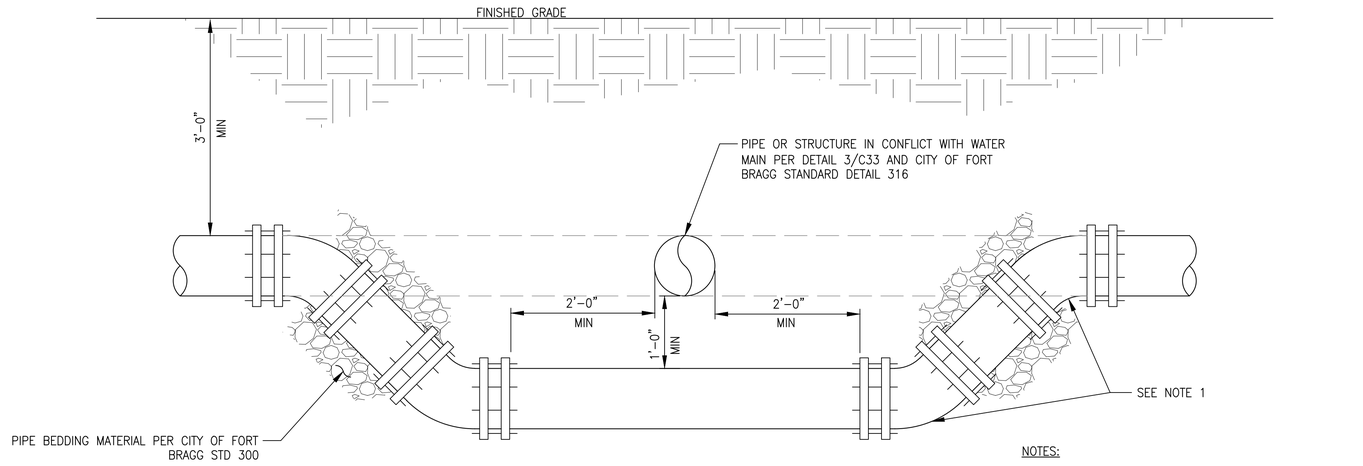
NOTES:

1. TRENCH DAMS SHALL BE LOCATED AS SHOWN ON THE PLANS OR AS DIRECTED BY THE ENGINEER.
2. TRENCH DAMS SHALL BE KEYED INTO UNDISTURBED SOIL 12" MIN. BEYOND TRENCH WALLS & 6" MIN. BELOW TRENCH BOTTOM. GEOTECHNICAL ENGINEER TO INSPECT DEPTHS OF ENTRENCHMENT INTO TRENCH WALLS AND BOTTOM PRIOR TO PLACEMENT OF CONCRETE.

2 — **CONCRETE TRENCH DAM**
NO SCALE




3 — **PIPE PENETRATION DETAIL**
NO SCALE




NOTES:

1. ALL BENDS SHALL BE RESTRAINED MECHANICAL JOINT 45° OR 22.5° FITTINGS.
2. ALL PIPE AND FITTINGS SHALL BE DUCTILE IRON AND SHALL BE WRAPPED IN POLYETHYLENE PER CITY STANDARD CONSTRUCTION SPECIFICATIONS

4 — **WATER MAIN INSTALLATION UNDER A PIPE OR STRUCTURE**
NO SCALE


COLEMAN ENGINEERING
COLEMAN ENGINEERING
1223 PLEASANT GROVE BLVD
SUITE 100
ROSEVILLE, CA 95678
(916) 791-1188


CITY OF FORT BRAGG CALIFORNIA

BAR IS ONE INCH AT FULL SCALE
0 — 1"
IF NOT ONE INCH ON THIS SHEET SCALE ACCORDINGLY

| NO. | REVISIONS | BY | APP | DATE |
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**RAW WATER LINE REPLACEMENT PROJECT**

# CIVIL DETAILS – 1

**CITY OF FORT BRAGG** **CALIFORNIA**

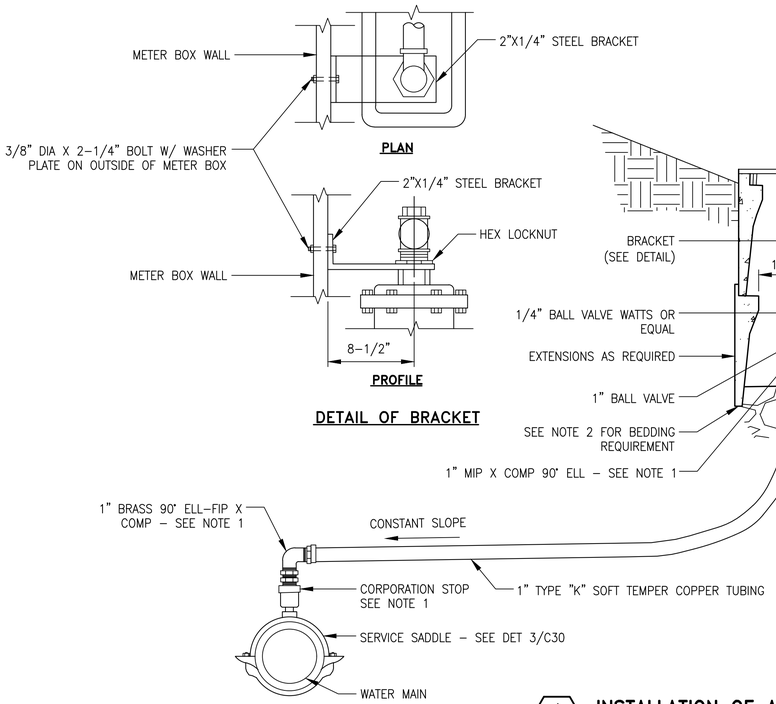
DESIGNED UNDER THE DIRECTION OF:
Chad R. Coleman 10/6/23
CHAD R. COLEMAN DATE
R.C.E. No. 56490 - REGISTRATION EXPIRES 06-30-25

| | | |
|---|---|---|
| DESIGN: | WCJ | DATE: 10/6/23 |
| DRAWN: | WCJ | DATE: 10/6/23 |
| CHECKED: | CRC | DATE: 10/6/23 |

REGISTERED PROFESSIONAL ENGINEER CHAD R. COLEMAN C86490 CIVIL STATE OF CALIFORNIA 10/6/23

SCALE AS SHOWN
DRAWING NUMBER C29
SHEET NUMBER 32 OF 68 SHEETS

10/9/23 S:_PROJECTS\TBR18-001 - RAW WATER LINE REPLACEMENT PROJECT\CADD\SEGMENTS 2-5 FULL SET\C29 - CIVIL DETAILS-1.DWG



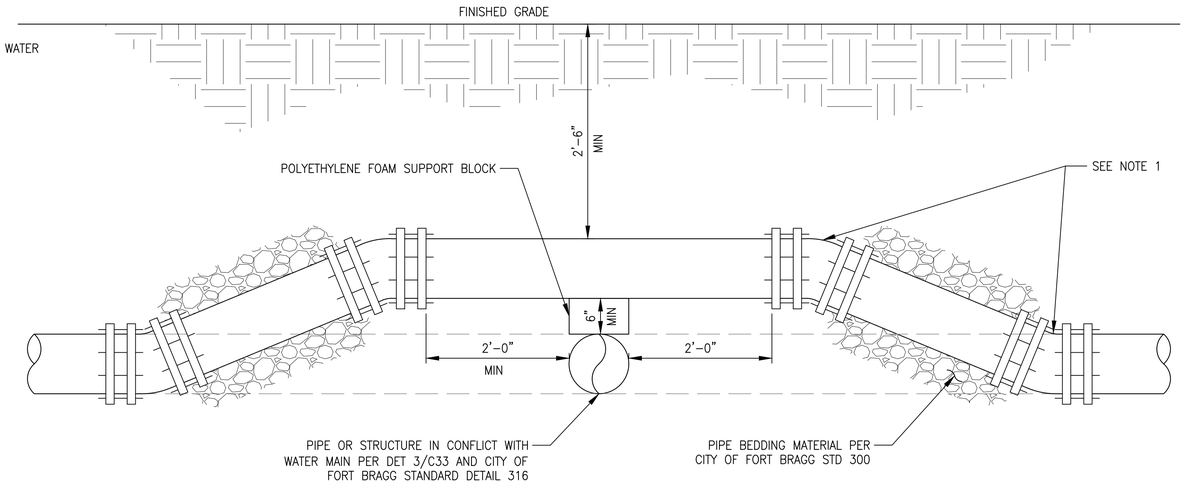

NOTES:

1. COMPONENTS MUST BE ON CITY OF FORT BRAGG ENGINEER'S APPROVED LIST PER STANDARD NO. 525 AND STANDARD NO. 503.
2. BEDDING MATERIAL TO BE COMPACTED TO MINIMUM 90% RELATIVE COMPACTION.

## 1 – INSTALLATION OF ARV & AVRV
NO SCALE

NOTES:

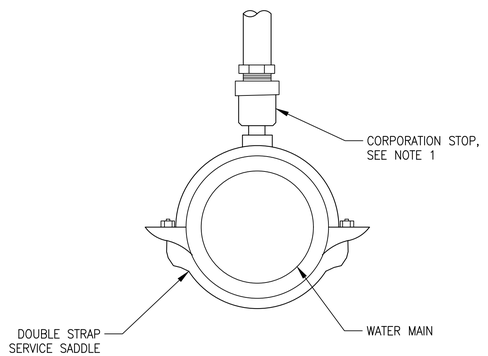
1. ALL BENDS SHALL BE RESTRAINED MECHANICAL JOINT 45° OR 22.5° FITTINGS.
2. ALL PIPE AND FITTINGS SHALL BE DUCTILE IRON AND SHALL BE WRAPPED IN POLYETHYLENE PER CITY STANDARD CONSTRUCTION SPECIFICATIONS



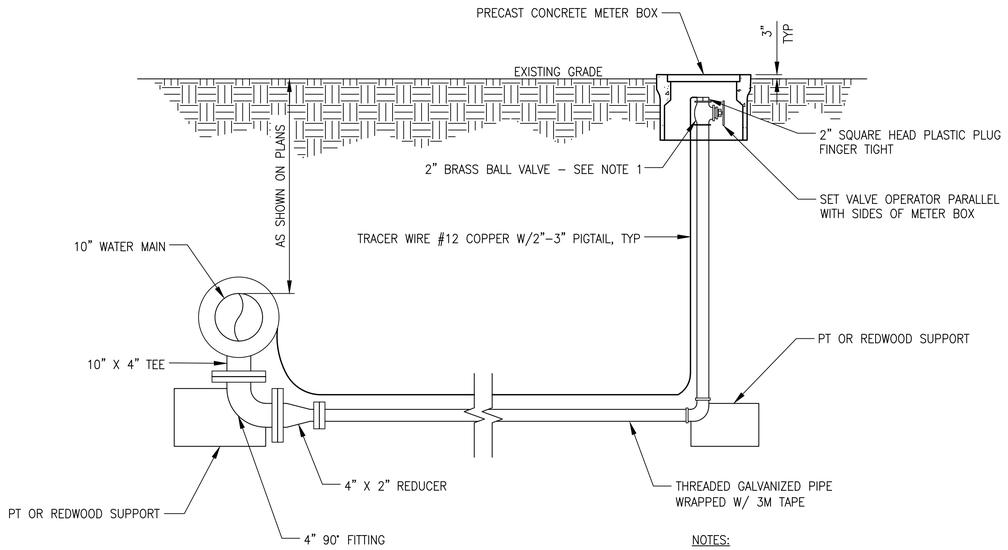

## 2 – WATER MAIN INSTALLATION OVER A PIPE OR STRUCTURE
NO SCALE

NOTES:

1. SEE ENGINEER'S APPROVED LIST FOR TAPPING SERVICE SADDLES PER STANDARD NO. 503.



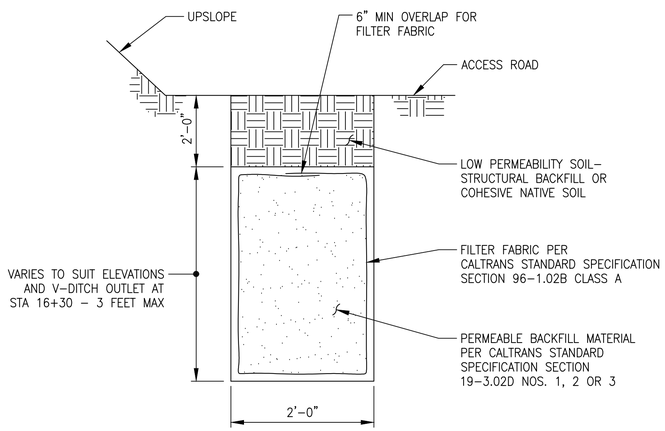

## 3 – SERVICE SADDLE DETAIL
NO SCALE




NOTES:

1. COMPONENTS MUST BE ON CITY OF FORT BRAGG ENGINEER'S APPROVED LIST PER STANDARD NO. 516.

## 4 – BLOWOFF VALVE DETAIL
NO SCALE




## 5 – TRENCHED UNDERDRAIN – SEGMENT 2
STA 14+48 TO STA 16+00

COLEMAN ENGINEERING
COLEMAN ENGINEERING
1223 PLEASANT GROVE BLVD
SUITE 100
ROSEVILLE, CA 95678
(916) 791-1188

BAR IS ONE INCH AT FULL SCALE
0 — 1"
IF NOT ONE INCH ON THIS SHEET SCALE ACCORDINGLY

| NO. | REVISIONS | BY | APP | DATE |
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**RAW WATER LINE REPLACEMENT PROJECT**

# CIVIL DETAILS - 2

**CITY OF FORT BRAGG** **CALIFORNIA**

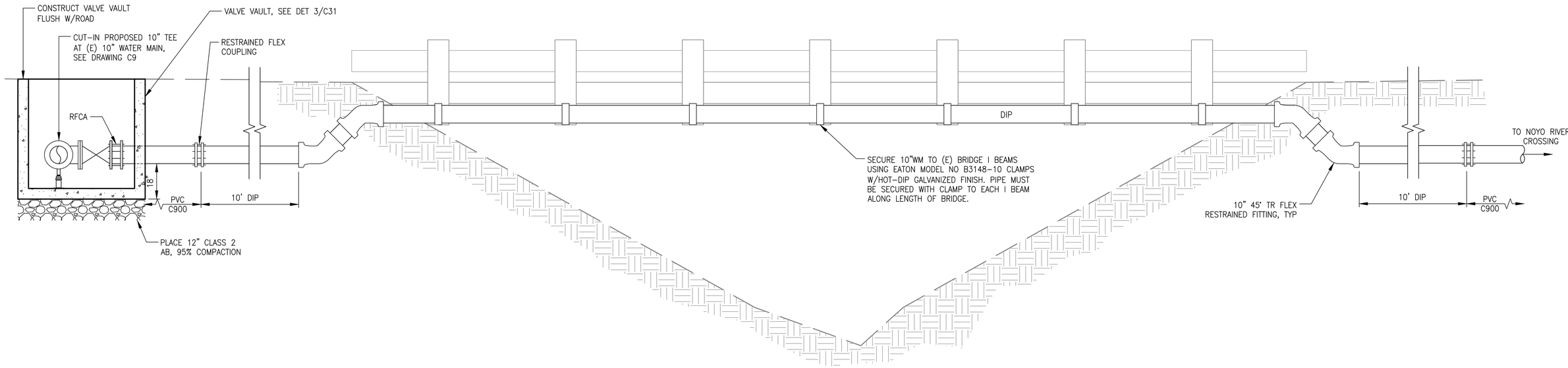
DESIGNED UNDER THE DIRECTION OF:
Chad R. Coleman 10/6/23
CHAD R. COLEMAN DATE
R.C.E. No. 56490 - REGISTRATION EXPIRES 06-30-25

| | | |
|---|---|---|
| DESIGN: | WCJ | DATE: 10/6/23 |
| DRAWN: | WCJ | DATE: 10/6/23 |
| CHECKED: | CRC | DATE: 10/6/23 |

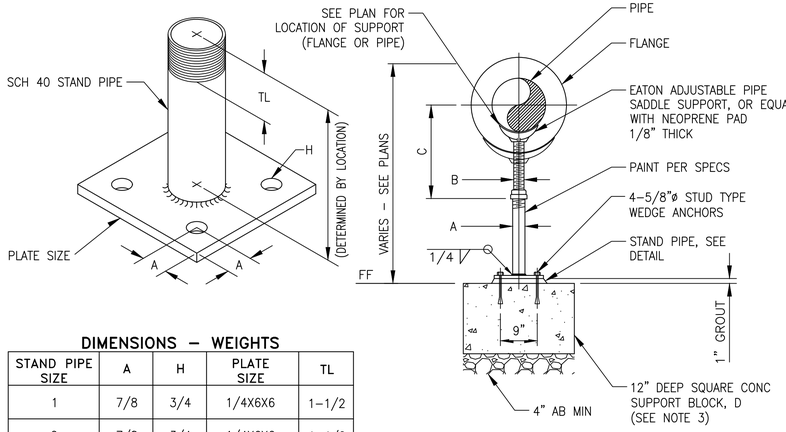
REGISTERED PROFESSIONAL ENGINEER CHAD R. COLEMAN No. C66490 CIVIL STATE OF CALIFORNIA
10/6/23

SCALE AS SHOWN
DRAWING NUMBER C30
SHEET NUMBER 33 OF 68 SHEETS

10/6/23 S:_PROJECTS\TTBG18-001 - RAW WATER LINE REPLACEMENT PROJECT\CAD\SEGMENTS 2-5 FULL SET\C30 - CIVIL DETAILS-2.DWG




1 — **GEORGIA PACIFIC HAUL ROAD BRIDGE DETAIL**
NO SCALE




**DIMENSIONS - WEIGHTS**

| STAND PIPE SIZE | A | H | PLATE SIZE | TL |
|---|---|---|---|---|
| 1 | 7/8 | 3/4 | 1/4X6X6 | 1-1/2 |
| 2 | 7/8 | 3/4 | 1/4X6X6 | 1-1/2 |
| 3 | 1-1/2 | 13/16 | 3/8X12X12 | 1-1/2 |
| 4 | 1-1/2 | 15/16 | 1/2X12X12 | 2 |

**EATON B3088T THREADED STAND PIPE**
N.T.S.

NOTES:

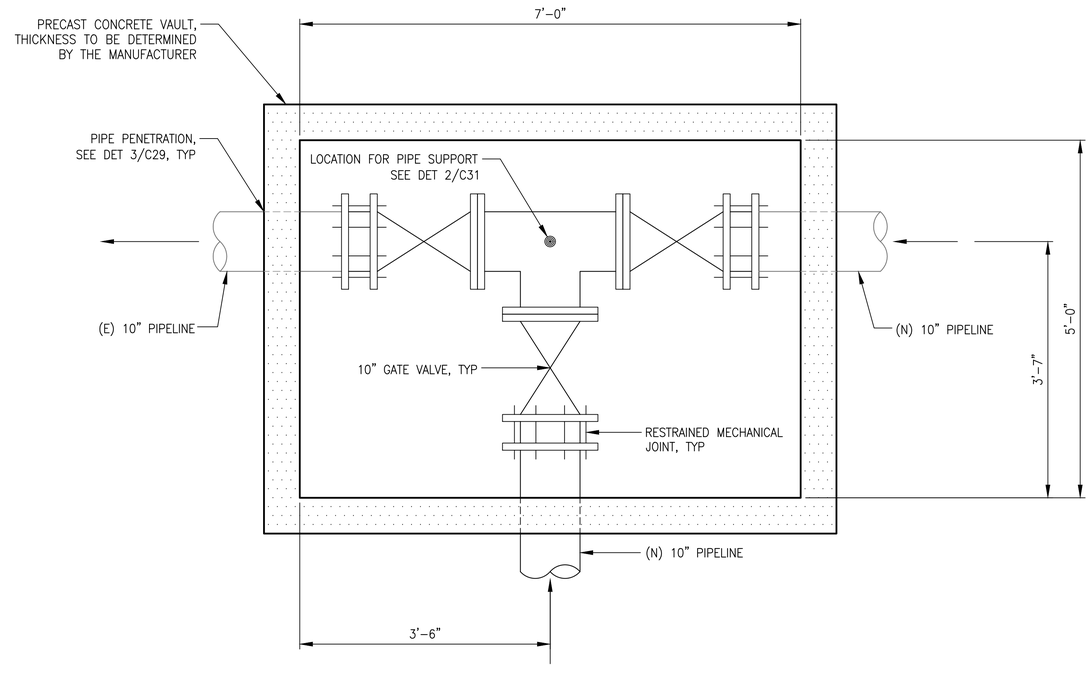
1. ALL SUPPORT COMPONENTS TO BE GALVANIZED.
2. ALL BOLTS TO BE STAINLESS STEEL (TYPE 316).
3. PROVIDE CONCRETE SUPPORT BLOCK WHERE STRUCTURAL CONCRETE IS NOT LOCATED BELOW SUPPORT LOCATION.

**DIMENSIONS - WEIGHTS**

| PIPE SIZE | A STAND PIPE SIZE | B ADJ. PIPE SIZE | C MIN. | C MAX. | D CONCRETE SIZE |
|---|---|---|---|---|---|
| 4 | 3 | 2-1/2 | 7-13/16 | 12-5/16 | 14 X 14 |
| 6 | 3 | 2-1/2 | 9-1/16 | 13-9/16 | 16 X 16 |
| 8 | 3 | 2-1/2 | 10-1/2 | 15 | 20 X 20 |
| 10 | 3 | 2-1/2 | 11-9/16 | 16-1/16 | 24 X 24 |
| 12 | 3 | 2-1/2 | 12-9/16 | 17-1/16 | 24 X 24 |
| 14 | 4 | 3 | 14-5/16 | 18-13/16 | 28 X 28 |
| 16 | 4 | 3 | 15-5/16 | 19-13/16 | 32 X 32 |

**EATON B3092 ADJUSTABLE PIPE SADDLE OR B3094 FLANGE SUPPORT**
N.T.S.

2 — **PIPE SUPPORT DETAIL**
NO SCALE




3 — **TIE-IN AT HAUL ROAD DETAIL**
NO SCALE

COLEMAN ENGINEERING
COLEMAN ENGINEERING
1223 PLEASANT GROVE BLVD
SUITE 100
ROSEVILLE, CA 95678
(916) 791-1188

CITY OF FORT BRAGG CALIFORNIA

BAR IS ONE INCH AT FULL SCALE
0 — 1"
IF NOT ONE INCH ON THIS SHEET SCALE ACCORDINGLY

| NO. | REVISIONS | BY | APP | DATE |
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**RAW WATER LINE REPLACEMENT PROJECT**

# CIVIL DETAILS - 3

**CITY OF FORT BRAGG** **CALIFORNIA**

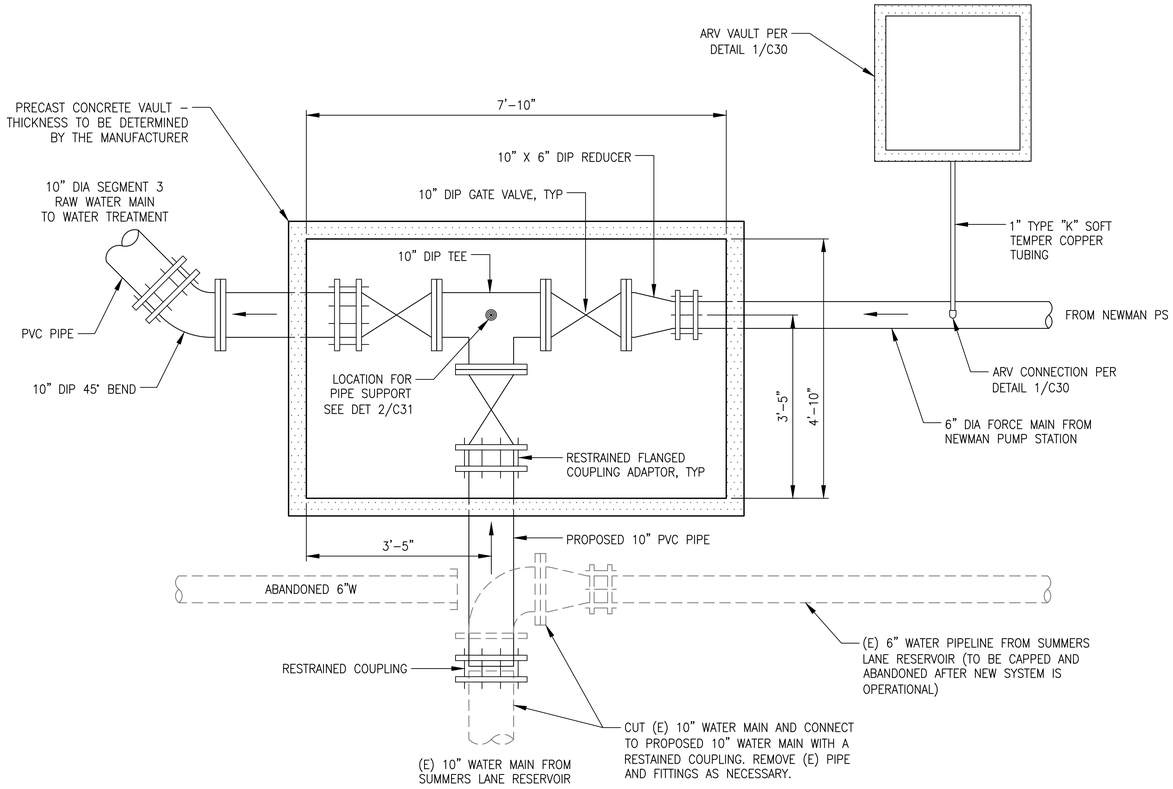
DESIGNED UNDER THE DIRECTION OF:
Chad R. Coleman 10/6/23
CHAD R. COLEMAN DATE
R.C.E. No. 56490 - REGISTRATION EXPIRES 06-30-25

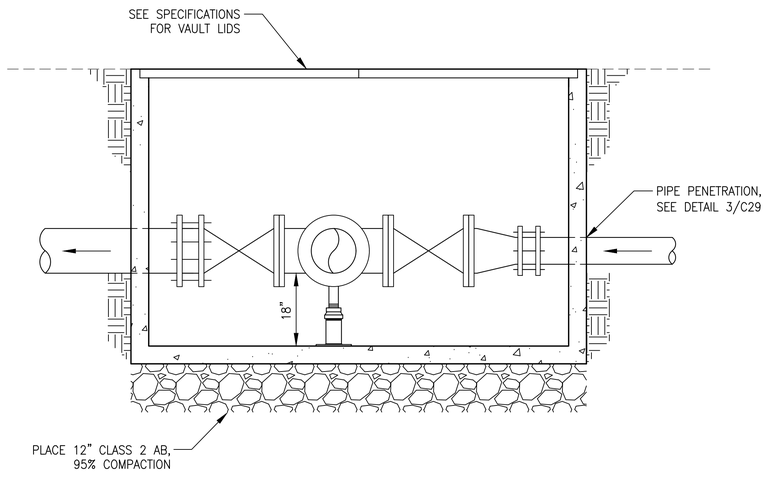
| | | |
|---|---|---|
| DESIGN: | WCJ | DATE: 10/6/23 |
| DRAWN: | WCJ | DATE: 10/6/23 |
| CHECKED: | CRC | DATE: 10/6/23 |

REGISTERED PROFESSIONAL ENGINEER CHAD R. COLEMAN No. C68490 CIVIL STATE OF CALIFORNIA 10/6/23

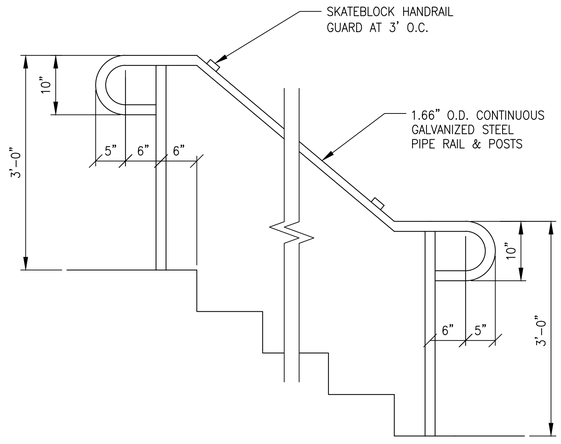
SCALE AS SHOWN
DRAWING NUMBER C31
SHEET NUMBER 34 OF 68 SHEETS

10/3/23 - S:_PROJECTS\FTBG18-001 - RAW WATER LINE REPLACEMENT PROJECT\CADD\SEGMENTS 2-5 FULL SET\C31 - CIVIL DETAILS - 3.DWG

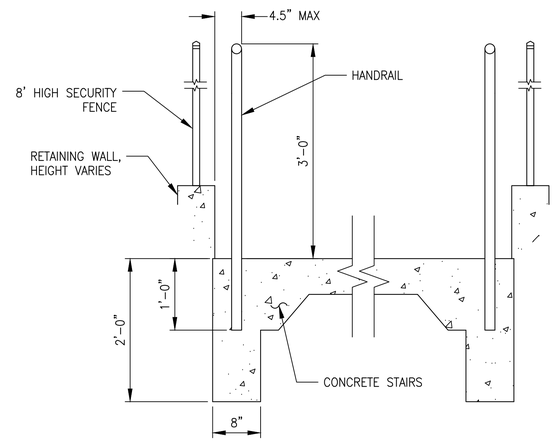



1 – **SUMMERS LANE RESERVOIR VALVE VAULT AND ARV VAULT DETAIL**
NO SCALE




PLAN
NO SCALE




SECTION
NO SCALE

2 – **HANDRAIL DETAILS**
NO SCALE

10/3/23 S:_PROJECTS\TBD18-001 - RAW WATER LINE REPLACEMENT PROJECT\CADD\SEGMENTS 2-5 FULL SET\C32 - CIVIL DETAILS - 4.DWG

COLEMAN ENGINEERING

COLEMAN ENGINEERING
1223 PLEASANT GROVE BLVD
SUITE 100
ROSEVILLE, CA 95678
(916) 791-1188

CITY OF FORT BRAGG CALIFORNIA

BAR IS ONE INCH AT FULL SCALE
0 1"
IF NOT ONE INCH ON THIS SHEET SCALE ACCORDINGLY

| NO. | REVISIONS | BY | APP | DATE |
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**RAW WATER LINE REPLACEMENT PROJECT**

# CIVIL DETAILS – 4

**CITY OF FORT BRAGG** **CALIFORNIA**

DESIGNED UNDER THE DIRECTION OF:
Chad R. Coleman 10/6/23
CHAD R. COLEMAN DATE
R.C.E. No. 56490 - REGISTRATION EXPIRES 06-30-25

| | |
|---|---|
| DESIGN: WCJ | DATE: 10/6/23 |
| DRAWN: WCJ | DATE: 10/6/23 |
| CHECKED: CRC | DATE: 10/6/23 |

REGISTERED PROFESSIONAL ENGINEER CHAD R. COLEMAN C86490 CIVIL STATE OF CALIFORNIA 10/6/23

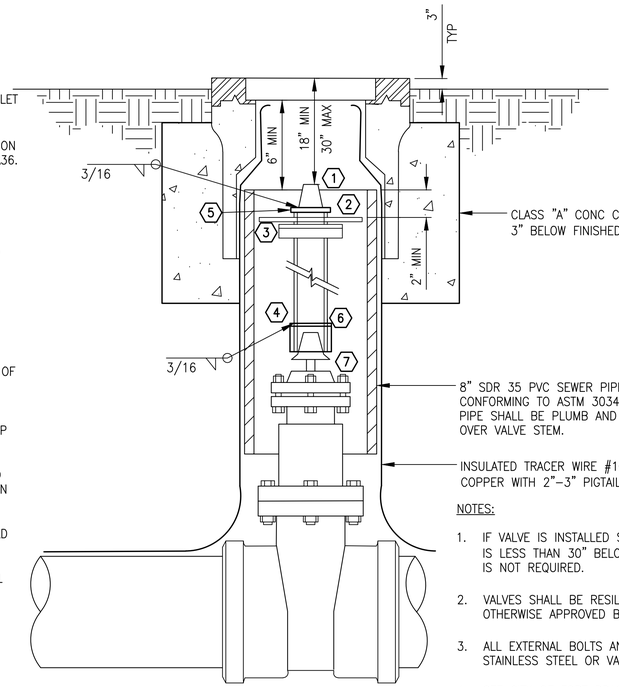
SCALE AS SHOWN
DRAWING NUMBER C32
SHEET NUMBER 35 OF 68 SHEETS

STEM EXTENSION FABRICATION NOTES:

1. ALL WELDS TO RISER SHAFT SHALL BE FILLET WELD ALL AROUND.
2. ALL STEEL REQUIRED FOR RISER FABRICATION SHALL BE STRUCTURAL STEEL PER ASTM A36.

VALVE STEM PARTS LIST:

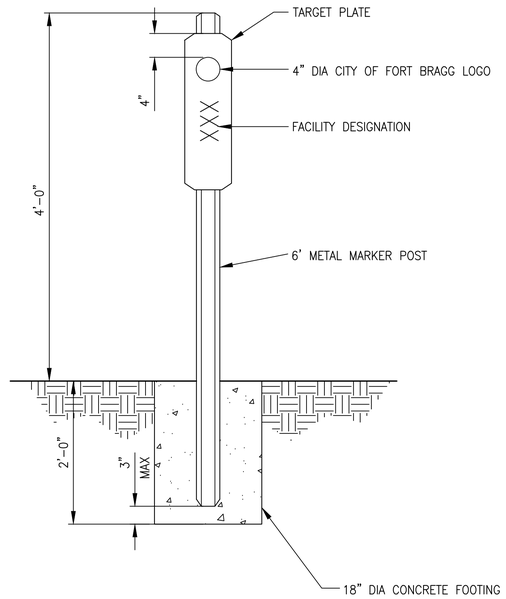
1. VALVE OPERATING NUT OR 1 7/8" X 1 7/8" X 2" HIGH, SOLID STEEL WELDED TO TOP PLATE.
2. 3/16" THK. X 7" DIA. FREE SPINNING GUIDE PLATE WITH 3 5/8" DIA. HOLE IN CENTER.
3. TWO 3/16" X 1 1/2" X 1 1/2" X 5" LONG STEEL ANGLE WELD TO TWO SIDES OF RISER SHAFT.
4. 2 1/2" X 3/16" SQUARE STEEL TUBING, LENGTH AS REQUIRED. EDGE WELD TO TOP PLATE.
5. 3" X 3" X 1/4" STEEL TOP PLATE. WELD TO RISER SHAFT AFTER GUIDE PLATE IS IN PLACE.
6. 2" X 2" X 1/4" STEEL BASE PLATE. WELD EDGE TO STEEL TUBING.
7. 2" X 2" X 3/16" SQ. STRUCTURAL STEEL TUBING 3" LONG TO FIT OPERATING NUT.




NOTES:

1. IF VALVE IS INSTALLED SO THAT THE TOP OF THE OPERATING NUT IS LESS THAN 30" BELOW FINISHED GRADE, THE VALVE STEM RISER IS NOT REQUIRED.
2. VALVES SHALL BE RESILIENT WEDGE GATE VALVES UNLESS OTHERWISE APPROVED BY THE CITY.
3. ALL EXTERNAL BOLTS AND NUTS ON VALVES SHALL BE 304 STAINLESS STEEL OR VALVE ASSEMBLY SHALL BE POLY WRAPPED.
4. SEE CITY OF FORT BRAGG STD 500 FOR GENERAL CONSTRUCTION NOTES.
5. VALVE EXTENSIONS MUST BE INSTALLED PRIOR TO FINAL INSPECTION.

## 1 – GATE VALVE AND VALVE BOX WITH RISER DETAIL
NO SCALE



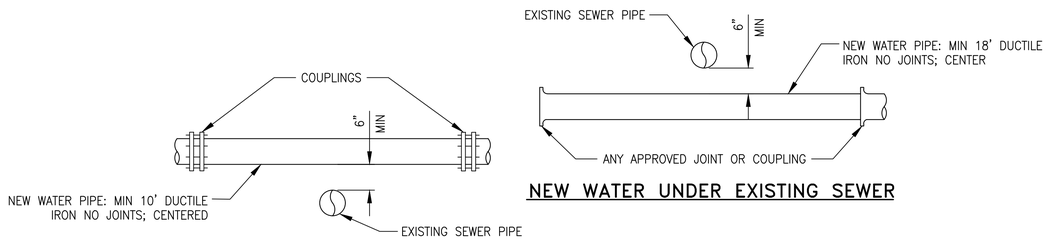

NOTES:

1. GUIDE MARKERS SHALL BE FURNISHED AND INSTALLED WITHIN 3–FEET OF ALL BOV & ARVS.
2. POSTS SHALL BE TYPE 'M' AND SHALL CONFORM TO CALTRANS SECTION 82.
3. ALL NUMBERS AND LETTERS SHALL BE BLOCK STYLE AND STENCILED IN BLACK ON A WHITE BACKGROUND.

