CITY OF ROHNERT PARK

CONTRACT DOCUMENTS, SPECIAL PROVISIONS AND STANDARD SPECIFICATIONS

FOR
WET WELL LINING PUMP STATION 2

PROJECT NO. 2017-09

BID DUE DATE: April 30, 2026 at 2:00 PM

NON-MANDATORY PRE-BID MEETING DATE: April 13, 2026 at 10:00 AM

NON-MANDATORY PRE-BID MEETING LOCATION: Pump Station - 201 J Rogers Lane

REQUEST FOR INFORMATION DUE BY: April 10, 2026 by 2:00 PM

Prepared by
City of Rohnert Park-
Public Works
600 Enterprise Drive
Rohnert Park, CA 94928
(707) 588-3300

CITY COUNCIL
Mayor – Emily Sanborn
Vice-Mayor – Jackie Elward
Council Member – Susan Hollingsworth Adams
Council Member – Gerard Giudice
Council Member – Samantha Rodriguez
City Manager – Marcela Piedra
City Engineer – Julian De Anda

Approved: _____ 3-31-26
Julian De Anda, PE Date
City Engineer

TABLE OF CONTENTS

Page

PART 1 - BID DOCUMENTS

Invitation for Sealed Bids	1-1
Instructions to Bidders	1-3
Bidder's Proposal	1-7
Schedule of Bid Prices	1-9
Addendum Acknowledgment	1-11
Contractor's License Declaration	1-12
List of Subcontractors	1-13
Bid Bond	1-14
Noncollusion Declaration	1-15
Declaration of Eligibility to Contract	1-16
In-Use Off-Road Diesel-Fueled Fleets Certification	1-17
Sample Contract	1-18
Insurance	1-25
Sample Certificate of Insurance and Endorsements	1-26

PART 2 - SPECIAL PROVISIONS

	Paragraph	Page
Project Owner	2.01	2-1
Location and Description of Work	2.02	2-1
Insurance Requirements for Contractors	2.03	2-1
Bonds	2.04	2-5
Liquidated Damages	2.05	2-5
Withdrawals of Proposals	2.06	2-5
Drawings and Specifications	2.07	2-5
Cooperation and Collateral Works	2.08	2-6
Protection and Restoration of Existing Improvements	2.09	2-6
Permits and Licenses	2.10	2-6
Approved Debris Haulers	2.11	2-6
Field Review Prior to Bidding	2.12	2-7
Testing	2.13	2-7
Working Hours and Record Drawings	2.14	2-7
Project Notification and Identification Sign	2.15	2-7

PART 3–STANDARD SPECIFICATIONS

SECTION 1 - DEFINITIONS AND TERMS

	Paragraph	Page
Definitions and Terms	n/a	3-1

SECTION 2 - PROPOSAL REQUIREMENTS AND CONDITIONS

Intent	2.1	3-4

SECTION 3 - AWARD AND EXECUTION OF CONTRACT

Award of Contract 3.1 3-5
Bid Protests 3.2 3-5
Return of Proposal Guarantees 3.3 3-5
Bonds 3.4 3-6
Execution of Contract 3.5 3-6
Failure to Execute Contract 3.6 3-6

SECTION 4 - SCOPE OF WORK

Work to be Done by Contractor 4.1 3-8
Final Cleanup 4.2 3-8
Changes in the Contract - Effect Between Parties 4.3 3-8
Maintenance of Detours 4.4 3-11
Use of Materials Found on the Work 4.5 3-12

SECTION 5 - CONTROL OF THE WORK

Authority of City Engineer 5.1 3-13
Plans 5.2 3-13
Conformity with Plans 5.3 3-13
Working Drawings 5.4 3-13
Coordination of Plans, Specifications, and Special Provisions 5.5 3-13
Interpretation of Plans and Specifications 5.6 3-14
Superintendence 5.7 3-14
Lines, Grades and Measurements 5.8 3-14
Inspection 5.9 3-15
Unauthorized Work and Defective Work or Materials 5.10 3-16
Methods and Equipment 5.11 3-16
Final Inspection and Acceptance 5.12 3-17
Cleanup Work 5.13 3-17

SECTION 6 - CONTROL OF MATERIALS

City-Furnished Materials 6.1 3-18
Materials to be Furnished by the Contractor 6.2 3-18
Source of Supply and Quality of Materials 6.3 3-18
Water and Electric Power 6.4 3-19
Materials and Workmanship; Warranty 6.5 3-19
Storage of Materials 6.6 3-19
Samples and Specimens 6.7 3-20
Trade Names and Alternatives 6.8 3-20
Removal of Equipment or Materials 6.9 3-20
Testing of Materials 6.10 3-20

SECTION 7 - LEGAL RELATIONS AND RESPONSIBILITY

Laws to be Observed 7.1 3-21
Permits 7.2 3-21
Patent Claims 7.3 3-21
Sanitary Provisions 7.4 3-21
Right of Way and Right of Access 7.5 3-22
Public Convenience and Access 7.6 3-22

Storage of Materials in Public Streets, Roads or Highways 7.7 3-22
Public Safety 7.8 3-22
Street Closures, Detours, Barricades 7.9 3-23
Use of Explosives 7.10 3-23
Preservation of Property 7.11 3-24
Preservation of Monuments 7.12 3-24
Safeguarding Excavations and Structures 7.13 3-24
Emergencies and Responsibility for Damage 7.14 3-24
Disposal of Material Outside of City's Right of Way 7.15 3-25
Contractor's Responsibility for Work 7.16 3-25
City Engineer Cannot Waive Obligations 7.17 3-26
Rights in Land Improvements 7.18 3-26
Personal Liability 7.19 3-26
Repair of Equipment 7.20 3-27
Contractor's Legal Address 7.21 3-27
Cooperation and Collateral Works 7.22 3-27
Utilities 7.23 3-27
In-Use Off-Road Diesel-Fueled Fleets Regulation. 7.24 3-30

SECTION 8 - PROSECUTIONS AND PROGRESS
Subcontracts 8.1 3-32
Assignment 8.2 3-32
Progress of the Work 8.3 3-32
Character of Workers 8.4 3-32
Temporary Suspension of Work 8.5 3-32
Time of Essence, Liquidated Damages, Extension of Time by City 8.6 3-33
Default By Contractor 8.7 3-34
Work at Night 8.8 3-34
Maximum Length of Open Trench 8.9 3-34
Limited Acceptance of Work 8.10 3-35

SECTION 9 - MEASUREMENT AND PAYMENT
Measurement for Payment 9.1 3-36
Scope of Payment 9.2 3-36
Deductions from Payments 9.3 3-36
Schedule of Values 9.4 3-36
Payments and Monthly Estimates 9.5 3-37
Payment for Stored Materials Off Site 9.6 3-38
Payment for Extra Work 9.7 3-38
Final Payment 9.8 3-39

SECTION 10 - CLAIMS BY CONTRACTOR
Obligation to File Claims for Disputed Work 10.1 3-40
Form and Contents of Claim 10.2 3-40
Informal Conference after Claim Submission 10.3 3-41
Mediation 10.4 3-41
Other Matters 10.5 3-42
Compliance with Statutory Procedures 10.6 3-43

PART 4 – TECHNICAL SPECIFICATIONS

DIVISION 1 – GENERAL REQUIREMENTS

SECTION NO.	TITLE
01120	WORK CONSTRAINTS
01125	BID ITEM DESCRIPTIONS
01300	CONTRACTOR SUBMITTALS
01354	HAZARDOUS MATERIALS PROCEDURES
01505	MOBILIZATION/DEMOBILIZZTION
01531	TEMPORARY FLOW CONTROL
01550	TEMPORARY FACILITIES AND CONTROLS
01600	ENVIRONMENTAL PROTECTION

DIVISION 2 - SITE CONSTRUCTION

SECTION NO.	TITLE
02100	CLEARING AND DEMOLITION
02200	EXCAVATION AND BACKFILL
02700	POLYVINYL CHLORIDE (PVC) PIPE AND FITTINGS
02710	HIGH DENSITY POLYETHYLENE (HDPE) PIPE AND FITTINGS
02722	AGGREGATE BASE
02770	SANITARY SEWER TESTING

DIVISION 3 - CONCRETE

SECTION NO.	TITLE
03000	CONCRETE WORK – GENERAL
03100	CONCRETE FORMING AND ACCESSORIES
03200	CONCRETE REINFORCING
03300	CAST IN PLACE CONCRETE
03600	GROUTS
03700	CHEMICAL GROUTING

DIVISION 5 – METALS

SECTION NO.	TITLE
05501	ANCHOR BOLTS
05505	MISCELLANEOUS METALS

DIVISION 9 – FINISHES

SECTION NO.	TITLE
09800	COATING SYSTEMS
09900	WASTEWATER STRUCTURES COATING

DIVISION 15 – MECHANICAL

SECTION NO.	TITLE
15050	BASIC MECHANICAL MATERIALS AND METHODS
15052	BASIC PIPING MATERIALS AND METHODS

DIVISION 16 AND 17 – ELECTRICAL

SECTION NO.	TITLE
16010	ELECTRICAL GENERAL
16110	CONDUIT AND BOXES
16120	LOW VOLTAGE WIRE AND DATA CABLE
16450	GROUNDING
16600	FACTORY AND FIELD TESTING
16905	CONTROL PANELS
16940	INSTRUMENTATION

APPENDIX

SECTION NO.	TITLE
A	ROHNERT PARK PUMP STATION WET WELL CONDITION ASSESSMENT, PS2 SECTIONS, V&A, DECEMBER 8, 2016
B	SITE PHOTOGRAPHS
C	RECORD DRAWINGS, WASTEWATER PUMP STATION IMPROVEMENTS, PROJECT NO. 1988-20
D	GRINDER INSTALLATION INSTRUCTIONS

PART 5 – DRAWINGS

WET WELL LINING PUMP STATION 2 DRAWINGS, 16 SHEETS

PART 1 - BID DOCUMENTS

INVITATION FOR SEALED BIDS

WET WELL LINING PUMP STATION 2
PROJECT NO. 2017-09

Notice is hereby given that on **Thursday, April 30, 2026, at 2:00:00 PM** at 130 Avram Avenue, Rohnert Park, California, the City of Rohnert Park will receive and open sealed bids for the Wet Well Lining Pump Station 2 Project No. 2017-09 ("Project"). Sealed bids shall be dropped off in the secured box to the right of the main doors in front of City Hall **before 2:00:00 PM on April 30, 2026**.

The work is described generally as coating of existing pump station wet well and grinder chamber (201 J Rogers Lane), replacement of pump station ventilation equipment, installation of new ventilation monitoring system, installation of new bypass piping, bypass pumping, and other appurtenances as necessary to complete the project. The Contractor must have a valid California contractor's license, a Class A license. The Engineer's estimate for this Project is **$910,000.** The Contractor must begin work within fifteen (15) calendar days after official notice by the City Engineer to proceed with the work and must diligently prosecute the same to completion within **80 business days** of that Notice.

Under California Labor Code Section 1770, *et seq*., copies of the determination of the Director of the Department of Industrial Relations of the general prevailing rate of per diem wages for each craft, classification and type of workman needed to execute the work are on file in and available to any interested person on request at the Department of Public Works, or on the Internet at http://www.dir.ca.gov/dlsr/PWD/index.htm, and are incorporated herein. (Labor Code Sec. 1773.2.) Prevailing wage determinations must also be posted at each job site.

Labor Code Section 1725.5 provides that no contractor or subcontractor may be listed on a bid proposal for a public works project nor awarded a contract for public work on a public works project unless registered with the Department of Industrial Relations [with limited exceptions from this requirement for bid purposes only under Labor Code section 1771.1(a)]. This Project is subject to compliance monitoring and enforcement by the Department of Industrial Relations. All contractors and subcontractors must furnish electronic certified payroll records directly to the Labor Commissioner (aka Division of Labor Standards Enforcement). The prime contractor must also post jobsite notices prescribed by regulation.

Per California Civil Code Section 9550, a payment bond in the amount of one hundred percent (100%) of the bid total will be required from the successful bidder for bids exceeding twenty-five thousand dollars ($25,000). A performance bond will also be required for bids exceeding twenty-five thousand dollars ($25,000). The bond(s) must be provided within ten (10) calendar days from notice of award and prior to the performance of any work.

For any moneys earned by the Contractor and withheld by the City of Rohnert Park to ensure the performance of the contract, the Contractor may, at its request and sole expense, substitute certain securities equivalent to the amount withheld in the form and manner and subject to the terms and conditions provided in the California Public Contracts Code Section 22300.

This notice incorporates by reference the terms, conditions and requirements of the specifications approved by the City, any and all changes or amendments to the specifications, and special instructions or special notice issued or given to prospective bidders.

The City of Rohnert Park makes no representation or warranty of the condition of the jobsite. All prospective bidders are requested to carefully review the plans and specifications and to examine and conduct tests or otherwise satisfy themselves as to the conditions at the Project site, subject to coordination with the office of the Rohnert Park City Engineer.

Except as otherwise indicated in the Instructions to Bidders, bids will be publicly opened, examined and declared on said day and hour and referred to and considered by the City Council at a future City Council meeting. Each bid must be submitted on the bid forms furnished by the City, and each bid must include all the items shown on these forms. Substitute forms may be used if specified in this Notice.

A prebid conference will be held at **10:00 AM on April 13, 2026, at the project site.** Attendance at the prebid conference is non-mandatory for all prime contractors submitting a bid. For those who have attended the prebid conference, additional site visits can be scheduled if the City is notified twenty-four (24) hours in advance.

The City 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. The City may reject any and all bids and waive any minor irregularity in the bids.

A digital copy of the drawings and specifications can be obtained on the Bids page of the City of Rohnert Park website (www.rpcity.org/Bids). A hard copy of the drawings and specifications may be obtained from Draftech for a non-refundable fee. Draftech Blueprinting is located at 1544 Terrace Way, Santa Rosa, CA 95404, phone number 707-578-9442.

To ensure receipts of addendums, any party interested in the Project shall place their information with the Department of Public Works at 707-588-3300 or PWProjects@rpcity.org. Submit requests for information (RFIs) on 04/10/26 by 2:00 PM, to the Department of Public Works at PWProjects@rpcity.org AND Project Manager, Julian De Anda, at jdeanda@rpcity.org.

Posted Date: April 3, 2026

Published Date: April 3 & 10, 2026

/s/ SYLVIA LOPEZ CUEVAS

City Clerk of the City of Rohnert Park

INSTRUCTIONS TO BIDDERS

The bidder must file its bid with the City Engineer of the City of Rohnert Park, California, using the copy of the Bidder's Proposal and Schedule of Bid Prices furnished with the specifications. These documents must be placed in a sealed envelope marked:

WET WELL LINING PUMP STATION 2

PROJECT NO. 2017-09

and addressed to the City Engineer of the City of Rohnert Park, California. Said sealed bids shall be dropped off in the secured box to the right of the main doors in front of City Hall located at 130 Avram Avenue, Rohnert Park, California **before 2:00:00 PM on April 30, 2026**. The bidder must not file the book of Special Provisions or the Contract Drawings with their bid.

The bidders' attention is directed to the schedule of bid prices that requires this Project be bid as a fixed bid contract.

Bid Forms. Each proposal and all bid submittals must conform and be responsive to the Invitation and the Plans, Specifications and Contract documents.

The wording of the proposal and bid submittals must not be changed. Any additions, conditions, limitations, or provisions inserted by the bidder will render the proposal irregular and may cause its rejection. Erasures or interlineations in the proposal or other submittals must be explained or noted over the signature of the bidder.

In case of discrepancy between a unit price and the total price set forth for the unit price item, the unit price shall prevail. Discrepancies between the indicated sum of any column of numerals and the correct sum thereof will be resolved in favor of the correct sum. Discrepancies between written words and figures, or words and numerals, will be resolved in favor of the words.

Prices. All proposals must give the prices proposed, both in writing and in figures in the respective spaces provided, and must be signed by the bidder, who must fill out all blanks in the proposal form as therein required.

Rejection of Bids. Proposals may be rejected if they show any alterations of form, additions not called for, conditional proposals, incomplete proposals, erasures, or irregularities of any kind, excepting that erasures or delineations in the proposal will be accepted as provided under "Bid Forms" above.

When proposals are signed by an agent, other than the officer or officers of a corporation authorized to sign Contracts on its behalf or a member of a co-partnership, a Power of Attorney must be on file with the City prior to opening proposals or must be submitted with the proposal; otherwise, the proposal may be rejected as irregular and unauthorized.

Bid Security. All proposals must be presented under sealed cover and accompanied by one of the following forms of bidder's security: Cashier's check, certified check, or a bidder's bond in the form provided herein, executed by an admitted surety insurer authorized to transact business in this State, made payable to the City. The submitted bidder's bond must be the City's bid bond. The security must be in an amount equal to at least ten percent (10%) of the proposal amount. A proposal will not be considered unless one of the forms of bidder's security is enclosed with it. A bidder's bond will not be accepted unless it has been properly filled out and executed by both the surety and the bidder.

Withdrawal of Bid. Any bid may be withdrawn at any time prior to the time fixed in the public notice for the opening of proposals only by a written request for withdrawal of the bid filed with the City Engineer. The request must be executed by the bidder or its duly authorized representative. The withdrawal of a bid does

not prejudice the right of the bidder to file a new bid. No bid may be withdrawn after the time fixed in the public notice for the opening of bids.

Means of Submittal. Proposals submitted by facsimile and proposals failing to reach the office of the City prior to the date and time set for receipt of same will not be considered.

Opening. Bids will be opened and read at the time and place indicated in the Invitation for Sealed Bids. Bidders and the public are invited to be present.

Multiple Proposals. More than one proposal from an individual, a firm, partnership, corporation or an association under the same or different names, will not be considered. Reasonable grounds for believing that any bidder is interested in more than one proposal for the work contemplated will cause the rejection of all proposals in which such bidder is interested. If there is reason for believing that collusion exists among the bidders, none of the participants in such collusion will be considered in this or future proposals. Proposals in which the prices obviously are unbalanced may be rejected.

License Requirement. No proposal will be accepted from a Contractor who is not licensed in accordance with law under the provisions of Division III, Chapter 9, of the Business and Professions Code of the State of California, or from a Contractor that has been deemed irresponsible or unresponsive by the City Council.

Subcontractors. Subcontractors listed by the bidder in accordance with the Special Provisions included herein must be properly licensed under the laws of the State of California for the type of work which they are to perform.

All bidders are hereby notified that they will be required to comply strictly with the provisions of Sections 4100 to 4113, inclusive, of the Public Contract Code of the State of California.

Each bidder must file with its proposal the name and location of the place of business, contractor's license number and Department of Industrial Relations registration number of each Subcontractor who will perform a portion of the Contract work in an amount in excess of one-half of one percent (0.5%), or in the case of bids for the construction of streets or highways, including bridges, in excess of one-half of one percent (0.5%) of the total bid or ten thousand dollars ($10,000). In each such instance, the nature and extent of the work to be sublet must be described.

The General Contractor to whom the Contract is awarded will not be permitted, without the written consent of the City, to substitute any person as Subcontractor in place of the Subcontractor designated in the original proposal, or to permit any Subcontract to be assigned or transferred, or to allow it to be performed by anyone other than the original Subcontractor. The City may consent to the substitution of another person as Subcontractor if the original Subcontractor, after having reasonable opportunity to do so, fails or refuses to execute the written Contract presented to it by the General Contractor, when said written Contract is based upon the conditions of the general Contract and complies with the Subcontractor's written proposal.

The failure of the Contractor to specify a Subcontractor for any portion of the Contract work in excess of one-half of one percent (0.5%) of the total Contract price must be deemed to indicate that the Contractor intends to perform such portion itself. The subletting or Subcontracting of work for which no Subcontractor was designated in the original proposal and which is in excess of one-half of one percent (0.5%) of the total Contract price will be allowed only with the written consent of the City and then only in cases of public emergency or necessity as determined by the City. Under such circumstances, the City is required to establish the facts constituting the emergency or necessity and to reduce its findings to a written public record.

Violations of the provisions of these specified sections of the Code must be deemed to be a violation of the Contract, and the City, because of any such violations, may cancel the Contract. The Contractor, after any such violations, will be penalized up to twenty percent (20%) of the amount of the Subcontract involved.

Material. The bidder may be required to furnish, as part of the submittal process, a complete statement of the origin, composition, and manufacture of any or all materials to be used in the construction of the work, together with samples. Such samples may be subjected to the tests provided for in these specifications or in the Special Provisions to determine their quality and fitness for the work.

Additional Requirements. The bidder's attention is directed to Section 3 of the General Provisions for additional proposal requirements and conditions, and information regarding award and execution of the contract. Contractor submitting a bid to the City of Rohnert Park, a public entity, must state, under penalty of perjury, the contractor's license number and the license's expiration date. This information must be entered in the Schedule of Bid Prices. No contractor or subcontractor may be awarded a contract for public work on a public works project unless registered with the Department of Industrial Relations pursuant to Labor Code Section 1725.5.

Explanations and Addenda. Any explanation desired by the bidders regarding the meaning or interpretation of the drawings and specifications must be requested in writing and in sufficient time to allow for a written reply to reach them and all other potential bidders before the date and time for submission of bids. Oral explanation or instructions given before award of the contract will not be binding. Any interpretations made will be in the form of an addendum to the specifications or drawings and will be furnished to all bidders and its receipt by the bidder must be acknowledged. Any explanation that makes a material change, addition, or deletion to the terms of the Invitation for Sealed Bids shall be issued no less than seventy-two (72) hours before the date and time for submission of bids. If an explanation making a material change, addition, or deletion must be issued less than seventy-two (72) hours before the scheduled date and time for submission of bids, the date and time for submission shall be extended so that a full seventy-two (72) hours is provided for analysis of the change, addition, or deletion.

Quantity of Work. The quantity of work for the unit price items to be done under the contract as noted in the Bid Schedule is but an estimate and is not to be taken as an expressed or implied statement that the actual quantity of work will correspond to the estimate. The right is reserved to increase or decrease, or to entirely eliminate items from the work if found desirable or expedient. The Contractor will be allowed no claims for anticipated profits, loss of profits, or for any damages of any sort because of any difference between the estimated and the actual quantities of work done.

The quantities given in the schedule for unit price items are for comparing proposals and may vary from the actual final quantities. Some quantities may be increased and others may be decreased or entirely eliminated, and no claim must be made against the City for damage occasioned thereby or for loss of anticipated profits, the Contractor being entitled only to compensation for the actual work done at the unit prices proposal.

The City reserves and must have the right to increase or decrease the quantities of work to be performed under a scheduled unit item or to entirely omit the performance thereof and upon decision of the City to so do, the City Engineer will direct the Contractor to proceed with the said work as so modified. If an increase in the quantity of work so ordered should result in delay to the work, the Contractor will be given an equivalent extension of time.

All estimates and all measurements used in determining the quantities of unit price items of work done, the percentage of completion of lump sum items of work, and the quantity of materials furnished under the Contract at various times during the progress of the work must be the Engineer's estimates and measurements. The planimeter must be considered an instrument of precision adapted to the measurements of all areas.

Insurance. The bidders' attention is drawn to Special Provisions – Location and Description of Work and Special Provisions – Minimum Limits of Insurance.

Inspection of Site. The bidder must examine carefully the site of the work contemplated and the proposal, plans, specifications, and the Contract form therefor. It will be assumed that the bidder has investigated and is satisfied as to the conditions to be encountered, as to the character, quality, and quantities of work to be performed and materials to be furnished, and as to the requirements of these specifications, the Special Provisions, and the Contract.

Where the City has investigated the subsurface conditions in respect to foundation or other design, bidders may inspect the City's investigation records , including examination of samples, if available. When the Plans include a log of test borings showing a record of the data obtained in the City's investigation of subsurface conditions, said log represents only the City's opinion as to the character of material encountered by it in its test borings and is only included for the convenience of bidders.

Investigations of subsurface conditions are made for the purpose of design. The City assumes no responsibility whatsoever in respect to the sufficiency or accuracy of borings or of the log of test borings or other preliminary investigations, or of the interpretation thereof, and there is no guaranty, either expressed or implied, that the conditions indicated are representative of those existing throughout the work, or any part of it, or that uninvestigated developments may not occur.

Making such information available to the bidders is not to be construed in any way as a waiver of the provisions of the first paragraph of this article and bidders must satisfy themselves through their own investigations as to conditions to be encountered.

No information derived from such inspection of the records of preliminary City investigations or from the maps, plans, specifications, profiles or drawings will in any way relieve the Contractor from any risk from properly fulfilling all the terms of the Contract.

Records of such preliminary City investigations may be inspected at the office of the Engineer. As-builts can be provided upon request.

Pre-construction Meeting. At the pre-construction meeting, the successful bidder must submit a CPM progress schedule which will show the time he/she proposes to occupy in prosecuting the various major divisions of work and his/her proposed sequence of operations. The CPM progress schedule must be subject to the approval of the City Engineer.

Adjustment of Schedule. If at any time the construction schedule is inadequate to secure completion of the work within the time specified, and the work is being prosecuted inadequately or improperly, the Engineer may require the Contractor to submit a revised progress schedule, providing for proper and timely completion of the work.

The Contractor is not entitled to additional compensation on account of revisions required by the City.

BIDDER'S PROPOSAL

WET WELL LINING PUMP STATION 2 PROJECT NO. 2017-09

TO BE EXECUTED BY ALL BIDDERS AND SUBMITTED WITH BID

To: City Council, City of Rohnert Park

The undersigned hereby declares:

(a) That the only persons or parties interested in this proposal as principals are the following:

_____.

(If the bidder is a corporation, give the name of the corporation and the name of its president, secretary, treasurer, and manager. If a co-partnership, give the name under which the co-partnership does business, and the names and addresses of all co-partners. If an individual, state the name under which the contract is to be drawn.)

(b) That this proposal is made without collusion with any other person, firm, or corporation.

(c) That he/she has carefully examined the locations of the proposed work and has familiarized himself/herself with all of the physical and climatic conditions and makes this bid solely upon his/her own knowledge.

(d) That he/she has carefully examined the drawings and specifications and makes this proposal in accordance therewith.

(e) That, if this bid is accepted, he/she agrees to enter into an agreement with City in the form included in the Contract Documents to complete all work as specified in the Contract for the contract price and within the contract time indicated in this bid and in accordance with the Contract Documents.

(f) That this bid will remain open and not be withdrawn for the period specified in the Instructions to Bidders.

(g) That he/she has read the insurance requirements in Section 2.03, Insurance in the Special Provisions section of this bid document;

(h) That he/she has conferred with his/her insurance carriers or brokers to determine in advance of the bid submission the availability of insurance certificates and endorsements as prescribed and provided herein;

(i) That if the bid is accepted, he/she will enter into a written contract and within ten (10) calendar days furnish the required proof of insurance including certificates and endorsements;

(j) That failure to comply strictly with the insurance requirements may result in forfeiture of the bid security and withdrawal of the bid proposal.

(k) That he/she is properly licensed in accordance with California Business and Professions Code section 7000, *et seq*. Bidder acknowledges that if the bidder is not properly licensed at the time the bid is awarded or as otherwise required by law, the bid will be considered non-responsive and will be rejected.

(l) That he/she and any subcontractor relied on by him will keep an accurate payroll record, showing the name, address, Social Security number, work classification, straight time and overtime hours worked each day and week, and the actual per diem wages paid to each journeyman, apprentice, worker, or other employee employed by the contractor or subcontractor in connection with the public work, as more fully set forth in the Contract. All contractors and subcontractors must furnish

electronic certified payroll records directly to the Labor Commissioner (aka Division of Labor Standards Enforcement).

(m) That in compliance with the Subletting and Subcontracting Fair Practices Act, California Public Contracts Code Section 4100, *et seq*., he/she has listed on the attached "List of Subcontractors" each subcontractor who will perform work or labor or render service to the bidder in or about the construction of the work or will specifically fabricate and install a portion of the work in an amount in excess of one half of one percent (0.5%) of the total bid sum or in the case of bids or offers for the construction of streets or highways, including bridges, in excess of one-half of one percent (0.5%) of the total bid or ten thousand dollars ($10,000), whichever is greater, and that no subcontractors may be used other than those specified without written approval of the City Engineer.

Accompanying this proposal is a certified or cashier's check, or bidder's bond payable to the order of the City Clerk of the City of Rohnert Park, in the sum of _____ dollars ($_____). Said bidder's bond is the City's bid bond form. Said bidder's bond has been duly executed by the undersigned bidder and by a financially sound surety company admitted in the State of California.

It is understood and agreed that should the bidder fail within ten (10) calendar days after the date of mailing written notice to the successful bidder that the contract has been awarded to enter into the contract and furnish acceptable surety bonds and insurance on forms included herein, then the proceeds of said check or bidder's bond will become the property of the City. But if the contract is entered into and said bonds are furnished, or if the bid is not accepted, then said check will be returned to the undersigned or the bidder will be released from the bidder's bond.

_____ _____

Address of Bidder Telephone Number of Bidder

_____ _____

City, State, Zip Signature of Bidder

SCHEDULE OF BID PRICES

WET WELL LINING PUMP STATION 2

PROJECT NO. 2017-09

TO BE EXECUTED BY ALL BIDDERS AND SUBMITTED WITH BID

In accordance with the plans and specifications approved by the City of Rohnert Park, the undersigned bidder is submitting the following bid prices for the performance of the entire proposed work as described in these specifications and attached drawings. The contract award will be based upon the Base Bid.

ITEM NO.	ITEM DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL COST
1	Mobilization and Demobilization	1	LS		
2	Temporary Erosion & Sediment Control	1	LS		
3	Bypass Pumping	1	LS		
4	Wet Well - Clean, Prepare, and Repair Concrete Surfaces	1	LS		
5	Wet Well - Remove and Replace/Reinstall Pipes, Conduits, Bubbler Tube, Etc.	1	LS		
6	Wet Well - Mortar & Epoxy Coating System below Elev. 80.1	1300	SF		
7	Wet Well - Mortar & Epoxy Coating System Above Elev. 80.2	1418	SF		
8	Wet Well - Coat (E) Pump Suction Elbows (Revocable)	4	EA		
9	Grinder Chamber - Clean, Prepare, and Repair Concrete Surfaces	1	LS		
10	Grinder Chamber - Remove and Replace/Reinstall Pipes, Conduits, Brackets, Etc.	1	LS		
11	Grinder Chamber - Seal Cracks/Penetrations	1	LS		
12	Grinder Chamber - Grating Support Angles and Anchors	1	LS		
13	Grinder Chamber - Mortar & Epoxy Coating System (below grating)	820	SF		
14	12-inch HDPE Bypass Pipe & Fittings	155	LF		
15	Bypass Pipe Supports, Pads, and Pump Connections	1	LS		
16	Ventilation System Demolition	1	LS		
17	Ventilation Ducting, Dampers, Registers, Accessories	1	LS		
18	Ventilation Fans	1	LS		
19	Ventilation Monitoring, Control Panel and Misc. Electrical Improvements	1	LS		
20	Gas Monitoring System	1	LS		

Total Amount of Bid (written in words) is: _____

_____dollars

and _____ cents.

Any discrepancy between words and figures shall be resolved as provided in the Instructions to Bidders.

$_____

(Figures)

_____ _____

Address of Bidder Signature of Bidder

_____ _____

City, State, Zip Name of Bidder (Print)

_____ _____

Telephone Number of Bidder FAX Number of Bidder

_____ _____

Contractor's License Number License's Expiration Date

_____ _____

Contractor's DIR Number DIR Registration Expiration Date

_____

Contractor's email address

ADDENDUM ACKNOWLEDGEMENT

TO BE EXECUTED BY ALL BIDDERS AND SUBMITTED WITH BID IF ADDENDUM ISSUED

ADDENDUM #1 Date_____Signature acknowledging receipt: _____

ADDENDUM #2 Date_____Signature acknowledging receipt: _____

ADDENDUM #3 Date_____Signature acknowledging receipt: _____

CONTRACTOR'S LICENSE DECLARATION
(Business and Professions Code Section 7028.15)

TO BE EXECUTED BY ALL BIDDERS AND SUBMITTED WITH BID

The undersigned declares that he or she is _____ of _____. (party making foregoing bid) (hereinafter the "Bidder")

1. Bidder's Contractor's License Number is as follows:_____.

2. The expiration date of Bidder's Contractor's License is _____, 20___.

3. Bidder acknowledges that pursuant to Business and Professions Code Section 7028(a), it is a misdemeanor for any person to submit a bid to a public agency in order to engage in the business or act in the capacity of a contractor within this State without having a license therefor, except as provided therein.

The undersigned declares, under penalty of perjury, that the representations made by the undersigned in this bid proposal are true and correct.

Executed on _____, 20 ___, at _____ (insert city and state where Declaration signed).

_____
Signature

_____
Typed Name

_____
Title

_____
Name of Bidder

LIST OF SUBCONTRACTORS

TO BE EXECUTED BY ALL BIDDERS AND SUBMITTED WITH BID

In accordance with the provisions of Public Contact Code Sections 4103 to 4108, inclusive, each bidder must list below the name and location of place of business, contractor's license number and Department of Industrial Relations registration number of each subcontractor who will perform a portion of the contract work in an amount in excess of one-half of one percent (0.5%) of the total contract price. In each such instance, the nature and extent of the work to be sublet must be described.

Subcontractor name, California Contractor's License Number and DIR Registration Number	Location of Place of Business	Description of Work to be Performed (also show bid Schedule Item No.)	Percentage of total contract work to be performed
Name: CLN: DIR:			
Name: CLN: DIR:			
Name: CLN: DIR:			
Name: CLN: DIR:			
Name: CLN: DIR:			
Name: CLN: DIR:			
Name: CLN: DIR:			
Name: CLN: DIR:			

[Add additional sheets if necessary]

**Note, the Subletting and Subcontracting Fair Practices Act also requires inclusion of any subcontractor who specially fabricates and installs a portion of the work according to detailed drawings.

BID BOND **Bond No. _____**

WHEREAS, _____ ("Principal") intends to submit a bid to the City of Rohnert Park ("City") for the above-referenced Project, and the terms of the bid require the Principal to submit bidder's security.

NOW, THEREFORE, Principal and _____, a corporation organized and existing under the laws of the State of _____ and duly authorized to transact business under the laws of the State of California as Surety, are held and firmly bond unto City in the sum of _____ dollars ($_____) lawful money of the United States of America, such sum being not less than ten percent (10%) of the bid amount for the payment of which sum to be made, the Principal and Surety bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH THAT, if the Principal submits a bid for the above-referenced Project, the terms and conditions of which are incorporated herein by reference, and if said bid is rejected by the City, or if said bid is accepted by the City and the Bidder properly executes and submits to the City the Agreement and all required documents (including the Performance bond, the Payment Bond, and the proof of insurance), then this obligation will be null and void; otherwise it will remain in full force and effect.

The Surety hereby agrees, for value received, that its obligations under this bond must in no way be impaired or modified by any agreement between the City and the Principal to extend the time within which the City may accept the Principal's bid, and the Surety hereby waives notice of any such extension.

In the event suit is brought upon this bond, the Surety must pay reasonable attorneys' fees and costs incurred by the prevailing parties in such suit, which fees and costs must be in addition to the face amount of the bond.

IN WITNESS WHEREOF, the undersigned represent and warrant that they have the right, power, legal capacity, and authority to enter into and execute this document on behalf of the Principal and the Surety and have caused this document to be executed by setting hereto their names, titles and signatures.

Principal: _____
(Name of Firm)

By: _____
Title: _____
Date: _____

Surety: _____
(Name of Firm)

By: _____
Title: _____
Date: _____

Address for Notices to Surety:

_____
_____
_____

Note: Notary acknowledgment for Surety and Surety's Power of Attorney must be attached.

NONCOLLUSION DECLARATION

TO BE EXECUTED BY BIDDER AND SUBMITTED WITH BID

The undersigned declares:

I am the _____ of _____, the party making the foregoing bid.

The bid is not made in the interest of, or on behalf of, any undisclosed person, partnership, company, association, organization, or corporation. The bid is genuine and not collusive or a sham. The bidder has not directly or indirectly induced or solicited any other bidder to put in a false or sham bid. The bidder has not directly or indirectly colluded, conspired, connived, or agreed with any bidder or anyone else to put in a sham bid or to refrain from bidding. The bidder has not in any manner, directly or indirectly, sought by agreement, communication, or conference with anyone to fix the bid price of the bidder or any other bidder, or to fix any overhead, profit, or cost element of the bid price, or of that of any other bidder. All statements contained in the bid are true. The bidder has not, directly or indirectly, submitted their bid price or any breakdown thereof, or the contents thereof, or divulged information or data relative thereto, to any corporation, partnership, company, association, organization, bid depository, or to any member or agent thereof, to effectuate a collusive or sham bid, and has not paid, and will not pay, any person or entity for such purpose.

Any person executing this declaration on behalf of a bidder that is a corporation, partnership, joint venture, limited liability company, limited liability partnership, or any other entity, hereby represents that he or she has full power to execute, and does execute, this declaration on behalf of the bidder.

I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct, and that this declaration is executed on _____[date], at _____ [city], _____ [state].

_____ _____

Firm (print or type) Signature

DECLARATION OF ELIGIBILITY TO CONTRACT

TO BE EXECUTED BY ALL BIDDERS AND SUBMITTED WITH BID

The undersigned, a duly authorized representative of the bidder, certifies and declares that:

1. The bidder is aware of California Labor Code Sections 1771.1 and 1777.7, which prohibit a contractor or subcontractor who has been found by the Labor Commissioner or the Director of Industrial Relations to be in violation of certain provisions of the Labor Code from bidding on, being awarded, or performing work as a subcontractor on a public works project for specified periods of time.

2. The bidder is not prohibited from bidding on, being awarded, or performing work as a contractor or subcontractor on a public works project under Labor Code sections 1771.1 and 1777.7, or any other provision of law.

3. The bidder is aware of Public Contract Code Section 6109, which states:

   (a) A public entity, as defined in Section 1100 [of the Public Contract Code], may not permit a contractor or subcontractor who is ineligible to bid or work on, or be awarded, a public works project pursuant to Section 1771.1 or 1777.7 of the Labor Code to bid on, be awarded, or perform work as a subcontractor on, a public works project. Every public works project shall contain a provision prohibiting a contractor from performing work on a public works project with a subcontractor who is ineligible to perform work on the public works project pursuant to Section 1777.1 or 1777.7 of the Labor Code.

   (b) Any contract on a public works project entered into between a contractor and a debarred subcontractor is void as a matter of law. A debarred subcontractor may not receive any public money for performing work as a subcontractor on a public works contract, and any public money that may have been paid to a debarred subcontractor by a contractor on the project will be returned to the awarding body. The contractor is responsible for the payment of wages to workers of a debarred subcontractor who has been allowed to work on the project.

4. The bidder has investigated the eligibility of each and every subcontractor that bidder intends to use on this public works project and has determined that none of them is ineligible to perform work as a subcontractor on a public works project by virtue of Public Contract Code Section 6109, Labor Code Sections 1771.1 and 1777.7, or any other provision of law.

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

Executed this _____ day of _____, 20___, at _____, California.

_____ _____

Signature Title of Authorized Official

IN-USE OFF-ROAD DIESEL-FUELED FLEETS CERTIFICATION

TO BE EXECUTED BY ALL BIDDERS AND SUBMITTED WITH BID

The undersigned Bidder certifies to Owner as set forth in sections 1 through 2, below.

1. Certification of Compliance. I hereby certify that I and all of my Subcontractors will conform to the California Air Resource Board (CARB) In-Use Off-Road Diesel-Fueled Fleets requirements for all work involving the use of vehicles subject to the regulations, including, without limitation, as applicable, the Contracting Requirements in Title 13 CCR section 2449, subdivision (i), subparts (1) – (4), and the Prime Contractor Requirements in Title 13 CCR section 2449, subdivision (j), subparts (1) – (5).

2. Instructions. Check one (1) box below.

☐ Bidder's current CARB issued Certificate of Reported Compliance accompanies this Certification. (If this box is checked, the Certificate *must be* provided.)

☐ Bidder certifies that its work on the Project (including work of its Subcontractors) does not involve the use of vehicles subject to the CARB In-Use Off-Road Diesel-Fueled Fleets requirements.

BIDDER: _____
(Name of Bidder)

Date: _____, 202__

By: _____
(Signature)

Name: _____
(Print Name)

Its: _____
(Title)

C O N T R A C T

WET WELL LINING PUMP STATION 2
PROJECT NO. 2017-09

THIS AGREEMENT is made and entered into this _____ day of_____, 20___, by and between _____, ("Contractor") License No. _____, DIR No. _____, DIR Expiration Date _____, and the City of Rohnert Park, ("City") ("Agreement").

WHEREAS, the City Council of said City has awarded a contract to Contractor for performing the work hereinafter mentioned in accordance with the sealed proposal of said Contractor.

NOW, THEREFORE, IT IS AGREED, as follows:

1. Scope of Work: Contractor must perform all the work and furnish all the labor, materials, equipment and all utility and transportation services required to complete all of the work of construction and installation of the improvements more particularly described in the Resolution adopted by the City Council of said City on <<MONTH DAY, YEAR>>, the items and quantities of which are more particularly set forth in Contractor's bid therefor on file in the office of the City Clerk, except work to be performed by subcontractors as set forth in Contractor's bid and for which Contractor retains responsibility.

2. Time of Performance and Liquidated Damages:

A. Contractor must begin work within fifteen (15) calendar days after official notice by the City Engineer to proceed with the work and must diligently prosecute the same to completion within **80 business days** of that Notice. Contractor acknowledges and agrees that time is of the essence with respect to Contractor's work and that Contractor shall diligently pursue performance of the work.

B. In the event Contractor does not complete the work within the time limit so specified or within such further time as said City Council must have authorized, Contractor must pay to City liquidated damages in the amount of two thousand dollars ($2,000) per day for each and every day's delay in finishing the work beyond the completion date so specified. Additional provisions with regard to said time of completion and liquidated damages are set forth in the specifications, which provisions are hereby referred to and incorporated herein by reference.

3. Payments:

A. City will pay Contractor for said work performed at the times and in the manner provided in the specifications and at the unit prices stated in Contractor's bid.

B. The award of the contract is for a total amount not to exceed <<AMOUNT [words ($_____)]>>.

4. Component Parts and Interpretation:

A. This contract consists of the following documents, each of which is on file in the office of the City Clerk and all of which are incorporated herein and made a part hereof by reference thereto ("Contract Documents"):

1) This Agreement

2) Notice Inviting Sealed Proposals

3) Instruction and Information to Bidders

4) Accepted Proposal, with all attachments and certifications

5) Performance Bond

6) Payment Bond

7) Special Provisions

8) Standard Specifications

9) Technical specifications

10) Design Standards

11) Plans, Profiles and Detailed Drawings

B. In the event of conflict between these documents, the following order of precedence will govern: this Agreement; change orders; supplemental agreements and approved revisions to plans and specifications; special conditions; standard specifications; detail plans; general plans; standard plans; and reference specifications. In the absence of a controlling or contrary provision in the foregoing, the *Standard Specifications* (2022 edition) of the California Department of Transportation shall apply to this Project.

5. Independent Contractor. Contractor is and will at all times remain as to City a wholly independent contractor. Neither City nor any of its officers, employees, or agents will have control over the conduct of Contractor or any of Contractor's officers, employees, agents or subcontractors, except as expressly set forth in the Contract Documents. Contractor may not at any time or in any manner represent that it or any of its officers, employees, agents, or subcontractors are in any manner officers, employees, agents or subcontractors of City.

6. Prevailing Wages:

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 DIR website http://www.dir.ca.gov/OPRL/DPreWageDetermination.htm.

B. Contractor must post at the work site, or if there is no regular work site then at its principal office, for the duration of the Contract, a copy of the determination by the Director of the Department of Industrial Relations of the specified prevailing rate of per diem wages. (Labor Code Sec. 1773.2.)

C. Contractor, and any subcontractor Contractor may engage may pay not less than the specified prevailing rate of per diem wages to all workers employed in the execution of the Agreement. (Labor Code § 1774.) Contractor is responsible for compliance with Labor Code Section 1776 relative to the retention and inspection of payroll records.

D. Contractor must comply with all provisions of Labor Code section 1775. Under Section 1775, Contractor may forfeit as a penalty to City up to two hundred dollars ($200) for each worker Contractor or any subcontractor employs in the execution of the Contract for each calendar day, or portion thereof, in which the worker is paid less than the prevailing rates. Contractor may also be liable to 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.

E. With each application for payment, Contractor shall also deliver certified payrolls to the City as set forth above in these General Conditions, and concurrently therewith (but in no event less frequently than monthly) directly to the Labor Commissioner in the format prescribed by the Labor Commissioner.

F. If federal funds are used to pay for the Work, Contractor and any subcontractor agree to comply, as applicable, with the labor and reporting requirements of the Davis-Bacon Act (40 USC § 276a-7), the Copeland Act (40 USC § 276c and 18 USC § 874), and the Contract Work Hours and Safety Standards Act (40 USC § 327 *et. seq*.).

7. Hours of Labor: Contractor acknowledges that under California Labor Code sections 1810 and following, eight hours of labor constitutes a legal day's work. Contractor will forfeit as a penalty to City the sum of twenty-five dollars ($25) for each worker employed in the execution of this Contract by Contractor or any subcontractor for each calendar day during which such worker is required or permitted to work more than eight (8) hours in any one calendar day and forty (40) hours in any one calendar week in violation of the provisions of Labor Code Section 1810.

8. Apprentices:

A. Contractor and any subcontractor under him must comply with the requirements of Labor Code Sections 1777.5 and 1777.6. Section 1777.5, as amended, which require Contractor or any subcontractor employing tradesmen in any apprenticeable occupation to apply to the joint apprenticeship committee nearest the site of the public works project and which administers the apprenticeship program in that trade for a certificate of approval. The certificate will also fix the ratio of apprentices to journeymen that will be used in the performance of the Contract. The ratio of apprentices to journeymen in such cases must not be less than one to five except:

1) When unemployment in the area of coverage by the joint apprenticeship committee has exceeded an average of fifteen percent (15%) in the ninety (90) days prior to the request for certificate, or

2) When the number of apprentices in training in that area exceeds a ratio of one (1) to five (5), or

3) When the trade can show that it is replacing at least one-thirtieth (1/30) of its membership through apprenticeship training on an annual basis statewide or locally, or

4) When the assignment of an apprentice to any work performed under a public works contract would create a condition which would jeopardize his life or the life, safety, or property of fellow employees or the public at large, or if the specified task to which the apprentice is to be assigned is of such a nature that training cannot be provided by a journeyman, or

5) When Contractor provides evidence that he employs registered apprentices on all of his contracts on an annual average of not less than one (1) apprentice to eight (8) journeymen.

B. Contractor is required to make contributions to funds established for the administration of an apprenticeship program if he employs registered apprentices or journeymen in any apprenticeable trade on such contracts and if other contractors on the public works site are making such contributions.

C. Contractor is responsible for making training fund contributions in the amount established in the prevailing wage rate – either to the applicable apprenticeship committee, or the California Apprenticeship Council ("CAC").

D. Contractor is required to submit contract award information for each craft required on

the Project using the appropriate form prepared by the Division of Apprenticeship Standards ("DAS") within the California Department of Industrial Relations ("DIR")—currently the "DAS 140 form." A copy of the current DAS 140 form is available at https://www.dir.ca.gov/DAS/DASForm140.pdf. If Contractor is approved to train apprentices, Contractor must send the required information to its apprenticeship committee. If Contractor is not approved to train apprentices, Contractor must send the information to all apprenticeship committees that can supply apprentices to the site of the public works project.

E. Contractor is required to contact the applicable apprenticeship committee to request apprentices for each craft or trade on the Project using the appropriate form DIR, currently the DAS 142 form. A copy of the current DAS 142 form is available at https://www.dir.ca.gov/DAS/DASForm142.pdf. The form must be submitted at least three business days before apprentices are required.

F. Information relative to apprenticeship standards, wage schedules, and other requirements may be obtained from the Director of Industrial Relations, ex officio the Administrator of Apprenticeship, San Francisco, California, or from the Division of Apprenticeship Standards and its branch offices.

9. Labor Discrimination: Labor Code Section 1735 reads as follows:

A contractor must not discriminate in the employment of persons upon public works on any basis listed in subdivision (a) of Section 12940 of the Government Code, as those bases are defined in Sections 12926 and 12926.1 of the Government Code, except as otherwise provided in Section 12940 of the Government Code. Every contractor for public works who violates this section is subject to all the penalties imposed for a violation of this chapter.

10. Workers' Compensation Insurance:

A. In accordance with the provisions of Labor Code Article 5, Chapter 1, Part 7, Division 2 (commencing with Section 1860) and Chapter 4, Part 1, Division 4 (commencing with Section 3700), Contractor is required to secure the payment of compensation to his employees and must for that purpose obtain and keep in effect adequate Worker's Compensation Insurance.

B. Contractor is aware of the provisions of Labor Code Section 3700 which requires every employer to be insured against liability for workers' compensation or to undertake self-insurance in accordance with the provisions of that Code, and will comply with such provisions before commencing the performance of the work of this Agreement.

11. Indemnity and Insurance:

A. To the fullest extent permitted by law (including without limitation California Civil Code Section 2782), Contractor must indemnify, hold harmless, release and defend City, its officers, elected officials, employees, agents, volunteers, and consultants from and against any and all actions, claims, demands, damages, disability, losses, expenses including, but not limited to, attorney's fees and other defense costs and liabilities of any nature that may be asserted by any person or entity including Contractor, in whole or in part, arising out of Contractor's activities hereunder, including the activities of other persons employed or utilized by Contractor including subcontractors hired by the Contractor in the performance of this Agreement excepting liabilities due to the sole negligence, intentional misconduct or active negligence of the City. This indemnification obligation is not limited in any way by any limitation on the amount or type of damages or compensation payable by or for Contractor under Worker's Compensation, disability or other employee benefit acts or the terms, applicability or limitations of any insurance held or provided by Contractor and must continue to bind the parties after termination/completion of this Agreement.

B. Contractor shall procure and maintain throughout the time for performance of the work under this Contract the insurance required by the Special Provisions. The requirement that Contractor

procure and maintain insurance shall in no way be construed to limit the Contractor's duty to indemnify City as provided in the paragraph above.

C. Failure of City to monitor compliance with these requirements imposes no additional obligations on City and will in no way act as a waiver of any rights hereunder.

12. City Right of Termination and Right to Complete the Work.

A. The City may terminate the Contract when conditions encountered during the work make it impossible or impracticable to proceed, or when the City is prevented from proceeding with the Contract by act of God, by law, or by official action of a public authority. In addition, the occurrence of any of the following is a default by Contractor under this Contract:

1) Contractor refuses or fails to prosecute the Work or any part thereof with such diligence as will insure its completion within the time specified or any permitted extension.

2) Contractor fails to complete the Work on time.

3) Contractor is adjudged bankrupt or makes a general assignment for the benefit of creditors, or a receiver is appointed on account of Contractor's insolvency.

4) Contractor fails to supply enough properly skilled workers or proper materials to complete the Work in the time specified.

5) Contractor fails to make prompt payment to any subcontractor or for material or labor.

6) Contractor fails to abide by any applicable laws, ordinances or instructions of City in performing the Work.

7) Contractor breaches or fails to perform any obligation or duty under the Contract.

B. Upon the occurrence of a default by Contractor, City will serve a written notice of default on Contractor specifying the nature of the default and the steps needed to correct the default. Unless Contractor cures the default within 10 days after the service of such notice, or satisfactory arrangements acceptable to City for the correction or elimination of such default are made, as determined by City, City may thereafter terminate this Contract by serving written notice on Contractor. In such case, Contractor will not be entitled to receive any further payment, except for Work actually completed prior to such termination in accordance with the provisions of the Contract Documents.

C. In the event of any such termination, City will also immediately serve written notice of the termination upon Contractor's surety. The surety will have the right to take over and perform pursuant to this Contract; provided, however, that if the surety does not give City written notice of its intention to take over and perform this Contract within five (5) days after service of the notice of termination or does not commence performance within ten (10) days from the date of such notice, City may take over the Work and prosecute the same to completion by contract or by any other method it may deem advisable for the account and at the expense of Contractor. Contractor and the surety will be liable to City for any and all excess costs or other damages incurred by City in completing the Work.

D. If City takes over the Work as provided in this Section, City may, without liability for so doing, take possession of, and utilize in completing the Work, such materials, appliances, plant, and other property belonging to Contractor as may be on the site of the Work and necessary for the completion of the Work.

13. Substitution of Securities for Withheld Amounts:

A. Pursuant to California Public Contracts Code Section 22300, securities may be substituted for any moneys withheld by a public agency to ensure performance under a contract. At the request and sole expense of the Contractor, securities equivalent to the amount withheld must be deposited with the public agency, or with a state or federally chartered bank as the escrow agent, who must pay such moneys to the Contractor upon satisfactory completion of the contract.

B. Securities eligible for substitution under this section must include those listed in the Public Contracts Code Section 22300 or bank or savings and loan certificates of deposit. Contractor must be the beneficial owner of any securities substituted for moneys withheld and must receive any interest thereon.

C. Alternatively, Contractor may request and the City shall make payment of retentions earned directly to the escrow agent at the expense of the Contractor. At Contractor's expense, Contractor may direct the investment of the payments into securities and the Contractor shall receive the interest earned on the investments upon the same terms provided for in Section 22300 for securities deposited by the Contractor. Upon satisfactory completion of the Agreement, Contractor shall receive from the escrow agent all securities, interest, and payments received by the escrow agent from the City, pursuant to the terms of this section.

D. Any escrow agreement entered into pursuant to this section must contain as a minimum the following provisions:

1) The amount of securities to be deposited;

2) The terms and conditions of conversion to cash in case of the default of the Contractor; and

3) The termination of the escrow upon completion of the contract.

14. General Provisions

A. Authority to Execute. Each party represents and warrants that all necessary action has been taken by such party to authorize the undersigned to execute this Agreement and to bind it to the performance of its obligations.

B. Assignment. Contractor may not assign this Agreement without the prior written consent of City, which consent may be withheld in City's sole discretion since the experience and qualifications of Contractor were material considerations for this Agreement.

C. Binding Effect. This Agreement is binding upon the heirs, executors, administrators, successors and permitted assigns of the parties.

D. Integrated Contract. This Agreement, including the Contract Documents, is the entire, complete, final and exclusive expression of the parties with respect to the Work to be performed under this Agreement and supersedes all other agreements or understandings, whether oral or written, between Contractor and City prior to the execution of this Agreement.

E. Modification of Contract. No amendment to or modification of this Agreement will be valid unless made in writing and approved by Contractor and by the City Council, City Manager or Assistant City Manager, as applicable. The parties agree that this requirement for written modifications cannot be waived and that any attempted waiver will be void.

F. Counterparts, Facsimile or other Electronic Signatures. This Agreement may be executed in several counterparts, each of which will be deemed an original, and all of which, when taken together, constitute one and the same instrument. Amendments to this Agreement will be considered

executed when the signature of a party is delivered by facsimile or other electronic transmission. Such facsimile or other electronic signature will have the same effect as an original signature.

G. Waiver. Waiver by any party of any term, condition, or covenant of this Agreement will not constitute a waiver of any other term, condition, or covenant. Waiver by any party of any breach of the provisions of this Agreement will not constitute a waiver of any other provision, or a waiver of any subsequent breach or violation of any provision of this Agreement. Acceptance by City of any Work performed by Contractor will not constitute a waiver of any of the provisions of this Agreement.

H. Interpretation. This Agreement will be interpreted, construed and governed according to the laws of the State of California. Each party has had the opportunity to review this Contract with legal counsel. The Agreement will be construed simply, as a whole, and in accordance with its fair meaning. It will not be interpreted strictly for or against either party.

I. Severability. If any term, condition or covenant of this Agreement is declared or determined by any court of competent jurisdiction to be invalid, void or unenforceable, the remaining provisions of this Agreement will not be affected, and the Agreement will be read and construed without the invalid, void or unenforceable provision.

J. Venue. In the event of litigation between the parties, venue in state trial courts will be in the County of Sonoma. In the event of litigation in a U.S. District Court, venue will be in the Northern District of California.

IN WITNESS WHEREOF, the City of Rohnert Park has caused these presents to be executed by its officers, thereunto duly authorized, and Contractor has subscribed same, all on the day and year first above written.

CITY OF ROHNERT PARK

_____

Marcela Piedra, City Manager Date

Per Resolution No. <<RESO #>>adopted by the Rohnert Park City Council at its meeting of <<Month>><<Day>>,<<Year>>.

_____

Tracy Rankin, Interim Risk Manager Date

_____

Betsy Howze, Finance Director Date

ATTEST:

_____

City Clerk

<<CONTRACTOR>>

_____

Name:_____ Date

Title: _____

APPROVED AS TO FORM:

_____

City Attorney

INSURANCE

Bidder's attention is directed to the following insurance forms and to Section 2.03 of the Special Provisions, located on Pages 2-1 through 2-6 in the Special Provisions section. It is highly recommended that bidders confer with their respective insurance carriers or brokers to determine in advance of bid submission the availability of insurance certificates and endorsements as prescribed and provided herein. Failure to comply strictly with the insurance requirements may result in forfeiture of the bid security and withdrawal of the bid proposal.

CERTIFICATE OF INSURANCE

ISSUE DATE MM/DD/YY)

CITY OF ROHNERT PARK (the "City")

PRODUCER

INSURED

THIS CERTIFICATE OF INSURANCE IS NOT AN INSURANCE POLICY AND DOES NOT AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW.

	COMPANIES	BEST'S RATING
COMPANY LETTER **A**		
COMPANY LETTER **B**		
COMPANY LETTER **C**		
COMPANY LETTER **D**		
COMPANY LETTER **E**		

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVEN BEEN REDUCED BY PAID CLAIMS.

CO LTR	TYPE OF INSURANCE	POLICY NUMBER	POLICY EFFECTIVE DATE (MM/DD/YY)	POLICY EXPIRATION DATE (MM/DD/YY)	ALL LIMITS IN THOUSANDS	
	GENERAL LIABILITY ☐ COMMERCIAL GENERAL LIABILITY ☐ CLAIMS MADE ☐ OCCUR. ☐ OWNER'S & CONTRACTOR'S PROT. ☐ OTHER _____				GENERAL AGGREGATE	$
					PRODUCTS-COMP/OPS AGGREGATE	$
					PERSONAL & ADVERTISING INJURY	$
					EACH OCCURRENCE	$
					FIRE DAMAGE (Any one fire)	$
					MEDICAL EXPENSE (Any one person)	$
	AUTOMOBILE LIABILITY ☐ ANY AUTO ☐ ALL OWNED AUTOS ☐ SCHEDULED AUTOS ☐ HIRED AUTOS ☐ NON-OWNED AUTOS ☐ GARAGE LIABILITY				COMBINED SINGLE LIMIT	$
					BODILY INJURY (Per person)	$
					BODILY INJURY (Per accident)	$
					PROPERTY DAMAGE	$
	EXCESS LIABILITY ☐ UMBRELLA ☐ OTHER THAN UMBRELLA FORM				EACH OCCURRENCE	$
					AGGREGATE	$
	☐ WORKER'S COMPENSATION AND EMPLOYERS' LIABILITY				☐ STATUTORY	
					EACH ACCIDENT	$
					DISEASE-POLICY LIMIT	$
					DISEASE-EACH EMPLOYEE	$
	PROPERTY INSURANCE ☐ COURSE OF CONSTRUCTION				AMOUNT OF INSURANCE	$

DESCRIPTION OF OPERATIONS/LOCATIONS/VEHICLES/RESTRICTIONS/SPECIAL ITEMS

THE FOLLOWING PROVISIONS APPLY:

1. None of the above-described policies will be canceled until after 30 days' written notice has been given to the City at the address indicated below.
2. The City of Rohnert Park, its officers, elected officials, employees, agents and volunteers are added as insureds on all liability insurance policies listed above.
3. It is agreed that any insurance or self-insurance maintained by the City will apply in excess of and not contribute with, the insurance described above.
4. The City is named a loss payee on the property insurance policies described above, if any.
5. All rights of subrogation under the property insurance policy listed above have been waived against the City.
6. The workers' compensation insurer named above, if any, agrees to waive all rights to subrogation against the City for injuries to employees of the insured resulting from work for the City or use of the City's premises or facilities.
7. Attached hereto are copies of the applicable policy pages or endorsements regarding notice of cancellation, additional insured and waiver of subrogation matters.

CERTIFICATE HOLDER/ADDITIONAL INSURED

CITY OF ROHNERT PARK
130 AVRAM AVENUE
ROHNERT PARK, CA 94928

AUTHORIZED REPRESENTATIVE

SIGNATURE _____

TITLE _____

PHONE NO. _____

Rev. 11/08

INSURER ISO FORM CG 20 10 11 85 (MODIFIED)
POLICY NO: **COMMERCIAL GENERAL LIABILITY**
ENDORSEMENT NO:

THIS ENDORSEMENT CHANGES THE POLICY, PLEASE READ IT CAREFULLY

ADDITIONAL INSURED – OWNERS, LESSEES OR CONTRACTORS

This endorsement modifies insurance provided under the following:

COMMERCIAL GENERAL LIABILITY COVERAGE PART.