FACILITY DESIGNATION

| | |
|---|---|
| BLOW OFF VALVE | BOV |
| AIR RELEASE VALVE | ARV |

## 2 – GUIDE MARKER DETAIL
NO SCALE

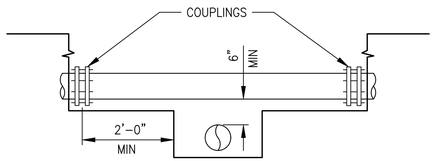



## NEW WATER UNDER EXISTING SEWER

## NEW WATER OVER EXISTING SEWER

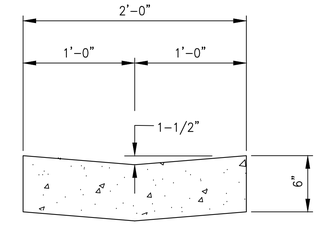
NOTES:

1. THIS STANDARD APPLIES TO PIPES UP TO AND INCLUDING 16" DIAMETER. ALL CROSSINGS OF LARGER DIAMETER SHALL BE AS APPROVED BY THE CITY ENGINEER.
2. ALL NEW DUCTILE IRON SHALL BE WRAPPED INN POLYETHYLENE PER CITY CONSTRUCTION SPECIFICATIONS.
3. WHERE SEWER CROSSES BELOW A WATER MAIN, WITH 1' OR MORE VERTICAL CLEARANCE, NO SPECIAL INSTALLATION IS REQUIRED.
4. NEW PIPE UNDER EXISTING SHALL BE USED WHEN THE EXISTING PIPE HAS A JOINT OVER OR WITHIN 2' OF THE NEW TRENCH.
5. ANY PIPE–PIPE CROSSING WITH LESS THAN 6" VERTICAL CLEARANCE SHALL NOT BE INSTALLED WITHOUT APPROVAL OF THE DIRECTOR OF PUBLIC WORKS.
6. FOR WATER MAIN LOWERING DETAIL, SEE DET 4/C29.




## NEW PIPE UNDER EXISTING

## 3 – PIPE – PIPE CROSSING DETAILS
NO SCALE




## 4 – VEE GUTTER DETAIL
NO SCALE

10/9/23 - S:_PROJECTS\TBD18-001 - RAW WATER LINE REPLACEMENT PROJECT\CADD\SEGMENTS 2-5 FULL SET\C33 - CIVIL DETAILS - 5.DWG

COLEMAN ENGINEERING
COLEMAN ENGINEERING
1223 PLEASANT GROVE BLVD
SUITE 100
ROSEVILLE, CA 95678
(916) 791–1188

BAR IS ONE INCH AT FULL SCALE
0 1"
IF NOT ONE INCH ON THIS SHEET SCALE ACCORDINGLY

| NO. | REVISIONS | BY | APP | DATE |
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**RAW WATER LINE REPLACEMENT PROJECT**

# CIVIL DETAILS – 5

**CITY OF FORT BRAGG** **CALIFORNIA**

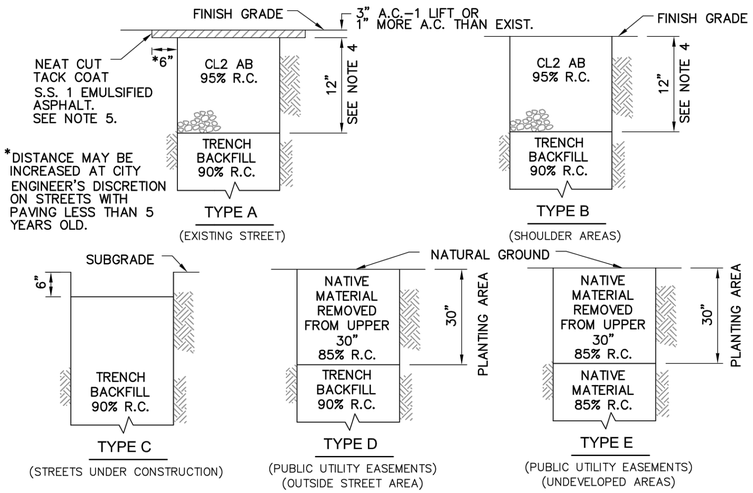
DESIGNED UNDER THE DIRECTION OF:
CHAD R. COLEMAN 10/06/23
CHAD R. COLEMAN DATE
R.C.E. No. 56490 - REGISTRATION EXPIRES 06-30-25

| | | |
|---|---|---|
| DESIGN: | WCJ | DATE: 10/06/23 |
| DRAWN: | WCJ | DATE: 10/06/23 |
| CHECKED: | CRC | DATE: 10/06/23 |

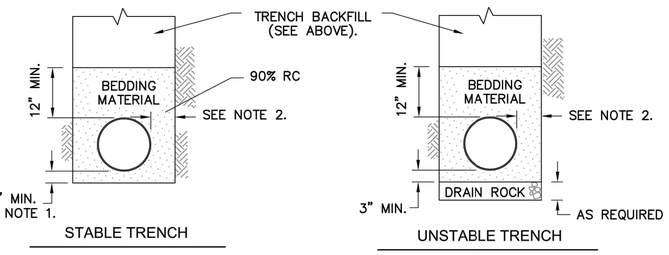
REGISTERED PROFESSIONAL ENGINEER CHAD R. COLEMAN C56490 CIVIL STATE OF CALIFORNIA 10/06/23

SCALE AS SHOWN
DRAWING NUMBER C33
SHEET NUMBER 36 OF 68 SHEETS

## STANDARD TRENCH DETAIL – 1




### TRENCH BACKFILL AND SURFACING




### PIPE BEDDING

NOTES:

1. 1/4 PIPE O.D. OR 4" MIN. WHEN EXCAVATION IS IN ROCKY GROUND.
2. PIPE DIAMETER 18" OR LESS: 6" MIN., 9" MAX. PIPE DIAMETER GREATER THAN 18": 9" MIN., 12" MAX.
3. RELATIVE COMPACTION DESIGNATED R.C.
4. THE STREET STRUCTURAL SECTION SHALL BE A MIN. OF 3" A.C. ON 12" A.B. OR MATCH EXISTING PAVEMENT THICKNESS PLUS 1" A.C., WHICHEVER IS THICKER OR AS SPECIFIED ON PLANS.
5. NEATLY CUT PAVEMENT SIX INCHES FROM EDGE OF TRENCH AFTER TRENCH IS BACKFILLED.

SHEET 1 OF 2

| CITY OF FORT BRAGG CALIFORNIA | STANDARD TRENCH DETAIL | STD. NO. 300 |
|---|---|---|
| SCALE: NONE | DRAWN: LMM / CHK: OAB / APPVD: | DATE: APR 2008 |

Xrefs:
Images:
Path: F:\GMAP–STD\FORT BRAGG\Standards\Std Plans Rev 04–08\FortBragg300–310.dwg
Layout Name: 300 (1of2)
Plot Date: Feb 23, 2009 at 16:49

## STANDARD TRENCH DETAIL – 2

MATERIAL SPECIFICATIONS:

*DRAIN ROCK* SHALL BE EITHER OF THE NOMINAL SIZES DESIGNATED AS 1–1/2" BY 3/4" OR 2–1/2" BY 1–1/2".

*PIPE BEDDING AND TRENCH BACKFILL MATERIAL* SHALL BE A WELL GRADED AGGREGATE (PEA GRAVEL WILL NOT BE ACCEPTED) MATERIAL AND SHALL HAVE A MINIMUM SAND EQUIVALENT VALUE OF 30 AND SHALL CONFORM TO THE FOLLOWING GRADINGS:

| | PERCENT PASSING | | | |
|---|---|---|---|---|
| | 3" | 1" | 3/4" | NO. 4 |
| PIPE BEDDING | | 100 | 95–100 | 55–100 |
| TRENCH BACKFILL | 100 | | | 40–100 |

*AGGREGATE BASE* SHALL BE CLASS 2, 1–1/2" MAX. OR 3/4" MAX CONFORMING TO THE PROVISIONS OF SECTION 26 OF THE STATE STANDARD SPECIFICATIONS.

*NATIVE MATERIAL* SHALL NOT CONTAIN ROCKS LARGER THAN 3".

*COMPACTION REQUIREMENTS:* (AS SHOWN ON SHEET 1 AND IN THE FOLLOWING MODIFICATIONS).

*DRAIN ROCK* SHALL BE CONSOLIDATED WITH A SURFACE VIBRATOR.

*PIPE BEDDING MATERIAL* USED TO GRADE THE TRENCH SHALL BE CONSOLIDATED WITH A SURFACE VIBRATOR WHEN IT IS PLACED OVER DRAIN ROCK OR WHEN DEPTH IS GREATER THAN 12".

*PIPE BEDDING MATERIAL* SHALL EITHER BE HAND TAMPED UNDER AND AT THE SIDES OF THE PIPE IN LIFTS NOT GREATER THAN 6" OR SHAPED AND COMPACTED PRIOR TO PIPE INSTALLATION.

*GENERAL:* THE COMPACTION REQUIREMENTS SHALL BE ACHIEVED UTILIZING METHODS AND EQUIPMENT APPROVED BY THE CITY. ANY METHOD OF COMPACTION WHICH FAILS TO UNIFORMLY ACHIEVE THE REQUIRED LEVELS OF COMPACTION THROUGHOUT THE LENGTH AND DEPTH OF TRENCHES SHALL BE DISCONTINUED. COMPACTION METHODS AND EQUIPMENT SHALL BE SUCH AS NOT TO DAMAGE THE INSTALLED PIPE, EXCEED ITS LOADING CAPACITY, OR DISTURB ITS ALIGNMENT. FLOODING, PONDING, OR THE USE OF DROP HAMMER TYPE COMPACTION EQUIPMENT WILL NOT BE ALLOWED.

*MECHANICAL COMPACTION:* TRENCH BACKFILL SHALL BE PLACED IN UNIFORM, HORIZONTAL LAYERS NOT EXCEEDING EIGHT (8) INCHES IN THICKNESS BEFORE COMPACTION. EACH LAYER SHALL BE COMPACTED, USING MECHANICAL MEANS, TO THE SPECIFIED DENSITY SHOWN ON THE PLANS.

THE CONTRACTOR MAY, AT HIS SOLE OPTION AND AT HIS SOLE EXPENSE, CONSTRUCT A TEST TRENCH SECTION WHICH DEMONSTRATES METHODS, EQUIPMENT, OR MATERIALS WHICH WILL RELIABLY ACHIEVE THE REQUIRED COMPACTION IN LIFTS GREATER THAN 8 INCHES. AT ITS SOLE DISCRETION, THE CITY MAY INCREASE THE MAXIMUM ALLOWABLE LIFT THICKNESS PERMITTED BASED UPON THE RESULTS DEMONSTRATED BY THE TEST TRENCH SECTION. SHOULD SUBSEQUENT TESTING DEMONSTRATE THAT THE REQUIRED COMPACTION IS NOT BEING RELIABLY ACHIEVED, THE CITY MAY, AT ITS SOLE DISCRETION, REDUCE THE MAXIMUM LIFT THICKNESS TO ITS ORIGINAL VALUE OF 8 INCHES.

*JETTING:* JETTING IS NOT ALLOWED.

SHEET 2 OF 2

| CITY OF FORT BRAGG CALIFORNIA | STANDARD TRENCH DETAIL | STD. NO. 300 |
|---|---|---|
| SCALE: NONE | DRAWN: LMM / CHK: OAB / APPVD: | DATE: APR 2008 |

Xrefs:
Images:
Path: F:\GMAP–STD\FORT BRAGG\Standards\Std Plans Rev 04–08\FortBragg300–310.dwg
Layout Name: 300 (2of2)
Plot Date: Feb 23, 2009 at 16:52

10/6/23 S:_PROJECTS\TBC18-001 – RAW WATER LINE REPLACEMENT PROJECT\CADD\SEGMENTS 2–5 FULL SET\C34 – STANDARD DETAILS – 1.DWG

COLEMAN ENGINEERING
COLEMAN ENGINEERING
1223 PLEASANT GROVE BLVD
SUITE 100
ROSEVILLE, CA 95678
(916) 791–1188

BAR IS ONE INCH AT FULL SCALE
0 1"
IF NOT ONE INCH ON THIS SHEET SCALE ACCORDINGLY

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**RAW WATER LINE REPLACEMENT PROJECT**

# STANDARD DETAILS – 1

**CITY OF FORT BRAGG** **CALIFORNIA**

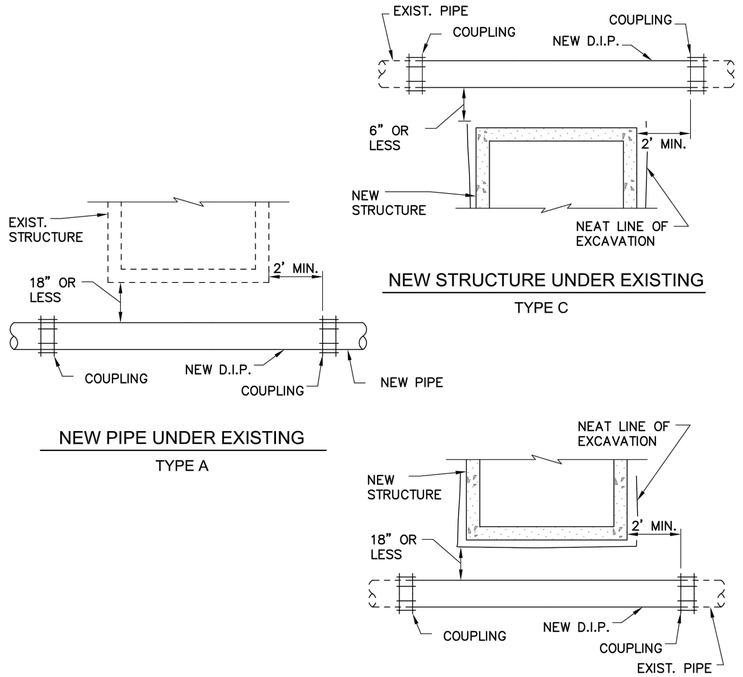
DESIGNED UNDER THE DIRECTION OF:
CHAD R. COLEMAN 10/06/23
CHAD R. COLEMAN DATE
R.C.E. No. 56490 - REGISTRATION EXPIRES 06-30-25

| | | |
|---|---|---|
| DESIGN: | WCJ | DATE: 10/06/23 |
| DRAWN: | WCJ | DATE: 10/06/23 |
| CHECKED: | CRC | DATE: 10/06/23 |

REGISTERED PROFESSIONAL ENGINEER CHAD R. COLEMAN C56490 CIVIL STATE OF CALIFORNIA 10/06/23

SCALE AS SHOWN
DRAWING NUMBER C34
SHEET NUMBER 37 OF 68 SHEETS

## PIPE – STRUCTURE CROSSING DETAILS



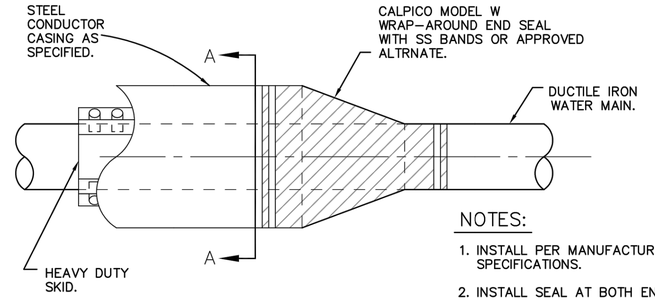

NOTES:

1. THIS STD. APPLIES TO PIPES UP TO AND INCLUDING 16" DIAMETER. ALL CROSSINGS INVOLVING PIPES OF LARGER DIAMETER SHALL BE AS APPROVED BY THE DIRECTOR OF PUBLIC WORKS.
2. WHEN PIPES CROSS WITHIN THE DIMENSIONS SHOWN, A NEW DUCTILE IRON PIPE SECTION SHALL BE INSTALLED AS DETAILED.
3. ALL DUCTILE IRON PIPE SHALL BE ENCASED IN POLYETHYLENE FILM IN TUBE FORM.
4. ANY TYPE "A" INSTALLATION REQUIRING MORE THAN ONE LENGTH OF PIPE SHALL BE ENCASED PER STD. 527.
5. SEE CITY APPROVED LIST FOR APPROVED COUPLINGS.

| PIPE – STRUCTURE CROSSING DETAIL | | | | STD. NO. 316 |
|---|---|---|---|---|
| SCALE: NONE | DRAWN: LMM | CHK: OAB | APPVD: | DATE: APR 2008 |

Xrefs:
Images:
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## DIRT STOP AND WATER MAIN ENCASEMENT DETAIL

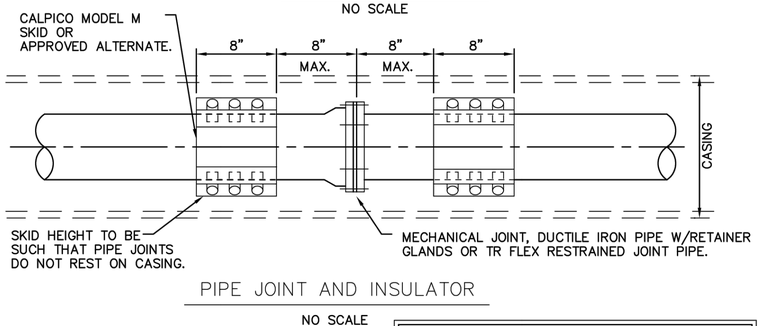



NOTES:

1. INSTALL PER MANUFACTURERS SPECIFICATIONS.
2. INSTALL SEAL AT BOTH ENDS.

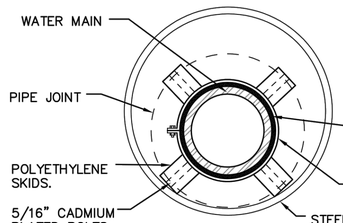
DIRT STOP DETAIL

NO SCALE




PIPE JOINT AND INSULATOR

NO SCALE




SECTION "A–A"

NO SCALE

| MINIMUM SIZE CASING REQUIRED | | | | | | | |
|---|---|---|---|---|---|---|---|
| PIPE SIZE | 6" | 8" | 12" | 14" | 16" | 18" | 20" |
| CASING SIZE (INSIDE DIA.) | 16" | 16" | 20" | 24" | 30" | 36" | 36" |
| CASING WALL THICKNESS | .375 | .375 | .375 | .375 | .500 | .560 | .560 |

NOTES:

1. INSTALL PER MANUFACTURERS SPECIFICATIONS.
2. SEE GENERAL CONST. NOTES.
3. WHERE CONDUCTOR CASING IS EXISTING R.C.P., REDWOOD SKIDS MAY BE INSTALLED IN LIEU OF POLYETHYLENE SKIDS WITH CITY APPROVAL.

NOTES:

1. FOR 10 INCH PIPE SIZE USE 20 INCH CASING (INSIDE DIAMETER) WITH THE CASING WALL THICKNESS OF 0.375.

| DIRT STOP AND WATER MAIN ENCASEMENT | | | | STD. NO. 527 |
|---|---|---|---|---|
| SCALE: NONE | DRAWN: LMM | CHK: OAB | APPVD: | DATE: APR 2008 |

Xrefs:
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10/9/23 S:_PROJECTS\FTB0118-001 - RAW WATER LINE REPLACEMENT PROJECT\CAD\SEGMENTS 2-5 FULL SET\C35 - STANDARD DETAILS - 2.DWG

COLEMAN ENGINEERING
COLEMAN ENGINEERING
1223 PLEASANT GROVE BLVD
SUITE 100
ROSEVILLE, CA 95678
(916) 791-1188

BAR IS ONE INCH AT FULL SCALE
0 1"
IF NOT ONE INCH ON THIS SHEET SCALE ACCORDINGLY

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**RAW WATER LINE REPLACEMENT PROJECT**

# STANDARD DETAILS – 2

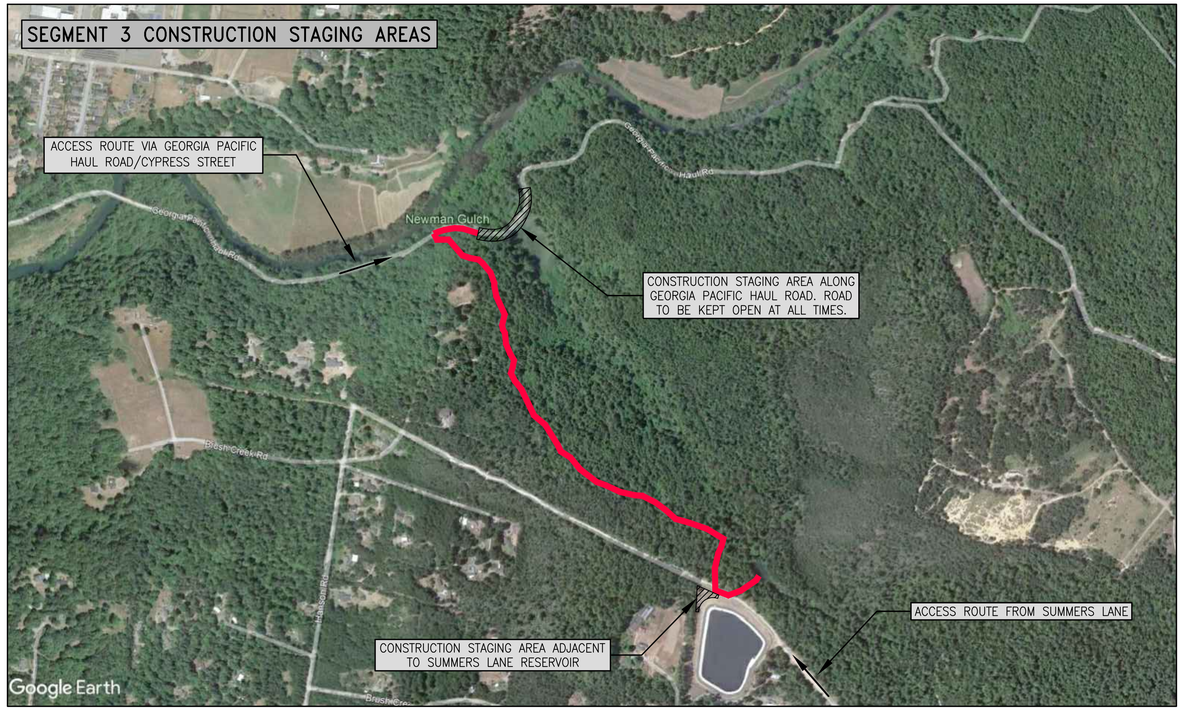
**CITY OF FORT BRAGG** **CALIFORNIA**

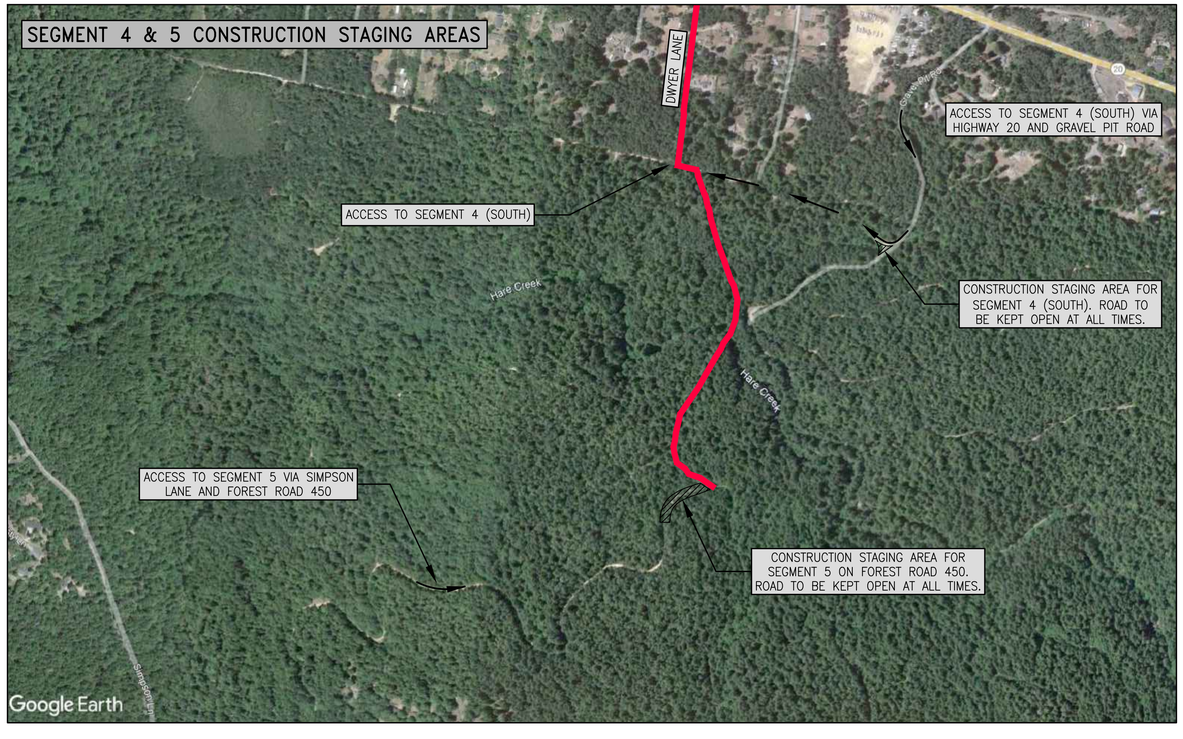
DESIGNED UNDER THE DIRECTION OF:
Chad R. Coleman 10/06/23
CHAD R. COLEMAN DATE
R.C.E. No. 56490 - REGISTRATION EXPIRES 06-30-25

| | | |
|---|---|---|
| DESIGN: | WCJ | DATE: 10/06/23 |
| DRAWN: | WCJ | DATE: 10/06/23 |
| CHECKED: | CRC | DATE: 10/06/23 |

REGISTERED PROFESSIONAL ENGINEER CHAD R. COLEMAN C86490 CIVIL STATE OF CALIFORNIA
10/06/23

SCALE AS SHOWN
DRAWING NUMBER C35
SHEET NUMBER 38 OF 68 SHEETS




## CONSTRUCTION STAGING AREAS AND ACCESS ROUTES BY SEGMENT

SEGMENT 2

1. THE SEGMENT 2 STAGING AREA IS LOCATED AT THE CITY OF FORT BRAGG'S WATER TREATMENT PLANT ON SHERWOOD ROAD. THE EXTENT AND LOCATION WITHIN THE TREATMENT PLANT BOUNDARY IS TO BE AGREED WITH THE CITY. THERE ARE NO OTHER STAGING AREAS ALONG THE SEGMENT 2 ROUTE.
2. ACCESS TO SEGMENT 2 IS FROM SHERWOOD ROAD ONLY. NO ACCESS IS PROVIDED FROM THE SOUTHERN END OF SEGMENT 2.

SEGMENT 3

1. STAGING AREAS ARE LOCATED AT THE NORTHERN END OF SEGMENT 3 ALONG THE GEORGIA PACIFIC HAUL ROAD, AND IMMEDIATELY TO THE NORTH OF THE CITY'S SUMMERS LANE RESERVOIR AT THE SOUTHERN END OF SEGMENT 3, AS SHOWN ON THE PLANS. EXTENT AND LOCATION TO BE AGREED WITH PROPERTY OWNER / CITY.
2. ACCESS TO SEGMENT 3'S NORTHERN SECTION IS VIA THE GEORGIA PACIFIC HAUL ROAD AND ITS ACCESS GATE OFF CYPRESS STREET IN THE CITY. ACCESS TO SEGMENT 3'S SOUTHERN SECTION IS REACHED VIA SUMMERS LANE OFF OF STATE HIGHWAY 20.

SEGMENTS 4 & 5

1. STAGING AREAS ARE LOCATED:
   - SEGMENT 4 AND NORTHERN SECTION OF SEGMENT 5: OFF OF GRAVEL PIT ROAD AFTER ITS INTERSECTION WITH SWITHENBANK LANE (GATE ACCESS), APPROXIMATELY 50 YARDS TO THE WEST ON THE SECOND LOWER FOREST ROAD (SEE MAP ON PLANS).
   - SEGMENT 5 SOUTHERN SECTION: ALONG FOREST ROAD 450 ADJACENT TO THE SOUTHERN END OF SEGMENT 5. EXTENT AND LOCATION TO BE AGREED WITH CALFIRE.
2. ACCESS ROUTES ARE:
   - SEGMENT 4 AND NORTHERN SECTION OF SEGMENT 5: VIA DWYER LANE FOR NORTHERN SECTION OF SEGMENT 4, AND OFF OF GRAVEL PIT ROAD AFTER ITS INTERSECTION WITH SWITHENBANK LANE (GATE ACCESS) ON THE SECOND LOWER FOREST ROAD (SEE MAP ON PLANS).
   - SOUTHERN SECTION OF SEGMENT 5: VIA FOREST ROAD 450 FROM ITS INTERSECTION WITH SIMPSON LANE.

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COLEMAN ENGINEERING
1223 PLEASANT GROVE BLVD
SUITE 100
ROSEVILLE, CA 95678
(916) 791-1188

CITY OF FORT BRAGG CALIFORNIA

BAR IS ONE INCH AT FULL SCALE
0 1"
IF NOT ONE INCH ON THIS SHEET SCALE ACCORDINGLY

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**RAW WATER LINE REPLACEMENT PROJECT**

# CONSTRUCTION STAGING AREAS AND ACCESS ROUTES

**CITY OF FORT BRAGG** **CALIFORNIA**

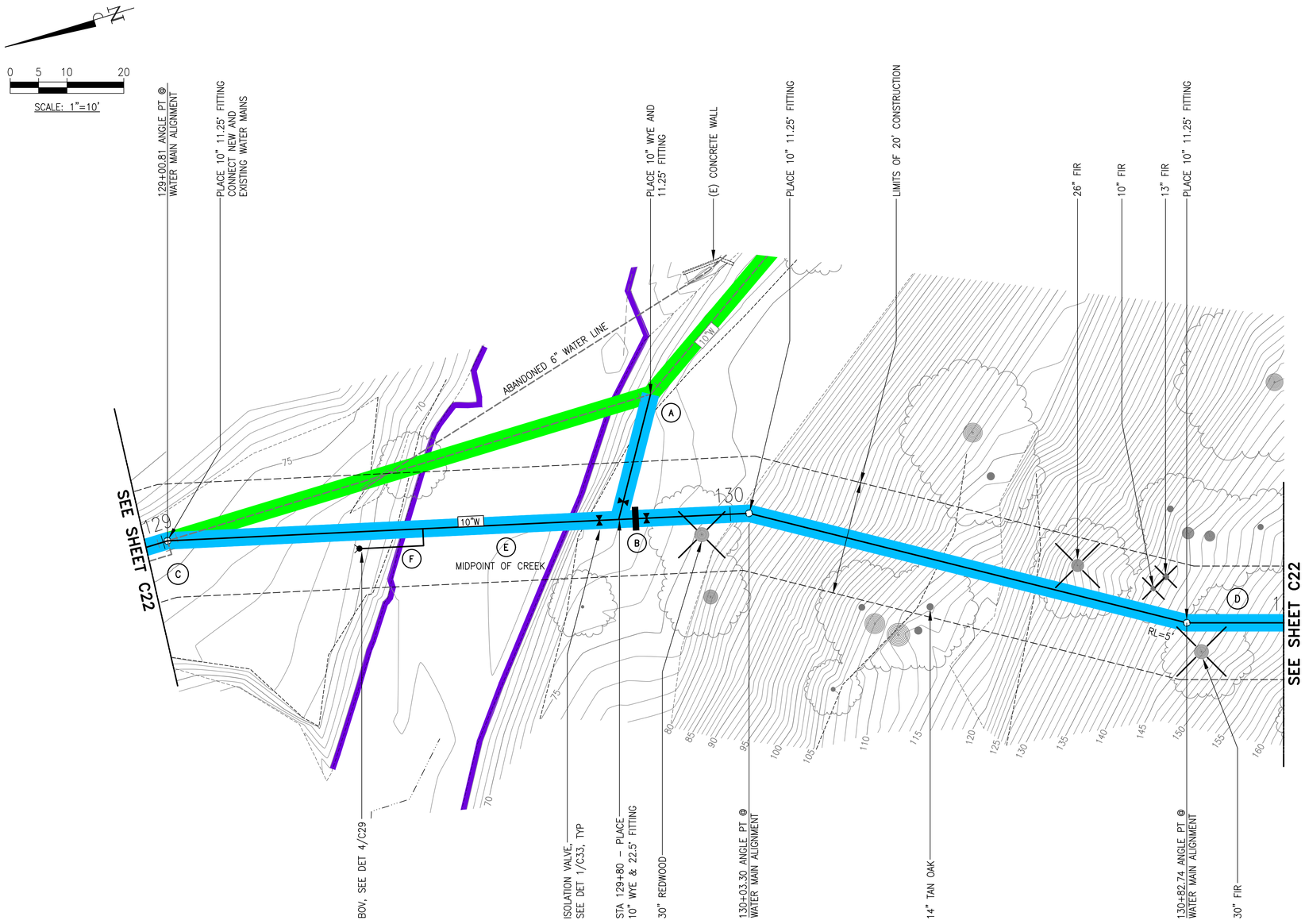
DESIGNED UNDER THE DIRECTION OF:
Chad R. Coleman 10/06/23
CHAD R. COLEMAN DATE
R.C.E. No. 56490 - REGISTRATION EXPIRES 06-30-25

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| DESIGN: | WCJ | DATE: 10/06/23 |
| DRAWN: | WCJ | DATE: 10/06/23 |
| CHECKED: | CRC | DATE: 10/06/23 |

REGISTERED PROFESSIONAL ENGINEER CHAD R. COLEMAN No. C86490 CIVIL STATE OF CALIFORNIA
10/06/23

SCALE NO SCALE
DRAWING NUMBER C36
SHEET NUMBER 39 OF 68 SHEETS

10/6/23 S:_PROJECTS\TTBC18-001 - RAW WATER LINE REPLACEMENT PROJECT\CADD\SEGMENTS 2-5 FULL SET\C36 - CONSTRUCTION STAGING AREAS & ACCESS ROUTES.DWG




## CONSTRUCTION SEQUENCE

1. INSTALL NEW 10" DIA. WATER MAIN FROM Ⓓ TO Ⓑ, Ⓒ TO Ⓕ, AND FROM Ⓑ TO Ⓐ. INSTALL THREE ISOLATION VALVES, 10" DIA WYE AND 22.5° FITTING AT Ⓑ.
2. ISOLATE HALF OF HARE CREEK CHANNEL FROM Ⓔ TO Ⓑ AND DIVERT SUMMER LOW FLOWS INTO HALF OF CHANNEL FROM Ⓔ TO Ⓕ USING GRAVEL BAGS AND AN IMPERMEABLE MEMBRANE BARRIER TO PREVENT SEEPAGE.
3. CONSTRUCT PIPELINE FROM Ⓑ TO Ⓔ USING EQUIPMENT NO LARGER THAN A MINI–EXCAVATOR. INSTALL BEDDING, 20" DIA. CASING, 10" DIA. PIPE, TEST PIPE, AND BACKFILL. RESTORE TRENCH ABOVE CASING WITH PREVIOUSLY EXCAVATED MATERIAL AT THIS LOCATION.
4. ONCE PIPELINE FROM Ⓑ TO Ⓔ IS INSTALLED, MOVE GRAVEL BAGS AND THE IMPERMEABLE MEMBRANE BARRIER TO ISOLATE THE HALF OF THE HARE CREEK CHANNEL FROM Ⓕ TO Ⓔ. CREEK FLOW IS DIVERTED OVER THE INSTALLED PIPELINE SOUTH OF Ⓔ.
5. ONCE THE DIVERSION IS IN PLACE, CONSTRUCT PIPELINE FROM Ⓔ TO Ⓕ USING METHOD DETAILED IN 3 ABOVE. CONNECT TO ALREADY–INSTALLED PIPE AND CASING AT Ⓔ AND Ⓕ. INSTALL BLOW–OFF VALVE AND ASSOCIATED CONNECTION PIPING.
6. TEST INSTALLED PIPE FROM Ⓐ TO Ⓑ TO Ⓔ TO Ⓕ TO Ⓒ AS A UNIT. INDIVIDUAL SECTIONS OF PIPELINE MUST BE TESTED PRIOR TO BACKFILL.
7. TEMPORARY SHUT DOWN THE EXISTING WATER MAIN AND MAKE CONNECTIONS TO THE NEW MAIN AT Ⓐ AND Ⓒ. SET VALVES AT Ⓑ TO ENABLE FLOW FROM Ⓐ THROUGH Ⓑ, Ⓔ & Ⓕ TO Ⓒ.

## LEGEND

- EXISTING 10" DIA WATER LINE
- NEW 10" DIA REPLACEMENT WATER MAIN
- EXTENT OF HARE CREEK CHANNEL AND FLOOD PLAIN

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1223 PLEASANT GROVE BLVD
SUITE 100
ROSEVILLE, CA 95678
(916) 791–1188

BAR IS ONE INCH AT FULL SCALE
0 1"
IF NOT ONE INCH ON THIS SHEET SCALE ACCORDINGLY

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**RAW WATER LINE REPLACEMENT PROJECT**

# HARE CREEK CROSSING CONSTRUCTION

**CITY OF FORT BRAGG** **CALIFORNIA**

DESIGNED UNDER THE DIRECTION OF:
Chad R. Coleman 10/6/23
CHAD R. COLEMAN DATE
R.C.E. No. 56490 - REGISTRATION EXPIRES 06-30-25

| | | |
|---|---|---|
| DESIGN: | WCJ | DATE: 10/6/23 |
| DRAWN: | GGY | DATE: 10/6/23 |
| CHECKED: | CRC | DATE: 10/6/23 |

REGISTERED PROFESSIONAL ENGINEER CHAD R. COLEMAN No. C56490 CIVIL STATE OF CALIFORNIA
10/6/23

SCALE 1"=10'
DRAWING NUMBER C37
SHEET NUMBER 40 OF 68 SHEETS

11/6/23 S:_PROJECTS\FTBG18-001 – RAW WATER LINE REPLACEMENT PROJECT\CAD\SEGMENTS 2-5 FULL SET\C37 – HARE CREEK CROSSING CONSTRUCTION.DWG

## BUILDING CONSTRUCTION / OCCUPANCY DATA

| | | | |
|---|---|---|---|
| OCCUPANCY<br>CONSTRUCTION TYPE | F2<br>VB | EXITS REQUIRED<br>EXITS PROVIDED | 1<br>1 |
| ALLOWABLE STORIES<br>ACTUAL STORIES | 1<br>1 | FIRE ALARM SYSTEM | NOT REQUIRED |
| ALLOWABLE FLOOR AREA<br>FLOOR AREA | 13,000 S.F.<br>459 S.F. | FIRE SPRINKLER SYSTEM | NOT REQUIRED |
| OCCUPANT LOAD | 459 S.F./ 300 = 2 OCCUPANTS | AREA SEPARATION | NOT REQUIRED |
| EXTERIOR WALL CONSTRUCTION | NON RATED PER TABLE 602<br>SEPARATION 10-30'<br>FOR NEAREST ADJACENT BUILDING | CODE INFORMATION<br>CONSTRUCTION TO CONFORM TO:<br>2022 CALIFORNIA BUILDING CODE<br>2022 CALIFORNIA MECHANICAL CODE<br>2022 CALIFORNIA PLUMBING CODE<br>2022 CALIFORNIA ELECTRICAL CODE<br>2022 CALIFORNIA FIRE CODE<br>2022 CALIFORNIA ENERGY CODE<br>2022 CALIFORNIA GREEN BUILDING STANDARDS CODE | NOTE THIS BUILDING<br>COMPLIES WITH REQUIRED<br>CALIFORNIA STATE<br>FIRE MARSHALL WILD LAND<br>URBAN INTERFACE STANDARDS<br>(WUI) |
| UPROTECTED OPENINGS | NON RATED PER TABLE 705.8<br>45% ALLOWABLE OPENING AREA<br>FOR SEPARATION 20-25' FROM<br>NEAREST ADJACENT BUILDING | | |

ABBREVIATIONS & SYMBOLS

| | | | |
|---|---|---|---|
| Ø | DIAMETER | G.W.B. | GYPSUM WALL BOARD |
| @ | AT | HC | HANDICAP |
| A.F.F. | ABOVE FINISHED FLOOR | LB | LAG BOLT |
| CLG. | CEILING | L.F. | LINEAL FEET |
| CLR. | CLEAR | LL | LIVE LOAD |
| CNTR | COUNTER | MAX. | MAXIMUM |
| CONC. | CONCRETE | MIN. | MINIMUM |
| D | DEPTH | NAT. | NATURAL |
| DF | DRINKING FOUNTAIN | NO | NUMBER |
| DL | DEAD LOAD | O.S.B. | ORIENTED STRAND BOARD |
| (E) | EXISTING | O.C. | ON CENTER |
| EA. | EACH | PSI | POUNDS PER SQUARE INCH |
| EA. WY. | EACH WAY | SF | SQUARE FEET |
| E.N. | END NAIL | THK. | THICK |
| EQ. | EQUAL | T.O. | TOP OF |
| F.F. | FINISHED FLOOR | TYP. | TYPICAL |
| F.P. | FIRE PLACE | U.O.N. | UNLESS OTHERWISE NOTED |
| F.R.P. | FIBER RESIN PANEL | W | WIDTH |
| FTG. | FOOTING | W/ | WITH |
| GA. | GAUGE | W.W.M. | WELDED WIRE MESH |
| GR. | GRADE | | |

1 — SHEET NOTE REFERENCE

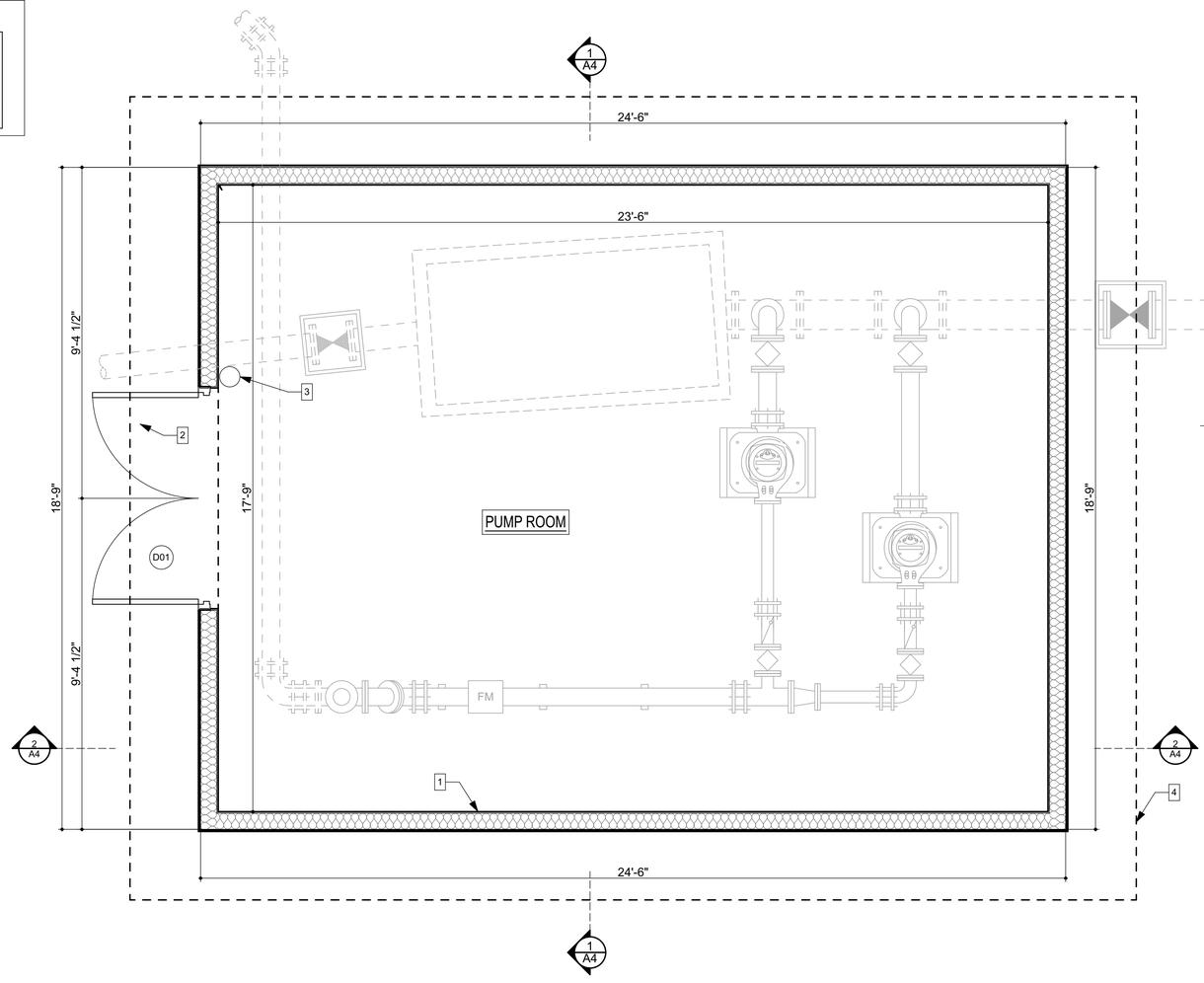
DETAIL# / SHEET# — A / M2 — SECTION REFERENCE (NUMBER/SHEET LOCATION)

DETAIL# / SHEET# — A / M2 — DETAIL REFERENCE (NUMBER/SHEET LOCATION)

DOOR MARK — F — DOOR NUMBER REFERENCE SEE DOOR SCHEDULE

1 — WINDOW REFERENCE

MECHANICAL — ROOM NAME/NUMBER REFERENCE




## KEYED SHEET NOTES

1. EXTERIOR WALL - 2 X 6 WOOD STUDS @ 16" O.C. - 1/2" ACX PLYWOOD WALL FINISH - R-19 BATT INSULATION - PLYWOOD SHEATHING PER STRUCTURAL SHEETS - VAPOR BARRIER - FIBER CEMENT LAP SIDING
2. FOR CONC. SLAB @ DOORWAYS - SLOPE 1/8" PER FOOT AWAY FROM BUILDING MAX. SLOPE EA. WAY TO BE 2% MAX
3. 2A-10BC FIRE EXTINGUISHER AFFIXED TO WALL ON MOUNTING BRACKET 4'-0" ABOVE FLOOR TO TOP OF EXTINGUISHER
4. LINE OF ROOF ABOVE

## FLOOR PLAN

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

NORTH


Saxon Sigerson AIA
Architect
Sigerson Architects

SIGERSON ARCHITECTS
P.O. BOX 1836
FAIR OAKS, CA 95628
(916) 863-6470


BAR IS ONE INCH AT FULL SCALE

0 — 1"

IF NOT ONE INCH ON THIS SHEET SCALE ACCORDINGLY

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**RAW WATER LINE REPLACEMENT PROJECT**

# NEWMAN PUMP STATION

ARCHITECTURAL FLOOR PLAN

**CITY OF FORT BRAGG** **CALIFORNIA**

DESIGNED UNDER THE DIRECTION OF:

10/6/23

SAXON SIGERSON — DATE

LICENSE NO. C25404 - LICENSE EXPIRES 09-30-23

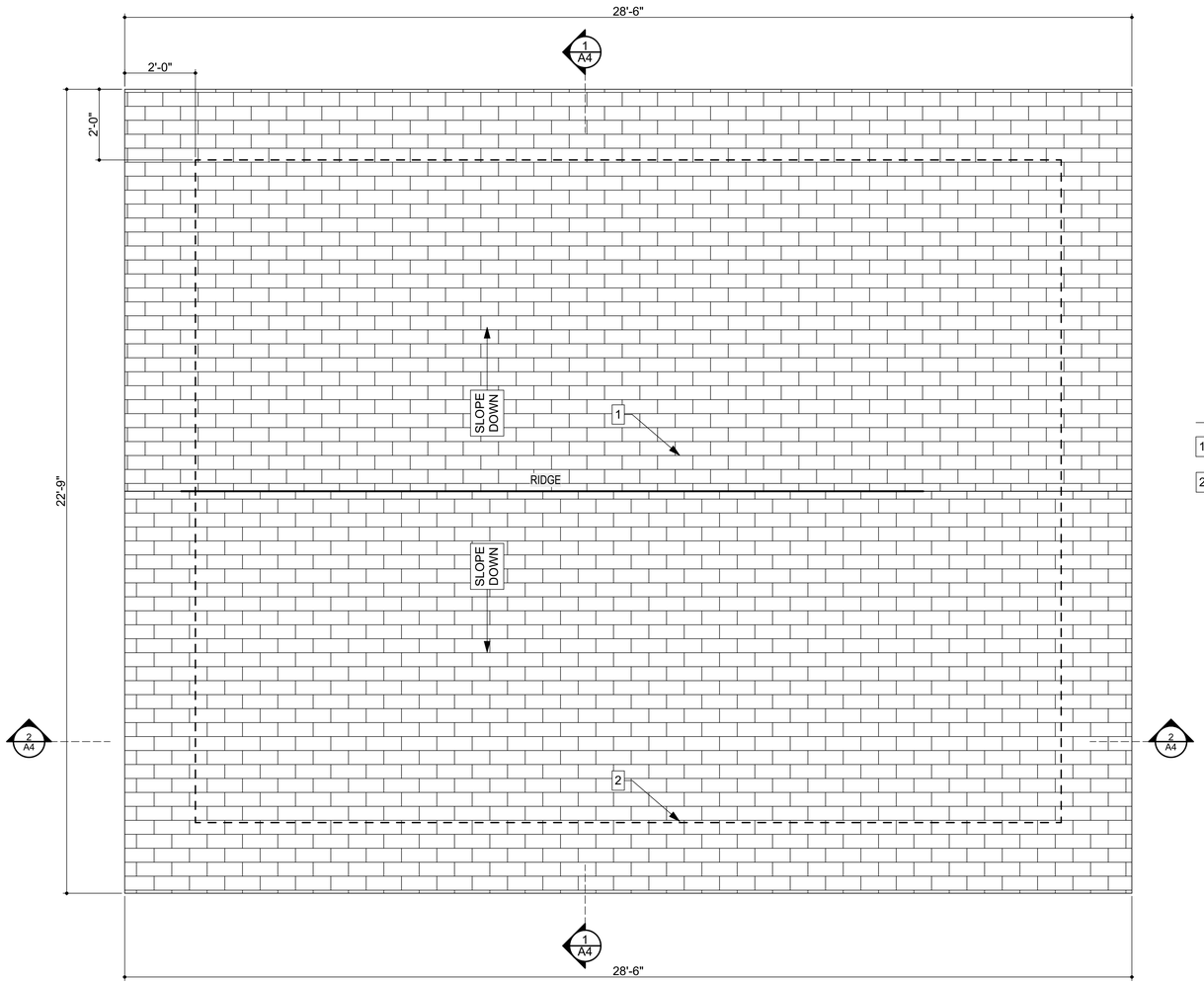
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| DRAWN: | SSS | DATE: 10/6/23 |
| CHECKED: | TH | DATE: 10/6/23 |

LICENSED ARCHITECT — SAXON SIGERSON — C-25404 — 9/30/23 RENEWAL DATE — STATE OF CALIFORNIA

SCALE: AS SHOWN

DRAWING NUMBER: A1

SHEET NUMBER: 41 OF 68 SHEETS




## KEYED SHEET NOTES

1. COMPOSITION ROOFING - 4 : 12 ROOF PITCH
2. LINE OF EXTERIOR FACE OF WALL BELOW

# ROOF PLAN

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

NORTH

Saxon Sigerson AIA
Architect
Sigerson
Architects

SIGERSON ARCHITECTS
P.O. BOX 1836
FAIR OAKS, CA 95628
(916) 863-6470

BAR IS ONE INCH AT FULL SCALE

0 1"

IF NOT ONE INCH ON THIS SHEET SCALE ACCORDINGLY

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**RAW WATER LINE REPLACEMENT PROJECT**

# NEWMAN PUMP STATION

ARCHITECTURAL ROOF PLAN

**CITY OF FORT BRAGG** **CALIFORNIA**

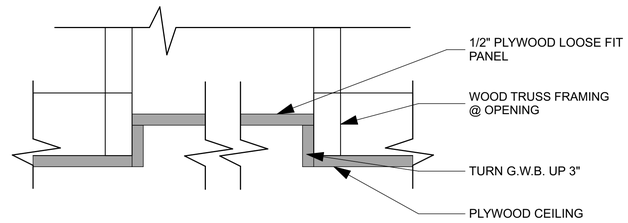
DESIGNED UNDER THE DIRECTION OF:

10/6/23
SAXON SIGERSON DATE
LICENSE NO. C25404 - LICENSE EXPIRES 09-30-23

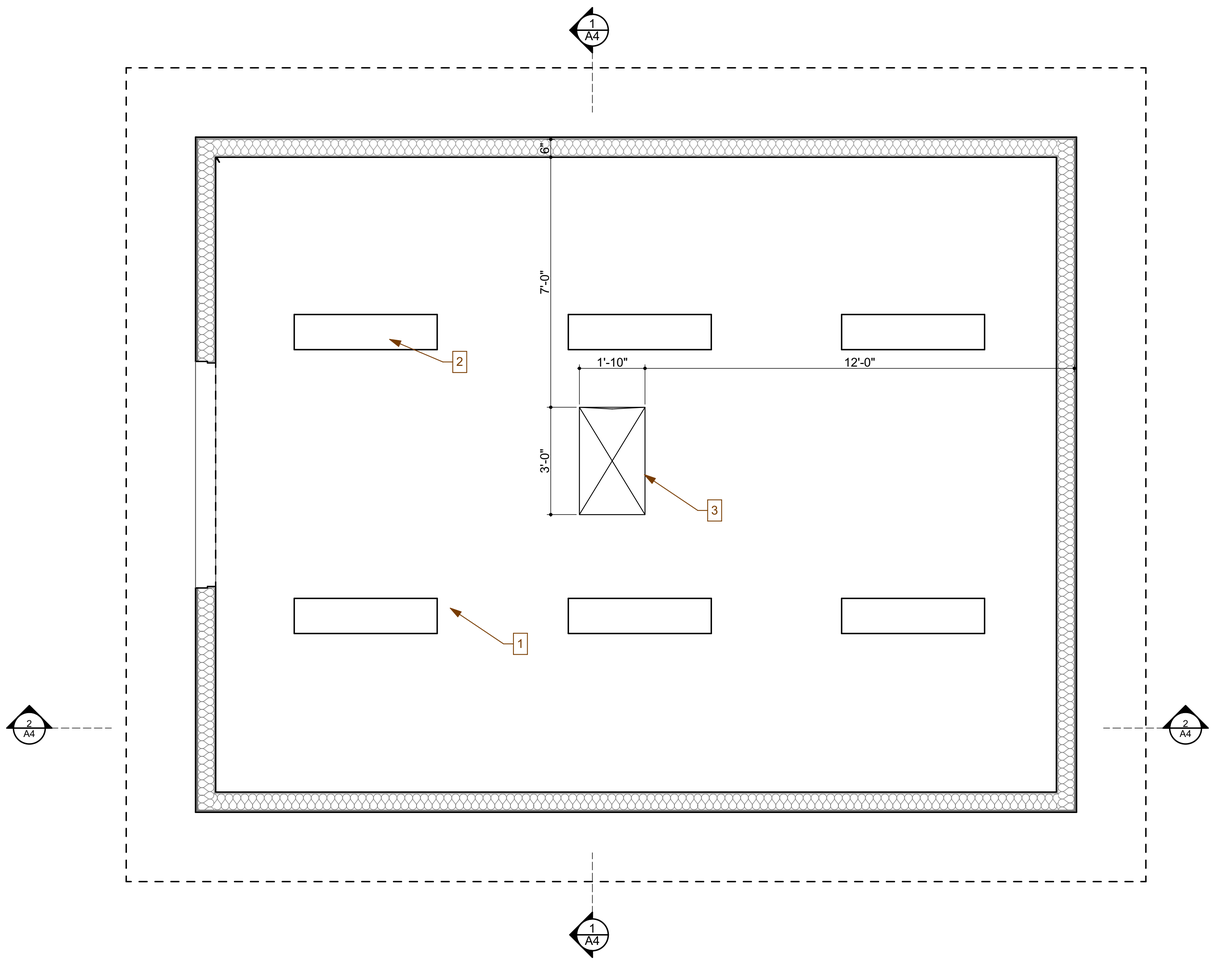
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LICENSED ARCHITECT
SAXON SHANE SIGERSON
C-25404
9/30/23
RENEWAL DATE
STATE OF CALIFORNIA

SCALE
AS SHOWN
DRAWING NUMBER
A2
SHEET NUMBER
42 OF 68 SHEETS




1 ATTIC ACCESS
SCALE: 3" = 1'-0"




REFLECTED CEILING PLAN
SCALE: 1/2" = 1'-0"

NORTH

## KEYED SHEET NOTES

1. 1/2" ACX PLYWOOD CEILING - PAINT
2. LIGHT FIXTURES - SEE ELECTRICAL SHEETS
3. ATTIC ACCESS PANEL - SEE 1/A3 COORDINATE LOCATION W/TRUSS LAYOUT

Saxon Sigerson AIA
Architect
Sigerson Architects

SIGERSON ARCHITECTS
P.O. BOX 1836
FAIR OAKS, CA 95628
(916) 863-6470

BAR IS ONE INCH AT FULL SCALE
0 1"
IF NOT ONE INCH ON THIS SHEET SCALE ACCORDINGLY

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**RAW WATER LINE REPLACEMENT PROJECT**

# NEWMAN PUMP STATION

ARCHITECTURAL REFLECTED CEILING PLAN

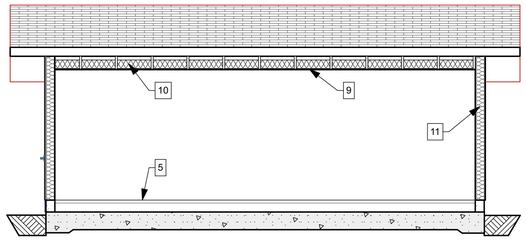
**CITY OF FORT BRAGG** **CALIFORNIA**

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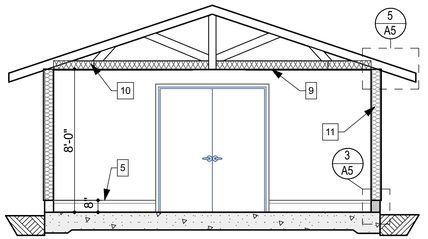
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LICENSED ARCHITECT SAXON SHANE SIGERSON C-25404 9/30/23 RENEWAL DATE STATE OF CALIFORNIA

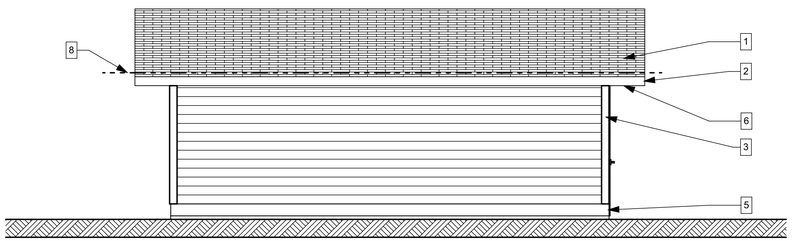
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DRAWING NUMBER: A3
SHEET NUMBER: 43 OF 68 SHEETS



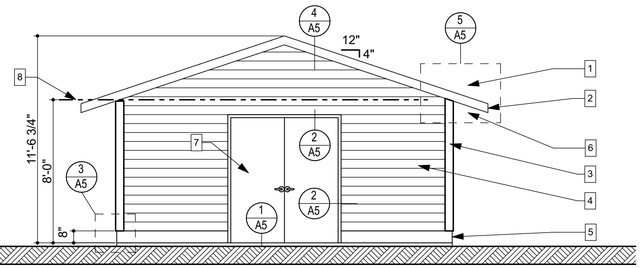

2 SECTION
SCALE: 1/4" = 1'-0"



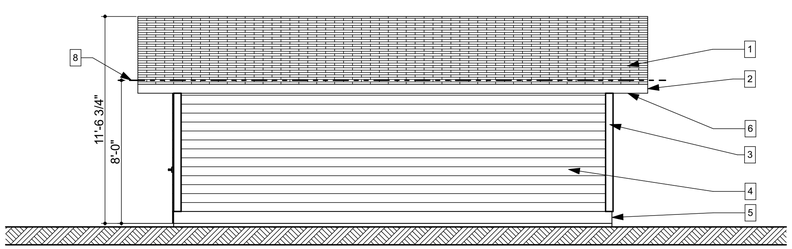

1 SECTION
SCALE: 1/4" = 1'-0"



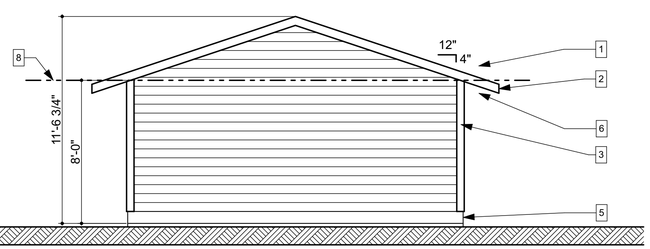

WEST ELEVATION
SCALE: 1/4" = 1'-0"




SOUTH ELEVATION
SCALE: 1/4" = 1'-0"




EAST ELEVATION
SCALE: 1/4" = 1'-0"




NORTH ELEVATION
SCALE: 1/4" = 1'-0"

## ELEVATION & SECTION KEYED SHEET NOTES

| | |
|---|---|
| 1 | COMPOSITION SHINGLE ROOF - 4 : 12 ROOF PITCH |
| 2 | 2 X 8 FIBER CEMENT FASCIA - PAINT |
| 3 | 2 X 6 FIBER CEMENT TRIM |
| 4 | 1 X 8 FIBER CEMENT LAP SIDING |
| 5 | CONC. CURB |
| 6 | ENCLOSED SOFFIT |
| 7 | HOLLOW METAL DOOR - PAINT |
| 8 | PLATE LINE/TOP OF WOOD FRAMED WALL |
| 9 | INSTALL 1/2" ACX PLYWOOD DIRECT TO BOTTOM OF TRUSSES - PAINT |
| 10 | INSTALL R-38 KRAFT FACED BATT INSULATION BETWEEN TRUSSES |
| 11 | R-19 BATT INSULATION |

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**RAW WATER LINE REPLACEMENT PROJECT**

# NEWMAN PUMP STATION

ARCHITECTURAL ELEVATIONS, SECTIONS

**CITY OF FORT BRAGG** **CALIFORNIA**

DESIGNED UNDER THE DIRECTION OF:
SAXON SIGERSON 10/6/23
LICENSE NO. C25404 - LICENSE EXPIRES 09-30-23 DATE

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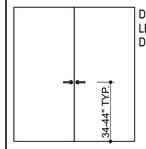
LICENSED ARCHITECT SAXON SHANE SIGERSON C-25404 9/30/23 RENEWAL DATE STATE OF CALIFORNIA

SCALE
AS SHOWN
DRAWING NUMBER
A4
SHEET NUMBER
44 OF 68 SHEETS

| DOOR SCHEDULE | | | | | | | |
|---|---|---|---|---|---|---|---|
| MRK | SIZE | TYPE | JAMB | HEAD | RATING | HARDWARE | REMARKS |
| DO1 | 1 | 1 | 1 | 1 | | 1 | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

DOOR TYPES:

1




DOUBLE LEAF DOOR

SIZE :

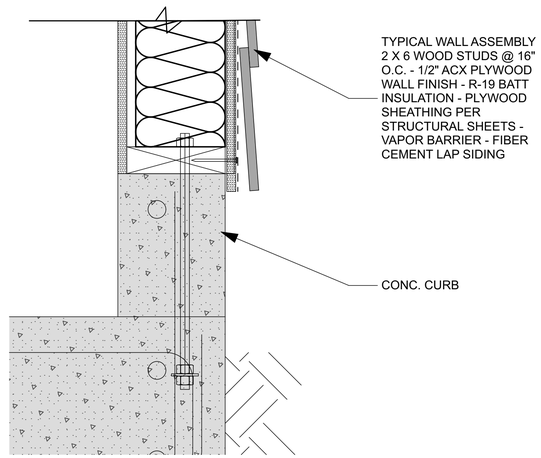
1. PAIR OF 3'-0" X 7'-0" X 1 3/4"

JAMB AND HEAD

1. KNOCK DOWN HOLLOW METAL

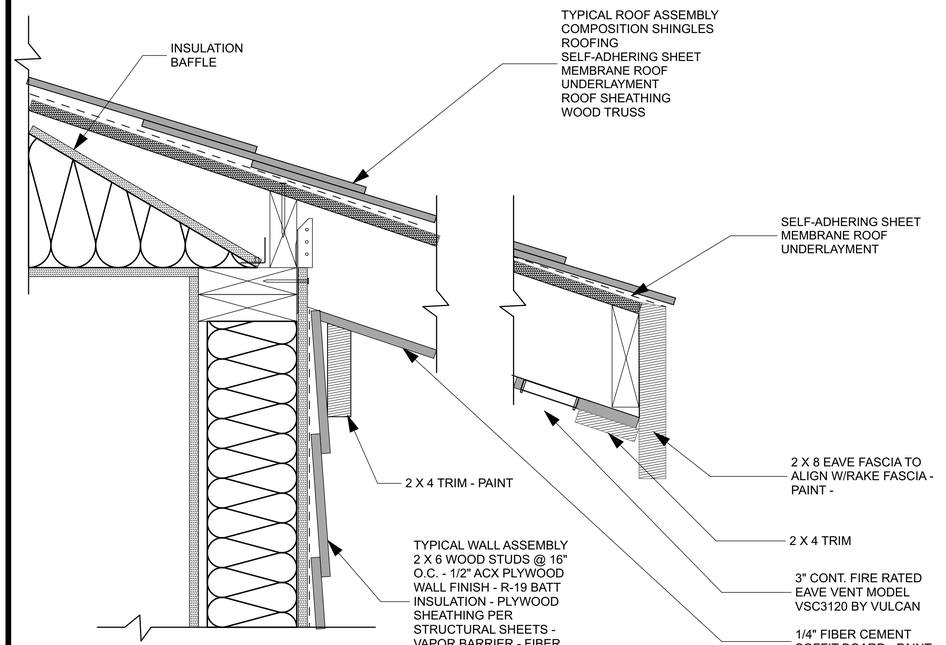
HARDWARE

1. KEYED LEVER SET



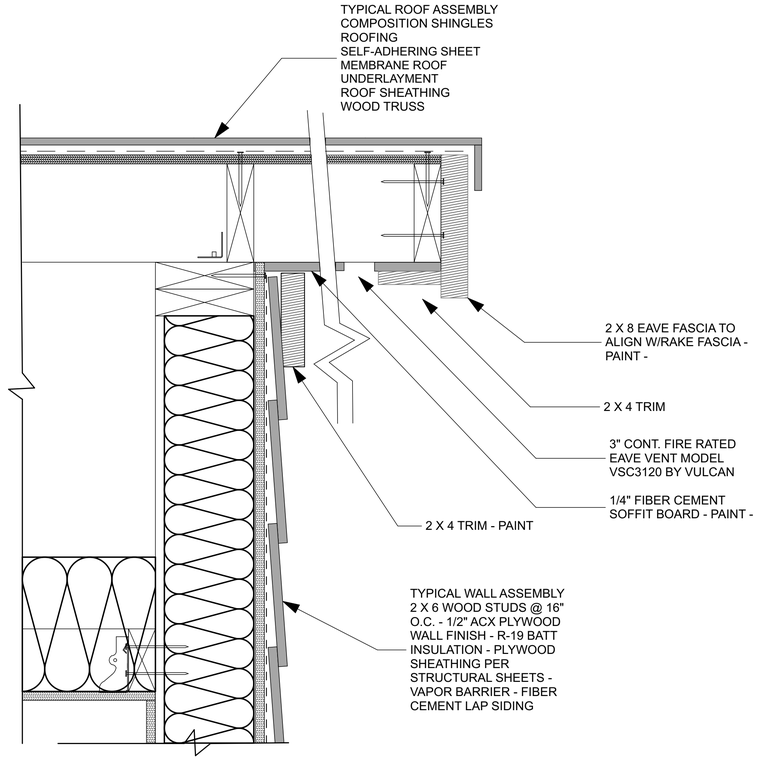

3 CONC. CURB @ EXT. WALL

SCALE: 3" = 1'-0"



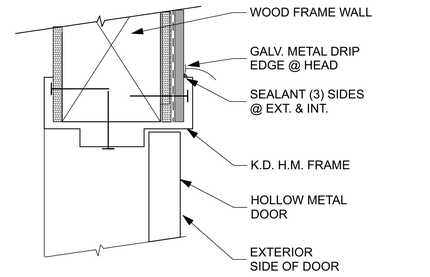

5 ROOF EAVE DETAIL

SCALE: 3" = 1'-0"



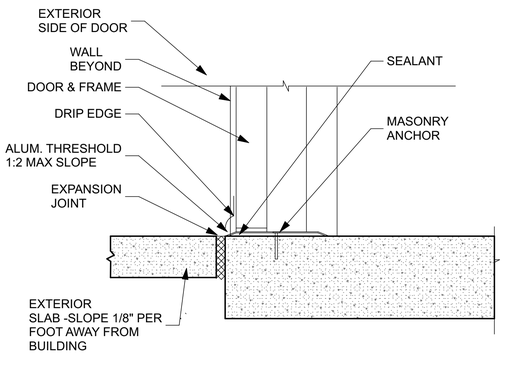

4 RAKE @ CMU WALL DETAIL

SCALE: 3" = 1'-0"




2 DOOR HEAD & JAMB DETAIL

SCALE: 3" = 1'-0"




1 DOOR THRESHOLD

SCALE: 3" = 1'-0"

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**RAW WATER LINE REPLACEMENT PROJECT**

# NEWMAN PUMP STATION

ARCHITECTURAL DETAILS

**CITY OF FORT BRAGG** **CALIFORNIA**

DESIGNED UNDER THE DIRECTION OF:

10/6/23

SAXON SIGERSON DATE

LICENSE NO. C25404 - LICENSE EXPIRES 09-30-23

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LICENSED ARCHITECT SAXON SHANE SIGERSON C-25404 9/30/23 RENEWAL DATE STATE OF CALIFORNIA