SCHEDULE

Name of Organization:

The City of Rohnert Park, its officers, elected officials, employees, agents and volunteers are named as additional insured.

(If no entry appears above, the information required to complete this endorsement will be shown in the Declarations as applicable to this endorsement).

WHO IS INSURED (Section II) is amended to include as an insured the person or organization shown in the Schedule but only with respect to liability arising out of "your work" performed for that insured.

Modifications to ISO for CG 20 10 11 85

1. The insured scheduled above includes the insured's elected or appointed officers, officials, employees, agents and volunteers.

2. This insurance must be primary as respects the insured shown in the schedule above, or if excess, must stand in an unbroken chain of coverage excess of the Named Insured's scheduled underlying primary coverage. In either event, any other insurance maintained by the Insured scheduled above must be in excess of this insurance and must not be called upon to contribute with it.

3. The insurance afforded by this policy must not be canceled except after thirty (30) days prior written notice by certified mail, return receipt requested, has been given to the Entity.

4. Coverage must not extend to any indemnity coverage for the active negligence of the additional insured in any case where an agreement to indemnify the additional insurance would be invalid under Subdivision (b) of Section 2782 of the Civil Code.

_____
Signature-Authorized Representative

_____

_____
Address

_____

CG 20 10 11 85 Insurance Services Office, Inc. Form (Modified)

SUBMIT IN DUPLICATE

AUTOMOBILE LIABILITY SPECIAL ENDORSEMENT FOR CITY OF ROHNERT PARK (the "City")	ENDORSEMENT NO.	ISSUE DATE (MM/DD/YY)

PRODUCER Telephone	POLICY INFORMATION: Insurance Company: Policy No.: Policy Period: (from) (to) LOSS ADJUSTMENT EXPENSE ☐ Included in Limits ☐ In Addition to Limits ☐ Deductible ☐ Self-Insured Retention (check which) of $_____
NAMED INSURED	APPLICABILITY. This insurance pertains to the operation and/or tenancy of the named insured under all written agreements and permits in force with the City unless checked here ☜ in which case only the following specific agreements and permits with the City are covered: CITY AGREEMENTS/PERMITS
TYPE OF INSURANCE ☐COMMERCIAL AUTO POLICY ☐BUSINESS AUTO POLICY ☐OTHER _____	OTHER PROVISIONS
LIMIT OF LIABILITY $ _____ per accident, for bodily injury and property damage.	CLAIMS: Underwriter's representative for claims pursuant to this insurance. Name: _____ Address: _____ Telephone: (___) _____

In consideration of the premium charged and notwithstanding an inconsistent statement in the policy to which this endorsement is attached or any endorsement now or hereafter attached thereto, it is agreed as follows:

1. INSURED. The City of Rohnert Park, its officers, elected officials, employees, agents and volunteers are included as insureds with regard to damages and defense of claims arising from: the ownership, operation, maintenance, use, loading or unloading of any auto owned, leased, hired or borrowed by the Named Insured, or for which the Named Insured is responsible.
2. CONTRIBUTION NOT REQUIRED. As respects work performed by the Named Insured for or on behalf of the City, the insurance afforded by this policy must: (a) be primary insurance as respects the City, its officers, officials, employees, agents or volunteers; or (b) stand in an unbroken chain of coverage excess of the Named Insured's primary coverage. Any insurance or self-insurance maintained by the City, its officers, officials, employees and volunteers must be in excess of the Named Insured's insurance and not contribute with it.
3. CANCELLATION NOTICE. With respect to the interests of the City, this insurance must not be cancelled, except after thirty 30) days prior written notice by receipted delivery has been given to the City.
4. SCOPE OF COVERAGE. This policy affords coverage at least as broad as:
   (1) If primary, Insurance Services Office form number CA0001 (Ed. 1/87), Code 1 ("any auto"); or
   (2) If excess, affords coverage which is at least as broad as the primary insurance forms referenced in the preceding section (1).

Except as stated above nothing herein must be held to waive, alter or extend any of the limits, conditions, agreements or exclusions of the policy to which this endorsement is attached.

ENDORSEMENT HOLDER	
CITY **CITY OF ROHNERT PARK** **130 AVRAM AVENUE** **ROHNERT PARK, CA 94928**	AUTHORIZED REPRESENTATIVE ☜ Broker/Agent ☜ Underwriter ☜ _____ I _____ (print/type name), warrant that I have authority to bind the above-mentioned insurance company and by my signature hereon do so bind this company to this endorsement. Signature _____ (original signature required) Telephone: ( ) Date signed: _____

REV. 11/08

SUBMIT IN DUPLICATE

WORKERS' COMPENSATION AND EMPLOYER'S LIABILITY SPECIAL ENDORSEMENT FOR ____CITY OF ROHNERT PARK____ (the "City")	ENDORSEMENT NO.	ISSUE DATE (MM/DD/YY)

PRODUCER

Telephone

POLICY INFORMATION:
Insurance Company:
Policy No.:
Policy Period: (from) (to)

OTHER PROVISIONS

NAMED INSURED

CLAIMS: Underwriter's representative for claims pursuant to this insurance.
Name:_____
Address: _____
_____
Telephone: (_____)_____

EMPLOYERS LIABILITY LIMITS

$ _____ (Each Accident)

$_____ (Disease - Policy Limit)

$_____ (Disease - Each Employee)

In consideration of the premium charged and notwithstanding an inconsistent statement in the policy to which this endorsement is attached or any endorsement now or hereafter attached thereto, it is agreed as follows:

1. CANCELLATION NOTICE. This insurance must not be cancelled, except after thirty (30) days prior written notice by receipted delivery has been given to the City.
2. WAIVER OF SUBROGATION. This insurance Company agrees to waive all rights of subrogation against the City, its officers, officials, employees, agents and volunteers for losses paid under the terms of this policy which arise from the work performed by the Named Insured for the City.

Except as stated above nothing herein must be held to waive, alter or extend any of the limits, conditions, agreements or exclusions of the policy to which this endorsement is attached.

ENDORSEMENT HOLDER

CITY

CITY OF ROHNERT PARK
130 AVRAM AVENUE
ROHNERT PARK, CA 94928

AUTHORIZED REPRESENTATIVE ☜ Broker/Agent ☜ Underwriter ☜ _____

I _____ (print/type name), warrant that I have authority to bind the above-mentioned insurance company and by my signature hereon do so bind this company to this endorsement.

Signature _____
(original signature required)

Telephone: ( ) Date signed: _____

REV. 11/08

PART 2 – SPECIAL PROVISIONS

SPECIAL PROVISIONS

2.01 PROJECT OWNER

The Project Owner is the City of Rohnert Park, California. Wherever in these or the Standard Specifications the word "Owner" appears, it means the City of Rohnert Park.

2.02 LOCATION AND DESCRIPTION OF WORK

Location of work is within the City of Rohnert Park, **at the City's sanitary sewer pump station 2 located at 201 J Rogers Ln, Rohnert Park, CA 94928.**

The work generally consists of, but not limited to, **coating of existing pump station wet well and grinder chamber, replacement of pump station ventilation equipment, installation of new ventilation monitoring system, installation of new bypass piping, bypass pumping,** and appurtenances as shown on the plans and specified in these Special Provisions.

2.03 INSURANCE REQUIREMENTS FOR CONTRACTORS

A. The following parties or entities must be listed as additional insured by endorsement:

1. The City of Rohnert Park, its officers, elected officials, employees, agents and volunteers

B. BIDDER'S ATTENTION IS DIRECTED TO THE INSURANCE REQUIREMENTS BELOW. IT IS HIGHLY RECOMMENDED THAT BIDDERS CONFER WITH THEIR RESPECTIVE INSURANCE CARRIERS OR BROKERS TO DETERMINE IN ADVANCE OF BID SUBMISSION THE AVAILABILITY OF INSURANCE CERTIFICATES AND ENDORSEMENTS AS PRESCRIBED AND PROVIDED HEREIN. IF AN APPARENT LOW BIDDER FAILS TO COMPLY STRICTLY WITH THE INSURANCE REQUIREMENTS, THAT BIDDER MAY BE DISQUALIFIED FROM AWARD OF THE CONTRACT.

C. Contractor must procure and maintain for the duration of the contract insurance against claims for injuries to persons or damages to property which may arise from or in connection with the performance of the work hereunder by Contractor, Contractor's agents, representatives, employees or subcontractors. The coverage of the above-named parties as additional insureds shall be "primary and non-contributory" and must state that it will not seek contribution from the City's insurance or self-insurance. The cost of Contractor's insurance must be included in Contractor's bid. The Notice to Proceed with the Work will not be issued, and Contractor must not commence work, until such insurance has been approved by the City. Such insurance must remain in full force and effect at all times during the prosecution of the Work and until the final completion and acceptance thereof. In addition, the Commercial General Liability Insurance must be maintained for a minimum of three (3) years after final completion and acceptance of the Work. It is Contractor's responsibility to ensure that proof of insurance is sent to the City during this time. The Notice to Proceed does not relieve Contractor of the duty to obtain such insurance as required herein.

D. Minimum Scope of Insurance

Coverage must be at least as broad as:

1. Insurance Services Office Commercial General Liability coverage (Occurrence Form CG 0001).

2. Insurance Services Office form number CA 0001 (Ed. 1/87) covering Automobile Liability, Code 1 "any auto" or the exact equivalent. If Contractor owns no vehicles, this requirement may be satisfied by a non-owned auto endorsement to the general liability policy described above. If Contractor or Contractor's employee(s) will use personal autos in any way on this Project, Contractor must provide evidence of personal auto liability coverage for each such person.

3. Workers' Compensation and Employers Liability: Workers' Compensation on a state-approved policy form providing statutory benefits as required by law with employer's liability insurance, with minimum limits of One Million Dollars ($1,000,000) per occurrence.

4. Course of Construction insurance coverage must provide "all risk" coverage for the completed value of the Project. Policies must contain the following provisions:

a. The City must be named as loss payee, and

b. The insurer must waive all rights of subrogation against the City.

5. Pollution Exposure and/or Asbestos Pollution Liability

Coverage must not extend to any indemnity coverage for the active negligence of the additional insured in any case where an agreement to indemnify the additional insured would be invalid under Subsection (b) of Section 2782 of the Civil Code.

D. Minimum Limits of Insurance

Contractor must maintain limits no less than:

1. Commercial General Liability: $2,000,000 per occurrence for bodily injury, personal injury and property damage and $2,000,000 general aggregate. It is permissible to use excess/umbrella coverage to meet limit requirements provided the umbrella policies are appropriately endorsed and meet all other requirements. Additionally, a letter clearly identifying the primary policy or policies to which the excess umbrella coverage applies must be submitted attesting to the following: *"Umbrella or excess liability policies must provide coverage at least as broad as specified for underlying coverages and covering those insured in the underlying policies. Coverage must be "pay on behalf", with defense costs payable in addition to policy limits. There must be no cross-liability exclusion of claims or suits by one insured against another, and such coverage must also apply on a primary and non-contributory basis for the benefit of the City before the City's own insurance or self-insurance shall be called upon to protect it as a named insured."*

2. Automobile Liability: $2,000,000 combined single limit per accident for bodily injury and property damage.

3. Workers' Compensation and Employers Liability: Workers' Compensation providing statutory benefits as required by the Labor Code with employers' liability insurance, with minimum limits of $1,000,000 per accident or disease.

4. Course of Construction insurance coverage must provide "all risk" coverage for the completed value of the Project. Policies must contain the following provisions:

a. The City must be named as loss payee, and

b. The insurer must waive all rights of subrogation against the City.

5. Pollution and/or Asbestos Pollution Liability: $1,000,000 each occurrence/ $1,000,000 policy aggregate. If coverages are written on a Claims Made form:

a. The "Retro Date" must be shown and must be before the date of the contract or the beginning of contract work.

b. Insurance must be maintained and evidence of insurance must be provided for at least five (5) years after completion of contract work.

c. If coverage is canceled or non-renewed, and not replaced with another claims made policy form with a "Retro Date" prior to the contract effective date, Contractor must purchase "extended reporting" coverage for a minimum of five (5) years after completion of contract work.

d. A copy of the claims reporting requirements must be submitted to the City for review.

E. Contractor agrees that any available insurance proceeds broader than or in excess of these specified minimum coverage requirements or the limits in subsection (A) shall be available to the additional insureds named above. Furthermore, the requirements for coverage and limits shall be (1) the minimum coverage and limits specified herein; or (2) such broader coverage and maximum limits of coverage of any insurance policy or proceeds available to the named insured for the work performed; whichever is greater.

F. Deductibles and Self-Insured Retentions

Any deductibles or self-insured retentions must be declared to and approved by the City. At the option of the City, either: the insurer must reduce or eliminate such deductibles or self-insured retentions as respects the City, its officers, elected officials, employees, agents, and volunteers; or the Contractor must procure a bond guaranteeing payment of losses and related investigations, claim administration and defense expenses.

G. Other Insurance Provisions

The policies are to contain, or be endorsed to contain, the following provisions:

1. General Liability and Automobile Liability Coverages

a. The City, its officers, elected officials, employees, agents and volunteers are to be covered as insureds as respects: liability arising out of activities performed by or on behalf of the Contractor, including the insured's general supervision of the Contractor; products and completed operations of the Contractor, premises owned, occupied or used by the Contractor, or automobiles owned, leased, hired or borrowed by the Contractor. The coverage must contain no special limitations on the scope of protection afforded to the City, its officers, elected officials, employees, agents or volunteers.

b. The Contractor's insurance coverage must be primary insurance as respects the City, its officers, elected officials, employees, agents and volunteers. Any insurance

or self-insurance maintained by the City, its officers, elected officials, employees, agents or volunteers must be in excess of Contractor's insurance and must not contribute with it.

c. Any failure to comply with reporting provisions of the policies must not affect coverage provided to the City, its officers, elected officials, employees, agents or volunteers.

d. The Contractor's insurance must apply separately to each insured against whom claim is made or suit is brought, except with respect to the limits of the insurer's liability.

2. Workers' Compensation and Employers Liability Coverage

The insurer must agree to waive all rights of subrogation against the City, its officers, elected officials, employees, agents and volunteers for losses arising from work performed by Contractor for the City.

3. All Coverages

a. Each insurance policy required by this clause must be endorsed to state that coverage must not be suspended, voided, cancelled by either party, reduced in coverage or in limits except after thirty (30) days' prior written notice by certified mail, return receipt requested, has been given to the City.

b. **Coverage must not extend to any indemnity coverage for the active negligence of the additional insured in any case where an agreement to indemnify the additional insured would be invalid under Civil Code Section 2782(b).**

4. Course of Construction policies must contain the following provisions:

a. The City must be named as loss payee.

b. The insurer must waive all rights of subrogation against the City.

5. Pollution and/or Asbestos Pollution Liability: $1,000,000 each occurrence/ $1,000,000 policy aggregate. If coverages are written on a Claims Made form:

a. The "Retro Date" must be shown and must be before the date of the contract or the beginning of contract work.

b. Insurance must be maintained and evidence of insurance must be provided for at least five (5) years after completion of contract work.

c. If coverage is canceled or non-renewed, and not replaced with another claims made policy form with a "Retro Date" prior to the contract effective date, Contractor must purchase "extended reporting" coverage for a minimum of five (5) years after completion of contract work.

d. A copy of the claims reporting requirements must be submitted to the City for review.

H. Acceptability of Insurers

Insurance is to be placed with insurers with a Best's rating of no less than A:VII or as approved by the City.

I. Verification of Coverage

Contractor must furnish the City with certificates of insurance and with original endorsements affecting coverage required by this clause. The certificates and endorsements for each insurance policy are to be signed by a person authorized by that insurer to bind coverage on its behalf. The certificates and endorsements are to be on forms provided by the City. Where by statute, the City's workers' compensation-related forms cannot be used, equivalent forms approved by the Insurance Commissioner are to be substituted. All certificates and endorsements are to be received and approved by the City before work commences. The City reserves the right to require complete, certified copies of all required insurance policies, at any time.

J. Subcontractors

Contractor must include all subcontractors as insureds under its policies or must furnish separate certificates and endorsements for each subcontractor. All coverages for subcontractors must be subject to all of the requirements stated herein.

2.04 BONDS

A. In accordance with Section 3.4 of the Standard Specifications, Contractor must provide the following bonds: Payment Bond equal to one hundred percent (100%) of the Contract Bid Price, and Performance Bond equal to one hundred percent (100%) of the Contract Bid Price on City's forms. Both bonds must, by their terms, remain in full force and effect for a period of one (1) year after the completion and acceptance of said Work to guarantee the replacement or making acceptable of any defective materials or faulty workmanship.

B. Contractor may elect to post a maintenance bond equal to one hundred percent (100%) of the Contract Bid Price, which will run for one (1) year after completion and acceptance of said Work to guarantee replacing or making acceptable any defective materials or faulty workmanship prior to the acceptance of said Work.

2.05 LIQUIDATED DAMAGES

In accordance with Section 8.6 of the Standard specifications, liquidated damages shall be **two thousand dollars ($2,000) per calendar day.**

2.06 WITHDRAWALS OF PROPOSALS

A. City reserves the right to reject any and all bids and to waive any informality or irregularity in the bids received.

B. No bidder may withdraw his/her bid for a period of ninety (90) days from the opening thereof.

2.07 DRAWINGS AND SPECIFICATIONS

A. The drawings showing location and character of work are entitled **Wet Well Lining Pump Station 2**, **numbered 1 through 16 inclusive**, and are included as a part of these specifications. The City of Rohnert Park 2023 Manual of Standards, Details and Specifications are the adopted Standard Plans for the City of Rohnert Park and are included as a part of these specifications.

B. Also included by reference as part of these specifications are the Standard Specifications of the City of Rohnert Park, Sections 1-10 inclusive, hereinafter referred to as "General Provisions."

C. In addition, the technical provisions of the Standard Plans and Standard Specifications, State of California, Department of Transportation, Business and Transportation Agency, most current edition, and to revisions thereof are included by reference as a part of these specifications insofar as they refer to materials and methods of work where applicable. Wherever in the Special Provisions reference is made to "Caltrans Standard Specifications" or "Caltrans Standard Plans," it refers to these specifications or plans.

2.08 COOPERATION AND COLLATERAL WORKS

A. Contractor must conform to the provisions of Section 7.26, "Cooperation and Collateral Works," of the Standard Specifications.

B. Contractor must ascertain the nature and extent of any simultaneous collateral work and must coordinate their operations and cooperate to minimize interference.

2.09 PROTECTION AND RESTORATION OF EXISTING IMPROVEMENTS

A. Contractor must conform to the provisions of Section 7.15, "Preservation of Property," of the Standard Specifications.

B. Without additional compensation, Contractor may remove and replace, in a condition as good as or better than original, such small miscellaneous structures as fences and sign posts, that interfere with the Contractor's operations.

C. All costs to Contractor for protecting, removing, modifying, relocating and restoring existing improvements must be considered as included in the Contract prices paid for the various items of work, and no additional allowance will be made therefor.

2.10 PERMITS AND LICENSES

A. Contractor will obtain all permits and pay any fees connected therewith having to do with its construction operations outside of the project's building permit acquired by the City of Rohnert Park. The City has an approved **Building Permit #CB26-0002**. The contractor will need to sign the Workers Compensation Declaration and submit it to the Project Manager, Julian De Anda, at Public Works. The Project Manager will submit the signed Workers Compensation Declarations to the Building Department for the issuance of the permit acquired by the City of Rohnert Park. Contractor to set up account for permit information and to schedule building permit inspections with the City's Building Department at: https://rpccrw.rpcity.org/etrakit3/

B. Contractor must have a valid California contractor's Class **A** license. Contractor and all subcontractors will be required to obtain a **City Business license**.

2.11 APPROVED DEBRIS HAULERS

A. There are three (3) approved debris haulers within the City and their contact information is listed below. Contractor shall contract with one of the three (3) debris haulers for service on the project. Payment for debris hauling shall be included within the Contractor's bid and no additional payment will be made for using one of the three (3) approved debris haulers.

Industrial Carting (Global Materials Recovery Services C&D Recycling Facility) (707) 585-0511	Recology Sonoma Marin 800-243-0291 https://www.recology.com/recology-sonoma-marin/	Pacific Sanitation 707-838-2597 http://www.pacificsanitation.com/

B. When Contractor utilizes a staging area or storage yard that is fenced and screened, final cleanup of the staging area and storage yard will be completed before the fence and screen are removed, except for spot cleanup or trimming that may be required in areas directly under or adjacent to the fence and screen.

C. Unless expressly waived by the City Engineer, when Contractor utilizes an area for storage of material or staging its activities, the area will be fenced and locked and all fencing will be installed with protective screening (*i.e.*, green screen) to minimize the visual impact of the storage and staging area.

2.12 FIELD REVIEW PRIOR TO BIDDING

The bidder must examine carefully the site of the work contemplated and the proposal, plans, specifications, and the contract forms therefor. It will be assumed that the bidder has investigated and is satisfied as to the conditions to be encountered, as to the character, quality and quantities of work to be performed and materials to be furnished, and as to the requirements of these specifications, the Special Provisions, and the Contract.

2.13 TESTING

The City will only pay for passing compaction tests meeting the requirements of these specifications. All failing tests will be charged to Contractor and the costs of such failing tests will be deducted from the Contract. In addition, the decision as to when and from what areas tests are to be made will be at the judgment of the Engineer only.

2.14 WORKING HOURS AND RECORD DRAWINGS

A. Contractor working hours shall be between 8:00 AM and 6:00 PM unless approved by the City Engineer at least seventy-two (72) hours in advance. Working days shall be Monday through Friday, excluding weekends and City observed holidays.

B. Contractor shall provide record drawings at the end of the Project, and final payment shall not be issued until completed and approved by the Project manager. The record drawing compilation shall be considered part of the bid amount.

2.15 PROJECT NOTIFICATION AND IDENTIFICATION SIGN

A. Contractor shall post notification flyers at each residence or commercial establishment within the work limit two (2) weeks prior to commencement of work and three (3) days prior to commencement of work. Cost for notification shall be considered as part of mobilization, and no additional payment shall be made.

B. Contractor shall supply a four foot-by-eight foot (4’ X 8’) sign to be displayed at the Project site as approved by the Engineer in wording to be provided by the City. The sign shall be constructed in accordance with City STD 742. Contractor shall remove the sign when construction is complete. All costs associated with furnishing, installing, maintaining, and removing the sign shall be included in various other bid items, and no separate payment will be made.

PART 3 – STANDARD SPECIFICATIONS

PART 3
CONDITIONS OF THE CONTRACT

SECTION 1

DEFINITIONS AND TERMS

Whenever in these specifications, or in any documents or instruments where these specifications govern, the following terms, or acronyms in place of them, are used, the intent and meaning must be interpreted as follows (except as the context requires a different meaning):

Abbreviations

AAI	American Asphalt Institute
AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
AISC	American Institute Steel Construction
AISI	American Iron and Steel Institute
API-ASME	American Pressure Institute - American Society of Mechanical Engineers
AREA	American Railway Engineering Association
ASA	American Standards Association
ASTM	American Society for Testing Materials
AWPA	American Wood Preservers Association
AWA	American Welding Society
AWWA	American Water Works Association
CRA	California Redwood Association
DFPA	Douglas Fir Plywood Association
NEMA	National Electrical Manufacturers' Association
WCLA	West Coast Lumbermen's Association

Acceptance

The formal written acceptance by the City of an entire Contract which has been completed in all respects in accordance with the plans and specifications and any modifications thereof previously approved.

Bidder

Any individual, firm or corporation submitting a proposal for the Work contemplated, acting directly or through a duly authorized representative.

City

City of Rohnert Park

City Engineer

The City Engineer of the City of Rohnert Park.

Contract or Contract Documents

The contract or agreement to be entered into by the successful bidder for the performance of the work must consist of the following documents, each of which is on file in the office of the City Clerk and all of which are incorporated in the Contract and made a part thereof by reference thereto: Contract, Invitation for Sealed Proposals, Instructions and Information to Bidders, Accepted Proposal, Performance Bond, Payment Bond, Special Provisions, Standard Specifications, Design and Construction Standards, Plans, Profiles and Detailed Drawings.

Contractor

The word "Contractor" means the person, persons, partnership or corporation entering into the Contract for the performance of the work required and the legal representative of said party of the agent appointed to act for said party in the performance of the Work.

Contract Prices

Either the unit prices or lump sum amounts to be named in the Contract, or the total of all payments under the Contract at the unit prices or lump sum amounts, as the case may be. This definition is for convenience and reference only and must not be construed to alter the fact that the Contract is an entire Contract for the performance of all work depicted on the plans and as described herein.

Directed

Whenever in these specifications the words "directed," "required," "permitted," "ordered," "instructed," "designated," "considered necessary," "prescribed," or words of like import are used, it must be understood that the directions, requirements, permission, order, instruction, designation, or prescription, etc. of the City Engineer are intended; and, similarly, the words "approved," "acceptable," "satisfactory," or words of like import, mean approved by, or acceptable or satisfactory to the City Engineer, unless otherwise stated.

Engineer

"Engineer" means properly authorized engineers, inspectors, and superintendents acting severally within their scope of the particular duties entrusted to them by the City Engineer.

Federal Agencies

Whenever in these specifications reference is made to any federal agency or officer, such references are deemed made to any agency or officer succeeding in accordance with law to the powers, duties, jurisdictions and authority of the agency or officer mentioned.

Inspector

The word "Inspector" means the authorized individual or firm acting within the jurisdiction entrusted to it by the City Engineer.

Plans

The word "Plans" means collectively all of the drawings or plans referenced by the Project specifications and made a part thereof, and also such supplemental drawings or plans as the City Engineer must issue from time to time to elucidate drawings or plans attached to these specifications, or for showing details which are not shown thereon, or for the purpose of showing changes in the work, as authorized in later paragraphs describing changes and Extra Work.

Specifications

The directions, provisions, and requirements contained herein as supplemented by such special provisions or special specifications as may be necessary, pertaining to the method and manner of performing the work or the quantities and qualities of materials to be furnished under the Contract. The special provisions or special specifications are specified clauses setting forth conditions or requirements peculiar to the Project under consideration and covering work or materials involved in the proposal and estimate but not satisfactorily covered by these Standard Specifications.

State

State of California.

Supervision

The word "supervision" where used in these specifications to indicate supervision by the City Engineer means the performance of obligations and the exercise of rights specifically imposed and granted upon and to the City in becoming a party to the Contract, of which the text of these specifications forms a part. Excepting as specifically stated herein, supervision by the City is not be construed to mean active and direct superintendence of the details of the Work.

Surety

The word "surety" or "sureties" means the bondsmen or party or parties who may guarantee the fulfillment of the Contract by bond, and whose signatures are attached to said bond.

SECTION 2

PROPOSAL REQUIREMENTS AND CONDITIONS

2.1 INTENT

It is the intent of these specifications that the provisions of all sections must apply unless otherwise specified in the Special Provisions, in which case the provisions contained therein must have precedence over those specified in the Standard Specifications. It is also the intent where reference is made to specifications or other organizations for portions of the Work, that such reference applies only to construction methods and materials used in said Work.

SECTION 3

AWARD AND EXECUTION OF CONTRACT

3.1 AWARD OF CONTRACT

A. The City reserves the right to accept or reject any or all proposals and waive technical defects as the City's best interests may require. Award of the Contract, if it be awarded, will be to the lowest responsive, responsible bidder whose proposal complies with all the requirements prescribed. The award, if made, will be awarded as soon as practicable after the opening of the proposals but not before the time for bid protests set forth below. Proposals in which the prices are obviously unbalanced will be rejected.

B. The proposals will be compared on a basis of the sum of the totals of the items on the schedule as calculated from the given estimated quantities and the unit prices or lump sums of the amount submitted. The entire work will be awarded to one bidder, unless otherwise specified in the Special Provisions.

3.2 BID PROTESTS

A. Any bid protest ("Bid Protest") must be filed in writing with the City Clerk, with a copy to the bidder whose bid is being protested and served by email or facsimile transmission within seven (7) calendar days of the City's issuance of the Notice to Intent to Award for Construction Work. **Proof of service of the Bid Protest must be submitted to the City Clerk within one business day of the filing of the Bid Protest, and any protest without a timely submitted proof of service may be rejected.** City will use reasonable efforts to deliver by email or facsimile a copy of the Notice of Intent to Award to all bidders who submitted bids no later than the business day after issuance, although any delay or failure to do so will not extend the bid protest deadline described above.

B. The Bid Protest must state all grounds upon which the protest is based and include all facts and documents in support of each protest ground.

C. Any bidder whose bid is subject to a protest may submit to the City Clerk a written response ("Response") to the Bid Protest, with a copy to the protesting bidder, and served by email or facsimile transmission within five (5) calendar days of the service of the Bid Protest.

D. The City Clerk shall promptly submit the Bid Protest, and any Response, to the City Manager, Assistant City Manager or his/her designee for decision ("Decision"). The Decision on the Bid Protest shall be in writing and shall be served upon the protesting bidder, and the bidder whose bid is being protested, via email or facsimile transmission within five (5) calendar days of his or her receipt of Bid Protest and any Response. If the City Manager, Assistant City Manager or his/her designee has not issued a written Decision on the Bid Protest within said five (5) calendar day period, then the Bid Protest shall be deemed denied. The Decision, by written Decision or deemed denial, shall be final.

E. Failure to comply with these Bid Protest Procedures shall be deemed to be a waiver of the right to protest a bid.

3.3 RETURN OF PROPOSAL GUARANTEES

Within ten (10) days after award of the Contract, the City will upon demand return the

proposal guarantees accompanying the proposals of all bidders, except those of the three (3) lowest responsible bidders as determined by the City. Proposal guarantees of the three (3) lowest responsible bidders will be held until the Contract has been finally executed, after which they will be returned to the respective bidders whose proposals they accompany.

3.4 BONDS

A. Prior to the City's execution of the Contract, the successful bidder must file good and sufficient bonds to be approved by the City conditioned upon the complete performance of the Contract and upon the payment of claims for labor and materials in connection therewith. The Contractor must pay all premiums and costs thereof and incidental thereto. Such bonds must not be subject to cancellation.

B. The following minimum thresholds require Payment and Performance bonds for projects over twenty-five thousand dollars ($25,000):

1. Payment Bond. Per Civil Code Section 9550, a payment bond is required for a public works contract involving an expenditure in excess of twenty-five thousand dollars ($25,000). Civil Code Section 9554 requires that the payment bond be in an amount not less than one hundred percent (100%) of the total amount payable pursuant to the public works contract and is subject to the provisions of that chapter as specified in the Special Provisions.

2. Performance Bond: The performance bond shall be in an amount specified in the Special Provisions and must be conditioned so as to ensure the complete performance of the Contract without exception.

C. Should City deem any surety or sureties unsatisfactory at any time, notice will be given to Contractor to that effect, and they must forthwith substitute a new surety or sureties satisfactory to the City. No further payment will be deemed due or will be made under this Contract until the new surety is qualified and accepted by the City.

D. Any alterations in the Work to be done, or increase or decrease of the materials to be furnished, which may be made pursuant to the terms of said Contract, will not in any way release either the principal or surety thereunder, nor will any extensions of time granted under the provisions of said Contract release either the principal or surety, and notice of such alterations or extensions of the Contract must be waived by the surety. The bonds must be maintained in full force and effect until the Contract has been completely performed and until all claims for material and labor have been paid.

E. Once the Notice of Completion has been recorded, Contractor may elect to post a Maintenance Bond equal to one hundred percent (100%) of the final Contact Price, including Contract change orders, if any, for a period of one-year after the Notice of Completion recorded date.

3.5 EXECUTION OF CONTRACT

The Contract must be signed by the successful bidder and returned, together with the Contract Bonds and valid insurance on City forms, within ten (10) calendar days after the date of mailing written notice to the successful bidder that the Contract has been awarded.

3.6 FAILURE TO EXECUTE CONTRACT

Failure to execute the Contract, file acceptable bonds, and/or acceptable insurance as

provided herein within said ten (10) calendar days shall allow the City, at its discretion, to annul the award and claim the proposal guarantee as provided in the California Public Contract Code. If the successful bidder refuses or fails to execute the Contract, the City may award the Contract to the second lowest responsible bidder. If the second lowest responsible bidder refuses or fails to execute the Contract, the City may award the Contract to the third lowest responsible bidder. On the failure or refusal of the second or third lowest responsible bidder, to whom any Contract is so awarded, to execute the same, such bidders' guarantees must be likewise forfeited to the City. The Work may then be re-advertised or may be constructed by other means as the City may decide.

SECTION 4

SCOPE OF WORK

4.1 WORK TO BE DONE BY CONTRACTOR

A. The Work to be done consists of furnishing all labor, methods or processes, implements, tools, machinery, transportation, insurance, permits, bonds, taxes and materials, except as otherwise specified which are required to construct the **coating of existing pump station wet well and grinder chamber, replacement of pump station ventilation equipment, installation of new ventilation monitoring system, installation of new bypass piping, bypass pumping, and other appurtenances as necessary to complete the project** in complete order for use and to leave the grounds in a neat and orderly condition.

B. Where items contain a description of work to be included for payment under a particular item, such description will be considered as including, but not being limited to, the Work described. It is further understood that it is the intent that the cost of all Work necessary for the completion of a particular item must be included in the price proposal for the item, unless the cost of such Work is specifically included in another item.

4.2 FINAL CLEANUP

A. Before City's final inspection, Contractor must clean the site and grounds occupied by it in connection with the Work of all rubbish, excess materials, falsework, temporary structures, and equipment, and all parts of the Work must be left in a neat and presentable condition. Nothing herein, however, requires Contractor to remove warning and directional signs prior to City's formal acceptance of the Work.

B. When Contractor utilizes a staging area or storage yard that is fenced and screened, final cleanup of the staging area and storage yard will be completed before the fence and screen are removed, except for spot cleanup or trimming that may be required in areas directly under or adjacent to the fence and screen.

4.3 CHANGES IN THE CONTRACT - EFFECT BETWEEN PARTIES

A. City reserves the right to make such alterations or deviations, additions to or omissions from the plans and specifications, as may be determined during the progress of the Work to be necessary and advisable for the proper completion thereof. When such change is ordered, the City Engineer must determine and state in his/her written order to Contractor made pursuant thereto whether in his/her opinion such change constitutes a material change and what adjustment of consideration provided for in the Contract is warranted. Upon written order of the City Engineer, Contractor must proceed with the Work as so increased, decreased or altered. Such action and any disposition thereof may be taken without notice by City to Contractor's insurance underwriters, sureties, or guarantors required by this Contract, and absence of notice thereto will not discharge the obligation of any such party.

B. When City and Contractor fail to agree as to whether an omission of a portion of the work or alterations, or deviations or additions to or omissions from the plans and specifications ordered by the Engineer or City constitute a material change or difference in character of the Work as herein contemplated sufficient to warrant adjustment in the consideration provided to be paid to

the Contractor or fail to agree on the consideration adjustment or compensation to be allowed for such change, Contractor must forthwith proceed with the changed Work upon receipt of written order from the City Engineer.

C. Pending a settlement of the dispute, the Contractor must file with the City Engineer, within ten (10) days after receiving such written notice to proceed, a protest setting forth in detail in what particulars the character of the Work was changed so as to warrant a consideration adjustment or by what amount the unit cost or other cost was increased or to what extent the consideration demand or reduction in consideration determined by the City Engineer as warranted is excessive. Failure to file such a protest in the time allotted will be deemed a waiver of any right to protest, and Contractor will proceed to complete the Work under the changed Contract terms and specifications.

D. The failure of the parties to agree will not be construed as relieving Contractor of its duty and responsibility for continuing with performance under the Contract as changed. Failure to continue performance under such circumstances will constitute a material breach of Contract by Contractor and the appropriate provisions hereof with relation thereto will apply. The determination of the City Engineer of the amount of reduction in Contract consideration or other consideration to City or increase in consideration or other basis of compensation to Contractor arising out of any such change will be final and binding upon the Contractor, unless it files a protest as set forth in Section 4.3(C) above. Payment by City on the basis of Contract prices so adjusted will constitute full and final performance of City obligations hereunder. If the parties fail to agree prior to completion of the Contract, final payments will not be delayed but must be made in accordance with the City Engineer's determinations subject to further claim of Contractor and compliance by City with court order, but nothing contained in this clause will excuse Contractor from proceeding with the performance of the Work as changed.

4.3.1 Reduction in Cost

If the cost of the Work to Contractor is reduced by reason of any modification of the Contract, compensation must be made to City therefor or a proportionate reduction in Contract consideration must be made therefor.

4.3.2 Quantity Changes

The quantities given in the proposal schedule for unit price items are for comparing proposals and may vary from the actual final quantities. Some quantities may be increased and others may be decreased or eliminated, and no claims can be made against the City for damage occasioned thereby or for loss of anticipated profits, Contractor being entitled only to compensation for the actual work done at the unit prices proposed.

4.3.3 Extra Work

A. City reserves the right, when confronted with unpredicted conditions, unforeseen events, or emergencies, to revise the details of the contemplated Work or to add work of a different character or function and have the Contractor perform such revised or added work, as Extra Work, when such Extra Work is considered by the City Engineer to be vitally appurtenant to the satisfactory completion of the Project. "Extra Work" is defined as added work of a different character or function and for which no basis for payment is prescribed in the Contract; or that involving revisions of the details of the Work in such a manner as to render inequitable payment

under items upon which the Contractor proposed; or that work to be done under stipulated prices as given in the Schedule of Bid Prices.

B. Contractor's execution of the Contract will be deemed to be an agreement on its part to perform Extra Work, as and when ordered by the City Engineer. Contractor must give notice to the sureties on the Contractor's bonds if the estimated total value of the Contract, as changed or supplemented, exceeds the original total proposal price by more than twenty-five percent (25%), but failure to give such notice will not affect the surety's obligation under said bonds. If required Extra Work results in delay to the Work, Contractor will be given an equivalent extension of time.

C. Upon City's decision to have Extra Work performed, the City Engineer will so inform Contractor, acquainting it with the details of the new work. Should an item of work within the proposal schedule correspond with the type of work to be done under Extra Work to the mutual satisfaction of Contractor and City, the Extra Work must be performed at the stipulated bid price and in the manner provided for said item. Should such Extra Work not correspond to a stipulated bid price, Contractor must prepare a price for said work based upon its estimate of cost and submit said price and estimate to the City Engineer based on one of the following methods as requested by City:

1) For a stated unit price or lump sum amount based upon current prevailing fair prices for materials, labor, plant, overhead, and profit; or

2) On a cost plus markup basis ("force account" by the Contractor). All work done by Contractor on a cost plus markup basis will be computed in the manner hereinafter described, and the compensation thus provided must be accepted as payment in full by the Contractor, and no additional payment will be allowed for the use of small tools, superintendent's services, timekeeper's services, nor any other overhead expenses incurred in the prosecution of the force account work.

(3) Under either method (1) or (2), total cost shall include:

(a) MATERIALS: For all materials purchased by Contractor and used in this specific work, the cost estimate shall reflect the actual cost less normal discounts of such materials, including freight and delivery charges, as shown by original receipted bills. Salvage value, as may be agreed upon between the City and the Contractor for materials which are not permanently incorporated in the work, will be deducted from the total amount as derived above. City reserves the right to furnish such materials required as it deems advisable, and Contractor shall have no claim for profit on the cost of such materials.

(b) LABOR: For all direct labor engaged in the specific operation, Contractor will receive the prevailing wage paid on the Project for each and every hour that said labor is actually engaged in such work. In addition, City will reimburse Contractor for unemployment compensation insurance payments; contributions made to the State as required by the provisions of the Unemployment Reserve Act, Chapter 352, Statutes of 1935, as amended; and for taxes paid to the federal government, as required by the Social Securities Act, approved August 14, 1935, as amended.

(c) EQUIPMENT: For any machine, power and equipment which is deemed necessary, Contractor will receive the actual cost of rented equipment furnished by it as shown on its paid vouchers. For the use of equipment Contractor owns, it will be paid at the rental

rates currently prevailing in the locality, and said rental rates must be deemed to include profit and overhead, and no extra compensation will be allowed, nor will any percentage or amount whatsoever be added thereto.

(d) MARKUP:

(i) Work by Contractor. A fifteen percent (15%) allowance will be added to Contractor's direct costs and will constitute the markup for all overhead and profit on Contractor's work. Contractor will also be compensated for any actual increase in the Contractor's bond premium caused by the Extra Work.

(ii) Work by Subcontractor. When any of the Extra Work is performed by a subcontractor, a fifteen percent (15%) allowance will be added to the subcontractor's direct costs and will constitute the markup for all overhead and profit on work by the subcontractor. In addition, a five percent (5%) allowance will also be added to the subcontractor's direct cost and will constitute the markup for all overhead and profit for Contractor on work by the subcontractor. Contractor will also be compensated for any actual increase in Contractor's bond premium caused by the Extra Work.

D. Contractor shall not commence Extra Work until it has secured the City's approval as to the method and amount of payment thereunder, excepting that the City Engineer may, in writing, order Contractor to proceed with Extra Work in advance of such approval.

E. Upon receipt of Contractor's price, the City Engineer will make an analysis thereof, and City will adopt one of the following procedures for prosecuting the Extra Work:

(1) Accept Contractor's price for the lump sum or unit price amount in the original or amended form and direct Contractor to proceed with the work; or direct Contractor to perform the work on a cost plus markup basis; or

(2) Have the work performed by the City or another contractor under separate contract, without undue interference or hindrance to Contractor and without claim or suit by Contractor for damages on account thereof.

4.4 MAINTENANCE OF DETOURS

A. Contractor will construct and maintain detours and detour bridges for the use of public traffic as provided in the Special Provisions, or as shown on the plans or as directed by the Engineer, and payment for such work will be made as set forth in the Special Provisions or at the contract prices for the items of work involved if the work being performed is covered by contract items of work, and no other method of payment therefor is provided in the Special Provisions. Otherwise, the work will be paid for as Extra Work as specified under Paragraph 4.3 of this section.

B. When public traffic is routed through the work, provisions for passageway through construction operations will not be considered as detour construction or detour maintenance.

C. Detours used exclusively by Contractor for hauling materials and equipment will be constructed and maintained by Contractor at Contractor's expense.

D. Contractor's failure or refusal to construct and maintain detours at the proper time will be sufficient cause for closing down the work until such detours are in satisfactory condition for the safe use of public traffic.

E. Where Contractor's hauling is causing such damage to the detour that its maintenance in a condition satisfactory for public traffic is made difficult or unusually expensive, the Engineer will have authority to regulate Contractor's hauling over the detour.

4.5 USE OF MATERIALS FOUND ON THE WORK

Contractor, with the approval of the Engineer, may use in the proposed construction such stone, gravel, sand or other material suitable, in the opinion of the Engineer, as may be found in the excavation, but it must replace at its own expense with other suitable material all of that portion of the material so removed and used which was contemplated for use in the embankments, backfills, bridge approaches, or otherwise. No charge for materials so used will be made against Contractor. Contractor shall not excavate or remove any materials from within the Project location which is not within the excavation, as indicated by the slope and grade lines, without written authorization from the Engineer.

SECTION 5

CONTROL OF THE WORK

5.1 AUTHORITY OF CITY ENGINEER

The City Engineer must decide all questions which may arise as to the quality or acceptability of materials furnished and work performed, the manner of performance, the rate of progress of the work, and the interpretation of the Plans and Specifications. His/her decision will be final, unless otherwise ordered by the City Manager or Assistant City Manager, and the City Engineer will have the authority to enforce and make effective all decisions and orders Contractor fails to carry out promptly.

5.2 PLANS

The approved Plans are hereby made a part of these Specifications. These Plans show in general the nature and dimensions of the work to be done. Contractor acknowledges that changes may be made to the Plans according to the best interests of the City.

5.3 CONFORMITY WITH PLANS

A. Finished surfaces in all cases must conform with the lines, grades, cross sections, and dimensions shown on the approved Plans. Deviations from the approved Plans and working drawings, as may be required by the exigencies of construction, will in all cases be determined by the City Engineer and must be authorized in writing by him/her.

B. Contractor must have Plans and Specifications for the Project on the Project location at all times and must make these Plans and Specifications available to the Engineer upon request.

5.4 WORKING DRAWINGS

A. Contractor must submit working drawings, in quadruplicate, as required by the Special Provisions. Working drawings for any structure must consist of such detailed plans as may be required for the prosecution of the work and are not included in the plans furnished by the City. They must include shop details, erection plans, masonry layout diagrams, and bending diagrams for reinforcing steel, which must be approved by the Engineer before any work involving these plans is performed. Plans for cribs, cofferdams, falsework, centering, and form work will be required and must be subject to approval, unless approval is waived by the Engineer. These plans will be subject to approval insofar as the details affect the character of the finished work, but other details of design will be left to Contractor, who must be responsible for the successful construction of the work.

B. Contractor hereby acknowledges that approval by the Engineer of Contractor's working drawings does not relieve Contractor of any responsibility for accuracy of dimensions and details, or for mutual agreement of dimensions and details.

C. Full compensation for furnishing all working drawings must be considered as included in the prices paid for the various Contract items of work, and no additional allowance will be made therefor.

5.5 COORDINATION OF PLANS, SPECIFICATIONS, AND SPECIAL PROVISIONS

A. These Specifications, the Plans, Special Provisions, Contract change orders, and all supplementary documents are essential parts of the Contract, and a requirement occurring in one is binding as though occurring in all. They are intended to be cooperative and to describe and provide

for a complete work.

B. In case of discrepancy either in the Plans or Specifications, the matter must be promptly submitted to the City Engineer who must make a determination in writing. Any adjustment by the Contractor without this determination will be at its own risk and expense. If Contractor, in the course of the work, finds any discrepancy in the Plans in the physical conditions of the locality, or any errors or omissions in the Plans, or in the layout as given by survey points and instructions, Contractor must immediately notify the Engineer in writing who will promptly verify the same. Any work or material not herein specified or shown on the Plans, but which is fairly implied in the judgment of the City Engineer, should be included therein, must be done or furnished as a part of the Contract as though shown or included in the Plans or Specifications. Any work done after such discovery, until authorized, will be done at Contractor's risk.

5.6 INTERPRETATION OF PLANS AND SPECIFICATIONS

A. Should it appear that the work to be done or any of the matter relative thereto are not sufficiently detailed or explained in the Plans and Specifications, Contractor shall apply to the Engineer for such further explanations as may be necessary and must conform to them as part of the Contract, so far as they may be consistent with the original Specifications; and in the event of any doubt or question arising respecting the true meaning of the Specifications, reference must be made to the City Engineer, whose decision thereon will be final.

B. In the event of any discrepancy between any Plans and the figures written thereon, the figures must be taken as correct.

5.7 SUPERINTENDENCE

A. Whenever Contractor is not present on any part of the work where it may be desired to give direction, the Engineer will give orders that must be received and obeyed by the superintendent, foreman, or authorized representative who may have charge of the particular work in reference to which the orders are given. Any order given by the Engineer, not otherwise required by the Specifications to be in writing, will, on Contractor's request, be given or confirmed by the Engineer in writing.

B. An authorized representative of the Contractor must be present at the site of the Work at all times, both while work is actually in progress and during periods when work is suspended.

C. Where Contractor is comprised of two or more persons, co-partnership or corporations, functioning on a joint-venture basis, Contractor must designate in writing to the City the name of their authorized representative who must have supreme authority to direct the work and to whom orders will be given by the Engineer, to be received and obeyed by Contractor.

D. Contractor must have a sufficient number of superintendents or foremen on the site of the work to adequately supervise and direct each major type of its construction work, and when, in the opinion of the Engineer, Contractor's required supervisory personnel are considered inadequate, Contractor, upon request from the City, must promptly provide adequate personnel.

5.8 LINES, GRADES AND MEASUREMENTS

A. Contractor will do the initial staking out of the work unless otherwise stated in the Special Provisions. Contractor will establish control lines and offset lines and set all stakes normally

required so Contractor can make the necessary measurements therefrom for the layout of the details of its work without the need for surveyors. Survey stakes and benchmarks removed by the carelessness of Contractor or its employees will be replaced by the City at Contractor's expense.

B. Contractor must employ skilled personnel for making measurements and skilled mechanics for setting equipment or metal parts that are to be permanently imbedded in or attached to proposed structures. Contractor must remedy any inaccuracies in the placing of equipment or metal parts at its own cost. Any inaccuracies in the performance of the Contractor's work due to faulty transfer or measurements must be remedied by the Contractor at its own expense.

5.9 INSPECTION

A. Except as otherwise provided in paragraph (D) below, all material and workmanship, if not otherwise designated by the Specifications, must be subject to inspection, examination and test by the Engineer at any and all times during manufacture and/or construction and at any and all places where such manufacture and/or construction are carried on. The Engineer may reject defective material and workmanship or require its correction. Rejected workmanship must be satisfactorily corrected, and rejected material must be satisfactorily replaced with proper material without charge therefor, and Contractor must promptly segregate and remove the rejected material from the premises. If Contractor fails to proceed at once with the replacement of rejected material and/or the correction of defective workmanship, the Engineer may by contract or otherwise replace such material and/or correct such workmanship and charge the cost thereof to Contractor, or may terminate the right of Contractor to proceed.

B. Contractor must furnish promptly without additional charge, all reasonable facilities, labor, and materials necessary for the safe and convenient inspection and tests as the Engineer may require. All Engineer inspections and tests will be performed in such a manner as not unnecessarily to delay the work. Special, full size, and performance tests will be as described in the Specifications. Contractor will be charged with any additional cost of inspection when material and workmanship are not ready at the time inspection is requested by the Contractor.

C. Inspection of material and finished articles to be incorporated in the work at the site must be made at the place of production, manufacture, or shipment, whenever the quantity justifies it, unless otherwise stated in the Specifications; and such inspection and written or other formal acceptance, unless otherwise stated in the Specifications, will be final, except as regards latent defects, departures from specific requirements of the Contract, damage or loss in transit, frauds, or such gross mistakes amount to fraud. Subject to the requirements contained in the preceding sentence, the inspection of material and workmanship for final acceptance as a whole or in part must be made at the site. Nothing contained in this paragraph will in any way restrict the City's rights under any warranty or guarantee. No work will be covered by a succeeding operation until the Engineer has had adequate notice and a sufficient opportunity to inspect the work. Any violation of this requirement will be deemed an attempt to defraud the City, and the work covered may be rejected. Contractor must comply promptly with all instructions of the Engineer. Failure to so comply will be sufficient cause for breach of contract. The Engineer may, when in the best interests of the City, order a suspension of the work or any part of the work which is not, in his/her opinion, proceeding satisfactorily.

D. The inspection of the work will not relieve Contractor of any of its obligations to fulfill its Contract as prescribed.

E. Should the Engineer consider it necessary or advisable at any time before final acceptance of the entire work to examine work already completed, and upon which adequate notice and sufficient opportunity for inspection was provided, Contractor must on request promptly furnish all necessary facilities, labor, and material. If such work is found to be defective or non-conforming in any material respect due to fault of the Contractor or its subcontractors, Contractor must defray all the expense of such examination and satisfactory reconstruction. If, however, such work is found to meet the requirements of the Contract, the actual direct cost of labor and material necessarily involved in the examination and replacement, plus markup as determined in Section 4.3, will be allowed the Contractor, and if completion of the work has been delayed thereby, Contractor will be granted a suitable extension of time on account of the additional work involved.

F. All inspections by the City, the Engineer, or the Engineer's representative are for the City's use in determining the acceptability of the Project. Contractor is responsible for the quality of all materials supplied and all workmanship. Contractor must provide and implement a quality control program independent of the inspections provided by the City. Such quality control program must be designed to ensure materials and workmanship are of first quality in conformance with these specifications and the best practices of the construction industry. Contractor's quality control plan must be submitted to the Engineer for review within fifteen (15) days of Notice to Proceed. Approval of the quality control plan by the Engineer does not relieve Contractor of providing sufficient tests or certifications to provide a complete and useable product in accordance with these specifications.

5.10 UNAUTHORIZED WORK AND DEFECTIVE WORK OR MATERIALS

Any work done beyond the scope of the Plans and Specifications established by the City Engineer, or any Extra Work done without written authority, will be considered unauthorized and will not be paid for. Work so done may be ordered removed at Contractor's expense. Upon failure of Contractor to comply promptly with any order of the Engineer made under the provisions of this Section 5, the City Engineer will have authority to cause defective work or materials to be remedied or removed and replaced, and unauthorized work to be removed, and to deduct the cost from any moneys due or to become due to the Contractor, notwithstanding that such defective work and materials have been previously overlooked by the Engineer and accepted or estimated for payment.

5.11 METHODS AND EQUIPMENT

A. Equipment not suitable to produce the quality of work required will not be permitted to operate on the Project. If the City Engineer or representative observes unsuitable equipment, the City Engineer shall have the right and authority to stop work. Contractor will not be granted extra additional days or compensation for delay due to Contractor's use of unsuitable equipment.

B. Plants must be designed and constructed in accordance with general practice for such equipment and must be of sufficient capacity and of such character to insure the production of sufficient material to carry the work to completion within the time limit.

C. Contractor must provide adequate and suitable equipment and plants to meet the above requirements and, when ordered by the Engineer, must remove unsuitable equipment from the work and discontinue the operation of unsatisfactory plants.

D. Each machine or unit of equipment must be operated by a person experienced in handling the particular make of machine or unit of equipment in use, at a speed or rate of production

not to exceed Manufacturer's recommendations.

E. All vehicles used to haul materials over existing highways must be equipped with pneumatic tires.

F. Beam scales for use in batchers, proportioning plants, platform scales, or for other purposes must be equipped with "V" blocks and pivots of hard steel in all hangers or other points of support which are used as parts of the weighing mechanism.

5.12 FINAL INSPECTION AND ACCEPTANCE

A. City will inspect the work for acceptance promptly upon receipt of notice in writing from Contractor that the work required under the Contract has been performed.

B. If, in the judgment of the City Engineer, the work has been completed in accordance with the Plans and the Specifications and is ready for acceptance, he/she will so certify and accept the completed work in accordance with the City's approved procedures. The City Engineer will, in his/her certification, give the date upon which the work was completed. Upon City's acceptance pursuant to such certification, the date of completion as certified by the City Engineer will be the date of completion of work up to which penalties for liquidated damages, if any, will be computed.

5.13 CLEANUP WORK

A. During construction, Contractor must keep the site reasonably free and clear from all rubbish and debris. Care must be taken to prevent spillage when hauling is being done on any public road or street, and any such spillage or debris resulting from Contractor's operation must be immediately cleaned up.

B. Upon the completion of the work, Contractor must remove all plants, building, rubbish, unused materials, concrete forms and other like material belonging to it or used under its direction during the construction. In the event of its failure to do so, the same may be removed by the City at Contractor's expense.

SECTION 6

CONTROL OF MATERIALS

6.1 CITY-FURNISHED MATERIALS

A. Contractor must notify the City as to the time at which it will require those materials which are to be furnished by the City. This notice must be given in sufficient advance of actual need to avoid delay.

B. City-furnished materials will be delivered Freight on Board (f.o.b.) trucks at the site of the work. "Site of the work" means the nearest point to the work which is readily accessible to trucks. Contractor will be charged with any standby or demurrage charges which may accrue at the point of delivery because of their failure to unload the trucks immediately upon their arrival at the site of work.

C. Contractor must receive and be responsible for these materials, storing those which may be damaged by the elements, in a safe, substantial manner until they are used in the work.

D. Any materials City delivered in an acceptable condition to Contractor which are subsequently lost or rejected by the City due to damages from handling, transporting, storing, flood waters, fire, or for any other reasons before its use in the completed Work, must be paid for by the Contractor. The total value of such materials will be deducted from moneys due or becoming due to Contractor. Contractor must remove any condemned material immediately and permanently from the site of work.

E. Any of the City's materials, remaining unused after all requirements for said materials have been met, must be promptly returned to City in acceptable condition. Contractor must return these materials f.o.b. to the City's truck at the site of work and at such points as will be conveniently accessible to City transportation.

F. Contractor must not sell, assign, mortgage, hypothecate, or remove equipment or materials which have been installed or delivered and which may be necessary for the completion of the Contract, without the City's written consent.

6.2 MATERIALS TO BE FURNISHED BY CONTRACTOR

Unless otherwise specified herein, or on the Plans and Specifications, Contractor must furnish all materials required for the completion of the Contract. The cost of hauling, storing and handling of all the materials Contractor is required to furnish must be included in the unit price proposal in the schedule for the work for which the materials are required.

6.3 SOURCE OF SUPPLY AND QUALITY OF MATERIALS

A. It is the Contractor's responsibility to require material suppliers and subcontractors to furnish materials which meet the requirements of the Specifications. All materials which are to become part of the completed Project must be new and must conform to the requirement prescribed therefor in these Specifications or as specified in the Special Provisions.

B. Unless otherwise waived in writing by the Engineer, Contractor will be required to furnish the City with certification(s) prepared and signed by the manufacturers and/or suppliers to the effect that items furnished meet all the requirements of the Specifications. Such certification(s) must be furnished prior to the use of the material in any part of the construction.

C. In the case of sand and gravel to be used for concrete construction, Contractor must notify the City's representative in writing of the sources of the available materials and secure source approval in writing prior to placing order for delivery of this material to the job site.

6.4 WATER AND ELECTRIC POWER

A. Unless otherwise indicated in the proposal schedules, Contractor will be responsible for providing, paying all costs for, and maintaining at their own expense an adequate supply of water and electric power of a quality suitable for construction and domestic purposes.

B. Contractor must indemnify, defend, and save City harmless against any and all claims or suits for damages arising from its acquisition and use of electric power and water.

6.5 MATERIALS AND WORKMANSHIP; WARRANTY

A. All material furnished by the Contractor must be of the specified quality and equal to approved samples, if samples have been submitted. All work must be performed and completed in a thorough, workmanlike manner, notwithstanding any omission from the Plans and Specifications. All work done and all materials furnished must comply with these Specifications to the City's satisfaction.

B. Materials furnished by Contractor and condemned by the Engineer as being unfit for use must be immediately and permanently removed from the site of work. Unused materials, except such as furnished by the City, will remain the property of Contractor.

C. Contractor warrants that all construction services shall be performed in accordance with generally accepted professional standards of good and sound construction practices, all Contract Documents requirements, and all laws, codes, standards, licenses, and permits. Contractor warrants that all materials and equipment shall be new, of suitable grade of their respective kinds for their intended uses, and free from defects. Contractor hereby grants to City for a period of one (1) year following the date of completion its unconditional warranty of the quality and adequacy of all of the Work including, without limitation, all labor, materials and equipment provided by Contractor and its subcontractors of all tiers. If either prior to completion of the Work, or within one (1) year after completion, any Work (completed or incomplete) is found to violate any of the foregoing warranties ("Defective Work"), Contractor shall promptly, without cost to City and in accordance with City's written instructions, correct, remove and replace the Defective Work with conforming Work, and correct, remove and replace any damage to other Work or other property resulting therefrom. If Contractor fails to do so, Contractor shall pay all of the City's resulting claims, costs, losses and damages. Where Contractor fails to correct Defective Work, or defects are discovered outside the correction period, City shall have all rights and remedies granted by law.

6.6 STORAGE OF MATERIALS

Materials must be so stored as to insure the preservation of their quality and fitness for the work. When considered necessary by the Engineer, they must be placed on wooden platforms or other hard, clean surfaces and not on the ground. They must be placed under cover when so directed. Stored materials must be so located as to facilitate prompt inspection.

6.7 SAMPLES AND SPECIMENS

Contractor must submit specimens or samples of materials to be used in the work as the Engineer may require.

6.8 TRADE NAMES AND ALTERNATIVES

A. For convenience in designation on the Plans or in the Specifications, certain equipment or articles or materials may be designated under the trade name of a manufacturer and its catalogue information. The use of alternative equipment or an article or material which is of equal quality and of the required characteristics for the purpose intended will be permitted, subject to the approval of the City Engineer.

B. The burden of proof as to the comparative quality and suitability of alternative equipment or articles or materials is on Contractor, and it must furnish, at its own expense, all information necessary or related thereto as required by the City Engineer. The City Engineer will be the sole judge as to the comparative quality and suitability of alternative equipment or articles or materials, and his/her decision will be final.

C. Contractor's price proposal is assumed to be on the basis of trade names specified or designated in the Specifications. Savings resulting from use of a less expensive equal or alternate must accrue to the City and must be subtracted from the unit price for this item.