SCALE AS SHOWN

DRAWING NUMBER A5

SHEET NUMBER 45 OF 68 SHEETS

## GENERAL:

1. INTERPRETATION OF DRAWINGS & SPECIFICATIONS
   - 1.1 WHERE APPLICABLE, SPECIFICATIONS HAVE BEEN PREPARED FOR THIS PROJECT AND ARE ARRANGED IN SEVERAL SECTIONS, BUT SUCH SEPARATION SHALL NOT BE CONSIDERED AS THE LIMITS OF THE WORK REQUIRED BY ANY SEPARATE TRADE. THE TERMS AND CONDITIONS OF SUCH LIMITATIONS ARE WHOLLY BETWEEN THE CONTRACTOR AND SUBCONTRACTORS.
   - 1.2 IN GENERAL, THE WORKING DETAILS WILL INDICATE DIMENSIONS, POSITIONS AND KIND OF CONSTRUCTION, AND THE SPECIFICATIONS WILL INDICATE QUALITIES AND METHODS. ANY WORK INDICATED ON THE WORKING DETAILS MENTIONED BUT NOT IN THE SPECIFICATIONS, OR VICE VERSA, SHALL BE FURNISHED AS THOUGH FULLY SET FORTH IN BOTH. WORK NOT PARTICULARLY DETAILED, MARKED OR SPECIFIED, SHALL BE THE SAME AS SIMILAR PARTS THAT ARE DETAILED, MARKED OR SPECIFIED. IF CONFLICTS OCCUR BETWEEN DRAWINGS AND SPECIFICATIONS, THE MOST EXPENSIVE MATERIALS OR METHODS WILL PREVAIL.
   - 1.3 SHOULD AN ERROR APPEAR IN THE WORKING DETAILS OR SPECIFICATIONS OR IN WORK DONE BY OTHERS AFFECTING THIS WORK, THE CONTRACTOR SHALL NOTIFY THE ENGINEER AT ONCE AND IN WRITING. IF THE CONTRACTOR PROCEEDS WITH THE WORK SO AFFECTED WITHOUT HAVING GIVEN SUCH WRITTEN NOTICE AND WITHOUT RECEIVING THE NECESSARY APPROVAL, DECISION OR INSTRUCTION IN WRITING FROM THE OWNER, THEN THEY SHALL HAVE NO VALID CLAIM AGAINST THE OWNER, FOR THE COST OF SO PROCEEDING AND SHALL MAKE GOOD ANY RESULTING DAMAGE OR DEFECT. NO VERBAL APPROVAL, DECISION, OR INSTRUCTION SHALL BE VALID OR BE THE BASIS FOR ANY CLAIM AGAINST THE OWNER, ITS OFFICERS, EMPLOYEES, OR AGENTS. THE FOREGOING INCLUDES TYPICAL ERRORS IN THE SPECIFICATIONS OR NOTATIONAL ERRORS IN THE WORKING DETAILS WHERE THE INTERPRETATION IS DOUBTFUL OR WHERE THE ERROR IS SUFFICIENTLY APPARENT AS TO PLACE A REASONABLY PRUDENT CONTRACTOR ON NOTICE THAT, SHOULD THEY ELECT TO PROCEED, THEY ARE DOING SO AT THEIR OWN RISK.
2. CONSTRUCTION SHALL CONFORM TO THE 2022 CBC AND ALL APPLICABLE CODES AND REGULATIONS.
3. SHOP DRAWING NOTE:
   - 3.1 SHOP DRAWINGS SHALL BE SUBMITTED ELECTRONICALLY IN PDF FORMAT AT FULL SCALE.
   - 3.2 THE PURPOSE OF SHOP DRAWING SUBMITTALS BY THE CONTRACTOR IS TO DEMONSTRATE TO THE STRUCTURAL ENGINEER THAT THEY UNDERSTAND THE DESIGN CONCEPT BY INDICATING WHICH MATERIALS THEY INTEND TO FURNISH AND INSTALL, AND BY DETAILING THE FABRICATION AND INSTALLATION METHODS THEY INTEND TO USE.
   - 3.3 PRIOR TO FABRICATION, SHOP DRAWINGS SHALL BE SUBMITTED FOR REVIEW TO THE STRUCTURAL ENGINEER. SHOP DRAWING SUBMITTALS SHALL INCLUDE, BUT ARE NOT NECESSARILY LIMITED TO CONCRETE MIX DESIGNS, STRUCTURAL STEEL, REINFORCING STEEL, MASONRY UNITS, GROUT MIX DESIGNS, GLUED LAMINATED BEAMS, AND PRE-FABRICATED WOOD ROOF FRAMING ITEMS SUCH AS I-JOISTS AND TRUSSES WHERE THESE ELEMENTS ARE INDICATED ON THE DRAWINGS.
   - 3.4 PRIOR TO SUBMISSION THE CONTRACTOR SHALL REVIEW ALL SUBMITTALS FOR CONFORMANCE WITH THE CONTRACT DOCUMENTS AND SHALL STAMP SUBMITTALS AS BEING "REVIEWED FOR CONFORMANCE"
   - 3.5 SHOP DRAWING SUBMITTALS PROCESSED BY THE STRUCTURAL ENGINEER ARE NOT CHANGE ORDERS.
   - 3.6 ANY DETAIL ON THE SHOP DRAWING THAT DEVIATES FROM THE CONTRACT DOCUMENTS SHALL CLEARLY BE MARKED WITH THE NOTE "THIS IS A CHANGE".
   - 3.7 SHOP DRAWINGS OR CALCULATIONS SUBMITTED FOR REVIEW THAT REQUIRE RESUBMITTAL FOR RE-REVIEW SHALL BE BILLED HOURLY FOR SUCH TIME TO THE GENERAL CONTRACTOR. RE-REVIEW WILL NOT PROCEED WITHOUT WRITTEN APPROVAL FROM THE GENERAL CONTRACTOR FOR ADDITIONAL ENGINEERING REVIEW SERVICES.
4. SAFETY NOTE:
   - 4.1 IT IS THE CONTRACTORS RESPONSIBILITY TO COMPLY WITH THE PERTINENT SECTIONS, AS THEY APPLY TO THIS PROJECT, OF THE "CONSTRUCTION SAFETY ORDERS" ISSUED BY THE STATE OF CALIFORNIA LATEST EDITION, AND ALL OSHA REQUIREMENTS.
   - 4.2 THE OWNER AND THE STRUCTURAL ENGINEER DO NOT ACCEPT ANY RESPONSIBILITY FOR THE CONTRACTOR'S FAILURE TO COMPLY WITH THESE REQUIREMENTS.
   - 4.3 THE CONTRACTOR SHALL BE RESPONSIBLE FOR ADEQUATE DESIGN AND CONSTRUCTION OF ALL FORMS AND SHORING REQUIRED.
5. THE CONTRACTOR SHALL NOTIFY THE STRUCTURAL ENGINEER WHERE A CONFLICT OR A DISCREPANCY OCCURS BETWEEN THE STRUCTURAL DRAWINGS AND ANY OTHER PORTION OF THE CONTRACT DOCUMENTS OR EXISTING FIELD CONDITIONS. SUCH NOTIFICATION SHALL BE GIVEN IN DUE TIME SO AS NOT TO AFFECT THE CONSTRUCTION SCHEDULE. CONTRACTOR SHALL VERIFY ALL DIMENSIONS WITH STRUCTURAL DRAWINGS PRIOR TO COMMENCING ANY WORK.
6. WHERE NO SPECIFIC DETAIL IS SHOWN, THE CONSTRUCTION SHALL BE IDENTICAL OR SIMILAR TO THAT INDICATED FOR LIKE CASES OF CONSTRUCTION ON THIS PROJECT. SHOULD THERE BE ANY QUESTION, CONTACT THE STRUCTURAL ENGINEER PRIOR TO PROCEEDING.
7. WHEN CONSTRUCTION ATTACHES TO AN EXISTING BUILDING, A COMPLETE SET OF DRAWINGS OF THE EXISTING BUILDING SHALL BE KEPT ON THE JOB SITE. CONTRACTOR TO OBTAIN THESE DRAWINGS FROM THE OWNER.
8. ANY SUBSTITUTIONS FOR STRUCTURAL MEMBERS, HARDWARE, OR DETAILS SHALL BE REVIEWED BY THE STRUCTURAL ENGINEER. SUCH REVIEW WILL BE BILLED ON A TIME AND MATERIALS BASIS TO THE GENERAL CONTRACTOR WITH NO GUARANTEE THAT THE SUBSTITUTION WILL BE ALLOWED.
9. DO NOT SCALE DRAWINGS. CONTACT THE STRUCTURAL ENGINEER FOR ANY DIMENSIONS NOT SHOWN.
10. THESE DRAWINGS ARE NOT COMPLETE UNTIL REVIEWED AND ACCEPTED BY THE LOCAL BUILDING OFFICIAL AND SIGNED BY THE OWNER AND THE STRUCTURAL ENGINEER.
11. ALL DRAWINGS AND WRITTEN MATERIAL APPEARING HEREIN CONSTITUTES THE ORIGINAL AND UNPUBLISHED WORK OF THE STRUCTURAL ENGINEER AND THE SAME MAY NOT BE DUPLICATED, USED OR DISCLOSED WITHOUT WRITTEN CONSENT OF THE STRUCTURAL ENGINEER.
12. THE STRUCTURE SHOWN ON THESE DRAWINGS IS STRUCTURALLY SOUND ONLY IN ITS COMPLETED FORM. THE STABILITY OF THIS STRUCTURE DEPENDS ON THE DIAPHRAGMS AND THE BRACING MEMBERS SHOWN. THE CONTRACTOR IS TO PROVIDE FOR THE DESIGN AND CONSTRUCTION OF SHORING FOR ALL EARTH, FORMS, CONCRETE, STEEL, WOOD, AND MASONRY TO RESIST GRAVITY, EARTH, WIND, SEISMIC, AND CONSTRUCTION LOADS. SHORING SHALL REMAIN IN PLACE UNTIL ALL DIAPHRAGMS AND LATERAL RESISTING ELEMENTS ARE IN PLACE IN THEIR ENTIRETY.

## PRE-ENGINEERED ROOF TRUSSES:

1. TRUSS DESIGN SHALL BE PROVIDED BY THE SUPPLIER TO MEET THIS CRITERIA, CURRENT CBC REQUIREMENTS AND CBC STANDARDS AS FOLLOWS:
   - TRUSS LOADING:
     - TOP CHORD: 15 PSF DEAD LOAD AND 20 PSF LIVE LOAD (REDUCIBLE)
     - BOTTOM CHORD: 5 PSF DEAD LOAD AND 10.0 PSF LIVE LOAD.
       LIVE LOADS DO NOT ACT SIMULTANEOUSLY.
       DESIGN FOR WIND UPLIFT IN ACCORDANCE WITH CBC.
2. MINIMUM GRADE LUMBER: #2 HEM FIR.
3. CONNECTIONS SHALL BE IN ACCORDANCE, WITH PUBLISHED APPROVALS OF I.C.C./E.S..
4. MINIMUM MEMBER SIZES:
   - TOP CHORD: 2x4
   - BOTTOM CHORD: 2x4
   - WEB: 2x4

   (RE-GRADED IF RIPPED FROM 2x6 LUMBER).
5. TRUSS DRAWINGS. CALCULATIONS AND COPIES OF I.C.C./E.S. APPROVALS FOR METAL CONNECTOR PLATES SHALL BE SUBMITTED TO THE ENGINEER FOR REVIEW PRIOR TO FABRICATION.
6. HEEL JOINT DESIGN SHALL CONSIDER THE EFFECTS OF ECCENTRIC LOADING IN ACCORDANCE WITH CBC STANDARDS.
7. MAXIMUM ALLOWABLE LOAD DURATION STRESS INCREASE IS TO BE 15%.
8. INCREASE IN ALLOWABLE STRESS FOR ASSEMBLIES OF REPETITIVE FRAMING SHALL NOT BE PERMISSIBLE UNLESS THE TRUSSES ARE JOINED BY TRANSVERSE LOAD DISTRIBUTING ELEMENTS ADEQUATE TO SUPPORT THE DESIGN LOAD AS PROVIDED FOR IN CBC.
9. PROVIDE COMBINED STRESS CALCULATIONS. WHEN EVALUATING COMBINED STRESS RATIO, THE MOMENT CONTRIBUTION SHALL BE CHECKED USING SIMPLE SPAN MOMENT FORMULAS. CONTINUOUS SPAN MOMENTS WILL NOT BE ALLOWED.
10. DESIGN CAMBER FOR 1½ TIMES ESTIMATED DEAD LOAD DEFLECTION.
11. PROVIDE COMPLETE ROOF TRUSS LAYOUT PLAN(S) WITH TRUSS IDENTIFICATION NUMBERS CLEARLY IDENTIFIED ON PLANS AND CALCULATIONS. INDICATE TRUSS MANUFACTURER ON TRUSS DRAWINGS AND PLANS.
12. CLEARLY INDICATE ALL BRACING AND BRIDGING. MEMBERS SHALL BE ALIGNED AND ALL CONNECTIONS COMPLETED BEFORE REMOVAL OF BRACING.
13. TRUSS DRAWINGS, TRUSS LAYOUT PLANS AND CALCULATIONS SHALL ALL BE SIGNED BY A CIVIL ENGINEER LICENSED BY THE STATE OF CALIFORNIA.

## CONCRETE AND REINFORCING STEEL:

1. CONCRETE CONSTRUCTION SHALL CONFORM TO ACI 318-14 & ACI 350.
2. THE MINIMUM 28 DAY STRENGTH AND TYPE OF CONCRETE SHALL BE AS FOLLOWS:
   - CONCRETE 145 PCF
   - F'cm 3,000 PSI (MINIMUM 5.5 SACKS CEMENT PER CU. YD.).
3. ALL CONCRETE SHALL BE READY-MIX IN ACCORDANCE WITH ASTM-C94.
4. CONCRETE MIX DESIGN SHALL BE REVIEWED BY THE OWNER'S TESTING LABORATORY AND SUBMITTED TO THE STRUCTURAL ENGINEER FOR APPROVAL. SELECTION OF CONCRETE MIX PROPORTIONS SHALL BE PER 2019 CBC SECTION 1903.
5. CEMENT SHALL CONFORM TO ASTM C-150 TYPE V.
6. CONCRETE AGGREGATES: NATURAL SAND AND ROCK AGGREGATES CONFORMING TO ASTM C-33.
7. REINFORCING SHALL CONFORM TO ASTM A706 GRADE 60.
8. WELDING OF REINFORCING STEEL SHALL CONFORM TO AWS D1.4 USING PROPER LOW HYDROGEN ELECTRODES. TACK WELDING TO REBAR IS STRICTLY PROHIBITED. SEE "REBAR WELDING".
9. REINFORCING STEEL SHALL BE DETAILED, FABRICATED, AND INSTALLED ACCORDING TO "MANUAL OF STANDARD PRACTICE FOR REINFORCED CONCRETE CONSTRUCTION" BY CRSI.
10. WIRE FABRIC SHALL CONFORM TO ASTM A-1064.
11. DIMENSIONS SHOWN FOR LOCATION OF REINFORCING ARE TO THE FACE OF MAIN BARS AND DENOTE CLEAR COVERAGE. UNLESS OTHERWISE NOTED, CONCRETE COVERAGE SHALL BE AS FOLLOWS:

| | |
|---|---|
| CONCRETE DEPOSITED DIRECTLY AGAINST GROUND (EXCEPT SLABS) | 3" |
| FORMED CONCRETE EXPOSED TO WEATHER OR GROUND OR LIQUID | |
| #6 AND LARGER | 2" |
| #5 AND SMALLER | 2" |
| BEAMS (TOP BARS) | 1½" |
| BEAMS (ALL OTHER MAIN REINFORCING) | 2" |
| COLUMN MAIN REINFORCING | 2" |
| WALLS AND SLABS (INTERIOR DRY FACES) | ¾" |
| SLABS ON GROUND WITH ONE LAYER OF REINFORCEMENT | POSITION IN CENTER OF SLAB |

12. REINFORCING STEEL PLACEMENT:
    - 12.1 ALL BARS SHOWN WITH LAPS OR SPLICES SHALL HAVE MIN LAP LENGTH UNLESS OTHERWISE NOTED.
    - 12.2 DOWEL ALL VERTICAL REBAR IN WALLS AND COLUMNS FROM FOUNDATION WITH SAME SIZE AND SPACING AS VERTICAL BARS.
    - 12.3 SPLICES IN ADJACENT BARS SHALL BE NOT LESS THAN 5'-0" APART.
    - 12.4 SPLICE CONTINUOUS BARS IN SOIL-BEARING GRADE BEAMS AS FOLLOWS: BOTTOM BARS AT MID-SPAN, TOP BARS AT CENTERLINE OF SUPPORT, UNLESS NOTED OTHERWISE.
    - 12.5 SPLICE CONTINUOUS BARS IN BEAMS, SPANDRELS, WALL BEAMS ETC. AS FOLLOWS: BOTTOM BARS AT CENTERLINE OF SUPPORT, TOP BARS AT MIDSPAN, UNLESS NOTED OTHERWISE.
    - 12.6 REINFORCING BARS SHALL BE RUN IN A MANNER THAT FORMS A CONTINUOUS SYSTEM OF BARS TYING ALL PARTS OF THE STRUCTURE TOGETHER. EXTEND ALL REINFORCING BARS AS FAR AS POSSIBLE IN EACH CONCRETE MEMBER AND TERMINATE BAR TO PROVIDE 2" OF CONCRETE COVER END OF BAR OR FACE OR BEND.
    - 12.7 BEAM STIRRUPS AND COLUMN TIES SHALL HOOK 135 DEGREES AROUND A CORNER BAR UNLESS NOTED OTHERWISE.
13. GENERAL:
    - 13.1 NO PIPES OR DUCTS SHALL BE PLACED IN CONCRETE SLABS, BEAMS, WALLS OR GRADE BEAMS UNLESS SPECIFICALLY DETAILED.
    - 13.2 REFER TO ARCHITECTURAL, STRUCTURAL, ELECTRICAL AND MECHANICAL DRAWINGS FOR ALL OPENINGS, FLANGES, MOULDS, GROOVES, CLIPS AND GROUNDS TO BE CAST IN CONCRETE.
14. CONSTRUCTION JOINTS SHALL BE MADE ROUGH AND ALL LAITANCE REMOVED FROM THE SURFACE. CONCRETE MAY BE ROUGHENED BY CHIPPING THE ENTIRE SURFACE, SANDBLASTING, OR HOSING THE SURFACE 4 TO 6 HOURS AFTER THE POUR WITH A FINE SPRAY.
15. REMOVE ALL DEBRIS FROM THE FORMS BEFORE PLACING ANY CONCRETE.
16. REINFORCING, DOWELS, BOLTS, ANCHORS, SLEEVES, ETC. TO BE EMBEDDED IN CONCRETE SHALL BE SECURELY POSITIONED BEFORE PLACING CONCRETE. OBTAIN APPROVAL OF ALL AFFECTED TRADES PRIOR TO PLACING CONCRETE.
17. MAXIMUM FREE FALL OF CONCRETE SHALL BE 3'-0".
18. WALLS SHALL BE PLACED IN HORIZONTAL LAYERS OF 2'-0" MAX DEPTH.
19. CONCRETE IN WALLS, PIERS, OR COLUMNS SHALL SET AT LEAST 2 HOURS BEFORE PLACING CONCRETE IF IT SUPPORTS BEAMS, SPANDRELS, OR SLABS.
20. REINFORCE ALL SLABS ON GRADE AS SHOWN ON DRAWINGS.
21. HORIZONTAL WALL BARS IN DOUBLE LAYER WALLS SHALL BE STAGGERED. USE #2 SPREADERS APPROXIMATELY EVERY THIRD INTERSECTION EACH DIRECTION FOR ALL DOUBLE LAYER WALLS. PLACE SPREADERS IN VERTICAL LINES WITH FORM TIES.
22. NO WOOD SPREADERS ARE ALLOWED. NO WOOD STAKES ARE ALLOWED IN AREAS TO BE CONCRETED.
23. MINIMUM WALL REINFORCING FOR TEMPERATURE AND SHRINKAGE CONTROL ARE:

| WALL THICKNESS | SINGLE LAYER | DOUBLE LAYER |
|---|---|---|
| 7" OR LESS | #4 @ 12" CC EW | |
| 8" | #4 @ 10" CC EW | |
| 9" AND 10" | | #4 @ 16" CC EW |
| 11" AND 12" | | #4 @ 12" CC EW |
| 18" | | #5 @ 12" CC EW |
| 24" | | #6 @ 12" CC EW |

24. NOTIFY THE ENGINEER 48 HOURS PRIOR TO PLACING CONCRETE.
25. REINFORCEMENT LAP SPLICE LENGTHS ARE:

| | 3,000 PSI | 3,500 PSI | 4,000 PSI |
|---|---|---|---|
| #6 AND SMALLER | $57d_b$ | $53d_b$ | $49d_b$ |
| #7 AND LARGER | $72d_b$ | $66d_b$ | $62d_b$ |

    - 25.1 SPLICE LENGTHS SHOWN APPLY TO LAP CLASS B NORMAL WEIGHT CONCRETE FOR THE STRENGTHS SHOWN. THE REINFORCING IS UNCOATED GRADE 60 REINFORCING.
    - 25.2 INCREASE LAP SPLICE LENGTHS BY 30% FOR TOP REINFORCING. TOP REINFORCING IS HORIZONTAL REINFORCING WITH MORE THAN 12" OF CONCRETE BELOW THE SPLICE.
    - 25.3 INCREASE LAP LENGTHS BY 30% IF LIGHTWEIGHT CONCRETE IS USED.
    - 25.4 WHERE CLEAR SPACING OF BARS IS LESS THAN 2 db OR WHERE CLEAR COVER IS LESS THAN 1 db INCREASE LAP LENGTHS BY 50%, UNO.
26. MAXIMUM SPACING OF WALL CONST. JOINTS IS 30ft.

## DESIGN CRITERIA:

1. CODE: 2022 CALIFORNIA BUILDING CODE (CBC)
2. DESIGN LIVE LOADS:

| AREA | LIVE LOAD | REMARKS |
|---|---|---|
| ROOF | | |
| FLAT TO < 4:12 | $L_r$= 20 PSF | REDUCIBLE PER CODE |

3. WIND DESIGN PARAMETERS:
   - BASIC WIND SPEED (3-SEC GUST): V= 103 MPH
   - RISK CATEGORY: IV
   - EXPOSURE CATEGORY: C
4. EARTHQUAKE DESIGN PARAMETERS:
   - SEISMIC IMPORTANCE FACTOR, $I_E$: 1.5
   - COMPONENT IMPORTANCE FACTOR, $I_P$: 1.5
   - RISK CATEGORY: IV
   - SITE CLASS: D
   - SEISMIC DESIGN CATEGORY: D
   - DESIGN SPECTRAL RESPONSE PARAMETERS:
     - $S_{DS}$: 1.2

## WOOD:

1. ALL SAWN LUMBER SHALL BE DOUGLAS FIR-LARCH AS GRADED BY THE WEST COAST LUMBER INSPECTION BUREAU (WCLIB) IN ACCORDANCE WITH STANDARD GRADING RULES NO. 17 TYPICAL UNLESS NOTED OTHERWISE. ALL MEMBERS SHALL HAVE A MINIMUM GRADE OF NO. 1 EXCEPT 2x4 AND 2x6 WALL STUDS, PLATES, AND BLOCKING MAY BE NO. 2.
2. MANUFACTURED LUMBER MINIMUM PROPERTIES:
   - 2.1 PARALLEL STRAND LUMBER SHALL BE GRADE 2.0E (Fb=2,900 PSI MIN) AND EQUIVALENT TO WEYERHAEUSER PARALLAM® PRODUCT.
   - 2.2 LAMINATED VENEER LUMBER SHALL BE GRADE 1.9E (Fb=2,600 PSI MIN) AND EQUIVALENT TO WEYERHAEUSER MICROLLAM® PRODUCT.
   - 2.3 GLU-LAMINATED MEMBERS-SEE "GLU-LAMINATED BEAM NOTES".
3. ALL STRUCTURAL SHEATHING USED FOR SHEARWALLS AND ROOF SHEATHING SHALL BE MANUFACTURED IN ACCORDANCE WITH PRODUCT STANDARDS OF APA - THE ENGINEERED WOOD ASSOCIATION. SHEATHING SHALL MEET PS2-04 PERFORMANCE STANDARD FOR WOOD-BASED STRUCTURAL-USE PANELS AND SHALL BE STAMPED WITH APA TRADEMARK.
4. ALL FOUNDATION PLATES OR SILLS ON CONCRETE SLABS WHICH ARE IN DIRECT CONTACT WITH EARTH, AND PLATES OR SILLS ON CONCRETE OR MASONRY FOUNDATIONS, SHALL BE PRESSURE TREATED.
5. ALL WOOD SHALL HAVE A MOISTURE CONTENT OF NOT MORE THAN 19% WHEN SHEATHING IS APPLIED.
6. 8" MINIMUM CLEARANCE SHALL BE MAINTAINED AT ALL EXTERIOR WALLS BETWEEN FINISH GRADE AND BOTTOM OF WOOD WALLS.
7. BEARING AND SHEARWALLS SHALL HAVE DOUBLE TOP PLATES LAPPED AT WALL CORNERS AND INTERSECTIONS AND PLATES SHALL BE INTERNAILED WITH (3) 16d AT SUCH LOCATIONS. FOR PLATE SPLICE DETAILS, SEE DRAWINGS.
8. SILL PLATE ANCHOR BOLTS SHALL BE INSTALLED WITH PLATE WASHERS 3x3x¼ BETWEEN NUT AND PLATE.
9. PROVIDE SOLID BLOCKING BETWEEN JOISTS AND RAFTERS AT ALL SUPPORTS.
10. PROVIDE BLOCKING AT ALL CEILING LEVELS.
11. JOISTS UNDER AND PARALLEL TO PARTITIONS SHALL BE DOUBLED AND NAILED TOGETHER.
12. HOLES FOR BOLTS IN WOOD SHALL BE BORED WITH A BIT OF THE SAME NOMINAL DIAMETER AS THE BOLT PLUS 1/16".
13. HOLES FOR LAG SCREWS SHALL BE BORED AS FOLLOWS:
    - 13.1 THE CLEARANCE HOLE FOR THE SHANK SHALL HAVE THE SAME DIAMETER AS THE SHANK, AND THE SAME DEPTH OF PENETRATION AS THE LENGTH OF UNTHREADED SHANK.
    - 13.2 THE LEAD HOLE FOR THE THREADED PORTION SHALL HAVE A DIAMETER EQUAL TO 60% TO 75% OF THE SHANK DIAMETER AND A LENGTH EQUAL TO AT LEAST THE LENGTH OF THE THREADED PORTION.
14. LAG SCREWS AND WOOD SCREWS SHALL BE SCREWED AND NOT DRIVEN INTO PLACE. SOAP MAY BE USED TO LUBRICATE THE SCREWS.
15. ALL BOLTS AND LAG SCREWS SHALL BE PROVIDED WITH METAL WASHERS UNDER HEADS AND NUTS WHICH BEAR ON WOOD. APPLIES ALSO TO INSERTED EXPANDING FASTENERS, RED HEAD, ETC.

| BOLT DIAMETER | MI WASHER | STEEL WASHER |
|---|---|---|
| ⅝"ø | 2¾"ø x 5/16" | 3"x3"x¼" |
| ¾"ø | 3"ø x 7/16" | 3"x3"x5/16" |
| ⅞"ø | 3½"ø x 1/16" | 3½"x3½"x⅜" |
| 1"ø | 4"ø x ½" | 3¾"x3¾"x⅜" |

16. ALL BOLTS AND LAG SCREWS SHALL BE TIGHTENED AT INSTALLATION AND RETIGHTENED BEFORE CLOSING IN OR AT COMPLETION OF JOB.
17. LAY ALL STRUCTURAL SHEATHING ON ROOF AND FLOORS WITH FACE GRAIN PERPENDICULAR TO SUPPORT TYPICAL UNLESS NOTED OTHERWISE. USE PLY-CLIPS AT UNSUPPORTED SHEATHING EDGES.
18. CONNECTOR HARDWARE MODEL NUMBER ARE THOSE FOR SIMPSON STRONG-TIE COMPANY. ALL JOIST HANGERS SHALL BE SIMPSON U SERIES UNLESS NOTED OTHERWISE. EQUIVALENT CONNECTORS WITH ICC ACCEPTANCE MAY BE SUBMITTED FOR REVIEW AS AN ALTERNATE.
19. NOTIFY STRUCTURAL ENGINEER AFTER WALL, FLOOR, AND ROOF SHEATHING NAILING HAS BEEN COMPLETED AND A MINIMUM OF 48 HOURS PRIOR TO CONCEALING SHEATHING.
20. ALL SPLIT, TWISTED OR OTHERWISE DAMAGED MATERIAL SHALL BE REPLACED.
21. FASTENERS AND CONNECTORS IN PRESERVATIVE-TREATED WOOD ARE TO BE APPROVED SILICONE BRONZE OR COPPER, STAINLESS STEEL OR HOT-DIPPED ZINC-COATED STEEL PER CBC 2304.9.5.
22. ALL NAILS SHALL BE COMMON WIRE SIZE.


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E-mail: bradf@vesolutions.net


BAR IS ONE INCH AT FULL SCALE

0 1"

IF NOT ONE INCH ON THIS SHEET SCALE ACCORDINGLY

| NO. | REVISIONS | BY | APP | DATE |
|---|---|---|---|---|
| 6 | | | | |
| 5 | | | | |
| 4 | | | | |
| 3 | | | | |
| 2 | | | | |
| 1 | | | | |

**RAW WATER LINE REPLACEMENT PROJECT**

# GENERAL NOTES

**CITY OF FORT BRAGG** **CALIFORNIA**

DESIGNED UNDER THE DIRECTION OF:

BRADLEY A. FRIEDERICHS — DATE 10/6/23
R.S.E. No. S2780 - REGISTRATION EXPIRES 09-30-23

| | |
|---|---|
| DESIGN: BAF | DATE: 10/6/23 |
| DRAWN: DGG | DATE: 10/6/23 |
| CHECKED: BAF | DATE: 10/6/23 |

REGISTERED PROFESSIONAL ENGINEER — BRADLEY ALAN FRIEDERICHS — No. S2780 — STRUCTURAL — STATE OF CALIFORNIA — 10/6/23

SCALE: AS SHOWN
DRAWING NUMBER: S1.0
SHEET NUMBER: 46 OF 68 SHEETS

## TABLE 1705.3
REQUIRED SPECIAL INSPECTIONS AND TESTS OF CONCRETE CONSTRUCTION

| TYPE | CONTINUOUS SPECIAL INSPECTION | PERIODIC SPECIAL INSPECTION | REFERENCED STANDARD | IBC REFERENCE |
|---|---|---|---|---|
| 1. INSPECT REINFORCEMENT, INCLUDING PRESTRESSING TENDONS, AND VERIFY PLACEMENT | | X | ACI 318 CH. 20, 25.2, 25.3, 26.6.1–26.6.3 | 1908.4 |
| 2. REINFORCING BAR WELDING:<br>A. VERIFY WELDABILITY OF REINFORCING BARS OTHER THAN ASTM A706<br>B. INSPECT SINGLE–PASS FILLET WELDS, 5/16" MAX<br>C. INSPECT ALL OTHER WELDS | | | AWS D1.4 ACI 318: 26.6.4 | |
| 3. INSPECT ANCHORS CAST IN CONCRETE | | X | ACI 318: 17.8.2 | |
| 4. INSPECT ANCHORS POST–INSTALLED IN HARDENED CONCRETE MEMBERS<br>A. ADHESIVE ANCHORS INSTALLED IN HORIZONTALLY OR UPWARDLY INCLINED ORIENTATIONS TO RESIST SUSTAINED TENSION LOADS<br>B. MECHANICAL ANCHORS AND ADHESIVE ANCHORS NOT DEFINED 4.a | X | X | ACI 318: 17.8.2.4<br>ACI 318: 17.8.2 | |
| 5. VERIFY USE OF REQUIRED DESIGN MIX | | X | ACI 318: CH. 19, 26.4.3, 26.4.4 | 1904.1, 1904.2, 1908.2, 1908.3 |
| 6. PRIOR TO CONCRETE PLACEMENT, FABRICATE SPECIMENS FOR STRENGTH TESTS, PERFORM SLUMP AND AIR CONTENT TESTS, AND DETERMINE THE TEMPERATURE OF THE CONCRETE. | X | | ASTM C172 ASTM C31 ACI 318: 26.4, 26.12 | 1908.10 |
| 7. INSPECT CONCRETE AND SHOTCRETE PLACEMENT FOR PROPER APPLICATION TECHNIQUES | X | | ACI 318: 26.5 | 1908.6, 1908.7, 1908.8 |
| 8. VERIFY MAINTENANCE OF SPECIFIED CURING TEMPERATURE AND TECHNIQUES | | X | ACI 318: 26.5.3–26.5.5 | 1908.9 |
| 9. INSPECT PRESTRESSED CONCRETE FOR:<br>A. APPLICATION OF PRESTRESSING FORCES; AND<br>B. GROUTING OF BONDED PRESTRESSING TENDONS | | | ACI 318: 26.10 | |
| 10. INSPECT ERECTION OF PRECAST CONCRETE MEMBERS | | | ACI 318: CH. 26.8 | |
| 11. VERIFY IN–SITU CONCRETE STRENGTH, PRIOR TO STRESSING OF TENDONS IN POST–TENSIONED CONCRETE AND PRIOR TO REMOVAL OF SHORES AND FORMS FROM BEAMS AND STRUCTURAL SLABS | | | ACI 318: 26.11.2 | |
| 12. INSPECT FORMWORK FOR SHAPE, LOCATION AND DIMENSIONS OF THE CONCRETE MEMBER BEING FORMED | | X | ACI 318: 26.11.1.2(b) | |

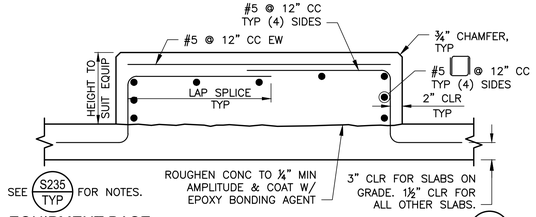
A. WHERE APPLICABLE, SEE ALSO SECTION 1705.12, SPECIAL INSPECTIONS FOR SEISMIC RESISTANCE.
B. SPECIFIC REQUIREMENTS FOR SPECIAL INSPECTION SHALL BE INCLUDED IN THE RESEARCH REPORT FOR THE ANCHOR ISSUED BY AN APPROVED SOURCE IN ACCORDANCE WITH 17.8.2 IN ACI 318, OR OTHER QUALIFICATION PROCEDURES. WHERE SPECIFIC REQUIREMENTS ARE NOT PROVIDED, SPECIAL INSPECTION REQUIREMENTS SHALL BE SPECIFIED BY THE REGISTERED DESIGN PROFESSIONAL AND SHALL BE APPROVED BY THE BUILDING OFFICIAL PRIOR TO THE COMMENCEMENT OF THE WORK.

## ABBREVIATIONS:

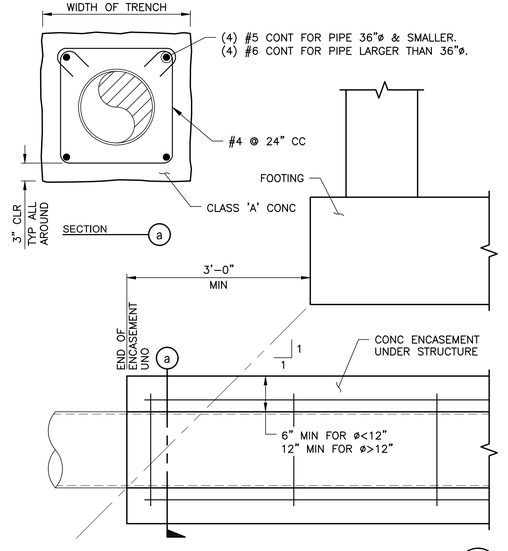
| | |
|---|---|
| AB | AGGREGATE BASE, ANCHOR BOLT |
| ADDNL | ADDITIONAL |
| AL | ALUMINUM |
| ARCH | ARCHITECTURAL |
| BETW | BETWEEN |
| BEV | BEVELLED |
| BLKG | WOOD BLOCKING |
| BLW | BELOW |
| BM | BEAM |
| BOF | BOTTOM OF FOOTING |
| BOT | BOTTOM |
| BRG | BEARING |
| CC | CENTER TO CENTER |
| CHKD PL | CHECKERED PLATE |
| CLR | CLEAR |
| ℄ | CENTERLINE |
| CMU | CONCRETE MASONRY UNIT |
| CNTSK | COUNTERSINK |
| COL | COLUMN |
| CONC | CONCRETE |
| CNJ | CONSTRUCTION JOINT |
| CONT | CONTINUOUS |
| CJ | CONTROL JOINT, CONTRACTION JOINT |
| db | BAR DIAMETER |
| DIA | DIAMETER |
| DIM | DIMENSION |
| DN | DOWN |
| (E) | EXISTING |
| EA | EACH |
| EF | EACH FACE |
| EJ | EXPANSION JOINT |
| EL, (ELEV) | ELEVATION |
| EMB | EMBEDMENT |
| EN | EDGE NAILING |
| EQ | EQUAL |
| EQUIP | EQUIPMENT |
| ES | EACH SIDE |
| EW | EACH WAY |
| EWEF | EACH WAY EACH FACE |
| EWF | ELECTRICALLY WELDED FABRIC |
| FB | FLAT BAR |
| FD | FLOOR DRAIN |
| FF | FINISHED FLOOR |
| FG | FINAL GRADE |
| FLG | FLANGE |
| FN | FIELD NAILING |
| FOM | FACE OF MASONRY |
| FS | FACE OF STUD |
| FTG | FOOTING |
| GA | GAGE |
| GALV | GALVANIZED |
| GC | GENERAL CONTRACTOR |
| GS | GALVANIZED STEEL |
| H | HIGH |
| HA | HEADED ANCHOR |
| HDG | HOT DIP GALVANIZED |
| HORIZ | HORIZONTAL |
| HR | HANDRAIL |
| HSB | HIGH STRENGTH BOLT |
| HSS | HOLLOW STRUCTURAL STEEL |
| IE | INVERT ELEVATION |
| JT | JOINT |
| KP | KICK PLATE |
| L | LONG |
| LS | LAG SCREW |
| MANUF | MANUFACTURER |
| MAX | MAXIMUM |
| MB | MACHINE BOLT |
| MECH | MECHANICAL |
| MIN | MINIMUM |
| MTG | MOUNTING |
| (N) | NEW |
| NTS | NOT TO SCALE |
| O/ | OVER |
| OH | OPPOSITE HAND |
| PEMB | PRE–ENGINEERED METAL BUILDING |
| ℗ | PLATE |
| PLC'S | PLACES |
| PT | PRESSURE TREATED |
| REINF | REINFORCING |
| REQ'D | REQUIRED |
| REQMT'S | REQUIREMENTS |
| SAD | SEE ARCHITECTURAL DRAWINGS |
| SIM | SIMILAR |
| SMS | SHEET METAL SCREW |
| SOG | SLAB ON GRADE |
| SP | STRUCTURAL PLYWOOD |
| SS | STAINLESS STEEL |
| STIFF | STIFFENER |
| STAGG | STAGGER |
| SQ | SQUARE |
| SYMM | SYMMETRICAL |
| T&B | TOP AND BOTTOM |
| TOC | TOP OF CONCRETE |
| TOF | TOP OF FRAMING |
| TOM | TOP OF MASONRY |
| TOP | TOP OF PLATE |
| TOS | TOP OF STEEL |
| TOW | TOP OF WALL |
| TYP | TYPICAL |
| UNO (UON) | UNLESS NOTED OTHERWISE |
| VERT | VERTICAL |
| W | WIDE |
| W/ | WITH |
| WHS | WELDED HEADED STUD |
| WP | WORKING POINT |
| WS | WATERSTOP |

NOTES:
1. THE MINIMUM PAD SIZE SHALL BE AS INDICATED OR AS SHOWN ON THE DRAWINGS OR AS DETERMINED BY THE EQUIPMENT MANUFACTURER.
2. THE SIZE, NUMBER, TYPE, LOCATION AND THREAD PROJECTION OF THE ANCHOR BOLTS SHALL BE DETERMINED BY THE EQUIPMENT MANUFACTURER. HOLD CONCRETE ANCHOR BOLTS IN POSITION WITH A TEMPLATE WHILE PAD IS BEING PLACED.
3. USE ANCHOR BOLT SLEEVES TO PROVIDE THE ANCHOR BOLT A MINIMUM MOVEMENT OF ½" IN ALL DIRECTIONS. SLEEVES SHALL BE FILLED WITH NON–SHRINK GROUT.
4. ANCHOR BOLT SLEEVES SHALL HAVE A MINIMUM INTERNAL DIAMETER 1" GREATER AND A MAXIMUM INTERNAL DIAMETER 3" GREATER THAN ANCHOR BOLT DIAMETER.
5. EQUIPMENT BASES SHALL BE INSTALLED LEVEL UNO.
6. PROVIDE WEDGES OR SHIMS TO SUPPORT THE BASE WHILE THE NON–SHRINK GROUT IS PLACED. TEMPORARY LEVELING NUTS SHALL BE BACKED OFF. THE WEDGES OR SHIMS THAT REMAIN IN PLACE SHALL NOT BE EXPOSED TO VIEW.
7. WHERE CONCRETE SLAB OR BEAM THICKNESS WILL NOT ACCOMMODATE THE ANCHOR BOLT, PROVIDE EXTRA THICKNESS OF SLAB OR BEAM.
8. CONTRACTOR TO PROVIDE STRUCTURAL CALCS STAMPED BY A CALIFORNIA REGISTERED ENGINEER FOR EQUIPMENT ANCHORAGE.

### EQUIPMENT BASE NOTES
SCALE: NTS — S235 TYP

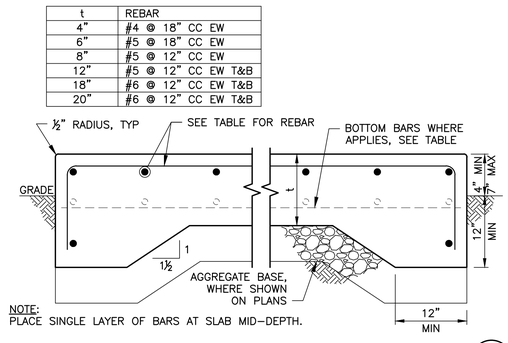



### EQUIPMENT BASE
SCALE: NTS — S237 TYP




### CONCRETE ENCASEMENT OF PIPE
SCALE: NTS — S240 TYP

| t | REBAR |
|---|---|
| 4" | #4 @ 18" CC EW |
| 6" | #5 @ 18" CC EW |
| 8" | #5 @ 12" CC EW |
| 12" | #5 @ 12" CC EW T&B |
| 18" | #6 @ 12" CC EW T&B |
| 20" | #6 @ 12" CC EW T&B |




NOTE:
PLACE SINGLE LAYER OF BARS AT SLAB MID–DEPTH.

### CONCRETE SLAB ON GRADE
SCALE: NTS — S245 TYP


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E–mail: bradf@vesolutions.net


BAR IS ONE INCH AT FULL SCALE
0 1"
IF NOT ONE INCH ON THIS SHEET SCALE ACCORDINGLY

| NO. | REVISIONS | BY | APP | DATE |
|---|---|---|---|---|
| 6 | | | | |
| 5 | | | | |
| 4 | | | | |
| 3 | | | | |
| 2 | | | | |
| 1 | | | | |

CITY OF FORT BRAGG

**RAW WATER LINE REPLACEMENT PROJECT**

# TYPICAL DETAILS 1

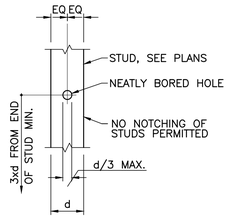
CALIFORNIA

DESIGNED UNDER THE DIRECTION OF:
BRADLEY A. FRIEDERICHS — DATE 10/6/23
R.S.E. No. S2780 - REGISTRATION EXPIRES 09-30-23

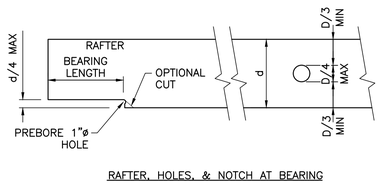
| | | |
|---|---|---|
| DESIGN: | BAF | DATE: 10/6/23 |
| DRAWN: | DGG | DATE: 10/6/23 |
| CHECKED: | BAF | DATE: 10/6/23 |

REGISTERED PROFESSIONAL ENGINEER — BRADLEY ALAN FRIEDERICHS — S2780 — STRUCTURAL — STATE OF CALIFORNIA — 10/6/23

SCALE: AS SHOWN
DRAWING NUMBER: S1.1
SHEET NUMBER: 47 OF 68 SHEETS




HOLES @ STUDS

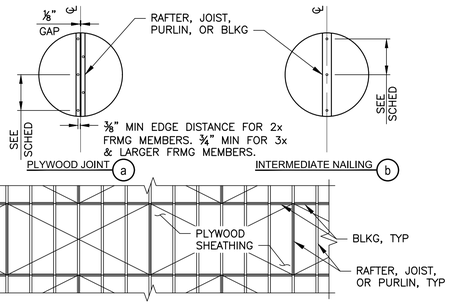



RAFTER, HOLES, & NOTCH AT BEARING

## HOLES IN WOOD FRAMING

SCALE: NTS

S400 TYP




PLYWOOD PANEL SCHEDULE

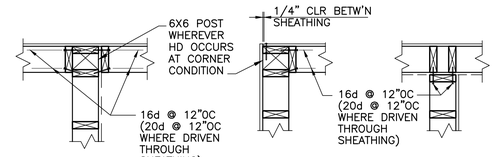
| TYPE | THICK | PANEL INDEX | GRADE | FRAMING MEMBER THICKNESS | NAILING SIZE | NAILING SPACING BN | NAILING SPACING EN | NAILING SPACING INT | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 1 | ½" | 24/0 | APA RATED C–D EXP 1 | 2x | 10d | 6" | 6" | 12" | UNBLOCKED DIAPHRAGM |
| | | | | | | | | | |

NOTES:
1. INDIVIDUAL PIECES OF PLYWOOD SHALL NOT BE LESS THAN 24" IN THE LEAST DIMENSION, NOR LESS THAN 8 ft² IN TOTAL AREA.
2. PRE–DRILL HOLES IF FRAMING MEMBER TENDS TO SPLIT.
3. PROVIDE EDGE NAILING ALONG ALL STRUCTURAL AND CHORD LINES.
4. EDGE BLOCKING CALLED FOR ABOVE IS FOR ROOF STRUCTURAL CONDITIONS ONLY. VERIFY ADEQUACY OF UNBLOCKED EDGES WITH ROOFING INSTALLER BEFORE APPLYING PLYWOOD.
5. ALL NAILS SHALL BE COMMON NAILS.

## PLYWOOD SHEATHING

SCALE: NTS

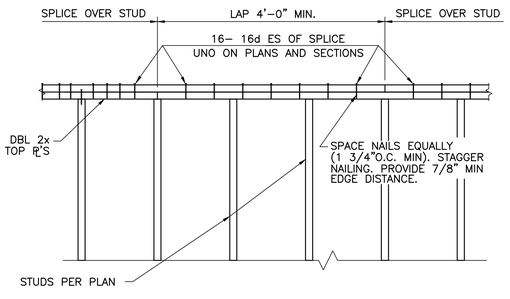
S401 TYP




## STUD FRAMING AT CORNERS

SCALE: NTS

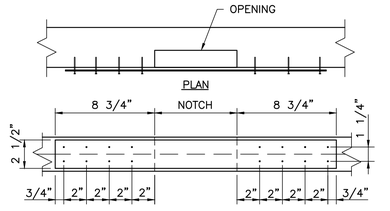
S404 TYP




## NAILED TOP PLATE SPLICE

SCALE: NTS

S405 TYP



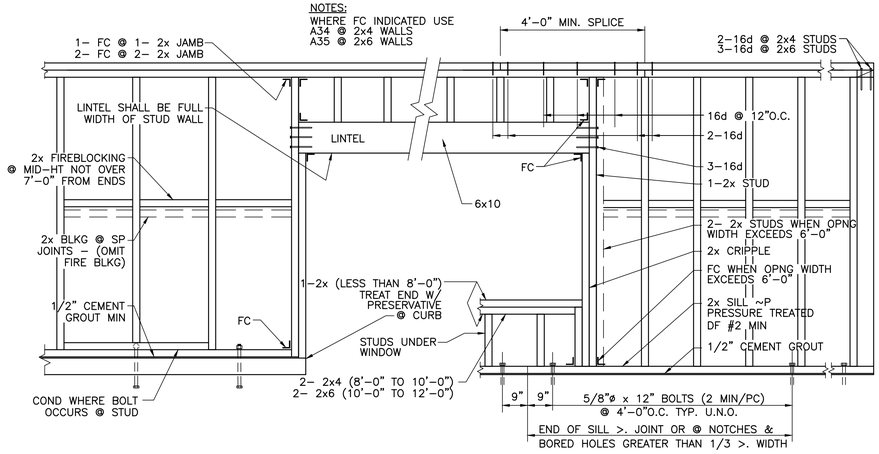

1/4"ø HOLES FOR #14x1 1/2" R.H.W.S. FOR 4"L WIDE P.
1/4"ø HOLES FOR #14x2 1/2" R.H.W.S. FOR WIDER P.
1/8x2 1/4" STRAP ONE SIDE WHEN NOTCH IS GREATER THAN 1/3 WIDTH OF PLATES, TWO SIDES WHEN NOTCH IS GREATER THAN 2/3 WIDTH OF PLATES.

NOTE:
AT TOP PLATES WITH GREATER THAN 20–16d FOR TOP PLATE SPLICES PROVIDE 1/8"x2 1/4" STRAPS EACH SIDE W/ 12–16d EACH END. INCREASE LENGTH OF STRAPS AS REQUIRED.

## SPLICE OF DOUBLE TOP PLATES NOTCH FOR PIPES OR CONDUIT

SCALE: NTS

S406 TYP




## WALL OPENING FRAMING

SCALE: NTS

S407 TYP

VE SOLUTIONS
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7777 Greenback Lane, Suite 104
Citrus Heights, CA 95610
PH. (916) 505–0519
Fax. (916) 514–9102
E–mail: bradf@vesolutions.net

BAR IS ONE INCH AT FULL SCALE
0 1"
IF NOT ONE INCH ON THIS SHEET SCALE ACCORDINGLY

| NO. | REVISIONS | BY | APP | DATE |
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CITY OF FORT BRAGG

**RAW WATER LINE REPLACEMENT PROJECT**

# TYPICAL DETAILS 2

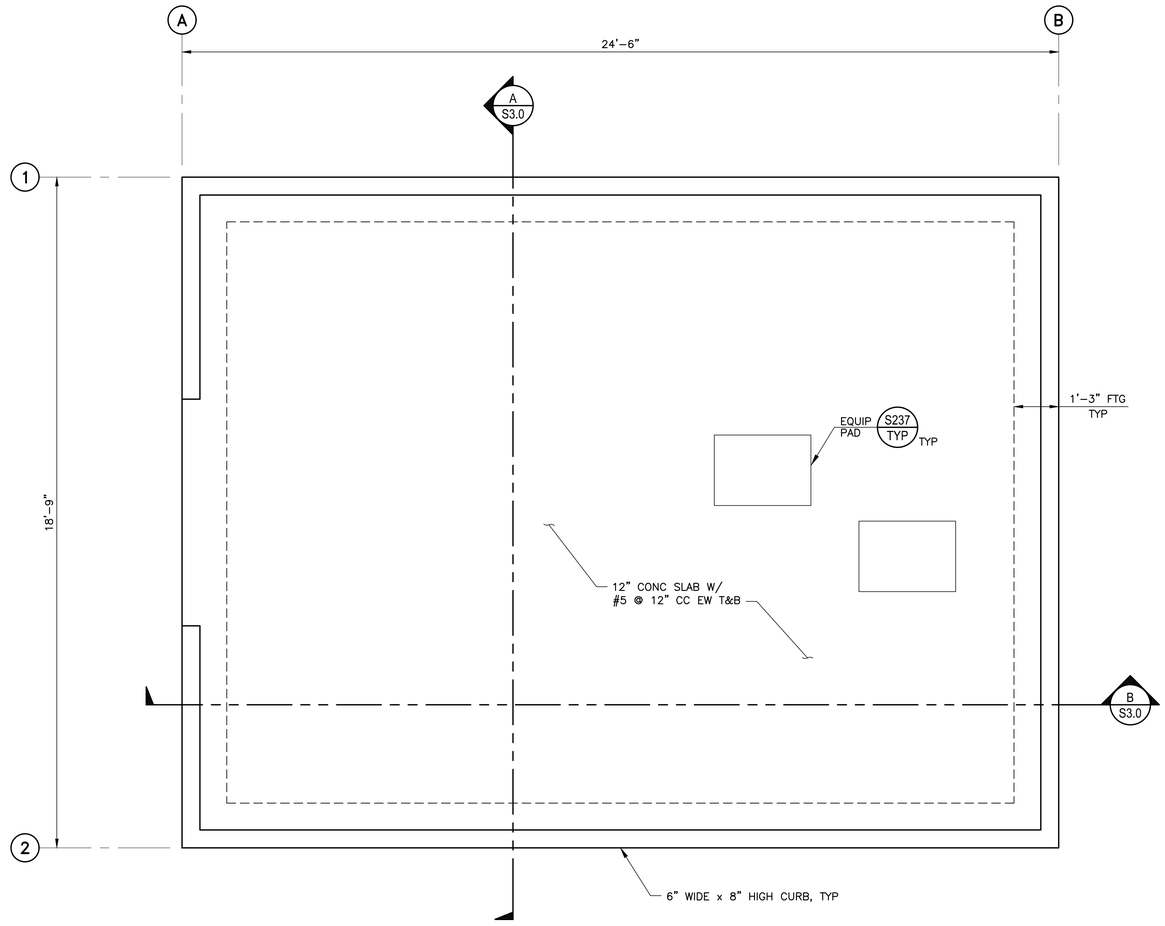
CALIFORNIA

DESIGNED UNDER THE DIRECTION OF:
10/6/23
BRADLEY A. FRIEDERICHS DATE
R.S.E. No. S2780 – REGISTRATION EXPIRES 09-30-23

| | | |
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| DESIGN: | BAF | DATE: 10/6/23 |
| DRAWN: | DGG | DATE: 10/6/23 |
| CHECKED: | BAF | DATE: 10/6/23 |

REGISTERED PROFESSIONAL ENGINEER BRADLEY ALAN FRIEDERICHS S2780 STRUCTURAL STATE OF CALIFORNIA
10/6/23

SCALE: AS SHOWN
DRAWING NUMBER: S1.2
SHEET NUMBER: 48 OF 68 SHEETS




FOUNDATION PLAN
SCALE: ½"=1'-0"


VE SOLUTIONS
Incorporated

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0 1"

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**RAW WATER LINE REPLACEMENT PROJECT**

# FOUNDATION PLAN

**CITY OF FORT BRAGG** **CALIFORNIA**

DESIGNED UNDER THE DIRECTION OF:

10/6/23

BRADLEY A. FRIEDERICHS DATE
R.S.E. No. S2780 - REGISTRATION EXPIRES 09-30-23

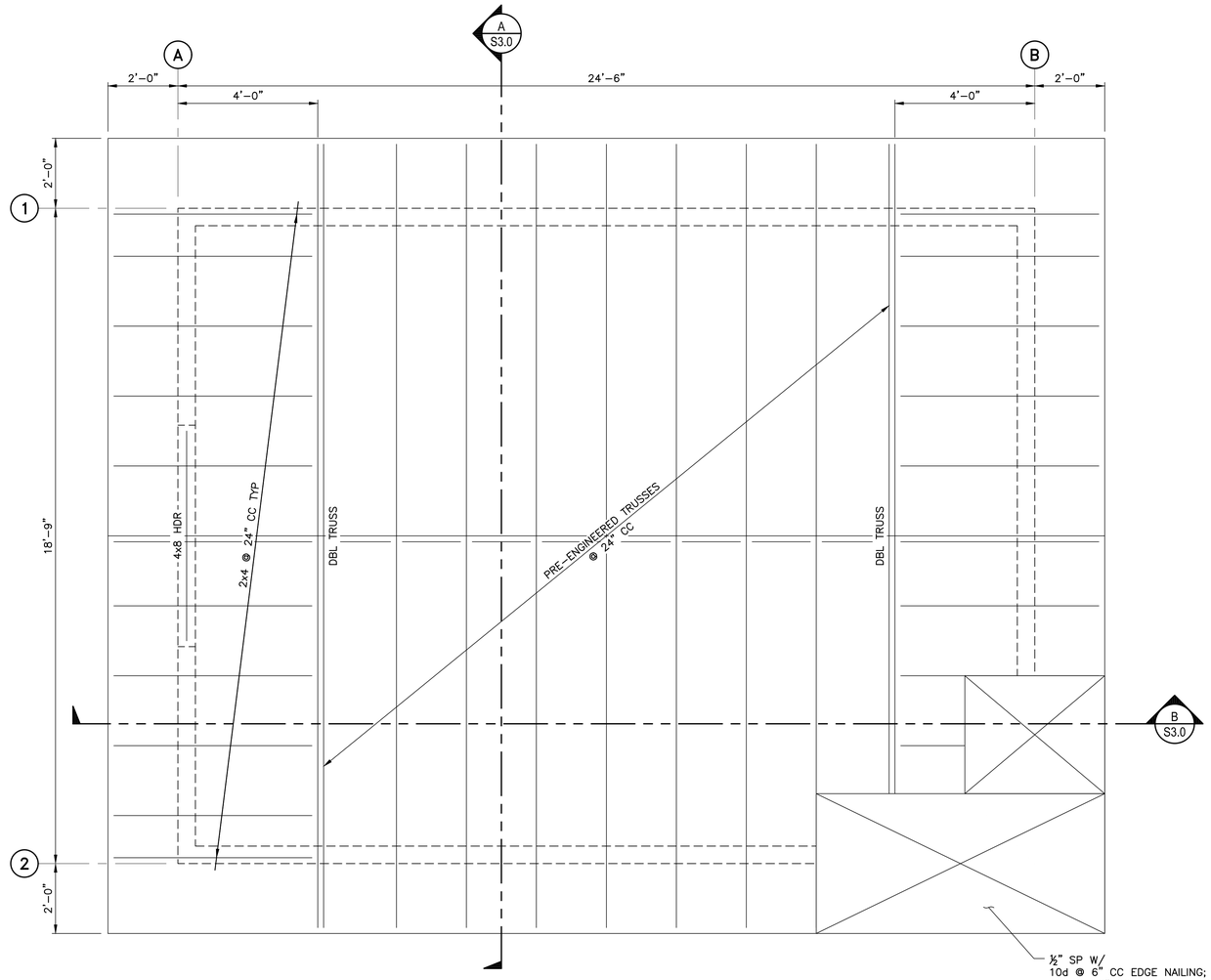
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| CHECKED: | BAF | DATE: 10/6/23 |

REGISTERED PROFESSIONAL ENGINEER
BRADLEY ALAN FRIEDERICHS
S2780
STRUCTURAL
STATE OF CALIFORNIA
10/6/23

SCALE
AS SHOWN

DRAWING NUMBER
S2.0

SHEET NUMBER
49 OF 68 SHEETS




ROOF FRAMING PLAN
SCALE: ½"=1'-0"

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**RAW WATER LINE REPLACEMENT PROJECT**

# ROOF FRAMING PLAN

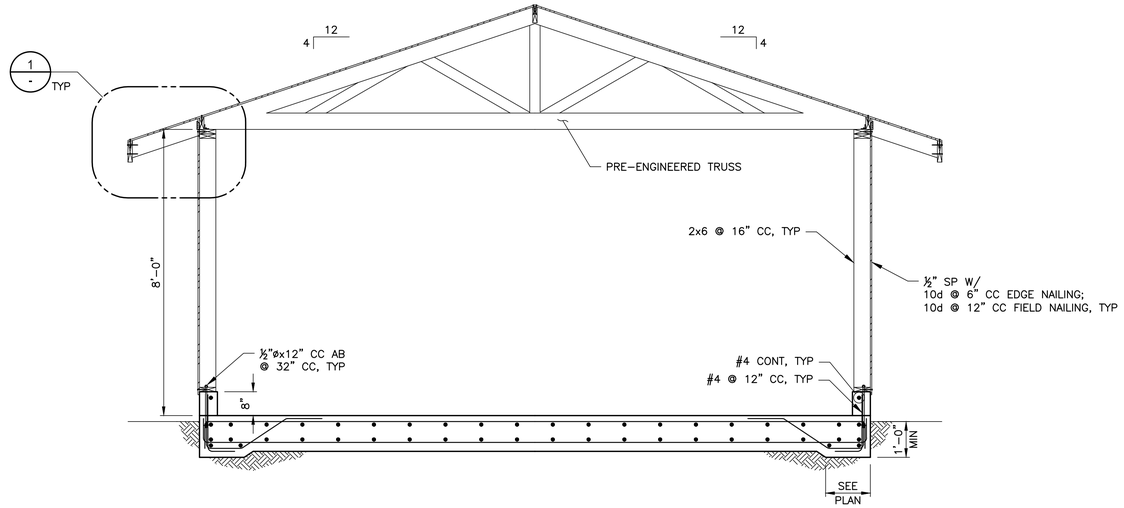
**CITY OF FORT BRAGG** **CALIFORNIA**

DESIGNED UNDER THE DIRECTION OF:
10/6/23
BRADLEY A. FRIEDERICHS DATE
R.S.E. No. S2780 - REGISTRATION EXPIRES 09-30-23

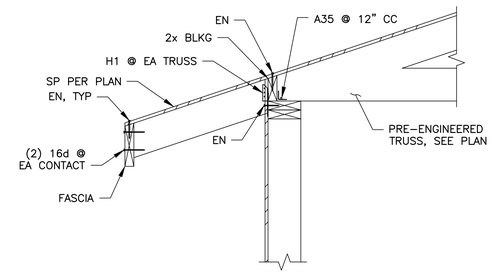
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REGISTERED PROFESSIONAL ENGINEER
BRADLEY ALAN FRIEDERICHS
S2780
STRUCTURAL
STATE OF CALIFORNIA
10/6/23

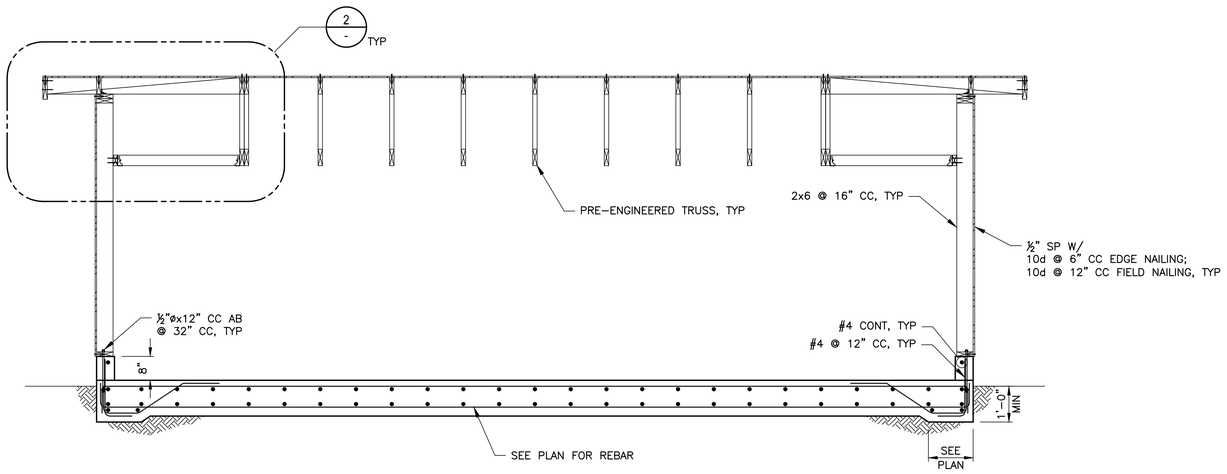
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DRAWING NUMBER
S2.1
SHEET NUMBER
50 OF 68 SHEETS



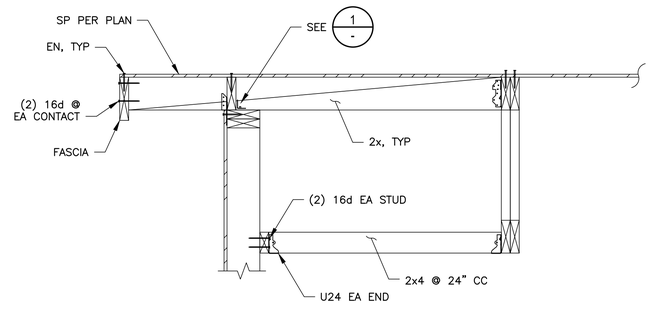

SECTION
SCALE: ½"=1'–0"
A
S2.0




DETAIL
SCALE: 1"=1'–0"
1
-




SECTION
SCALE: ½"=1'–0"
B
S2.0




DETAIL
SCALE: 1"=1'–0"
2
-

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**RAW WATER LINE REPLACEMENT PROJECT**

# SECTIONS & DETAILS

**CITY OF FORT BRAGG** **CALIFORNIA**

DESIGNED UNDER THE DIRECTION OF:
10/6/23
BRADLEY A. FRIEDERICHS DATE
R.S.E. No. S2780 - REGISTRATION EXPIRES 09-30-23

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REGISTERED PROFESSIONAL ENGINEER
BRADLEY ALAN FRIEDERICHS
S2780
STRUCTURAL
STATE OF CALIFORNIA
10/6/23

SCALE
AS SHOWN
DRAWING NUMBER
S3.0
SHEET NUMBER
51 OF 68 SHEETS

## ABBREVIATIONS

| | |
|---|---|
| A | AMPERES |
| AC | ALTERNATING CURRENT |
| AFF | ABOVE FINISHED FLOOR |
| AICS | AMPERES INTERRUPTING CAPACITY, SYMMETRICAL |
| AWG | AMERICAN WIRE GAUGE |
| BC | BARE COPPER |
| C | CONDUIT |
| CB | CIRCUIT BREAKER |
| CO | CONDUIT ONLY |
| CKT | CIRCUIT |
| CPT | CONTROL POWER TRANSFORMER |
| CT | CURRENT TRANSFORMER |
| DP | DEEP |
| DC | DIRECT CURRENT |
| DISC | DISCONNECT |
| DWG | DRAWING |
| E | EXISTING |
| ELEV | ELEVATION |
| G, GND | GROUND |
| GEC | GROUNDING ELECTRODE CONDUCTOR |
| GFCI | GROUND FAULT CURRENT INTERRUPTING |
| GRS | GALVANIZED RIGID STEEL |
| HDG | HOT DIPPED GALVANIZED |
| HH | HANDHOLE |
| HOA | HAND OFF AUTOMATIC |
| HP | HORSEPOWER |
| HPS | HIGH PRESSURE SODIUM |
| HR | HOUR |
| Hz | HERTZ |
| JB | JUNCTION BOX |
| KVA | KILOVOLT AMPERES |
| KW | KILOWATT |
| L | LONG |
| LA | LIGHTING ARRESTOR |
| LTG | LIGHTING |
| MT'D | MOUNTED |
| MA | MILLIAMPERE |
| MCC | MOTOR CONTROL CENTER |
| MCB | MAIN CIRCUIT BREAKER |
| MIN | MINIMUM |
| N | NEUTRAL |
| NC | NORMAL CLOSED |
| NO | NORMAL OPEN |
| NTS | NOT TO SCALE |
| O/L'S | OVERLOADS |
| P | POLE |
| PB | PULL BOX, PUSH BUTTON |
| PH, ø | PHASE |
| PLC | PROGRAMMABLE LOGIC CONTROLLER |
| PQM | POWER QUALITY METER |
| PS | PRESSURE SWITCH |
| PT | POTENTIAL TRANSFORMER |
| PVC | POLYVINYL CHLORIDE |
| RECP | RECEPTACLE |
| RGS | RIGID STEEL CONDUIT |
| RVSS | REDUCED VOLTAGE SOLID STATE |
| SMUD | SACRAMENTO MUNICIPAL UTILITY DISTRICT |
| SW | SWITCH |
| TB | TERMINAL BOARD |
| TEL. CO. | TELEPHONE COMPANY |
| TWSP | TWISTED SHIELDED PAIR |
| TYP | TYPICAL |
| UON | UNLESS OTHERWISE NOTED |
| UG | UNDERGROUND |
| V | VOLT |
| W | WIRE, WIDE |
| W/ | WITH |
| WP | WEATHERPROOF |
| XFMR | TRANSFORMER |

## ELECTRICAL SYMBOLS – PLANS

| CLG. | WALL | FLR. | SYMBOLS DESCRIPTION |
|---|---|---|---|
| | | | DUPLEX RECEPTACLE |
| | | | JUNCTION BOX |
| | | | AREA FLOOD LIGHT AND POLE |
| | +18" | | INDICATES HEIGHT FROM FINISHED GRADE TO CENTERLINE OF DEVICE |
| | * | | + 18" U.O.N. |
| | HH | | HANDHOLE, 11"Hx17"Lx18"D, U.O.N. |
| | F | | FUSIBLE DISCONNECT SWITCH SITE AS NOTED ON PLANS. |
| | | | CONTROL STATION, SEE SCHEMATIC DIAGRAM |
| | | | FEEDER DESIGNATION SEE SCHEDULE OR ONE LINE DIAGRAM FOR SIZE |
| | | | CONDUIT IN SLAB OR UNDER GROUND 3/4"C–2#12 & 1#12 GND. U.O.N. |
| | | | CONDUIT EXPOSED 3/4"C–2#12 & 1#12 GND U.O.N. |
| | | | QUANTITY #12 WIRE 3/4"C U.O.N. CURVE LINE INDICATES GROUND WIRE |
| | #10 | | WIRE SIZE OTHER THAN #12 CURVE LINE INDICATES GROUND WIRE |
| | G | | GROUNDING CONDUCTOR 30" BELOW GRADE, #4/0 U.O.N. |
| | G | | EXOTHERMIC WELD CONNECTION |
| | A–1,3 | | HOMERUN TO PANEL A, CIRCUIT 1 AND 3 |
| | | | CONDUIT BENDS TOWARD OBSERVER |
| | | | CONDUIT BENDS AWAY FROM OBSERVER |
| | | | CONDUIT STUB–OUT AND CAPPED |
| | J | | FLEXIBLE CONDUIT CONNECTION |
| | | | CONDUIT SEAL (HAZARDOUS LOCATION) |
| | | | MOTOR CONNECTION |
| | GW | | GROUND ROD, 3/4" x 10'–0" GW NEXT TO SYMBOL INDICATES GROUND ROD WITH GROUND WELL. SEE DETAIL, GW / GE–2 |
| | X / E–Y | | DETAIL CALLOUT– X, DETAIL IDENTIFIER. Y– SHEET WHERE DETAIL IS DRAWN |
| | | | JUNCTION BOX OR PULLBOX |
| (E) | | | EXISTING TO REMAIN |
| (RS) | | | EXISTING TO BE REMOVE AND SALVAGED. |
| (D) | | | EXISTING TO BE DEMOLISHED. |

## ELECTRICAL SYMBOLS – SINGLE LINE DIAGRAM

| | |
|---|---|
| M | UTILITY METERING |
| AM | AMMETER |
| VM | VOLTMETER |
| VS | VOLTMETER SWITCH |
| AS | AMMETER SWITCH |
| 3 | CURRENT TRANSFORMER, QUANTITY INDICATED |
| | POWER TRANSFORMER |
| 100A MCP | CIRCUIT BREAKER, 3 POLE UNLESS NOTED MCP INDICATES MOTOR CIRCUIT PROTECTOR |
| 4 | MAGNETIC MOTOR STARTER, NEMA SIZE INDICATED FVNR=FULL–VOLTAGE NON–REVERSING 2S, 2W = 2 SPEED, 2 WINDING |
| | SWITCH |
| | FUSE |
| F | DISCONNECT SWITCH "F" INDICATES FUSED, SEE PLANS FOR RATING |
| 15 | MOTOR, 15 HORSEPOWER |
| G | GENERATOR |
| | SURGE ARRESTER |
| | LIGHTING ARRESTER |
| | GROUND |
| | DELTA CONNECTION |
| | WYE CONNECTION |
| PFR | POWER FAILURE RELAY |
| GFR | GROUND FAULT RELAY |
| | SPACE HEATER |
| | FLUORESCENT LIGHT FIXTURE |
| | VENTILATION FAN |
| | UTILITY SERVICE |
| | SOLID STATE STARTER |
| VFD | VARIABLE FREQUENCY DRIVE |

## ELECTRICAL SYMBOLS – SCHEMATIC DIAGRAMS

| NORMALLY OPEN | NORMALLY CLOSED | DEVICE |
|---|---|---|
| | | CONTACT |
| | | PUSH BUTTON SINGLE CIRCUIT MOMENTARY CONTACT |
| | | PUSH BUTTON SINGLE CIRCUIT LOCK–OUT |
| | | LIQUID FLOAT LEVEL SWITCH |
| | | PRESSURE OR VACUUM SWITCH |
| | | FLOW SWITCH |
| | | TEMPERATURE SWITCH |
| | | TIME CONTACT CONTACT ACTION RETARDED ON ENERGIZATION |
| | | TIME CONTACT CONTACT ACTION RETARDED ON DE–ENERGIZATION |
| | | SELECTOR SWITCH (H–O–A) |
| | | MANUAL MOTOR STARTER |
| | O.L. | MOTOR OVERLOAD RELAY CONTACT |
| | | MOTOR OVERLOAD HEATER |
| A | | PILOT LIGHT R=RED, W=WHITE, G=GREEN, A=AMBER |
| R | | PILOT LIGHT–PUSH TO TEST |
| R | | RELAY |
| TD | | TIME DELAY RELAY |
| M | | STARTER COIL |
| S | | SOLENOID OPERATED VALVE |
| | | MOTOR |
| | | BELL OR BUZZER |
| ETM | | ELAPSED TIME METER |
| | | FUSE |
| | | CONTROL POWER TRANSFORMER |
| | | GROUND |
| | | WIRING IN MOTOR STARTER OR CONTROL PANEL |
| | | FIELD WIRING |
| | | WIRE TERMINAL IN MOTOR STARTER OR CONTROL PANEL |
| | | WIRE TERMINAL IN PLC |
| PFR | | PHASE/POWER FAILURE RELAY |
| | | SPACE HEATER |
| | | RESISTOR |
| | | CIRCUIT BREAKER |

## GENERAL NOTES:

1. INSTALLATION SHALL MEET ALL REQUIREMENTS OF THE LATEST EDITION OF THE NATIONAL ELECTRICAL CODE (NEC) AND ALL LOCAL CODES HAVING JURISDICTION.
2. AN EQUIPMENT GROUNDING CONDUCTOR SIZED PER THE NEC SHALL BE PULLED IN ALL ELECTRICAL CONDUITS (POWER AND CONTROL) WHETHER OR NOT SHOWN ON THE PLANS.
3. ALL EQUIPMENT SHALL BE NEW, UNUSED, AND U.L. LISTED (WHERE A U.L. LISTING IS AVAILABLE FOR THAT CLASS OF EQUIPMENT).
4. ALL EQUIPMENT FURNISHED AND INSTALLED BY THE CONTRACTOR SHALL BE GUARANTEED AGAINST DEFECTS IN MATERIALS AND WORKMANSHIP FOR A PERIOD OF ONE YEAR FROM THE DATE OF ACCEPTANCE.
5. THE DRAWINGS ARE NOT INTENDED TO SHOW THE EXACT LOCATION OF CONDUIT RUNS AND STUB–UPS. THESE ARE TO BE COORDINATED WITH OTHER TRADES TO AVOID CONFLICTS AND MAINTAIN REQUIRED CLEARANCES. THE CONTRACTOR SHALL COORDINATE CONDUIT STUB–UP LOCATIONS BASED UPON APPROVED EQUIPMENT SHOP DRAWINGS. UNLESS SHOWN OTHERWISE,
6. ALL LIGHTING & RECEPTACLE HOMERUNS SHALL BE 3/4" CONDUIT CONTAINING (AS A MINIMUM) 2#12 AND 1 #12 GND.
7. DETAILS APPLY TO ALL WORK, EVEN IF DETAIL CALLOUT IS NOT SPECIFICALLY CALLED OUT ON DRAWINGS.