6.9 REMOVAL OF EQUIPMENT OR MATERIALS

Contractor may not sell, assign, mortgage, hypothecate or remove equipment or materials which have been installed or delivered and which may be necessary for the completion of the Contract without the written consent of the City.

6.10 TESTING OF MATERIALS

Unless otherwise specified elsewhere in the Specifications or in the Special Provisions or called for in the Plans, the City or its authorized representative shall perform all tests of materials and work for determining compliance with specified requirements.

SECTION 7

LEGAL RELATIONS AND RESPONSIBILITY

7.1 LAWS TO BE OBSERVED

Contractor must keep itself fully informed of all existing and future State and Federal laws and County and municipal ordinances and regulations which in any manner affect those engaged or employed in the work, or the materials used in the work, or which in any way affect the conduct of the work, and of all such orders and decrees of bodies or tribunals having any jurisdiction or authority over the same. Contractor must at all times observe and comply with all such existing and future laws, ordinances, regulations, orders, and decrees of bodies or tribunals having any jurisdiction or authority over the work; and must indemnify, defend, and hold the City and all its officers, agents and servants harmless against any claim or liability arising from or based on the violation of any such law, ordinance, regulation, order, or decree, whether by itself or its employees or agents. If any discrepancy or inconsistency is discovered in the Plans, Drawings, Specifications, or Contract for the Work in relation to any such law, ordinance, regulation, order or decree, Contractor must forthwith report the same to the City Engineer in writing.

7.2 PERMITS

A. City will obtain all necessary rights and approvals for the work to occupy properties in streets, highways or railways. Contractor will obtain all permits and pay any fees connected therewith having to do with its construction operations. Contractor will furnish City with a copy of all permits and must fully comply with all conditions and provisions of same.

B. Bidders must contact railway companies affected by the work under the Project and ascertain their requirements in respect to indemnification agreements, bonds and insurance. Upon award of the Contract, Contractor must immediately again contact the railway company and, if required, enter into an indemnification agreement, furnish bonds and insurance, and pay the fees therefor.

C. All expenses incurred by the railway company as a result of Contractor's operations will be borne by the Contractor.

7.3 PATENT CLAIMS

The bidder must include in the price proposal for the work the patent fees or royalties or charges upon any patented article or process which it may furnish or use in the prosecution of the work, and the bidder to whom the Contract is awarded must indemnify, defend and save the City harmless against any legal action that may be brought for infringement of patents upon any articles or processes that may be used by Contractor in the prosecution of the work. Contractor must furnish satisfactory evidence of release of all claims of this nature before the final payment is made upon the Contract.

7.4 SANITARY PROVISIONS

Contractor must provide and maintain in a neat and sanitary condition such accommodations for the use of its employees as may be necessary to comply with all applicable laws, ordinances and regulations pertaining to the public health and sanitation of dwellings and camps. Enclosed toilets must be provided for the use of the persons employed or engaged on any work under these Specifications.

7.5 RIGHT OF WAY AND RIGHT OF ACCESS

A. City will acquire all permanent rights of way or permanent easements required for the constructed Project. Contractor is hereby authorized to use the site for the purposes described in the Specifications.

B. Contractor is responsible for obtaining the right to enter, remove, alter, or make use of any existing road, culvert, bridge, canal, pipeline, levee, fence or similar barrier, lines of communications or improvement of any nature, or the trespassing on privately owned lands, and it must indemnify, defend and save City harmless from any and all claims for such damages occasioned by such entering, removing, altering, using or trespassing.

C. In case of interference to the work by delay of the City in furnishing permanent rights of way or permanent easements, Contractor will be allowed an extension of time equivalent to the time lost by unavoidable delay in the completion of the Contract because of the failure to furnish the rights of way on time, but no damages will be allowed or paid for such delay.

D. Rights of way and/or easements and construction easements have been secured for work sites, and for trails and roadways as considered necessary for ingress and egress to the work site. Such rights and/or easements have been delineated on the Plans. The right to enter, remove, alter, or otherwise make use of adjacent property, roads, utility lines, fences, vegetation and other improvements as not included within the rights of way or easements will be at Contractor's sole expense and responsibility .

7.6 PUBLIC CONVENIENCE AND ACCESS

A. Contractor must conduct its operations so as to cause the minimum obstruction and inconvenience to traffic and to places of business and residence adjacent to the work. No greater quantity of work must be under construction at any one time than can be properly conducted with due regard for the rights of the public. Where existing streets are not available as detours, all traffic must be permitted to pass through the work with as little inconvenience and delay as possible, unless otherwise provided or authorized. If only half the street is under improvement, the other half must be conditioned and maintained as a detour.

B. The work must be conducted by tunneling, backfilling or bridging where necessary to provide access to fire hydrants and water gates; driveways to service stations, markets or other places of business requiring public vehicular access; and driveways to private residences, unless Contractor makes other arrangements satisfactory to the City. Temporary approaches to intersecting streets and alleys must be provided and maintained in good condition. Safe crossings for pedestrians must be provided at intervals of not more than three hundred feet (300').

7.7 STORAGE OF MATERIALS IN PUBLIC STREETS, ROADS OR HIGHWAYS

Construction materials must not be stored on the streets unless permitted by the City Engineer.

7.8 PUBLIC SAFETY

Contractor is required by law to conform to the "Construction Safety Order," "Trench Construction Safety Orders," "General Safety Orders," and "Tunnel Safety Rules" of the California Division of Occupational Safety and Health. Contractor must maintain copies of these rules and orders at the site of its operations and shall be governed by the requirements thereof.

The requirements concerning Ventilation, General Safety Precautions, Transportation, Roof Inspection, Timbering, and all rules and regulations concerning the use of explosives are of particular importance.

7.9 STREET CLOSURES, DETOURS, BARRICADES

A. In addition to the requirements of this paragraph and Section 4 of these Specifications, Contractor must, unless otherwise permitted by the City Engineer, conform to the requirements for street closures, detours and barricades as stipulated in the Special Provisions. However, the City Engineer may permit deviations from the requirements stipulated therein when such deviations are to the best interests of the City and are approved by the County, City or State authorities concerned.

B. During the progress of the work, Contractor must make adequate provisions to accommodate the normal traffic along streets and highways immediately adjacent to or crossing the work so as to cause a minimum of inconvenience to the general public.

C. Contractor must give due notice to local police and fire departments prior to beginning construction and must cooperate with said departments in complying with their requirements pertaining to emergency vehicles and equipment.

D. Contractor must comply with County, City or State requirements and authorities concerning closure of streets; the providing of barriers, guards, lights, temporary bridges, flagmen and watchmen; and the posting of proper notices or signals to the public regarding detours and the condition of the work under construction so as to effectively guard the public from danger as a result of the work being done under the Contract. Contractor must fully comply with such requirements. Contractor must also be held responsible for compliance with any additional requirements as may arise during the progress of the work. All costs involved in respect to the above requirements will be considered as included in the price proposals for the various items of work.

E. Contractor must furnish, install, and upon completion of the work, remove all signs and warning devices required for directing and protecting the public during construction.

F. The signs and posting thereof must conform to the current requirements as specified in the manuals covering signs published by the Division of Highways, Department of Public Works of the State of California. Copies of these manuals are on file in the office of the Engineer.

G. Contractor must notify the appropriate authorities of any municipality or unincorporated area twenty-four (24) hours in advance of the start of any construction work being done in said municipality or area.

H. The provisions of Paragraph 7.18, "Emergencies and Responsibility for Damage," apply to the precautions and safeguards taken by Contractor in connection with the closure of streets, barricades, detours, signs, etc., as required by the above authorities.

7.10 USE OF EXPLOSIVES

A. The use of explosives will not be permitted unless otherwise stated in the Special Provisions. If permitted, the method employed and the quantity of explosives used must at all times be subject to the approval of the Engineer. Explosives must be handled, used and stored in accordance with the provisions and requirements of all applicable laws, ordinances and regulations with respect thereto.

B. The Engineer's approval for the use of explosives does not relieve Contractor from its responsibility to indemnify, defend and save City harmless from any legal actions or claims brought against it because of or on account of the use of explosives.

7.11 PRESERVATION OF PROPERTY

A. Contractor is responsible for the protection, restoration, , or the replacement of any improvements such as, but not limited to, lawns, trees, shrubs, hedges, fences, walls, sidewalks, driveways, curbs, gutters and pavement existing on public or private property at the start of work or placed there during the progress of work and not being specified or shown on the drawings to be either temporarily or permanently removed. Contractor is responsible for removal of all USA Markings created within the Project limits and in relation to the Project. Replacement or restoration must meet the approval of the Engineer.

B. With respect to trees, Contractor must obtain permission from the Engineer and from any jurisdictional agency concerned prior to the removal or trimming of any trees, except where a tree is specifically indicated on the Plans or in the Specifications to be removed. Trees which are so indicated need not be replaced except where otherwise stipulated in the Specifications.

C. All costs involved in the protection and restoration of existing improvements as herein specified must be included in the prices proposal for the various items of work.

7.12 PRESERVATION OF MONUMENTS

Contractor must not disturb any monuments or stakes found on the lines of improvements without permission from the Engineer, and must bear the expenses of resetting any monuments or stakes which may have been disturbed with such permission. Contractor must reset all street signs and traffic signs it disturbed during the progress of the Work.

7.13 SAFEGUARDING EXCAVATIONS AND STRUCTURES

A. In excavating for the Project, Contractor must be fully responsible for providing and installing adequate sheeting and/or timbering and bracing as may be necessary as a precaution against slides or cave-ins, and to protect all existing improvements of any kind, either on public or private property, from damage. Contractor must make necessary repairs to or reconstruction of any such damaged improvements at its own expense and as directed by the Engineer.

B. Contractor must remove all shattered rock or other loose material which may be dangerous to workmen or to structures. Even if such removal enlarges the excavation beyond the required limits, it does not relieve Contractor from the necessity of making such removal, and Contractor will not be entitled to additional compensation under any Contract item on account of such removal and enlargement.

C. Contractor is responsible for providing all materials required for sheeting, bracing and shoring. Upon completion of the work, except for such as may be left in place, all remaining materials will become Contractor's property and responsibility.

7.14 EMERGENCIES AND RESPONSIBILITY FOR DAMAGE

A. Contractor, at all times throughout the performance of the Contract, must take all precautions necessary to prevent any accident or other cause of damage to life or property in any place affected by the operations, arising from the Work, or resulting from any unusual conditions which may arise, including, but not limited to, erecting and maintaining suitable and sufficient

barriers, signs, lights, or other necessary protection. This duty also extends to interruption or contamination of public water supplies, irrigation, or other public services, or to any failures of partly completed works.

B. If, in the opinion of the Engineer, the precautions taken by Contractor are not safe or adequate at any time during the life of the Contract, he/she may order Contractor to take further precautions, and if Contractor fails to remediate the situation adequately, the Engineer may order the work done by the City and charge Contractor for the cost thereof, such cost to be deducted from any moneys due or becoming due to Contractor. Failure of the Engineer to order such additional precautions, however, does not relieve Contractor from its full responsibility for public safety.

C. Contractor must indemnify, defend and save City harmless from any legal actions or claims of every kind and description brought against City for, or on account of, any injury or damage to person or property received or sustained by any person or persons on account of work done by Contractor, any duly authorized subcontractor, agent, employee or workman of Contractor ("Indemnifying Parties") pursuant to the Contract or any extension or addition thereof caused by the negligence of the Indemnifying Parties, or by or in consequence of any negligence in guarding the person or property, or any material used or to be used for the same, or by or on account of any material, implement, appliance or machine used in the construction, or by or on account of any accident or of any act or omission of the Indemnifying Parties.

D. City may withhold and retain a sufficient amount of the money due Contractor under the Contract as City determines is necessary until all legal actions or claims for such damages have been resolved and evidence to that effect has been furnished to the City. The funds retained under this Section is in addition to any funds retained as provided for in Paragraph 9.5.

E. All of the above provisions also apply to suits for loss of business and/or obstruction or inconvenience to business of private property owners.

7.15 DISPOSAL OF MATERIAL OUTSIDE OF CITY'S RIGHT OF WAY

A. Unless otherwise specified in the Special Provisions, Contractor must make its own arrangements for disposing of materials outside of City's right of way at Contractor's own expense and Contractor must pay all costs associated therewith.

B. When any material, including excess or unsuitable excavated earth or other materials are to be disposed of outside of City's right of way, Contractor must first obtain written permit from the owner on whose property the disposal is to be made, and it must file said permit or a certified copy thereof, together with a written release from the property owner, absolving City from any and all responsibility in connection with disposal of material on said property.

C. Unless otherwise provided in the Special Provisions, full compensation for all costs for disposing of materials, as specified above, must be included in the prices paid for the various Contract items of work, and no additional allowance will be made therefor.

7.16 CONTRACTOR'S RESPONSIBILITY FOR WORK

A. The submission of a proposal hereunder shall be considered evidence that the bidder has carefully examined the site of the work with regard to the climatic and physical conditions which will affect construction operations.

B. Throughout the term of the Contract, Contractor assumes all risks and expense of

interference and delay in its operations, and the protection from or the repair of damage to improvements being built by it under the Contract as may be caused by floods, storms, industrial waste, irrigation, underground water, or other sources. Contractor also assumes full responsibility and expense of protecting or removing and returning to the site of work all equipment or materials under its care that are or may be endangered by weather elements.

C. Furthermore, Contractor must indemnify, defend and save City harmless against all claims or suits for damage arising from Contractor's operations in dewatering the Work and efforts to control or divert water.

D. All works installed by the Contractor in connection with dewatering, control, and diversion of water, but not specified to become a permanent part of the Project, must be removed and the site restored, insofar as practical, to original condition at the Contractor's own expense.

7.17 CITY ENGINEER CANNOT WAIVE OBLIGATIONS

It is expressly agreed that neither the City Engineer nor any of his/her agents have the power or authority to waive any of the obligations of these Specifications for Contractor's furnishing of good and suitable material and for performing the work as herein described. Failure or omission on the part of the City Engineer, or any of his/her assistants or agents, to condemn defective or inferior work or materials does not imply acceptance of the work nor release of Contractor from obligations to immediately tear out, remove and properly replace the same without compensation, at its own cost and expense at any time, upon the discovery of said defective work or material, prior to the final acceptance of the entire Work; neither will such failure or omission, nor any acceptance by the City or by the City Engineer or any other officer or employee of the City, be construed as barring the City at any subsequent time from recovery of damages from Contractor and its sureties of such a sum of money as may be needed to remove and to build anew all portions of the work in which fraud was practiced, or improper work or material hidden.

7.18 RIGHTS IN LAND IMPROVEMENTS

Nothing in these Specifications may be construed as allowing Contractor to make any arrangements with any person to permit occupancy or use of any land, structure or building within the limits of the Contract for any purpose whatsoever, either with or without compensation, in conflict with any agreement between the City and any owner, former owner, or tenant of such land, structure or building.

7.19 PERSONAL LIABILITY

Neither the City, the City Engineer, nor any of their elected officials, officers, employees, or agents may be held personally responsible for any liability arising under the Contract. Contractor must maintain in full force and effect, during the entire life of the Contract, public liability, property damage and personal injury insurance in amounts not less than specified in the Special Provisions. Contractor must maintain on file with the City during the entire life of the Contract a memorandum of coverage or other evidence of such insurance, issued by the underwriter. Said insurance may not be cancelled or declined renewal unless notice is mailed to the City at least forty-five (45) days prior to the effective date of renewal or at least sixty days (60) days prior to the effective date of cancellation. In addition, if a public agency is named as an additional insured by way of endorsement or certificate of insurance, notice shall be given to said public agency. Contractor must pay all premiums whether said premiums cover Extra Work or work under regular Contract items.

7.20 REPAIR OF EQUIPMENT

The work of installing, assembling, repairing, reconditioning, or other work of any nature on machinery, equipment, or tools used for the Work will be considered a part of the work to be performed under the Contract, and any laborers, workmen, or mechanics working on such machinery, equipment or tools, unless employed by bonafide commercial repair shops, garages, blacksmith shops, or machine shops, which have been established and operating on a commercial basis for a period of at least two (2) months prior to the award of the Contract, will be subject to all of the requirements relating to labor set forth in the Contract and in these Special Provisions.

7.21 CONTRACTOR'S LEGAL ADDRESS

The address given in the proposal will be considered Contractor's legal address, which may be changed at any time by notice in writing to the City at its office. The delivery to such address, or the depositing in the United States mails in a sealed envelope, postpaid, registered and properly directed to the Contractor's legal address, of any communications will be legal and sufficient service of the same upon Contractor.

7.22 COOPERATION AND COLLATERAL WORKS

A. Where two or more contractors are employed in related or adjacent work, each must conduct its operations in such manner as not to cause any unnecessary delay or hindrance to the other. Each contractor must be responsible to the other for all damage to work, to person or property, and for loss caused by failure to finish the work within the specified time for completion.

B. Contractor must also coordinate its work and cooperate with contractors or workmen employed by other agencies on or adjacent to the site of the work.

7.23 UTILITIES

A. "Utilities" for the purpose of these specifications must be considered as including, but not limited to, pipelines, conduits, transmission lines, and appurtenances of "Public Utilities" (as defined in the California Public Utilities Code) and those of private industry, businesses, or individuals solely for their own use or for the use of their tenants, and storm drains, sanitary sewers, street lighting, and traffic signal systems.

B. All utility service interrupted or severed by Contractor's operations shall be immediately reinstated at the earliest opportunity whether by temporary or permanent connections, and permanent reconstruction must be made as soon as construction operations permit.

C. City has, by a search of known records, endeavored to locate and indicate on the drawings, all utilities that exist within the limits of the work. However, the accuracy or completeness of the utilities indicated on the drawings is not guaranteed. Service connections to adjacent property may or may not be shown on the drawings. It is Contractor's responsibility to determine the exact location of all utilities and their service connections. Contractor must make its own investigation as to the location and type of existing utilities, their appurtenances, and service connections which may be affected by the Work and must notify the City as to any utility located by it which has been incorrectly shown or omitted from the drawings.

D. Where underground main distribution conduits such as water, gas, sewer, electric power, telephone, or cable television are shown on the Plans, the Contractor shall assume that every property parcel will be served by a service connection for each type of utility. The Contractor shall

determine the location and depth of all utilities, including service connections, which have been marked by the respective owners and which may affect or be affected by its operations. Unless otherwise specified in the Special Provisions, payment for locating (potholing) these utilities shall be considered as included in the prices in the BID for other items of work and no additional compensation shall be made to the Contractor.

E. Work required in connection with utilities because of interference with Contract work will be performed and paid for as specified in the following paragraphs, 7.23(D)(1) through 7.23(D)(8); however, when directed or approved by the City Engineer, changes in line or grade of structure being built may be made in order to avoid utilities. The cost of such changes will be paid for as Extra Work.

(1) By Other Than Contractor

When it is stated in the Special Provisions or indicated on the drawings that a utility is to be relocated, altered, or reconstructed by other than Contractor, City will conduct all negotiations with the owners in respect to such work, and the work will be done at no cost to Contractor.

(2) By Contractor Under a Specified Contract Item

When the bidding schedule contains a separate item covering the relocation, alteration, or reconstruction of a utility by Contractor, the price proposal for said item must cover all costs involved in such work. The utility owner's drawings and Special Provisions will give the construction details for the work, and unless the time at which the work must be done is specified in the Special Provisions, Contractor must coordinate with the utility owner regarding when the work is to be done.

(3) By Contractor But Not Under a Specified Contract Item

When work on a utility is specified or indicated on the Plans to be done by Contractor, but is not included as a separate Contract item in the bidding schedule, City will make all arrangements with the owner of the utility with respect to the construction details; however, Contractor must coordinate with the utility owner as to when the work is to be done. Any costs for such work must be included in the unit prices or included in the lump sum amounts proposed for the various Contract items.

(4) By Contractor – Service Connections

The alteration, temporary relocation or reconstruction of service connections to adjacent property is Contractor's responsibility, and Contractor must notify occupants of the affected properties before service is interrupted and make all arrangements with the utility owners regarding the interruption and reconstruction of service connections. The costs for such work on service connections must be included in the unit prices or in the lump sum amounts proposed for the various Contract items, unless otherwise specified in the Special Provisions. Reconstruction of sanitary sewer house connections must be accomplished in the manner shown on the Plans.

(5) By Contractor for His Own Convenience

The temporary relocation or alteration of any utility desired by Contractor solely for its own convenience in the performance of the Contract work to a position or condition other than that provided for in the Special Provisions or shown on the Plans is Contractor's

responsibility, and Contractor must make all arrangements with the owners of the utility regarding such work. Any cost of such work for Contractor's own convenience must be included in the unit prices or included in the lump sum amounts proposed for the various Contract items.

(6) By Contractor or by Others – Unknown Utilities Disclosed During the Work

In the event that a utility is disclosed subsequent to the award of the Contract, such utility not being indicated on the drawings, the alteration, relocation, or proper support and protection must be done and paid for as follows:

(a) When said utility is found to occupy space required to be occupied by a part of the permanent works to be constructed under the Contract, or when said utility is more or less parallel with the conduit and, in the case of pipe conduit, found to be within vertical planes of each side of the pipe a distance away from the pipe equal to ten inches (10") for pipe ninety-six inches (96") or less in diameter and equal to twelve inches (12") for pipe greater than ninety-six inches (96") in diameter or to be within the specified excavation pay lines (when such are specified or shown on the drawings), City will arrange for the relocation or alteration of said utility or require Contractor to do the same as Extra Work. However, when said utility is found to cross the excavation laterally, but not to intercept the permanent works to be constructed, then Contractor will be required to maintain the utility in place at its own expense.

(b) When said utility is more or less parallel with and any portion of it does not lie within the vertical planes specified hereinabove (for pipe conduit) or does not lie within the excavation pay lines (when such are specified or shown on the drawings), Contractor must advise the City thereof, and in cooperation with the City, provide and place the necessary support for proper protection to insure continuous and safe operation of the utility structure. All costs for such work must be borne by Contractor, unless it is ascertained by the City that the utility's franchise is such as to require the utility to bear such costs, in which case, it will be Contractor's responsibility to secure enforcement of said franchise if it so desires.

(7) Responsibility of Contractor

Contractor is responsible for all costs for the repair of any and all damage to the Work or to any utility (whether previously known or disclosed during the work), as may be caused by Contractor's operations. Contractor must maintain in place all utilities not shown on the drawings to be relocated or altered by others. Contractor must maintain in their relocated positions utilities which are relocated by others to avoid interference with structures and which cross the Project work. At the completion of the Work, Contractor must leave all utilities and appurtenances in a condition satisfactory to the owners and the City.

(8) Delays Caused by Failure to Relocate Utilities

(a) Where parties other than Contractor are responsible for the relocation of utilities in accordance with these Plans and Specifications, and a delay in the Contractor's work is caused by the failure on the part of said parties to remove or relocate such utilities in time to prevent such delay, Contractor will not be entitled, as a result of such delay, or to damages or additional payments over and above the Contract price. In the event of such delays, Contractor will be entitled to an extension of time. The City will determine the length of such extension with consideration as to the effect of the delay on the Project as a whole.

(b) To minimize delays caused by the failure of other parties to relocate utilities which interfere with construction work, Contractor, upon request to the City, may be permitted to temporarily omit that portion of work affected by the utility. Contractor must construct the portion thus omitted immediately following the relocation of the utility involved. Should the omitted portion of the work consist of concrete pipe, Contractor may complete said portion by constructing a field joint.

(c) Unless otherwise specified, where sewers, drainage water, gas or any other conduits and related structures and appurtenances which have been abandoned or which are to be abandoned as a result of the construction of this Project are found to interfere with construction, the interfering portions will be removed and the remaining exposed portions sealed with either a wall of concrete not less than six inches (6") thick. All salvable castings or steel parts which interfere with construction must be removed, and Contractor must contact the owners and, if required, must deliver such materials f.o.b. to the owner's trucks at the site of the work; otherwise, such material will become Contractor's property to be disposed of away from the site of work.

(d) The cost of all such work must be included in the prices proposed for the various items of work, unless it is ascertained that the franchise of the former owner is such as to require it to bear such costs, in which event, it will be Contractor's responsibility to secure enforcement of said franchise if it so desires.

7.24 IN-USE OFF ROAD DIESEL-FUELED FLEETS REGULATION

Attention is directed to provisions of the California Code of Regulations Sections 2449, 2449.1, and 2449.2, Title 13, relating to In-Use Off-Road Diesel-Fueled Fleets (Regulation), issued by the California Air Resources Board (CARB). Contractor warrants that it shall be knowledgeable of and comply with the Regulation, including without limitation the matters contained in this Section, at all times prior to and during its work on the Project. The Regulation shall control in the event of any conflict between this Section and the Regulation.

A. Contracting Requirements.

(a) If the Project involves the use of vehicles subject to the Regulation, Contractor must obtain copies of the valid Certificates of Reported Compliance, as described in Regulation section 2449(n), for the fleet selected for the Contract and its listed subcontractors, if applicable, prior to entering into a new or renewed contract with that fleet.

(b) Contractor shall not enter into a contract with a fleet for which it does not have a valid Certificate of Reported Compliance for the fleet and Contractor's listed Subcontractors, if applicable, prior to entering into a new or renewed contract with that fleet.

(c) The Certificates of Reported Compliance received by the Contractor for the Project must be retained for three years after the Project's completion. Upon request by CARB, these records must be provided to CARB within five business days of the request.

(d) If the Project is considered to be an emergency operation, as defined in Regulation section 2449(c)(18), it is exempt from the requirements in Regulation section 2449(i)(1)-(3). Nevertheless, Contractor must still retain records verifying vehicles subject to the Regulation that are operating on the emergency operations project are actually being operated on the project for emergency operations only. These records must include a description of the emergency, the address or a description of the specific location of the emergency, the dates on which

the emergency operations were performed, and an attestation by the fleet that the vehicles are operated on the project for emergency operations only.

B. Other Contractor Requirements.

(a) Between March 1 and June 1 of each year, Contractor must collect new valid Certificates of Reported Compliance for the current compliance year, as defined in Regulation section 2449(n), from all fleets that have an ongoing contract with the Contractor as of March 1 of that year. Contractor must not write contracts to evade this requirement.

(b) Contractor shall only allow fleets with valid Certificates of Reported Compliance on Contractor's job sites.

(c) If Contractor discovers that any fleet intending to operate vehicles subject to the Regulation for Contractor does not have a valid Certificate of Reported Compliance, as defined in Regulation section 2449(n), or if Contractor observes any noncompliant vehicles subject to the Regulation on Contractor's job site, then Contractor must report the required information to CARB when as provided and within the time period contained in in the Regulation

(d) Upon request by CARB, Contractor must immediately disclose to CARB the name and contact information of each responsible party for all vehicles subject to the Regulation operating at the job site or for Contractor.

(e) If applicable, Contractor shall prominently display signage for any project where vehicles subject to the Regulation as provided and within the time period contained in in the Regulation.

SECTION 8

PROSECUTIONS AND PROGRESS

8.1 SUBCONTRACTS

Contractor may sublet the Contract work only in accordance with the provisions of these Specifications and with the consent of City. Contractor will be responsible as the prime contractor to ensure that its subcontractors and material suppliers conform to all the provisions of these Specifications. If Contractor, after complying with these conditions, must sublet any portion of the proposed work to a subcontractor, Contractor will remain directly responsible to City for all work being performed by it or by any subcontractor under it, and all obligations imposed upon Contractor in the original Contract will be equally binding upon any subcontractor. City will deal directly with and make all payment to Contractor and will have no obligation at any time to pay a subcontractor for any work done. Contractor understands and acknowledges that the Subletting and Subcontracting Fair Practices Act (as set forth in the California Public Contracts Code) applies to this Contract, and Contractor agrees to comply with the terms of that Act.

8.2 ASSIGNMENT

Contractor may not assign the Contract or sublet it as a whole without the written consent of City. Contractor may not assign or permit the assignment of or any lien on any money due or to become due to it hereunder without the written consent of the City.

8.3 PROGRESS OF THE WORK

A. Time is of the essence in this Contract. Unless otherwise provided in the Special Provisions, Contractor must begin work not later than fifteen (15) calendar days after the date of the Notice to Proceed, and Contractor shall prosecute the work with due diligence so as to complete the work within the time specified in the Special Provisions or within such extension of time as may be granted.

B. Should Contractor begin work in advance of receiving notice that the Contract has been approved as above provided, any work performed in advance of said date of approval will be considered as having been done by Contractor at its own risk and as a volunteer, unless the Contract is so approved.

8.4 CHARACTER OF WORKERS

A. Contractor will only employ skilled foremen and workers on work requiring special qualifications. When required by the Engineer, Contractor shall discharge from the Work any employee – whether employed by Contractor or any subcontractor – who is incompetent, disorderly, abusive, dangerous, insubordinate, or who in any way attempts to interfere with City employees in the inspection and supervision of the work and shall not employ them again without the consent of the City Engineer.

B. Any representative of Contractor who is proven to have deliberately given false information about the performance of any part of the work shall be discharged if so ordered by the City Engineer.

8.5 TEMPORARY SUSPENSION OF WORK

The City Engineer may order Contractor to suspend work when, in his/her opinion, the

conditions are such as to prevent the work being properly carried out. Such conditions may include war, government regulations, labor disputes, strikes, fire, floods, adverse weather or elements, inability to obtain material, labor or equipment, required Extra Work, or other specific conditions or events as may be further described in the Specifications. When delay is caused by such an order, an extension of time may be granted when the conditions, in the opinion of the City Engineer, could not have reasonably been foreseen. Under no circumstances will Contractor be excused from performance or entitled to any extra compensation or reimbursement because of any such suspension.

8.6 TIME OF ESSENCE, LIQUIDATED DAMAGES, EXTENSION OF TIME BY CITY

A. Time is of the essence, and the parties acknowledge and agree that, (1) if all the Work called for under the Contract in all parts and requirements is not finished or completed by the date set forth in the Special Provisions, (2) circumstances and conditions as reflected by records of the City are such that material damage will be sustained by the City, and (3) it is and will be impracticable and extremely difficult to ascertain and determine the actual damage which City will sustain by reason of such delay, Contractor will pay to City the sum stated in the Special Provisions per day for each and every calendar days' delay in finishing the work beyond the date prescribed; and Contractor agrees to pay said liquidated damages as herein provided. In case the same are not paid, Contractor agrees that the City may deduct the amount thereof from any monies due or that may become due to Contractor under the Contract.

B. It is further agreed that, in case the work called for under the Contract is not finished and completed in all parts and requirements by the date specified, City shall have the right to extend the time of completion or not, as may be deemed to best serve the interest of the City. If City decides to extend said time, City has the right to charge Contractor, its heirs, assigns or sureties and to deduct from the final payment for the work all or any part, as may be deemed proper, the actual cost of engineering, inspection, superintendence, and other overhead expenses directly chargeable to Contractor and which accrue during the period of such extension, except that the cost of final surveys and preparation of a final estimate will not be included in such charges.

C. The time of completion will be extended, and Contractor will not be assessed with liquidated damages during any delay beyond the day named for completion of the work caused by Acts of God or acts of a public enemy, fires, floods, epidemics, quarantine restrictions, strikes, and freight embargoes or delay of subcontractors due to such causes, provided Contractor must notify the Engineer in writing of any cause or causes of such delay within ten (10) days from the beginning of any such delay and must include in each monthly pay request the number of days of such delay that occurred in said pay period. Subject to entry of a judgment of a court of competent jurisdiction contrary to the decision of the Engineer's determination of the facts and cause of such delay, the Engineer's determination of what constitutes a reasonable extension of time for completion will be final and conclusive. Failure to give notice of cause for such a time delay and failure of inclusion of the Contractor's request for an extension in the monthly pay request will be deemed a waiver of any right to an extension of time for such cause, subject only to impossibility of compromise therewith by Contractor.

D. Under no circumstances will Contractor be excused from performance or entitled to any extra compensation or reimbursement because of any delay occasioned by, or in any way arising out of, any Acts of God or acts of a public enemy, fires, floods, epidemics, quarantine restrictions,

strikes, and freight embargoes or delay of subcontractors due to such causes.

8.7 DEFAULT BY CONTRACTOR

A. If Contractor fails to begin delivery of material and equipment, to commence the Work within the time specified, to maintain the rate of delivery of material, to execute the Work in the manner and at such locations as specified, or to maintain the work schedule that will ensure the City's interest, or, if Contractor fails to carry out the intent of the Contract, City may serve written notice upon Contractor and the surety on its Performance Bond demanding satisfactory compliance with the Contract.

B. The Contract may be canceled by the City without liability for damage, when in City's opinion Contractor is not complying in good faith, has become insolvent, or has assigned or subcontracted any part of the work without the City's consent. In the event of such cancellation, Contractor will be paid the actual amount due based on Contract unit prices or the lump sums proposal and the quantity of the work completed at the time of cancellation, less damages caused to City by Contractor's acts. Contractor, in having tendered a Proposal, will be deemed to have waived any and all claims for damages because of cancellation of the Contract for any such reason. If City declares the Contract canceled for any of the above reasons, City will serve written notice to that effect upon the surety. The surety must, within five (5) days, assume control and perform the work as successor to the Contractor.

C. If the surety assumes any part of the Work, it must take Contractor's place in all respects for that part, and City will pay the surety for all work performed by it in accordance with the Contract. If the surety assumes the entire Contract, all money due to Contractor at the time of its default will be paid to the surety as the work progresses, subject to the terms of the Contract.

D. If the surety does not assume control and perform the work within five (5) days after receiving notice of cancellation, or fails to continue to comply, City may exclude the surety from the premises. City may then take possession of all material and equipment and complete the work by using City forces, by letting the unfinished work to another contractor, or by a combination of such methods. In that event, the cost of completing the Work will be charged against the Contractor and its surety and may be deducted from any money due or becoming due from the City. If the sums due under the Contract are insufficient for completion, the Contractor or surety must pay to City all costs in excess of the sums due within five (5) days after the Notice of Completion resolution.

E. The remedies available to City under this subsection are cumulative and in addition to all other rights and remedies available to City under the law.

8.8 WORK AT NIGHT – Not Applicable

8.9 MAXIMUM LENGTH OF OPEN TRENCH

A. Except by special permission of the Engineer, the maximum length of any open trench where prefabricated pipe is used must not be greater than five hundred feet (500'), or the distance necessary to accommodate the amount of pipe installed in a single day, whichever is greater. The distance is measured as the collective length, including excavation, construction, pipe laying, backfilling, and compaction at any one location.

B. All trenches shall be covered with trench plates that have an H20 traffic load rating.

Trench plates shall be properly secured and ramped with compacted asphalt concrete. No trench plates shall be used on the weekends without prior written approval from the City. Contractor shall be responsible for inspecting trench plates on the weekends including providing pictures to the City on condition of trench plates in the street.

C. Except by special permission of the Engineer, the maximum length of open trench in any one location where concrete structures are poured in place will be that which is necessary to permit the uninterrupted progress of construction of the concrete structure, with construction pursued as follows: excavation, setting of reinforcing steel, pouring of floor slab, walls, and cover slab or arch are to follow each other without any one of these operations preceding the next nearest operation by more than two hundred feet (200').

D. Except by special permission of the Engineer, the maximum length of open trench in any one location where prefabricated concrete box conduit is used will be that which is necessary to permit the uninterrupted progress of construction of the concrete structure with construction pursued as follows: excavation, setting of reinforcing steel, pouring of floor slab, erection of side walls, erection of cover slab, and pouring of filler spaces are to follow each other without any one of these operations preceding the next nearest operation by more than two hundred feet (200').

8.10 LIMITED ACCEPTANCE OF WORK

At any time during the progress of the Work, City may, upon written notice to Contractor, take over and utilize the whole or any part of the work, or appurtenance thereto, which has been completed, giving, if desired, permits to utilize the same. Such use by City will constitute a limited acceptance of that part of the work so taken over and utilized which will relieve Contractor and its sureties from responsibility for any damage to, or defect in, that part of the work not inherent in its construction which may be caused by the use of such part by City or by property owners under its permits.

SECTION 9

MEASUREMENT AND PAYMENT

9.1 MEASUREMENT FOR PAYMENT

A. Measurement and calculations of quantities for payment will be as hereinafter specified for the particular material to be furnished or class of work to be performed, unless otherwise specified in the Special Provisions.

B. Unit prices or lump sum amounts proposals shall include full compensation for furnishing all labor, materials, tools, and equipment and doing all work shown on the Plans or stipulated in the Specifications for that particular item of work, unless otherwise specified in the Special Provisions.

C. When payment is specified to be made on the basis of weight, the weighing shall be done on certified platform scales, and Contractor must furnish the Engineer with the duplicate Certified Weighmaster's Certificate(s) showing the actual net weights. When weighing is done on certified scales at a mixing plant, duplicate weight delivery tickets will be accepted. One ticket must be furnished to the inspector at the plant and one ticket to the Engineer at the site of work. City will accept the certificates as evidence of the weight delivered.

9.2 SCOPE OF PAYMENT

Contractor hereby accepts the compensation as herein provided, in full payment for furnishing all materials, labor, tools, and equipment necessary to complete the Work and for performing all Work contemplated by the Contract; also for loss or damage arising from the nature of the Work, or from the action of the elements, except as provided above or from any unforeseen difficulties that may be encountered during the prosecution of the work until acceptance of the completed Work; also for all expenses incurred in consequence of the suspension or discontinuance of the work as herein specified; and for completing the work according to the Plans and Specifications. Neither the payment of any estimate nor of any retained percentage relieves Contractor of any obligation to make good any defective work or material.

9.3 DEDUCTIONS FROM PAYMENTS

City may, at its option and at any time, retain out of any amounts due to Contractor sums sufficient to cover any unpaid claims, provided that sworn statements of said claims must have been filed with the City.

9.4 SCHEDULE OF VALUES

A. Prior to Contractor's application for the first progress payment, Contractor must submit a detailed breakdown of its bid by scheduled Work items and/or activities, including coordination responsibilities and Project record document responsibilities. Where more than one subcontractor comprises the work of a work item or activity, the Schedule of Values must show a separate line item for each subcontract. Contractor must furnish such breakdown, of the total Contract sum, by assigning dollar values (cost estimates) to each applicable progress schedule network activity, which cumulative sum equals the total Contract sum. The format and detail of the breakdown must be as directed by City to facilitate and clarify future progress payments to Contractor for direct work under the Contract Documents. This breakdown will be referred to as the "Schedule of Values."

B. Contractor's overhead, profit, insurance, cost of bonds and/or other financing, as well as "general conditions costs," (*e.g.*, site cleanup and maintenance, temporary roads and access, off-site access roads, temporary power and lighting, security and the like), must be prorated through all activities so that the sum of all the Schedule of Values line items equals Contractor's total Contract sum.

C. City will review the breakdown in conjunction with the progress schedule to ensure that the dollar amounts of this Schedule of Values are, in fact, fair-market cost allocations for the Work items listed. Upon City's favorable review, City will accept this Schedule of Values for use. City will be the sole judge of fair-market cost allocations.

D. City will reject any attempt to increase the cost of early activities (*i.e.*, "front loading") which will result in a complete reallocation of monies until such front loading is corrected. Repeated attempts at front loading may result in suspension or termination of the Work or refusal to process progress payments, until such time as the Schedule of Values is acceptable to City.

9.5 PAYMENTS AND MONTHLY ESTIMATES

A. The City Engineer will, after the award of Contract, establish a monthly payment closure date. This date will serve to close each working month for which a monthly payment is payable during the life of the Contract. Contractor will, within five (5) days after the established monthly payment closure date each month in which work is being performed, make and deliver to the City two signed copies of monthly Contract payment applications stating the amount or percentage of work completed according to the Contract, as of the closure date established, estimated on the basis of the unit or lump-sum Contract prices. No allowance will be made for materials and equipment not incorporated into the work, unless approved by the City Engineer. City will independently verify Contractor's monthly payment application and create a monthly progress payment request. City's determinations of the amounts or percentages of work completed are final.

B. Except as otherwise provided in a labor compliance program applicable to the Work or as otherwise required by City, concurrently with each application for payment, Contractor shall submit to City Contractor's and its subcontractors' certified payroll records required to be maintained pursuant to Labor Code Section 1776 for all labor performed during the pay periods ending in the period covered by the application for payment

C. City will prepare a warrant in an amount sufficient with all previous payments to make the aggregate ninety-five percent (95%) of the amount earned as certified, provided, however, that City, at any time after fifty percent (50%) of the Work has been completed may make any of the remaining partial payments in full, less authorized deductions, if it finds that satisfactory progress is being made.

D. The partial payments made as the work progresses will be payments on account and will in no way be considered as an acceptance of any part of the Work or materials, nor will they govern the final estimate. Extra Work will be paid for as specified in Section 4.6. Payments for unit price items will be made upon the basis of the unit prices proposal and the quantities of work done, calculated as hereinafter specified, for each particular item of work. However, where several types of work are included in a unit price item, City will make partial payment for the portions of such work as are completed at the time of making the monthly estimates. City will pay all monies due to Contractor under the Contract on demand, prepared and approved as required by law. It is further

understood that any delay in the preparation, approval and payment of these demands will not constitute a breach of Contract on the part of City.

E. Payments for lump sum items will be based upon the lump-sum proposal and City's estimate as to the percentage of completion.

9.6 PAYMENT FOR STORED MATERIALS OFF SITE

A. Contractor to submit a request in writing for such payment. Upon approval by the City Engineer, the Contractor may invoice City for materials purchased in advance and not stored at the Project Location, if any. Payment of such invoice(s) by City is contingent upon the following conditions:

1. The invoice shall specifically identify the quantity, manufacturer and unique description of each of the materials stored off-site ("Listed Items");

2. Contractor shall certify that the Listed Items are in accordance with the Contract;

3. Contractor shall provide proof that (a) title to the Listed Items has vested in Contractor and (b) the Listed Items are insured while stored or in transit until delivered to the Project Location;

4. Contractor shall include an anticipated schedule for delivery of the Listed Items to the Project Location;

5. Listed Items must be clearly and visibly marked as belonging to Contractor and/or City, as applicable and segregated from other materials; and

6. City shall be entitled to inspect the Listed Items at the off-site storage facility.

B. City will pre-pay one hundred percent (100%) of Contractor's Application for Payment for the materials delivered, less (5%) Retention as indicated in Section 9 of these Standard Specifications. Contractor shall protect stored materials from damage. Damaged materials, even though paid for, will not be incorporated into the Work and will be replaced at Contractor's expense.

9.7 PAYMENT FOR EXTRA WORK

A. Payment for Extra Work will be made as provided by Section 4.6. Where payment is to be made on a force account basis, Contractor and the City's representative will compare records of Extra Work Contractor performed on a force account basis at the end of each day. City's representative will make copies of these records in duplicate and must be signed by both the inspector and Contractor's representative, one copy for Contractor and one copy for the City. Bills for Extra Work must be signed by Contractor and submitted to the City.

B. Each month, Contractor will include in the monthly payment application an estimate of the amount or cost of Extra Work performed as included in approved Contract change orders. Contractor will submit, at the same time it returns the signed monthly payment application, a complete itemized statement of claim for all costs of Extra Work performed. Failure to include such a statement or claim for Extra Work for the pay period, or failure to deliver a complete statement for Extra Work in excess of that estimated by the City Engineer, will constitute a waiver on the part of Contractor to any claim for payment for Extra Work not therein included.

C, Method of payment for Extra Work approved as specified in Section 4 under unit price or lump sum amounts or at stipulated prices must be the same as that for Contract items as set forth in this Section.

D. Payment for Extra Work by Contractor's force account must be made in the following manner: Upon verification by the Engineer of Contractor's statement for force-account work, a claim will be prepared upon the proper claims form for approval of the City Engineer and presentation to the City Manager or Assistant City Manager, for his/her approval and direction.

9.8 FINAL PAYMENT

A. Upon Contractor's completion and City's acceptance of the Work, and at least thirty-five (35) days after the date of recordation of the Notice of Completion, the City Engineer will present Contractor's claim for the balance of the total Contract price, less any sums which may lawfully be retained under the Contract.

B. Unless qualified by Contractor under the procedure established in Section 9.5 hereof, the final progress payment request of the City Engineer shall be taken as conclusive evidence of the amount of work done under the Contract. If Contractor qualified its acceptance of the final progress payment and the parties fail to agree prior to the termination of the thirty-five-(35-) day period after recordation of Notice of Completion, the final payment shall not be delayed and shall be made in accordance with the City Engineer's determination, subject to further claim of Contractor and compliance by City with any applicable court order.

SECTION 10

CLAIMS BY CONTRACTOR

10.1 OBLIGATION TO FILE CLAIMS FOR DISPUTED WORK

A. Should it appear to Contractor that (1) the Work to be performed or any of the matters relative to the Contract Documents are not satisfactorily detailed or explained therein, (2) should any questions arise as to the meaning or intent of the Contract Documents, or (3) should any dispute arise regarding the true value of any work performed, work omitted, or Extra Work that Contractor may be required to perform, time extensions, payments to Contractor during performance of this Contract, performance of the Contract, and/or compliance with Contract procedures, or (4) should Contractor otherwise seek extra time or compensation FOR ANY REASON WHATSOEVER, then Contractor shall first follow all other procedures set forth in the Contract Documents and Standard Specifications. If a dispute remains, then Contractor shall give written notice to City that expressly invokes this Section 10. City shall decide the issue in writing within fifteen (15) days; and City's written decision shall be final and conclusive. If Contractor disagrees with City's decision, or if Contractor contends that City failed to provide a decision timely, then Contractor's SOLE AND EXCLUSIVE REMEDY is to promptly file a written claim setting forth Contractor's position as required herein ("Claim").

B. Contractor shall present as its Claims all subcontractor, sub-subcontractor and supplier claims of any type, and prove them under the terms of the Contract Documents. City shall not be directly liable to any subcontractor, supplier, or any other person or organization, or to any surety for or employee or agent of any of them, for damages or extra costs of any type arising out of or resulting from the Project.

10.2 FORM AND CONTENTS OF CLAIM

A. Contractor's written Claim shall be submitted via registered mail or certified mail with return receipt requested, identify itself as a "Claim" under this Section 10, and include the following: (i) a narrative of pertinent events; (ii) citation to contract provisions; (iii) theory of entitlement; (iv) complete pricing of all cost impacts; (v) a time impact analysis of all time delays that shows actual time impact on the critical path; (vi) reasonable documentation supporting items (i) through (v); and (vii) a verification under penalty of perjury of the Claim's accuracy. The Claim shall be submitted to City within thirty (30) calendar days of receiving City's written decision, or the date Contractor contends such decision was due, shall be priced like a change order, and must be updated monthly as to cost and entitlement if it is a continuing claim. Routine contract materials, for example, correspondence, RFI, change order requests, or payment requests shall not constitute a Claim. Contractor shall bear all costs incurred in the preparation and submission of a Claim.

B. Upon receipt of a Claim, City shall conduct a reasonable review of the Claim. Within forty-five (45) days, or such extended period as City and Contractor may agree, City shall provide Contractor with a written statement identifying what portion of the Claim is disputed and what portion is undisputed.

C. If City's governing body must approve City's response to the Claim and the governing body has not met within the forty-five- (45-) day (or extended) period, then City shall provide its written statement within three (3) days of the governing body's meeting.

D. City shall pay the undisputed portions of the Claim within sixty (60) days of the issuance of a written statement identifying an undisputed portion.

E. Claims must be submitted on or before the day of final payment. Claims not submitted before final payment are deemed waived.

F. Notwithstanding and pending the resolution of any Claim or dispute, Contractor shall diligently prosecute the disputed work to final completion in accordance with City's determination.

10.3 INFORMAL CONFERENCE AFTER CLAIM SUBMISSION

A. If Contractor disputes City's response to its Claim, including a failure to respond, it may submit via registered mail or certified mail, return receipt requested, a written demand for an informal conference to meet and confer for settlement of the issues in dispute. City shall schedule such a meet-and-confer conference within thirty (30) days for settlement of the dispute.

B. Within ten (10) days of the meet-and-confer conference, City shall provide Contractor with a written statement identifying the portion of the Claim that remains in dispute and the portion that is undisputed.

C. City shall pay the undisputed portions of the Claim within sixty (60) days of the issuance of a written statement identifying an undisputed portion.

10.4 MEDIATION

A. If the Contractor disputes City's statement provided under Paragraph 10.3(B), it shall lodge with the City Clerk a written objection to the City's written statement within three (3) days of the date on the City's statement of dispute. The parties shall then mutually agree to a mediator within ten (10) business days of the date of the City's written statement. If the parties cannot agree upon a mediator, each party shall select a mediator and those mediators shall select a qualified neutral third party to mediate with regard to the disputed portion of the claim. Each party shall bear the fees and costs charged by its respective mediator in connection with the selection of the neutral mediator.

B. Mediation shall be confidential and non-binding. Unless otherwise agreed, by the parties or as provided in this Paragraph 10.4, the mediation shall be pursuant to the construction mediation procedures of JAMS and held at the JAMS office closest to the Project site.

C. The cost of mediation shall be equally shared by all parties to the mediation. The parties shall, prior to the commencement of mediation upon notice of the other party, exchange relevant, non-privileged Project documents in compliance with Code of Civil Procedure Sections 2031.010, *et seq*. The parties may agree mutually to engage in additional discovery prior to mediation. Should the parties proceed with additional discovery, they shall, unless mutually agreed otherwise, comply with Code of Civil Procedure Sections 2019.010, *et. seq*. The mediator(s) will undertake to resolve any discovery disputes relating to the mediation.

D. For Claims under three hundred seventy-five thousand dollars ($375,000), unless the parties agree otherwise in writing, mediation pursuant to this Paragraph 10.4 shall excuse the mediation obligation under Public Contract Code Section 20104.4(a).

E. If mediation is unsuccessful, the parts of the Claim remaining in dispute shall be resolved as otherwise provided by the Contract and applicable law.

F. Following receipt of a Claim, the parties may mutually agree, in writing, to waive the mediation requirements of this Paragraph 10.4 and proceed to the commencement of a civil action.

G. All statutes of limitation shall be tolled from the date of the demand for mediation until a date two (2) weeks following the mediation's conclusion.

10.5 OTHER MATTERS

A. The provisions of this Section 10 constitute a non-judicial claim settlement procedure that, pursuant to Government Code Section 930.2, shall constitute a condition precedent to submission of a valid Government Code claim. Contractor shall bear all costs incurred in the preparation, submission and administration of a claim. Any Government Code claims presented must affirmatively indicate Contractor's prior compliance with the claims procedure herein and the previous dispositions under Paragraphs 10.3 and 10.4 above of the claims asserted. No suit may be brought against City arising out of or in connection with the Project unless and until Contractor presents to City a statutory Government Code claim, in accordance with Government Code Sections 910, *et seq*. Pursuant to Government Code Section 930.2, the one- (1-) year period in Government Code Section 911.2 shall be reduced to one hundred and fifty (150) days from either accrual of the cause of action, substantial completion, or termination of the contract, whichever occurs first; in all other respects, the Government Code shall apply unchanged.

B. Failure to submit and administer claims as required in this Section 10 shall waive Contractor's right to claim on any specific issues not included in a timely submitted claim. Claim(s) or issue(s) not raised in a timely protest and timely claim submitted under this Section 10 may not be asserted in any subsequent litigation, Government Code claim, or legal action.

C Contractor shall submit subcontractor claims in the same manner as other Claims. In the event a subcontractor (on behalf of the subcontractor or a lower-tier subcontractor) requests in writing that Contractor present a Claim to the City and furnishes reasonable documentation supporting the Claim, Contractor shall, within forty-five (45) days of receipt of the written request, notify the subcontractor in writing as to whether the Contractor presented the claim to City and, if the Contractor did not present the Claim, provide the subcontractor with a statement of the reasons for not doing so.

D. All waivers or modifications of this Section 10 may only be made in a writing signed by City and Contractor and approved as to form by legal counsel for both; oral or implied modifications shall be ineffective.

E. Any failure by City to respond within any time frame contained in Paragraphs 10.2 through 10.5 of this Section shall result in the Claim being deemed rejected in its entirety. No failure to meet a time requirement shall constitute an adverse finding with regards to the merits of the Claim or the responsibility or qualifications of the Contractor.

10.6 COMPLIANCE WITH STATUTORY PROCEDURES

The foregoing provisions of Paragraphs 10.2 through 10.5 are intended to comply with Public Contract Code Section 9204 and, to the extent applicable, Public Contract Code Section 20104*, et seq*. In the event of any conflict between these provisions and the Public Contract Code, the applicable Public Contract Code provision will apply.

PART 4 – TECHNICAL SPECIFICATIONS

TECHNICAL SPECIFICATIONS

FOR

CONSTRUCTION OF

WET WELL LINING PUMP STATION 2
PROJECT NO. 2017-09

FOR

CITY OF ROHNERT PARK, CALIFORNIA

March 25, 2026

SCHAAF & WHEELER
CONSULTING CIVIL ENGINEERS

2200 Range Avenue, Suite 201
Santa Rosa, CA 95403
(707) 528-4848

SECTION 01005
CERTIFICATION

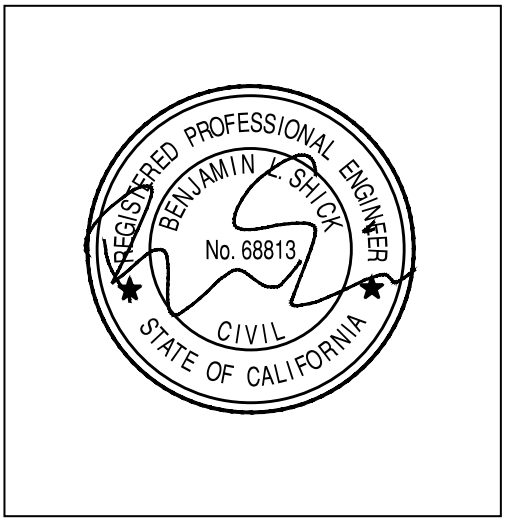
THE FOLLOWING SECTIONS:

Divisions 1, 2, 3, 5, 9, and 15

OF THESE TECHNICAL PROVISIONS WERE PREPARED UNDER THE SUPERVISION OF:

Benjamin L. Shick, P.E.
California Registered Civil Engineer No. C68813
Expiration 9/30/27

Schaaf & Wheeler, Consulting Civil Engineers
2200 Range Avenue, Suite 201
Santa Rosa, California 95403
(707) 548-4848



SECTION 01005
CERTIFICATION

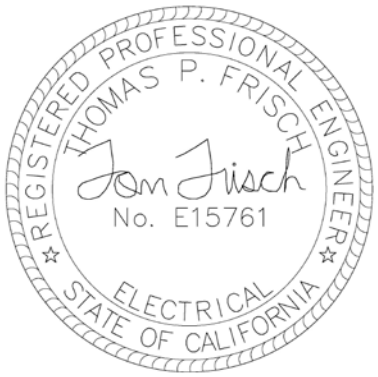
THE FOLLOWING SECTIONS:

Division 16

OF THESE TECHNICAL PROVISIONS WERE PREPARED UNDER THE SUPERVISION OF:

Thomas P. Frisch, P.E.
California Registered Electrical Engineer No. E15761
Expiration 9/30/26

Frisch Engineering, Inc.
Consulting Electrical Engineers
13405 Folsom Blvd, Unit 600
Folsom, CA 95630
(916) 353-1025



DIVISION 1 – GENERAL REQUIREMENTS

SECTION NO.	TITLE
01120	WORK CONSTRAINTS
01125	BID ITEM DESCRIPTIONS
01300	CONTRACTOR SUBMITTALS
01354	HAZARDOUS MATERIALS PROCEDURES
01505	MOBILIZATION/DEMOBILIZATION
01531	TEMPORARY FLOW CONTROL
01550	TEMPORARY FACILITIES AND CONTROLS
01600	ENVIRONMENTAL PROTECTION

DIVISION 2 - SITE CONSTRUCTION

SECTION NO.	TITLE
02100	CLEARING AND DEMOLITION
02200	EXCAVATION AND BACKFILL
02700	POLYVINYL CHLORIDE (PVC) PIPE AND FITTINGS
02710	HIGH DENSITY POLYETHYLENE (HDPE) PIPE AND FITTINGS
02722	AGGREGATE BASE
02770	SANITARY SEWER TESTING

DIVISION 3 - CONCRETE

SECTION NO.	TITLE
03000	CONCRETE WORK – GENERAL
03100	CONCRETE FORMING AND ACCESSORIES
03200	CONCRETE REINFORCING
03300	CAST IN PLACE CONCRETE
03600	GROUTS
03700	CHEMICAL GROUTING

DIVISION 5 - METALS

SECTION NO.	TITLE
05501	ANCHOR BOLTS
05505	MISCELLANEOUS METALS

DIVISION 9 - FINISHES

SECTION NO.	TITLE
09800	COATING SYSTEMS
09900	WASTEWATER STRUCTURES COATING

DIVISION 15 - MECHANICAL

SECTION NO.	TITLE
15050	BASIC MECHANICAL MATERIALS AND METHODS
15052	BASIC PIPING MATERIALS AND METHODS
15061	PIPE SUPPORTS
15810	DUCTWORK
15830	HVAC FANS

DIVISION 16 AND 17 - ELECTRICAL

SECTION NO.	TITLE
16010	ELECTRICAL GENERAL
16110	CONDUIT AND BOXES
16120	LOW VOLTAGE WIRE AND DATA CABLE
16450	GROUNDING
16600	FACTORY AND FIELD TESTING
16905	CONTROL PANELS
16940	INSTRUMENTATION

APPENDICES

SECTION NO.	TITLE
A	ROHNERT PARK PUMP STATION WET WELL CONDITION ASSESSMENT, PS2 SECTIONS, V&A, DECEMBER 8, 2016
B	SITE PHOTOGRAPHS
C	RECORD DRAWINGS, WASTEWATER PUMP STATION IMPROVEMENTS, PROJECT NO. 1988-20
D	GRINDER INSTALLATION INSTRUCTIONS

END OF SECTION

SECTION 01120
WORK CONSTRAINTS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Site Use and Construction Restrictions.
2. Temporary Construction Access Requirements and Limitations
3. Utility restrictions and requirements.
4. Temporary Construction Easement restrictions and requirements.

B. Related Work Specified Elsewhere:

1. Contract Time and Order of Work: Bid Documents and Special Provisions
2. Environmental Protection: Section 01600

1.02 SITE USE AND CONSTRUCTION RESTRICTIONS

A. The project site is within the City's sanitary sewer pump station site and structures.

B. The City will provide a limited staging area within the project site as shown on the plans. It might be desirable to access or have additional temporary staging areas within the City limits of Rohnert Park, or other neighboring cities. Contractor is responsible for obtaining any necessary staging or storage areas and shall comply with all jurisdiction regulations for which the work is to occur.

C. Contractor shall review the project location, site conditions, and restrictions.

D. Construction impacts due to identified or observable site constraints shall be considered by the Contractor when making their bid, and the costs associated with such constraints shall not be compensated for beyond the provisions contained herein.

E. Contractor shall provide access to residences and businesses at all times during construction. Contractor shall maintain access to driveways to the maximum extent possible.

F. Contractor shall maintain access for the City to operate and maintain all facilities within the pump station site at all times during construction.

G. See the City's Special Provisions for work hours and limitations.

1.03 DOCUMENTATION OF EXISTING CONDITIONS

A. The Contractor is responsible for reviewing and documenting the existing site conditions prior to performing any work. Documentation shall include photographs, videos, notes,

and other items as necessary to accurately document the condition of all items that may be affected by the work.

B. The Contractor shall submit the documentation of existing conditions digitally to the City prior to proceeding with the work.

1.04 UNDERGROUND FACILITIES

A. The Contractor shall note that not all existing utilities are shown on the plans and the location of the utilities shown are approximate. The location of the utilities shown on the plans are based on utility basemaps and record drawings and are approximate in nature.

B. The Contractor shall have all utilities located by contacting USA, and review utility locations.

C. Some, but not all potential utility conflicts are shown on the plans. The Contractor shall pothole all potential utility conflicts prior to construction. Potholing results and any identified conflicts shall be submitted to the City for review prior to construction.

D. The Contractor is responsible for coordinating all project documentation, including but not necessarily limited to, the Contract Documents, and existing record drawings for the determination of the location of all underground facilities. Contractor shall have utilities marked in the field by Underground Services Alert a minimum of 48 hours prior to the start of construction.

E. The Contractor shall exercise care in all excavations to avoid damage to existing underground facilities. This shall include potholing or hand digging in those areas where underground facilities are known to exist until they have been sufficiently located to avoid damage to the facilities.

F. The Contractor shall notify the Engineer of any potential utility conflicts as soon as they are known.

1.05 OVERHEAD ELECTRIC UTILITIES

A. Contractor shall insure a minimum clearance between the power lines and the work at all times as dictated by OSHA and PG&E regulations.

1.06 SEASONAL RESTRICTIONS

A. All construction activities that impacts the pump station operation and/or capacity shall be completed during the dry season. See Section 01531 for additional requirements and restrictions.