10/6/23 S:_PROJECTS\FTBG18-001 – RAW WATER LINE REPLACEMENT PROJECT\CAD\SEGMENTS 2-5 FULL SET\GE1 – ABBREVIATIONS AND SYMBOLS.DWG

J Calton Engineering

BAR IS ONE INCH AT FULL SCALE

0 1"

IF NOT ONE INCH ON THIS SHEET SCALE ACCORDINGLY

| NO. | REVISIONS | BY | APP | DATE |
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**RAW WATER LINE REPLACEMENT PROJECT**

# ABBREVIATIONS AND SYMBOLS

**CITY OF FORT BRAGG** **CALIFORNIA**

DESIGNED UNDER THE DIRECTION OF:

JOHN C. CALTON 10/6/23
No. 14099 - REGISTRATION EXPIRES 06-30-23 DATE

| | | |
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| DESIGN: | JCC | DATE: 10/6/23 |
| DRAWN: | WCJ | DATE: 10/6/23 |
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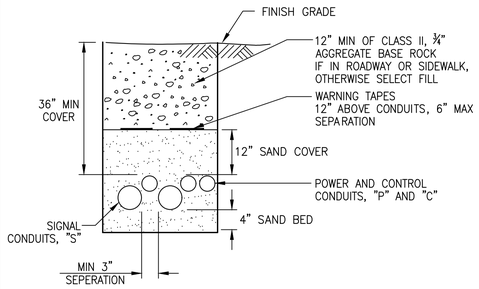
REGISTERED PROFESSIONAL ENGINEER JOHN C. CALTON No. 14099 ELECTRICAL STATE OF CALIFORNIA

10/6/23

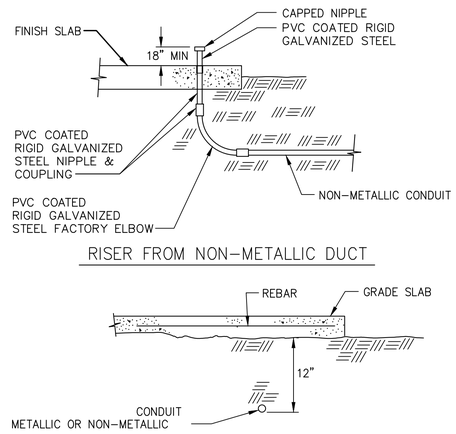
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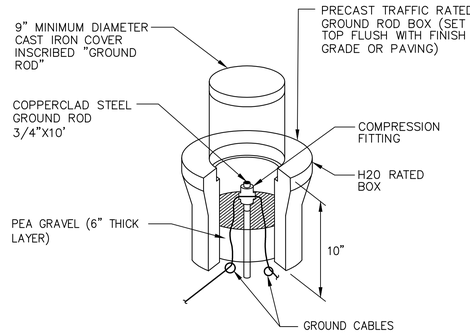
SHEET NUMBER 52 OF 68 SHEETS



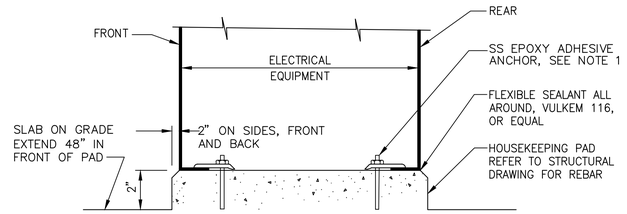

TYPICAL ELECTRICAL TRENCH SECTION 1




CONDUIT PLACEMENT UNDER SLAB 2

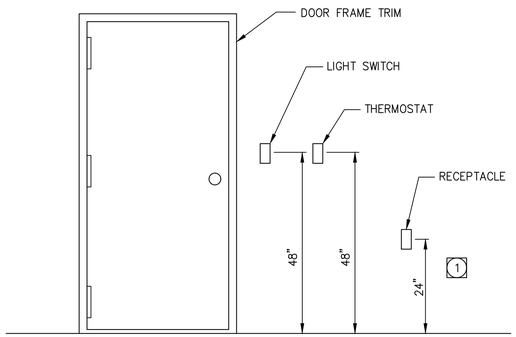



GROUND ROD INSTALLATION 3



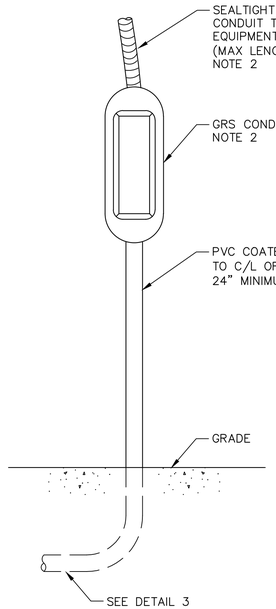

NOTES:
1. EQUIPMENT ANCHORAGE SHALL BE DESIGNED BY A REGISTERED CIVIL OR STRUCTURAL ENGINEER.

FREESTANDING EQUIPMENT MOUNTING 4




OUTLET BOX MOUNTING 5

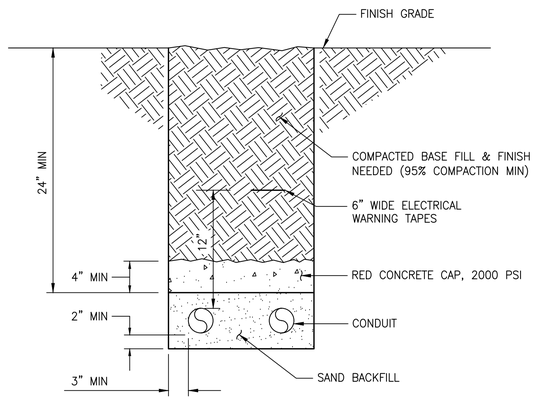
1 OR AS NOTED ON PLAN DRAWINGS




NOTES:

1. CONDUIT STUB UP THRU CONCRETE FLOOR TO BE PVC COATED GALVANIZED RIGID STEEL.
2. CONTRACTOR TO PROVIDE HOT DIPPED GALVANIZED STRUT, ANCHORED TO FLOOR, FOR SUPPORT OF CONDUITS, PER NEC.

TYPICAL CONDUIT TO EQUIPMENT DETAIL 6




CONCRETE CAP TRENCH DETAIL 7

J Calton Engineering

BAR IS ONE INCH AT FULL SCALE

0 1"

IF NOT ONE INCH ON THIS SHEET SCALE ACCORDINGLY

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**RAW WATER LINE REPLACEMENT PROJECT**

# DETAILS – SHEET 1 OF 4

**CITY OF FORT BRAGG** **CALIFORNIA**

DESIGNED UNDER THE DIRECTION OF:
JOHN C. CALTON 10/6/23
No. 14099 - REGISTRATION EXPIRES 06-30-23 DATE

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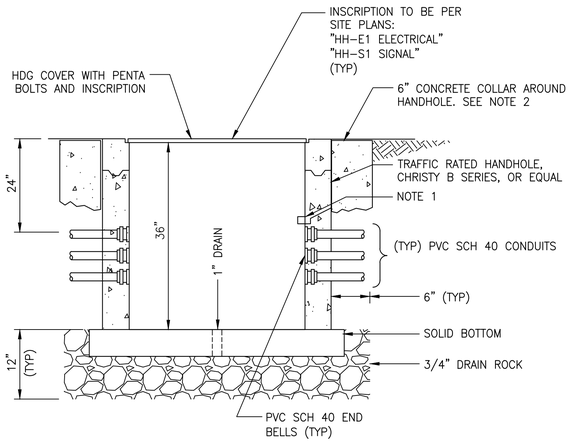
REGISTERED PROFESSIONAL ENGINEER JOHN C. CALTON No. 14099 ELECTRICAL STATE OF CALIFORNIA 10/6/23

SCALE NO SCALE

DRAWING NUMBER GE2

SHEET NUMBER 53 OF 68 SHEETS

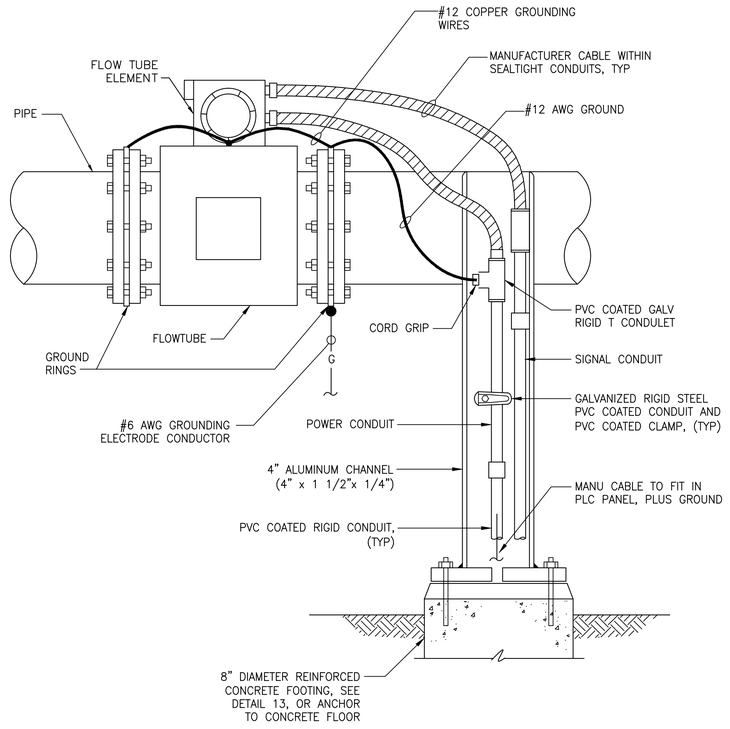
10/5/23 - S:_PROJECTS\FTBG18-001 - RAW WATER LINE REPLACEMENT PROJECT\CAD\SEGMENTS 2-5 FULL SET\GE2 - DETAILS - SHEET 1 OF 4.DWG



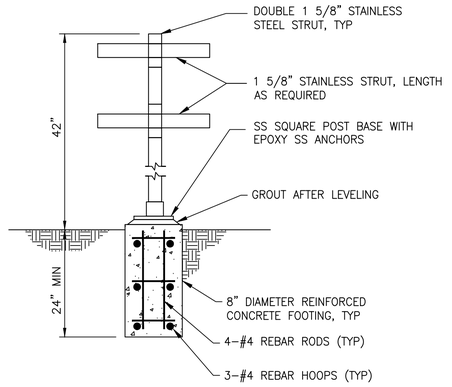

NOTES:

1. PROVIDE AND INSTALL EPOXY CEMENT PHENOLIC TAG, INSCRIBED WITH CONDUIT NUMBER, ABOVE EACH CONDUIT, OR CABLE TIE TO CONDUIT.
2. INSTALL TRAFFIC RATED HANDHOLE WITH 6" CONCRETE COLLAR. REFER TO CHRISTY CONCRETE TRAFFIC RATED INSTALLATION GUIDE. PROVIDE 1" DRAIN IN BOTTOM SLAB.
3. LABEL CABLES WITH ENGRAVED PHENOLICS PER SPECIFICATIONS.

PRE–CAST HANDHOLE DETAIL 11



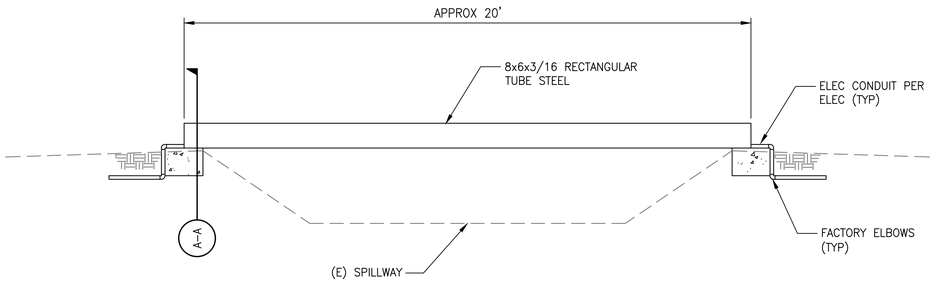

FLOWMETER WIRING DETAIL 12




NOTES:

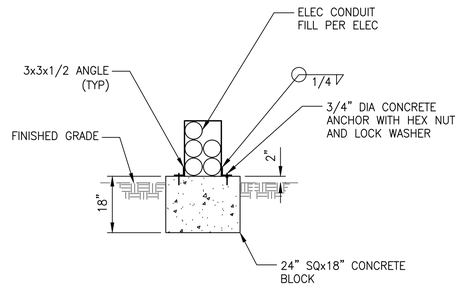
1. ALL STRUT AND HARDWARE SHALL BE TYPE 316 STAINLESS STEEL.

SINGLE STANCHION DETAIL 13




NOTES:

1. COAT TUBE STEEL AND ANGLES PER SPECIFICATIONS.
2. PROVIDE ONE GUARD POST EACH END. FIELD LOCATE TO PROTECT EXPOSED CONDUIT.




SECTION A–A

ELECTRICAL CONDUIT STREAM CROSSING 14

J Calton Engineering

BAR IS ONE INCH AT FULL SCALE
0 1"
IF NOT ONE INCH ON THIS SHEET SCALE ACCORDINGLY

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**RAW WATER LINE REPLACEMENT PROJECT**

# DETAILS – SHEET 2 OF 4

**CITY OF FORT BRAGG** **CALIFORNIA**

DESIGNED UNDER THE DIRECTION OF:
JOHN C. CALTON 10/6/23
No. 14099 - REGISTRATION EXPIRES 06-30-23 DATE
DESIGN: JCC DATE: 10/6/23
DRAWN: WCJ DATE: 10/6/23
CHECKED: JCC DATE: 10/6/23

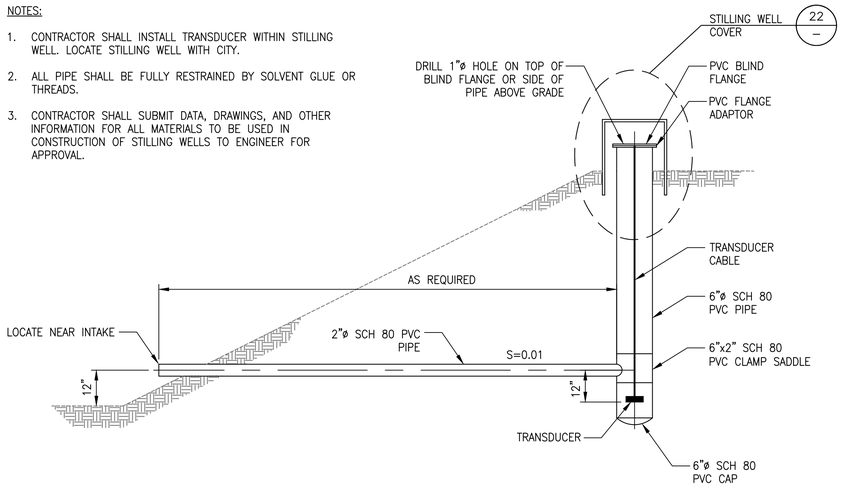
REGISTERED PROFESSIONAL ENGINEER JOHN C. CALTON No. 14099 ELECTRICAL STATE OF CALIFORNIA 10/6/23

SCALE NO SCALE
DRAWING NUMBER GE3
SHEET NUMBER 54 OF 68 SHEETS

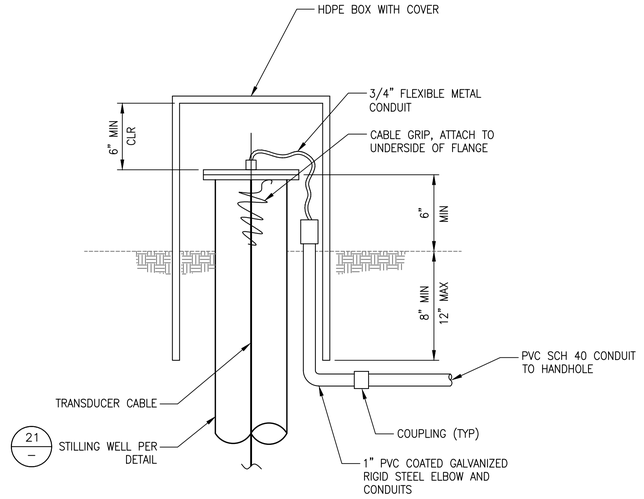
10/5/23 S:_PROJECTS\FTBG18-001 - RAW WATER LINE REPLACMENT PROJECT\CAD\SEGMENTS 2-5 FULL SET\DE3 - DETAILS - SHEET 2 OF 4.DWG

NOTES:

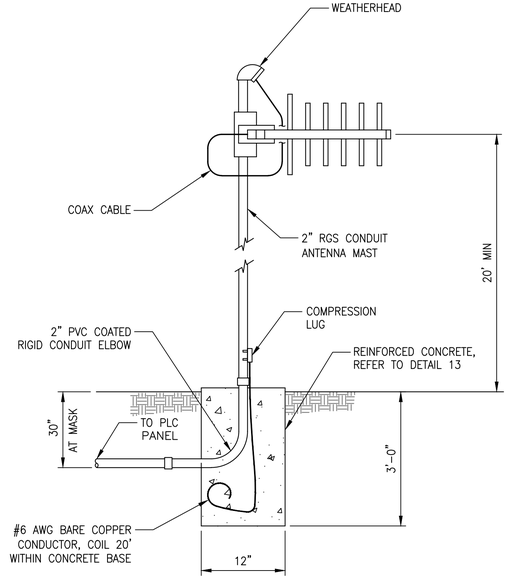
1. CONTRACTOR SHALL INSTALL TRANSDUCER WITHIN STILLING WELL. LOCATE STILLING WELL WITH CITY.
2. ALL PIPE SHALL BE FULLY RESTRAINED BY SOLVENT GLUE OR THREADS.
3. CONTRACTOR SHALL SUBMIT DATA, DRAWINGS, AND OTHER INFORMATION FOR ALL MATERIALS TO BE USED IN CONSTRUCTION OF STILLING WELLS TO ENGINEER FOR APPROVAL.




## STILLING WELL DETAIL 21
NO SCALE




## STILLING WELL COVER DETAIL 22
NO SCALE




## ANTENNA MAST INSTALLATION 23
NO SCALE

J Calton Engineering

BAR IS ONE INCH AT FULL SCALE
0 — 1"
IF NOT ONE INCH ON THIS SHEET SCALE ACCORDINGLY

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**RAW WATER LINE REPLACEMENT PROJECT**

# DETAILS – SHEET 3 OF 4

**CITY OF FORT BRAGG** **CALIFORNIA**

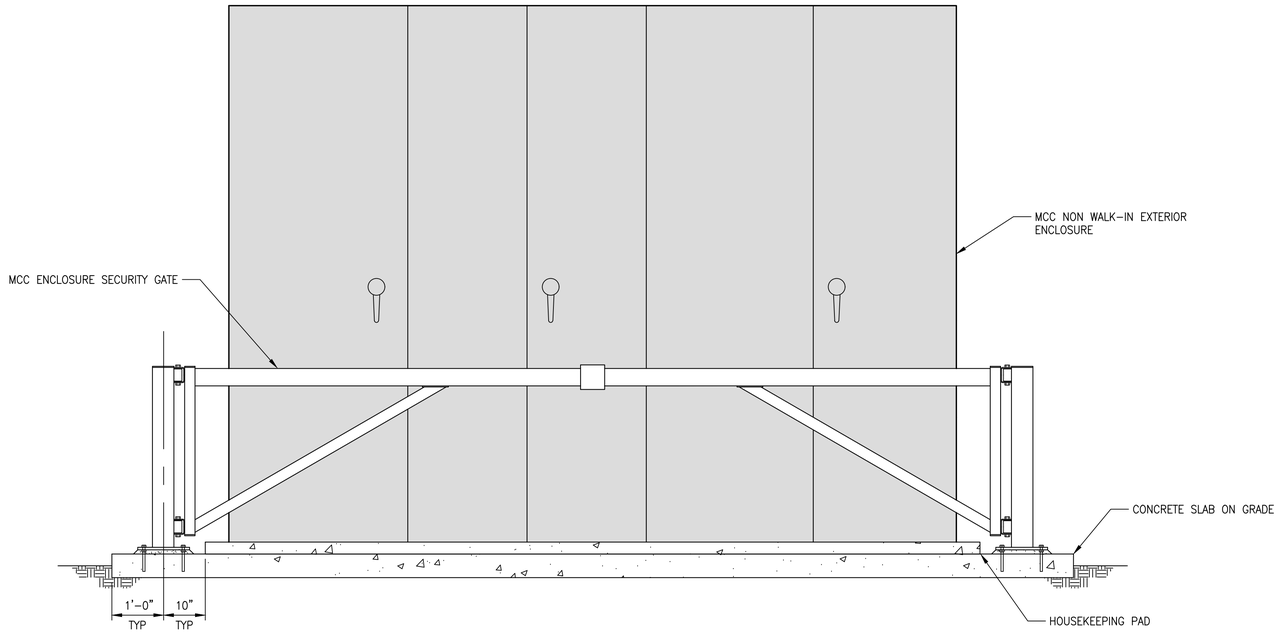
DESIGNED UNDER THE DIRECTION OF:
JOHN C. CALTON 10/6/23
No. 14099 - REGISTRATION EXPIRES 06-30-23 DATE

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| DESIGN: | JCC | DATE: 10/6/23 |
| DRAWN: | WCJ | DATE: 10/6/23 |
| CHECKED: | JCC | DATE: 10/6/23 |

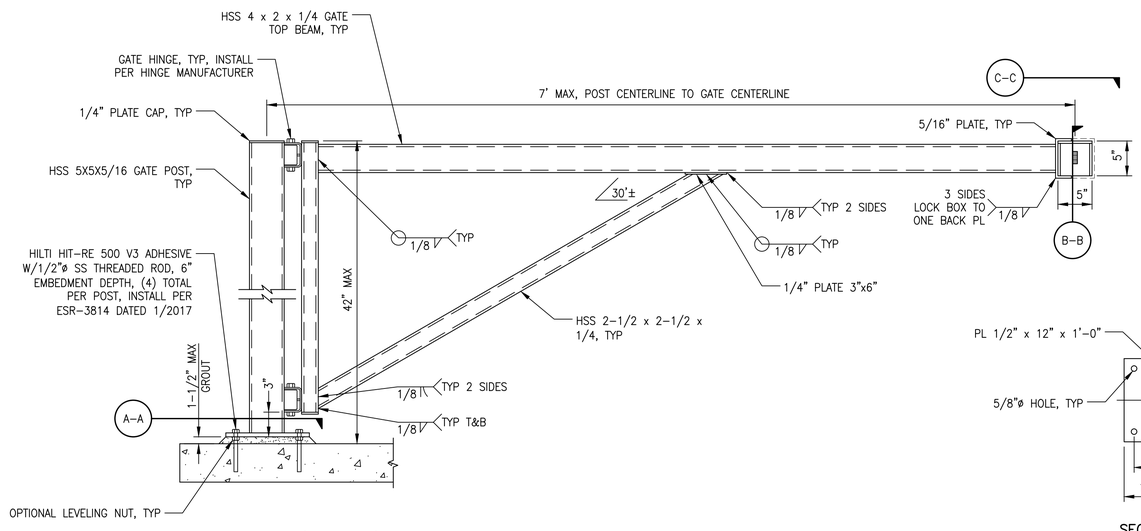
REGISTERED PROFESSIONAL ENGINEER — JOHN C. CALTON — No. 14099 — ELECTRICAL — STATE OF CALIFORNIA
10/6/23

SCALE NO SCALE
DRAWING NUMBER GE4
SHEET NUMBER 55 OF 68 SHEETS

10/5/23 S:_PROJECTS\FTBG18-001 – RAW WATER LINE REPLACEMENT PROJECT\CADD\SEGMENTS 2-5 FULL SET\GE4 – DETAILS – SHEET 3 OF 4.DWG



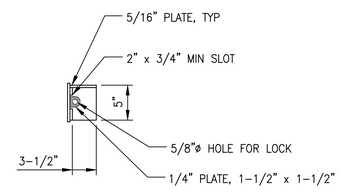

GATE / MCC ELEVATION



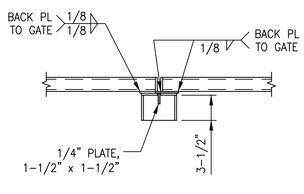

GATE DETAIL (TYP OF 2)




SECTION A-A




SECTION B-B




SECTION C-C

## MCC ENCLOSURE SECURITY GATE

NTS

10/5/23 S:_PROJECTS\TBD18-001 - RAW WATER LINE REPLACEMENT PROJECT\CADD\SEGMENTS 2-5 FULL SET\GE5 - DETAILS - SHEET 4 OF 4.DWG

J Calton Engineering

BAR IS ONE INCH AT FULL SCALE
0 1"
IF NOT ONE INCH ON THIS SHEET SCALE ACCORDINGLY

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**RAW WATER LINE REPLACEMENT PROJECT**

# DETAILS - SHEET 4 OF 4

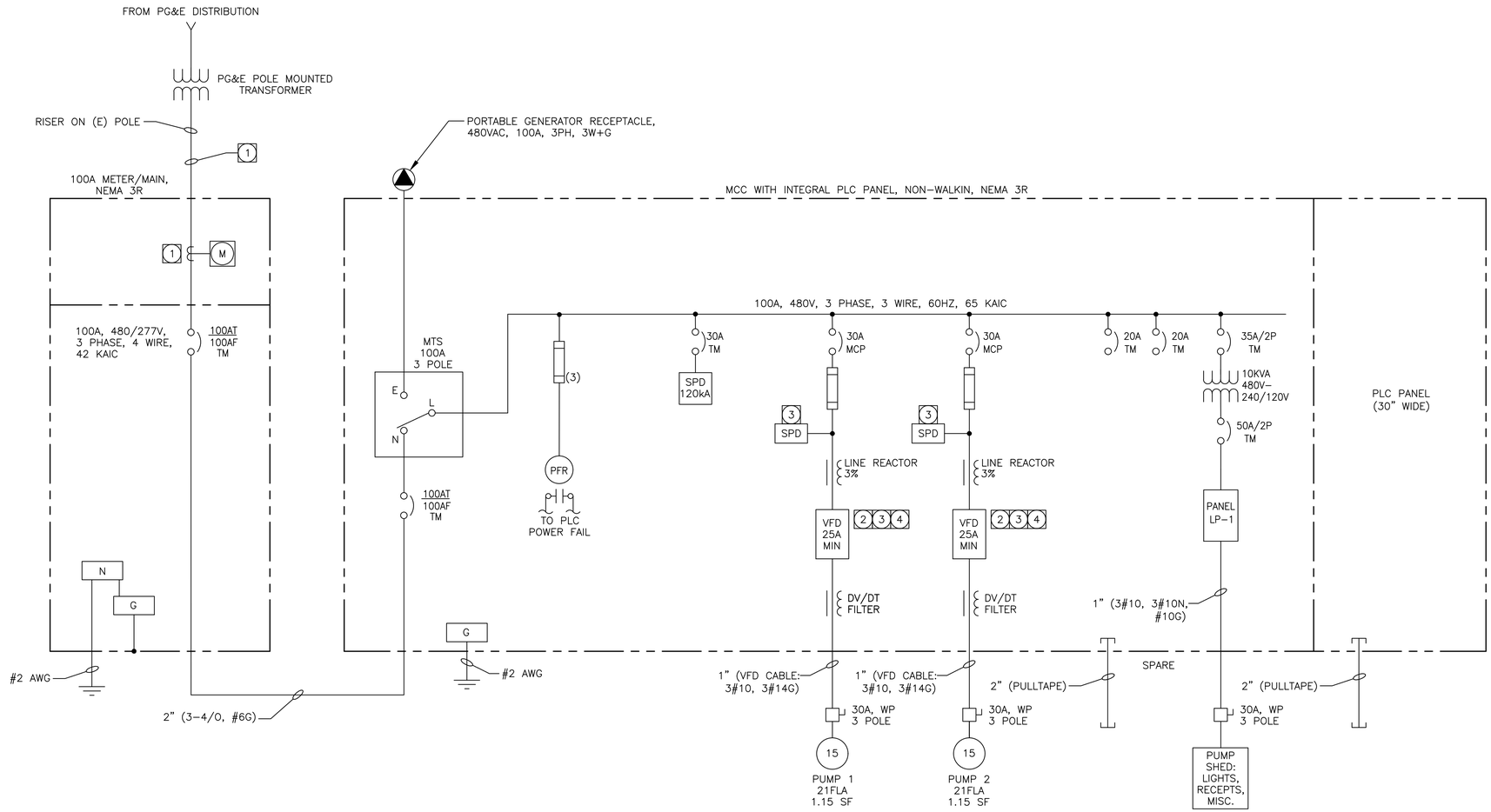
**CITY OF FORT BRAGG** **CALIFORNIA**

DESIGNED UNDER THE DIRECTION OF:
JOHN C. CALTON 10/6/23
No. 14099 - REGISTRATION EXPIRES 06-30-23 DATE

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| DESIGN: | JCC | DATE: 10/6/23 |
| DRAWN: | WCJ | DATE: 10/6/23 |
| CHECKED: | JCC | DATE: 10/6/23 |

REGISTERED PROFESSIONAL ENGINEER JOHN C. CALTON No. 14099 ELECTRICAL STATE OF CALIFORNIA 10/6/23

SCALE NO SCALE
DRAWING NUMBER GE5
SHEET NUMBER 56 OF 68 SHEETS




| LOAD CALCULATIONS AT 480 VAC | |
|---|---|
| **DESCRIPTION** | **AMPS** |
| PUMP 1 (15 HP) | 21.0 |
| PUMP 2 (15 HP) | 21.0 |
| 10KVA TRANSFORMER (480-120/240) | 21.0 |
| SUBTOTAL | 63.0 |
| 25% OF CONTINUOUS LOADS | 15.8 |
| **TOTAL LOAD** | **78.8** |

KEY NOTES:

1. INCLUDE ALL WORK FOR NEW PG&E SERVICE.
2. SIZE VFD, LINE REACTOR, AND DV/DT FILTER FOR SERVICE FACTOR RATING TIMES MOTOR FULL LOAD AMPS.
3. PROVIDE SPD (STRIKESORB) ON ALL LINE SIDE VFDS, RATED AT 30KA.
4. VFD'S SHALL HAVE MINIMUM AMPACITY AS SHOWN.

J Calton Engineering

BAR IS ONE INCH AT FULL SCALE

0 1"

IF NOT ONE INCH ON THIS SHEET SCALE ACCORDINGLY

| NO. | REVISIONS | BY | APP | DATE |
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**RAW WATER LINE REPLACEMENT PROJECT**

# SINGLE LINE DIAGRAM, LOAD CALCULATIONS

**CITY OF FORT BRAGG** **CALIFORNIA**

DESIGNED UNDER THE DIRECTION OF:

JOHN C. CALTON 10/6/23
No. 14099 - REGISTRATION EXPIRES 06-30-23 DATE

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|---|---|---|
| DESIGN: | JCC | DATE: 10/6/23 |
| DRAWN: | WCJ | DATE: 10/6/23 |
| CHECKED: | JCC | DATE: 10/6/23 |

REGISTERED PROFESSIONAL ENGINEER JOHN C. CALTON No. 14099 ELECTRICAL STATE OF CALIFORNIA 10/6/23

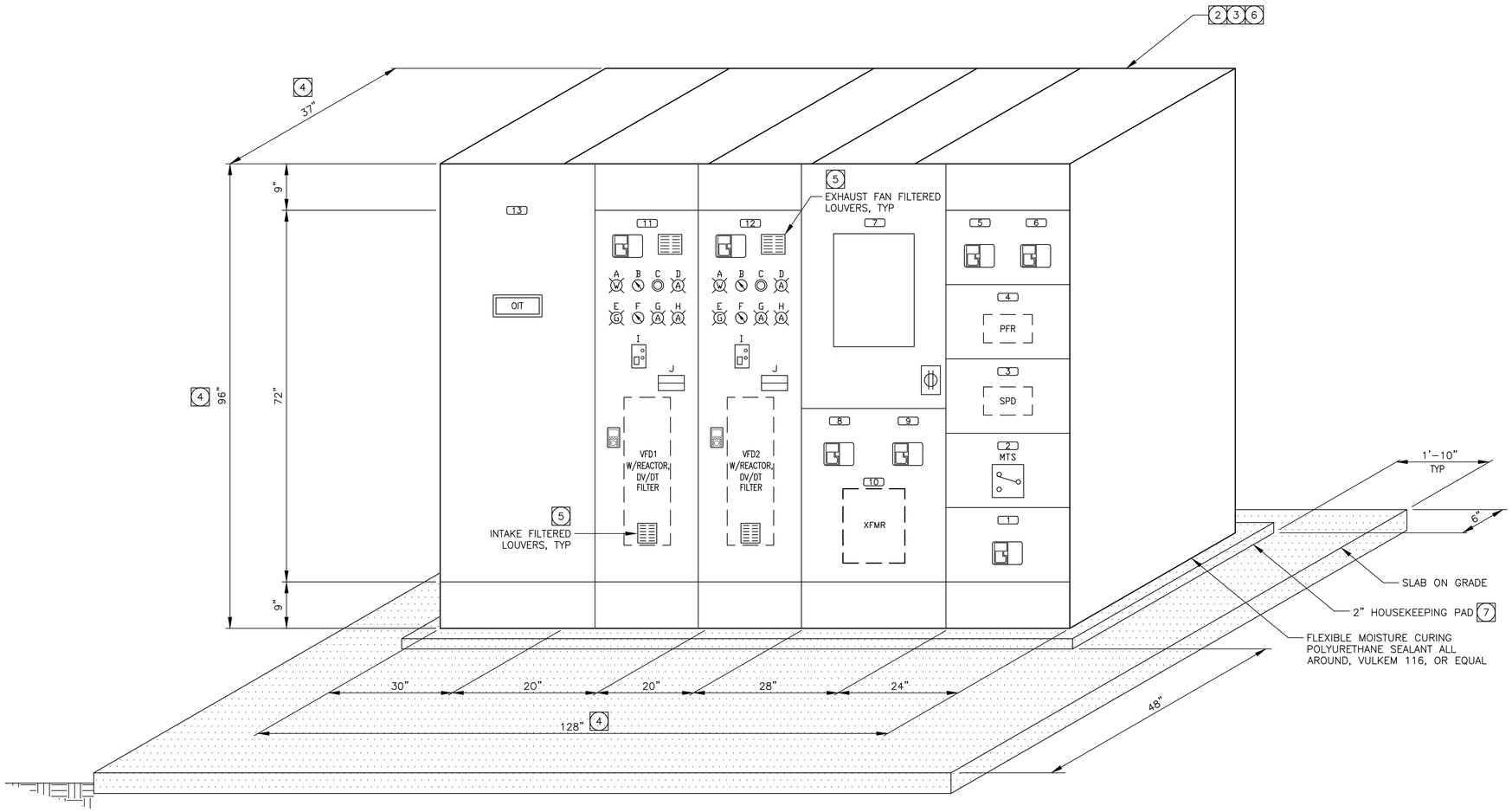
SCALE NO SCALE

DRAWING NUMBER E1

SHEET NUMBER 57 OF 68 SHEETS

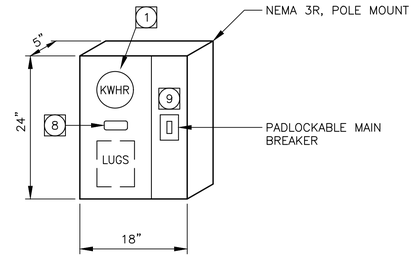
10/5/23 S:_PROJECTS\FTBG18-001 - RAW WATER LINE REPLACEMENT PROJECT\CAD\SEGMENTS 2-5 FULL SET\E1 - SINGLE LINE DIAGRAM, LOAD CALCULATIONS.DWG

| NAMEPLATE SCHEDULE | | | |
|---|---|---|---|
| TAG # | TYPE | SIZE | INSCRIPTION |
| 1 | PLATE | .75" X 3" | MAIN BREAKER |
| 2 | PLATE | .75" X 3" | MTS |
| 3 | PLATE | .75" X 3" | SPD INSIDE |
| 4 | PLATE | .75" X 3" | PFR INSIDE |
| 5 | PLATE | .75" X 3" | SPARE |
| 6 | PLATE | .75" X 3" | SPARE |
| 7 | PLATE | .75" X 3" | PANELBOARD LP-1 |
| 8 | PLATE | .75" X 3" | XFMR PRIMARY |
| 9 | PLATE | .75" X 3" | XFMR SECONDARY |
| 10 | PLATE | .75" X 3" | XFMR INSDE |
| 11 | PLATE | .75" X 3" | PUMP 1 VFD |
| 12 | PLATE | .75" X 3" | PUMP 2 VFD |
| 13 | PLATE | .75" X 3" | PLC PANEL |
| | | | |
| A | RING | N/A | CONTROL POWER ON |
| B | RING | N/A | HAND-OFF-AUTO |
| C | RING | N/A | RESET |
| D | RING | N/A | VFD FAULT |
| E | RING | N/A | PUMP RUNNING |
| F | RING | N/A | HAND SPEED |
| G | RING | N/A | HIGH DISCH PRESSURE |
| H | RING | N/A | PHASE FAIL |
| I | PLATE | .5" X 1.5" | MONITORING RELAY |
| J | RING | N/A | TIMER/COUNTER |




## MCC – INTERIOR ELEVATION

NTS




## METER/MAIN ELEVATION

NTS

KEY NOTES:

1. PROVIDE METERING SECTION PER PG&E.
2. MCC SHALL BE NON WALK–IN TYPE WITH SLOPED ROOM, PAINTED STEEL, NEMA 3R.
3. ELEVATION DOES NOT SHOW DEAD FRONT PADLOCKABLE, OUTER DOORS AND EXTERIOR WEATHERPROOF OVERALL ENCLOSURE. PROVIDE SAME NAMEPLATES (TAG #1 THRU #13) ON OUTER DOORS AS LISTED ON INTERIOR SECTIONS.
4. OVERALL MCC DIMENSIONS ACCOUNT FOR NON WALK–IN ENCLOSURE.
5. MCC SUPPLIER SHALL SUPPLY FANS AND LOUVERS AS REQUIRED, NOT ALL SHOWN ON INTERIOR ELEVATION.
6. PROVIDE LED LIGHTS WITHIN THE ENCLOSURE, TYPICAL FOR EACH DOOR.
7. PROVIDE HOUSEKEEPING PAD THAT IS INTEGRAL WITH SLAB ON GRADE. PAD SHALL BE MINIMUM 2" LARGER THAN EQUIPMENT IN ALL DIMENSIONS. SLAB SHALL EXTEND 48" IN FRONT OF PAD, AND BE 6" LARGER IN SIDES AND BACK.
8. PROVIDE NAMEPLATE WITH PHYSICAL ADDRESS, OR LATITUDE/LONGITUDE, PER PG&E GREENBOOK.
9. PROVIDE ARC FLASH LABEL WITH CALCULATIONS FOR NEC.
10. MOUNT PUMP MONITORING RELAY ON FRONT DOOR. COORDINATE SUPPLIER WITH PUMP SUPPLIER.

J Calton Engineering

BAR IS ONE INCH AT FULL SCALE

0 1"

IF NOT ONE INCH ON THIS SHEET SCALE ACCORDINGLY

| NO. | REVISIONS | BY | APP | DATE |
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**RAW WATER LINE REPLACEMENT PROJECT**

# EQUIPMENT ELEVATIONS

**CITY OF FORT BRAGG** **CALIFORNIA**

DESIGNED UNDER THE DIRECTION OF:

JOHN C. CALTON 10/6/23
No. 14099 - REGISTRATION EXPIRES 06-30-23 DATE

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|---|---|
| DESIGN: JCC | DATE: 10/6/23 |
| DRAWN: WCJ | DATE: 10/6/23 |
| CHECKED: JCC | DATE: 10/6/23 |

REGISTERED PROFESSIONAL ENGINEER JOHN C. CALTON No. 14099 ELECTRICAL STATE OF CALIFORNIA 10/6/23

SCALE NO SCALE

DRAWING NUMBER E2

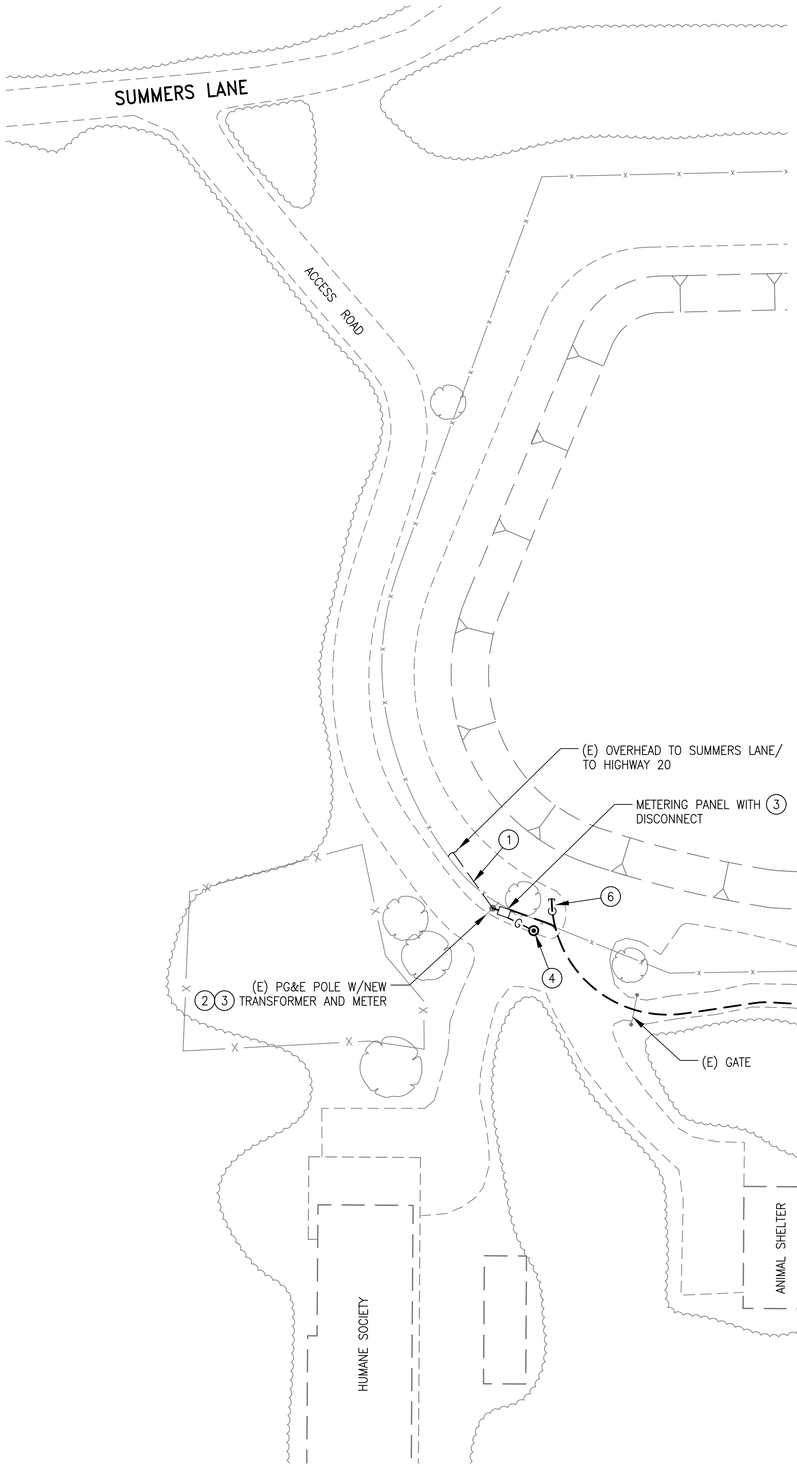
SHEET NUMBER 58 OF 68 SHEETS

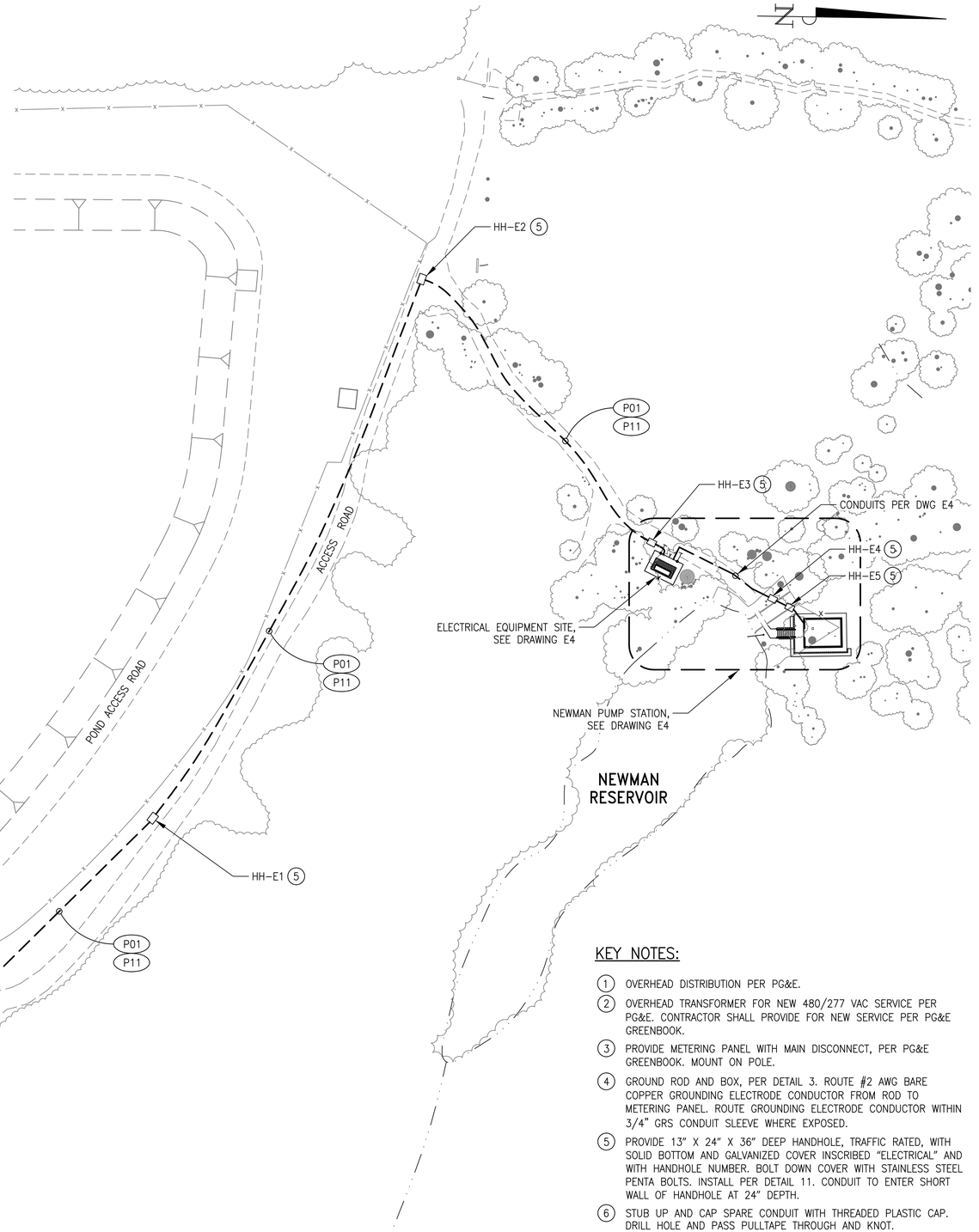
10/5/23 S:_PROJECTS\FTB618-001 - RAW WATER LINE REPLACEMENT PROJECT\CAD\SEGMENTS 2-5 FULL SET\E2 - EQUIPMENT ELEVATIONS.DWG

## GENERAL NOTES:

1. ALL EXPOSED CONDUITS, FITTINGS, CONDULETS TO BE GALVANIZED RIGID STEEL.
2. CONDUIT ROUTING IS DIAGRAMMATIC. CONTRACTOR IS RESPONSIBLE FOR FINAL ROUTING, STUB UP LOCATIONS, AND CONDUIT SPACING.
3. CONDUITS AND CABLES SHALL BE LABELED AT BOTH ENDS, AND WITHIN ALL INTERMEDIATE PULL OR ACCESS POINTS.
4. DUCT SEAL ALL CONDUITS STUBBING UP WITHIN PANELS, HANDHOLES, AND J–BOXES.
5. ALL EQUIPMENT AND CONTROL DEVICES TO HAVE NAMEPLATES. NAMEPLATES TO BE SCREWED ON. ADHESIVE NOT ACCEPTABLE.
6. USE PVC COATED FACTORY ELBOWS TO TRANSITION FROM BELOW GRADE TO EXPOSED CONDUIT RUNS.
7. STANDARD DETAILS APPLY, EVEN IF NOT CALLED OUT.
8. MAXIMUM LENGTH OF LIQUIDTIGHT FLEXIBLE METAL CONDUIT IS 18", UNLESS OTHERWISE APPROVED BY ENGINEER.
9. REFER TO CONDUIT AND CABLE SCHEDULE ON DWG E7.
10. ALL CONDUIT RISERS FROM BELOW GRADE TO EXPOSED TO BE PER DETAIL 2.
11. ALL UNDERGROUND TRENCHING TO BE PER DETAIL 1, UNLESS SHOWN OTHERWISE.
12. REFER TO MECHANICAL AND CIVIL DRAWINGS FOR EQUIPMENT LOCATIONS.
13. PROVIDE ALL NECESSARY ANCHORS, SUPPORTS, UNISTRUT, BOXES, ETC. FOR MOUNTING EQUIPMENT.
14. ALL CONCEALED GROUNDING CONNECTIONS TO BE IRREVERSIBLE COMPRESSION TYPE OR EXOTHERMIC TYPE.

## SUMMERS LANE RESERVOIR




## KEY NOTES:

1. OVERHEAD DISTRIBUTION PER PG&E.
2. OVERHEAD TRANSFORMER FOR NEW 480/277 VAC SERVICE PER PG&E. CONTRACTOR SHALL PROVIDE FOR NEW SERVICE PER PG&E GREENBOOK.
3. PROVIDE METERING PANEL WITH MAIN DISCONNECT, PER PG&E GREENBOOK. MOUNT ON POLE.
4. GROUND ROD AND BOX, PER DETAIL 3. ROUTE #2 AWG BARE COPPER GROUNDING ELECTRODE CONDUCTOR FROM ROD TO METERING PANEL. ROUTE GROUNDING ELECTRODE CONDUCTOR WITHIN 3/4" GRS CONDUIT SLEEVE WHERE EXPOSED.
5. PROVIDE 13" X 24" X 36" DEEP HANDHOLE, TRAFFIC RATED, WITH SOLID BOTTOM AND GALVANIZED COVER INSCRIBED "ELECTRICAL" AND WITH HANDHOLE NUMBER. BOLT DOWN COVER WITH STAINLESS STEEL PENTA BOLTS. INSTALL PER DETAIL 11. CONDUIT TO ENTER SHORT WALL OF HANDHOLE AT 24" DEPTH.
6. STUB UP AND CAP SPARE CONDUIT WITH THREADED PLASTIC CAP. DRILL HOLE AND PASS PULLTAPE THROUGH AND KNOT.

J Calton Engineering

BAR IS ONE INCH AT FULL SCALE
0 — 1"
IF NOT ONE INCH ON THIS SHEET SCALE ACCORDINGLY

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**RAW WATER LINE REPLACEMENT PROJECT**

# OVERALL ELECTRICAL SITE PLAN

**CITY OF FORT BRAGG** **CALIFORNIA**

DESIGNED UNDER THE DIRECTION OF:
JOHN C. CALTON 10/6/23
No. 14099 - REGISTRATION EXPIRES 06-30-23 DATE
DESIGN: JCC DATE: 10/6/23
DRAWN: WCJ DATE: 10/6/23
CHECKED: JCC DATE: 10/6/23

REGISTERED PROFESSIONAL ENGINEER JOHN C. CALTON No. 14099 ELECTRICAL STATE OF CALIFORNIA 10/6/23

SCALE 1"=40'
DRAWING NUMBER E3
SHEET NUMBER 59 OF 68 SHEETS

10/5/23 S:_PROJECTS\FTB018-001 - RAW WATER LINE REPLACEMENT PROJECT\CAD\SEGMENTS 2-5 FULL SET\E3 - OVERALL SITE PLAN.DWG

TO METER MAIN
SEE DWG E3

P01
P11

2 HH-E3

1

G

MCC AND PLC PANEL

ANTENNA AND MAST 7

115" RWD

S04

SLAB ON GRADE WITH HOUSEKEEPING PAD 5

INSTALL 8' HIGH CHAIN LINK FENCE W/PRIVACY SLATS

P02 P03 P04
C01 C02

S01
S05

HH-E4 2 4

3 4 HH-S1

HH-E5 2 4

(E) SPILLWAY 6

(E) WOOD FOOT BRIDGE

HH-S2
3 4

8 LT WITH STILLING WELL

REFER TO DRAWINGS E8 AND E9 FOR WORK HERE

NEWMAN PUMP STATION

NEWMAN RESERVOIR

## KEY NOTES:

1. GROUND ROD AND BOX, PER DETAIL 3. ROUTE #2 AWG BARE COPPER GROUNDING ELECTRODE CONDUCTOR FROM ROD TO MCC GROUND BUS, THROUGH SLAB ON GRADE.
2. PROVIDE 13" X 24" X 36" DEEP HANDHOLE, TRAFFIC RATED, WITH SOLID BOTTOM AND GALVANIZED COVER INSCRIBED "ELECTRICAL" AND WITH HANDHOLE NUMBER. BOLT DOWN COVER WITH STAINLESS STEEL PENTA BOLTS. INSTALL PER DETAIL 11. CONDUIT TO ENTER SHORT WALL OF HANDHOLE AT 24" DEPTH.
3. PROVIDE 10" X 17" X 36" DEEP HANDHOLE, TRAFFIC RATED, WITH SOLID BOTTOM AND GALVANIZED COVER INSCRIBED "SIGNAL" AND WITH HANDHOLE NUMBER. BOLT DOWN COVER WITH STAINLESS STEEL PENTA BOLTS. INSTALL PER DETAIL 11. CONDUIT TO ENTER SHORT WALL OF HANDHOLE AT 24" DEPTH.
4. CONCRETE COLLAR NOT REQUIRED AT THIS HANDHOLE.
5. MCC SLAB ON GRADE WITH INTEGRAL HOUSEKEEPING PAD, SEE DETAIL ON DRAWING E2.
6. INSTALL GRS CONDUITS ACROSS SPILLWAY PER DETAIL 14.
7. 20' HIGH ANTENNA MAST WITH CONCRETE BASE. ANTENNA MAST SHALL BE 2" GRS CONDUIT WITH WEATHERHEAD. INSTALL, CONNECT (WITH WEATHERPROOF SPLICE KIT), AND ORIENT ANTENNA PER CITY. REFER TO DETAIL 23.
8. INSTALL SUBMERSIBLE LEVEL TRANSDUCER AND STILLING WELL PER DETAIL 21 AND 22. LOCATE IN RESERVOIR PER CITY.

## GENERAL NOTES:

1. ALL EXPOSED CONDUITS, FITTINGS, CONDULETS TO BE GALVANIZED RIGID STEEL.
2. CONDUIT ROUTING IS DIAGRAMMATIC. CONTRACTOR IS RESPONSIBLE FOR FINAL ROUTING, STUB UP LOCATIONS, AND CONDUIT SPACING.
3. CONDUITS AND CABLES SHALL BE LABELED AT BOTH ENDS, AND WITHIN ALL INTERMEDIATE PULL OR ACCESS POINTS.
4. DUCT SEAL ALL CONDUITS STUBBING UP WITHIN PANELS, HANDHOLES, AND J-BOXES.
5. ALL EQUIPMENT AND CONTROL DEVICES TO HAVE NAMEPLATES. NAMEPLATES TO BE SCREWED ON. ADHESIVE NOT ACCEPTABLE.
6. USE PVC COATED FACTORY ELBOWS TO TRANSITION FROM BELOW GRADE TO EXPOSED CONDUIT RUNS.
7. STANDARD DETAILS APPLY, EVEN IF NOT CALLED OUT.
8. MAXIMUM LENGTH OF LIQUIDTIGHT FLEXIBLE METAL CONDUIT IS 18", UNLESS OTHERWISE APPROVED BY ENGINEER.
9. REFER TO CONDUIT AND CABLE SCHEDULE ON DWG E7.
10. ALL CONDUIT RISERS FROM BELOW GRADE TO EXPOSED TO BE PER DETAIL 2.
11. ALL UNDERGROUND TRENCHING TO BE PER DETAIL 1, UNLESS SHOWN OTHERWISE.
12. REFER TO MECHANICAL AND CIVIL DRAWINGS FOR EQUIPMENT LOCATIONS.
13. PROVIDE ALL NECESSARY ANCHORS, SUPPORTS, UNISTRUT, BOXES, ETC. FOR MOUNTING EQUIPMENT.
14. ALL CONCEALED GROUNDING CONNECTIONS TO BE IRREVERSIBLE COMPRESSION TYPE OR EXOTHERMIC TYPE.

10/6/23 S:_PROJECTS\1780\18-001 - RAW WATER LINE REPLACEMENT PROJECT\CADD\SEGMENTS 2-5 FULL SET\E4 - SITE PLAN.DWG

J Calton Engineering

CITY OF FORT BRAGG CALIFORNIA

BAR IS ONE INCH AT FULL SCALE
0 1"
IF NOT ONE INCH ON THIS SHEET SCALE ACCORDINGLY

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**RAW WATER LINE REPLACEMENT PROJECT**

# ELECTRICAL SITE PLAN

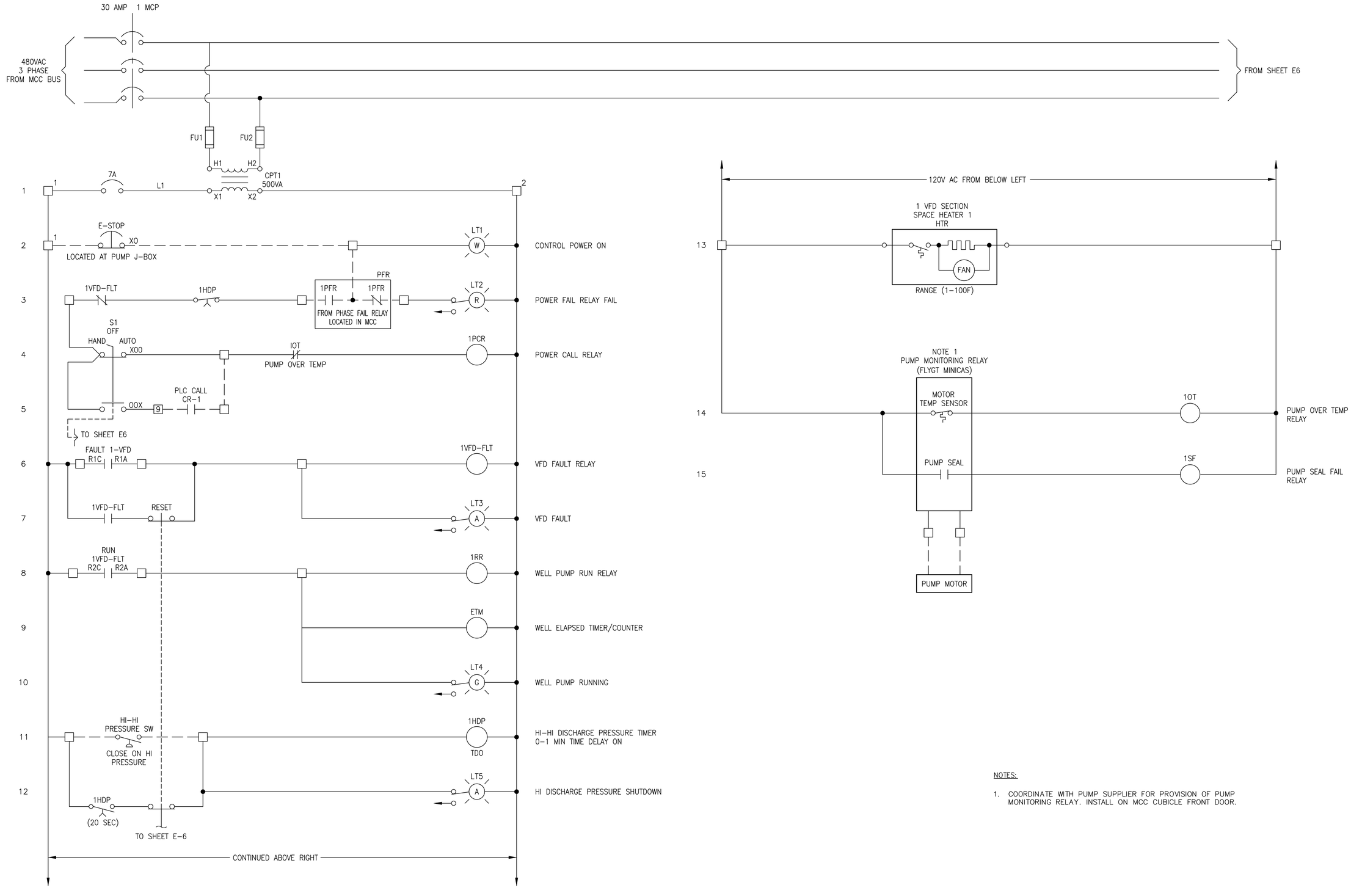
**CITY OF FORT BRAGG** **CALIFORNIA**

DESIGNED UNDER THE DIRECTION OF:
JOHN C. CALTON 10/6/23
No. 14099 - REGISTRATION EXPIRES 06-30-23 DATE

| | | |
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| DESIGN: | JCC | DATE: 10/6/23 |
| DRAWN: | WCJ | DATE: 10/6/23 |
| CHECKED: | JCC | DATE: 10/6/23 |

REGISTERED PROFESSIONAL ENGINEER JOHN C. CALTON No. 14099 ELECTRICAL STATE OF CALIFORNIA 10/6/23

SCALE 1"=5'
DRAWING NUMBER E4
SHEET NUMBER 60 OF 68 SHEETS




NOTES:

1. COORDINATE WITH PUMP SUPPLIER FOR PROVISION OF PUMP MONITORING RELAY. INSTALL ON MCC CUBICLE FRONT DOOR.

10/5/23 S:_PROJECTS\TBD18-001 - RAW WATER LINE REPLACEMENT PROJECT\CADD\SEGMENTS 2-5 FULL SET\E5 - PUMP VFD SCHEMATIC - SHEET 1 OF 2.DWG

J Calton Engineering

BAR IS ONE INCH AT FULL SCALE
0 1"
IF NOT ONE INCH ON THIS SHEET SCALE ACCORDINGLY

| NO. | REVISIONS | BY | APP | DATE |
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**RAW WATER LINE REPLACEMENT PROJECT**

# PUMP VFD SCHEMATIC
## SHEET 1 OF 2

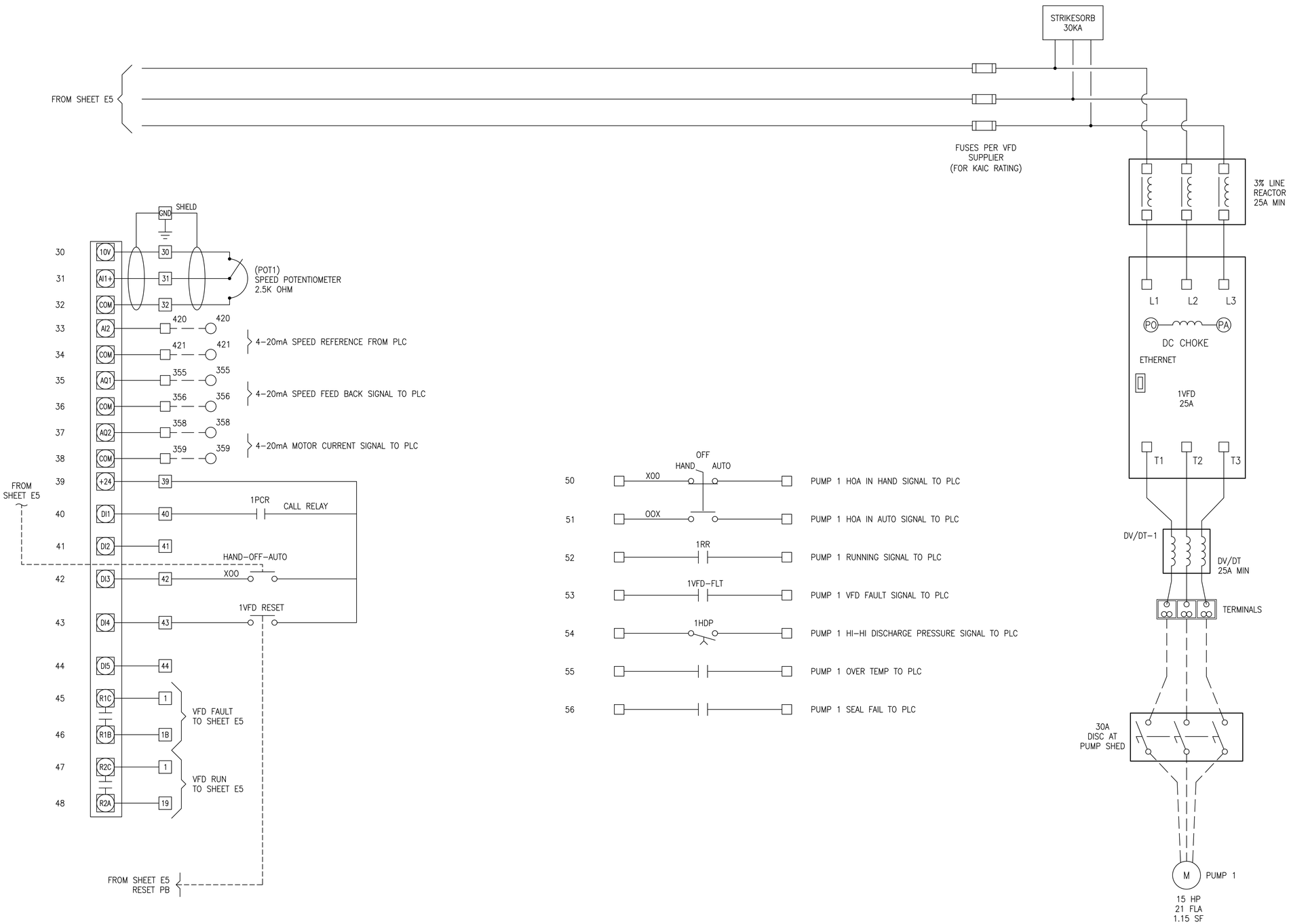
**CITY OF FORT BRAGG** **CALIFORNIA**

DESIGNED UNDER THE DIRECTION OF:
JOHN C. CALTON 10/6/23
No. 14099 - REGISTRATION EXPIRES 06-30-23 DATE

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| DESIGN: | JCC | DATE: 10/6/23 |
| DRAWN: | WCJ | DATE: 10/6/23 |
| CHECKED: | JCC | DATE: 10/6/23 |

REGISTERED PROFESSIONAL ENGINEER JOHN C. CALTON No. 14099 ELECTRICAL STATE OF CALIFORNIA
10/6/23

SCALE NO SCALE
DRAWING NUMBER E5
SHEET NUMBER 61 OF 68 SHEETS




10/5/23 S:_PROJECTS\TR618-001 - RAW WATER LINE REPLACEMENT PROJECT\CADD\SEGMENTS 2-5 FULL SET\E6 - PUMP VFD SCHEMATIC - SHEET 2 OF 2.DWG

J Calton Engineering

BAR IS ONE INCH AT FULL SCALE

0 1"

IF NOT ONE INCH ON THIS SHEET SCALE ACCORDINGLY

| NO. | REVISIONS | BY | APP | DATE |
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**RAW WATER LINE REPLACEMENT PROJECT**

# PUMP VFD SCHEMATIC
## SHEET 2 OF 2

**CITY OF FORT BRAGG** **CALIFORNIA**

DESIGNED UNDER THE DIRECTION OF:
JOHN C. CALTON 10/6/23
No. 14099 - REGISTRATION EXPIRES 06-30-23
DESIGN: JCC DATE: 10/6/23
DRAWN: WCJ DATE: 10/6/23
CHECKED: JCC DATE: 10/6/23

REGISTERED PROFESSIONAL ENGINEER JOHN C. CALTON No. 14099 ELECTRICAL STATE OF CALIFORNIA 10/6/23

SCALE NO SCALE
DRAWING NUMBER E6
SHEET NUMBER 62 OF 68 SHEETS

## CONDUIT AND CABLE SCHEDULE

| CONDUIT NO. | CONDUIT SIZE | CABLE SIZE AND QUANTITIES | FROM | TO | REMARKS |
|---|---|---|---|---|---|
| P01 | 2" | 3-#4/0, #6G | METER/MAIN PANEL | MCC - MAIN BREAKER | 480 VAC POWER, VIA HANDHOLES |
| P02 | 1" | VFD CABLE (3-#10, 3-#14G) | MCC - PUMP 1 VFD | DISCONNECT SWITCH - PUMP 1 | 480 VAC POWER |
| P03 | 1" | VFD CABLE (3-#10, 3-#14G) | MCC - PUMP 2 VFD | DISCONNECT SWITCH - PUMP 1 | 480 VAC POWER |
| P04 | 1" | 3-#10, 3-#10N, #10G | MCC - LP-1 - CKT 2,4,6 | NEWMAN PS - 3 POLE DISC SWITCH | 120 VAC: MAGMETER, LIGHTS, RECEPTS |
| P05 | 3/4" | #10, #10N, #10G | NEWMAN PS - 3 POLE DISC SWITCH | NEWMAN PS - MAGMETER | 120 VAC: PS MAGMETER |
| P06 | 3/4" | #10, #10N, #10G | NEWMAN PS - 3 POLE DISC SWITCH | NEWMAN PS - LIGHT SWITCH | 120 VAC: LIGHTS |
| P07 | 3/4" | #10, #10N, #10G | NEWMAN PS - 3 POLE DISC SWITCH | NEWMAN PS - RECEPTACLES | 120 VAC: RECEPTS |
| | | | | | |
| | | | | | |
| P10 | 1" | PULLTAPE | MCC - BREAKER SECTION | NEWMAN PS | STUB IN NEWMAN PS AND CAP |
| P11 | 2" | PULLTAPE | STUB UP AT METER/MAIN, CAP | MCC - PLC PANEL | SPARE CONDUIT, VIA HANDHOLES |
| | | | | | |
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## CONDUIT AND CABLE SCHEDULE

| CONDUIT NO. | CONDUIT SIZE | CABLE SIZE AND QUANTITIES | FROM | TO | REMARKS |
|---|---|---|---|---|---|
| C01 | 1" | 10-#14, #14G | MCC - PUMP 1 VFD | PUMP 1 - OT&SF, E-STOP, PSHH | 120 VAC CONTROLS, 4 SPARES |
| C02 | 1" | 10-#14, #14G | MCC - PUMP 2 VFD | PUMP 2 - OT&SF, E-STOP, PSHH | 120 VAC CONTROLS, 4 SPARES |
| | | | | | |
| | | | | | |
| | | | | | |
| S01 | 1 1/2" | 3-#16 TWSP, 6-#14, #14G | MCC - PLC PANEL | NEWMAN PS - SIGNAL J-BOX | ANALOG AND DC SIGNALS, SPARES |
| S02 | 1/2" | 2-#14, #14G | NEWMAN PS - SIGNAL J-BOX | NEWMAN PS - INTRUSION SWITCH | INTRUSION ALARM |
| S03 | 3/4" | #16 TWSP, #14G | NEWMAN PS - SIGNAL J-BOX | NEWMAN PS - MAGMETER | MAGMETER FLOW SIGNAL |
| S04 | 2" | COAXIAL CABLE | MCC - PLC PANEL | ANTENNA MAST, STUB UP 10' | ATTACH TO ANTENNA |
| S05 | 1" | LEVEL MANU CABLE | MCC - PLC PANEL | LEVEL TRANSDUCER | |
| | | | | | |
| | | | | | |
| | | | | | |
| S10 | 1" | PULLTAPE | MCC - PLC PANEL | NEWMAN PS | STUB IN NEWMAN PS AND CAP |

NOTES:
1. CONDUIT SIZES SHOWN ARE MINIMUM. CONTRACTOR TO CONFIRM BASED ON SUPPLIED CABLE DIAMETERS AND NEC ALLOWED CONDUIT FILL.