1.07 TREE AND PLANT PROTECTION

A. Preserve and protect all existing trees and plants at or adjacent to the site unless otherwise noted.

1.08 WORK SEQUENCE

A. The overall sequence of the Work is at the Contractor's discretion, subject to City approval.

B. The use of multiple crews is at the sole discretion of the Contractor and no additional compensation will be allowed to meet the contract requirements.

C. As detailed in specification section 01531, the Contractor shall phase the project in a manner that minimizes the duration of impacts to the pump station operation and bypass pumping to the extent feasible.

1.09 MAINTAINING SEWER SERVICE

A. Contractor shall maintain existing sewer service at all times during construction. Refer to Section 01531 Temporary Flow Control for additional information.

B. EMERGENCY RESPONSE

1. For the duration of construction, Contractor shall be available on a 24-hour on-call basis to respond to an emergency situation. The Contractor shall provide the City with a minimum of three (3) names of persons and their cell phone numbers for this purpose. All persons listed shall be able to respond to any sanitary sewer overflow or trench safety emergency within 30 minutes of being notified.

2. Should a sewage spill occur during construction, Contractor shall be responsible for the following:

    a. Clean up of the site in accordance with City, County, Health Department, Regional Water Quality Control Board and any other regulatory agency requirements.

    b. Reporting of the spill to the proper jurisdictional agency and preparing all required documentation per the State Water Board Sanitary Sewer Overflow (SSO) Guidelines.

    c. Payment of any and all fines assessed against the City for the spill.

    d. Coordination and payment of any analytical testing (lab) required at the site by jurisdictional agencies.

    e. Protection of the public from exposure to contaminated area.

1.10 TRAFFIC CONTROL

A. Reference the City's Standard Specifications for traffic control requirements.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01125
BID ITEM DESCRIPTIONS

PART 1 GENERAL

1.01 SUMMARY

A. Section includes description of requirements and procedures for determining amount of Work performed and for obtaining payment for Work performed.

1.02 REFERENCES

A. California Public Contract Code

B. California Code of Civil Procedure

C. California Government Code

1.03 SCOPE OF WORK

A. Work under Contract Documents, or under any Bid Item, allowance, or alternate, shall include all labor, materials, taxes, transport, handling, storage, supervision, administration, and all other items necessary for the satisfactory completion of Work, whether or not expressly specified or indicated.

1.04 DETERMINATION OF QUANTITIES

A. Quantity of work to be paid for under any item for which a unit price is fixed in the Contract Documents shall be, as determined by the Engineer, the number of units of work satisfactorily completed in accordance with Contract Documents or as directed by City. Unless otherwise provided, determination of number of units of work so completed will be based, so far as practicable, on actual measurement or count within prescribed or ordered limits, and no payment will be made for work done outside of limits. Measurements and computations will be made by methods set forth in Contract Documents. If methods are not so set forth, measurements shall be made in any manner which the City considers appropriate for class of Work measured (e.g., preassigned values, percentage completion, units completed, or incremental milestones). Contractor must immediately inform City of any disputes regarding quantity measurements and shall immediately supply City with any documentation supporting the disputed measurements.

1.05 UNITS OF MEASUREMENT

A. Measurements shall be in accordance with U.S. Standard Measures. A pound is an avoirdupois pound. A ton is 2,000 pounds avoirdupois. The unit of liquid measure is the U.S. gallon.

1.06 CERTIFIED WEIGHTS

A. When payment is to be made on the basis of weight, the weighing shall be done on certified platform scales, or when approved by the Engineer, on a completely automated weighing and recording system. The Contractor shall furnish the Engineer with duplicate licensed weighmaster's certificates showing the actual net weights. The Engineer will accept the certificates as evidence of the weights delivered.

1.07 METHODS OF MEASUREMENT

A. Materials and items of work, which are to be paid for on the basis of measurement, shall be measured in accordance with the method stipulated in the particular sections involved. In determining quantities, all measurements shall be made in a horizontal plane unless otherwise specified.

B. Material not used in the work and remaining on a transporting vehicle shall be determined by the Engineer and deducted from the certified tag.

C. When material is to be measured and paid for on a volume basis and it would be impractical to determine the volume, or when requested by the Contractor in writing and approved by the City in writing, the material will be weighed and converted to volume measurement for payment purposes. Factors for conversion from weight measurement to volume measurement will be determined by the City and shall be agreed to by the Contractor before such method of measurement of pay quantities will be adopted.

D. Full compensation for all expense involved in conforming to the above requirements for measuring and weighing materials shall be considered as included in the unit prices paid for the materials being measured or weighed and no additional allowances will be made therefore.

E. Quantities of material wasted or disposed of in a manner not called for under the Contract; or rejected loads of material, including material rejected after it has been placed by reason of failure of the Contractor to conform to the provisions of the Contract; or material not unloaded from the transporting vehicle; or material placed outside the lines indicated on the plans or given by the Engineer; or material remaining on hand after completion of the Contract, will not be paid for and such quantities will be deducted from the final total quantities. No compensation will be allowed for hauling rejected material.

1.08 BASIS OF PAYMENT

A. Unit Price Quantities: When estimated quantity for specific portions of Work is listed in the Bid, quantity of Work to be paid for shall be actual number of units satisfactorily completed, as determined by City and agreed to by Contractor, in accordance with Contract Documents.

B. Lump Sum: When estimated quantity for specific portion of Work is not indicated and unit is designated as lump sum, payment will be on a lump sum basis for Work

satisfactorily completed in accordance with Contract Documents and the approved Schedule of Values. Progress payments will be based on a percentage complete basis for each line item of the accepted Schedule of Values.

C. City does not expressly, or by implication, agree, warrant, or represent in any manner, that actual amount of Work will correspond with amount shown or estimated and reserves right to increase or decrease amount of any class or portion of Work, to leave out entire Bid Item or Items, or to add work not originally included in Bid or Contract Documents, when in its judgment such change is in best interest of City. No change in Work shall be considered a waiver of any other condition of Contract Documents. No claim shall be made for anticipated profit, for loss of profit, for damages, or for extra payment whatsoever, except as otherwise expressly provided for in Contract Documents, because of any differences between the amount of work actually done and estimated amount as set forth herein, or for elimination of Bid Item.

PART 2 DESCRIPTION OF BID ITEMS

2.01 GENERAL

A. The bid items are presented to indicate major categories of the work for purposes of comparative bid analyses, and a preliminary breakdown for monthly progress payments. Bid items are not intended to be exclusive descriptions of work categories and the Contractor shall determine and include in its pricing all materials, labor, and equipment necessary to complete each Bid Item as shown and specified.

B. Contractor shall perform all work depicted in the Contract Documents whether it is specifically mentioned in the Bid Schedule and bid item descriptions or not. The Bid Schedule and the Bid Item Descriptions below are intended to cover any and all Work depicted in the Contract Documents. Not all elements of every part of the Work are explicitly listed. It is the intention of City and a provision of this Contract, that any and all of the Work depicted shall be included in Contractor's bid and installed complete at a price included in a Bid Item submitted with Contractor's bid. No adjustments will be made to unit, extended, or total prices for an item that is depicted in the contract documents but is not specifically described or itemized. Such items may be included for payment in a bid item of the Contractors' choice, as long as the chosen bid item is closely related.

C. Bid items described to be in easements occur in locations where access is difficult, typically requiring work to be completed with hand held equipment. Locations that are in or adjacent to paved streets and driveways are described to be in the public right of way.

D. The locations referenced in the bid item descriptions below are shown in more detail on the project plans,

2.02 BID ITEM DESCRIPTIONS

1. Mobilization and Demobilization

The contractor shall include in this lump sum bid item full compensation for all labor, supervision, materials, tools, equipment and incidentals, and for all the work involved in mobilization and demobilization, including, but not limited to, furnishing all specified contract bonds and insurance certificates, required project forms, public notification, transporting equipment, establishing a storage area, sanitary restroom facilities, and all other work not otherwise attributable to any specific bid item and as directed by the Town.

Payment for this item shall be on a lump sum basis.

2. Temporary Erosion & Sediment Control

   This lump sum bid item includes all work to prepare and implement water pollution and erosion controls in conformance with the Contract Documents, applicable permits, including the City's NPDES permit for Storm Water Pollution Prevention. This bid item includes all work to prepare and implement a Water Pollution Control Plan (WPCP) and the requisite construction Best Management Practices (BMPs) to prevent the illegal discharge of pollutants from the site.

3. Bypass Pumping

   This lump sum bid item for bypass pumping shall include full compensation for providing all labor, materials, tools, equipment, and appurtenances and associated work to provide temporary bypass pumping of the pump station to handle all sewage inflows as specified herein and as shown on the plans. This bid item includes but is not limited to continuous monitoring of sewer system water levels, preparation and implementation of a detailed bypass plan, connection plan, and emergency plan to the City for approval before the bypass is installed

4. Wet Well - Clean, Prepare, and Repair Concrete Surfaces

   This lump sum bid item includes all labor, materials, tools, equipment, and appurtenances necessary to clean, prepare, and repair all concrete surfaces within the existing wet well as specified herein, and as recommended by the coating system manufacturer's recommendations.

   This bid item also includes all necessary temporary scaffolding, PPE, temporary ventilation, and other items as necessary to access all surfaces within the wet well and to meet all codes and regulations.

5. Wet Well - Remove and Replace/Reinstall Pipes, Conduits, Bubbler Tube, Etc.

   This lump sum bid item includes all labor, materials, tools, equipment, and appurtenances necessary to remove and replace or reinstall existing pipes, conduits, light fixtures, bubbler tube, and all other items attached to the surfaces of the existing wet well as specified herein and as shown on the Plans. This bid item includes proper removal of all existing pipe and conduit supports and installation of new pipe, conduits, pipe supports, conduit supports, and other items as necessary to coat all interior surfaces of the existing wet well and to properly reinstall or replace existing conduits, pipes, light fixtures, and appurtenances upon completion of the wet well coating system. This bid item also includes removal of all abandoned or unused pipes, conduits and appurtenances as shown on the plans and as directed by the City.

This bid item also includes all necessary temporary scaffolding, PPE, temporary ventilation, and other items as necessary to access all surfaces within the wet well and to meet all codes and regulations.

6. Wet Well - Mortar & Epoxy Coating System below Elev. 80.1

   This bid item per square foot includes all labor, materials, tools, equipment, and appurtenances necessary to install a mortar and epoxy coating system on all interior surfaces of the wet well below Elevation 80.1 as specified herein and as shown on the Plans. This bid item includes all testing and inspection requirements as specified herein and as recommended by the coating manufacturer's recommendations.

   This bid item also includes all necessary temporary scaffolding, PPE, temporary ventilation, and other items as necessary to access all surfaces within the wet well and to meet all codes and regulations.

7. Wet Well - Mortar & Epoxy Coating System Above Elev. 80.2

   This bid item per square foot includes all labor, materials, tools, equipment, and appurtenances necessary to install a mortar and epoxy coating system on all interior surfaces of the wet well above Elevation 80.1 as specified herein and as shown on the Plans. This bid item includes all testing and inspection requirements as specified herein and as recommended by the coating manufacturer's recommendations.

   This bid item also includes all necessary temporary scaffolding, PPE, temporary ventilation, and other items as necessary to access all surfaces within the wet well and to meet all codes and regulations.

8. Wet Well - Coat (E) Pump Suction Elbows (Revocable)

   This bid item per each suction elbow includes all labor, materials, tools, equipment, and appurtenances necessary to remove existing suction elbow within the wet well, install a new epoxy coating system on the suction elbow, and reinstall the suction elbow with new 316 stainless steel flange bolts and nuts as specified herein and as shown on the Plans.

   This bid item is revocable as deemed necessary by the City. The City will inspect the existing suction elbows once the wet well has been drained and cleaned to determine if the Contractor shall proceed with the scope under this bid item, or if it will be removed from the construction contract.

9. Grinder Chamber - Clean, Prepare, and Repair Concrete Surfaces

   This lump sum bid item includes all labor, materials, tools, equipment, and appurtenances necessary to clean, prepare, and repair all concrete surfaces within the existing grinder chamber and the flow through channel between the grinder chamber and the wet well as specified herein, and as recommended by the coating system manufacturer's recommendations.

   This bid item also includes all necessary temporary scaffolding, PPE, temporary ventilation, and other items as necessary to access all surfaces within the grinder chamber and to meet all codes and regulations.

10. Grinder Chamber - Remove and Replace/Reinstall Pipes, Conduits, Brackets, Etc.

    This lump sum bid item includes all labor, materials, tools, equipment, and appurtenances necessary to remove and replace or reinstall existing pipes, conduits, and all other items attached to the surfaces of the existing grinder chamber as specified herein and as shown on the Plans. This bid item includes proper removal of all existing pipe and conduit supports and installation of new pipe, conduits, pipe supports, conduit supports, and other items as necessary to coat the surfaces of the existing grinder chamber and to properly reinstall or replace existing conduits, pipes, and appurtenances upon completion of the grinder chamber coating system. This bid item also includes removal and relocation of the existing grinder support brackets and removal of all abandoned or unused pipes, conduits, slide gate brackets, support brackets and appurtenances as shown on the plans and as directed by the City.

    This bid item also includes all necessary temporary scaffolding, PPE, temporary ventilation, and other items as necessary to access all surfaces within the grinder chamber and to meet all codes and regulations.

11. Grinder Chamber – Seal Cracks/Penetrations

    This lump sum bid item includes all labor, materials, tools, equipment, and appurtenances necessary to install seal all existing cracks and pipe penetrations within the grinder chamber and the flow through channel between the grinder chamber and the wet well as specified herein and as shown on the Plans. This bid item includes injecting chemical grout, sealing pipe penetrations, and other items as necessary to create a water tight structure prior to installing the new grinder chamber coating system.

    This bid item also includes all necessary temporary scaffolding, PPE, temporary ventilation, and other items as necessary to access all surfaces within the grinder chamber and to meet all codes and regulations.

12. Grinder Chamber – Grating Support Angles and Anchors

    This lump sum bid item includes all labor, materials, tools, equipment, and appurtenances necessary to install new stainless steel angles and anchors to support the existing grating system as specified herein and as shown on the Plans.

13. Grinder Chamber - Mortar & Epoxy Coating System (below grating)

    This bid item per square foot includes all labor, materials, tools, equipment, and appurtenances necessary to install a mortar and epoxy coating system on all interior surfaces of the grinder chamber below the existing access grating as specified herein and as shown on the Plans. This bid item includes all testing and inspection requirements as specified herein and as recommended by the coating manufacturer's recommendations.

    This bid item also includes all necessary temporary scaffolding, PPE, temporary ventilation, and other items as necessary to access all surfaces within the grinder chamber and to meet all codes and regulations.

14. 12-inch HDPE Bypass Pipe & Fittings

    This per linear foot bid item includes all labor, materials, tools, equipment, and appurtenances necessary to install a 12-inch fused HDPE bypass pipe and fittings as specified herein and as shown on the Plans. This bid item includes all fittings, connections, and testing and inspection requirements as specified herein and as shown on the plans.

15. Bypass Pipe Supports, Concrete Pads, and Pump Connections

    This lump sum bid item includes all labor, materials, tools, equipment, and appurtenances necessary to install new pipe supports and concrete pads for the new HDPE bypass pipe and pump connections as specified herein and as shown on the Plans. This bid item also includes HDPE pipes to connect the City's portable pump to the new bypass connection, and new HDPE suction pipe extending from the City's portable pump into the diversion structure. This bid item includes all fittings, hardware, pipe supports, pipe clamps, and all other items as necessary to construct a complete and functional bypass pipe system that connects to the City's portable pump.

    Installation of the bypass suction pipe will require confined space entry into the existing diversion structure. The diversion structure is approximately 18' deep. Reference the pump station record drawings included in Appendix C to these specifications.

16. Ventilation System Demolition

    This Lump Sum (LS) bid item shall include full compensation for providing all labor, materials, tools, equipment, and appurtenances required to demolish and properly dispose of all existing ventilation equipment being replaced as part of this project. This bid item includes removal and disposal of existing ventilation ducting, supports, fans, conduits, leads, and other items as necessary to completely remove existing equipment and repair for installation of new ventilation equipment as specified herein and as shown on the plans.

17. Ventilation Ducting, Dampers, Registers, Accessories

    This Lump Sum (LS) bid item shall include full compensation for providing all labor, materials, tools, equipment, and appurtenances required for procuring and installing new ventilation ducting, duct supports, registers, dampers, turning vanes, and appurtenances in as specified herein and as shown on the plans.

18. Ventilation Fans

    This Lump Sum (LS) bid item shall include full compensation for providing all labor, materials, tools, equipment, and appurtenances required for procuring and installing new ventilation fans and appurtenances in as specified herein and as shown on the plans. This bid item includes installation of new fans on existing roof curbs, inspection of existing roof curbs, roof mounting, and appurtenances as necessary for proper installation of new ventilation fans.

19. Ventilation Monitoring, Control Panel and Misc. Electrical Improvements

    This lump sum bid item shall include full compensation for providing all items necessary for the execution and completion of this work including, but not limited to,

procuring and installing all new equipment including new ventilation control panel, fan motor connections, air duct pressure differential switches, alarm horns, alarm beacons, current monitors, and mounting brackets in accordance with these specifications and as shown on the plans.

20. Gas Monitoring System

    This lump sum bid item includes all necessary labor, materials, and equipment to furnish and install the gas monitoring system, LEL sensor, conduit, wiring, alarms, controller, and other items necessary to conform to the requirements in these specifications and as shown on the plans.

2.03 CONTRACTOR'S COST BREAKDOWN

A. The Contractor shall submit a Schedule of Values to the Engineer at the preconstruction conference. The price breakdown, as agreed upon by the Contractor and the Engineer, shall be used for preparing future estimates for partial payments to the Contractor, and shall list the major items of work with a price fairly apportioned to each item. Overhead and other general costs and profit shall be prorated to each item so that the total of the prices for all items equal the lump sum price.

B. The price breakdown shall be generally in the same format as the Contract specifications divisions and subdivisions, with major items of work listed individually. The price breakdown shall be by structural, civil, landscaping, or other logical division of work. The price breakdown shall include separate allowances for any testing and startup work required. Measurable approximate quantities of work performed by the Contractor or its subcontractors shall be provided. For quantities that are the sum total of several individual quantities, backup summaries shall be provided which list the individual descriptions and quantities. These summaries then will be used to determine the quantities of work in place in subsequent progress payment requests.

C. The above is a statement of the intent of the Contract Documents to provide a moderate level of detail, acceptable to the Engineer, to allow a fair and reasonable estimate to be made of the value of work installed. The detail of the price breakdown must be sufficient to provide timely processing of the monthly progress payment request.

D. The price breakdown will be subject to the approval of the Engineer, and upon request, the Contractor shall substantiate the price for any or all items and provide additional level of detail, including quantities of work. The price breakdown shall be sufficiently detailed to permit its use by the Engineer as one of the bases for evaluating requests for payments. The Engineer shall be the sole judge of the adequacy of the price breakdown.

E. The Schedule of Values shall be solely used to determine progress payments. The Schedule of Values shall not be considered in determining payment or credit for additional or deleted work.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01300
CONTRACTOR SUBMITTALS

PART 1 - GENERAL

1.01 GENERAL

A. Wherever submittals are required hereunder, all such submittals by the CONTRACTOR shall be submitted to the ENGINEER.

B. Within 14 business days after the date of commencement as stated in the Notice to Proceed or at Preconstruction Conference, which may occur within 10 working days of the date of commencement, the CONTRACTOR shall submit the following items to the ENGINEER for review:

1. A preliminary schedule of Shop Drawings, Samples, and proposed Substitutes ("Or-Equal") submittals listed in the Bid.
2. A list of all permits and licenses the CONTRACTOR shall obtain indicating the agency required to grant the permit and the expected date of submittal for the permit and required date for receipt of the permit.

1.02 MEASUREMENT AND PAYMENT

A. Full compensation for conforming to the Provisions of this Section will be considered as included in the prices paid for the various items of Work and no additional compensation will be allowed therefore.

1.03 SUBMITTAL TIMING

A. The CONTRACTOR shall submit the following items to the ENGINEER for review one week prior to the pre-construction conference:

1. Proposed construction schedule for entire project.
2. Proposed Traffic Control Plans
3. Proposed Staging Site

B. At the pre-construction conference referred to in the Special Provisions, the CONTRACTOR shall submit the following items to the ENGINEER for review:

1. A preliminary list of submittals.
2. A list of all permits and licenses the CONTRACTOR shall obtain indicating the agency required to grant the permit, the expected date of submittal for the permit, and required date for receipt of the permit.
3. A 21-day plan of operation.
4. Sewer bypass plan (see Section 01531)
5. Water Pollution Control Plan (WPCP)
6. Sanitary Sewer Overflow (SSO) Emergency Response Plan

1.04 SHOP DRAWINGS

A. Wherever called for in the Contract Documents, or where required by the ENGINEER, the CONTRACTOR shall furnish to the ENGINEER for review, digital files of all shop drawing submittals. The term "Shop Drawings" as used herein shall be understood to include detail design calculations, shop drawings, fabrication, and installation drawings, erection drawings, list, graphs, catalog sheets, data sheets, and similar items. Whenever the CONTRACTOR is required to submit design calculations as part of a submittal, such calculations shall bear the signature and seal of an ENGINEER registered in the appropriate branch and in the state wherein the project is to be built, unless otherwise directed.

B. Normally, a separate transmittal form shall be used for each specific item or class of material or equipment for which a submittal is required. Transmittal of a submittal of various items using a single transmittal form will be permitted only when the items taken together constitute a manufacturer's "package" or are so functionally related that expediency indicates review of the group or package as a whole. A multiple-page submittal shall be collated into sets, and each set shall be stapled or bound, as appropriate, prior to transmittal to the ENGINEER.

C. Except as may otherwise be indicated herein, the ENGINEER will return prints of each submittal to the CONTRACTOR with its comments noted thereon, within 14 working days following their receipt by the ENGINEER. It is considered reasonable that the CONTRACTOR shall make a complete and acceptable submittal to the ENGINEER by the second submission of a submittal item. The OWNER reserves the right to withhold monies due to the CONTRACTOR to cover additional costs of the ENGINEER's review beyond the second submittal. The ENGINEER'S maximum review period for each submittal, including all resubmittals, will be 14 working days per submittal. In other words, for a submittal that requires two resubmittals before it is complete, the maximum review period for that submittal could be 28 working days. No extension of Contract Time will be granted for delays due to resubmittals that are reviewed within the number of days specified.

D. If the submittal is returned to the CONTRACTOR marked "NO EXCEPTIONS TAKEN," formal revision and resubmission of said submittal will not be required.

E. If the submittal is returned to the CONTRACTOR marked "MAKE CORRECTIONS NOTED," formal revision and resubmission of said submittal will not be required.

F. If the submittal is returned to the CONTRACTOR marked "REVISE AND RESUBMIT," the CONTRACTOR shall revise said submittal and shall resubmit the required number of copies of said revised submittal to the ENGINEER.

G. If a submittal is returned to the CONTRACTOR marked "REJECTED-RESUBMIT," the CONTRACTOR shall revise said submittal and shall resubmit the required number of copies of said revised submittal to the ENGINEER.

H. Fabrication of an item shall be commenced only after the ENGINEER has reviewed the pertinent submittals and returned copies to the CONTRACTOR marked either “NO EXCEPTIONS TAKEN” or “MAKE CORRECTIONS NOTED.” Corrections indicated on submittals shall be considered as changes necessary to meet the requirements of the Contract Documents and shall not be taken as the basis for changes to the contract requirements.

I. All CONTRACTOR shop drawings submittals shall be carefully reviewed by an authorized representative of the CONTRACTOR, prior to submittal to the ENGINEER. Each submittal shall be dated, signed, and certified by the CONTRACTOR, as being correct and in strict conformance

with the Contract Documents. In the case of shop drawings, each sheet shall be so dated, signed, and certified. No consideration for review by the ENGINEER of any CONTRACTOR submittals will be made for any items which have not been so certified by the CONTRACTOR. All non-certified submittals will be returned to the CONTRACTOR without action taken by the ENGINEER, and any delays caused thereby shall be the total responsibility of the CONTRACTOR.

J. The ENGINEER's review of CONTRACTOR shop drawings submittals shall not relieve the CONTRACTOR of the entire responsibility for the correctness of details and dimensions. The CONTRACTOR shall assume all responsibility and risk for any misfits due to any errors in CONTRACTOR submittals. The CONTRACTOR shall be responsible for the dimensions and the design of adequate connections and details.

1.05 CONTRACTOR'S SCHEDULE

A. Prepare construction schedule showing sequence of activities and proposed shutdowns.

B. Preliminary construction schedule submitted five days prior to Pre Construction Meeting.

C. Update construction schedule on monthly basis and submit with request for Progress Payment.

1.06 RECORD DRAWINGS

A. The CONTRACTOR shall keep and maintain, at the job site, one record set of Drawings. On these, it shall mark all project conditions, locations, configurations, and any other changes or deviations which may vary from the details represented on the original Contract Drawings, including buried or concealed construction and utility features which are revealed during the course of construction. Special attention shall be given to recording the horizontal and vertical location of all buried utilities that differ from the locations indicated, or which were not indicated on the Contract Drawings. Said record drawings shall be supplemented by any detailed sketches as necessary or directed to indicate, fully, the WORK as actually constructed. These master record drawings of the CONTRACTOR's representation of as-built conditions, including all revisions made necessary by addenda and change orders shall be maintained up-to-date during the progress of the WORK.

B. Record drawings shall be accessible to the ENGINEER at all times during the construction period.

C. Final payment will not be acted upon until the CONTRACTOR prepared record drawings have been prepared and delivered to the ENGINEER. Said up-to date record drawings shall be in the form of a set of Contract Documents prints with any changes from the original Contract Documents carefully plotted on the prints in red ink.

D. Upon substantial completion of the WORK and prior to final acceptance, the CONTRACTOR shall finalize and deliver a complete set of record drawings to the ENGINEER for transmittal to the OWNER, conforming to the construction records of the CONTRACTOR. This set of drawings shall consist of corrected drawings showing the reported location of the WORK, and shall become the property of the OWNER. The information submitted by the CONTRACTOR and incorporated by the ENGINEER into the Record Drawings will be assumed to be correct, and the CONTRACTOR shall be responsible for the accuracy of such information, and for any errors or omissions which may appear on the Record Drawings as a result.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF SECTION

SECTION 01354
HAZARDOUS MATERIALS CONDITIONS AND PROCEDURES

PART 1 GENERAL

1.01 DESCRIPTION

A. Section includes description of existing site conditions, general requirements, and procedures for work in the presence of hazardous materials, and requirements for personal protective equipment, training, and monitoring.

B. Requirements of this section apply to the Work or any portion thereof which involves disturbance of or exposure to hazardous materials.

1.02 DEFINITIONS

A. Hazardous Materials: Materials consisting of or containing any substances defined, regulated or listed as hazardous substances, hazardous materials, hazardous wastes, health hazards, toxic waste, pollutant or toxic substances or similarly identified as hazardous to human health or the environment in or pursuant to CERCLA, the Hazardous Materials Transportation Act, RCRA, the Clean Water Act, California Health and Safety Code, the Clean Air Act, the California Water Code or any other appropriate regulation or law including without limitation friable asbestos, polychlorinated biphenyls, petroleum, natural gas and synthetic fuel products and by-products.

B. Personal Protective Equipment (PPE): Individually donned equipment and clothing used in conjunction with appropriate engineering controls and work practices to protect project workers from unacceptable risk related to the handling of soil, building material, or groundwater impacted with hazardous materials.

C. Training and Personnel Monitoring – Labor, materials, equipment, and analyses, utilized to provide appropriate baseline and ongoing training, communication, and verification, including medical surveillance (if needed), of conditions related to employee exposure to hazardous materials.

D. Contaminated Materials:

1. Contaminated Soil: Soil that cannot be disposed of at a Class II or III landfill/disposal site.
2. Contaminated Water: Ground water from dewatering operations containing constituents at measured levels in excess of permit thresholds for discharge into the sanitary sewer system.
3. Contaminated Sludge: Sludge, sediment and debris removed from the sanitary sewer facilities that cannot be disposed of at a Class II or III landfill/disposal site.
4. Site materials, whether existing or new, other than soil or water that cannot be disposed of at a Class II or III landfill/disposal site shall also be considered as contaminated material.

1.03 SUBMITTALS

A. Hazardous Materials Site-Specific Health and Safety Plan (HMSSHASP): Submit for acceptance by the Engineer within 21 days after Notice to Proceed.

B. Amendments: Submit amendments to the HMSSHASP for review and acceptance by the Engineer as they occur.

C. Contaminated Soil Excavation and Disposal Work Plan (CSEDWP):

1. The CONTRACTOR shall prepare and submit to the ENGINEER for approval a CSEDWP. The plan shall be approved prior to beginning any excavation work.

2. The CSEDWP shall address the management of contaminated soils and ground water that may be encountered during the prosecution of the Work. All contaminated material encountered in work areas shall be disposed of at a landfill/disposal site approved for the type of material encountered.

3. The CSEDWP shall address removal and disposal procedures for contaminated soils encountered along the pipeline alignments. The Plan will provide, at a minimum, the following information:

a. The name(s) and address(es) of Subcontractor(s) for work of this Section.

b. As discussed in 2.01, the methodology for all waste tracking activities to prevent the occurrence of cross contamination; excavation methods detailing operations necessary to ensure no blending of contaminated soil with non-contaminated soil; and temporary stockpiling methods.

c. Corporate name, address, and contact person information (name, telephone, and fax number) of all hazardous waste transporters. Include proof of current permit, license, and/or authorization to transport hazardous waste within the state.

d. Disposal facility information described in 2.01 herein.

e. The CONTRACTOR shall submit documentation certifying that all contaminated materials were transported to, accepted, and disposed of, at the disposal facility.

1.04 EXISTING SITE CONDITIONS

A. Contaminated Material:

1. The Contractor may encounter contaminated materials (as defined herein) on work site surfaces or within equipment that may be abandoned on-site or demolished and removed from site.

2. The City is not aware of substantial contamination at these Work sites, but given the historic use of the facilities, contaminated material could include lead-based paint, residual solvents, and petroleum hydrocarbons from maintenance activities.

1.05 GENERAL REQUIREMENTS

A. No work that disturbs existing structures, soil, or groundwater containing hazardous materials shall be performed until the Hazardous Substance Site-Specific Health and Safety Plan is reviewed and accepted by the Engineer.

B. Documentation:

1. Maintain logs on-site of monitoring equipment calibration.
2. Maintain logs on-site of the results of field monitoring measurements.
3. Maintain copies on-site of any laboratory analytical results associated with health and safety monitoring.

C. Contractor shall comply with the following general work practices:

1. Do not smoke, chew gum, apply cosmetics, or consume food and beverages in areas where hazardous materials are being handled.
2. Wash hands thoroughly before eating, smoking, or drinking.
3. Do not store food in areas where it may come in contact with hazardous materials, including soil and dusts.
4. To the extent practical, stay upwind from operations that emit vapors, gases, or particulates.
5. Clean clothing and footwear upon leaving jobsite and prior to entering any vehicle, mobile equipment, or office.
6. Clean vehicle interiors and hand held tools as needed to prevent accumulation of particulates.

D. Follow guidelines for the selection and use of proper personal protective equipment as outlined in the applicable job safety or task hazard analysis from the Hazardous Material Site Specific Health and Safety Plan. At a minimum all Contractor personnel that may come into contact with site soils shall be suitably dressed to perform their work in a safe manner that minimizes exposure to soil and does not interfere with their hearing, vision, or free use of their hands or feet. The following minimum PPE shall be worn by all Contractor employees who may come into contact with site soils:

1. Waist length shirts with sleeves.
2. Trousers covering the entire leg.
3. Work boots.
4. Eye protection meeting the latest American National Standard for Occupational and Educational eye and face protection.
5. Work gloves when handling soil or hand tools in contact with soil.
6. Additional equipment may modify this minimum requirement and, if required, will be outlined in the Hazardous Material Site Specific Safety and Health Plan as part of the job safety or task hazard analysis.

E. Use equipment, in addition to the minimum outlined herein, if listed in the Hazardous Material Site Specific Safety and Health Plan as part of the job safety or task hazard analysis.

1.06 HAZARDOUS MATERIALS SITE-SPECIFIC HEALTH AND SAFETY PLAN

A. Prepare a Hazardous Materials Site-Specific Health and Safety Plan (HMSSHASP) for all site personnel in accordance with the federal OSHA, and Cal/OSHA regulations.

1. The Plan shall include:

a. Provisions specific to handling soils and ballast containing elevated concentrations of petroleum hydrocarbons, poly-nuclear aromatic hydrocarbons, and the metals lead and arsenic.

b. Additional information or procedures as determined necessary by the Contractor for safe performance of work in the presence of hazardous materials.

B. Implement the HMSSHASP, including use of engineering controls, providing its site personnel with the appropriate training and monitoring and personal protective equipment (PPE) based upon the type of work to be performed and the associated hazard, and ensuring proper use of PPE and compliance with safe work practices. The Contractor shall perform all monitoring necessary to determine the ongoing appropriate level of PPE for the work.

C. The Engineer will have the authority to stop work if, in the opinion of the Engineer, the level of PPE selected by the Contractor is not appropriate or site personnel are not complying with the requirements of the HMSSHASP.

1.07 UNKNOWN HAZARDOUS MATERIALS

A. When the presence of hazardous materials are not indicated in the Contract Documents and the Contractor encounters materials, including groundwater, which the Contractor reasonably believes to be hazardous and the hazardous materials have not been rendered harmless, the Contractor shall immediately cease work in the affected area and report the condition to the Engineer in writing. The Contractor may continue work in unaffected areas reasonably believed to be safe.

B. The Engineer will direct the Contractor as to sampling, testing, disposal, and/or remedial work that might take place either through the Contractor’s forces or City’s own forces or an authorized agent. If the consequent delay of work in the affected area delays a current controlling operation, the delay will be considered in accordance with the Contract General Provisions.

PART 2 PRODUCTS

2.01 CONTAMINATED SOILS

A. The CONTRACTOR shall perform all work of this Section in accordance with the Hazardous Materials Site Specific Health and Safety Plan. The Hazardous Materials Site Specific Health and Safety Plan shall contain the information listed below.

B. Hazardous Materials Site Specific Health and Safety Plan

1. Detail the Methods and Procedures to comply with California Labor Code Section 6401.7, Federal, and Local Health and Safety Laws, Rules and Requirements for the duration of the Contract Times. Include the following:

   a. Identification of the certified or licensed safety consultant, who will prepare, initiate, maintain, and supervise safety programs, and procedures. Consultant shall meet the following requirements:
      1) Health, Safety, and Environmental (HSE) consultants per OSHA requirements, or
      2) Certified Safety Professionals (CSP) per OSHA requirements.

   b. Procedures for providing workers with an awareness of safety and health hazards expected to be encountered in the course of construction.

   c. Safety equipment appropriate to the safety and health hazards expected to be encountered during construction. Include warning devices, barricades, safety equipment in public right-of-way and protected areas, and safety equipment used in multi-level structures.

   d. Methods for minimizing employees' exposure to safety and health hazards expected during construction.

   e. Procedures for reporting safety or health hazards.

   f. Procedures to follow to correct a recognized safety and health hazard.

   g. Procedures for investigation of accidents, injuries, illnesses, and unusual events that have occurred at the construction site.

   h. Periodic and scheduled inspections of general work areas and specific work stations.

   i. Training for employees and workers at the jobsite.

   j. Methods of communication of safe working conditions, work practices and required personal protection equipment.

2. Assume responsibility for every aspect of Health and Safety on the jobsite, including the health and safety of subcontractors, suppliers, and other persons on the jobsite.

   a. Employ additional health and safety measures specified by the Safety Consultant, as necessary, for workers in accordance with OSHA guidelines.

3. Transmit to CITY and ENGINEER copies of reports and other documents related to accidents or injuries encountered during construction.

C. On all portions of the work involving grading or excavation, the CONTRACTOR shall examine soil as evidenced by site history, discoloration, odor, differences in soil properties, abandoned underground tanks or pipes, or buried debris.

1. If the project is not within an area of known soil contamination and no evidence of soil contamination is found, then testing of the soil will only be required if directed by the ENGINEER. The CONTRACTOR shall follow the paragraphs below, if contamination is suspected or found.

2. If the work is within an area of known soil contamination or evidence of soil contamination is found, then soil from grading or excavation operations shall be tested.

    a. The soil shall be managed as required by the governing agencies.

    b. The CONTRACTOR shall test excavated material suspected of contamination for disposal characteristics.

    c. All confirmation and stockpile soil samples for testing shall be submitted to a State-certified analytical laboratory for chemical analysis.

3. If the project is found to be within an area of soil contamination not identified by the CITY in the Contract Documents, a change order shall be negotiated to cover additional work performed by the CONTRACTOR.

D. During excavation, if the CONTRACTOR encounters contaminated soil, the CONTRACTOR shall immediately implement the CSEDWP. Any non-contaminated soil that becomes mixed with contaminated soil shall be designated as contaminated and shall be handled and disposed as such at no additional cost to the CITY. CONTRACTOR will not be paid for handling and disposal of the volume of non-contaminated soil at the contaminated soil price, if it is mixed with contaminated soil.

E. The CONTRACTOR shall temporarily stockpile excavated soil in piles not exceeding a volume of 500 cubic yards pending soil characterization and analytical results. Stockpiles shall be securely barricaded and clearly labeled. Excavated material will not have to be segregated into different stockpiles for sampling and disposal. However, if a clearly segregable material is encountered (railroad ballast or other soil that is stained, odorous, or discolored) the material shall be stockpiled separately and sampled for disposal characteristics.

F. Contaminated soils stored at the temporary stockpile area shall be covered with visqueen material to prevent the migration of contaminants from the material. CONTRACTOR shall provide temporary berms constructed of clean soil or hay bales and covered with visqueen to contain runoff from the stockpiled soil. Visqueen material shall have a thickness of at least 10 milli-inches. CONTRACTOR shall recover all rainwater or other water that collects in the temporary stockpile area.

G. The CONTRACTOR shall implement a material tracking system to track all contaminated soil between collection, excavation, stockpiling or storage, sampling and testing, and final disposition. The waste tracking system shall include identification of the source of the soil (location, depths, and date of excavation) and stockpile or storage location.

    1. The CONTRACTOR shall identify a minimum of one landfill that is permitted to and will accept the contaminated soils expected for disposal. The CONTRACTOR shall select landfills that are established, fully operational, and in full compliance with all applicable federal, state, and local regulations.

H. All construction equipment used for the handling of contaminated material shall be decontaminated prior to use for other work elements or removal from site.

2.02 CONTAMINATED WATER

A. The CONTRACTOR shall perform all work of this Section in accordance with the Construction Safety Plan described in this specification.

B. The CONTRACTOR shall contain and properly dispose of all water generated from excavation work in contaminated areas, as described in this Section.

C. The CONTRACTOR shall test excavated ground water for disposal characteristics. The CONTRACTOR shall allow the suspended particles to settle out of solution prior to testing water. Water samples taken during initial studies included suspended particles that contained metals. All confirmation samples will be submitted to a State-certified analytical laboratory for chemical analysis.

D. During excavation operations, if the CONTRACTOR encounters contaminated water, the CONTRACTOR shall immediately implement the CSEDWP. Any non-contaminated water that becomes mixed with contaminated water shall be designated as contaminated water and shall be handled and disposed as such at no additional cost to the CITY. CONTRACTOR will not be paid for handling and disposal of the volume of non-contaminated water at the contaminated price, if it is mixed with contaminated water.

E. The CONTRACTOR shall temporarily store water from dewatering activities pending water characterization and analytical results. Stored water shall be clearly labeled. Contractor shall install in-line filtration system prior to disposal for water if required by disposal facility.

F. The CONTRACTOR shall identify a minimum of one disposal site that is permitted to and will accept the contaminated water expected for disposal. The CONTRACTOR shall select facilities that are established, fully operational, and in full compliance with all applicable federal, state, and local regulations.

G. All construction equipment used for the handling of contaminated material shall be decontaminated prior to use for other work elements or removal from site.

PART 3 EXECUTION

3.01 HAZARDOUS MATERIALS INDEMNITY

A. From and after CONTRACTOR undertakes work on the property subject to this Agreement, CONTRACTOR shall indemnify, defend (with counsel selected by CITY) and hold harmless CITY, from and against all Liability concerning CONTRACTOR’s operations on said property. CONTRACTOR and CITY agree that upon receipt of any notices of a release or potential release of Hazardous Materials during work on the property subject to this Agreement or transportation to or from the disposal facility at which the hazardous soils may be placed, the parties will provide prompt notice to the other. CONTRACTOR shall timely initiate and diligently pursue and complete all appropriate response, remediation, and removal actions for the release, within the deadlines specified by applicable laws and regulations.

B. So long as CONTRACTOR is not in material breach hereof, and is discharging its defense and indemnity obligations in a reasonable and responsible manner for a Liability, and it has accepted and is discharging responsibility hereunder for such liability without any reservation of rights, CITY hereby assigns to CONTRACTOR all of its present and future rights to recover, or receive contribution, from any and all potentially responsible third parties for those costs, expenses and fees incurred by CONTRACTOR pursuant to this Indemnity. Subject to the foregoing, CITY hereby also assigns its rights to CONTRACTOR to bring an action against or otherwise cause any or all of such potentially responsible parties to take responsive actions, and to remove and remediate the Hazardous Materials. Each party agrees to cooperate fully with the other in the preservation and prosecution of all such claims and private enforcement actions.

C. So long as CONTRACTOR is not in material breach hereof, and is discharging its defense and indemnity obligations in a reasonable and responsible manner for a Liability, and it has accepted responsibility hereunder for such liability without any reservation of rights, CONTRACTOR shall have control over the defense of such Liability without any reservation of rights, and over all negotiations relating to the settlement thereof. CONTRACTOR's exercise of control over settlements shall not relieve CONTRACTOR of its indemnity and defense obligations to CITY.

3.02 HAZARDOUS MATERIAL AND WASTE MANAGEMENT

A. Storage: The CONTRACTOR shall label and store all hazardous materials, such as pesticides, paints, thinners, solvents, and fuels; and all hazardous wastes, such as waste oil and antifreeze; in accordance with all applicable local, State and Federal regulations.

1. The CONTRACTOR shall store all hazardous materials and all hazardous wastes in accordance with secondary containment regulations, and it is recommended that these materials and wastes be covered, as needed, to avoid potential management of collected rain water as a hazardous waste.

2. The CONTRACTOR shall keep an accurate, up-to-date inventory, including, but not limited to, Material Safety Data Sheets (MSDSs) of hazardous materials and hazardous wastes stored on-site, to assist emergency response personnel in the event of a hazardous materials incident.

B. Usage: When rain forecast within 24 hours or during wet weather, the Engineer may prevent the CONTRACTOR from applying chemicals in outside areas. The CONTRACTOR shall not over-apply pesticides or fertilizers and shall follow material manufacturer's instructions regarding uses, protective equipment, ventilation, flammability, and mixing of chemicals.

C. Disposal: The CONTRACTOR shall arrange for regular hazardous waste collection to comply with time limits on storage of hazardous wastes. The CONTRACTOR shall dispose of hazardous waste only at authorized and permitted Treatment, Storage, and Disposal Facilities, and use only licensed hazardous waste haulers to remove the waste off-site, unless quantities to be transported are below applicable threshold limits for transportation specified in State and Federal regulations. CONTRACTOR shall ensure that CITY receives a copy of the Uniform Hazardous Waste Manifest form completed by the hazardous waste facility that accepted said materials.

END OF SECTION

SECTION 01505
MOBILIZATION/DEMOBILIZATON

PART 1 - GENERAL

1.01 GENERAL

A. Mobilization shall include the obtaining of all permits; moving onto and off of the site of all personnel and equipment; furnishing and erecting temporary facilities, temporary fence, and other construction facilities, including the dismantling and removal of such facilities; and implementing security requirements; all as required for the proper performance and completion of the WORK. Mobilization shall include the following principal items:

1. Moving on to the site of all CONTRACTOR's equipment required for first month operations.
2. Providing on-site sanitary facilities and potable water facilities.
3. Arranging for and erection of CONTRACTOR's work and storage areas.
4. Obtaining all required permits including, but not limited to, City of Rohnert Park Encroachment Permit, OSHA permits, and all other permits necessary to complete the work.
5. Having all OSHA required notices and establishment of safety programs.
6. Having the CONTRACTOR's superintendent at the job site full time.
7. Submitting initial submittals, including those required for the Preconstruction Conference.
8. Completing the Preconstruction Conference.

B. Demobilization shall include moving off the site all equipment and temporary facilities; final cleaning of all work sites and the Contractor’s staging area; completion of all punch list items; and submittal of construction record drawings, any required permits signed by the issuing agency, certifications, and operation and maintenance manuals.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF SECTION

SECTION 01531
TEMPORARY FLOW CONTROL

PART 1 - GENERAL

1.01 DEFINITION

A. Bypass Pumping: Temporary flow control accomplished by diverting flow away from the Work area using one or more pumps

B. Temporary Flow Control: Reducing, limiting, or excluding flow in or to a sanitary sewer, storm sewer, pump station, force main, or other facility as required for performing the Work under the Contract. Draining, handling, and disposal of sanitary sewage and stormwater from pipelines and other facilities as required for performing the Work under the Contract is also part of temporary flow control.

C. Temporary Flow Control Plan: Plan prepared by Contractor containing complete information on how Contractor proposes to perform temporary flow control in accordance with specified requirements.

1.02 SYSTEM DESCRIPTION

A. The City's Pump Station 1 will provide conveyance of sewage inflows during the project. The Contractor is required to provide bypass pumping capabilities during construction to convey the full pump station inflows in the event that Pump Station 1 is not operational, or if the inflows exceed the capacity of Pump Station 1.

B. The Contractor shall provide facilities and controls required to intercept, convey, and discharge sanitary sewer flows to as necessary to complete the work.

C. Include bypass pumping equipment as specified herein, and as necessary to isolate, bypass and convey the inflows.

D. The Contractor shall provide the minimum bypass system capacity:

1. Bypass system capacity: 6 MGD (4,166 gpm) at total dynamic head ranging between 30 and 50 feet.

E. The Contractor shall not oversize the bypass pumping equipment in a manner that it increases the operating pressure and flow rate.

F. Contractor shall phase the project in a manner that minimizes the use of bypass pumping to the extent feasible.

G. General bypass system requirements:

1. Contractor shall install plugs in existing gravity sewer pipes and facilities as shown on the plans and as required to control and divert flows.
2. Contractor shall bypass all pump station inflows from the existing diversion structure to the existing bypass connection as shown on the plans.

a. The bypass pumping set levels shall be coordinated and established with City's operations and maintenance staff.

3. Contractor shall maintain full capacity pumping, monitoring and alarm equipment as specified herein.

H. All sewer flows shall be pumped.

I. Contractor shall assume responsibility for the pump station, and all pump station flows during all bypass pumping operations.

J. Conform to regulatory requirements.

K. Protect water resources, wetlands, and other natural resources.

L. Temporary flow control shall be done in a manner that will not damage private or public property or create a nuisance or public menace. Flow shall be conveyed in enclosed pipes that are adequately protected from traffic or other hazards.

1.03 SITE CONDITIONS

A. Existing facilities are shown on Drawings.

1.04 SUBMITTALS

A. Informational Submittals:

1. Temporary Flow Control and Bypass Plan.
2. Emergency Cleanup Plan.
3. Emergency Contact Information.
4. Names and qualifications of industrial hygienist and standby cleanup Subcontractor, including but not limited to, certification by the Institute of Inspection, Cleaning, and Restoration Certification (IICRC).
5. Information describing equipment and materials to be used and showing conformance with specified requirements.

B. Notification Letters:

1. Provide notification letter to City with the date and time that the Contractor will be responsible for managing the existing pump station and flows associated with it.
2. Provide notification letter to City with the date and time that the bypass pumping operations will be completed, and the pump station can resume normal operations.

1.05 QUALITY ASSURANCE

A. Qualifications:

1. Industrial Hygienist and Cleanup Subcontractor: Certified by the Institute of Inspection, Cleaning, and Restoration Certification (IICRC).
2. Temporary Flow Control System Designer: Professional engineer who has at least 5 years' experience in design of such systems and who is registered in the State of California.

PART 2 - MATERIALS

2.01 GENERAL REQUIREMENTS

A. Provide materials and equipment that will ensure continuous and successful operation of temporary flow control systems.

B. Contractor shall regularly inspect the bypass system and repair or modify systems as necessary.

C. Unless otherwise shown or specified, materials and equipment may be new or used at Contractor's option.

2.02 PLUGS

A. Provide with taps for connection of pressure gauges and air hoses.

B. Pipe Diameters Larger than 24 Inches:
   1. Use inflatable bag stoppers made in two or more pieces.
   2. Manufacturers:
      a. Lansas
      b. Cherne Industries
      c. Or approved equal

C. Contractor should consider the use of redundant multiple plugs to fully isolate and secure the pump station.

2.03 PUMPS

A. Pumps shall be fully automatic, self-priming units that do not require use of foot valves or vacuum pumps in priming system.

B. Pumps shall be solids handling design with ability to pump minimum 3-inch diameter sphere.

C. Pumps shall be able to run dry for long periods of time to accommodate cyclical nature of flows.

D. Engine: Equipped to minimize noise. Noise levels shall not exceed 55 dBA at a distance of 50 feet from source.

2.04 GENERATOR

A. Generator shall be able to simultaneously start and run electric powered pumps required for flow to be controlled.

B. Equipped to minimize noise. Noise levels shall not exceed 55 dBA at a distance of 50 feet from source.

C. Include automatic transfer switch if flow control system is to operate unattended.

D. Contractor is responsible for providing all fuel required during bypass pumping.

E. An engine driven pump may be used in lieu of a backup power generator as long as the pump is capable of handling the full bypass capacity.

F. Temporary generators and engine driven pumps shall be registered with the California Air Resource Board (ARB) and shall meet all ARB and Bay Area Air Quality Management District (BAAQMD) requirements.

2.05 LEVEL SENSORS, ALARM AND NOTIFICATION SYSTEM

A. Provide redundant backup level sensors that will automatically start and stop the pumps in the event of a primary level sensor failure.

B. At a minimum, the Contractor shall maintain high level and power failure alarms at all times during bypass pumping.

PART 3 - EXECUTION

3.01 GENERAL REQUIREMENTS

A. Install temporary flow control facilities only within the pump station site.

B. Operate and maintain temporary flow control 24 hours per day, 7 days per week, including without limitation, holidays, as required to control flows.

C. Bypass pumping equipment shall remain in place until the work is complete and has passed all testing requirements. Promptly remove temporary flow control facilities as soon as they are no longer needed.

D. Sewage shall not be conveyed within the soil in open trenches at any time during construction.

3.02 TEMPORARY FLOW CONTROL PLAN

A. Prepare and submit Temporary Flow Control Plan at least 30 days before starting the Work requiring temporary flow control; include following information:
   1. Drawings indicating location of temporary sewer plugs, bypass discharge lines, suction lines, pumps, and all other equipment to be used during bypass pumping.
   2. Locations where flow will be intercepted and discharged.
   3. Complete descriptions and performance characteristics of pumps, and electric power generators.
   4. Acoustical information for equipment to be used showing compliance with noise control requirements.
   5. Details of temporary force mains, including horizontal and vertical alignments, pipe materials, protection of existing buried and aboveground facilities and improvements, maintenance of traffic and access to properties and pump station site.
   6. Design calculations proving adequacy of temporary system and selected equipment to convey all flows.

7. Drawings showing layouts and configurations of temporary flow control facilities and also showing locations relative to the pump station buildings and site.
8. Drawings and design calculations of temporary bulkheads and plugs.
9. Drawings and design calculations for thrust restraint of temporary piping.
10. Details of system controls and control logic; include diagrams and narrative.
11. Anticipated schedule for the Work.
12. Other information to completely describe temporary flow control facilities and conformance to specified requirements.

3.03 BLOCKING FLOW

A. Flow control may consist of blocking flow with pneumatic plugs.

B. Use primary and secondary plugs for each flow control location.

3.04 PIPING

A. Minimize disturbance of existing utilities.

B. Piping shall not be installed above ground across existing driveways and roadways.

3.05 TEMPORARY SANITARY SEWAGE FLOW REDUCTION

A. Due to the significantly large sewershed area, it is not possible to significantly reduce the sewage flow to the pump station.

3.06 FIELD QUALITY CONTROL

A. Hydrostatic Pressure Test for Bypass Systems:
   1. Prior to operation, test each section of discharge piping with the maximum operating pressure of system.
   2. Notify Owner 24 hours prior to testing.

B. Full Scale Test:
   1. At least 14 days prior to test, notify Engineer of date and time of test.
   2. Do not begin temporary flow control activities until successful test has been completed.
   3. Conduct test on proposed temporary flow control at least 14 days before scheduled date of actual proposed temporary flow control.
   4. Purpose of test is to demonstrate capability, function, and reliability of Contractor's proposed method of temporary flow control.
   5. Duration: Minimum of 4 hours.
   6. Conduct between 8:00 a.m. and 4:00 p.m. Do not conduct test on Saturday, Sunday, or holiday.
   7. If electric pumps are being used, provide standby generators to ensure continuity of pumping operation in event of power failure.
   8. Demonstrate system controls and operation, reliability, and transfer to standby equipment during test.

9. Conduct until flow is accommodated for minimum specified test duration.
10. Failure:
    a. Test shall be deemed to have failed if during test flows are not accommodated for whatever reason and for whatever length of time.
    b. If test fails, determine and correct deficiencies that caused test to fail and conduct another Full Scale Test.
11. Determination by Engineer of a successful test, permission by Engineer to proceed with the Work requiring temporary flow control, or anything else shall not relieve Contractor from responsibility to provide temporary flow control.

*****END OF SECTION*****

SECTION 01550
TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: temporary facilities for the project including sanitary facilities, storage of materials, safety requirements, first aid equipment, fire protection, security measures, protection of the Work and property, access roads and parking, environmental controls, disposal of trash, debris and excavated material, and pest and rodent control.

1.02 CONTRACTOR'S RESPONSIBILITY

A. Comply with applicable requirements as specified in other Sections.
   1. Maintain and operate temporary facilities and systems to assure continuous service.
   2. Modify and extend systems as Work progress requires.
   3. Completely remove temporary materials and equipment when their use is no longer required.
   4. Restore existing facilities used for temporary services to specified or to original condition.
   5. Maintain sewer service as described in Section 01531.

1.03 TEMPORARY UTILITIES

A. Obtaining Temporary Service:
   1. Make arrangements with utility service companies for temporary services as necessary to compete the work.
   2. Abide by rules and regulations of the utility service companies or authorities having jurisdiction.
   3. Be responsible for utility service costs until the Work is substantially complete. Included are fuel, power, light, heat, water, and other utility services necessary for execution, completion, testing, and initial operation of the Work.

B. Water:
   1. Provide water required for and in connection with Work to be performed or for other use as required for proper completion of the Work.
   2. The Contractor is responsible for obtaining temporary construction water permit and meter from City of Rohnert Park (City). The contractor is responsible for providing a backflow prevention device with current test certification and conveying water to the point of use.
   3. Provide and maintain an adequate supply of potable water for domestic consumption by Contractor personnel and Engineer or his Representatives.

C. Electricity and Lighting:
   1. Provide electric power service as required for the Work. Provide power for operation of the Contractor's equipment, or for any other use by Contractor.

D. Sanitary Facilities:

1. Provide and maintain sanitary facilities for persons on the job site; comply with the regulations of State and local departments of health.
2. Enforce the use of sanitary facilities by construction personnel at the job site. Such facilities shall be enclosed. Pit-type toilets will not be permitted. No discharge will be allowed from these facilities. Collect and store sewage and waste so as not to cause a nuisance or health problem; have sewer and waste hauled off-site and properly disposed in accordance with applicable regulations.
3. Locate toilets near the Work site and secluded from view insofar as possible. Keep toilets clean and supplied throughout the course of the Work.

1.04 FIELD OFFICE

Not Used.

1.05 STORAGE OF MATERIALS

A. Storage of materials not susceptible to weather damage may be on blocks off the ground.

B. Store materials in a neat and orderly manner. Place materials to permit easy access for identification, inspection, and inventory.

C. Stockpile materials in a way that provides drainage temporary and existing buildings and facilities.

D. Materials and equipment shall not be stored on private property without receiving written approval from property owner.

1.06 SAFETY REQUIREMENTS

A. Conduct operations in strict accord with applicable Federal, State and local safety codes and statutes and with good construction practice. The Contractor is fully responsible and obligated to establish and maintain procedures for safety of all work, personnel, and equipment involved in the Project.

B. Observance of and compliance with the regulations shall be solely and without qualification the responsibility of the Contractor without reliance or superintendence of or direction by the Engineer or the Engineer’s representative. Immediately advise the Engineer of investigation or inspection by Federal Safety and Health inspectors of the Contractor or subcontractor's work or place of work on the job site under this Contract, and after such investigation or inspection, advise the Engineer of the results. Submit one copy of accident reports to Engineer within 10 days of occurrence.

C. Protect areas occupied by workmen using the best available devices for detection of lethal and combustible gases. Test such devices frequently to assure their functional capability. Constantly observe infiltration of liquids into the Work area for visual or odor evidences of contamination, immediate take appropriate steps to seal off entry of contaminated liquids to the Work area.

D. Safety measures, including but not limited to safety personnel, first-aid equipment, ventilating equipment and safety equipment, in the specifications and shown on the Drawings are obligations of the Contractor.

E. Maintain required coordination with the Police and Fire Departments during the entire period covered by the Contract.

1.07 FIRST AID EQUIPMENT

A. Provide a first aid kit throughout the construction period. List telephone numbers for physicians, hospitals, and ambulance services in each first aid kit.

B. Have at least one person thoroughly trained in first aid procedures present on the site whenever Work is in progress.

1.08 FIRE PROTECTION

A. Conform to specified fire protection and prevention requirements established by Federal, State or local governmental agencies and as provided in Contractor's Safety Program.

1.09 SECURITY MEASURES

A. Protect all Work materials, equipment, and property from loss, theft, damage, and vandalism. Contractor's duty to protect property includes Owner's property used in connection with the performance of the Contract.

B. If existing fencing or barriers are breached or removed for purposes of construction, provide and maintain temporary security fencing equal to existing.

1.10 PROTECTION OF PUBLIC UTILITIES

A. Prevent damage to existing public utilities during construction. Give owners of utilities at least 48 hours notice before commencing Work in the area, for locating utilities during construction, and for making adjustments or relocation of utilities when they conflict with the proposed Work.

1.11 PROTECTION OF THE WORK AND PROPERTY

A. Preventive Actions:
   1. Take precautions, provide programs, and take actions necessary to protect the Work and public and private property from damage.
   2. Take action to prevent damage, injury or loss, including, but not be limited to, the following:
      a. Store apparatus, materials, supplies, and equipment in an orderly, safe manner that will not unduly interfere with progress of the Work or the Owner's operations.
      b. Provide suitable storage for materials which are subject to damage by exposure to weather, theft, breakage, or otherwise.
      c. Place upon the Work or any part thereof only such loads as are consistent with the safety of that portion of the Work.
      d. Frequently clean up refuse, rubbish, scrap materials, and debris caused by construction operations, keeping the Project site safe and orderly.
      e. Provide safe barricades and guard rails around openings, for scaffolding, for temporary stairs and ramps, around excavations, elevated walkways, and other hazardous areas.
   3. Obtain written consent from proper parties before entering or occupying with workers, tools, materials or equipment, privately-owned land.

4. Assume full responsibility for the preservation of public and private property on or adjacent to the site. If any direct or indirect damage is done by or on account of any act, omission, neglect, or misconduct in execution of the Work by the Contractor, it shall be restored by the Contractor to a condition equal to or better than that existing before the damage was done.

B. Barricades and Warning Signals: Where Work is performed on or adjacent to any roadway, right-of-way, or public place, furnish and erect barricades, fences, lights, warning signs, and danger signals; provide watchmen; and take other precautionary measures for the protection of persons or property and protection of the Work. Use barricades painted to be visible at night. From sunset to sunrise, furnish and maintain at least one light at each barricade. Erect sufficient barricades to keep vehicles from being driven on or into Work under construction. Furnish watchmen in sufficient numbers to protect the Work. Maintain barricades, signs, and lights, and provide watchmen until the Project is accepted by the City.

C. Protection of Existing Structures:

1. Underground Structures:
   a. Underground structures are defined to include, but not be limited to, sewer, water, gas, and other piping, and manholes, chambers, electrical and signal conduits, tunnels, and other existing subsurface installations located within or adjacent to the limits of the Work.
   b. Known underground structures, including existing siphons are shown on the Drawings. This information is shown for the assistance of the Contractor in accordance with the best information available, but is not guaranteed to be correct or complete.
   c. Explore ahead of trenching and excavation work and uncover obstructing underground structures sufficiently to determine their location, to prevent damage to them and to prevent interruption of utility services. Restore to original condition damages to underground structure at no additional cost to the Owner.
   d. Necessary changes in location of the Work may be made by the Engineer to avoid unanticipated underground structures.
   e. If permanent relocation of an underground structure or other subsurface installations is required and not otherwise provided for in the Contract Documents, the City will direct Contractor in writing to perform the Work, which shall be paid for under the provisions for changes in the Contract Price as described in the City's General Conditions.
2. Surface Structures: Surface structures are defined as existing buildings, structures and other constructed installations above the ground surface. Included with such structures are their foundations or any extension below the surface. Surface structures include, but are not limited to buildings, tanks, walls, bridges, roads, dams, channels, open drainage, piping, poles, wires, posts, signs, markers, curbs, walks, guard cables, fencing, and other facilities that are visible above the ground surface.
3. Protection of Underground and Surface Structures:
   a. Support in place and protect from direct or indirect injury underground and surface structures located within or adjacent to the limits of the Work. Install such supports carefully and as required by the party owning or controlling such structure. Before installing structure supports, Contractor shall satisfy the Engineer that the methods and procedures to be used have been approved by the owner of the structure.
   b. Avoid moving or in any way changing the property of public utilities or private service corporations without prior written consent of a responsible official of that

service or public utility. Representatives of these utilities reserve the right to enter within the limits of this project for the purpose of maintaining their properties, or of making such changes or repairs to their property that may be considered necessary by performance of this Contract.

c. Notify the owners and/or operators of utilities and pipelines of the nature of construction operations to be performed and the date or dates on which those operations will be performed. When construction operations are required in the immediate vicinity of existing structures, pipelines, or utilities, give a minimum of 5 working days advance notice. Probe and flag the location of underground utilities prior to commencement of excavation. Keep flags in place until construction operation reach and uncover the utility.

d. Assume risks attending the presence or proximity of underground and surface structures within or adjacent to the limits to the Work including but not limited to damage and expense for direct or indirect injury caused by his Work to any structure. Immediately repair damage caused, to the satisfaction of the owner of the damaged structure.

4. Protection of Installed Products:
   a. Provide protection of installed products to prevent damage from subsequent operations. Remove protection facilities when no longer needed, prior to completion of Work.
   b. Control traffic to prevent damage to equipment, materials, and surfaces.
   c. Provide coverings to protect equipment and materials from damage.

5. Protection of Landscaping
   a. The Contractor shall be responsible for the protection of all the trees, shrubs, irrigation systems, fences, and other landscape items adjacent to or within the work area, unless they are directed to do otherwise on the plans.
   b. In the event of damage to landscape items, the Contractor shall replace the damaged items to the satisfaction of the engineer and the owner, or pay damages to the owner as directed by the City.
   c. When the proposed pipeline is to be within planted or other improved areas in public or private easements, the Contractor shall restore such areas to the original condition after completion of the work. Restoration shall include a placement of 5 inches of topsoil, resoding, seeding, and replacement of all landscaped items.
   d. If the Contractor does not proceed with the restoration after completion of the work or does not complete the restoration in a satisfactory manner, the City reserves the right to have the work done and to charge the Contractor for the actual cost of the restoration including all labor, material, and overhead required for restoration.

1.12 ROADS, PARKING, AND TRAFFIC CONTROL

A. See the City's Standard Specifications for Traffic Control Requirements.

B. Prevent interference with traffic on existing roads to the maximum extent possible.

C. Designate temporary parking areas to accommodate construction personnel. When site space is not adequate, provide additional off-site parking. Locate as approved by City.

D. Minimize use by construction traffic of existing streets and driveways.

E. Do not allow heavy vehicles or construction equipment in existing parking areas.

1.13 ENVIRONMENTAL CONTROLS

A. Provide and maintain methods, equipment, and temporary construction as necessary for controls over environmental conditions at the construction site and adjacent areas.

B. Comply with statutes, regulations, and ordinances which relate to the proposed Work for the prevention of environmental pollution and preservation of natural resources, including but not limited to the National Environmental Policy Act of 1969, PL 91-190, Executive Order 11514.

C. The City recognizes that the site has considerable natural value and that construction of projects should have minimum impact to the surrounding environment. The Contractor shall adopt construction procedures that do not cause unnecessary excavation and filling of the terrain, indiscriminate destruction of vegetation, air or stream pollution, nor the harassment or destruction of wildlife.

D. Recognize and adhere to the environmental requirements of the Project. Disturbed areas shall be strictly limited to boundaries established by the Contract Documents. Particularly avoid pollution of "on-site" streams, wells or other water sources.

E. Burning of rubbish, debris, or waste materials is not permitted.

1.14 POLLUTION CONTROL

A. Prepare a Spill Response and Prevention Plan, specific to the Contractor’s means and methods. Submit prior to mobilization per Section 01300, Contractor Submittals.

B. Provide methods, means, and facilities required to prevent contamination of soil, water, or atmosphere by discharge of noxious substances from construction operations.

C. Provide equipment and personnel to perform emergency measures required to contain any spillage, and to remove contaminated soils or liquids. Excavate and dispose of any contaminated earth off-site, and replace with suitable compacted fill and topsoil.

D. Take special measures to prevent harmful substances from entering public waters. Prevent disposal of wastes, effluents, chemicals, or other such substances adjacent to streams, or in sanitary or storm sewers.

E. Prevent toxic concentrations of chemicals.

F. Prevent harmful dispersal of pollutants into the atmosphere.

G. Use equipment during construction that conforms to current Federal, State and local laws and regulations.

H. Dispose of all trash and debris in permitted landfills or recycling facilities, as applicable, in accordance with state and local laws and regulations.

1.15 PEST AND RODENT CONTROL

A. Provide rodent and pest control as necessary to prevent infestation of construction or storage areas.

B. Employ methods and use materials which will not adversely affect conditions at the site or on adjoining properties.

1.16 NOISE CONTROL

A. Provide vehicles, equipment, and construction activities that minimize noise to the greatest degree practicable. Noise levels shall conform to the latest OSHA standards and the City of Rohnert Park's Noise Ordinance.

B. Conduct construction operations during daylight hours except as approved by Engineer.

C. Select construction equipment to operate with minimum noise and vibration.

1.17 DUST CONTROL

A. Control objectionable dust caused by operation of vehicles and equipment. Apply water or use other methods, subject to approval of the Engineer, which will control the amount of dust generated.

PART 2 - MATERIALS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF SECTION

SECTION 01600
ENVIRONMENTAL PROTECTION

PART 1 GENERAL

1.01 REGULATORY REQUIREMENTS

A. These specifications reflect regulatory permit requirements known at the time of bidding.

B. Contractor shall adhere to all related requirements set forth in the State Water Resources Control Board NPDES General Permit Requirements (General Permit No. CAS000002). Permit requirements are available for download on the State Water Resource Control Board's website (http://www.waterboards.ca.gov).

1.02 SUBMITTALS

A. Water Pollution Control Plan (WPCP)
   1. Submit to the City a Storm Water Pollution Control Plan (WPCP) detailing the placement of physical Best Management Practices (BMPs) to comply with the requirements set forth in the State Water Resources Control Board NPDES General Permit Requirements (General Permit No. CAS000002) and required for the Work, and the methods used to comply with those BMPs directed at operational procedures, Monitoring Program and Reporting Plan. The plan shall specifically address and detail changes from the alternatives called out in this section. The Contractor's preferred techniques shall show how it will comply with the stated objectives of the program.
   2. The Contractor shall submit details and product data for proposed BMP's. Details shall be from the CASQA Stormwater Best Management Practice (BMP), Handbook Portal, Construction, and shall be marked to show compliance or marked to show deviation.
   3. The entire plan shall be kept and maintained by the Contractor on the construction site during the duration of the project.
   4. The Contractor shall be responsible for taking the proper actions to prevent contaminants and sediments from entering the storm sewer drainage system should any unforeseen circumstance occur. The Contractor shall take immediate action if directed by the Engineer, or if the Contractor observes contaminants and/or sediments entering the storm drainage system, to prevent further storm water from entering the system.

B. Product Data: On all proposed products.

PART 2 PRODUCTS

2.01 GENERAL

A. All necessary erosion control products and systems required by the State Water Resources Control Board NPDES General Permit (General Permit No. CAS000002)

shall be used. All products and installations shall adhere to the CASQA Stormwater Best Management Practice Handbook.

2.02 FIBER ROLLS

A. Contractor shall install fiber rolls as shown in the submitted pollution control plan and as directed by the Engineer to sufficiently control erosion.

B. Cylinders of biodegradable plant material such as weed-free straw, coir, compost, wood chips, excelsior, or wood fiber or shavings encased within biodegradable netting.

C. Fiber rolls shall be 8” minimum diameter.

D. Fiber rolls shall be staked with oak stakes with minimum dimensions of 0.75 inches square by 24 inches long.

E. Netting Material: Clean, evenly woven, and free of encrusted concrete or other contaminating materials such as preservatives. Also free from cuts, tears, or weak places with a minimum lifespan of 6 months.

2.03 FILTER FABRIC

A. Woven or nonwoven geotextile filter fabric made of either polypropylene, polyethylene, ethylene, or polyamide material, in continuous rolls of longest practical length.
B. Grab Strength: 100 psi in any principal direction (ASTM D-4632), Mullen burst strength >200 psi (ASTM D-3786), and equivalent opening size between 50 and 140.
C. Furnish ultraviolet inhibitors and stabilizers for minimum 6 months of expected usable construction life at temperature range of 0 degrees F to 120 degrees F.

2.04 SANDBAGS

A. Polypropylene, polyethylene, or polyamide woven fabric, with minimum unit weight of 4 ounces per square yard, Muller burst strength exceeding 300 psi, and ultraviolet stability exceeding 70 percent. Fill bags with bank-run sand.

PART 3 EXECUTION

3.01 SITE PROTECTION

A. All site protection measures described herein, including stormwater pollution prevention and habitat protection as described in the Special Provisions, shall be maintained in place continuously for the duration of construction.

B. The Contractor shall maintain a controlled and stable work area at all times. The Contractor is responsible to take those measures needed to control site runoff and soil disturbance, including the placement of temporary aggregate base course at work sites to prevent soil erosion during construction as required.

3.02 DUST CONTROL

A. The Contractor at its expense shall take whatever steps, procedures, or means as are required to prevent abnormal dust conditions being caused by its operations in

connection with the execution of the Work; and on any unpaved road which the Contractor or any of its subcontractors are using, excavation or fill areas, demolition operations, or other activities. Control shall be by sprinkling, use of dust palliatives, modification of operations, or any other means acceptable to agencies having jurisdiction.

B. All construction areas shall be watered at least twice daily and more often during windy periods. Active areas adjacent to residences should be kept damp at all times.

C. Unless the construction dictates otherwise, and unless otherwise approved by the City's Representative, the Contractor shall furnish and operate a self-loading motor sweeper with spray nozzle. The paved streets, parking areas, and staging areas shall be swept at the end of each day of construction as necessary to keep paved areas acceptably clean and to prevent sediment discharges from reaching the drainage system. Adjacent public streets where visible material has been carried onto shall be swept daily.

D. Enclose, cover, water twice daily, or apply (non-toxic) soil binders to exposed stockpiles (dirt, sand, etc.)

E. Vehicles driving on dirt areas will travel at speeds no greater than 10 mph to minimize noise and dust disturbance.

F. Cover all trucks hauling soil, sand, and other loose materials or require trucks to maintain at least two feet of freeboard above the load.

G. Suspend construction activities that cause visible dust plumes that extend beyond the construction site.

3.03 NOISE ABATEMENT

A. Operations at the work sites shall be performed so as to minimize unnecessary noise. Special measures shall be taken to suppress noise during any approved working hour variances. Noise levels due to construction activity shall not exceed the levels specified by local ordinance.

B. Internal combustion engines used on the Work shall be equipped with a muffler of a type recommended by the manufacturer. No internal combustion engine shall be operated without said muffler.

C. All noise generating activity shall comply with City of Rohnert Park’s noise Ordinance.

3.04 INSTALLATION OF FIBER ROLLS

A. Fiber roll materials shall be as specified herein.

B. The Engineer will monitor fiber rolls for effectiveness (see also Section 3.10). Should the installed fiber rolls prove to be an ineffective means of runoff pollution control as measured below, the Contractor shall replace fiber rolls as required until adequate pollution control is achieved.

3.05 REMOVAL OF SEDIMENT CONTROLS

A. All spoil material trapped behind sediment controls shall be disposed of off-site in conformance with all applicable regulatory requirements.

3.06 MAINTAINING WORK AREAS

A. The Contractor shall, at all times, keep property on which work is in progress and the adjacent property free from accumulations of waste material or rubbish caused by employees or by the Work. All surplus material shall be removed from the site immediately after completion of the work causing the surplus materials. Upon completion of the construction, the Contractor shall remove all temporary structures, rubbish, and waste materials resulting from its operations.

B. This provision also applies to any material stockpile and equipment storage areas.

C. All equipment (including personal gear) will be cleaned of soil, seeds, and plant material prior to arriving on-site and after working in areas with invasive non-native plants, such as perennial pepperweed (*Lepidium latifolium*), to prevent the spread of weeds.

D. All stockpiled materials not actively being used shall be bermed and covered from wind and rain. All chemicals shall be stored in watertight containers (with appropriate secondary containment to prevent any spillage or leakage) or in a storage shed. All waste containers shall be covered at the end of each day and before rain events.

E. Concrete transit mixers shall only be washed out in designated wash-out areas where the water will flow into a temporary pit in dirt area or onto stockpiles of aggregate base or sand. Concrete washouts must be water tight.

F. All construction entrances and exits shall be stabilized to sufficiently control sediment tracking from the site. Construction activity traffic to and from the project shall be limited to the stabilized entrances and exits.

G. All storm drain inlet and perimeter controls, as well as construction entrances and exits shall be maintained and replaced as necessary or as determined by the City inspector. BMP maintenance and repair shall begin within 72 hours of failure or shortcoming identification.

3.07 EQUIPMENT AND VEHICLE REFUELING

A. Contractor shall prepare and implement a spill prevention and response plan for refueling equipment, machinery, and vehicles at the project site. Appropriate spill response personnel must be assigned and trained.
   1. Submit to Engineer for review prior to beginning any refueling activity.

B. Machinery, vehicles, and construction equipment shall not be refueled within 60 feet of the creek.

3.08 DISPOSAL OF MATERIAL

A. The Contractor shall make arrangements for disposing of materials outside the Site and the Contractor shall pay all costs involved. The Contractor shall first obtain permission from the property owner on whose property the disposal is to be made and absolve the City from any and all responsibility in connection with the disposal of material on said property. When material is disposed of as provided above, the Contractor shall conform to all required codes pertaining to grading, hauling, and filling of earth.

B. This provision also applies to any material stockpile and equipment storage areas.

C. During the course of construction activities, all trash and debris shall be collected in trash receptacles with a tightly secured lid to prevent attracting predators to the site. All trash cans shall be removed and emptied at an appropriate facility once per week at minimum. If no garbage receptacles are available, all debris including food wrappers and drink containers shall be collected and removed from the area on a daily basis for disposal at an appropriate facility.

3.09 SITE CONTROL DURING INCLEMENT WEATHER

A. The Contractor is solely responsible for site protection during periods of inclement weather.

B. All construction activity with the potential to cause erosion, sedimentation, or water pollution shall be suspended during periods of inclement weather.
   1. Inclement weather is defined as a rain event with a forecasted probability of 50% or greater of measurable (0.01 inch or more) rainfall.
   2. The Contractor is responsible for keeping track of upcoming inclement weather and must obtain the precipitation forecast information from the National Weather Service Forecast Office (http://www.srh.noaa.gov/).
   3. Contractor shall notify the City 48 hours prior to forecast inclement weather.
   4. Contractor shall develop a Rain Event Action Plan (REAP) 48 hours prior to any likely precipitation event forecast of 50% or greater probability. The REAP shall be a written document, specific for each rain event and shall be designed to protect all exposed portions of the site. REAP shall contain all information outlined in the State Water Resources Control Board NPDES General Permit Requirements (Order No. 2009-0009-DWQ) for Risk Level 2 sites. Permit requirements are available for download on the State Water Resource Control Board's website (http://www.waterboards.ca.gov).
   5. Contractor shall begin implementation and make the REAP available onsite no later than 24 hours prior to the likely precipitation event.
      a. If a defined rain event is forecast for a weekend or holiday, all site protection shall be deployed and in place before the Contractor stops work prior to that weekend or holiday.
      b. The Contractor has discretion as to how he runs his operations while maintaining an adequately protected site at the onset of rainfall.

3.10 WATER POLLUTION MONITORING

A. The City will monitor the Contractor's operations and site maintenance to ensure compliance with the NPDES General Construction Permit and other regulatory requirements.

B. During discharge events the City will sample site runoff for the following constituents and compare to Regional Water Quality Control Board numeric effluent limits (NELs):
   1. Turbidity: Maximum turbidity measured in runoff leaving the construction sites will not be allowed to exceed 250 NTU (roughly equivalent to 750 mg/l).
   2. pH: Measured pH runoff leaving the construction sites must be between 6.5 and 8.5 pH units.

C. If effluent limits are exceeded during a discharge event, all work shall cease and the Engineer will direct the Contractor to employ other housekeeping and pollution control measures until compliance is reached.

D. The contractor is responsible for maintaining the identified effluent limits for all runoff leaving the construction site. No exceptions will be made for poor quality run-on water. Run-on from off site shall be directed away from the disturbed area or shall collectively be in compliance with the effluent limits.

3.11 FINES FOR PERMIT VIOLATION

A. Contractor is responsible for all permit violation fines and necessary corrective actions due to his negligence.

B. NPDES permit violation fines will be identified within the permit language. Typical fines per violation are:
   1. Maximum of $25,000/day and $10/gallon over 1,000 gallons discharged
   2. Minimum mandatory penalties of $3,000 per violation

3.12 DOCUMENTATION

A. Contractor shall retain storm water monitoring and control and BMP records for a period of at least three years. Records shall be retained on-site while construction is ongoing. Documentation shall be well organized and shall contain the following items at a minimum:
   1. Document all housekeeping BMPs in the WPCP and REAP(s) in accordance with the nature and phase of the construction project.
   2. Printed copies of all likely precipitation event forecast of 50% or greater probability during all phases of construction.
   3. Copies of all storm water related inspection, sampling, observation, and annual reports.
   4. Records of any corrective actions and follow-up activities that resulted from analytical results, visual observations, or inspections.

3.13 ACCIDENTAL DISCOVERIES

A. Significant cultural resources are not known to exist at the project sites.

1. In the event than an archaeological resource is found during construction, all construction work within a 50-foot radius of the find shall be halted, and the Engineer notified.
2. A qualified archaeologist will be retained by the City to examine the find and a mitigation plan may be implemented.
3. Any resulting changes in the scope of work or time delays caused by the discovery of cultural resources shall be dealt with in conformance with these Contract Documents.

B. In the event that human remains are encountered during excavation or backfilling activities, there shall be no further disturbance until the County Coroner has made the necessary findings as to origin and disposition.
1. Notify the Engineer immediately upon the discovery of possible human remains.
2. Do not resume work until so directed in writing.
3. If the remains are determined to be of Native American descent, the provisions of Section A above will apply.

END OF SECTION

SECTION 02100
CLEARING AND DEMOLITION

PART 1 GENERAL

1.01 SUMMARY

A. Section includes all work necessary to move or remove and legally dispose of all interfering or objectionable material from the project site, including but not necessarily limited to trees, tree branches, tree stumps, brush, shrubs, weeds, debris, roots, rocks, concrete rubble, concrete masonry units, pipe, concrete curbs and gutters, asphalt pavement, concrete structures and concrete slabs, but only as required.

B. Related Sections:
   1. Section 02200 – Excavation and Backfill.

1.02 REFERENCES

A. State of California Department of Transportation (Caltrans).

1.03 DEFINITIONS

A. Clearing: Clearing shall consist of cutting, removing, and disposing of trees, shrubs, brush, limbs, and other vegetative growth. Clearing shall also include the removal and disposal of trash piles, rubbish, and fencing, and the preservation of trees, shrubs, and vegetative growth which are not designated for removal.

B. Grubbing: Grubbing is the removal and disposal of wood or root matter below the ground surface remaining after clearing.

C. Stripping: Stripping refers to the removal and disposal of all organic sod, topsoil, grass, and grass roots; all evidence of surface improvements and other objectionable material remaining after clearing and grubbing.

D. Demolition: The removal of existing structures, portions of existing structures, equipment, utilities, concrete curbs, sidewalks, and driveways, pipelines and other appurtenances.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.01 EQUIPMENT

A. Equipment shall be suitable for the work to be done and shall be in good operating condition. Equipment operators and workmen are to be skilled in such operations and shall be competently supervised.

3.02 CLEARING, GRUBBING AND STRIPPING

A. Clearing and grubbing shall be in accordance with the provisions of Section 16 of the Caltrans Standard Specifications.

B. Clear, grub and strip areas to be excavated or surfaced.

3.03 DEMOLITION

A. Remove existing structures, portions of existing structures, and equipment called for on the plans and as directed by the Engineer.

B. Contractor shall not demolish existing facilities beyond the limits designated on the drawings unless specifically directed to do so by the Engineer.

3.04 PRESERVATION OF PROPERTY

A. The project area shall be cleared and grubbed **only** to the extent necessary to accommodate the work in conformance with the notes and details shown on the plans. Trees or growth shall not be trimmed back unnecessarily.

B. Contractor shall take extreme care not to damage shrubs, trees, fences, irrigation systems, and other improvements of adjacent property owners.

C. All existing improvements not specifically designated on the plans to be removed or relocated shall remain in their original condition and location undisturbed. However, upon written permission by the Owner, existing improvements may, for the convenience of the Contractor, and at his expense, be removed and temporarily relocated during construction and shall be replaced in their original location in as good or better condition as when the Contractor entered upon the work site.

3.05 DEMOLITION OF SURFACE IMPROVEMENTS

A. Removal of sidewalks, curbs and gutters, driveways, concrete slabs, pavement, pavement markings, and traffic striping if necessary shall be in accordance with the provisions of Section 15-1.03B of the Caltrans Standard Specifications. Curbs, gutters, sidewalks, driveways, slabs and pavement shall be removed by full depth saw cut to the nearest joint from the lines shown on the plans or as directed by the Engineer.

B. Where the plans indicate replacement of existing asphaltic pavement, the existing pavement shall be removed and disposed of off-site.

3.06 DEMOLITION OF EXISTING PUMP STATION EQUIPMENT

A. Demolition, removal, and disposal of existing sanitary sewer pump station equipment shall be performed by the Contractor as shown on the Drawings and as necessary to complete the work.

3.07 REMOVAL OF DEBRIS

A. All demolished and cleared material shall become the property of the Contractor and shall be legally disposed of by the Contractor.

B. Removed concrete and asphalt concrete shall be legally disposed of off the right-of-way at a location provided by the Contractor. Demolished concrete shall not be buried in structure backfill areas.

3.08 REMOVAL OF SEWAGE, SLUDGE, AND GREASE FROM PUMP STATION

A. The contractor is responsible for cleaning and removing all sewage, sludge, and grease from the pump station as necessary to complete the work.

B. Liquid sewage can be conveyed to the downstream force main.

C. All sludge, grease, and debris shall be removed from the site and properly disposed of by the Contractor.

*****END OF SECTION*****

SECTION 02200
EXCAVATION AND BACKFILL

PART 1 GENERAL

1.01 SUMMARY

A. Furnish all labor, materials, equipment, facilities, transportation and services to complete all excavation, backfill, fill, grading and related work as shown on the plans and/or specified herein.

B. Section Includes:
1. Removal of excess and unsuitable material from the site.
2. Excavation of material to allow for the placement of underground structures, including any necessary shoring and bracing.
3. Backfilling of underground conduit, pipe, and structures.
4. Preparation of subgrade for concrete slab work and pavement.
5. Furnish and compact artificial fill.
6. Finish grading.
7. Shoring of excavations
8. Control of water (groundwater)
9. Hazardous materials

C. Related Sections:
1. Section 02100 - Clearing and Demolition
2. Section 02722 - Aggregate Base

1.02 REFERENCES

A. Associated General Contractors (AGC):
1. Manual of Accident Prevention in Construction (Section 9).

B. American Society for Testing and Materials (ASTM):
1. C 131 - Test Method for Resistance to Degradation of Small-Size Course Aggregate by Abrasion and Impact in the Los Angeles Machine.
2. C 136 - Test Method for Sieve Analysis of Fine and Course Aggregates.
3. D 422 - Standard Test Method for Particle - Size Analysis of Soils.
4. D 1556 - Test Method for Density and Unit Weight of Soil in Place by the Sand Cone Method.
5. D 1557 - Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 (2,700 kN-m/m).
6. D 2419 - Test Method for Sand Equivalent Value of Soils and Fine Aggregate.
7. D 2922 - Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
8. D 6938 - Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).
9. D 4253 - Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table
10. D 4318 - Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of

Soils.

11. D 6938 Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

C. Division of Industrial Safety (DIS).

D. Occupational Safety and Health Act (OSHA).

E. State of California Department of Transportation (Caltrans).

1.03 DEFINITIONS

A. Excavation: Work shall consist of excavation, storage and any necessary removal of native soil material for structures, foundations, and pavement. Excavation may include the removal and disposal of existing on-site soil and bedrock (including cobbles and boulders), pavement, or concrete slab materials.

B. Fill: Material placed to backfill excavations.

C. On-Site Material: Material obtained from the project site.

D. In-Place Density of Compacted Backfill: Is the in-place density determined in accordance with ASTM D 1556, or with ASTM D 2922 and ASTM D 6938.

E. Maximum Dry Density: Is maximum dry density obtained in the laboratory when tested in accordance with ASTM D 1557 and ASTM D4253.

F. Optimum Moisture Content: Is the water content at the maximum dry density when tested in accordance with ASTM D 1557.

1.04 SUBMITTALS

A. Product Data: Submit material source, gradation, Plasticity Index, and other test data as required for all materials, including imported and on-site materials to be used as backfill.

B. Dewatering Plan: Submit dewatering plan including arrangement, location and depths of system components, size, type, and required permits.

PART 2 PRODUCTS

2.01 MATERIALS

A. General:
   1. All fill material shall be free from sod, large lumps, boulders, rocks, roots, brush, or other objectionable material (as determined by the Engineer), and free of hazardous materials as defined by Section 25117 of the State Health and Safety Code.

B. Class 2 AB shall conform to Section 02722 of these specifications.

C. Native Backfill Material:
   1. Use of native material for backfill is not acceptable except for in landscaped areas

where topsoil material is being reused.

D. Drain Rock:
   1. Drain rock shall match the requirements of the Crushed Rock Material as specified herein.

E. Crushed Rock:
   1. Crushed rock shall be clean and durable meeting the requirements of ASTM No. 57 stone with the following gradation:

Sieve Size	% Passing Sieve
1-1/2”	100
1”	95-100
½”	25-60
No. 4	0-10
No. 8	0-5

F. Geotextiles, Filter Fabrics, and Geogrid:
   1. Stabilization Fabric:
      a. Mirafi 140N
      b. Approved Equal

PART 3 EXECUTION

3.01 EXAMINATION

A. Verification of Conditions:
   1. The Contractor shall, prior to submitting his bid, visit all sites and become familiar with actual site and soil conditions. No allowance will be made by the City for any unfavorable conditions or events which should have been foreseen from a thorough examination of the contract documents, the geotechnical reports, the site, and working conditions.

B. Verification of Prepared Subgrade prior to Constructing Improvements:
   1. The Contractor shall request the City to visually inspect and provide written confirmation of the suitability of prepared subgrade soils prior to the continuation of work.
      a. Work completed without such confirmation is at the Contractor’s risk and subject to removal at the direction of the City.
   2. Contractor shall protect excavation prior to and during the inspection.

3.02 HAZARDOUS MATERIALS

A. See Section 01354.

3.03 OFF-HAUL TESTING

A. The Contractor shall remove and dispose of all excess excavated material to a suitable site. The proper and legal disposal shall be the responsibility of the Contractor.

B. Contractor shall include export and disposal of material in the cost of work to be performed. The Contractor shall include environmental analytical testing in the cost of the work to be performed.

C. Contractor shall maintain proper documentation, in accordance with applicable laws, to provide evidence of proper disposal of off-hauled materials.

3.04 PROTECTION

A. If existing live utilities are encountered, they are to be protected from damage and the proper authorities and affected utility companies notified.

B. Service shall not be interrupted except as directed or accepted; allow sufficient time for utility companies to arrange for continuation of services.

C. Record unmarked utility locations on record drawings and notify the Engineer.

D. Open excavations, trenches, and the like are to be protected with fences, barricades, covers, and railings as required.

E. Every precaution shall be taken to prevent spillage when hauling on or adjacent to any public street or highway. Any spillage shall be promptly removed.

F. Except where trees are shown to be removed, trees shall be protected from injury during construction operations. No tree roots over 2 inches in diameter shall be cut without written permission of the Engineer. Trees shall be supported during excavation by means previously reviewed by the Engineer and no construction work shall occur within the tree dripline unless authorized by the Engineer. See the tree preservation notes on the Plans.

3.05 SAFETY

A. The Contractor is solely responsible for excavation safety, including support to all adjacent improvements at all times.

B. Excavation shall be in accordance with the State of California Construction Safety Orders. The Contractor shall, in accordance with Section 6705 of the California Labor Code, submit a detailed drawing to the Engineer before excavation begins, showing the design of shoring, bracing, sloping or other provisions to be made for worker protection from the hazard of caving ground during any excavation of five or more feet in depth

C. If the Contractor presents a drawing which varies from shoring system standards established by the Construction Safety Orders, the drawing shall be prepared and signed by a registered civil or structural engineer licensed by the State of California. Any Engineer's review of said drawings will in no way relieve the Contractor from responsibility and liability for the adequacy of shoring systems and excavations.

3.06 EXCAVATION SUPPORT AND PORTECTION

A. Shoring and support of the excavation shall be in conformance with all laws and regulations.

3.07 CONTROL OF WATER

A. Water may be encountered within the Work at any time, and the presence of such water is likely to be continuous. Contractor shall control site water so that work may be done in the dry in a safe working environment according to relevant provisions of the Safety Orders.

B. Prior to the preparation of bedding or subgrade, the excavation shall be thoroughly dewatered by the use of sump pumps and dewatering equipment as necessary to safely convey water away from structural excavations to positive draining outlets.

C. All site water discharge shall be into a City's sewer system or at an approved facility.

D. The Contractor shall notify the City two working days prior to discharging into the sewer system. The notice shall include the proposed discharge location, flow rate, and duration.

E. Contractor shall make adequate provisions for the removal of sediment from groundwater prior to discharge.

F. The Contractor shall prevent surface water (e.g. rainwater) and subsurface or groundwater from flowing into excavations and from flooding the project site and surrounding areas.

G. The Contractor shall remove all water which accumulates in all excavations during the progress of work so that all work can be done in the dry. Excavated areas shall be kept free from water while structures are constructed, while concrete is setting and until backfill has been placed to a sufficient height to anchor the work against possible floatation.

H. Contractor shall implement sufficient measures to limit the inflow of groundwater so that the maximum allowed dewatering pumping rate of 50 gpm is sufficient to keep excavated areas free from water.

I. Provide sufficient pumping capacity to maintain the groundwater level at least two feet below the lowest level of excavation or backfill at all times.

J. Sufficient pumping equipment for immediate use shall be on the project site at all times, including standby pumps for use in case other pumps become inoperable. Water shall be disposed of so as to cause no injury to public or private property, or to be a menace to the public health.

K. Dewatering devices shall be adequately filtered to prevent the removal of fines from the soil.

L. The Contractor shall be responsible for any damage to foundations or other parts of existing structures or of the new work, caused by the failure of any part of the Contractor's protective works.

M. Depending upon groundwater conditions and the degree of project completion, underground structures are susceptible to floatation prior to backfill and anchorage.

Contractor shall prevent the floatation or movement of structures during construction.

N. As recommended by the Engineer or City, the Contractor shall be prepared to backfill the trench with drain rock (3/4" crushed rock) encapsulated with filter fabric to control groundwater. All drain rock shall be compacted as specified herein.

O. Groundwater cutoff plugs shall be placed as indicated on the plans or as directed by the Engineer/City.

P. After dewatering is no longer necessary, all dewatering pumps and appurtenances shall be removed by the Contractor.

3.08 PREPARATION OF SUBGRADE

A. Strip surface vegetation, weeds, and at least the top six inches from areas underlying surface structures and areas to be paved. Excavate soft, wet, or otherwise unsuitable base grade to firm, unyielding soil.

B. Where mud or other soft or unstable material is encountered as determined by the Engineer in the field, remove such material to a minimum of 12 inches. The bottom of the over-excavation should then be completely covered with geotextile and backfilled with drain rock. The stabilization fabric should be wrapped around the backfill to completely encapsulate the drain rock.

3.09 EXCAVATION

A. Contractor shall notify the Engineer of any site condition not reflected on the plans or in these specifications, such as conflict in grade, bad soil, or unexpected utility lines. The Engineer will observe the excavation bottom prior to placing permeable material, and may recommend further excavation if soils are not suitable.

B. Strip surface vegetation, weeds, and at least the top six inches from areas underlying surface structures and areas to be paved. Excavate soft, wet, or otherwise unsuitable base grade to firm, unyielding soil.

C. Excavation to the lines, grades, and dimensions shown on the plans. Excavations shall be made to such width outside the lines of the structure to be constructed as may be required for proper working methods, the erection of forms, and the protection of work. Any resulting over-excavation extending beyond the lines, grades, and dimensions shown on the plans shall be backfilled with material complying with these specifications at no additional cost to the City.

D. Care shall be taken to preserve foundation surfaces in an undisturbed condition, and excavation at or near property lines shall be performed in a manner that minimizes disturbances to adjacent property. Any foundation surfaces disturbed without the Engineer's authorization shall be replaced at the Contractor's expense with material approved by the Engineer so that by test, the bearing capacity of the replacement material is equal to or better than the undisturbed foundation material.

E. Existing structures and completed work shall be adequately braced and cared for so that no damage will result.

F. Excavated material unsuitable for backfill or in excess of the amount required for backfill shall be disposed of by the Contractor off the site at his expense.

3.10 BACKFILLING

A. All debris, form work, etc. shall be removed from the excavation prior to backfilling.

B. Pipe and conduits shall be supported during the placement and compaction of bedding and backfill.

C. Backfill with crushed rock encapsulated in geotextile fabric in areas where groundwater is encountered as recommended by the Engineer or City.

D. Contractor shall construct backwater cutoff plugs as indicated on the plans and as directed by the Engineer or City.

E. Fill materials shall be spread in level layers of appropriate thickness for the compaction equipment to be used and moisture content of the material, and compacted as specified. Layers shall not exceed 8 inches in thickness after compaction.

F. Granular backfill shall be tamped mechanically or manually along the sides of pipes and structures to minimize voids in the material between the pipe or structure and excavation walls. No flooding or jetting shall be used to compact bedding or backfill materials.

G. Where the backfill material moisture content is too low to permit the specified degree of compaction, water shall be added before or during spreading until the proper moisture content is achieved. Jetting will not be permitted for compaction.

H. Where the backfill material moisture content is too high to permit the specified degree of compaction, the material shall be dried until the moisture content is satisfactory.

I. No fill shall be placed during conditions that will alter the moisture content of the fill material sufficiently to make adequate compaction impossible. After placing operations have been stopped due to adverse conditions, no additional fill material shall be placed until the last layer compacted has been checked and found to be compacted to the specified densities.

J. All ground surfaces shall be finished to uniform grades and slopes as indicated on the plans so that the ground drains properly and is free from depressions which may cause areas of standing water. Drainage shall be away from foundations and slabs. Clods are to be broken up and the surface of the ground shall be uniformly pulverized and graded

K. Crushed rock should be consolidated in place with light vibratory equipment. Rubber-tire equipment should not be allowed to operate on the exposed subgrade; the crushed rock should be stockpiled and pushed out over the stabilization fabric.

L. Excavations should be backfilled simultaneously with shoring removal to ensure that all voids are filled.

M. Tests: Tests are to be made on each layer of fill to assure adequate compaction throughout the entire area. If the field densities are not satisfactory, the Contractor will

be required to recompact each layer and/or work area as necessary to achieve the specified densities. Compaction testing will be performed in accordance with ASTM D1556, D1557, D2922, and D6938. Compaction testing will be performed and paid for by the City.

3.11 COMPACTION

A. Unless otherwise indicated on the drawings, fill materials shall be compacted to relative compactions based on the ASTM D1557 maximum dry density as follows:

Pipe or Conduit Bedding	90%
Trench Backfill under Paved Areas	95%
Backfill under structures	95%
Trench Backfill under Non-Paved Areas	90%
All Other Backfill	90%

3.12 GRADING

A. Contractor shall grade the site as required to match improvements to existing contours.

B. All ground surfaces shall be finished to uniform grades and slopes as indicated on the plans so that the ground drains properly and is free from depressions which may cause areas of standing water. Drainage shall be away from foundations and slabs. Clods are to be broken up and the surface of the ground shall be uniformly pulverized and graded.

C. Temporary benches cut into hillsides shall be restored to pre-construction contours. Benches shall be backfilled and compacted as specified herein.

D. At the completion of grading work, the site shall be left in a clean and finished condition.

*****END OF SECTION*****

SECTION 02700

POLYVINYL CHLORIDE (PVC) PIPE AND FITTINGS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
   1. PVC Pipe and Fittings.

B. Related Sections:
   1. Section 02200 – Excavation and Backfill.
   2. Section 03300 – Cast in Place Concrete.
   3. Section 03600 – Grouts.

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM):
   1. D 3034 – Specifications for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
   2. D 3212 – Specification for Joint for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals.
   3. D 3965 – Classification System and Basis for Specifications for Rigid Acrylonitrile-Butadiene-Styrene (ABS) Materials for Pipe and Fittings.
   4. F 477 - Specifications for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.

B. American Water Works Association (AWWA):
   1. C110 - Ductile Iron and Gray Iron Fittings, 3-inch through 48-inch
   2. C116 - Protective Fusion-bonded Epoxy Coatings for the Interior and Exterior Surfaces of Ductile Iron and Gray Iron Fittings

1.03 SUBMITTALS

A. Product Data:
   1. PVC Pipe.
   2. Fittings.

PART 2 PRODUCTS

2.01 MATERIALS

A. Plastic (PVC) Pipe: Schedule 40 and 80 Plastic (PVC) pipe as shown on the plans shall be solvent weld in conformance with ASTM D2855.

B. Bedding and Backfill
   1. Per specification Section 02200 and as detailed on the Plans.

PART 3 EXECUTION

3.01 PIPE STORAGE

A. Pipe may be stored on the project site at the Contractor's own risk. Precautions shall be taken to prevent damage to the stored pipe.

B. PVC shall be protected from damage due to sunlight exposure.

3.02 HANDLING

A. Care shall be taken in handling, transporting and placing pipe to prevent damage. No interior hooks or slings shall be used in lifting pipe. All handling operations shall be done with an exterior sling or with a suitable fork lift.

B. No damaged pipe will be accepted and will be replaced with new pipe to the next joint.

3.03 EXCAVATION AND BACKFILL

A. Trenching, Excavating and Backfilling shall be done in accordance with Section 02200.

3.04 CONNECTIONS

A. Thoroughly clean pipe and fittings of dirt, dust, and moisture before installation. Installation and joining methods shall be as recommended by the pipe and fitting manufacturers.

B. Cut pipe square for good joint integrity. After cutting pipe, ream inside and chamfer outside to remove burrs, shoulders, and ragged edges.

3.05 SUPPORTS AND CLAMPS

A. All pipe and fittings within the pump station structures shall be adequately supported as shown on the plans and specified herein.

3.06 CONCRETE STRUCTURE PENETRATIONS

A. Core drill through existing concrete structures as necessary to accommodate the new pipe.

B. Structure penetrations shall be sealed water tight as shown on the plans.

3.07 INSPECTION

A. All pipe and fittings shall be visually inspected by the City.

*****END OF SECTION*****

SECTION 02710

HIGH DENSITY POLYETHYLENE (HDPE) PIPE AND FITTINGS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
   1. High Density Polyethylene (HDPE) Pipe.

B. Related Sections:
   1. Section 02200 – Excavation and Backfill.
   2. Section 03300 – Cast in Place Concrete.
   3. Section 03600 – Grouts.

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM):
   1. D 2122 – Determining Dimensions of Thermal Plastic Pipe and Fittings
   2. D 2321 – Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity Flow Applications
   3. D 2837 – Hydrostatic Design Basis for Thermal Plastic Pipe Materials
   4. D 3350 – Polyethylene Plastics Pipe and Fittings Material
   5. F 714 – Polyethylene Plastic Pipe Based on Outside Diameter
   6. F 1667 – Guide for Construction Procedures for Buried Plastic Pipe

1.03 SUBMITTALS

A. Product Data:
   1. HDPE Pipe.
   2. Fittings, flange adapters, etc.

B. Submit debeading process and equipment for use in removing the internal bead for the newly joined HDPE pipe sections.

C. The Contractor shall submit a copy of the technician's certification(s) for the operation of the fusion equipment.

D. The Contractor shall perform trial fusion welds and submit samples to the City for review prior to installation of the pipe. The fusion machine used for the trial welds shall be the same machine to be utilized for the installation work.

E. Pipe Fusion Logs.

PART 2 PRODUCTS

2.01 MATERIALS

A. Materials used for the manufacture of HDPE pipe and fittings shall be extra high molecular weight, high density ethylene/hexene copolymer PE 3408 polyethylene resin meeting a minimum cell classification of 445474C or 445574C per ASTM D3350.

B. The HDPE pipe manufacturer shall provide certification that stress regression testing has been performed on the specified material. Said certification shall be done in conformance with ASTM D2837, and the manufacturer shall provide a product supplying a minimum hydrostatic design basis (HDB) of 1,600 psi.

C. HDPE materials shall be listed by the Plastics Pipe Institute in PPI TR-4 with a 73°F hydrostatic design stress rating of 800 psi, and a 140°F hydrostatic design stress rating of 400 psi. The PPI listing shall be in the name of the pipe manufacturer, based on ASTM D2837 and PPI TR-3 testing and validation of samples of the pipe manufacturer's production pipe.

D. The physical properties of the pipe and fittings material shall be as indicated in the table below:

PROPERTY	TEST METHOD	VALUE
Density	ASTM D 1505	>0.947 g/cm^3
Melt Index	ASTM D 1238	<0.15 g/10 min
Tensile Strength, Yield	ASTM D 638	>3,000 psi
Flexural Modulus	ASTM D 790	>80,000 psi

2.02 HDPE PIPE

A. Pipe supplied under this specification shall have a nominal IPS (iron pipe size) outside diameter. Pipe shall be produced to the specifications of ASTM F714.

B. The DR (dimension ratio) shall be 17.

C. Pipe shall have green stripes along the exterior of the pipe.

D. Pipe shall have a minimum 2% carbon black UV stabilizer.

E. Pipe shall be marked with nominal size, dimension ration (DR), trade name, material classification (PE4710), certification base (ASTM F714), and date produced.

2.03 HDPE FITTINGS

A. Material for HDPE fittings shall comply with ASTM A 3261 for butt heat fusion fittings. Material for standard HDPE fittings shall comply with ASTM D3350.

B. Standard HDPE fittings shall be commercial products manufactured by injection molding or by extrusion and machining, or shall be fabricated from HDPE pipe conforming to this specification.

C. Fittings shall be fully pressure rated by the manufacturer to provide a working pressure equal to that of the pipe.

D. Fittings shall be manufactured from the same resin type, grade and cell classification as the pipe itself.

E. HDPE Flange Adapters:

1. HDPE Flange Adapters shall be provided as shown on the Drawings.

2. New HDPE Flange Adapter and back up ring shall be ANSI Class 150/AWWA C207.

3. Backup rings shall be ductile iron per ASTM A536 and shall be fusion bonded epoxy coated.

4. All collar-type adapters shall be installed with butt fusion methods per manufacturer instructions. Couplings shall be factory coated to prevent corrosion.

PART 3 EXECUTION

3.01 PIPE STORAGE AND HANDLING

A. Pipe shall be stored and handled in conformance with the pipe supplier's guidelines.

B. Pipe may be stored on the project site at the Contractor's own risk. Precautions shall be taken to prevent damage to the stored pipe.

C. Care shall be taken in handling, transporting and placing pipe to prevent damage. No interior hooks or slings shall be used in lifting pipe. All handling operations shall be done with an exterior sling or with a suitable fork lift.

D. No damaged pipe will be accepted.

3.02 FUSION PROCESS

A. Fusing pipe shall only be done by qualified fusion technicians holding current qualification credentials for the pipe being fused.

B. Pipe supplier's procedures shall be followed at all times during fusion operation.

C. Each fusion join shall be recorded and logged by an approved electronic monitoring device (data logger) connected to the fusion machine, which utilizes a current version of the pipe supplier's recommended and compatible software. A copy of all fusion logs shall be submitted to the City.

D. Use only appropriately sized and outfitted fusion machines.

E. Pipe shall be joined using the butt fusion method providing a joint weld strength equal or greater than the tensile strength of the pipe.

F. All internal beads for newly joined HDPE force main pipe sections shall be removed. It is acceptable for the beads on the casing pipe to remain as long as they do not interfere with the force main or casing spacer installation.

3.03 INSTALLATION

A. Refer to the plans and Sections:

1. Section 02200 – Excavation and Backfill.

B. Butt Fusion Joints:

1. Butt heat fusion joints shall be completed by a qualified installer.
2. Joints shall meet requirements included in ASTM F2620.

3.04 TESTING

A. Testing shall be done in accordance with Section 02770.

*****END OF SECTION*****

SECTION 02722
AGGREGATE BASE

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: Aggregate base.

B. Related Sections:
   1. Section 02200 - Excavation and Backfill.
   2. Section 03300 - Cast in Place Concrete.

1.02 REFERENCES

A. American Concrete Institute (ACI):
   1. C 117 - Test Method for Material Finer than 75-µm (No. 200) Sieve in Mineral Aggregate by Washing.
   2. C 136 - Method for Sieve Analysis of Fine and Coarse Aggregates.
   3. D 4318 - Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

B. State of California Department of Transportation.
   1. CALTRANS - Standard Specifications.

1.03 SUBMITTALS

A. Product Data:
   1. Source, gradation, and testing data for aggregate base course.

B. Quality Control:
   1. Test Reports: Reports for tests required by Sections of CALTRANS Standard Specifications.

C. Certificates of Compliance: Certificates as required by Sections of CALTRANS Standard Specifications.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Storage and Protection: Protect from segregation and excessive moisture during delivery, storage, and handling.

PART 2 PRODUCTS

2.01 MATERIALS

A. Aggregate Base Course:

1. Class 2, 3/4-inch maximum aggregate size free from vegetable matter and other deleterious substances, and of such nature that aggregate can be compacted readily under watering and rolling to form a firm, stable base.
2. Materials derived from processing demolished or removed asphalt concrete are not acceptable.
3. Coarse aggregate material retained in Number 4 sieve shall consist of material of which at least 25 percent by weight shall be crushed particles when tested in accordance with California Test 205.
4. Aggregate shall not be treated with lime, cement, or other chemical material before the Durability Index test is performed.
5. Aggregate grading and sand equivalent tests shall be performed to represent not more than 500 cubic yards or one day's production of material, whichever is smaller.
6. Grade within the limits and conform to quality requirements as follows when tested in accordance with California Test 202:

Sieve Sizes (Square Openings)	Percent by Weight Passing Sieve
1 inch	100
3/4 inch	90-100
Number 4	35-55
Number 30	10-30
Number 200	2-9

Quality Requirements		
Description	California Test	Minimum Test Result
Resistance (R Value)	301	78
Sand Equivalent	217	22
Durability Index	229	35

PART 3 EXECUTION

3.01 EXAMINATION

A. Verification of Conditions: Examine conditions upon which the work specified in this Section depends for defects that may influence installation and performance.

B. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Subgrade Preparation: Prepare as specified in Section 02200, "Excavation and Backfill"

3.03 INSTALLATION

A. Furnish, spread, and compact aggregate base course material to the lines, grades, and dimensions indicated on the Drawings.
   1. Spreading: Spread in accordance with sections of CALTRANS Standard Specifications.
   2. Compacting: per Sections 02200.

3.04 FIELD QUALITY CONTROL

A. Tests: Perform field tests per Sections 02200.

*****END OF SECTION*****

SECTION 02770
SANITARY SEWER TESTING

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Testing of sanitary sewer systems.

B. Related Sections:
   1. Section 02700 – Polyvinyl Chloride (PVC) Pipe and Fittings
   2. Section 02710 – High Density Polyethylene (HDPE) Pipe and Fittings
   3. Section 03300 – Cast in Place Concrete

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM):
   1. C 969 – Standard Practice for Infiltration and Exfiltration Acceptance Testing of Installed Precast Concrete Pipe Sewer Lines
   2. C 1091-03a – Test Method for Hydrostatic Infiltration Testing of Vitrified Clay Pipe Lines
   3. F 1417 – Standard Practice for Installation Acceptance of Plastic Non-pressure Sewer Lines Using Low-Pressure Air
   4. F 2164 – Standard Practice for Field Leak Testing of Polyethylene (PE) and Crosslinked Polyethylene (PEX) Pressure Piping Systems Using Hydrostatic Pressure
   5. D 3034 – Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings
   6. F 1667 – Guide for Construction Procedures for Buried Plastic Pipe

B. Uni-Bell PVC Pipe Association
   1. B-6 – Recommended Practice for low Pressure Air Testing of Installed Sewer Pipe

PART 2 PRODUCTS

2.01 GENERAL

A. Temporary plugs, bypass pumping, low-pressure testing equipment and all other necessary materials shall be provided by the Contractor, subject to the City's approval. All testing shall be performed by the Contractor in the presence of the City's representative. No materials shall be used which would be injurious to the public, personnel, adjacent improvements or the pipeline.

2.02 PRESUUSRE GAUGES

A. Pressure gauges shall be laboratory-calibrated test gauges and shall be recalibrated by a certified laboratory prior to the leakage test. Gauge shall be easy to read in no more than

one (1) pound per square inch (psi) increments and have a maximum full-scale range of five (5) psi.

PART 3 EXECUTION

3.01 FORCE MAIN TESTING

A. Testing of new HDPE bypass pipe and fittings shall be in accordance with ASTM F2164. Contractor shall provide all equipment and personnel necessary to properly test. Testing shall be done in the presence of the City inspector.

B. Testing shall be done after the pipe has been fused, installed, and backfilled. Ensure thrust restraints have been installed and allow sufficient time for any required concrete thrust blocks to achieve required sufficient strength. Ensure fused joints have sufficiently cooled.

C. Testing shall not be done only when the temperature of pipe is 80 degree Fahrenheit or less.

D. Testing against closed valves is not recommended. Contractor shall blind flange before the closed valve.

E. Testing Procedure:

1. Fill the pipeline with water at a maximum velocity of 10-feet per minute and bleed off any trapped air.

2. Gradually increase the pressure so the lowest element in the system achieves a test pressure that is 1.5 times the pipe design pressure or 150 psi, whichever is less. Monitor pipe for any leaks.

3. Provide additional water to maintain sufficient test pressure. After the pipe has been pressurized at test pressure for 4 hours, testing can begin.

4. To test, reduce test pressure by 10 psi and stop adding test liquid. Monitor the pressure for 1 hour. Test pressure shall remain within 5% of the target value, and no visual leakage shall occur. If pipe does not pass these requirements, contractor shall repair leaks and retest the pipe.

F. Under no circumstance shall the pipe be pressurized over the design pressure for more than 8 hours. If the test is not complete within this time limit, the pipeline shall be depressurized at or below the design pressure and allowed to “relax” for at least 8 hours before testing.

G. Air shall not be used to test HDPE pressure pipe.

*****END OF SECTION*****

SECTION 03000
CONCRETE WORK - GENERAL

PART 1 GENERAL

1.01 APPLICABLE SECTION

A. Submit Shop Drawings, Product Data, Mill Certificates, and Samples required by other portions of Contract Documents. The requirements/provisions of the General and Supplementary Conditions shall apply to this section.

1.02 DESCRIPTION OF WORK

A. The work included under this section consists of furnishing all material, supplies, equipment, tools, transportation, and facilities, and performing all labor and services necessary for, required in connection with or properly incidental to furnishing, and installing concrete work as described in this section of the specifications, shown on the accompanying drawings, or reasonably implied therefrom, except as hereinafter specifically excluded.

B. Work Included:
1. All formwork, including any special forms necessary to produce architectural details and/or to accommodate the work of others and removal of forms.
2. All concrete reinforcement, placement, bending and forming thereof.
3. All concrete and cement finishing; all surface treatment and curing, including non-slip finishes and color work.
4. Installation of all reglets, bolts, anchors, cans, sleeves, column anchor bolts, etc., whether furnished under this section or by others (except cans and sleeves required under the Electrical and Mechanical Divisions).
5. The furnishing of all items required to be or shown on the drawings as embedded in concrete, which are not specifically required under other sections.
6. Setting headers and screeds. Curing and protecting concrete.
7. Inserts, sleeves, cans, etc. required under the Electrical and Mechanical Divisions.

PART 2 PRODUCTS

2.01 PRODUCTS

A. See specification Sections 03100, 03200, 03300, and 03600.

PART 3 EXECUTION

3.01 DEFECTIVE WORK

A. General: Work considered to be defective may be ordered by the Engineer to be replaced in which case the Contractor shall remove the defective work at his expense. Work considered to be defective shall include, but not be limited to, the following:
1. Reinforcing:

a. Kinks and bends therein which are not scheduled or indicated on the drawings; reinforcing improperly placed, or previously heated, or excessively cold worked reinforcing.

2. Concrete:
   a. Concrete in which defective or inadequate reinforcing steel has been placed.
   b. Concrete incorrectly formed or not conforming to details and dimensions on the drawings or with the intent of these documents, or concrete the surfaces of which are out of plumb or level.
   c. Concrete below specified strength.
   d. Concrete not meeting the maximum allowable drying shrinkage requirements.
   e. Concrete containing wood, cloth, or other foreign matter, rock pockets, voids, honeycombs, cracks or cold joints not scheduled or indicated on the drawings.

3.02 CORRECTION OF DEFECTIVE WORK

A. The Contractor shall, at his expense, make all such corrections and alleviation measures as directed by the Engineer.

B. Concrete work containing rock pockets, voids, honeycombs, cracks or cold joints not scheduled or indicated on the drawings, shall be chipped out until all unconsolidated material is removed.

C. Secure approval of chipped-out areas before patching. Patch per ACI 301-89.

END OF SECTION

SECTION 03100
CONCRETE FORMING AND ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Formwork for concrete, with shoring, bracing and anchorage.

1.02 RELATED REQUIREMENTS

A. Section 03200 - Concrete Reinforcing

B. Section 03300 - Cast-in-Place Concrete

1.03 REFERENCE STANDARDS (Editions adopted by current governing California Building Code)

A. ACI 117 - Standard Specifications for Tolerances for Concrete Construction and Materials.

B. ACI 301 - Specifications for Structural Concrete for Buildings; American Concrete Institute.

C. ACI 318 - Building Code Requirements for Structural Concrete and Commentary; American Concrete Institute.

D. ACI 347 - Guide to Formwork for Concrete; American Concrete Institute.

E. ASTM C31 - Standard Practice for Making and Curing Concrete Test Specimens in the Field.

F. ASTM C39 - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.

G. ASTM D994 - Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type).

H. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).

1.04 SUBMITTALS

A. See Section 01300 – Contractor Submittals, for submittal procedures.

B. Product Data: Provide data on formwork release agent or form liner proposed for use with each formed surface.

C. Formwork Facing Materials: Data on form-facing materials proposed for smooth-form finish if different from that specified in Part 2.02.

D. Construction and Contraction Joints: Location of construction and contraction joints proposed if different from those indicated in the Contract Documents.

E. Shop Drawings
   1. All of the following shop drawings and calculations shall be prepared, stamped, and signed by a registered Civil or Structural Engineer of the State of California.
   2. Formwork
      a. Submit shop drawings for fabrication and erection of forms for portions of the concrete surfaces, as indicated below:
         1) For formwork over 12’ in height.
         2) Show general construction of forms including size of members, bracing, jointing,

special form joint or reveals, location and pattern of form tie placement, and other items that affect the structural integrity of formwork or exposed concrete visually.

3. Falsework and Shoring Shop Drawings: The Contractor shall submit shop drawings and calculations of any required falsework, shoring. Shop drawings and calculations shall be prepared in accordance with the requirements of the ACI 318 and State of California Department of Transportation Standard Specifications, Section 48-2 - Falsework.
4. Reshoring and Backshoring Plans: When reshoring or backshoring is required or permitted, submit procedures and plans of operations, before use. Indicate on shop drawings the magnitude of construction loads permitted during reshoring or back-shoring.

F. Testing for Formwork Removal: Data on method for determining strength of concrete for removal of formwork when a method other than field-cured cylinders (ASTM C31 and ASTM C39) is proposed.

G. Formwork Removal Plans: Detail plans for formwork removal operations when removal of forms at concrete strengths lower than that specified in Part 3.08 is proposed.

1.05 QUALITY ASSURANCE

A. Codes and Standards: Comply with the provisions of the following codes, specifications, and standards, except where more stringent requirements are shown or specified.
1. California Building Code, current governing edition
2. ACI 318
3. ACI 347

PART 2 PRODUCTS

2.01 FORMWORK - GENERAL

A. Maximum deflection of facing materials reflected on concrete surfaces exposed to public view shall be 1/240 of the span between structural members of the formwork.

B. Formed Construction and Contraction Joints
1. Locate and form construction joints that least impair strength of the structure and meet the requirements of Section 033000 - Cast-in-Place Concrete Part 3.05.
2. Unless otherwise specified or permitted, locate and detail formed construction joints to the following requirements:
   a. Locate construction joints within the middle third of the spans of slabs, beams, and girders. When a beam intersects a girder within this region, offset the joint in the girder a distance equal to or greater than twice the width of the beam;
   b. Locate joints in walls and columns at the underside of slabs, beams, or girders and at the tops of footings or slabs; and
   c. Make joints perpendicular to the main reinforcement.
3. Provide keyways where indicated on Contract Documents. Unless otherwise specified, longitudinal keyways indicated on the Contract Documents, shall be a minimum of 1-1/2 in. deep in joints in walls and between walls and slabs or footings.
4. Provide construction and contraction joints where indicated on the Contract Documents. Submit for acceptance the location of construction and contraction joints differing from those indicated on the Contract Documents.

2.02 FORM MATERIALS

A. Form-facing materials: Materials for form faces in contact with concrete shall meet the requirements of "Concrete Finishing" Section 033000 - Cast-in-Place Concrete and the following requirements unless otherwise specified in Contract Documents.

1. For smooth-form finish, use plywood, tempered concrete-form-grade hardboard, metal, plastic, paper, or other acceptable materials capable of producing the desired finish for form-facing materials. Form-facing materials shall produce a smooth, uniform texture on the concrete. Do not use form-facing materials with raised grain, torn surfaces, worn edges, dents, or other defects that will impair the texture of concrete surfaces. Facing materials shall be supported with studs or other backing capable of maintaining deflections within the tolerances specified in Part 2.01.

2.03 FORMWORK ACCESSORIES

A. Use commercially manufactured accessories for formwork accessories that are partially or wholly embedded in concrete, including ties and hangers. Do not use nonfabricated wire form ties. Where indicated in the Contract Documents, use form ties with integral water barrier plates in walls or other acceptable positive water barriers.

2.04 FORMWORK RELEASE AGENT

A. Use commercially manufactured formwork release agents that prevent formwork absorption of moisture, prevent bond with concrete, and do not stain the concrete surfaces.

2.05 EXPANSION JOINT FILLER

A. Premolded expansion joint filler shall conform to ASTM D994 or ASTM D1751.

2.06 FABRICATION AND MANUFACTURE

A. Formwork shall be tight to prevent loss of mortar from concrete.

B. Place 3/4 inch chamfer strips in the corners of formwork to produce beveled edges on permanently exposed surfaces unless otherwise specified. Do not bevel reentrant corners or edges of formed joints of concrete unless specified in the Contract Documents.

C. Inspect formwork and remove deleterious material immediately before concrete is placed. Provide temporary openings where needed at the base of column and wall formwork to facilitate cleaning and inspection.

D. Fabricate form ties so ends or end fasteners can be removed with minimum spalling at the faces of concrete.

E. Locate waterstops in joints where indicated on Contract Documents. Use pieces of premolded waterstop with a maximum practicable length to create the minimum number of end joints. Make joints in waterstops in accordance with the manufacturer's recommendations. Ensure that joints develop effective watertightness equal to the continuous waterstop material, permanently develop not less than 50% of the strength of the parent section and permanently retain flexibility.