## FIXTURE SCHEDULE

| TYPE | VAC | DESCRIPTION | LAMPS | MOUNTING | MANUFACTURER / MODEL NO. |
|---|---|---|---|---|---|
| A | 120 | LED STRIP LIGHT, VAPOR TIGHT, IN POLYCARBONATE HOUSING, 48" LONG. UL LISTED FOR WET LOCATIONS. PROVIDE WITH HIGH EFFICIENCY LEDS. SUITABLE FOR SURFACE MOUNTING, WITH WET LOCATION FITTINGS AT BOTH ENDS. PROVIDE WITH SWITCHABLE LUMENS OUTPUT AND COLOR TEMPERATURES. NO CONTROLS REQUIRED. | LED 24-42 WATTS 3000-4800 LUMENS | SURFACE MOUNT | FIXTURE: LITHONIA CSVT-L48-ALO3-MVOLT-SWW3-80CRI-WLFEND2. |
| B | 120 | LED EMERGENCY LIGHTING UNIT WITH 90 MINUTES OF ILLUMINATION. THERMOPLASTIC HOUSING WITH TEST SWITCH, LITHIUM-IRON PHOSPHATE BATTERIES, TWO LED LAMPS FOR 640 LUMENS. MULTIVOLT. 5000K. PROVIDE WITH SELF DIAGNOSTICS, FAILURE INDICATION. UL LISTED. | LED TWO 6.6 WATT LAMPS, 640 LUMENS | WALL MOUNT | FIXTURE: LITHONIA ELM4L-UVOLT-LTP-SDRT |
| C | 120 | LED WALL SCONCE FIXTURE, ENCLOSED AND GASKETED. WALL MOUNTED. LONG LIFE LEDS, 100,000 HOURS, 3000K COLOR, TYPE IV DISTRIBUTION. MOTION AND AMBIENT SENSOR CONTROLS. DARK BRONZE FINISH. UL LISTED FOR WET LOCATIONS. | LED 20 WATT 2053 LUMENS | WALL MOUNT | FIXTURE: LITHONIA WRW-LED-P1-30K-SR4-MVOLT-PIR-DDBXD |

## GENERAL NOTES:

1. ALL EXPOSED CONDUITS, FITTINGS, CONDULETS TO BE GALVANIZED RIGID STEEL.
2. CONDUIT ROUTING IS DIAGRAMMATIC. CONTRACTOR IS RESPONSIBLE FOR FINAL ROUTING AND STUB UP LOCATIONS.
3. CONDUITS AND CABLES SHALL BE LABELED AT BOTH ENDS, AND WITHIN ALL INTERMEDIATE PULL OR ACCESS POINTS.
4. DUCT SEAL ALL CONDUITS STUBBING UP WITHIN PANELS AND J–BOXES.
5. ALL EQUIPMENT AND CONTROL DEVICES TO HAVE NAMEPLATES. NAMEPLATES TO BE SCREWED ON. ADHESIVE NOT ACCEPTABLE.
6. USE PVC COATED FACTORY ELBOWS TO TRANSITION FROM BELOW GRADE TO EXPOSED CONDUIT RUNS.
7. STANDARD DETAILS APPLY, EVEN IF NOT CALLED OUT.
8. MAXIMUM LENGTH OF LIQUIDTIGHT FLEXIBLE METAL CONDUIT IS 18", UNLESS OTHERWISE APPROVED BY ENGINEER.
9. REFER TO CONDUIT AND CABLE SCHEDULE ON DWG E–7.
10. ALL CONDUIT RISERS FROM BELOW GRADE TO EXPOSED TO BE PER DETAIL 2.
11. REFER TO MECHANICAL AND CIVIL DRAWINGS FOR EQUIPMENT LOCATIONS.
12. PROVIDE ALL NECESSARY ANCHORS, SUPPORTS, UNISTRUT, BOXES, ETC. FOR MOUNTING EQUIPMENT. PROVIDE 3/4" PLYWOOD ON INTERIOR WALLS TO SUPPORT WALL MOUNTED ELECTRICAL EQUIPMENT.

## KEY NOTES:

(1) PROVIDE 30A DISCONNECT SWITCH ON STANCHION. ROUTE CONDUIT FROM SWITCH TO MOTOR TERMINAL BOX VIA LIQUIDTIGHT FLEXIBLE METAL CONDUIT.

(2) PROVIDE 4"X4"X4" J–BOX AND MOUNT ON STANCHION. ROUTE CONDUITS FROM J–BOX TO DISCONNECT SWITCH AND CONNECT TO MOTOR MONITOR CABLES (1/2" WITH 2–#14, #14G), AND TO HI–HI PRESSURE SWITCH (1/2" WITH 2–#14 #14G). MOUNT E–STOP SWITCH ON J–BOX AND LABEL "PUMP 1 E–STOP", SIMILAR FOR PUMP 2. COIL SPARES IN J–BOX.

(3) MOUNT INTRUSION SWITCHES AT TOP OF DOOR. SWITCHES TO BE CLOSED WHEN DOORS ARE CLOSED. WIRE SWITCHES IN SERIES.

(4) INSTALL MAGNETIC FLOWMETER PER MANUFACTURER RECOMMENDATIONS. PROVIDE 120 VAC POWER FROM 3 POLE DISCONNECT SWITCH, CIRCUIT #2.

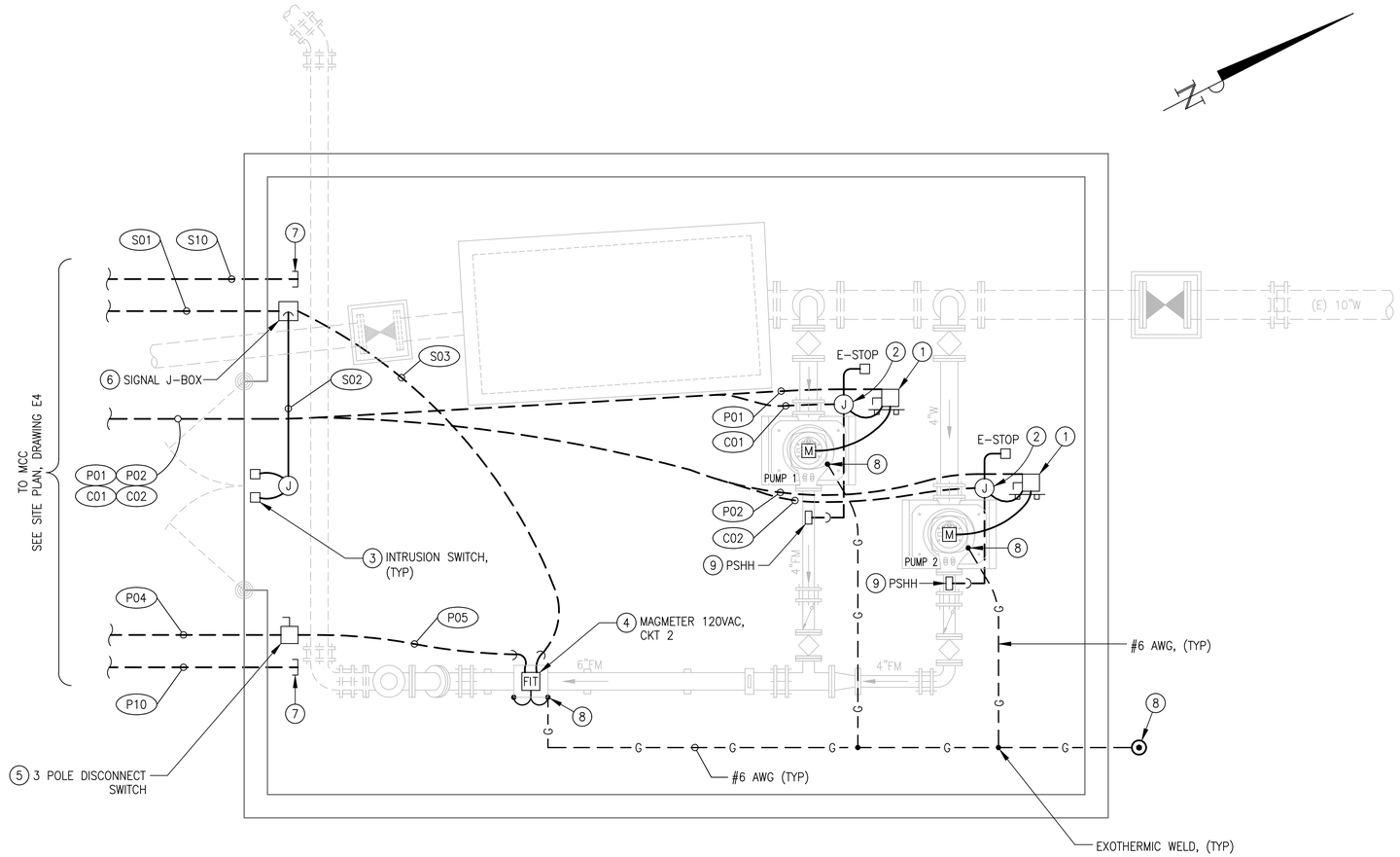
(5) PROVIDE 3 POLE DISCONNECT SWITCH IN NEMA 3R ENCLOSURE TO DISCONNECT THREE 120 VAC CIRCUITS FROM LP–1. PROVIDE LABEL "DISCONNECT OPENS CIRCUITS #2, #4, #6 FROM LP–1 FOR MAGMETERS, RECEPTACLES, AND LIGHTS".

(6) PROVIDE 6" X 6" X 6" NEMA 3R BOX FOR SIGNAL CONDUITS AND CABLES.

(7) STUB UP SPARE CONDUITS 18" ABOVE FLOOR, CAP, AND LABEL.

(8) PROVIDE GROUND ROD AND WELL. ROUTE #6 AWG BARE COPPER GROUNDING ELECTRODE CONDUCTOR WITHIN SLAB AND BOND PUMP 1 MOTOR CASING, PUMP 2 MOTOR CASING, AND MAGMETER GROUND RINGS. EXPOSED CONNECTIONS TO BE MADE WITH LUGS.

(9) SET HI–HI PRESSURE SWITCH PER ENGINEER IN FIELD.




1 — POWER AND CONTROL PLAN
SCALE: 1"=2'

J Calton Engineering

CITY OF FORT BRAGG CALIFORNIA

BAR IS ONE INCH AT FULL SCALE
0 — 1"
IF NOT ONE INCH ON THIS SHEET SCALE ACCORDINGLY

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**RAW WATER LINE REPLACEMENT PROJECT**

# NEWMAN PUMP STATION
## POWER AND CONTROL PLAN

**CITY OF FORT BRAGG** **CALIFORNIA**

DESIGNED UNDER THE DIRECTION OF:
JOHN C. CALTON
No. 14099 - REGISTRATION EXPIRES 06-30-23
10/6/23
DATE

| | | |
|---|---|---|
| DESIGN: | JCC | DATE: 10/6/23 |
| DRAWN: | WCJ | DATE: 10/6/23 |
| CHECKED: | JCC | DATE: 10/6/23 |

REGISTERED PROFESSIONAL ENGINEER — JOHN C. CALTON — No. 14099 — ELECTRICAL — STATE OF CALIFORNIA
10/6/23

SCALE: AS SHOWN
DRAWING NUMBER: E8
SHEET NUMBER: 64 OF 68 SHEETS

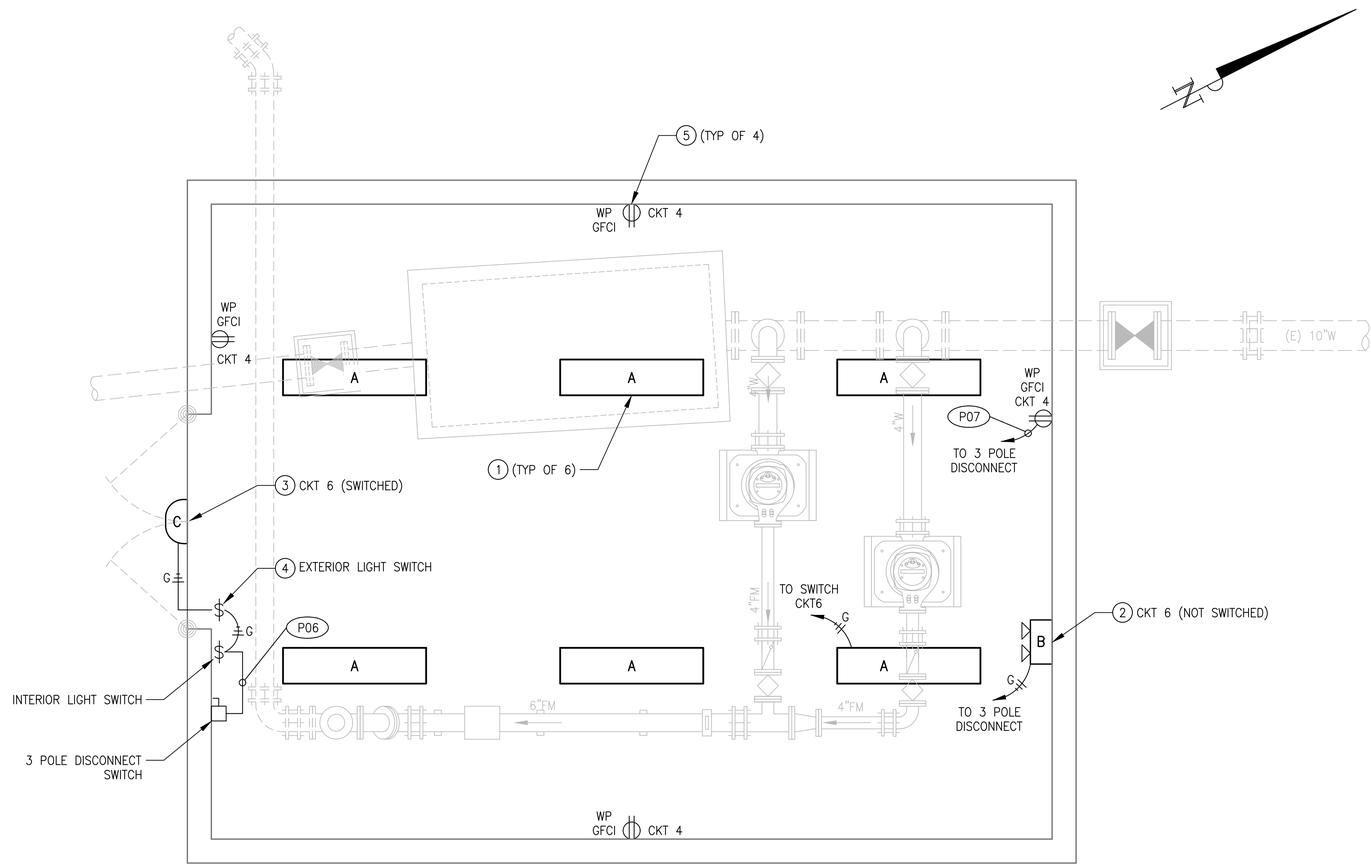
10/5/23 S:_PROJECTS\FTBG18-001 - RAW WATER LINE REPLACEMENT PROJECT\CAD\SEGMENTS 2-5 FULL SET\E8 - NEWMAN PUMP STATION - POWER AND CONTROL PLAN.DWG

## GENERAL NOTES:

1. ALL EXPOSED CONDUITS, FITTINGS, CONDULETS TO BE GALVANIZED RIGID STEEL.
2. CONDUIT ROUTING IS DIAGRAMMATIC. CONTRACTOR IS RESPONSIBLE FOR FINAL ROUTING AND STUB UP LOCATIONS.
3. CONDUITS AND CABLES SHALL BE LABELED AT BOTH ENDS, AND WITHIN ALL INTERMEDIATE PULL OR ACCESS POINTS.
4. DUCT SEAL ALL CONDUITS STUBBING UP WITHIN PANELS AND J-BOXES.
5. ALL EQUIPMENT AND CONTROL DEVICES TO HAVE NAMEPLATES. NAMEPLATES TO BE SCREWED ON. ADHESIVE NOT ACCEPTABLE.
6. USE PVC COATED FACTORY ELBOWS TO TRANSITION FROM BELOW GRADE TO EXPOSED CONDUIT RUNS.
7. STANDARD DETAILS APPLY, EVEN IF NOT CALLED OUT.
8. MAXIMUM LENGTH OF LIQUIDTIGHT FLEXIBLE METAL CONDUIT IS 18", UNLESS OTHERWISE APPROVED BY ENGINEER.
9. REFER TO CONDUIT AND CABLE SCHEDULE ON DWG E-7.
10. ALL CONDUIT RISERS FROM BELOW GRADE TO EXPOSED TO BE PER DETAIL 2.
11. REFER TO MECHANICAL AND CIVIL DRAWINGS FOR EQUIPMENT LOCATIONS.
12. PROVIDE ALL NECESSARY ANCHORS, SUPPORTS, UNISTRUT, BOXES, ETC. FOR MOUNTING EQUIPMENT.

## KEY NOTES:

1. MOUNT TYPE A LIGHTS ON CEILING. CONDUITS SHALL BE EXPOSED ON CEILING. LIGHTS SHALL BE SWITCHED, CIRCUIT #6.
2. MOUNT TYPE B LIGHT ON WALL OPPOSITE DOOR AT 8' ABOVE FLOOR. CONNECT TO UNSWITCHED CIRCUIT #6.
3. MOUNT TYPE C LIGHT CENTERED ABOVE EXTERIOR DOORWAY, 6" ABOVE DOOR TO BOTTOM OF FIXTURE. LIGHT SHALL BE INDIVIDUALLY SWITCHED, CIRCUIT #6.
4. MOUNT TOGGLE SWITCH FOR LIGHTING AT 48" ABOVE FLOOR. LABEL "INTERIOR LIGHTS, LP-1 CKT 6", AND "EXTERIOR LIGHT, LP-1 CKT 6", RESPECTIVELY.
5. INTERIOR GFCI RECEPTACLES, 24" ABOVE FLOOR, WITH WHILE IN USE COVERS. LABEL "LP-1 CKT 4".




1 — LIGHTING AND RECEPTACLE PLAN
SCALE: 1"=2'

10/5/23 S:_PROJECTS\FTBG18-001 - RAW WATER LINE REPLACMENT PROJECT\CAD\SEGMENTS 2-5 FULL SET\E9 - NEWMAN PUMP STATION - LIGHTING AND RECEPTACLE PLAN.DWG

J Calton Engineering

BAR IS ONE INCH AT FULL SCALE
0 — 1"
IF NOT ONE INCH ON THIS SHEET SCALE ACCORDINGLY

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**RAW WATER LINE REPLACEMENT PROJECT**

# NEWMAN PUMP STATION
## LIGHTING AND RECEPTACLE PLAN

**CITY OF FORT BRAGG** **CALIFORNIA**

DESIGNED UNDER THE DIRECTION OF:
JOHN C. CALTON 10/6/23
NO. 14099 - REGISTRATION EXPIRES 06-30-23 DATE
DESIGN: JCC DATE: 10/6/23
DRAWN: WCJ DATE: 10/6/23
CHECKED: JCC DATE: 10/6/23

REGISTERED PROFESSIONAL ENGINEER JOHN C. CALTON No. 14099 ELECTRICAL STATE OF CALIFORNIA 10/6/23

SCALE AS SHOWN
DRAWING NUMBER E9
SHEET NUMBER 65 OF 68 SHEETS

## PLC I/O LIST

| DESCRIPTION | PLC TYPE | PLC BIT NO. | DESCRIPTION | PLC TYPE | PLC BIT NO. |
|---|---|---|---|---|---|
| PUMP 1 IN HAND STATUS | DI | 1 | PUMP 1 VFD RUNNING SPEED (0-100%) | AI | 1 |
| PUMP 1 IN AUTO STATUS | DI | 2 | PUMP 1 VFD RUNNING AMPS (0-25 AMPS) | AI | 2 |
| PUMP 1 RUNNING | DI | 3 | PUMP 2 VFD RUNNING SPEED (0-100%) | AI | 3 |
| PUMP 1 VFD FAULT | DI | 4 | PUMP 2 VFD RUNNING AMPS (0-25 AMPS) | AI | 4 |
| PUMP 1 HI-HI PRESSURE ALARM | DI | 5 | PUMP STATION FLOW (0-1000 GPM) | AI | 5 |
| PUMP 1 OVER TEMP ALARM | DI | 6 | RESSERVOIR LEVEL (0-15' WATER) | AI | 6 |
| PUMP 1 SEAL FAIL ALARM | DI | 7 | SPARE | AI | 7 |
| SPARE | DI | 8 | SPARE | AI | 8 |
| PUMP 2 IN HAND STATUS | DI | 9 | | | |
| PUMP 2 IN AUTO STATUS | DI | 10 | PUMP 1 VFD SPEED COMMAND (0-100%) | AO | 1 |
| PUMP 2 RUNNING | DI | 11 | PUMP 2 VFD SPEED COMMAND (0-100%) | AO | 2 |
| PUMP 2 VFD FAULT | DI | 12 | SPARE | AO | 3 |
| PUMP 2 HI-HI PRESSURE ALARM | DI | 13 | SPARE | AO | 4 |
| PUMP 2 OVER TEMP ALARM | DI | 14 | | | |
| PUMP 2 SEAL FAIL ALARM | DI | 15 | PUMP 1 CALL TO START | DO | 1 |
| SPARE | DI | 16 | PUMP 1 CALL TO START | DO | 2 |
| MCC INTRUSION ALARM | DI | 1 | SPARE | DO | 3 |
| PLC PANEL INTRUSION ALARM | DI | 2 | SPARE | DO | 4 |
| NEWMAN PUMP STATION INTRUSION ALARM | DI | 3 | SPARE | DO | 5 |
| POWER FAIL RELAY ALARM | DI | 4 | SPARE | DO | 6 |
| AC POWER FAIL ALARM | DI | 5 | SPARE | DO | 7 |
| UPS ON BATTERY ALARM | DI | 6 | SPARE | DO | 8 |
| UPS FAIL/LOW BATTERY ALARM | DI | 7 | SPARE | DO | 9 |
| DC POWER FAIL ALARM | DI | 8 | SPARE | DO | 10 |
| SPARE | DI | 9 | SPARE | DO | 11 |
| SPARE | DI | 10 | SPARE | DO | 12 |
| SPARE | DI | 11 | SPARE | DO | 13 |
| SPARE | DI | 12 | SPARE | DO | 14 |
| SPARE | DI | 13 | SPARES | DO | 15-16 |
| SPARE | DI | 14 | | | |
| SPARE | DI | 15 | | | |
| SPARE | DI | 16 | | | |

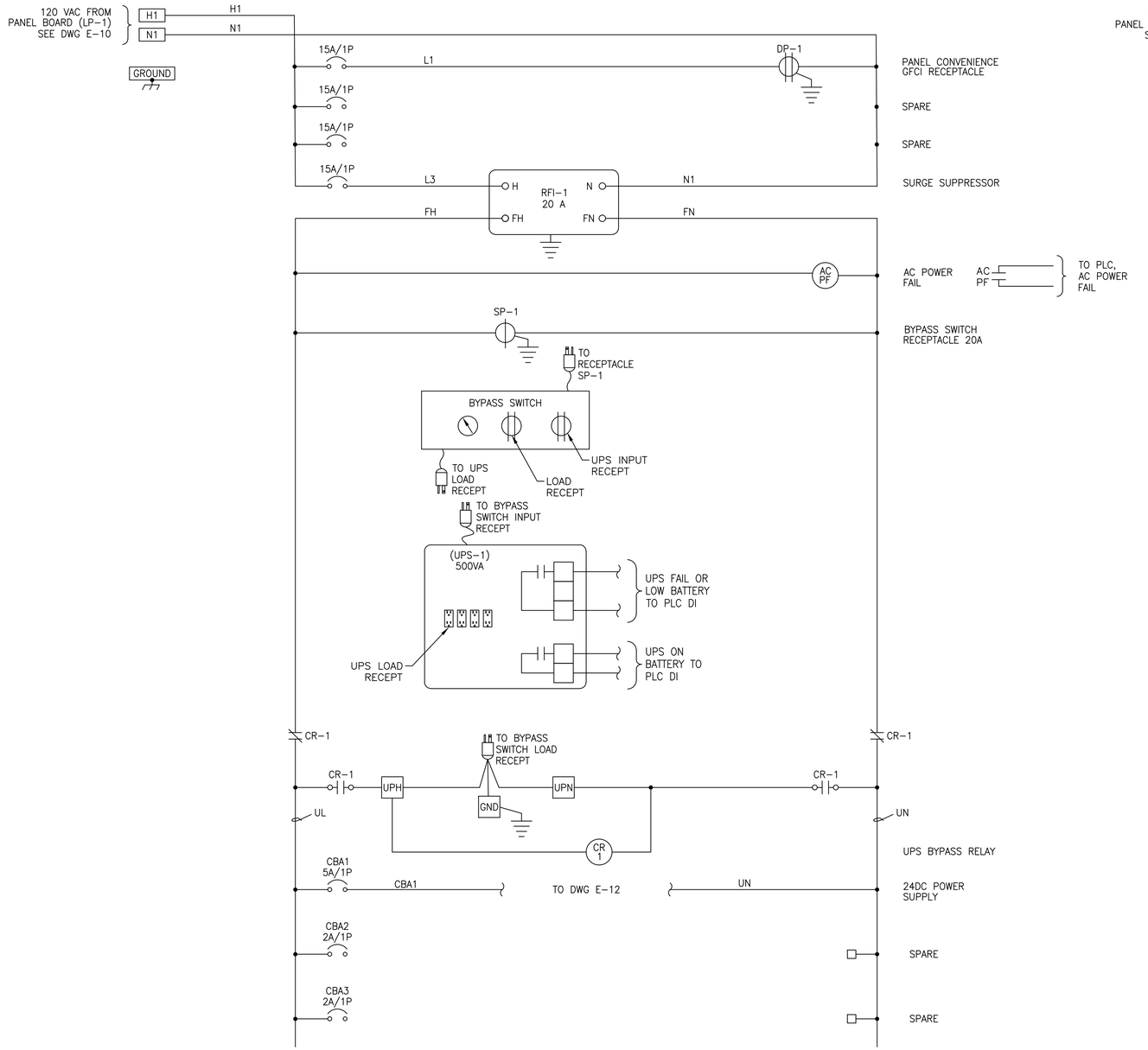
NOTES:
1. PROVIDE WIRED FROM PLC I/O TO FIELD TERMINAL BLOCKS FOR ALL I/O, INCLUDING SPARES.
2. PROVIDE SPDT ISOLATION RELAYS ON ALL DIGITAL OUTPUTS, INCLUDING SPARES.
3. CONTRACTOR TO ASSIGN TAG NUMBERS, PER GSWC STANDARDS, IF NOT SHOWN ABOVE.

## PANELBOARD "LP-1" SCHEDULE

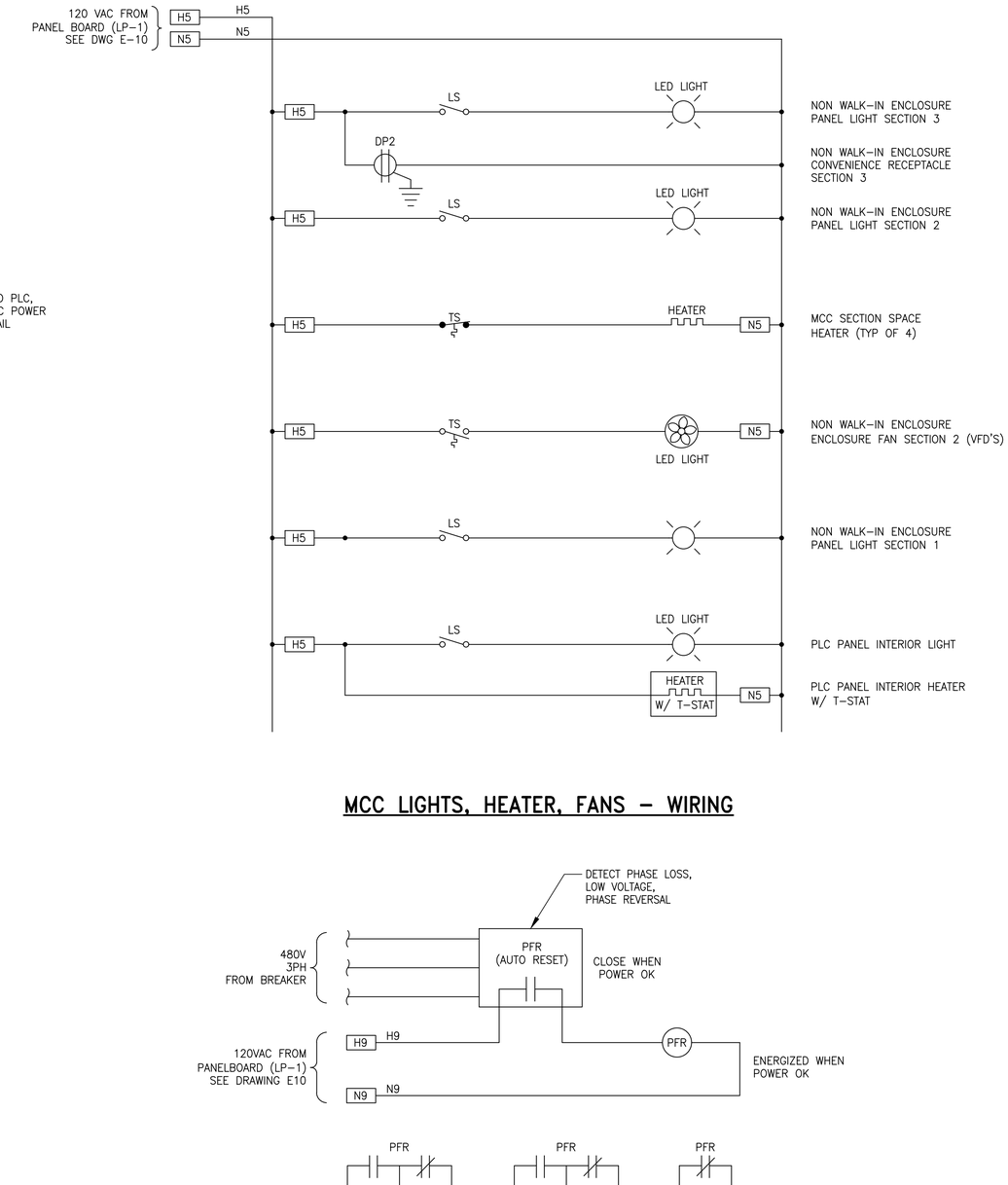
| | | | | | |
|---|---|---|---|---|---|
| LOCATION: | MCC | NEMA: | 1 | PH A WEIGHTED VA | 1410 |
| VOLTS: | 240 / 120 | FEED: | BOTTOM | PH B WEIGHTED VA | 820 |
| PHASE & WIRE: | 1PH 3W | MTG. | MCC | | |
| INTERRUPT: | 22 KAIC | BUS: | 100 A | | |
| OPTIONS: | COPPER BUS, SPD | MAIN: | CB | EQUIP SIZING VA | 2230 |
| | | MAIN RATING: | 50AT/100AF | PANEL AMPS | 9.3 |

| NOTES | DESCRIPTION | LOAD (VA) | BKR | CIR | Ø | CIR | BKR | LOAD (VA) | DESCRIPTION | NOTES |
|---|---|---|---|---|---|---|---|---|---|---|
| | PLC PANEL - UPS | 500 | 20A-1P | 1 | A | 2 | 20A-1P | 60 | NEWMAN PUMP STATION - MAGMETER | |
| | SPARE | | 15A-1P | 3 | B | 4 | 20A-1P | 720 | NEWMAN PUMP STATION - RECEPTS | 1 |
| 1 | MCC HEATERS, FANS, LIGHTS & RECEPTS | 600 | 20A-1P | 5 | A | 6 | 20A-1P | 140 | NEWMAN PUMP STATION - LIGHTS | |
| | SPARE | | 15A-1P | 7 | B | 8 | 20A-2P | 100 | SPD | |
| | POWER FAIL RELAY CONTROLS | 10 | 20A-1P | 9 | A | 10 | | 100 | | |
| | SPARE | | 20A-1P | 11 | B | 12 | 20A-1P | | SPARE | |
| | SPARE | | 20A-1P | 13 | A | 14 | 20A-1P | | SPARE | |
| | SPARE | | 20A-1P | 15 | B | 16 | 50A-2P | | MAIN BREAKER | 1 |
| | SPARE | | 20A-1P | 17 | A | 18 | | | | |

NOTES:
1. PROVIDE WITH LOCKOUT/TAG OUT DEVICE




## PLC PANEL AC POWER DISTRIBUTION




## MCC LIGHTS, HEATER, FANS – WIRING




## POWER FAIL RELAY – CONTROLS

10/6/23 S:_PROJECTS\FTB018-001 - RAW WATER LINE REPLACEMENT PROJECT\CADD\SCHEMATICS 2-5 FULL SET\E11 - MISCELLANEOUS SCHEMATICS - SHEET 1 OF 2.DWG

J Calton Engineering

BAR IS ONE INCH AT FULL SCALE
0 1"
IF NOT ONE INCH ON THIS SHEET SCALE ACCORDINGLY

| NO. | REVISIONS | BY | APP | DATE |
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**RAW WATER LINE REPLACEMENT PROJECT**

# MISCELLANEOUS SCHEMATICS
SHEET 1 OF 2

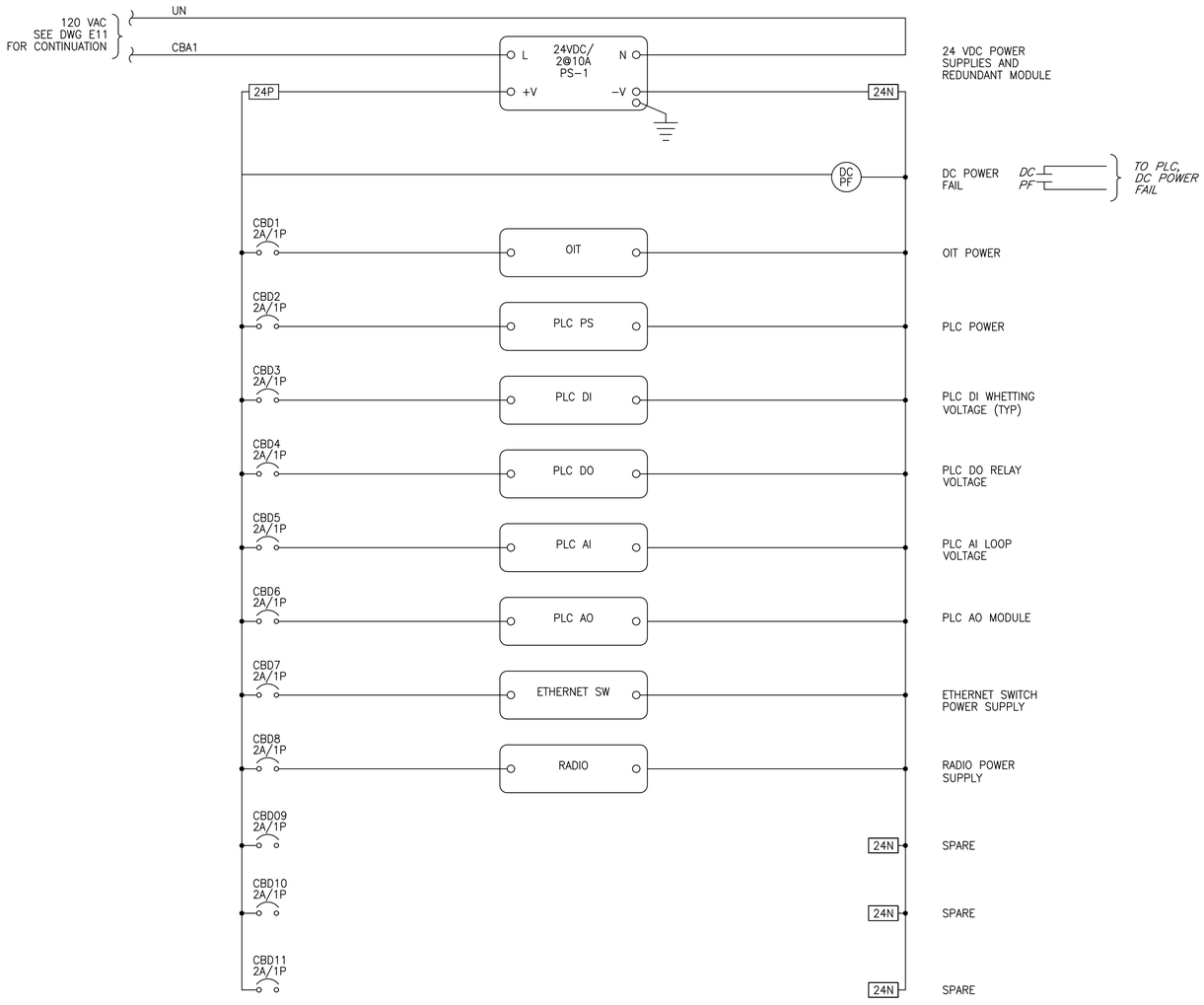
CITY OF FORT BRAGG — CALIFORNIA

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| CHECKED: | JCC | DATE: 10/6/23 |

REGISTERED PROFESSIONAL ENGINEER — JOHN C. CALTON — No. 14099 — ELECTRICAL — STATE OF CALIFORNIA
10/6/23

SCALE: NO SCALE
DRAWING NUMBER: E11
SHEET NUMBER: 67 OF 68 SHEETS




## PLC PANEL DC POWER DISTRIBUTION

10/6/23 S:_PROJECTS\FTB\18-001 - RAW WATER LINE REPLACEMENT PROJECT\CADD\SCHEMATICS 2-5 FULL SET\E12 - MISCELLANEOUS SCHEMATICS - SHEET 2 OF 2.DWG

J Calton Engineering

BAR IS ONE INCH AT FULL SCALE
0 — 1"
IF NOT ONE INCH ON THIS SHEET SCALE ACCORDINGLY

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**RAW WATER LINE REPLACEMENT PROJECT**

# MISCELLANEOUS SCHEMATICS
SHEET 2 OF 2

**CITY OF FORT BRAGG** **CALIFORNIA**

DESIGNED UNDER THE DIRECTION OF:
JOHN C. CALTON 10/6/23
No. 14099 - REGISTRATION EXPIRES 06-30-23 DATE

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REGISTERED PROFESSIONAL ENGINEER JOHN C. CALTON No. 14099 ELECTRICAL STATE OF CALIFORNIA
10/6/23

SCALE
NO SCALE
DRAWING NUMBER
E12
SHEET NUMBER
68 OF 68 SHEETS