2.07 EPOXY ANCHORING SYSTEMS

A. Refer to Section 05501.

PART 3 EXECUTION

3.01 EARTH FORMS

A. Where sides of excavations have been cut neat and accurate to size for pouring of concrete directly against the excavation, forms for footings will not be required. Remove loose soil prior to placing concrete.

3.02 CONSTRUCTION AND ERECTION OF FORMWORK

A. At construction joints, lap contact surface of the form sheathing for flush surfaces exposed to view over the hardened concrete in the previous placement. Ensure formwork is sealed against hardened concrete to prevent offsets or loss of mortar at construction joints and to maintain a true surface.

B. Provide positive means of adjustment (such as wedges or jacks) of shores and struts. Do not make adjustments in the formwork after concrete has reached its time of initial setting. Brace formwork securely against lateral deflection and lateral instability.

C. Fasten form wedges in place after final adjustment of forms and before concrete placement.

D. Anchor formwork to shores, supporting surfaces, or members to prevent upward or lateral movement of the formwork system during concrete placement. Form supports shall be placed on adequate foundations and have sufficient strength and bracing to prevent settlement or distortion from the weight of the concrete or other cause. Support shall rest on double wedged shim, or other approved means, so that the forms will be maintained at the proper grade.

E. Construct formwork for wall openings to facilitate removal and to counteract swelling of wood formwork.

F. Provide runways for moving equipment and support runways directly on the formwork or structural member without resting on the reinforcing steel.

G. All formed joints on concrete surfaces to be exposed shall be taped and shall align so joints will not be apparent on the concrete surfaces.

H. Any movement or bellying of forms during construction shall be considered just cause for their removal and, in addition, the concrete work so affected.

I. Bolts, rods, or other approved devices shall be used for internal form ties and shall be of sufficient quantities to prevent spreading of the forms. The ties shall be placed at least 1 inch away from the finished surface of the concrete. Bolts and rods that are to be completely withdrawn shall be coated with grease.

J. Boards or other form materials that have been damaged or checked or warped prior to placing of concrete shall be removed from the forms and replaced with approved materials or otherwise corrected to the satisfaction of the engineer.

K. Assign a sufficient number of men to keep watch on and maintain the forms during placing of concrete. Satisfactorily remedy any displacement or looseness of forms or reinforcement before placing of concrete. No form shall be moved or altered except as may be specifically directed.

L. Wall forms shall be set to account for movement of post-tensioned slabs that will occur due to long term shortening of slabs. The Engineer will establish the offsets at each level after the Contractor has submitted a detailed pour schedule.

3.03 APPLICATION - FORM RELEASE AGENT

A. Cover surfaces of formwork with an acceptable material that will prevent bond with the concrete. A field-applied formwork release agent or a factory-applied liner may be used. If a formwork release agent is used, apply to the surfaces of the formwork in accordance with the manufacturer's recommendations before placing reinforcing steel. Do not allow formwork release agent to puddle in the forms. Do not allow formwork release agent to contact reinforcing steel or hardened concrete against which fresh concrete is to be placed.

3.04 INSERTS, EMBEDDED PARTS, AND OPENINGS

A. Position and support expansion joint materials, waterstops, and other embedded items to prevent displacement. Fill voids in sleeves, inserts, and anchor slots temporarily with readily removable material to prevent entry of concrete into voids.

B. Place sleeves, inserts, anchors, and embedded items required for adjoining work or for support of adjoining work before concrete placement. Holes, notches, conduits, pipes, etc. are not allowed in concrete slabs, walls, members, etc. unless shown on the structural drawings or requested and specifically accepted by the Engineer.

3.05 FORM CLEANING

A. Clean surfaces of formwork and embedded materials of mortar, grout, and foreign materials before concrete is placed.

3.06 FORMWORK TOLERANCES

A. Unless otherwise specified in the Contract Documents, construct formwork so concrete surfaces conform to the tolerance limits of ACI 117. The class of surface shall conform to Part 2.02.

B. To maintain specified tolerances, camber formwork to compensate for anticipated deflections in formwork during concrete placement. Set formwork and intermediate screed strips for slabs accurately to produce designated elevations and contours of the finished surface before removal of formwork. Ensure that edge forms and screed strips are strong enough to support vibrating screeds or roller pipe screeds when the finish specified requires the use of such equipment.

C. When formwork is cambered, set screeds to the same camber to maintain specified concrete thickness.

3.07 FIELD QUALITY CONTROL

A. The Contractor shall hire the Engineer responsible for the design of formwork over 12' in height, falsework or shoring to inspect the work as detailed on the reviewed shop drawings.

B. The Contractor shall verify accuracy of items, furnished under other sections of these specifications and installed under this section.

3.08 FORM REMOVAL

A. Remove top forms on sloping surfaces of concrete as soon as removal will not allow concrete to sag. Perform needed repairs or treatment required at once and follow immediately with specified curing.

B. Do not damage concrete during removal of formwork for columns, walls, slabs, sides of beams, and other parts not supporting the weight of the concrete. Perform needed repair and treatment required on vertical surfaces at once and follow immediately with specified curing.

C. Leave formwork and shoring in place to support the weight of concrete in beams and joists for at least 14 days and in slabs for at least 10 days after the last concrete and until concrete has attained 3000 psi minimum per Part 3.08E and the Engineer responsible for design of shoring and falsework has approved removal.

D. Vertical forms shall remain on columns, walls, pilasters for at least seven 7 days after the last concrete and until concrete has attained 3000 psi minimum per Part 3.08E and the Engineer responsible for design of the formwork has approved removal.

E. Contractor shall request to have field cured compression test specimen taken where it is planned to remove formwork and shoring sooner than indicated above and submit detailed plans for

review and acceptance. Mold cylinders in accordance with ASTM C31, and cure them under the same conditions for moisture and temperature as used for the concrete they represent. Test cylinders in accordance with ASTM C39.

F. In removing plywood forms, no metal pinch bars shall be used and special care to be taken in stripping. Start at top edge or vertical corner where it is possible to insert wooden wedges. Wedging shall be done gradually and shall be accompanied by light tapping of the plywood panels to crack them loose. Do not remove forms with a single jerk after it has been started at one end.

G. Nothing herein shall be construed as relieving the contractor of any responsibility of the safety of the structure.

END OF SECTION

SECTION 03200
CONCRETE REINFORCING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Reinforcing steel for concrete, shotcrete and masonry.

B. Supports and accessories for steel reinforcement.

1.02 RELATED REQUIREMENTS

A. Section 03100 - Concrete Forming and Accessories.

B. Section 03300 - Cast-in-Place Concrete.

1.03 REFERENCE STANDARDS (Editions adopted by current governing California Building Code)

A. ACI 117 - Standard Specifications for Tolerances for Concrete Construction and Materials; American Concrete Institute International.

B. ACI 301 - Specifications for Structural Concrete for Buildings; American Concrete Institute International.

C. ACI 318 - Building Code Requirements for Structural Concrete and Commentary; American Concrete Institute International.

D. ACI SP-66 - ACI Detailing Manual; American Concrete Institute International.

E. ASTM A1064 - Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.

F. ASTM A123 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

G. ASTM A185 - Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.

H. ASTM A615 - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.

I. ASTM A 641 - Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.

J. ASTM A706 - Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement.

K. ASTM A767 - Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement.

L. ASTM A780 - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.

M. ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection and/or Testing.

N. AWS D1.4 - Structural Welding Code - Reinforcing Steel; American Welding Society.

O. CRSI (DA4) - Manual of Standard Practice; Concrete Reinforcing Steel Institute.

1.04 SUBMITTALS

A. See Section 01300 – Contractor Submittals, for submittal procedures.

B. Shop Drawings (Placing drawings)
   1. Comply with requirements of ACI SP-66. Shop drawings shall also show details for congested areas and connections. Shop drawings used in field must be reviewed copies.

C. Product Data
   1. Manufacturer's catalog sheets including instructions for use and description of application and ICC/IAPMO evaluation report shall be provided on each of the following items intended for use on project:
      a. Mechanical anchorage devices for splices.

D. Mill Certificates
   1. The Contractor shall provide Mill Certificates for each size of bar for each heat to be used on project and certify that reinforcing steel supplied for this project meet or exceed specified requirements.
   2. Mill Certificates shall include name of mill, date of rolling, date of shipping to fabricator and shall be signed by fabricator certifying that each material complies with or exceeds the specified requirements. A Mill Certificate shall be furnished with each lot of material delivered to the project and the lot shall be clearly identified in the Certificate.
   3. When Mill Certificates cannot be provided, the Contractor shall hire a professional testing laboratory to verify compliance and provide laboratory test reports. The Contractor shall pay for the cost of testing.

E. Laboratory Test Reports
   1. Laboratory test reports shall be signed by a principal of the testing agency who is a registered Civil Engineer in the State of California.
   2. When required by other portions of these specifications, laboratory test reports shall be submitted for each size of bar tested for each heat to show compliance with appropriate ASTM Standards and these specifications.

F. Welder's Certificates and WPS: Submit description of reinforcement weld locations, welding procedures, and welder certification when welding is permitted.

1.05 QUALITY ASSURANCE

A. Perform work of this section in accordance with the current governing edition of CBC, ACI 301, ACI SP-66, ACI 318, and AWS D1.4 except as modified by the contract documents.

B. Sampling and Testing:
   1. General
      a. If the Owner's agent, through oversight or otherwise, has accepted material or work which is defective or contrary to specifications, this material or work, regardless of state of completion, may be rejected.
      b. Testing agencies shall meet the requirements of ASTM E329. Testing agencies shall be accepted by the Engineer before performing any work.
   2. Testing responsibilities of Contractor:
      a. Submit data on qualifications of proposed testing agency for acceptance. Use of testing services will not relieve the Contractor of the responsibility to furnish materials and construction in compliance with the Contract Documents.
      b. Cooperate with and notify owner's agent at least 24 hours in advance of inspections required and shall provide samples, test pieces, and facilities for inspection at no cost to

the owner.

c. Identify each lot of fabricated reinforcing steel to be shipped to the site by assigning an individual lot number that identifies steel by heat number and shall be tagged in such a manner that each such lot can be accurately identified at the job site.

d. Remove all unidentified reinforcing steel, anchorage assemblies and bar couplers received at the site.

1.06 STORAGE OF MATERIALS

A. Store reinforcement during fabrication and at site to avoid excessive rusting or coating with grease, oil, soil, or other objectionable materials. Bundles shall not be dropped or dragged. Reinforcing steel shall be transported and stored in a manner that will not damage any applied coating.

1.07 SEQUENCING AND SCHEDULING

A. Coordinate work with all trades so as not to interfere with the work of other trades. Bring interferences between trades to Engineer's attention and resolve before any concrete is placed.

PART 2 PRODUCTS

2.01 REINFORCING BARS

A. Reinforcing Steel:

1. Bars for reinforcement shall conform to the requirements of ASTM A706 ASTM A615, Grade 60 bars may be substituted to meet a through e above if the actual yield strength based on mill tests does not exceed the specified yield strength by more than 18,000 psi, the ratio of the actual ultimate tensile stress to the actual tensile yield strength is not less than 1.25, and the minimum elongation in 8 inches shall be at least 14% for #3 through #6, 12% for #7 through #11 and 10% for #14 and #18. This substitution must be verified by the special inspector prior to bundle tag removal.
2. Bars for reinforcement not noted above shall be deformed grade steel conforming to the requirements of ASTM A706 or A615, Grade 60.
3. Uncoated steel unless noted otherwise.
4. Galvanized in accordance with ASTM A767, Class II where required by Contract Documents chromate wash treated after fabrication and bending. Repair coating damage in accordance with ASTM A780.

2.02 WIRE

A. All wire for concrete reinforcement shall conform to ASTM A1064.

2.03 WELDED WIRE REINFORCEMENT

A. All wire fabric mesh shall conform to ASTM A185, plain welded wire mesh in flat sheets (not rolls), with welded intersections spaced not farther apart than 12 in. in the direction of principal reinforcement.

B. Use wire-reinforcement supports complying with Class 1, maximum protection, or Class 2, moderate protection, as indicated in Chapter 3 of the CRSI Manual of Standard Practice.

C. Use galvanized wire-reinforcement support or wire reinforcement support coated with plastic.

2.04 WELDING ELECTRODES

A. Welding electrodes shall be per Table 5-1 of AWS D1.4.

2.05 MECHANICAL COUPLING DEVICES

A. Mechanical coupling devices shall develop 125 percent of the minimum yield strength of the bars spliced.

2.06 REINFORCEMENT ACCESSORIES

A. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for adequate support of reinforcement during concrete placement. Reinforcement supports shall conform to the requirements of ACI 301.

2.07 OTHER MATERIALS

A. All other materials, not specifically described by these specifications but required for complete and proper placement of reinforcement shall be new, first quality of their respective kinds, and subject to the approval of the Engineer.

2.08 FABRICATION

A. Welding of reinforcement is permitted only with the specific approval of Engineer. Perform welding in accordance with AWS D1.4. Do not weld crossing bars (tack welds) for assembly of reinforcement, supports, or embedded items.

PART 3 EXECUTION

3.01 EXISTING CONDITIONS

A. Prior to all work of the section, carefully inspect the installed work of other trades and verify that all work is sufficiently complete to permit the start of work under this section and that the completed work of this section will be in complete accordance with the original design and the reviewed shop drawings. In the event of discrepancy, immediately notify the Engineer in writing.

B. In the event conduits, pipes, inserts, sleeves, or any other items interfere with placing the reinforcement as indicated on the drawings or approved shop drawings, or as otherwise required, immediately notify the

Engineer and obtain approval on procedure before placement of reinforcement is started.

3.02 BENDING

A. Bends for reinforcing steel shall be made in accordance with ACI 301 and ACI 318. Bend bar sizes No. 3 through 5 cold only one time, provided reinforcing bar temperature is above 32 degree F. Do not field bend reinforcing steel in a manner that will injure material, cause the bars to be bent on too tight a radius, or that is not indicated as allowed on drawings or permitted by Engineer. Do not straighten bent or kinked bars for use on project without permission of Engineer. Replace bars with kinks or bends not shown on the drawings.

3.03 PLACING

A. All reinforcement shall be placed in strict conformance with the requirements of the Contract Drawings, both as to location, position and spacing of members. It shall be supported and secured against displacement by the use of adequate and proper wire supporting and spacing devices, tie wires, etc. so that it will remain in its proper position in the finished structure. Reinforcement may not be wet set in concrete pours.

B. Tolerances: Do not exceed the placing tolerances specified in ACI 318 and ACI 117, whichever is more stringent, before concrete is placed. Placing tolerances shall not reduce cover requirements

except as specified in ACI 117.

C. Minimum concrete cover for reinforcement and couplers shall be as indicated in the Contract Drawings. Concrete cover is measured from the theoretical excavation line, not the line of any over excavation. Where less than 3 inches cover is noted and concrete will be placed against soil, increase the section thickness to attain 3 inches cover.

D. Preserve clear space between parallel bars of not less than 1-1/2 times the nominal diameter of round bars and in no case let the clear distance be less than 1-1/2 inches nor less than 1-1/3 times the maximum size of aggregate for concrete. Bars placed in shotcrete shall have a minimum clearance between bars of 2-1/2 inches for No. 5 and smaller and 6 bar diameters for bars larger than No. 5. When two curtains of steel are provided in shotcrete wall, the curtain nearer the nozzle shall have a minimum spacing equal to 12 bar diameters and the remaining curtain shall have a minimum spacing of six bar diameters.

E. For slabs on ground, extend welded wire reinforcement to within 2 in. of the concrete edge. Reinforcement shall be lapped and tied around the perimeter of each sheet in order to maintain the proper positioning of the reinforcement. Lap splices shall have a minimum of two ties per spliced length. Do not place welded wire reinforcement on grade and subsequently raise into position in concrete.

F. Furnish and use templates for placement of column dowels unless otherwise permitted by engineer.

G. Lap splices shall be contact lap splices in accordance with ACI 318 unless noted otherwise on the Contract Drawings. Bars shall be wired together at laps. Wherever possible, stagger splices in adjacent bars. Splice bars in members such as spandrels, beams, etc, as follows: Top bars at centerline of span, bottom bars at the support. Make all splices in welded wire reinforcement at least 1-1/2 meshes wide or 12 inches, whichever is greater. When splicing in areas to receive shotcrete, lap splices shall be non-contact with at least 2 inches clearance between bars.

H. Butt splices shall be accomplished by mechanical anchorage devices. Stagger these devices 2 feet, unless noted otherwise on the Contract Documents.

I. Bars shall not be cut by gas torch.

3.04 CLEANING REINFORCEMENT

A. Take all means necessary to ensure that steel reinforcement, at the time concrete is placed around it, is completely free from rust, soil, loose mill scale, oil, paint and all coatings which will destroy or reduce the bond between steel and concrete.

END OF SECTION

SECTION 03300

CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: Cast-in-place concrete.

B. Related Sections:
1. Section 03100 - Concrete Forming and Accessories
2. Section 03200 - Concrete Reinforcing
3. Section 03600 - Grouts

1.02 REFERENCES

A. American Concrete Institute (ACI):

1. 211.2 - Standard Practice for Selecting Proportions for Structural Lightweight Concrete.
2. 301 - Specifications for Structural Concrete for Buildings.
3. 305R - Guide to Hot Weather Concreting.
4. 306R - Guide to Cold Weather Concreting.
5. 318 - Building Code Requirements for Structural Concrete.
6. Manual of Concrete Practice.
7. Recommended Practices.

B. American Society for Testing and Materials (ASTM):

1. C 31 - Practice for Making and Curing Concrete Test Specimens in the Field.
2. C 33 - Specification for Concrete Aggregates.
3. C 39 - Test Method for Compressive Strength of Cylindrical Concrete Specimens.
4. C 40 - Test Method for Organic Impurities in Fine Aggregates for Concrete.
5. C 42 - Method of Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
6. C 88 - Test Method of Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate.
7. C 94 - Specification for Ready-Mixed Concrete.
8. C 114 - Test Methods for Chemical Analysis of Hydraulic Cement.
9. C 131 - Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
10. C 136 - Test Method for Sieve Analysis of Fine and Coarse Aggregates.
11. C 143 - Test Method for Slump of Hydraulic Cement Concrete.

12. C 150 - Specification for Portland Cement.
13. C 157 - Test Method for Length Change of Hardened Hydraulic-Cement Mortar and Concrete.
14. C 171 – Sheet Materials for Curing Concrete
15. C 172 - Practice for Sampling Freshly Mixed Concrete.
16. C 173 - Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
17. C 203 - Test Methods for Breaking Load and Flexural Properties of Block-Type Thermal Insulation.
18. C 227 - Test Method for Potential Alkali Reactivity of Cement-Aggregate Combinations (Mortar-Bar Method).
19. C 260 - Specification for Air-Entraining Admixtures for Concrete.
20. C 289 - Test Method for Potential Alkali-Silica Reactivity of Aggregates (Chemical Method).
21. C 309 - Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
22. C 311 - Test Methods for Sampling and Testing Fly Ash or Natural Pozzolans for Use as a Mineral Admixture in Portland-Cement Concrete.
23. C 330 - Specification for Lightweight Aggregates for Structural Concrete.
24. C 469 - Test Method for Static Modulus of Elasticity and Poisson's Ratio of Concrete in Compression.
25. C 494 - Specification for Chemical Admixtures for Concrete.
26. C 567 - Test Method for Density of Structural Lightweight Concrete.
27. C 595 - Specification for Blended Hydraulic Cements.
28. C 618 - Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland-Cement Concrete.
29. D 75 - Practices for Sampling Aggregates.
30. D 1751 - Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)

C. California Department of Transportation (Caltrans)

1.03 DEFINITIONS

A. Alkali: Is defined to mean sum of sodium oxide and potassium oxide calculated as sodium oxide.

B. Hairline Crack: Crack with a crack width of less than 4 thousandths of an inch.

1.04 SYSTEM DESCRIPTION

A. Performance Requirements:

1. General:

a. Except as otherwise specified, provide concrete composed of portland cement, fine aggregate, coarse aggregate, and water so proportioned and mixed as to produce plastic, workable mixture in accordance with requirements as specified in this Section and suitable to specific conditions of placement.

b. Proportion materials in manner such as to secure lowest water-cement ratio which is consistent with good workability, plastic, cohesive mixture, and one which is within specified slump range.

c. Proportion fine and coarse aggregate in manner such as not to produce harshness in placing nor honeycombing in structures.

2. Watertightness of Concrete Work: It is intent of this Section to secure for every part of the Work concrete and grout of homogeneous structure, which when hardened will have required strength, watertightness, and durability.

a. It is recognized that some surface hairline cracks and crazing will develop in the concrete surfaces.

b. Construction, contraction, and expansion joints have been positioned in structures as indicated on the Plans, and curing methods specified, for purpose of reducing number and size of these expected cracks, due to normal expansion and contraction expected from specified concrete mixes.

c. Class A and Class B Concrete: Watertight: Repair cracks which develop in walls or slabs and repair cracks which show any signs of leakage until all leakage is stopped.

d. Walls or foundation slabs that leak or sweat because of porosity or cracks too small for successful pressure grouting: Seal on water side by coatings of surface sealant system, as specified in this Section.

e. Grouting and Sealing: Continue as specified above until structure is watertight and remains watertight for not less than one year after final acceptance or date of final repair, whichever occurs later in time.

3. Workmanship and Methods: Provide concrete work, including detailing of reinforcing, conforming with best standard practices and as set forth in ACI 318, Manuals, and Recommended Practices.

1.05 SUBMITTALS

A. Mix designs for each proposed use:

1. Sieve analysis and source of fine and coarse aggregates.

2. Results of test for aggregate organic impurities.

3. Results of test for deleterious aggregate per ASTM C289.

4. Proportioning of materials.

5. Type of cement.

6. Type of fly ash.

7. Slump.

8. Air content.

9. Brand, type, ASTM designation, and quantity of each admixture proposed for use.

10. Standard deviation value of concrete production facility.

B. Test Reports:

1. 28-Day cylinder compressive test results of trial mixes per ACI 318 and as indicated herein.

2. Shrinkage test results.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Packing and Shipping:

1. Deliver, store, and handle concrete materials in manner as to prevent damage and inclusion of foreign substances.

2. Deliver and store packaged materials in original containers until ready for use.

3. Deliver aggregate to mixing site and handle in such manner that variations in moisture content will not interfere with steady production of concrete of specified degree of uniformity and slump.

B. Acceptance at Site: Reject material containers or materials showing evidence of water or other damage.

1.07 QUALITY ASSURANCE

A. Perform work in accordance with ACI 301.

B. Conform to ACI 305R when placing concrete in hot weather.

C. Conform to ACI 306R when placing concrete in cold weather.

D. City will hire a third party inspector to perform evaluation of materials in the field.

1.08 SEQUENCING AND SCHEDULING

A. Schedule placing of concrete in such manner as to complete any single placing operation to construction, contraction, or expansion joint.

PART 2 PRODUCTS

2.01 MATERIALS

A. Aggregate:

1. General:

a. Provide concrete aggregates that are sound, uniformly graded, and free of deleterious material in excess of allowable amounts specified.

b. Grade aggregate in accordance with ASTM D75 and C136.

c. Provide unit weight of fine and coarse aggregate which produces in place concrete with a calculated equilibrium density of not more than 145 pounds per cubic foot.

B. Fine Aggregate:

1. Provide fine aggregate for concrete or mortar consisting of clean, natural sand or of sand prepared from crushed stone or crushed gravel.

2. Do not provide aggregate having deleterious substances in excess of following percentages by weight of contaminating substances. In no case shall total exceed percent listed.

Item	Test Method	Percent
Removed by decantation (dirt, silt, etc.)	ASTM C117	3
Shale or Chert	ASTM C295	1
Clay Lumps	ASTM C142	1

3. Except as otherwise specified, grade fine aggregate from coarse to fine in accordance with requirements of ASTM C33.

C. Coarse Aggregate:

1. General: Provide coarse aggregate consisting of gravel or crushed stone made up of clean, hard, durable particles free from calcareous coatings, organic matter, or other foreign substances.

2. Weight: Not exceeding 15 percent, for thin or elongated pieces having length greater than 5 times average thickness.

3. Deleterious Substances: Not in excess of following percentages by weight, and in no case having total of all deleterious substances exceeding 2 percent.

Item	Test Method	Percent
Shale or chert	ASTM C295	1
Coal and lignite	ASTM C123	1/4
Clay lumps and friable particles	ASTM C142	1/4
Materials finer than Number 200 sieve	ASTM C117	1/2*
* Except when material finer than Number 200 sieve consists of crusher dust, maximum amount shall be 1 percent.		

4. Grading:

a. Aggregate: As specified in ASTM C33, Size Number 57, except as otherwise specified or authorized in writing by the Engineer.

D. Portland Cement:

1. General: Conform to specifications and tests for ASTM C150, Types II or III, Low Alkali, except as specified otherwise.

2. Low Alkali Portland: Have total alkali containing not more than 0.60 percent.

3. Exposed Concrete in Any Individual Structure: Use only one brand of Portland cement.

4. Cement for Finishes: Provide cement from same source and of same type as concrete to be finished.

E. Admixtures:

1. General:

a. Do not use admixtures of any type, except as specified, unless written authorization has been obtained from the Engineer.

b. Compatible with concrete and other admixtures.

c. Do not use admixtures containing chlorides calculated as chloride ion in excess of 0.5 percent by weight.

d. Use in accordance with manufacturer's recommendations and add each admixture to concrete mix separately.

2. Air Entraining Admixture:

a. Provide all concrete with 5 percent, plus or minus 1 percent, entrained air of evenly dispersed air bubbles at time of placement.

b. Conform to ASTM C260.

3. Pozzolan Admixture:

a. Fly Ash Pozzolan:

1) Conforming to requirements of ASTM C618, Class F, may be used as admixture in concrete made with Type II Portland cement.

2) Pozzolan may replace Portland cement at ratio of 1.0 pound fly ash for each pound of Portland cement replaced.

3) Maximum of 15 percent by weight of minimum quantities of Portland cement listed in Table A under paragraph 2.03E may be replaced with fly ash pozzolan.

4) Do not use pozzolan as an admixture in concrete made with portland-pozzolan cement.

5) Loss on Ignition for Pozzolan: Not exceed four percent.

b. Ground granulated blast-furnace slag, grades 100 or 120, complying with ASTM C989 may substitute for Portland cement up to a maximum of 25% of the total cementitious material by weight.

c. Substitutions that combine fly ash and ground granulated blast-furnace slag are limited to a combined total of 30% of the total cementitious material by weight with fly ash no more than 15% of the total.

4. Water Reducing Admixture:

a. May be used at the Contractor's option.

b. Conform to ASTM C494, Type A or Type D.

c. May not contain air entraining agents.

d. Must be liquid form before adding to the concrete mix.

e. No decrease in cement is permitted as result of use of water reducing admixture.

5. Superplasticizers: Are not to be used without acceptance by Engineer.

F. Water:

1. Water for Concrete, Washing Aggregate, and Curing Concrete: Clean and free from oil and deleterious amounts of alkali, acid, organic matter, or other substances.

2. Chlorides and Sulfate Ions:

a. Water for Conventional Reinforced Concrete: Use water not containing more than 1,000 milligrams per liter of chlorides calculated as chloride ion, nor more than 1,000 milligrams per liter of sulfates calculated as sulfate ion.

2.02 EQUIPMENT

A. Mixing Concrete:

1. Mixers may be of stationary plant, paver, or truck mixer type.

2. Provide adequate equipment and facilities for accurate measurement and control of materials and for readily changing proportions of material.

3. Mixing Equipment:

a. Capable of combining aggregates, cement, and water within specified time into thoroughly mixed and uniform mass and of discharging mixture without segregation.

b. Maintain concrete mixing plant and equipment in good working order and operated at loads, speeds, and timing recommended by manufacturer or as specified.

c. Proportion cement and aggregate by weight.

B. Machine Mixing:

1. Batch plant shall be capable of controlling delivery of all material to mixer within 1 percent by weight of individual material.

2. If bulk cement is used, weigh it on separate visible scale which will accurately register scale load at any stage of weighing operation from zero to full capacity.

3. Prevent cement from coming into contact with aggregate or with water until materials are in mixer ready for complete mixing with all mixing water.

4. Procedure of mixing cement with sand or with sand and coarse aggregate for delivery to project site, for final mixing and addition of mixing water will not be permitted.

5. Retempering of concrete will not be permitted.

6. Discharge entire batch before recharging.

7. Volume of Mixed Material Per Batch: Not exceed manufacturer's rated capacity of mixer.

8. Mixers:

    a. Perform mixing in batch mixers of acceptable type.

    b. Equip each mixer with device for accurately measuring and indicating quantity of water entering concrete, and operating mechanism such that leakage will not occur when valves are closed.

    c. Equip each mixer with device for automatically measuring, indicating, and controlling time required for mixing.

        1) Interlock device to prevent discharge of concrete from mixer before expiration of mixing period.

C. Transit-mixed Concrete:

1. Mix and deliver in accordance with ASTM C 94.

2. Total Elapsed Time Between Addition of Water at Batch Plant and Discharging Completed Mix: Not to exceed 90 minutes or elapsed time at project site shall not exceed 30 minutes.

3. Under conditions contributing to quick setting, total elapsed time permitted may be reduced by the Engineer.

4. Equip each truck mixer with device interlocked so as to prevent discharge of concrete from drum before required number of turns and furnish such device that is capable of counting number of revolutions of drum.

5. Continuously revolve drum after it is once started until it has completely discharged its batch.

    a. Do not admit water until drum has started revolving.

    b. Right is reserved to increase required minimum number of revolutions or to decrease designated maximum number of revolutions allowed, if necessary, to obtain satisfactory mixing. The Contractor will not be entitled to additional compensation because of such increase or decrease.

D. Other Types of Mixers: In case of other types of mixers, mixing shall be as follows:

1. Mix concrete until there is uniform distribution of materials, and discharge mixer completely before recharging.

2. Neither speed nor volume loading of mixer shall exceed manufacturer's recommendations.

3. Continue mixing for minimum of 1-1/2 minutes after all materials are in drum, and for batches larger than one cubic yard increase minimum mixing time 15 seconds for each additional cubic yard or fraction thereof.

2.03 MIXES

A. Measurements of Materials:

1. Measure materials by weighing, except as otherwise specified or where other methods are specifically authorized in writing by the Engineer.

2. Furnish apparatus for weighing aggregates and cement that is suitably designed and constructed for this purpose.

3. Accuracy of Weighing Devices: Furnish devices that have capability of providing successive quantities of individual material that can be measured to within one percent of desired amount of that material.

4. Measuring or Weighing Devices: Subject to review by the Engineer, and bear valid seal of the Sealer of Weights and Measures having jurisdiction.

5. Weighing Cement:

   a. Weigh cement separately.

   b. Cement in Unbroken Standard Packages (Sacks): Need not be weighed.

   c. Bulk Cement and Fractional Packages: Weigh such cement.

6. Mixing Water: Measured by volume or by weight.

B. Concrete Proportions and Consistency:

1. Concrete Consistency and Composition:

   a. Provide concrete that can be worked readily into corners and angles of forms and around reinforcement without excessive vibration and without permitting materials to segregate or free water to collect on surface.

   b. Prevent unnecessary or haphazard changes in consistency of concrete.

2. Ratio of Coarse Aggregate to Fine Aggregate: Not less than 1.0 nor more than 2.0 for all concrete Classes.

3. Aggregate:

   a. Obtain aggregate from source which is capable of providing uniform quality, moisture content, and grading during any single day's operation.

4. Concrete Mix Water to Cement Ratio, Minimum Cement Content, and Slump Range: Conform to values specified in Table 1 in this Section.

5. Concrete Batch Weights: Control and adjust so as to secure maximum yield, and at all times maintain proportions of concrete mix within specified limits.

6. Mixture Modification: If required, by the Engineer, modify mixture within limits set forth in this Section.

C. Concrete Mixes:

1. Proportioning of Concrete Mix: Proportion mixes to meet required minimum average compressive strength f'_c.

2. Mixes:

   a. Adjusting of Water: After acceptance, do not change mixes without acceptance by Engineer, except that at all times adjust batching of water to compensate for free moisture content of fine aggregate.

   b. Total Water Content of Each Concrete Class: Not exceed those specified in Table A in this Section.

   c. Checking Moisture Content of Fine Aggregate: Furnish satisfactory means at batching plant for checking moisture content of fine aggregate.

3. Change in Mixes: Undertake new trial batch and test program as specified in this Section.

D. Hand Mixed Concrete:

1. Hand mix concrete only when acceptable to the Engineer.
2. Prepare hand mixed concrete on watertight, level platform in batches not to exceed 1/3 cubic yard each.
3. Aggregate:
    a. First spread required amount of coarse aggregate on platform in an even and uniform layer, and then over such aggregate spread proper proportion of fine aggregate.
    b. Combined Depth of Both Such Layers: Not be greater than one foot.
4. Cement:
    a. First evenly spread required quantity of cement over fine aggregate.
    b. Then turn entire batch with shovels at least twice before adding water.
5. Water:
    a. Then uniformly sprinkle or spray proper amount of water over batched materials.
    b. Then turn with shovels not less than three times before being removing from platform.

E. Classes of Concrete:

1. Provide concrete different concrete mixes for the applications indicated on Drawings and indicated herein.
2. Class A Concrete: Class A shall be used in all applications unless otherwise indicated the plans or if a different concrete mix is specified for a specific application below.
3. Class G Concrete: Class G shall be used for all precast and cast place in structures including manholes and vaults. Class G concrete and reinforcement shall meet the requirements for exposure class C2 per ACI 318 and 310.
4. All sidewalk and curb concrete shall contain 1 lb. of lamp black per cubic yard.
5. Pumped Concrete: Provide pumped concrete that complies with all requirements of this Section.
6. Do not place concrete with slump outside limits indicated in Table 1.
7. Classes:
    a. Classes A and G Type II low alkali cement.
    b. Admixtures: Provide admixtures as specified in this Section.

TABLE 1 CONCRETE WITH AIR ENTRAINMENT				
Class	**Minimum Compressive Strength f'c at 28 Days (Pounds per Square Inch)**	**Maximum Net Water to Cement Ratio**	**Minimum Cement per Cubic Yard of Concrete by Weight (Pounds)**	**Slump Range (Inches)**
A	4,000	0.45	564	2 to 4
G	5,000	0.40	N/A	2 to 4

F. Air Entraining Admixture:

1. Add agent to batch in portion of mixing water.
2. Batch solution by means of mechanical batcher capable of accurate measurement.

2.04 WATERSTOPS

A. All concrete joints shall be made watertight by using a preformed plastic material that is permanently self-adhering and flexible. Compound shall be “Ram-Nek” by Henry Company or approved equal.

B. Manhole pipe connection shall have an A-Lox X-Cel water stop or approved.

PART 3 EXECUTION

3.01 INSTALLATION

A. Joints and Bonding:

1. As far as practicable construct concrete work as monolith.
2. Locations of contraction, construction, expansion, and other joints are indicated on the Plans or as specified in this Section.
3. Construction Joints:
   a. Where construction joints are not indicated on the Plans, provide slabs and walls with construction joints at intervals not greater than 30 feet.
   b. In order to preserve strength and watertightness of structures, make no other joints, except as authorized the Engineer.
   c. At construction joints, thoroughly clean concrete of laitance, grease, oil, mud, dirt, curing compounds, mortar droppings, or other objectionable matter by means of heavy sandblasting, and wash surfaces just prior to succeeding concrete placement.
   d. At Horizontal Joints: Immediately prior to resuming concrete placing operations, thoroughly spread bed of grout not less than 1/2 inch in thickness, nor more than 1 inch in thickness over horizontal joint surfaces.

4. Take special care to ensure that concrete is well consolidated around and against waterstops and that waterstops are secured in proper position.

B. Conveying and Placing Concrete:

1. Convey concrete from mixer to place of final deposit by methods which prevent separation or loss of materials.

2. Use equipment for chuting, pumping, and conveying concrete of such size and design as to ensure practically continuous flow of concrete at delivery end without separation of materials.

3. Design and use chutes and devices for conveying and depositing concrete that direct concrete vertically downward when discharged from chute or conveying device.

4. Keep equipment for conveying concrete thoroughly clean by washing and scraping upon completion of any day's placement.

C. Placing Concrete:

1. Provide City with a minimum of two (2) days notice prior to placing concrete.

2. Do Not Place Concrete Until:

a. Reinforcement is securely and properly fastened in its correct position and loose form ties at construction joints have been retightened.

b. Dowels, bucks, sleeves, hangers, pipes, conduits, bolts, and any other fixtures required to be embedded in concrete have been placed and adequately anchored.

c. Forms have been cleaned and oiled as specified.

3. Placement of concrete in which initial set has occurred, or of retempered concrete, will not be permitted.

4. Place no concrete during rainstorms or high velocity winds.

5. Protect concrete placed immediately before rain to prevent water from coming in contact with such concrete or winds causing excessive drying.

6. Keep sufficient protective covering on hand at all times for protection of concrete.

7. After acceptance, adhere to proposed sequence of placing concrete, except when specific changes are requested and accepted by the Engineer.

8. Depositing Concrete:

a. Deposit concrete at or near its final position to avoid segregation caused by rehandling or flowing.

b. Do not deposit concrete in large quantities in one place and work along forms with vibrator or by other methods.

c. Do not drop concrete freely into place from height greater than 5 feet.

d. Use tremies for placing concrete where drop is over 5 feet.

e. Commence placement of concrete on slopes, at bottom of slope.

9. Place concrete in approximately horizontal layers not to exceed 24 inches in depth and bring up evenly in all parts of forms.

10. Continue concrete placement without avoidable interruption, in continuous operation, until end of placement is reached.

11. If more than 20 minutes lapse prior to placement of new concrete over concrete previously placed, reduce depth of layers being placed at one time, and/or increase placing equipment, until it is possible to return with placing operation to previously placed concrete within 20 minutes.

12. If concrete is to be placed over previously placed concrete and more than 20 minutes have elapsed, then spread layer of grout not less than 1/2 inch in thickness nor more than 1 inch in thickness over surface before placing additional concrete.

D. Consolidating Concrete:

1. Place concrete with aid of acceptable mechanical vibrators.

2. Thoroughly consolidate concrete around reinforcement, pipes, or other shapes built into the work.

3. Provide sufficiently intense vibration to cause concrete to flow and settle readily into place and to visibly affect concrete over radius of at least 18 inches.

4. Vibrators:

a. Keep sufficient vibrators on hand at all times to vibrate concrete as placed.

b. In addition to vibrators in actual use while concrete is being placed, have on hand minimum 1 spare vibrator in serviceable condition.

c. Place no concrete until it has been ascertained that all vibrating equipment, including spares, are in serviceable condition.

5. Take special care to place concrete solidly against forms so as to leave no voids.

6. Take every precaution to make concrete solid, compact, and smooth, and if for any reason surfaces or interiors have voids or are in any way defective, repair such concrete in manner acceptable to the Engineer.

E. Footings and Slabs on Grade:

1. Do not place concrete on ground or compacted fill until subgrade is in moist condition acceptable to the Engineer.

2. If necessary sprinkle subgrade with water not less than 6 nor more than 20 hours in advance of placing concrete.

3. If it becomes dry prior to actual placing of concrete, sprinkle again, without forming pools of water.

4. Place no concrete if subgrade is muddy or soft.

F. Loading Concrete:

1. Green Concrete:

a. No heavy loading of green concrete will be permitted.

b. Green concrete is defined as concrete with less than 100 percent of the specified strength.

2. No backfill shall be placed against concrete walls until the concrete has reached the specified strength and the connecting slabs and beams have been cast and have reached the specified strength.

3. Use construction methods, sequencing, and allow time for concrete to reach adequate strength to prevent overstress of the concrete structure during construction.

G. Curing Concrete:

1. General:

a. Cure concrete by methods specified in this Section.

b. Cure concrete minimum of 7 days.

2. Water Curing:

a. Keep surfaces of concrete being water cured constantly and visibly moist day and night for period of not less than 7 days.

b. Each day forms remain in place may count as 1 day of water curing.

c. No further curing credit will be allowed for forms in place after contact has once been broken between concrete surface and forms.

d. Do not loosen form ties during period when concrete is being cured by leaving forms in place.

e. Flood top of walls with water at least 3 times per day, and keep concrete surfaces moist at all times during 7 day curing period.

3. Sprayed Membrane Curing:

a. Apply curing compound to concrete surface after repairing and patching, and within 1 hour after forms are removed.

b. If more than 1 hour elapses after removal of forms, do not use membrane curing compound, but apply water curing for full curing period.

c. If surface requires repairing or painting, water cure such concrete surfaces.

d. Curing Compound:

1) Do not remove curing compound from concrete in less than 7 days.

2) Curing compound may be removed only upon written request by the Contractor and acceptance by the Engineer, stating what measures are to be performed to adequately cure structures.

3) Take care to apply curing compound in area of construction joints to see that curing compound is placed within construction joint silhouette.

4) Remove curing compound placed within construction joint silhouette by heavy sandblasting prior to placing any new concrete.

5) Contractor's Option: Instead of using curing compound for curing of construction joints such joints may be water cured.

6) Apply curing compound by mechanical, power operated sprayer and mechanical agitator that will uniformly mix all pigment and compound.

7) Apply compound in at least 2 coats.

8) Apply each coat in direction 90 degrees to preceding coat.

9) Apply compound in sufficient quantity so that concrete has uniform appearance and that natural color is effectively and completely concealed at time of spraying.

10) Continue to coat and recoat surfaces until specified coverage is achieved and until coating film remains on concrete surfaces.

11) Thickness and Coverage of Compound: Provide compound having film thickness that can be scraped from surfaces at any and all points after drying for at least 24 hours.

12) The Contractor is cautioned that method of applying curing compound specified herein may require more compound than normally suggested by manufacturer of compound and also more than is customary in the trade.

13) Apply amounts specified herein, regardless of manufacturer's recommendations or customary practice, if curing compound is used in place of water curing.

14) If the Contractor desires to use curing compound other than specified compound, coat sample areas of concrete wall with proposed compound and also similar adjacent area with specified compound in specified manner for comparison.

a) If proposed sample is not equal or better, in opinion of the Engineer, in all features, proposed substitution will not be allowed.

15) Prior to final acceptance of the work, remove, by sandblasting or other acceptable method, any curing compound on surfaces exposed to view, so that only natural color of finished concrete is visible uniformly over entire surface.

4. Plastic Membrane Curing:

a. Polyethylene film may be used to cure slabs. Seal joints and edges with small sand berm.

b. Install plastic membrane as soon as concrete is finished and can be walked on without damage.

c. Keep concrete moist under plastic membrane.

3.02 CONCRETE FINISHING

A. Protect persons and adjacent materials and finishes from dust, dirt and other surface or physical damage during finishing operations, including materials driven by wind.

B. Exposed Concrete Surfaces:

1. Repair defective work, remove fins, offsets, and curing membrane, and grind projections smooth. Fill depressions 1/4 inch or larger in depth or width and with mortar after removal of curing membrane.

C. Horizontal Concrete: After proper and adequate vibration and tamping, use the following finishes for horizontal concrete surfaces.

1. All surfaces except where otherwise indicated herein: Steel trowel finish, without local depressions or high points, followed by light hairbroom finish. Do not use stiff bristle brooms or brushes. Perform brooming parallel to slab-drainage. Provide resulting finish that is rough enough to provide nonskid finish.

D. Joints:

1. Provide joints as indicated on the Plans.

3.03 FIELD QUALITY CONTROL

A. Testing of Concrete:

1. During progress of construction, the City will have tests made to determine whether the concrete, as being produced, complies with requirements specified.

2. Tests will be performed in accordance with ASTM C 31, ASTM C 39, and ASTM C 172.

3. The City's laboratory technician will make and deliver test cylinders to the laboratory for testing.

4. Required Number Cylinders for testing by City:

a. Not less than 3 cylinder specimens, 6 inch diameter by 12 inch long, will be tested for each 150 cubic yards of each class of concrete with minimum of 3 three specimens for each class of concrete placed and not less than 3 specimens for each half day's placement.

b. One cylinder will be broken at 7 days and 2 at 28 days.

5. The City's laboratory technician will test slump at the beginning of each placement, as often as necessary to keep slump within the specified range, and when requested to do so by the Engineer.

6. The Contractor shall:

a. Coordinate test cylinder sampling with City's laboratory technician.

b. Coordinate slump tests of concrete with the City's laboratory technician, who will use a slump cone in accordance with requirements of ASTM C 143.

c. Not use concrete that does not meet specification requirements in regards to slump, but remove such concrete from project site.

d. Provide concrete for test specimens when requested by the Engineer for the purposes of Quality Assurance testing.

B. Air Entraining Admixture:

1. Test percent of entrained air in concrete at beginning of each placement, as often as necessary to keep entrained air within specified range, and when requested to do so by the Engineer.

2. Provide test equipment.

3. Do not use concrete that does not meet Specification requirements as to air entrainment and shall remove such concrete from project site.

4. Test air entrainment in concrete in accordance with ASTM C 173.

5. The Engineer may at any time test percent of entrained air in concrete received on project site.

C. Enforcement of Strength Requirement:

1. Concrete is expected to reach higher compressive strength than that which is indicated in Table 1 as specified compressive strength f'c.

2. Strength Level of Concrete: Will be considered acceptable if following conditions are satisfied.

a. Averages of all sets of 3 consecutive strength test results is greater or equal to specified compressive strength f'c.

b. No individual strength test (average of 2 cylinders) falls below specified compressive strength f'c by more than 500 pounds per square inch.

c. Whenever one, or both, of 2 conditions stated above is not satisfied, provide additional curing of affected portion followed by cores taken in accordance with ASTM C 42 and ACI 318 and comply with following requirements:

1) If additional curing does not bring average of 3 cores taken in affected area to at least specified compressive strength f'c, designate such concrete in affected area as defective.

2) The Engineer may require the Contractor to strengthen defective concrete by means of additional concrete, additional reinforcing steel, or replacement of defective concrete, all of the Contractor's expense.

END OF SECTION

SECTION 03600
GROUTS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Concrete mortar.
   2. Grout.
   3. Drypack mortar.
   4. Nonshrink grout.
   5. Epoxy grout.
   6. Non-shrink epoxy grout.

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM):
   1. C109 - Test Method for Compressive Strength of Hydraulic Cement Mortars (using 2 inch or 50 millimeter cube specimens).
   2. C531 - Test Method for Liner Shrinkage and Coefficient of Thermal Expansion of Chemical-Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes.
   3. C579 - Test Method for Compressive Strength of Chemical-Resistant Mortars and Monolithic Surfacings.
   4. C827 - Test Method for Change in Height at Early Ages of Cylindrical Specimens from Cementitious Mixtures.
   5. C939 - Test Method for Flow of Grout for Preplaced-Aggregate Concrete (Flow Cone Method).
   6. C1090 - Test Method for Measuring Change in Height of Cylindrical Specimens from Hydraulic-Cement Grout.
   7. C1107 - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).
   8. C1181 - Test Methods for Compressive Creep of Chemical-Resistant Polymer Machinery Grouts.

1.03 SUBMITTALS

A. Non-shrink Grout and Non-shrink Epoxy Grout: Submit manufacturer's literature and certified test data prior to installation.

1.04 DELIVERY, STORAGE, AND HANDLING

A. All materials shall be delivered to the jobsite in their original, unopened packages or containers, clearly labeled with the manufacturer's product identification and printed instructions.

B. All materials shall be stored in a cool dry place and in accordance with the manufacturer's recommendations.

C. All materials shall be handled in accordance with the manufacturer's instructions.

1.05 PROJECT/SITE CONDITIONS

A. Refer to manufacturer's literature or contact the manufacturer for any special physical or environmental limitations that may be required for use of products.

1.06 WARRANTIES

A. Non-shrink Grout: The manufacturer shall warranty that the non-shrink grout will never go below its initial placement volume when tested in accordance with ASTM C1107.

B. Non-shrink Epoxy Grout: The manufacturer shall warranty that non-shrink epoxy grout will show negligible shrinkage or expansion when tested in accordance with ASTM C531.

PART 2 PRODUCTS

2.01 MATERIALS

A. Concrete Mortar:
   1. General: Consist of concrete mixture with coarse aggregate removed and water quantity adjusted as required.
   2. At Exposed Concrete Surfaces Not to Be Painted or Submerged in Water: White cement.

B. Grout:
   1. Consist of mixture of Portland cement and sand.

C. Dry-pack Mortar:
   1. Consist of mixture of Portland cement and sand.

D. Non-shrink Grout:
   1. Non-shrink grout shall be a preportioned and prepackaged cement-based mixture. It shall contain no metallic particles such as aluminum powder and no metallic aggregate such as iron filings. It shall require only the addition of potable water.
   2. Potable water for pre-soaking, mixing, and curing shall be clean and free of oils, acids, alkalies, organics, and any other deleterious matter.
   3. Bleeding: Non-shrink grout shall be free from the emergence of mixing water from within or the presence of water on its surface.
   4. Non-shrink grout shall be in accordance with ASTM C1107.
   5. Consistency: Non-shrink grout shall remain at a minimum flowable consistency for at least 45 minutes after mixing at 45 degrees Fahrenheit to 90 degrees Fahrenheit when tested in accordance with ASTM C230. If at a fluid consistency, it shall be verified in accordance with ASTM C939.
   6. Dimensional Stability (height change): Non-shrink grout shall be in accordance with ASTM C1107, volume-adjusting Grade B or C at 45 degrees to 90 degrees. It shall show 90 percent or greater bearing area under bases or baseplates.
   7. Compressive Strength: Non-shrink grout shall show minimum compressive strengths at 45 degrees Fahrenheit to 90 degrees Fahrenheit in accordance with ASTM C1107 for various periods from the time of placement, including

5,000 pounds per square inch at 28 days when tested in accordance with ASTM C109 as modified by C1107.

8. Manufacturers: One of the following or equal:
    a. Five Star Products, Inc., Fairfield, CT, Five Star Grout.
    b. Master Builders, Inc., Cleveland, OH, Masterflow 928.
    c. L&M Construction Chemicals, Inc., Omaha, NE, CRYSTEX.

E. Epoxy Grout:
1. Consist of mixture of epoxy and sand.
2. Sand: Clean, bagged, graded, and kiln dried silica sand.

F. Non-shrink Epoxy Grout:
1. Non-shrink epoxy grout shall be a 100 percent solids, premeasured, prepackaged system containing a two-component thermosetting epoxy resin and inert aggregate.
2. Consistency: Non-shrink epoxy grout shall maintain a flowable consistency for at least 45 minutes at 70 degrees Fahrenheit.
3. Dimensional Stability (height change):
    a. Non-shrink epoxy grout shall have negligible shrinkage or expansion (less than 0.0006 in/in) when tested in accordance with ASTM C531.
4. Compressive Strength: Non-shrink epoxy grout shall show a minimum compressive strength of 10,000 pounds per square inch at 24 hours and 14,000 pounds per square inch at 7 days when tested in accordance with ASTM C579, Method B.
5. Compressive Creep: The compressive creep for non-shrink epoxy grout shall not exceed 0.0027 in/in when tested under a 400 pounds per square inch constant load at 140 degrees Fahrenheit in accordance with ASTM C1181.
6. Thermal Capability: The coefficient of thermal expansion for non-shrink epoxy grout shall not exceed 0.000018 inches per inch per degree Fahrenheit when tested under ASTM C531, Method B.
7. Manufacturers: One of the following or equal:
    a. Five Star Products, Inc., Fairfield, CT, Five Star Epoxy Grout.
    b. Master Builders, Inc., Cleveland, OH, Masterflow 648 CP Plus.
    c. L&M Construction Chemicals, Inc., EPOGROUT.

2.02 MIXES

A. Concrete Mortar Mix:
1. Use water-cement ratio that is no more than that specified for concrete being repaired.
2. At Exposed Concrete Surfaces Not to Be Painted or Submerged in Water: Use sufficient white cement to make color of finished patch match that of surrounding concrete.

B. Grout Mix:
1. For Concrete Repair: Mix in same proportions used for concrete being repaired, with only sufficient water to give required consistency for spreading.
2. For Spreading over the Surfaces of Construction or Cold Joints: Mix with no more water used than allowed by water-cement ratio specified for concrete.
3. For Other Applications: Mix in proportions by weight of one part cement to four parts of concrete sand.

C. Dry-pack Mortar Mix: Use only enough water so that resulting mortar will crumble to touch after being formed into ball by hand.

D. Non-shrink Grout: Mix in accordance with manufacturer's installation instructions such that resulting mix has fluid or flowable consistency and is suitable for placing by pouring.

E. Epoxy Grout:
   1. Mix in accordance with manufacturer's installation instructions for mixing.
   2. Proportioning:
      a. For horizontal work, consist of mixture of one part epoxy with not more than 2 parts sand.
      b. For vertical or overhead work, consist of 1 part epoxy gel with not more than 2 parts sand.

F. Non-shrink Epoxy Grout: Mix in accordance with manufacturer's installation instructions.

PART 3 EXECUTION

3.01 EXAMINATION

A. Inspect concrete surfaces to receive grout or mortar and verify that they are free of ice, frost, dirt, grease, oil, curing compounds, paints, impregnations and all loose material or foreign matter likely to affect the bond or performance of grout or mortar.

B. Confirm that newly placed concrete has been cured sufficiently to attain its design strength and limit further shrinkage.

C. Verify that temperature of cementitious or epoxy grout does not exceed manufacturer's recommendations.

3.02 PREPARATION

A. Surface Preparation:
   1. Roughen all concrete surfaces by heavy sandblasting, chipping, or other mechanical means to assure bond. Loose or broken concrete shall be removed.
   2. All grease, oil, dirt, curing compounds, laitance, and other deleterious materials that may affect bond that were identified in the inspection process shall be completely removed from concrete and bottoms of baseplates. All metal surfaces should have a 2 to 3 mil peak-to-valley profile for epoxy grouts.
   3. For cementitious mortars and grouts, concrete surfaces shall be saturated surface dry. Any standing water shall be removed prior to placing grouts.
   4. For epoxy grouts, do not wet concrete surfaces with water. Instead, where required, wet surfaces with epoxy for horizontal work or epoxy gel for vertical or overhead work prior to placing epoxy grouts.

B. Forms and Headboxes for Grouts (Cementitious or Epoxy):
   1. Forms for grouts shall be built of material with adequate strength to withstand the placement of grouts.

2. Forms must be rigid and liquid tight. All cracks and joints shall be caulked with an elastomeric sealant. All forms shall be lined with polyethylene for easy grout release. Forms carefully waxed with two coats of heavy-duty paste wax shall also be acceptable.
3. Forms shall be 4 to 6 inches higher than the baseplate on one side of the baseplate configuration when using head pressure for placement.
4. A sufficient number of headboxes shall be built to facilitate placement of grouts.
5. Air relief holes a minimum 1/8 inch in diameter shall be provided when required by a baseplate configuration to avoid entrapping air underneath.

3.03 APPLICATION

A. Cement Mortar and Grout:
   1. For Defective Concrete Repair:
      a. Filling: Filling of voids around items through the concrete.
      b. Grout Spreading: Spread over construction joints, cold joints, and similar type items.
   2. Concrete Surfaces:
      a. Apply epoxy bonding agent to clean, roughened, and dry surfaces before placing mortar or grout.
   3. Placing:
      a. Exercise particular care in placing Portland cement mortar or grout since they are required to furnish structural strength or impermeable water seal or both.
      b. Do not use cement mortar or grout that has not been placed within 30 minutes after mixing.

B. Epoxy Grout:
   1. Apply in accordance with manufacturer's installation instructions.
   2. Use where specified herein or where indicated on the Plans.

3.04 PLACEMENT

A. The Contractor shall make arrangements to have a grout manufacturer's representative present for a preconstruction meeting and during initial grout placement. Grout shall only be installed after the final equipment alignment is correct and accepted by the Engineer.
   1. Grouts shall be mixed in accordance with the manufacturer's recommendations.
   2. A mortar mixer with moving paddles shall be used for mixing grouts. For cementitious grouts, pre-wet the mixer and empty out excess water before beginning mixing.
   3. Cementitious Grouts:
      a. Non-shrink cementitious grout shall be added to a premeasured amount of water that does not exceed the manufacturer's maximum recommended water content.
      b. Mix cementitious grouts per manufacturer's instructions for uniform consistency.
      c. Grouts may be drypacked, flowed, or pumped into place. All baseplate grouting shall take place from one side of a baseplate to the other to avoid trapping air. Do not overwork grouts.
      d. Do not retemper grout by adding more water after stiffening.

e. Hydrostatic head pressure shall be maintained by keeping the level of the grout in the headbox above the bottom of the baseplate. The headbox should be filled to the maximum level and the grout worked down to top of baseplate.

4. Epoxy Grouts:
   a. Epoxy grouts shall be mixed in complete units. Do not vary the ratio of components or add solvent to change the consistency of the mix.
   b. Pour the hardener into the resin and mix for at least one minute and until each mixture is uniform in color. Pour the chemical components into the mortar mixer wheelbarrow and add the aggregate. Mix until aggregate is uniformly wetted. Overmixing will cause air entrapment in the mix.
   c. All epoxy grout shall be flowed into place using a headbox. All grouting shall take place from one side of a baseplate to the other in a continuous flow to avoid trapping air.
   d. Hydrostatic head pressure shall be maintained by keeping the level of grout in headboxes above the bottom of baseplates. Headboxes shall be filled to the maximum level and grout worked down to the bottom of baseplates.
   e. Epoxy grouts shall not be cut back after setting. The final level of grout will be as installed with all chamfer edges built into the formwork.

3.05 CURING

A. Cementitious Grouts:
   1. Grouts must be cut back to the lower edge of baseplates after reaching initial set. Provide a 45 degree angle cut back.
   2. Clean equipment and tools as recommended by the grout manufacturer.
   3. Cure Grouts in accordance with manufacturer's specifications and recommendations. Keep grout moist for a minimum of 3 days. The method needed to protect grouts will depend on temperature, humidity, and wind. Wet burlap, a soaker hose, sun shading, ponding and, in extreme conditions, a combination of methods shall be employed.
   4. Grouts shall be maintained above 40 degrees Fahrenheit until they have attained a compressive strength of 3,000 pounds per square inch or above 70 degrees Fahrenheit for a minimum of 24 hours to avoid damage from subsequent freezing.

B. Epoxy Grouts:
   1. Cure grouts in accordance with manufacturers' specifications and recommendations. Do not wet cure epoxy grouts.
   2. Consult the manufacturer for appropriate cure schedule. In no case should any surface in contact with grout be allowed to fall below 50 degrees Fahrenheit for a minimum of 48 hours after placement.
   3. Equipment and tools shall be cleaned immediately with a strong liquid detergent and water solution before grout hardens.

3.06 FIELD QUALITY CONTROL

A. Non-shrink cementitious grouts shall be tested for 24 hour compressive strength in accordance with ASTM C109.

B. Non-shrink grouts shall be tested for 24 hour compressive strength in accordance with ASTM C579 (Method B).

END OF SECTION

SECTION 03700
CHEMICAL GROUTING

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Preparing and injection of a crack or joint with infiltrating water with a low viscosity hydrophobic polyurethane resin chemical grout.

B. Related Sections
   1. Section 03300 - Cast In Place Concrete.
   2. Section 03600 – Grouts
   3. Section 09900 – Wastewater Structures Coating

1.02 SUBMITTALS

A. The Contractor shall submit all proposed materials, product data sheets, installation procedures, material safety data sheets (MSDS), and equipment to be used for chemical grouting.

B. Letter from the Chemical Grout Manufacturer certifying the Chemical Grout Installer as factory trained and qualified.

PART 2 PRODUCTS

2.01 CHEMICAL GROUT

A. Chemical grout shall be a low viscosity hydrophobic polyurethane resin chemical grout. The grouting compound shall be a non- toxic, non-flammable, high flash point (270 F) hydrophobic polymer of the type which is applied in a crack or open joint by use of a packer. When the grout is mixed with water the material will expand up to 2 to 5 times its original volume and cure to a pale yellow closed cell polyurethane foam.

B. Chemical grout shall be SikaFix HH LV as manufactured for Sika Corporation or approved equal.

C. Mixed polyurethane chemical grout shall meet the following physical properties:
   1. Pot Life: approximately 5 hours, providing no moisture enters the system
   2. Mixed Viscosity: 450 - 850 cps ASTM D- 2196 A
   3. Flash point 270F
   4. Density 8.7 – 9.2 lbs./gal. ASTM D 3754- 95
   5. Solids 100%
   6. Corrosiveness - non- corrosive

D. Properties of the cured polyurethane chemical grout

1. Tensile Strength: 150 psi ASTM D-190-63
   a. Elongation: 250%
2. Absorption 10% After 6 months immersion
3. Shrinkage: Less than 4% ASTM D-1042
4. Density 8.70 – 9.17 lbs./gal ASTM D3574

PART 3 EXECUTION

3.01 SURFACE PREPARATION

A. When crack (s) is contaminated it will be necessary to clean the crack surface to exactly locate the crack. If the crack encounter high water flow, it will be necessary to seal the surface of the crack with a surface sealing material. The surface sealing can be done before or after drilling the injection holes. Then, begin drilling 5/8" diameter holes along the side of the crack at 45 angles. Drill the hole to intersect the crack midway through the substrate. Install the injection packers in holes. Prior to product application moisture must be present. If concrete being injected contains insufficient moisture to activate the grout, inject the crack with a small amount of water prior to the application of the chemical grout.

B. Additional surface preparation per the chemical grout manufacturer's recommendations.

3.02 PACEMENT PROCEDURES

A. Mix as recommended by the manufacturer.

B. Access to the back side of concrete requiring chemical grout is not feasible, all proposed materials and methods shall be designed to seal cracks and joints accordingly.

C. Begin by drilling 5/8" diameter holes along the side of the crack at a 45° degree angle. Drill the hole to intersect the crack midway through the substrate. Spacing of the injection ports depends on crack width, but normal spacing varies from 6" to 36". It is necessary to flush the drilled holes with water to remove drill dust from the holes and cracks, and insure that the crack is wet enough to react with the grout when introduced to the crack. Install the injection packers in the holes.

D. If the crack or joint to be injected is ½" or greater at surface, pack an open cell polyurethane foam saturated with the mixed polyurethane chemical grout into the crack/ joints. Spray the saturated foam with a small amount of water to activate the grout and create a surface seal.

E. Injection pressure shall vary from 200 psi to 2500 psi depending on the width of the crack, thickness of the concrete and condition of the concrete.

F. Placement Procedure: The polyurethane chemical grout for the pressure injection grouting.
   1. Inject the prepared cracks with a minimum of 250 psi in order to achieve maximum filling and penetration without the inclusion of air pockets or voids

in the polyurethane chemical grout. Begin the pressure injection at the lowest packer and continue until there is the appearance of the polyurethane chemical grout at an adjacent packer, thus indicating travel. When travel is indicated, a decision to discontinue or continue the pressure injection from that packer should be made by the contractor, based on his experience, with the approval of the engineer. Continue the procedure until all pressure-inject able cracks have been filled.

2. Pump polyurethane chemical grout for 45 seconds and then pause to allow the material to flow into all of the cracks and crevices. Watch for material flow and water movement to appear on the surface. When movement stops, begin injection into the next packer. When sealing vertical cracks, begin injecting at the bottom of the crack and work vertically. If site temperatures are extremely low, heat bands or heated water baths may be used on the pails, before and during use to maintain the products temperature. Re-inject to assure that all voids are properly sealed off.
3. If penetration of any cracks is impossible, consult the engineer before discontinuing the injection procedure. If modification of the proposed procedure is required to fill the cracks, submit said modification in writing to the engineer for acceptance prior to proceeding.
4. Adhere to all limitations and cautions for the polyurethane chemical grout as stated in the manufacturers current printed literature.

3.03 CLEANING

A. Use sharp sided tool such as putty knife or trowel to remove excess material from walls, floors, etc. Wait for material to cure before removing. May be sanded off if necessary.

B. Leave finished work and work area in a neat, clean condition without evidence of spillovers onto adjacent areas.

3.04 FIELD TESTING

A. The City will monitor the existing cracks and joints for infiltration throughout the warranty period of the project. If infiltration is persistent, the Contractor shall perform additional measures to mitigate infiltration.

** END OF SECTION **

SECTION 05501
ANCHOR BOLTS

PART 1 GENERAL

1.01 DESCRIPTION

A. This section specifies anchor bolts complete with washers and nuts. Unless otherwise specified, anchor bolts shall be Type 316 stainless steel.

1.02 REFERENCES

A. This section contains references to the following documents. They are a part of this section as specified and modified. The latest edition of referenced publications in effect at the time of bid opening shall govern. In case of conflict between the requirements of this section and those of the listed documents, the requirements of this section shall prevail.

Reference	Title
ASTM A36/A36M	Carbon Structural Steel
ASTM A307	Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength
ASTM A320/A320M	Alloy Steel Bolting Materials for Low-Temperature Service for Pressure and High-Temperature Parts
ASTM A449	Quenched and Tempered Steel Bolts and Studs
CBC	2016 California Building Code

1.03 SUBMITTALS

A. Submittals shall be provided in accordance with Section 01300 – Submittals and shall include the following information:
   1. Data indicating load capacities.
   2. Chemical resistance.
   3. Temperature limitations.
   4. Installation instructions.
   5. Evaluation Report for expansion type anchors as specified in Paragraph 05501-3.04.
   6. Manufacturer’s data and catalog numbers.

PART 2 PRODUCTS

2.01 GENERAL

A. Anchor bolt holes in equipment support frames shall not exceed the bolt diameters by more than 25 percent up to a limiting maximum oversizing of 1/8-inch. Minimum anchor bolt diameter shall be ½-inch.

B. Tapered washers shall be provided where mating surface is not square with the nut.

C. Expansion or adhesive anchors set in holes drilled in concrete after the concrete is placed will not be permitted in substitution for cast-in-place anchor bolts except where otherwise specified. Upset threads shall not be acceptable.

2.02 MATERIALS

A. Anchor bolt materials shall be as specified in Table A unless otherwise specified. All equipment anchor bolts and anchor bolts that are submerged or above the water surface shall be Type 316 stainless steel.

Table A. Anchor Bolt Materials

Material	Specification
Carbon steel bolts: Structures Equipment	 ASTM A307, hot-dip galvanized, Grade A ASTM A449, Type 1, hot-dip galvanized
Stainless steel bolts, nuts, washers	ASTM A320 Type 304 or 316
Expansion anchors	Simpson Strong-Bolt 2, Hilti Kwik Bolt TZ, or equal
Adhesive anchor bolts	Simpson SET-XP, Hilti HIT-RE 500-SD, or equal

PART 3 EXECUTION

3.01 GENERAL

A. Fieldwork, including cutting and threading, shall not be permitted on galvanized items. Dissimilar metals shall be protected from galvanic corrosion by means of pressure tapes, coatings, or isolators. All stainless steel anchor bolts and fasteners shall be assembled with a stainless steel anti-seize compound such as molycote.

3.02 CAST-IN-PLACE ANCHOR BOLTS

A. Anchor bolts to be embedded in concrete and concrete unit masonry shall be placed accurately and held in the correct position while the concrete or grout is placed or, if specified, recesses or blockouts shall be formed in the concrete and the metalwork shall be grouted in place in accordance with Section 03300 – Reinforced Concrete. The surfaces of metalwork in contact with concrete shall be thoroughly cleaned.

B. After anchor bolts have been embedded, their threads shall be protected by grease and the nuts run on.

3.03 ADHESIVE ANCHOR BOLTS

A. Use of adhesive anchors shall be subject to the following conditions:
   1. Use shall be limited to locations where exposure, on an intermittent or continuous basis, to acid concentrations higher than ten percent, to chlorine gas, or to machine or diesel oils, is extremely unlikely.
   2. Use shall be limited to applications where exposure to fire or exposure to concrete or rod temperature above 120 degrees F is extremely unlikely. Overhead applications (such as pipe supports), because of the above concerns, shall be disallowed.
   3. If required, approval from the Engineer for a specific application and from the supplier of the equipment to be anchored.
   4. Anchor diameter and grade of steel shall be per contract documents or per equipment supplier specifications. Anchor shall be threaded or deformed full length of embedment and shall be free of rust, scale, grease, and oils.
   5. Embedment depth shall be as specified on the Drawings or as required by an approved equipment anchorage submittal.

6. New concrete shall attain a minimum age of 21 days before holes are drilled for adhesive anchors.
7. All installation recommendations by the anchor system manufacturer shall be followed carefully, including maximum hole diameter.
8. Holes shall have rough surfaces, such as can be achieved using a rotary percussion drill.
9. Holes shall be blown clean with compressed air and be free of dust or standing water prior to installation.
10. Anchor shall be left undisturbed and unloaded for full adhesive curing period.
11. Concrete temperature (not air temperature) shall be compatible with curing requirements of adhesives per adhesive manufacturer. Anchors shall not be placed in concrete below 25ºF.

3.04 EXPANSION ANCHORS

A. Use of expansion anchors shall be subject to Conditions 2-3 and 7-9 specified in Paragraph 05501-3.03 and approval by the Engineer.

B. The Contractor shall supply the Engineer with the current evaluation report from the International Code Council – Evaluation Service for the particular brand of expansion anchors to be used.

END OF SECTION

SECTION 05505
MISCELLANEOUS METALS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Furnishing all material, supplies, equipment, tools, transportation and facilities and performing all labor and services necessary for, required in connection with or properly incidental to furnishing and installing miscellaneous metal, as described in this Section of the Specifications, shown on the accompanying Plans, or reasonably implied therefrom.

1.02 REFERENCED SECTIONS

A. The following Sections are referenced in this Section
   1. Section 01300 – Submittals

1.03 SUBMITTALS

A. Comply with Section 01300 – Submittals.

B. Certified test reports: Before delivery of any miscellaneous metalwork, provide certificates which attest to material compliance with these specifications.

C. Layout or installation shop drawings for all miscellaneous metals, including but not limited to, seat angles, brackets, flashing, pipe supports.

PART 2 PRODUCTS

2.01 MATERIALS

A. Wide Flange Beams: ASTM A992.

B. Structural Steel Shapes (other than Wide Flange Beams) and Plates: ASTM A36.

C. Structural Tubing (HSS): ASTM A500, Grade B.

D. Structural Pipe: ASTM A53, Grade B or ASTM A501.

E. Stainless Steel: ASTM A320, Type 304 or Type 316, as specified

F. Machine Bolts, Nuts, and Washers: ASTM A307.

G. High Strength Bolts: ASTM A325 bearing-type connections.

H. Hardened Steel Washers: ASTM F436.

I. Heavy Hex Nuts: ASTM A563.

J. Welded Headed Studs: ASTM A108.

K. Welding Materials: AWS D1.1 and D1.3; type required for materials being welded.

2.02 FABRICATION

A. Fabricate structural steel members in accordance with AISC Specification.

B. Conform to Chapter 22, California Building Code; 2016 Edition (CBC).

C. Welding
1. Welder qualification requirements, welding procedures, etc. according to AWS D1.1 and D1.3.
2. Employ only certified welders.
3. Butt welds: Full penetration welds unless otherwise noted.
4. Arc welding electrodes: E70 Series.
5. All welds on hand and guardrails are to be ground smooth.
6. Tie plates: Welded as shown on the Plans.

D. Holes for bolts or rivets shall be punched or drilled 1/16-inch larger than normal bolt. Holes in column base plates may be 5/16-inch larger than anchor bolt diameter only if washers field welded to the base plate are provided under the nuts.

E. Zinc coating material: As specified in ASTM A153.

F. Zinc dust-zinc oxide coating: Conform to MILLSPEC DOD-P-20135.

G. Coating: As manufactured by Z.R.C. Chemical Products Co., Galvicon Co., or equal.

2.03 MISCELLANEOUS STEEL METALWORK

A. Other miscellaneous steel metalwork including embedded and nonembedded steel metalwork, hangers, and inserts shall be as specified on the Plans and shall be hot-dip galvanized after fabrication unless otherwise specified.

2.04 COATING REQUIREMENTS

A. Hot-dip galvanize fabricated material where specified on the Plans and in this Section of the Specifications.

B. Clean, prepare and shop prime other steel work. Do not prime surfaces to be field welded. Touch-up primer in the field after welding is complete. Apply finish coats in the field.

PART 3 EXECUTION

3.01 STEEL ERECTION

A. Erect structural steel in accordance with AISC Specification.

B. Make provision for erection loads, and for sufficient temporary bracing to maintain structure safe, plumb and in true alignment until completion of erection and installation of permanent bracing.

C. Do not field cut or alter structural members without approval of Engineer.

D. After erection, prime welds, abrasions, and surfaces not shop primed, galvanized, except surfaces to be in contact with concrete. Use a primer consistent with shop coat. Use primer recommended for galvanized surfaces.

E. Bolting: Securely bolt or weld the work as erection progresses to provide for all dead load, lateral forces and erection stresses.

3.02 MISCELLANEOUS METALWORK

A. General
   1. Fieldwork shall not be permitted on galvanized items. Drilling of bolts or enlargement of holes to correct misalignment will not be allowed.
   2. Protect dissimilar metals from galvanic corrosion by means of pressure tapes, coatings, or isolators. Protect aluminum in contact with concrete or grout with a heavy coat of bituminous paint.
   3. Metalwork to be embedded in concrete:
      a. Placed accurately and held in correct position while the concrete is placed or, if specified, recesses or blockouts shall be formed in the concrete.
      b. The surfaces of metalwork in contact with or embedded in concrete shall be thoroughly cleaned.
      c. If accepted, recesses may be neatly cored in the concrete after it has attained its design strength and the metalwork grouted in place.

B. Seat Angles, Supports, and Guides
   1. Set seat angles for grating and supports for floor plates so that they are flush with the floor and also maintain the grating and floor plates flush with the floor.

C. Fabrication
   1. Holes shall be punched 1/16-inch larger than the nominal size of the bolts, unless otherwise specified. Whenever needed, because of the thickness of the metal, holes shall be subpunched and reamed or shall be drilled.
   2. Fabrication including cutting, drilling, punching, threading, and tapping required for miscellaneous metal or adjacent work shall be performed prior to hot-dip galvanizing.

3.03 FABRICATIONS REQUIREMENTS

A. Steel members, fabrications, and assemblies: Galvanized after fabrication in accordance with ASTM A123.

B. Steel items weighing 100 pounds or less: Hot-dip zinc coated.

C. Anchor bolts and nuts 5/8 inch and larger: Hot-dip zinc coated in accordance with ASTM A153.

D. Anchor bolts and nuts smaller than 5/8-inch and all other bolts, screws, nuts, washers and other minor steel fasteners: Mechanically zinc coated.

E. Fabrication practices for products to be galvanized: In accordance with applicable portions of ASTM A143, A384, and A385.

3.04 REPAIR OF DEFECTIVE GALVANIZED COATING

A. Where zinc coating has been damaged after installation, substrate surface shall be first cleaned and then repaired with zinc dust-zinc oxide coating in accordance with ASTM A780. Application shall be as recommended by the zinc dust-zinc oxide coating manufacturer. Coating shall consist of multiple coats to dry film thickness of eight mils.

B. Remove items not physically damaged, but which have insufficient or deteriorating zinc coatings, and items damaged in shipment or prior to installation from the project site for repair by the hot-dip zinc coating method.

3.05 CLEANING

A. After installation, damaged surfaces of shop primed metals shall be cleaned and touched up with the same material used for the shop coat.

END OF SECTION

SECTION 09800
COATING SYSTEMS

PART 1 GENERAL

1.01 DOCUMENTS

The General Conditions and all other Contract Documents for this project are complementary and applicable to this section of the Specifications.

1.02 SCOPE OF WORK

A. **Work Included**

1. Paint, protective coatings, and finishes for pipes, exposed metal, and equipment.
2. Preparing and coating existing pump suction elbows.

B. **Related Work Specified Elsewhere**
1. HPDE Pipe & Fittings: Section 02710.

1.03 REFERENCE STANDARDS

Standards listed below are a part of this section as specified and modified. In case of conflict between the requirements of this section and those of listed standards, the requirements of this section shall prevail. Where two or more standards are at variance, the most restrictive requirement shall apply.

A. AWWA C105 *Polyethylene Encasement for Ductile-Iron Pipe Systems*

B. AWWA C210 *Liquid Epoxy Coating Systems for the Interior and Exterior of Steel Water Pipelines*

B. AWWA C213 *Fusion-Bonded Epoxy Coating for the Interior and Exterior of Steel Water Pipelines*

C. SSPC PA2 *Measurement of Dry Paint Thickness with Magnetic Gauges*

D. SSPC SP1 *Solvent Cleaning*

E. SSPC SP5 *White Metal Blast Cleaning*

F. SSPC SP6 *Commercial Blast Cleaning*

G. SSPC SP7 *Brush-off Blast Cleaning*

H. SSPC SP8 *Pickling*

I. SSPC SP10 *Near-white Blast Cleaning*

1.04 SUBMITTALS

A. Complete data on each type of paint and primer shall be submitted to the Engineer demonstrating the product's compliance with these specifications. This shall be done whether or not the product is named herein. Submittals shall also include manufacturer's published instructions and indicate where or for what use each product is intended. The Contractor shall be in receipt of the Engineer's written approval prior to delivery of any paint to the job-site.

B. Paints not listed in the specifications shall be submitted with a certified ingredients analysis and with solids by volume so that a complete comparison between specified and proposed paint may be made. Certification of compliance with State of California Air Regulation Board standards shall be submitted.

C. Contractor shall provide color chips for approval. City will select all colors.

PART 2 PRODUCTS

2.01 GENERAL

The paints, primers, and coatings shall be the products of the Tnemec Company Inc., North Kansas City, MO, Koppers Company Inc., Pittsburgh, PA, or equal. The "or equal" clause refers to dry film thickness, generic type of primer, paint, or coating and ingredients in the coating. No request for substitution will be considered which decreases the film thickness designated, the number of coats to be applied, the general type of coating, paint, or primer; or the quantity, quality or type of ingredients in the coatings specified. Paints shall meet current State of California Air Regulation Board standards.

2.02 PIPE AND FITTINGS COATING SYSTEMS

A. C**oating Existing Pump Suction Elbows:** The existing pump suction elbows shall be removed from the wet well and shall be fusion bonded epoxy lined and coated as specified herein. All surface preparation and coating installation shall be completed within a shop specifically designed for the installation of fusion bonded epoxy coating systems.
   1. **Surface Preparation:** Sandblast to SSPC 10 (near-white blast cleaning).
   2. **Lining and Coating:** Blasted surfaces shall be coated with a 13 mil minimum and 20 mil maximum thickness fusion epoxy prepared from a 100% dry epoxy resin applied by the fluidizing bed method, in conformance with AWWA C213.
   3. **Top Coat:** Fusion bonded epoxy surfaces shall be prepared in accordance with the coating manufacturer and topped with two coats of acrylic polyurethane such as Tnemec Series 75 Enura-Shield, at a dry film thickness of 2.0 to 5.0 mils per coat.

2.03 FERROUS METAL COATINGS FOR NON-IMMERSION SERVICE

A. **Ferrous Metals for Non-Immersion Service:** Exposed metals including steel bollards, steel air ducting, associated appurtenances, and miscellaneous ferrous metal not called out elsewhere shall be lined and/or coated with the following system, following manufacturer’s recommendations:
   1. **Surface Preparation:** Sandblast to SSPC 6 (commercial blast cleaning).
   2. **Prime Coat:** Blasted surfaces shall be coated with a 2.5 to 3.5 mil d.f.t. coat of zinc-rich aromatic urethane, such as Tnemec Series 90-97 Tneme-Zinc, or approved equal.

3. **Intermediate Coat:** Primed surfaces shall be coated with a 4 to 6 mil d.f.t. coat of polyamidoamine epoxy, such as Tnemec Series N69 High-Build Epoxoline II, or approved equal.
4. **Top Coat:** A 2 to 3 mil d.f.t. coat of semi-gloss aliphatic acrylic polyurethane such as Tnemec Series 73 Endura-Shield shall be applied.

B. All prime and intermediate coats shall be compatible. City shall select finished top coat color from manufacturer's standard colors. Prime and intermediate coat colors shall be compatible as recommended by the manufacturer.

PART 3 EXECUTION

3.01 GENERAL

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 and instructions for reducing. Materials shall not be delivered until the Engineer's written approval has been received.

B. 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. Work shall be free from "runs", "bridges", "shiners", or other imperfections due to faulty intervals. Care shall be taken to obtain a uniform, unbroken coating over all bolts, threads, nuts, welds, edges, and corners. Further, all weld splatter shall be removed and all welds neutralized with thinner.

C. Care shall be exercised not to damage adjacent work during sandblasting operations. Stainless steel need not be sandblasted. Blasted surfaces shall be coated within four hours of being sandblasted. All dust shall be removed from the surfaces prior to painting.

3.02 ENVIRONMENTAL CONDITIONS

A. Paint shall not be applied in extreme heat, nor in dust or smoke laden air, nor in damp or humid weather, nor when the air temperature and/or the temperature of the surface to be painted is below 50^{o} F or within 10^{o} F of the dew point. The Contractor shall provide temporary heat as required to maintain 50^{o} F temperature and 10^{o} F above the dew point day and night until painting is complete and the paint is dry.

B. Paint shall not be applied to surfaces hotter than 120^{o} F.

3.03 GENERAL SURFACE PREPARATION

A. All surfaces to be coated or painted shall be in the specified condition to receive the material before any coating or painting is performed. No more sandblasting or surface preparation than can be coated or painted in a normal working day will be permitted. All sharp edges, burrs, and weld spatter shall be removed.
1. **White Metal Blast Cleaning (SSPC SP5):** Removal of all visible rust, mill scale, paint, and foreign matter by blast cleaning by wheel or nozzle using sand, grit, or shot.

2. **Near-White Blast Cleaning (SSPC SP10):** Blast cleaning nearly to White Metal Cleanliness, until at least 95% of each element of surface area is free of all visible residues.
3. **Commercial Blast (SSPC SP6):** Blast cleaning until at least 67% of each element of surface area is free of all visible residues.
4. **Brush-off Blast Cleaning (SSPC SP7):** Blast cleaning of all except tightly adhering residues of mill scale, rust and coatings, exposing numerous evenly distributed flecks of underlying metal.
5. **Solvent Cleaning (SSPC SP1):** Removal of all grease, oil, and dirt.

3.04 INSPECTION AND GUARANTEE

A. During and after final application of protective coatings, all metal surfaces shall be checked mechanically with an Elcometer, Mikrotest or other approved dry film thickness gage to insure that the specified dry film thickness has been attained.

B. Coating testing and repair of damages, flawed areas, holidays, or mishaps shall conform to applicable AWWA standards.

C. The Contractor shall guarantee all coating work for a period of one year following the date of final acceptance by the City and is hereby notified that the City will inspect the project prior to the expiration of the guarantee period. The Contractor will be notified of the eleventh month inspection by certified letter and asked to attend. Defects in workmanship and materials shall be repaired by the Contractor at no cost to the City.

3.05 PAINT SCHEDULE

A. **Items for Coating:** Items shall be coated as specified herein.

B. **Factory Painted Equipment:** Except as otherwise noted in the specifications, the following shall receive final finish coats at the factory. Paint shall conform to these specifications for appropriate service. Any areas damaged during shipment, installation, or initial testing shall be refinished as the original at no extra cost to the City. Factory painted items shall be of a color approved by the City.

- Bypass pipe fittings

C. **Items Not Painted:** Unless otherwise specified, the following items shall not be painted:

- Aluminum, brass, bronze, copper, plastic, rubber, stainless steel, chrome, or lead
- Encased piping or conduit
- Plastic pipe and conduit
- Galvanized steel framing and plates
- Nameplates
- Serial numbers
- Warning or operating instruction labels
- Gages
- Steel encased in concrete or masonry
- Concrete

** END OF SECTION **

SECTION 09900
WASTEWATER STRUCTURES COATING

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Preparing and coating of existing sanitary sewer concrete structures as indicated on the contract drawings.

B. Related Sections
   1. Section 03300 - Cast In Place Concrete.
   2. Section 03600 – Grouts
   3. Section 03700 - Chemical Grouting

1.02 REFERENCE STANDARDS

A. American Society for Testing and Materials (ASTM)
   1. D570 - Standard Test Method for Water Absorption of Plastics
   2. D638 - Standard Test Method for Tensile Properties of Plastics
   3. D695 - Standard Test Method for Compressive Properties of Rigid Plastics
   4. D790 - Standard Test Method for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials
   5. D4258 - Standard Practice for Surface Cleaning Concrete for Coating
   6. D4259 - Standard Practice for Abrading Concrete
   7. D7234 - Standard Test Method for Pull-Off Adhesion Strength of Coatings on Concrete Using Portable Pull-Off Adhesion Testers

B. National Association of Corrosion Engineers (NACE)

C. Society for Protective Coatings (SSPC):
   1. SP1 - Solvent Cleaning
   2. SP13 - Surface Preparation of Concrete

D. American Concrete Institute (ACI)
   1. RAP-3 – Spall Repair by Low Pressure Spraying
   2. 546R – Concrete Repair Guide

1.03 SUBMITTALS

A. The Contractor shall furnish detailed data pertaining to the surfaces of the structure(s) to be rehabilitated, the rehabilitation product, surface preparation, and installation for review.

B. Copies of manufacturer's technical information and application instructions for each material proposed for use. Specify exactly which product is being proposed for each coating type (as specified below). This may be accomplished through a reference table along with information on the various products, or by a separate, tabbed

section with information on products being submitted for each system in a separate tab of a binder. Submittal of general manufacturer's literature without detailing which product is proposed for each paint system will be unacceptable.

C. Letter from the Coatings Manufacturer certifying the Coatings Installer as factory trained and qualified.

D. Furnish copies of the final, approved submittal to the coatings installer so that it is clear which product is to be used for which each system.

E. Test reports from an independent testing laboratory confirming chemical resistance of coating for chemicals common to municipal wastewater treatment facilities.

PART 2 PRODUCTS

2.01 CEMENTITIOUS COATING

A. Both a cementitious and epoxy coating system shall be applied to all concrete surfaces as indicated on the project plans. Cementitious coating shall be compatible with the epoxy coating.

B. Cementitious coating shall meet the following physical properties:
1. Compressive Strength: > 9,000 psi per ASTM C-109 at 28 days
2. Flexural Strength: > 1,400 psi per ASTM C 293 at 28 days
3. Tensile Strength: > 650 psi per ASTM C 196
4. Bond Strength: > 2,000 psi per ASTM C 882
5. Shrinkage at 90% R.H: 0% per ASTM C 596

C. Products:
1. Parson Environmental: Parson MH Liner or Parson CA Liner 100
2. Raven Lining System: Raven 705CA or Raven 755
3. Madewell: Mainstay ML-72 or ML-CA
4. Or Approved Equal

2.02 EPOXY COATINGS

A. Epoxy Coatings shall be used on all concrete surfaces where indicated to be coated on the project plans.

B. Epoxy coatings shall meet the following physical properties:
1. Compressive strength: > 16,000 psi per ASTM D695
2. Flexural strength: > 12,000 psi per ASTM D790
3. Tensile strength: > 7,500 psi per ASTM D638

C. Products:
1. Parson Environmental: Parsonpoxy SEL-80
2. Raven Lining Systems: Raven 405
3. Madewell: Mainstay DS-5
4. Or Approved Equal

PART 3 EXECUTION

3.01 GENERAL

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.

B. Installation shall be in conformance with the manufacturer’s recommendations unless otherwise noted herein.

C. All protective coating materials shall be used within the manufacturer's recommended shelf life.

D. Storage: Coating materials shall be protected from exposure to inclement weather, and shall be thoroughly stirred, strained, and kept at a uniform consistency during application.

E. Mixing:
   1. Coatings of different manufacturers shall not be mixed together.
   2. Mixing of multi-component coating systems shall be performed in accordance with Manufacturer’s recommendations. Components must be mixed in complete batches only and used immediately.

3.02 SURFACE PREPARATION

A. Remove roots.

B. All oil, grease, and form release and curing compounds shall be removed by detergent cleaning in accordance with SSPC-SP1 before abrasive blast cleaning. Surface preparation shall be performed in accordance with the latest editions of the following standards:
   1. ASTM D4258: Standard Practice for Surface Cleaning Concrete for Coating
   2. ASTM D4259: Standard Practice for Abrading Concrete

C. Concrete surfaces and deteriorated concrete surfaces to be coated or lined shall be abrasive blast cleaned in accordance with SSPC-SP13 to remove existing coatings, laitance, deteriorated concrete, and to roughen the surface equivalent to the surface of the No. 60 grit flint sandpaper (surface profile of 2.5 to 4 mils).

D. Repair any cracks, bug holes, spalled areas, holes, leaks, or evidence of leaks with mortar or grout as recommended by the epoxy coating manufacturer.

E. Unless required for proper adhesion, surfaces shall be dry prior to coating. The presence of moisture shall be determined with a moisture detection device such as Delmhorst Model DB, or equal.

F. All surfaces to be coated shall be completely dry, clean, and contaminant-free prior to application.

G. Additional surface preparation per the epoxy coating manufacturer's recommendations.

3.03 APPLICATION OF MATERIALS

A. Coating shall be applied by a Manufacturer approved installer.

B. Coating shall be applied by spray methods in accordance with the manufacturer requirements and as follows:
   1. Material shall not be applied to frozen surfaces or surfaces that may freeze within 24 hours of application
   2. Application shall be at an angle as near perpendicular to the sub-surface as practicable with the application nozzle held 1 foot from the sub-surface. If nozzle flow is non-uniform and slugs, sand spots and wet sloughs result, the nozzle shall be directed away from the work area until the faulty conditions are corrected.
   3. Application shall be suspended if:
      a. Air velocity separates the cement from the aggregate at the nozzle.
      b. Ambient temperature approaches freezing and the newly placed coating can not be protected and insulated.
   4. Allow sufficient time between coating layers to allow for the previous layer to become tacky. Do not allow the coating to achieve final set between layers. If final set occurs between layers, prepare the surface in accordance with the manufacturer's requirements.

C. Whether spray or trowel application is used, the application shall be according to the principles of good workmanship outlined in SSPC-PA1-82 and shall provide a finish which is continuous, uniform in thickness, and verified free of pores or other defects using electrical discontinuity testing (high voltage spark testing.

D. Coating application thickness:
   1. Cementitious coating material shall be applied with the following minimum thickness:
      a. Grinder Pit, Below Grating: 1" Minimum thickness over all surfaces.
      b. Wet Well, Below High Water Mark: 1" Minimum thickness over all surfaces.
      c. Wet Well, Above High Water Mark: ½" Minimum thickness over all surfaces.
   2. Epoxy coating material shall be applied with the following minimum thickness:
      a. Grinder Pit, Below Grating: 1" Minimum thickness over all surfaces.
      b. Wet Well, Below Elevation Indicated on Plans: 1" Minimum thickness over all surfaces.
      c. Wet Well, Above Elevation Indicated on Plans: ½" Minimum thickness over all surfaces.

E. Coatings shall be applied to all walls, ceilings, inverts, and concrete surfaces as indicated on the plans.

3.04 COATING EXISTING STRUCTURES

A. Coat existing wastewater structures as indicated on the Drawings and specified herein:
   1. Prepare all interior surfaces in accordance with the product manufacturer's recommendations and these specifications.
   2. Repair any cracks, voids, and leaks with hydraulic cement mortar unless otherwise specified, in conformance with the product manufacturer's recommendations.
   3. Apply coating system to all interior floor/bench, wall, and ceiling surfaces in conformance with manufacturer's recommendations.
   4. Remove all existing conduits, pipes, clamps, supports, ducting, lights, brackets, and other items within the concrete structures prior to preparing and coating concrete surfaces. Replace and/or reinstall all items upon completion of coating system installation and curing.

3.05 FIELD TESTING

A. Proper, safe access shall be provided in locations where requested by the Engineer to facilitate inspection. Additional illumination shall be furnished when the Engineer requests. Proper ventilation and atmospheric monitoring shall be provided as well as all other safety equipment and precautions required by OSHA for a safe inspection in all areas.

B. The Engineer will conduct wet-film thickness testing. Contractor shall recoat any areas found deficient in thickness.

C. Holiday Testing:
   1. Engineer will visually inspect coverage for blisters, sags, and holidays. Contractor shall repair areas identified by this inspection prior to conducting holiday test.
   2. Contractor shall holiday test, in the presence of the Engineer, all coated surfaces.
      a. Holiday testing equipment and procedures shall be done in strict accordance with the latest edition of the NACE "Discontinuity (Holiday) Testing of Protective Coatings."
      b. Areas that contain holidays shall be marked and repaired or recoated in accordance with the coating manufacturer's printed instructions and then retested.
   3. Holiday detectors shall be of the following type:
      a. High voltage pulse-type holiday detector such as Tinker & Rasor Model AP-W, D.E. Stearns Co. Model 14/20, or equal shall be used. The unit shall be adjusted to operate at a voltage of at least 110 volts/mil desired thickness.

D. Adhesion Testing:
   1. Adhesion testing will be performed by an independent inspector hired and paid for by the City as deemed necessary by the City. The adhesion testing will be conducted after the coating system has cured per manufacturer instruction and in accordance with ASTM D7234.

2. The Contractor shall schedule adhesion testing with the City a minimum of one week prior to the desired testing date. The pull tests shall meet or exceed 200 psi and shall include subbase adhered to the back of the dolly or no visual signs of coating material in the test hole.
3. Pull tests with the results between a minimum 150 psi and 200 psi shall be acceptable if more than 50% of the subsurface adhered to the back of the dolly. If any test fails, a minimum of three additional locations in the section of the failure will be tested.
4. If any of the retests fail, all loosely adhered or unadhered liner in the failed area, as determined by the Engineer, shall be removed and replaced at the Contractor's expense. The costs for testing all reapplied coatings shall be paid for by the Contractor.
5. Adhesion testing is destructive and removes lining material. The Contractor shall repair all disturbed and removed areas of the lining material per the manufacturer's recommendations after testing is complete.

E. Any damaged areas, faulty areas, or discontinuities (pinholes) found during quality control inspection shall be repaired in accordance with the Manufacturer's recommendations.

3.06 ADJUSTMENT AND CLEANING

A. At the completion of the Work, Contractor shall remove all material and debris associated with the Work of this Section.

B. At the completion of the Work, Contractor shall clean all surfaces to which coatings were applied, as well as all adjacent, uncoated surfaces in a manner acceptable to the Engineer.

C. Coatings shall be protected from damage until Final Acceptance of all Work in the area that was coated. Coatings damaged in any manner by Contractor prior to Final Acceptance of all Work in that area shall be repaired or replaced in a manner acceptable to the Engineer at no additional cost to the Owner.

D. Just prior to Final Acceptance of all Work in the area that was coated, Contractor shall clean all coatings, as recommended by the manufacturer, to provide a finished product acceptable to the Owner.

** END OF SECTION **

SECTION 15050
BASIC MECHANICAL MATERIALS AND METHODS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: Basic design and performance requirements for mechanical equipment.

1.02 REFERENCES

A. American Society of Mechanical Engineers (ASME):
   1. ASME PTC 8.2 - Performance Test Code for Centrifugal Pumps.
   2. ANSI/ASME PTC 10 - Performance Test Code - Compressors and Exhausters.
   3. ANSI/ASME PTC 17 - Performance Test Code - Reciprocating Internal-Combustion Engines.
   4. ANSI/ASME PTC 11 - Performance Test Code - Measurement of Shaft Horsepower - Instruments and Apparatus.

B. American Bearing Manufactures Association (ABMA) Standards:
   1. ABMA 9 - Load Ratings and Fatigue Life for Ball Bearings.
   2. ABMA 11 - Load Ratings and Fatigue Life for Roller Bearings.

C. American Society for Testing and Materials (ASTM):
   1. A 36 - Standard Specification for Structural Steel.
   2. A 48 - Standard Specification for Gray Iron Castings.
   3. A 526 - Standard Specification for Steel Sheet, Zinc Coated by the Hot Dip Process, Commercial Quality.
   4. B-61 - Standard Specification for Steam or Valve Bronze Castings.
   5. B 62 - Standard specification for Composition Bronze or Ounce Metal Castings.
   6. E 527 - Standard Practice for Numbering Alloys and Metals (UNS).

D. American National Standards Institute/Hydraulic Institute Standards (ANSI/HI):
   1. ANSI/HI 1.1-1.5 - Centrifugal Pumps - Nomenclature, Definitions, Application, and Operation.
   2. ANSI/HI 1.6 - Centrifugal Pump Tests.

1.03 DEFINITIONS

A. Special Tools: Tools that have been specifically made for use on unit of equipment for assembly, disassembly, repair, or maintenance.

B. Resonant Frequency: That frequency at which a small driving force produces an ever-larger vibration if no dampening exists.

C. Rotational Frequency: The revolutions per unit of time usually expressed as revolutions per minute.

D. Critical Frequency: Same as resonant frequency for the rotating elements or the installed machine and base.

E. Peak Vibration Velocity: The root mean square average of the peak velocity of the vibrational movement times the square root of 2 in inches per second.

F. Rotational Speed: Same as rotational frequency.

G. Maximum Excitation Frequency: The excitation frequency with the highest vibration velocity of several excitation frequencies that are a function of the design of a particular machine.

H. Critical Speed: Same as critical frequency.

I. Free Field Noise Level: Noise measured without any reflective surfaces (an idealized situation); sound pressure levels at 3 feet from the source unless specified otherwise.

1.04 SYSTEM DESCRIPTION

A. General:
   1. Provisions specified under each technical equipment specification prevail over and supersede conflicting provisions as specified in this Section.
   2. Provide equipment and parts that are suitable for stresses which may occur during fabrication, transportation, erection, and operation.
   3. Provide equipment that has not been in service prior to delivery, except as required by tests.
   4. Like parts of duplicate units are to be interchangeable.
   5. When two or more units of equipment for the same purpose are required, provide products of same manufacturer.
   6. Equipment manufacturer's responsibility extends to selection and mounting of gear drive units, motors or other prime movers, accessories, and auxiliaries required for proper operation.
   7. When necessary, modify manufacturer's standard product to conform to specified requirements or requirements indicated on the Drawings and contained in Laws and Regulations.

B. Material Requirements:
   1. Materials: Suitable for superior corrosion resistance and for services under conditions normally encountered in similar installations.
   2. Dissimilar Metals: Separate contacting surfaces with dielectric material.

C. Vibration:
   1. Resonant Frequency: Ensure there are no natural resonant torsional, radial, or axial frequencies within 25 percent above or below the operating rotational frequencies or multiples of the operating rotational frequencies that may be excited by the equipment design.

D. Equipment Mounting and Anchoring:
   1. Mount equipment on cast iron or welded steel bases with structural steel support frames. Utilize continuous welds to seal seams and contact edges between steel members. Grind welds smooth.
   2. Provide bases and supports with machined support pads, dowels for alignment or mating of adjacent items, adequate openings to facilitate grouting, and openings for electrical conduits.
   3. Provide jacking screws in bases and supports for equipment weighing over 1,000 pounds.

4. Anchor equipment base to concrete pad. Determine number, size, type, and location of bolts, anchor bolts, or other connections.
5. Provide bolt sleeves for anchor bolts for heavy equipment. Adjust bolts to final location and fill sleeve with non-shrink grout.

E. Structural Design:
1. For equipment with operating weight of 400 pounds or more provide calculations for:
    a. Determination of operating weight and centroid of equipment.
        1) Operating weight is to be weight of unit plus weight of fluids or solids normally contained in unit during operation.
    b. Determination of seismic forces and overturning moments.
    c. Determination of shear and tension forces in connections.
    d. Design of connection details based on calculated shear and tension forces.

F. Equipment Units Weighing 50 Pounds or More: Provide with lifting lugs or eyes to allow removal with hoist or other lifting device.

1.05 SUBMITTALS

A. Product Data:
1. For each item of Equipment:
    a. Design features.
    b. Load capacities.
    c. Efficiency ratings.
    d. Material designations by UNS alloy number or ASTM Specification and Grade.
    e. Data needed to verify compliance with the Specifications.
    f. Catalog data.
    g. Name plate data.
    h. Clearly mark submittal information to show specific items, materials and accessories or options being furnished.

B. Shop Drawings:
1. Drawings for Equipment:
    a. Drawings that include outline drawings, cut-away drawings, parts lists, material specification lists, and other information required to substantiate that proposed equipment complies with specified requirements.
2. Outline drawings showing equipment, driver, driven equipment, pumps, seal, motor(s) or other specified drivers, variable frequency drive, shafting, U-joints, couplings, drive arrangement, gears, baseplate or support dimensions, anchor bolt sizes and locations, bearings, and other furnished components.
3. Installation and checkout instructions including leveling and alignment tolerances, grouting, lubrication requirements, and initial start-up procedures.
4. Wiring, control schematics, control logic diagrams and ladder logic or similar for computer based controls.
5. Recommended or normal operating parameters such as temperatures and pressures.
6. Alarm and shutdown set points for all controls furnished.

C. Calculations:
   1. Calculations and other information to substantiate base plates, supports, and anchor bolts meet minimum design strength requirements and seismic design.
   2. Calculations and other information to substantiate that operating rotational frequencies meet the requirements of this Section.
   3. Torsional Analysis of Power Transmission Systems: When torsional analysis specified in the equipment Sections, provide:
      a. Sketch of system components identifying physical characteristics including mass, diameter, thickness, and stiffness.
      b. Results of analysis including first and second critical frequencies of system components and complete system.

D. Quality Control Submittals:
   1. Source quality control reports and certified test data.
   2. Submit factory test reports before shipment.
   3. Certified static and dynamic balancing reports for rotating equipment.
   4. Field quality control reports and test data.
   5. Submit material test reports a specified in the equipment sections.

E. Operation and Maintenance Manuals:
   1. Submit prior to training of City's personnel.
   2. Make available at project site complete copy of manuals for use by field personnel and Engineer during start-up and testing of equipment.
   3. Include manufacturer and model number of every bearing; include calculated ball pass frequencies of the installed equipment for both the inner and outer raceways.
   4. Include motor rotor bar pass frequencies.

1.06 QUALITY ASSURANCE

A. Qualifications: Equipment manufacturer and system component manufacturers to have a minimum of 5 years experience in the design, manufacture, and assembly of the specified equipment and components with an established record of successful operation of such equipment and components.

B. References: Provide references from a minimum of 3 installations currently operating the same model equipment in continuous service for a minimum of 2 years under similar operating conditions. Reference information shall include location, service, contact person, and contact phone number.

C. Manufacturer's Field Service:
   1. Furnish services of authorized representative specially trained in installation of equipment.
      a. Visit project site and perform tasks necessary to certify installation.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Packing and Shipping:
   1. Equipment: Pack in boxes, crates, or otherwise protect from damage and moisture, dust, or dirt during shipment, handling, and storage.
   2. Bearings: Separately pack or otherwise suitably protect during transport.
   3. Spare Parts: Deliver in boxes labeled with contents, equipment to which spare parts belong, and name of Contractor.

B. Storage:
   1. Equipment Having Bearings: Store in enclosed facilities. Rotate units at least once per month or more often as recommended by the manufacture to protect rotating elements and bearings.
   2. Gear Boxes: Oil filled or sprayed with rust preventive protective coating.

C. Protection:
   1. Equipment: Protect equipment from deleterious exposure.
   2. Painted Surfaces: Protect against impact, abrasion, discoloration, and other damage.

1.08 PROJECT CONDITIONS

A. Environmental Requirements:
   1. Equipment for project is to be suitable for performance in a wastewater pumping plant environment and under following conditions:
      a. Ambient Temperatures: freezing to 95 degrees Fahrenheit.
      b. Relative Humidities: 60 to 100 percent.
      c. Other: Coastal fog.

1.09 SEQUENCING AND SCHEDULING

A. Equipment Anchoring: Obtain from equipment manufacturers' anchoring material and templates or setting drawings in time for anchors to be cast-in-place when concrete is placed.

B. Coordinate details of equipment with other related parts of the Work, including verification that structures, piping, wiring, and equipment components are compatible.

C. General Start-up and Testing of Equipment:
   1. Perform general start-up and testing procedures after operation and maintenance manuals for equipment have been received.
   2. Conduct functional testing of mechanical or electrical systems when each system is substantially complete and after general start-up and testing procedures have been successfully completed.

1.10 WARRANTY

A. Warranty: Where no specific term of warranty is provided in a technical specification, warrant equipment free of defects in material and workmanship for one year from the date of acceptance or date of first beneficial use of the equipment by the City; cover parts and labor.

B. Where a warranty exceeds one year, manufacturer’s warranty shall be issued in the City’s name.

1.11 MAINTENANCE

A. Special Tools:
   1. When specified, provide special tools required for operation and maintenance.
   2. Mark or tag and list such tools in maintenance and operations instructions. Describe use of each tool.

B. Spare Belts:
   1. When spare belts are specified, furnish 1 spare belt for every different type and size of belt-driven unit.
      a. Where 2 or more belts are involved, furnish matched sets.
      b. Identify as to equipment, design, horsepower, speed, length, sheave size, and use.
      c. Package in boxes labeled with identification of contents.

C. Spare Parts:
   1. Assume responsibility until turned over to City.
   2. Store in enclosed facilities.
   3. Furnish itemized list and match identification tag attached to every part.
   4. List parts by generic title and identification number.
   5. Furnish name, address, and telephone number of supplier and spare parts warehouse.

PART 2 PRODUCTS

2.01 MATERIALS

A. Ferrous Materials:
   1. Steel for Members used in Fabrication of Assemblies: ASTM A 36.
   2. Iron Castings: ASTM A 48, tough, close-grained gray iron, free from blowholes, flaws, and other imperfections.
   3. Galvanized Steel Sheet: ASTM A 526, minimum 0.0635 inch (16 gauge).
   4. Expanded Metal: ASTM A 36, 13 gauge, 1/2 inch flat pattern expanded metal.

B. Nonferrous Materials:
   1. Stainless Steel: Type 304 or 316 as specified; provide L grade where welding required.
   2. Bronze in Contact with Liquid: Composition of not more than 2 percent aluminum nor more than 6 percent zinc; UNS Alloy C83600, C92200, or C92700 in accordance with ASTM B 62, B-61, B-505, or B-584, when not specified otherwise.

C. Dielectric Materials for Separation of Dissimilar Metals:
   1. Neoprene, bituminous impregnated felt, heavy bituminous coatings, nonmetallic separators or washers, or other materials.

D. Non-Shrink Grout: As specified in Section 03600.

2.02 BEARINGS

A. Type: Oil or grease lubricated, ball or roller antifriction type, of standard manufacture.

B. Oil Lubricated Bearings: Provide either pressure lubricating system or separate oil reservoir splash type system.
   1. Oil Lubrication Systems: Sized to safely absorb heat energy normally generated in bearings under maximum ambient temperature of 15 degree Fahrenheit above the specified maximum ambient temperature specified under article, Project Conditions; provide external cooler when required, air cooled if water cooling

source not indicated on the Drawings. Equip with filler pipe and external level gauge.

C. Grease Lubricated Bearings, Except Those Specified to Be Factory Sealed: Fit with easily accessible grease supply, flush, drain, and relief fittings.
   1. Lubrication Lines and Fittings:
      a. Lines: Minimum 1/4 inch diameter stainless steel tubing.
      b. Multiple Fitting Assemblies: Mount fittings together in easily accessible location.
      c. Use standard hydraulic type grease supply fittings.
         1) Manufacturers: One of the following or equal:
            a) Alenite
            b) Zurk.

D. Ratings: Rated in accordance with ABMA 9 or ABMA 11 for L_{10} rating life of not less than 50,000 hours.
   1. Higher ratings, when specified in other Sections, supersede preceding requirement.

2.03 FABRICATION

A. Nameplates: Engraved or stamped on Type 304 stainless steel and fastened to equipment at factory in an accessible and visible location.
   1. Indicate Following Information as Applicable:
      a. Manufacturer's name.
      b. Equipment model number and serial number.
      c. Maximum and Normal rotating speed.
      d. Horsepower.
      e. Rated capacity.
      f. Service class per applicable standards.
   2. Nameplates for Pumps: Include:
      a. Rated total dynamic head in feet of fluid.
      b. Rated flow in gallons per minute.
      c. Impeller, gear, screw, diaphragm, or piston size.
   3. Gear Reduction Units: Include:
      a. AGMA Class of service.
      b. Service factor.
      c. Input and output speeds.

B. Bolt Holes in Equipment Support Frames: Do not exceed bolt diameter by more than 25 percent, up to limiting maximum diameter oversize of 1/4 inch.

C. Shop Finishing:
   1. Provide factory and field coating.
      a. Bases and Support Frames in Contact with Concrete or Other Material: Paint contacting surfaces with minimum of 2 coats of zinc chromate primer before installation or grouting.
      b. Shop Primer for Steel and Iron Surfaces, Unless Specified Otherwise:
         1) Manufacturers: One of the following or equal:
            a) Ameron, Amercoat 185 Universal Primer.
            b) Cook, 391-N-167 Barrier Coat.
            c) Kop-Coat, Pug Primer.

d) Tnemec, 37-77 Chem-Prime.
e) Valspar, 13-R-28 Chromox Primer.

c. Coat machined, polished, and nonferrous surfaces which are not to be painted with rust-preventive compounds.
1) Manufacturers: One of the following or equal:
a) Houghton, Rust Veto 344.
b) Rust-Oleum, R-9.

d. Coating for Ferrous Metal Surfaces, Except Stainless Steel: High solids polyamine epoxy.

e. Finish Painting of Motors: Shop finish paint with manufacturer's standard coating, unless otherwise specified.

2.04 SOURCE QUALITY CONTROL

A. As specified in the individual equipment sections of the Specifications.

PART 3 EXECUTION

3.01 EXAMINATION

A. Inspect all components for shipping damage, conformance to specifications, and proper torques and tightness of fasteners.

3.02 PREPARATION

A. Metal Work Embedded in Concrete:
1. Accurately place and hold in correct position while concrete is being placed.
2. Clean surface of metal in contact with concrete immediately before concrete is placed.

B. Concrete Surfaces Designated to Receive Grout:
1. Give surfaces heavy sandblasting treatment.
2. Clean surfaces of sandblasting sand, grease, oil, dirt, and other foreign material that may reduce bonding of grout.
3. Concrete Saturation: Saturate concrete with water. Concrete surface shall be damp concrete at time grout is placed.

C. Field Measurements:
1. Prior to fabrication of equipment, take measurements for installation of equipment and verify dimensions indicated on the Drawings. Ensure equipment and ancillary appurtenances fit within available space.

3.03 INSTALLATION

A. Install equipment in accordance with manufacturer's installation instructions and recommendations.

B. Lubrication Lines and Fittings:
1. Lines from Fittings to Point of Use: Support and protect.
2. Fittings:

a. Bring fittings to outside of equipment in manner such that they are readily accessible from outside without necessity of removing covers, plates, housings, or guards.
b. Mount fittings together wherever possible using factory-mounted multiple fitting assemblies securely mounted, parallel with equipment lines, and protected from damage.
c. Fittings for Underwater Bearings: Bring fittings above water surface and mount on edge of structure above.

C. Alignment of Drivers and Equipment:
1. Where drive motors or other drivers are connected to driven equipment by flexible coupling, disconnect coupling halves and align driver and equipment after complete unit has been leveled on its foundation.
2. Comply with procedures of appropriate Hydraulic Institute Standards, AGMA Standards, alignment tolerances of equipment manufacturers and the following requirements to bring components into angular and parallel alignment:
a. Maximum Total Coupling Offset (not the per plane offset): Not to exceed 0.5 mils per inch of coupling length for spacer couplings based on coupling length (not dial separation).
b. Utilize jacking screws, wedges, or shims as recommended by the equipment manufacturer and as specified in the equipment sections.
3. Use Reverse-indicator Arrangement Dial Type or Laser Type Alignment Indicators: Mount indicators on the driver/coupling flange and equipment/coupling flange. Alignment instrumentation accuracy to be sufficient to read angular and radial misalignment at 10 percent or less of the manufacturer's recommended acceptable misalignment.
4. Alignment and calculations to include measurement and allowance for thermal growth, spacer coupling length, indicator separation, and axial spacing tolerances of the coupling.
5. When alignment satisfies most stringent tolerance of system components, tighten anchor bolts and grout between base and foundation. Allow minimum 48 hours for grout to harden. After grout hardens, remove jacking screws, fully tighten anchor bolts, and recheck alignment. Correct alignment as required.
6. After operational testing is complete, dowel motor or drivers and driven equipment. Comply with manufacturer's instructions.

D. Grouting Equipment Bases:
1. Comply with manufacturer's installation instructions for grouting spaces, type of grout, and tolerances for level and alignments, both vertical and horizontal.
2. Grout base when piping connections are complete and in alignment with no strain transmitted to equipment.
3. Grout base when equipment is leveled and in alignment.
4. Place grout, filling voids under equipment bases including recesses between anchor bolts and sleeves.
a. Extend grout to edge of bases or bedplates and bevel at 45 degrees around units.
b. Finish surfaces with slope that prevents ponding water within grouted areas.

E. Special Techniques: Use applicable special tools and equipment, including precision machinist levels, dial indicators, and gauges as required in equipment installations.

F. Completed Equipment Installations: Comply with requirements for intended use and specified vibration and noise tolerances.

G. Warning Signs: Mount securely with stainless fasteners at equipment which can be started automatically or from remote locations.

3.04 FIELD QUALITY CONTROL

A. Test equipment as required by product manufacturer.

3.05 MANUFACTURER'S REPRESENTATIVE

A. Field Checkout: Before field testing and start-up, provide services of factory-trained field service representative to certify the equipment has been installed, aligned and checked in accordance with the manufacturers instructions and the Specifications.

B. Testing: Provide services of factory trained representative to observe and advise the Contractor during field quality control testing.

C. Training: When training is specified, provide services of factory-trained representative to perform training.

END OF SECTION

SECTION 15052
BASIC PIPING MATERIALS AND METHODS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: Basic piping materials and methods.

B. Related Sections:

1. Section 02700 – Polyvinyl Chloride (PVC) Pipe and Fittings
2. Section 02710 – High Density Polyethylene (HDPE) Pipe
3. Section 02770 – Sanitary Sewer Testing.

1.02 REFERENCES

A. American National Standards Institute

1. B 1.20.1 - Specifications of International Thread Standards

B. American Society of Testing and Materials (ASTM):

1. A 53 - Standard Specification for Pipe, Steel, Black, and Hot-Dipped, Zinc-Coated Welded and Seamless.
2. A 106 - Specification for Seamless Carbon Steel Pipe for High-Temperature Service.
3. A 262 – Standard Practices for Detecting Susceptibility to Intergranular Attack in Austenitic Stainless Steels
4. A 351 - Standard Specification for Castings, Austenitic, for Pressure-Containing Parts
5. B 62 - Standard Specification for Composition Bronze or Ounce Metal Castings
6. D 1784 - Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds

7. D 1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120
8. D 2240 - Test Method for Rubber Property - Durometer Hardness.
9. D 2564 - Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems
10. D 2672 - Standard Specification for Joints for IPS PVC Pipe Using Solvent Cement
11. B 42 - Standard Specification for Seamless Copper Pipe, Standard Sizes
12. B 88 - Standard Specification for Seamless Copper Pipe Water Tube

C. American Water Works Association

1. AWWA C115 - Flanged Ductile Iron Pipe with Ductile Iron or Gray Iron Threaded Flanges
2. AWWA C116 - Protective Fusion-bonded Epoxy Coatings for the Interior and Exterior Surfaces of Ductile Iron and Gray Iron Fittings
3. AWWA C207 - Steel Pipe Flanges for Waterworks Service

1.03 DEFINITIONS

A. Aboveground Piping: Piping within buildings, tunnels, or other structures without regard to elevation of piping, or exposed piping outside buildings and structures.

B. Underground Piping: Piping buried in soil or cast in concrete.

C. Underwater Piping: Piping below tops of walls in basins or concrete tanks containing water.

D. Wet Wall: Wall with water on at least one side.

1.04 SYSTEM DESCRIPTION

A. Piping Drawings:

1. Except in details, piping is indicated diagrammatically. Not every offset and fitting, or structural difficulty that may be encountered has been indicated on the Drawings. Sizes and locations are indicated on the Drawings.

2. Perform minor modifications to piping alignment where necessary to avoid structural, mechanical, or other type of obstructions that cannot be removed or changed.

    a. Modifications are intended to be of minor scope, not involving a change to the design concept or a change to the Contract Price or Contract Times.

B. Performance Requirements:

1. Restraining Piping:

    a. Restrain piping at valves and at fittings where piping changes direction, changes sizes, and at ends.

        1) When piping is underground use mechanical restraints.

        2) When piping is aboveground or under water, use mechanical or structural restraints.

        3) Determine thrust forces by multiplying the nominal cross sectional area of the piping by 2.5 times the pump shutoff head.

    b. Provide underground mechanical restraints at all valves, fittings, and where specified in the Piping Schedule or shown on the Drawings.

C. Connections to Existing Piping:

1. Expose existing piping to which connections are to be made with sufficient time to permit, where necessary, field adjustments in line, grade, or fittings.

    a. Provide sleeves, flanges, nipples, couplings, adapters, and other fittings needed to install or attach new fittings to existing piping and to make connections to existing piping.

D. Connections at Dissimilar Metals:

1. Connect ferrous and nonferrous metal piping, tubing, and fittings with dielectric couplings especially designed for the prevention of chemical reactions between dissimilar metals.

2. Nonferrous metals include aluminum, copper, and copper alloys.

E. Piping Alternatives:

1. Provide piping in accordance with this Section, unless indicated on the Drawings or specified otherwise.

2. Alternative Pipe Ratings: Piping with greater pressure rating than specified may be substituted in lieu of specified piping without changes to the Contract Price. Piping of different material may not be substituted in lieu of specified piping.

3. Valves in Piping Sections: Valves shall have the same pressure rating as the adjacent piping.

4. For flanged joints, where one of the joining flanges is raised face type, provide a matching raised face type flange for the other joining flange.

PART 2 PRODUCTS

2.01 LINK TYPE SEALS

A. Manufacturers: One of the following or equal:

1. Calpico, Inc.

2. Thunderline Corporation, Link-Seal.

B. Characteristics:

1. Modular mechanical type, consisting of interlocking neoprene or synthetic rubber links shaped to continuously fill the annular space between the pipe and wall opening.

2. Assemble links solely with stainless steel bolts and nuts to form a continuous rubber belt around the pipe.

3. Provide a stainless steel or glass reinforced nylon pressure plate under each bolt head and nut. Isolate pressure plate from contact with wall sleeve.

2.02 GASKETS

A. Gaskets for Steel Piping:

1. Suitable for pressures equal to and less than 150 pounds per square inch gauge, temperatures equal to and less than 250 degrees Fahrenheit, and raw sewage service.

2. Gasket Material:

a. Neoprene elastomer with minimum Shore A hardness value of 70.

b. Reinforcement: Inserted 13 ounce nylon fabric cloth for pipes 20 inch or larger.

c. Thickness: Minimum 3/32 inch thick for less than 10 inch pipe; minimum 1/8 inch thick for 10 inch and larger pipe.

3. Manufacturers: One of the following or equal:

4. Pipe 20 inches in Diameter and Larger:

a. Garlock, Style 8798.

b. John Crane, similar product.

5. Pipe less than 20 inches in Diameter:

a. Garlock, Style 7797.

b. John Crane, similar product.

B. Gaskets for Flanged Joints in Polyvinyl Chloride and Polyethylene Piping:

1. Suitable for pressures equal and less than 150 pounds per square inch gauge, with low flange bolt loadings, temperatures equal and less than 120 degrees Fahrenheit, polymer, chlorine, caustic solutions, and other chemicals, except chemicals which liberate free fluorine including fluorochemicals and gaseous fluorine.

2. Material: Viton Rubber; 0.125 inch thick.

3. Manufacturers: One of the following or equal:

a. Garlock.

b. John Crane, similar product.

2.03 PIPE AND FITTINGS

A. Sewer PVC Pipe and Fittings: Refer to Section 02700.

B. High Density Polyethylene (HDPE) Pipe and Fittings: Refer to Section 02710

C. Stainless steel pipe shall be seamless conforming to ASTM A262. Stainless steel shall be 316 unless otherwise noted.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verification of Existing Conditions:

1. Locate and expose existing structures, piping, conduits, and other facilities and obstructions that may affect construction of underground piping before starting excavation for new underground piping and appurtenances.

2. Verify sizes, elevations, locations, and other relevant features of existing facilities and obstructions. Determine conflicts for the construction of the new underground piping and appurtenances.

3. Make piping location and grade adjustments to resolve conflicts between new piping and existing facilities and obstructions.

3.02 WALL AND SLAB PENETRATIONS

A. Provide sleeves for piping penetrations through concrete walls, floors, ceilings, roofs, pilasters, columns, piers, and beams unless specified or otherwise indicated on the Drawings.

B. For piping 1 inch in nominal diameter and larger, provide sleeves with minimum inside diameters of 1 inch plus outside diameter of piping. For piping smaller than 1 inch in nominal diameter, provide sleeve of minimum twice the outside diameter of piping.

1. Arrange sleeves and adjacent joints so piping can be pulled out of sleeves and replaced without disturbing the structure.

2. Cut ends of sleeves flush with surfaces of concrete, masonry, or plaster.

3. Conceal ends of sleeves with escutcheons where piping runs through floors, walls, or ceilings of finished spaces within buildings.

4. Seal spaces between pipes and sleeves with link-type seals when not otherwise specified or indicated on the Drawings.

C. Cast couplings or wall pieces in walls for penetrations of buried rigid piping including steel and vitrified clay through structures.

1. Provide couplings or wall pieces with mechanical push-ons, or similar flexible joints at outside faces of walls.

2. Provide additional similar joints in piping at transition points between trenches and structure excavations.

3. For steel piping, single joints may be used in lieu of 2 joints. Locate single joints outside within 2 feet from outside faces of walls. Link Seal: Use 2 link seals where seal is used to seal at wet wall sleeves. Mount one seal on the inside face of the wall and the other on the outside face of the wall. Coordinate the inside diameter of the wall sleeve with the size of the seal to provide watertight sealing.

D. Where not indicated on the Drawings, penetrations for conditions other than those specified under the preceding subparagraphs shall be 1 of the 3 types specified in such subparagraphs found by Engineer to be the most suitable for the particular conditions.

3.03 EXPOSED PIPING

A. Install exposed piping in straight runs parallel to the axes of structures, unless indicated otherwise.

1. Install piping runs plumb and level, unless otherwise indicated on the Drawings. Slope plumbing drain piping with 1/8 inch per foot downward in the direction of flow. Slope digester gas piping to drip traps or low-point drains at minimum 1/2 inch per foot where condensate flows against the gas, or 1/4 inch per foot where condensate flows with gas.

B. Install exposed piping after installing equipment and after piping and fitting locations have been determined.

C. Do not transfer pipe loads and strain to equipment.

D. In addition to the joints indicated on the Drawings, provide unions, flexible couplings, flanged joints, and other types of joints or means which are compatible with and suitable for the piping system, and necessary to allow ready assembly and disassembly of the piping.

E. Assemble piping without distortion or stresses caused by misalignment.

1. Match and properly orient flanges, unions, flexible couplings, and other connections.

2. Do not subject piping to bending or other undue stresses when fitting piping. Do not correct defective orientation or alignment by distorting flanged joints or subjecting flange bolts to bending or other undue stresses.

3. Flange bolts, union halves, flexible connectors, and other connection elements shall slip freely into place.

4. Alter piping assembly to fit when proper fit is not obtained.

5. Install eccentric reducers or increasers with the top horizontal for pump suction piping.

3.04 BURIED PIPING

A. Bury piping with minimum 3-foot cover without air traps, unless otherwise indicated on the Drawings.

B. Where 2 similar services run parallel to each other, piping for such services may be laid in the same trench. Lay piping with sufficient room for assembly and disassembly of joints, for thrust blocks, for other structures, and to meet separation requirements of public health authorities having jurisdiction.

C. Laying Piping:

1. Lay piping in finished trenches free from water or debris. Begin at the lowest point with bell ends up slope.

2. Place piping with top or bottom markings with markings in proper position.

3. Lay piping on an unyielding foundation with uniform bearing under the full length of barrels.

4. Where joints require external grouting, banding, or pointing, provide space under and immediately in front of the bell end of each section laid with sufficient shape and size for grouting, banding, or pointing of joints.

5. At the end of each day's construction, plug open ends of piping temporarily to prevent entrance of debris or animals.

D. Buried metallic pipe, fittings, and valves shall be wrapped with polyethylene as specified in Section 02720.

3.05 CLEANING

A. Piping Cleaning:

1. Upon completion of installation, clean piping interior of foreign matter and debris. Perform special cleaning when required by the Contract Documents.

3.06 PIPING SCHEDULE

A. Abbreviations:

1. Abbreviations to designate piping include the following:

BF	Butt fusion
BS	Bell and spigot
CI	Cast iron
CL	Class, followed by the designation
DIP	Ductile iron piping
FL	Flanged
Ga	Gauge, preceded by the designation
GE	Grooved end joint
HDPE	High Density Polyethylene
NPS	Nominal pipe size, followed by the number in inches, pounds per square inch, or pounds per square inch, gauge.
PEE	Polyethylene encasement
PVC	Polyvinyl Chloride

SCH	Schedule, followed by the designation
SCRD	Screwed
SS	Stainless steel
	Sanitary Sewer
SSFM	Sanitary Sewer Force Main
STL	Steel
SW	Solvent Weld
VCP	Vitrified clay piping
WLD	Weld

END OF SECTION

SECTION 15061
PIPE SUPPORTS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: Supports for pipe, fittings, valves, and appurtenances.

B. Related Sections:

1. Section 05501 – Anchor Bolts
2. Section 05505 – Miscellaneous Metals.
3. Section 09800 – Coating Systems.
4. Section 15052 - Basic Piping Materials and Methods.

1.02 REFERENCES

A. American National Standard Institute or Manufacturer's Standardization Society (ANSI/MSS):

1. SP-58 - Standard for Pipe Hangers and Supports - Materials, Design, and Manufacture.
2. SP-69 - Standard for Pipe Hangers and Supports - Selection and Application.

1.03 SUBMITTALS

A. Shop Drawings: Include schedule, indicating where supports will be installed, and drawings of pipe support system components.

PART 2 PRODUCTS

2.01 PIPE SUPPORTS

A. Standard U-bolt: ANSI/MSS SP-69 Type 24.

1. Manufacturers: One of the following or equal:
   a. Anvil, Figure 137.
   b. Bergen-Paterson, Part 6510.
   c. B-Line Systems, Inc., Figure B3188.

B. Pipe Clamps: ANSI/MSS SP 69 Type 4.

1. Manufacturers: One of the following or equal:
   a. Anvil, Figure 212.
   b. Bergen-Paterson, Part 6100.
   c. B-Line Systems, Inc., Figure B3140.

d. Unistrut.

C. Clevis Hangers: ANSI/MSSS SP 69 Type 1

1. Manufacturers: one of the following or equal:

a. Anvil, Figure 590.

D. Anchor Bolts, Flush Shells, Powder Actuated Fasteners, and Concrete Anchors: As specified in Section 05501.

2.02 MATERIALS

A. Pipe Supports:

1. Stainless Steel (Type 316): Use in all locations unless noted otherwise on the Plans.

2. Hot-dip Galvanized Steel: Use in areas other than above and where specifically indicated on the Drawings. Hot-dip galvanize pipe support after fabrication.

3. Plastic, Aluminum, FRP and Other Miscellaneous Materials: Use where specifically indicated on the Drawings.

B. Fasteners:

1. As specified

PART 3 EXECUTION

3.01 INSTALLATION

A. Properly support, suspend, or anchor exposed pipe, fittings, valves, and appurtenances to prevent sagging, overstressing, or movement of piping; and to prevent thrusts or loads on or against connected pumps, blowers, and other equipment.

B. Carefully determine locations of inserts. Anchor to formwork prior to placing concrete.

C. Use flush shells only where indicated on the Drawings.

D. Do not use anchors relying on deformation of lead alloy.

E. Do not use stud type powder actuated fasteners for securing metallic conduit or steel pipe larger than 1 inch to concrete, masonry, or wood.

F. Suspend pipe hangers from hanger rods. Secured with double nuts.

G. Install continuously threaded hanger rods only where indicated on the Drawings.

H. Use adjustable ring hangers; or adjustable clevis hangers, for 6 inch and smaller diameter pipe.

I. Use adjustable clevis hangers for pipe larger than 6 inches in diameter.

J. Secure pipes with galvanized double nutted U-bolts or suspend pipes from hanger rods and

hangers.

K. Support Spacing:

1. Support 2 inch and smaller piping on horizontal and vertical runs at maximum 4 feet on center, unless otherwise specified.
2. Support larger than 2 inch piping on horizontal and vertical runs at maximum 6 feet on center, unless otherwise specified.
3. Support exposed polyvinyl chloride and other plastic pipes at maximum 5 feet on center, regardless of size.

L. Install Supports at:

1. Horizontal bends.
2. Both sides of flexible pipe connections.
3. Base of risers.
4. Floor penetrations.
5. Connections to pumps, blowers and other equipment.
6. Valves and appurtenances.

M. Securely anchor plastic pipe, valves, and headers to prevent movement during operation of valves.

N. Anchor plastic pipe between expansion loops and direction changes to prevent axial movement through anchors.

O. Support base fittings with metal supports or when indicated on the Drawings, concrete piers.

P. Size hanger rods, supports, clamps, anchors, brackets, and guides in accordance with ANSI/MSS SP 58 and SP 69.

Q. Do not use chains, plumbers' straps, wire, or similar devices for permanently suspending, supporting, or restraining pipes.

R. Support plumbing drainage and vents in accordance with California Plumbing Code.

S. Supports, Clamps, Brackets, and Portions of Support System Bearing Against Copper Pipe: Copper plated, copper throughout, or isolated with neoprene or polyvinyl chloride tape.

T. Where pipe is insulated, install over-sized supports and hangers.

U. Install insulation shield in accordance with ANSI/MSS SP 69, Type 40. Shield shall be galvanized steel unless specified elsewhere.

V. Install riser clamps at floor penetrations and where indicated on the Drawings.

W. Provide dielectric protection whenever fastening dissimilar metals.

X. Paint or Coat support system components as specified in Sections 09800.

END OF SECTION

SECTION 15810
DUCTWORK

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: This specification, in conjunction with the contract documents and design drawings, provides the minimum requirements for materials and operations used in the fabrication and installation of ductwork. Systems covered by this document include ventilation and exhaust for pressure classes from minus 10 inches to plus 10 inches water gauge. Operations include the specification of ductwork materials, gauges, pressure classifications, construction, duct liners, filters, dampers, connectors, supports, testing and certifications. This specification does not include ductwork requirements for materials handling systems. The materials, products, accessories, and methods listed in this specification shall be followed unless noted otherwise on the drawings.

1.02 REFERENCES

A. The latest edition of the following codes and standards shall be used. Where differences between Standards and this specification exist, this specification shall take precedence. Where Standards allow for the use alternate materials and methods, the contractor shall submit for approval a request to use alternate materials and methods before beginning work.

B. Sheet Metal and Air Conditioning Contractors' National Association (SMACNA)

HVAC Duct Construction Standards - Metal and Flexible
HVAC Duct Systems Design
Fire, Smoke and Radiation Damper Installation Guide for HVAC Systems
Accepted Industry Practice for Industrial Duct Design
HVAC Systems - Testing, Adjusting and Balancing
Round Industrial Duct Construction Standards
Rectangular Industrial Duct Construction Standards
HVAC Air Duct Leakage Test Manual
Seismic Restraint Guidelines for Mechanical Systems

C. National Fire Protection Association (NFPA)

80	Standard for Fire Doors and Windows
90A	Standard for Installation of AC and Ventilation Systems
90B	Standard for Installation of Warm Air Heating and AC Systems
255	Building Materials, Test of Burning Characteristics (same as ASTM E84)
820	Standard for Fire Protection in Wastewater Treatment and Collection Facilities

D. American Society for Testing and Materials (ASTM)

A240	Standard Specification for Heat-Resisting Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels
A480	Standard Specification for General Requirements for Flat Rolled Stainless Heat-Resisting Steel Plate, Sheet, and Strip

A653 Standard Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc-Iron Alloy-Coated by the Hot Dip Process
C232 Standard Test Method for Bleeding of Concrete
ASTM C 582 – Standard specification for contact – molded reinforced thermosetting plastic laminates for corrosion resistant equipment.
C916 Standard Specification for Adhesives for Duct Thermal Insulation
C1071 Standard Specification for Fibrous Glass Duct Lining Insulation
D638 Standard Test Method for Tensile Properties of Plastics
D790 Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
ASTM D 2996 – Standard specification for Filament-Wound Glass-Fiber-Reinforced Thermoset Resin Pipe.
ASTM D 3982 – Standard specification for contact-molded fiberglass ducts and hoods.
NPS 15-69 - Standards specification for Custom Contact-Molded Reinforced - Polyester Chemical - Resistant Process Equipment.
SMACNA Thermoset FRP Duct Construction Manual
E84 Standard Test Method for Surface Burning Characteristics of Building Materials
E477 Standard Test Method for Measuring Acoustical and Airflow Performance of Duct Liner Material and Prefabricated Silencers
E814 Standard Test Method for Fire Tests of Through Penetration Fire Stops

E. American Welding Society (AWS)

B2.2 Brazing Procedures and Performance Qualifications
D9.1 Sheet Metal Welding Code

F. Underwriter's Laboratories (UL)

181 Factory Made Air Ducts and Air Connectors
555 Standard for Safety Fire Dampers
555S Leakage Rated Dampers for Use in Smoke Control Systems
723 Test for Surface Burning Characteristics of Burning Materials (ASTM E84)

G. North American insulation Manufactures Association (NAIMA)

AH124 Fibrous Glass Duct Liner Standard

1.03 SUBMITTALS

General: Manufacturers, products, and model numbers cited in this specification are meant to serve as a guide to minimum standards set forth by this specification. Proposed substitutions that can meet these minimum standards are allowed for submittal and shall be included in the submittal package furnished to the town for consideration and approval, prior to commencement of work.

A. Shop Drawings: Submit shop drawings for the following items:

1. Plenums and plenum related items showing physical dimensions, joints, sealants, door construction and hardware.
2. Factory fabricated ducts, fittings and joining systems.
3. Firewall duct penetrations; fire and smoke dampers; louvers and access doors.

B. Submit Material Safety Data Sheets on sealants and adhesives.

C. Submit changes or alterations in ductwork layout, with supporting calculations showing that the modified design will not increase total pressure, before work commences. Submittals for proposed changes shall be stamped for approval prior to commencement of work.

D. Submit control-wiring diagrams for automatic dampers and other automated ductwork accessories.

E. Duct Coordination Drawings (Duct Shop Drawings)

F. Design Data – Seismic Design Calculations

1. Design Calculations for duct construction as specified in SMACNA

1.04 QUALITY ASSURANCE

A. Employ qualified sheet metal workers in accordance with SMACNA Duct Construction Standards.

B. Asbestos Free: Insulating and sealing materials must be certified to be free of asbestos.

C. Brazing: Certify brazing procedures, brazers, and operators in accordance with AWS B2.2 Brazing Procedures and Performance Qualifications.

D. Welding: Certify welding procedures, welding equipment and welders in accordance with AWS D9.1 Sheet Metal Welding Code.

E. Attachments, such as conduit and pipe, to ductwork are not permitted.

1.05 WARRANTY

A. Employ qualified sheet metal workers in accordance with SMACNA Duct Construction Standards. Ductwork system components furnished under this contract shall be guaranteed against defective design, materials, and workmanship for the full warranty period, which is standard with the manufacturer or supplier, but in no case less than one year from the date of system acceptance.

PART 2 PRODUCTS

2.01 MATERIALS

A. Rigid Ducts, Casings and Fittings: Shall be made from galvanized steel sheets of lock form quality per ASTM A653 with a G90 zinc coating (0.90 oz/ft2 both sides), unless otherwise shown on the contract documents. Sheets shall be free of pits, blisters, slivers, and ungalvanized spots.

B. Supports: Angle iron, channels, rods, and related supporting materials shall be galvanized.

C. Fasteners: Use galvanized rivets, screws, and bolts throughout.

D. Reinforcement: Provide galvanized steel or stainless-steel reinforcement shapes and plates where required.

E. Tie Rods: Use galvanized steel, 1/4-inch minimum diameter fasteners for ductwork 36 inch or less in length; use 3/8-inch minimum diameter for lengths longer than 36 in.

2.02 DESIGN AND CONSTRUCTION

A. General:

1. Contractor shall field verify duct routing configuration for exhaust and supply fans.
2. Construct all ducts, casings, and fittings of rigid, galvanized steel, unless otherwise shown in the contract documents.
3. Contractor is responsible for coordination between the ductwork trade and the other mechanical, electrical, and architectural trades.

B. Ductwork Pressure Classification

Unless otherwise indicated on the construction drawings, ductwork shall be constructed to meet the appropriate pressure class defined below.

1. All ductwork shall be capable of withstanding the calculated water gage pressure based on field determined plenum routing and sizing.

C. Plenums:

1. Contractor shall field verify duct routing configuration for exhaust and supply fans. Main air handling (equipment) plenum walls, doors, and roof shall be factory built as follows: 18 gauge galvanized steel, minimum, double-wall construction (perforated inner walls) 4 inch acoustical insulated casing (top and sides) to provide a "U"-value of 0.06 Btu/hr-ft²-°F, hinged access doors with 90° latching handles to all compartments (double-wall insulated doors with air-tight sealing gaskets). Doors shall be provided with 12”x12” double pane, hermetically sealed observation windows of wire-reinforced glass. Panels shall be provided with (end, bottom or top) supply and return duct openings, as shown on the drawings; return air and outside air dampers shall be furnished where indicated. Interior partition walls shall be perforated 20 gauge steel acoustic panels sandwiching 4" minimum thickness, 1.5 lb/cu.ft. rigid fiberglass insulation, reinforced to be rigid under all operating conditions.
2. All other plenums shall be factory or site built of 16 gauge galvanized metal panels. One end of panel shall be flanged 1” and opposite end formed with 1" double standing seam.

D. FRP Round Ductwork:

1. Manufacturer: Provide FRP duct as manufactured by one of the following without exception:
   a. Corrosion Composites by Monoxivent
   b. Yankee Plastics

c. Or equal

2. FRP – Fiberglass Reinforced Plastic ductwork and appurtenances, complete and in place, in accordance with the requirements of the Drawings.

3. All ductwork in the Wetwell shall be FRP.

4. Minimum Wall thickness will be in accordance with NPS 15-69, Table 2.

5. Duct with inside diameter of 20" (508mm) or less shall have a wall thickness of 0.125" (3.2mm); duct with inside diameter of 22" - 36" (559mm - 914mm)shall have a wall thickness of 0.1875" (4.8mm); duct with inside diameter of 38" (965mm) or greater shall have a wall thickness of 0.25" (6.4mm).

   a. Surfacing veil shall be C glass veil with a silane finish and a soluble binder.

   b. Chopped strand mat shall be type ECR glass minimum 1.5 oz/sq ft (458 g/sq m) with silane finish and styrene soluble binder.

   c. Continuous roving for chopper gun spray up shall be type E glass.

   d. Woven roving shall be type E glass minimum 24 oz/sq yd (814 g/sq m)

   e. Continuous roving for filament winding shall be type E glass with silane finish.

6. Minimum Hanger Spacing will be in accordance with ASTM D 3982, Table 1.

7. Construction:

   a. FRP shall be of filament wound construction with a PS 15-69 corrosion barrier. Cast duct with no reinforced internal corrosion barrier or press molded fittings will not be accepted.

   b. FRP duct shall be factory assembled to the greatest possible extent, with a minimum number of field joints.

   c. Maximum allowable deflection for any size ductwork shall be 0.50" (12.7mm) between supports and for any size of duct under worst case operating conditions.

   d. FRP ductwork shall be designed using a safety factor of 10 to 1 for pressure and 5 to 1 for vacuum without exception.

   e. Out of roundness of duct shall be limited to 1% of diameter.

   f. Length of flanged duct sections shall not vary more than 0.50" (12.7mm) at 70 degrees F (21 degrees C).

   g. Un-flanged duct sections shall be square on the ends in relation to the center axis within 0.125" (3.2mm) up to and including 24" (610mm) diameter and within 0.1875" (4.8mm) for all diameters greater than 24" (610mm).

8. Laminates:

   a. Resin shall be a premium grade of fire retardant vinyl ester with a flame spread rating of less than 25, I.D. “Class 1” of ASTM E84 “Standard Method of Test for Surface Burning Characteristics of Building Material”. Resin shall be AOC’s #K022, Ashland’s #FR992 or Reichhold #9300.

   b. Ductwork shall have a resin rich inner surface, an interior layer, a structural layer and an exterior layer with UV resistant coating.

c. Inner surface: Nominal 10 mils thick composed of a single ply of the “C “glass surfacing veil, having a resin content of 90%.

d. Interior layer: Nominal 90 mils thick composed of at least two layers of 1-1/2’’ chopped strand mat. Resin content shall be 75%.

e. Structural layer: Filament wound type E glass to meet minimum wall thickness as specified. The total wall thickness includes the inner surface.

f. Exterior UV resistant coating: Factory applied corrosion resistant gel coat with UV inhibitors. Light gray or white shall be used as the standard colors.

9. Fittings:

a. Fittings shall be hand lay-up construction fabricated from the same resin and have the same strength as the FRP duct.

b. The internal diameter of fittings shall be equal to the adjacent duct.

c. The centerline radius of all elbows shall be 1.5 times the diameter.

d. Elbows 24" (610mm) diameter and smaller shall be smooth radius. Elbows larger than 24" (610mm) diameter shall be mitered.

e. Elbows 45 degrees or less shall be at least two (2) miter/three (3) gore. Elbows greater than 45 degrees shall be at least four (4) miter/five (5) gore.

10. Flanges:

a. Provide flanged connections as required to flexible connectors, expansion joints, vessels, demisters, fans, silencers and other locations as shown.

b. Flanges shall be hand lay-up construction. Dimensions shall be in accordance with PS 15-69 – Table 2 and the duct dimension schedule.

c. Flange faces shall be perpendicular to the axis of the duct within 0.5 degree.

d. Flange faces shall be flat to within 0.0313" (0.8mm) up to and including 18" (457mm) diameter and within 0.0625" (1.6mm) for 20" (508mm) diameter and larger.

e. Gaskets shall be EPDM/Neoprene, full face and minimum 0.125" (3.2mm) thickness.

f. Bolts, nuts and washers shall be Type 316 stainless steel.

11. Joints:

a. Provide butt and wrap joints in accordance with ASTM D 3982.

b. Field weld materials shall be supplied by the duct manufacturer. Complete written and online video instructions shall be provided along with Material Safety Data Sheets.

c. Resin, catalyst and fiberglass materials shall be supplied in bulk for the total number of joints plus 20% extra.

12. Round FRP dampers shall be the butterfly type. FRP fabrication shall meet the corrosion requirements specified in this section for FRP ductwork.

a. Frame and blade: premium vinyl ester. Blade shall fully encapsulate shaft. Blades that bolt to a single side of the shaft will not be accepted.

b. Shaft: Pultruded vinyl ester

c. Bearings: EPDM/Neoprene

d. Pins and hardware: Type 316 stainless steel.

e. Shaft seals: EPDM/Neoprene

f. Isolation dampers will have full circumference EPDM/Neoprene seals.

g. Dampers shall have flanged ends or plain ends. Provide Type 316 stainless steel bolts, nuts and washers for flanged connections (By Others).

h. Balancing/Volume dampers shall have a fully adjustable slot with an extra hole drilled in the handle for contractor to "drill –and-pin in-place" once the system is balanced so handle cannot vibrate loose.

2.03 HANGERS AND SUPPORTS

A. General: Refer to SMACNA Duct Construction Standards - Metal and Flexible, Rectangular Industrial Duct Construction Standards, and Round Industrial Duct Construction Standards respectively for rectangular and round ductwork for installation of hangers and spacing.

1. Straps and angles shall be manufactured from galvanized steel; rods shall be manufactured from uncoated or galvanized steel.
2. Perforated iron band for duct support is prohibited.
3. Wire for duct support is prohibited.

B. Building Attachments: Shall be concrete inserts or structural steel fasteners compatible with building materials. Do not use powder-actuated fasteners. Screwed fasteners shall be load rated.

C. Exterior Ducts: Unless detailed otherwise on the drawings, exterior ducts supported on roofs shall be supported with structural steel angle or channel sized per SMACNA standards for trapeze hangers and supported with pipe or angle columns.

1. Hangers shall be spaced a minimum of 5' on center.
2. The minimum size of the trapeze hanger shall be 1-1/2" x 1-1/2"x 3/16" angle or 3 X 4.1 lbs. Channel
3. Minimum column supports shall be 2" diameter standard weight pipe and coordinated with roofing penetration requirements.

2.04 PRESSURE DIFFERENTIAL SWITCHES

A. Pressure differential switches shall be Dwyer Series 1900 Compact Low Differential Pressure Switches or equal.

B. Switch shall be capable of reading 0.07 to 20 inch water column with repetitive accuracy within 3%. Pressure switch shall be UL-FM listed and explosion proof.

2.05 SEALANTS

A. Self-adhering vinyl coated fabric duct tape is not permitted, except to temporarily seal the duct openings for contamination prevention.

B. Outdoor Ducts (without exterior insulation):

1. Polymeric rubber, resins, and reinforcing materials dispersed in solvent: 24 hour cure time, UV resistant, operational temperature range of -20 to +150 °F, manufactured by United McGill, type Uni-Weather or approved equal.

C. Indoor Ducts and Outdoor Ducts with Exterior Insulation:

1. Ductwork: Water based, vinyl acrylic polymeric sealant; nonflammable; fire retardant; operational temperature range of -25 to 200 °F, 48 hour cure time. Manufactured by Ductmate, type Pro-Seal or approved equal.

2. Pressurized Ductwork: Ductwork that is to be sealed while under pressure shall be sealed with water based mastics with fiberglass reinforcing and with short curing times. Manufactured by Versa Grip, type 102 (Hard Cast) or approved equal.

D. Fire Stopping: Seal ductwork penetrations to halt the spread of fire, water and smoke through firewalls and floors and as indicated on contract drawings with fire resistant sealant. Maximum allowable flame spread, as tested by ASTM E814, is 25 with a smoke-developed rating no higher than 50.

PART 3 EXECUTION

3.01 EXAMINATION

A. Construct and install ducts to SMACNA HVAC Duct Construction Standards Metal and Flexible, SMACNA Round Industrial Duct Construction Standards, or SMACNA Rectangular Industrial Duct Construction Standards (as per Part 2 “Products”) and this specification.

B. Ductwork installation shall not proceed, until representatives from the other contracting trades have been consulted to ensure that there are no layout or installation conflicts, unless otherwise directed by the District.

C. Structural conditions of the building may indicate that modifications to the ductwork are necessary. Dimensions on drawings indicate free inside area. Actual duct dimensions may need to be altered for insulation allowance when required. Ducts shall be transitioned or divided as may be required; whenever this is necessary, the equivalent area shall be maintained. Such corrections shall be approved and directed by the District, before modifications are started.

D. Exit passageways, stairs, ramps and other exits shall not be used as a part of the air return, supply or exhaust.

E. Installation and workmanship shall be such that the system is free from buckling, warping, breathing (oil canning), and vibration. Installation must conform to the requirements set forth in NFPA 90A and 90B.

3.02 PREPARATION

A. Open ends of ducts shall be covered and sealed with duct tape during installation to prevent debris from contaminating system.

3.03 INSTALLATION

A. Metal Ductwork:

1. Install with a minimum of 4" separation from earth to the duct or insulation finish.
2. Securely fasten at each change in direction.
3. Install branch connections and couplings tight to the duct wall surface with a minimum of projection into duct. Secure with sheet metal screws at intervals of 12 inches with a minimum of 3 screws in each connection.

B. FRP Ductwork:

1. FRP ducts shall be installed in a neat and workmanlike manner, properly aligned and cut from measurements taken at the site to avoid interferences with structural members, architectural features, openings and equipment.
2. Supports and anchors: All ducting shall be firmly supported with fabricated or commercial hangers or supports in accordance with SMACNA requirements. Where necessary to avoid stress on equipment or structural members, the ducts shall be anchored or harnessed. Expansion joints and guides as shown on drawings shall compensate for expansion due to temperature differences.
3. Support duct risers in accordance with ASHRAE and SMACNA as indicated.

C. Sealing Ductwork:

1. 0"-2" w.g. classification: Transverse joints shall be sealed as per SMACNA guidelines for Seal Class C using products listed in Section 2.
2. Greater than 2" w.g. positive or ½" negative classification: Joints, seams and penetrations shall be sealed as per SMACNA guidelines for Seal Class A. The shop procedure for sealing ducts shall be equivalent to the following: before fittings and joints are assembled, duct adhesive shall be applied, using a pump-type oil can, to rivets, grooved seams, and tap-off collars on the internal side of the metal. Pittsburgh lock pocket shall be flooded with adhesive, using pump-type oil can, and the duct assembled. Duct sealer shall be brushed around reinforcing corners, rivets, notches and tap-off collars after duct is assembled. Where joints are not accessible for proper sealing, hand holes should be cut in the duct and joints sealed from the inside. Fabricate hand hole covers and cover the holes with insulation. Special care shall be taken to seal all duct corners.

3.04 HANGERS AND SUPPORTS

A. Metal strapping for supporting and hanging ductwork and VAV boxes may be attached to metal roof decks with the following conditions;

1. The metal roof deck is 22 gauge or heavier.

2. For round ductwork 18 inch diameter or less and rectangular ductwork having a perimeter of 96 inches or less and duct thickness of 20 gauge or lighter.

3. Metal strapping must be attached to the side flute of the metal deck with one each No. 10 Buildex screw (or other equal load rated fastener) at each end for U-shaped straps and two each No. 10 screws for single point attachments.

4. VAV boxes weighing 110 lbs. or less. VAV boxes shall be supported separately from ductwork and piping.

B. Hangers shall be installed plumb and shall present a neat appearance.

C. Strap hangers shall extend the full depth of the duct, bend and extend 1 inches under and against the bottom of the duct.

D. Attach hangers to the ducts using rivets or screws of appropriate sizes 6 inches on center (minimum of 2 each side) and on the bottom return.

E. All ducts shall be rigidly supported.

1. Where vertical ducts pass through floors or roofs, supporting angles shall be attached to ducts and to the structure.

2. Place supporting angles on at least two sides of the duct.

F. Reference Section 2 for Hangers and Supports construction and spacing data.

3.05 CONNECTORS

A. Provide flexible connections, not less than 4 inches wide, constructed of approved fireproof, waterproof, non-asbestos, glass fabric, at the inlet and outlet connection of each fan unit, securely fastened to the unit and to the ductwork by a galvanized iron band provided with tightening screws. There shall be no metal-to-metal contact at flexible connections. There shall be no stretching of the flexible material at flexible connections. This connection shall be UL listed, to meet NFPA 90 requirements and the following applications;

1. Indoor Supply/Return Air: Neoprene coated glass fabric, minimum 30 oz./sq.yd., Ventfabrics - “Ventglas” or DuroDyne - “Neoprene”.

2. Outdoor Supply/Return Air: U.V. resistant Hypalon coated glass fabric, minimum 24 oz./sq.yd. Ventfabrics – “Ventlon” or DuroDyne – “Durolon”.

3. Laboratory/Chemical Exhaust: Teflon coated glass fabric, minimum 16 oz./sq.yd., Ventfabrics – “Ventlel”.

B. Control Dampers: Control dampers shall be furnished as required to meet the performance criteria specified in section 23 34 00 and as listed on the drawings for minimum ventilation flow rates. Contractor shall adjust dampeners as needed to provide the required ventilation flow rate as identified in the specifications and as required by NFPA 820.

3.06 PLENUMS

A. Panels shall be assembled by interlocking the flanged end with the double standing seam and bolting on 18" centers. Seams shall project into the airside of the apparatus casings. Sealer shall be poured into, or plenum tape wrapped around the double seam prior to assembly. Joint shall be assembled immediately after sealer is applied. Paint outside of seam with sealer and allow 24 hours to dry before applying air pressure.

B. Panels shall be braced rigidly in place by 1-1/2" x 1-1/2" x 1/8" angles spaced on 4'-0" centers maximum and run continuous for the full length or width of the casings.

C. Casings shall be secured to concrete curbs on floors, or walls by a 2" x 2" x 3/16" toe angle, gasketed between the casing and the toe angle and gasketed or grouted between the toe angle and the floor. The toe angles shall be secured to the floor or wall by 1/4" bolts 1' -0" o.c., shot into the floor or the wall or 1/4" "J" bolts set in concrete 1'-0" o.c., through the flange angles of the panels. The toe angles shall run continuously for the full length of the casing in contact with the floor or wall. Seal joints airtight with sealer.

D. Rivets and bolts through the casing shall be gasketed.

E. Casings shall be constructed according to SMACNA HVAC Duct Construction Standards - Metal and Flexible.

3.07 DUCT PENETRATIONS

A. Ducts through masonry openings and along edges of all plenums at floors and walls, shall be provided with a continuous 2" x 2" x 1/8" galvanized angle iron which shall be bolted to the construction and made airtight to the same by applying silicone caulking compound. Sheet metal at these locations shall be bolted to the angle irons.

B. Ducts through drywall or plaster walls and ceilings shall be finished with a 22 gage galvanized steel flange neatly installed.

3.08 INSPECTION AND TESTING

A. The Contractor shall be responsible for providing a joint and cooperative effort to coordinate the test and balance.

B. All finished installations shall be carefully inspected for proper joints and sufficient supports, anchoring, interference and damage to duct, fittings and gel coat. Damage shall be repaired to the satisfaction of the Engineer.

C. Prior to enclosure or buying, all ducting systems shall be pressure tested at 1-1/2 times the maximum working pressure. The contractor shall furnish all test equipment, labor, materials and devices at no extra cost to the owner.

D. Leakage may be determined by loss of pressure, soap solution, chemical indicator or other positive and accurate method. All fixtures, devices or other accessories which are to be connected to the lines and which would be damaged if subjected to the test pressure shall be disconnected and ends of the branch lines plugged or capped as required during the test procedures.

E. Leaks shall be repaired to the satisfaction of the Engineer and the system shall be re-tested until no leaks are found.

3.09 CLEANING

A. Ductwork shall be cleaned as it is being installed, to remove oil film and dust allowing sealants, such as silicone caulk, to cure before duct is cleaned and sealed.

END OF SECTION

SECTION 15830
HVAC FANS

PART 1 GENERAL

1.01 WORK INCLUDED

A. Centrifugal Roof Mounted Exhaust and Supply Fans, Greenheck Model CUE, RSQ,SP.

1.02 REFERENCES

A. AMCA 99, “Standards Handbook”

B. ANSI/AMCA Standard 204-96, “Balance Quality and Vibration Levels for Fans”

C. ANSI/AMCA Standard 210-99, “Laboratory Methods of Testing Fans for Aerodynamic Performance Rating”

D. AMCA Publication 211-05, “Certified Ratings Programme – Product Rating Manual for Fan Air Performance”

E. AMCA Standard 300-96, “Reverberant Room Method for Sound Testing of Fans”

F. AMCA Publication 311-05, “Certified Ratings Programme – Product Rating Manual for Fan Sound Performance”

G. AMBA - Method of Evaluating Load Ratings of Bearings ANSI-11 (r1999).

H. OSHA guideline 1910.212 – General requirements for Machine Guarding. (www.osha.gov)

I. OSHA guideline 1926.300 – General requirements for safe operation and maintenance of hand and power tools. (www.osha.gov)

J. OSHA guideline 1910.219 – General requirements for guarding safe use of mechanical power transmission apparatus. (www.osha.gov)

K. UL Standard 705, “Power Ventilators”

1.03 SUBMITTALS

A. Provide dimensional drawings and product data on each tubular centrifugal fan.

B. Provide fan curves for each fan at the specified operation point, with the flow, static pressure and horsepower clearly plotted.

C. Provide inlet sound power readings for the eight octave bands.

D. Strictly adhere to QUALITY ASSURANCE requirements as stated in section 1.4 of this specification

1.04 QUALITY ASSURANCE

A. Performance ratings: Conform to AMCA standard 211 and 311. Fans must be tested in accordance with ANSI/AMCA Standard 210-99 and AMCA Standard 300-96 in an AMCA accredited laboratory. Fans shall be certified to bear the AMCA seal for air and sound performance.

B. Classification for Spark Resistant Construction Conform to AMCA 99.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly indicating manufacturer, material, products included, and location of installation.

B. Storage: Store materials in a dry area indoor, protected from damage, and in accordance with manufacturer's instructions.

C. Handling: Handle and lift fans in accordance with the manufacturer's instructions. Protect materials and finishes during handling and installation to prevent damage. Follow all safety warnings posted by the manufacturer.

PART 2 PRODUCTS

2.01 GENERAL

A. Exhaust Fans: Shall be Greenheck CUE, SP or equal

1. All exhaust fans shall be direct driven where available. If direct drive is not available, belt driven fans shall be supplied.

B. Supply Fans: Shall be Greenheck RSQ or equal

1. All exhaust fans shall be direct driven where available. If direct drive is not available, belt driven fans shall be supplied.

C. Minimum Fan Performance Criteria

1. Supply Fan (Control Room/Drywell/Bathroom)
    1) 2,400 CFM
    2) 0.75 S.P. (in. of Water)
2. Exhaust Fan (Control Room):
    1) 920 CFM
    2) 0.1 S.P. (in. of Water)
3. Exhaust Fan (Drywell):
    1) 1360 CFM
    2) 0.5 S.P. (in. of Water)
4. Exhaust Fan (Bathroom):
    1) 50 CFM
    2) 0.1 S.P. (in. of Water)

5. Supply Fan (Wetwell)

    1) 2,450 CFM
    2) 0.1 S.P. (in. of Water)

6. Exhaust Fan (Wetwell)

    1) 2,510 CFM
    2) 0.15 S.P. (in. of Water)

D. Base fan performance at standard conditions (density 0.075 Lb/ft3).

E. Contractor shall determine static pressures based on field verified ducting configurations. Fans selected shall be capable of accommodating static pressure and flow variations of +/-15% of determined values.

F. Fans are to be equipped with lifting lugs.

G. After fabrication all carbon steel components shall be cleaned and chemically treated by a phosphatizing process to insure proper removal of grease, oil, scale, etc. Fan shall then be coated with a minimum of 2-4 mils of Permatector (Polyester Urethane), electrostatically applied and baked. Finish color shall be industrial gray. Coating must exceed 1,000-hour salt spray under ASTM B117 test method.

H. Supply fans shall be supplied with insect screen on the intake.

I. Supply fans shall be supplied with 2-inch washable aluminum filters.

2.02 FAN HOUSING AND OUTLET

A. Housing shall have a rigid internal support structure.

B. Fan housing shall be constructed of rolled steel with a continuous seam weld.

C. Housing and bearing support shall be constructed of welded structural steel members to prevent vibration and rigidly support the shaft and bearings.

D. Either an OSHA compliant weatherhood, or an OSHA compliant belt guard shall be included to completely cover the motor pulley and belt(s) as required.

2.03 FAN WHEEL

A. The fan wheel shall be of the non-overloading backward inclined centrifugal type. Wheels shall be statically and dynamically balanced to balance grade G6.3 per ANSI S2.19.

B. Wheel shall be constructed with completely welded aluminum. The maximum pressure capabilities shall be 4.5 inches W.G.

C. Aluminum parts shall not require protective coating.

D. The wheel and fan inlet shall be carefully matched and shall have precise running tolerances for maximum performance and operating efficiency.

2.04 FAN MOTORS AND DRIVE

A. Fans shall be direct driven where available. If direct drive is not available, fans shall be supplied with belt driven motors.

B. Motors shall meet or exceed EPACT (Energy Policy ACT) efficiencies. Motors to be NEMA T-frame, 1800 or 3600 RPM, Open Drip Proof (ODP) or Totally Enclosed Fan Cooled (TEFC) with a 1.15 service factor.

C. Drive belts and sheaves shall be sized for 150% of the fan operating brake horsepower, and shall be readily and easily accessible for service, if required.

D. Fan shaft to be turned and polished steel that is sized so the first critical speed is at least 25% over the maximum operating speed for each pressure class.

E. Fan shaft bearings shall be Air Handling Quality, bearings shall be heavy-duty grease lubricated, self-aligning or roller pillow block type.

F. Air Handling Quality bearings to be designed with low swivel torque to allow the outer race of the bearing to pivot or swivel within the cast pillow block. Bearings shall be 100% tested for noise and vibration by the manufacturer. Bearings shall be 100% tested to insure the inner race diameter is within tolerance to prevent vibration.

G. Bearings shall be selected for a basic rating fatigue life (L-10) of 80,000 hours at maximum operating speed for each pressure class {Average Life or (L-50) of 400,000 hours}.

H. Bearings shall be fixed to the fan shaft using concentric mounting locking collars, which reduce vibration, increase service life, and improve serviceability. Bearings that use set screws shall not be allowed.

I. Bearings shall have extended lube lines with Zerk fittings to allow for lubrication.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine areas to receive fans. Notify the Engineer of conditions that would adversely affect installation or subsequent utilization and maintenance of fans. Do not proceed with installation until unsatisfactory conditions are corrected.

3.02 INSTALLATION

A. Install fans systems as indicated on the contract drawings.

B. Contractor shall install new fans on the existing roof curbs. Contractor shall fabricate roof curb adapters to accommodate the existing roof curb dimensions. Contractor shall inspect existing roof curbs prior to installation and notify the City of any issues that may prevent proper installation of the fans.

C. Install fans in accordance with manufacturer instructions.

END OF SECTION

SECTION 16010
ELECTRICAL GENERAL

PART 1 GENERAL

1.01 SCOPE OF WORK

A. The following list of components and areas of work is a summary of the work required in the electrical and controls portion of the Drawings and Specifications. The list is not comprehensive of the total work required nor is it in any specific order. It is merely being provided as an aid to the bidder. Work not listed herein, but described in the plans or Specifications, is also part of the overall scope of work.

1. Ventilation Control panel:
    a. Systems Integrator to provide detailed shop-level design submittal, furnish equipment, assemble, wire, test, and complete all test forms pertaining to control panels as part of their scope of work.
    b. System Integrator to perform factory and field testing as required for this project. Instrumentation calibrations and I/O checkout must be complete prior to Operational Testing.
    c. Connect alarms to Security System I/O point as defined by City.
2. Instrumentation
    a. Systems Integrator to select, furnish, configure, test, and complete test forms pertaining to instrumentation as part of their scope of work.
3. Disconnects, conduit, junction boxes, pull boxes, wire, and grounding system, for equipment interconnection, and operation.
    a. Contractor to label conduits, wire, and equipment per specifications.
4. Site electrical devices, lights and receptacles.
5. System startup, calibration, testing and documentation.

B. Electro-mechanical equipment to be installed in this project may be specified in other divisions but will interface to equipment provided under Electrical Specifications. Obtain submittals for those devices, review, coordinate and provide all interfacing equipment, software, communications, I/O, and testing to integrate the equipment to the extent possible and as intended.

C. Install electrical and control portion of electro-mechanical equipment specified in other sections. Reference those Specifications, pertinent details, and follow all manufacturer instructions to erect, install and commission equipment. Furnish all electrical equipment, interconnecting wire, and make connections to place equipment in operation.

D. All electrical equipment and materials, and methods - including installation, calibration, and testing - shall conform to the applicable codes and standards listed in this and other Sections. All electrical materials and work shall conform to published standards of the National Electric Code (NEC) current issue, Institute of Electrical and Electronic Engineers (IEEE), and Underwriters Laboratories Inc (UL).

1.02 RELATED SPECIFICATIONS

A. The following specification sections are part of the [Electrical Specifications].

Section	Description
16110	Conduit and Boxes
16120	Low Voltage Wire and Data Cable
16450	Grounding
16600	Factory and Field Testing
16905	Control Panels
16940	Instrumentation

B. Owner, Engineer, Construction Manager, and City are used within Electrical Specifications and are interchangeable. They are all representatives of the Owner, in this case, the City of Rohnert Park

1.03 QUALIFICATIONS AND REQUIRED WORK SCOPE

A. Electrical Contractor / Certified Electrician
   1. Management and installation of the entire electrical and control system required for this project shall be by an Electrical Contractor or Certified Electrician (EC/CE) meeting qualifications as defined herein.
   2. EC/CE shall select, furnish, and install all commodity electrical materials (conduit, wire, supports, fittings, ductbanks, etc) that are generally not "custom" or uniquely manufactured for this project. Custom electrical panels, controls, and instrumentation shall be furnished by Systems Integrator but installed by EC/CE.
   3. The EC/CE shall meet the following minimum qualifications:
      a. Has a current C10 Electrical Contractor's License and/or project Foreman who is a Californina Certified Electrician issued by the State of California Department of Industrial Relations.
      b. EC/CE shall comply with State law which requires that all personnel installing electrical components are certified by the State of California as "Electrician" or "Electrician Trainee." Trainees may install electrical components only under direct supervision of a certified Electrician.
      c. EC/CE shall have sufficient qualified personnel to staff the project and meet the construction schedule as defined by the Contract requirements or as approved during the submittal process.
      d. EC/CE shall be regularly engaged in similar industrial power and controls electrical work.
      e. EC/CE shall have successfully performed work of similar or greater complexity (as measured in contract value on industrial power and controls projects) on at least three (3) previous projects.
      f. EC/CE must be competent in performance, supervision and coordination of work required and performed by equipment suppliers or other specialty subcontractors.
      g. EC/CE shall be capable of looking at electrical equipment submittals, prior to installation, comparing hookup requirements to the Drawings, and notifying Engineer of any deficiencies.

h. EC/CE shall be competent in methods and materials execution and selection associated in the type of electrical and instrumentation work indicated in Drawings and specified in this Division.

i. EC/CE shall be familiar with and understand codes and requirements from NFPA70, NFPA110, and all other governing national or local codes.

j. EC/CE shall know and understand common terms and abbreviations used in this Industry. Not all terms and abbreviations will be defined in the Drawings and Specifications.

4. If the EC/CE does not meet the qualifications, the EC/CE may be stopped from doing further work, rejected, removed, and/or required to meet qualifications prior to the resumption of work.

B. System Integrator

1. Systems Integrator shall be a supplier to the Electrical Contractor or Certified Electrician and must be competent in performance, supervision and coordination of work required in this contract.
2. This includes, but is not limited to, all work necessary to select, furnish, construct, supervise installation, configure, calibrate, test, and place into operation all transmitters, instruments, control panels, motor controls, alarm equipment, communications, monitoring equipment, and accessories.
3. The System Integrator shall provide a Project Engineer with one year (minimum) prior experience on similar sized projects. This Project Engineer shall coordinate the technical aspects of this project and prepare the submittals and drawings. The Project Engineer shall attend coordination meetings when specifically requested by the Engineer.
4. The System Integrator (SI) shall meet the following minimum qualifications:
   a. SI shall be regularly engaged providing electrical and control systems for industrial projects.
   b. Manufacturing facility within 200 road miles of project location.
   c. SI shall be capable of labeling all electrical panels as manufactured or customized by the System Integrator with appropriate Underwriters Laboratories (UL) label prior to factory testing or shipment to project site.
   d. SI shall have successfully completed work of similar or greater complexity and on similar facilities on at least 5 previous projects under the present company name.
   e. SI shall be actively engaged in the following disciplines for the last 5 consecutive years.
      1) Design and manufacturing of custom Control Panels, Motor Controls, and associated devices and equipment as specified in this division.
      2) Programming and commissioning of SCADA, PLC and Operator Interface hardware.
      3) Instrumentation - selection, purchase, calibration, start-up and commissioning.
      4) Testing, calibration, start-up, and commissioning of control systems.
   f. SI shall have a staffed and equipped service facility with personnel and equipment required to provide on-site field service to troubleshoot, diagnose, and repair the control system.

1.04 CONTRACT DOCUMENTS

A. The resolution of conflicting information within the contract electrical documents shall put precedence on electrical Drawings over that of electrical Specifications.

B. The Drawings and Specifications are intended to be descriptive of the type of electrical system to be provided with sufficient detail to construct. Minor omission of detail shall not relieve a qualified contractor from the obligation to provide a complete operational system if it can be determined that the particular detail is usual and customary for similar systems.

C. The following Specifications may incorporate specific equipment or materials that do not have equal equipment listed. These items are standards because of their familiarity, serviceability, and/or spare parts inventory. However, equal alternate equipment or materials (noted in the submittal cover letter) will be considered for use on this project if submitted. The Engineer may reject said equipment for the purpose of adherence to standards.

D. Contract Drawings are diagrammatic and indicate general arrangement of systems and equipment.
   1. Exact locations and layouts of electrical products shall be defined during submittal, assembly, or field fit during construction. Field measurements take precedence over dimensioned drawings. Drawing intent is to show initial size, capacity, approximate location, orientation, and general relationship of equipment in area shown but may not show exact detail or arrangement.
   2. However, when materials, locations, sizes, or methods are specifically dimensioned, detailed or noted, the Drawings shall take precedence over electrical Specifications in the event of conflict. In no case, is NEC, UL, or other applicable governing standards to be overridden.

E. The Contractor shall examine existing conditions, submittals and equipment furnished under other Specifications divisions in order to determine conduit routing, stub-up locations, and final terminations for all conduits and cables. The exact locations and routing of cables and conduits shall be governed by structural conditions, physical interferences, and the physical location of wire terminations on equipment.

F. All equipment shall be installed and located so that it can be readily accessed for operation and maintenance. If accessibility appears to be compromised, the location of equipment or stub ups shall be modified to the extent possible.

G. Where conduits are shown on the Drawings, or stated to be furnished but not explicitly shown, as part of the scope of work; the Contractor shall provide all fittings, boxes, wiring, etc. as required for completion of the raceway system in compliance with the NEC and the applicable Specifications in this Section.

H. No changes from the Drawings or Specifications shall be made without written approval of the Engineer. Should there be a need to deviate from the Contract documents, submit written details and reasons for all changes to the Engineer for review.

I. The Contractor shall maintain a neatly and accurately marked full size set of Contract Drawings recording the as built locations and layout of all electrical and instrumentation

equipment, routing of raceways, junction and pull boxes, and other diagram or drawing changes. Drawings shall be kept current weekly, with all "change orders", submittal modifications, and construction changes shown. Drawings shall be subject to the inspection by the Engineer at all times, progress payments or portions thereof may be withheld if Drawings are not accurate or current.

J. When documents are changed, they shall be marked with erasable colored pencils or PDF markup tools using the following coloring scheme:
   1. Additions - Blue
   2. Deletions - red

K. Prior to acceptance of the work, the Contractor shall deliver to the Engineer one set of record full size drawings neatly marked accurately showing the information required above.

1.05 PROJECT COORDINATION

A. Prior to submittal, the Electrical Contractor shall coordinate with equipment suppliers to verify sizes, mounting, connections, storage, and delivery of equipment. If there are any issues whereby the solution will be in conflict with plans and Specifications, or that are undefined and need direction, they shall be brought to the attention of the Engineer or Construction Manager via the RFI process.

1.06 SUPERVISION

A. The Contractor shall schedule all activities, manage all technical aspects of the project, coordinate submittals and drawings, and attend all project meetings associated with this Section. The Contractor shall coordinate and confirm that the project schedule is being adhered to and all work is being completed within the scheduled time frames.

B. The Contractor shall supervise all work in this Section, including the electrical system general construction work, from the beginning to completion and final acceptance.

C. The Contractor shall coordinate, obtain, prepare, and/or complete the documentation required within this division. All documentation shall be complete and delivered prior to final acceptance.

1.07 INSPECTIONS

A. General
   1. Contract work or materials shall be subject to inspection at any time by the Engineer. If equipment, material, or installation method does not conform to the Contract documents, or does not have a favorably reviewed submittal status and has been determined to be unsatisfactory by the Engineer, then the Contractor shall remove said material from the premises; and if said material has been installed, the entire expense of removing and replacing same, including any cutting and patching that may be necessary, shall be borne by the Contractor.
   2. The Engineer may inspect and test the fabricated equipment at the factory before shipment to job site. See Electrical Specifications [Factory and Field Testing] for requirements.

3. Work shall not be closed in or covered over before inspection and approval by the Engineer. All costs associated with uncovering and making repairs where non-inspected work has been performed shall be borne by the Contractor.
4. The Contractor shall cooperate with the Engineer and provide assistance at all times for the inspection of the electrical system under this Contract. The Contractor shall remove covers, provide access, operate equipment, and perform other reasonable work which, in the opinion of the Engineer, will be necessary to determine the quality of the work.

B. Milestones requiring inspection and signoff.
1. Underground conduit and grounding system complete. Do not cover any portion of conduit prior to inspection. Conduits must be labeled with temporary tags per Electrical Specifications [Conduit and Boxes] and [Grounding].
2. Factory testing. Coordinate test date with Engineer 2 weeks prior to test scheduled date.
3. Installation of electrical equipment. Equipment is anchored in place, conduit connections are complete, no wire is yet pulled into conduit. Permanent conduit tags must be in place per Electrical Specifications [Conduit and Boxes] and [Grounding].
4. Wire termination complete. Do not energize equipment. All wire tags must be installed and wires terminated per Electrical Specifications [Low Voltage Wire and Data Cable]. Pre-energization testing to commence after inspection.
5. Testing per Electrical Specifications [Factory and Field Testing]. All testing per Electrical Specifications [Factory and Field Testing] shall be witnessed unless specifically declined by the Engineer. Schedule tests with Engineer 2 weeks prior to test date.
6. Start-up per Electrical Specifications [Factory and Field Testing]. Schedule tests with Engineer 2 weeks prior to test date.
7. Punch list – final inspection. Schedule final walkthrough with Engineer one week prior to intended project completion date. All items on punchlist must be complete prior to scheduling walk-through.

1.08 JOB CONDITIONS

A. Construction Power and Telephone Service
1. The Contractor shall coordinate, furnish and install, temporary utility services required during construction of the project, such as temporary electrical power and telephone service. Temporary services shall be installed in accordance with the applicable codes and regulations of the serving utilities.
2. Upon completion of the project, remove temporary services. All equipment and material shall be the property of the Contractor.

B. Equipment Storage
1. The Contractor shall provide adequate protection for all equipment and materials during shipment, storage and construction.
2. Equipment and materials shall be completely and sufficiently sealed and covered and set on a pallet above grade so that they are protected from weather, wind, dust, water, or construction operations.
3. Equipment shall not be stored outdoors. Where equipment is stored or installed in an area with susceptibility to moisture, such as unheated buildings, untested

piping, etc., provide an acceptable means to prevent moisture damage, such as plastic cover and a uniformly distributed heat source to prevent condensation.

C. The project site is located where outside temperatures vary between 10 deg F. to 110 deg F. Humidity in this area will range from 10% to 100%.

1.09 AREA CLASSIFICATIONS

A. Area classifications are shown on the site electrical plans. The area enclosed by walls or the entire drawing area shall be classified as shown unless otherwise described in notes.

B. All electrical equipment, enclosures, conduit, and supports shall be formally rated for or, at minimum, meet the intent of the rating as interpreted by Engineer.

C. If no area classification rating is shown on the Drawings, classification shall default to a NEMA 12 rating for indoors, and NEMA 4 rating for outdoors (non corrosive) and NEMA 4X for corrosive areas both indoors and outdoors.

1.10 SUBMITTAL REQUIREMENTS

A. General

1. Requirements described herein are specific to electrical submittals and are secondary to those described in other general Specifications sections. Any additional requirements described here that are beyond those described in those sections shall be provided as described. Conflicts shall be resolved by giving priority to general Specifications.
2. The Contractor shall ensure that the System Integrator and/or equipment suppliers provide the submittal documentation required in this section. Submittals shall be neat, orderly, complete (without un-needed parsing), and indexed.
3. The Contractor shall coordinate submittals with the work so that project will not be delayed. This coordination shall include scheduling the different categories of submittals, so that one will not be delayed for lack of coordination with another. Time extensions will not be allowed due to failure to properly schedule submittals.
4. No material or equipment shall be delivered to the job site until the submittal for such items has been reviewed by the Engineer and marked "no exceptions noted" or "make corrections noted".
5. The equipment Specifications have been prepared on the basis of the equipment first named in the Specifications. The Contractor shall note that the second named equipment, if given, is considered acceptable and equal equipment, but in some cases additional design, options, or modifications may be required to meet Specifications or functional installation.
6. Exceptions to the Specifications or Drawings or equipment or procedures submitted as “equal” to specified equipment shall be clearly identified in a letter at the front of the submittal. Submittal data for “equal” equipment or procedures shall contain sufficient details so a proper evaluation may be made by the Engineer. The Contractor is responsible for verifying proper application/operation of substituted equipment.
7. The opinion of the Engineer will be the final determination whether a substitution request meets the design intent.

8. Deviations from the Contract documents shall not be incorporated into the work without prior written approval of the Engineer. A "Change Order" directive from the Engineer is required prior to incorporating any deviation from the Contract documents that has costs associated. The cost differential associated with this change order must be negotiated with the Owner to amend the Contract to reflect the costs or savings.

B. Submittal Procedures

1. Identify all submittals by submittal number on letter of transmittal. Submittals shall be numbered consecutively and resubmittals shall have a letter suffix. For example:
   a. 1st submittal: 1
   b. 1st resubmittal: 1A
   c. 2nd resubmittal: 1B, etc.
2. The reviewed submittals will be annotated "Make Corrections Noted", "No Exceptions Noted", "Revise and Resubmit Noted Items", or "Rejected without Review." The following actions shall then be taken by the Contractor:
   a. "No Exceptions Noted" - The Contractor may proceed with the work covered in this submittal. No resubmission is necessary.
   b. “Make Corrections Noted” - The Contractor may proceed with the work covered in this submittal incorporating the changes noted. However, the Contractor shall revise the submittal in accord with the changes noted and resubmit six (6) copies of drawings, bill of materials, and catalog data denoting changes within 14 calendar days when requested by the Engineer for record keeping purposes.
   c. "Revise and Resubmit Noted Items" - The Contractor shall not proceed with the work covered in this submittal. The Contractor shall revise and correct the submittal in accordance with the comments and resubmit six (6) copies within 14 calendar days for approval.
   d. "Rejected without Review" submittal - The Contractor shall not proceed with the work covered in this submittal. The submittal did not address the work scope as defined by the submittal’s title or the previous submittal comments have not been addressed in full. The Contractor shall revise and correct the submittal in accordance with the Specifications, and resubmit six (6) copies within calendar 14 days for approval.
3. Resubmittals shall address all comments by the Engineer. A submittal response letter shall be submitted that addresses each comment by the Engineer with a standardized response of “revised” or with a written explanation. Partial re-submittals (that do not address all comments) may be returned without review at the discretion of the Engineer.
4. The Contractor shall be responsible for the Engineer's review cost for each resubmittal in excess of the second resubmittal. These costs will be back-charged to the Contractor and will be deducted from his progress payments.

C. Electrical Equipment -- Submittal data shall be grouped by equipment type. Each submittal shall be as complete as possible covering the entire project and scope of supply. Drawings or equipment submitted individually that are not on the critical path will not be accepted for individual review. The electrical submittals shall include (as a minimum):

1. Table of Contents

2. Comment Letter: The Project Engineer of the System Integrator shall note all deviations from Contract Documents and the reason(s) for the deviation. They may use this forum to inform the Engineer or installing Contractor of important information related to the project. RFIs must be submitted separately. Re-submittals shall include written responses to every comment provided by the Engineer during the previous review.
3. Bill of Materials: The Contractor and System Integrator each shall provide Bill of Material for electrical components formatted as shown below. Generic names or part numbers as defined by a distributor or Integrator are not acceptable. Only the originating manufacturer's name and part number shall be listed. Provide separate bill of materials for each panel, MCC, instrument list, etc.

Bill of Material

Item #	Qty	Tag#	Description	Manufacturer	Part #

4. Catalog Data shall include the following: (features and options shall be highlighted, circled, or "arrowed.")
   a. Instrumentation data summary sheets (by Contractor)
   b. Manufacturer's technical information brochure
   c. Physical size and mounting details and illustrations
   d. Calibration Range
   e. Input/output signals
   f. Electric power, air, and/or water supply requirements.
   g. Options selected and available (Cross out items not included)
   h. Materials of construction of components

D. Shop Drawings Shop drawings shall be furnished for each electrical panel even if one was not shown explicitly on the Drawings. Shop drawings shall be numbered in sequence. Blank drawings or drawings that contain no specific project data will not be accepted for review.
1. Shop Drawings shall be generated with a computer utilizing AutoCAD or similar drafting program. Drawings shall be no smaller than 11" x 17". The lettering shall be legible and no smaller than 0.75 inch in height.
2. Shop Drawings shall be custom prepared for this project and shall have borders and a title block identifying the project, manufacturer, system or location, drawing number, drawing title, AutoCAD file name, project engineer, date, revisions, and type of drawing. Diagrams shall carry a uniform and coordinated set of wire colors, wire numbers, and terminal block numbers. The shop drawings shall include the following as a minimum:
3. Electrical one-line diagrams detailing all devices associated with the power distribution system. The following applicable information or data shall be shown on the one- or three- line diagram: location, size and amperage rating of bus; size and amperage rating of wire or cable; breaker ratings, number of poles, and frame sizes; power fail and other protective devices; fuse size and type.
4. Detailed analog and digital I/O diagrams showing the wiring requirements for each instrument or device connection. Reference the Drawings for an example of each I/O card drawing requirements. If one is not included in the Drawings, then one may be obtained from the Engineer upon request.

5. Elementary (wiring) diagrams shall be provided for all relay logic, programmable logic controls, motor controls, power supplies, and other wiring. All elementary (wiring) diagrams shall be drawn in JIC EMP/EGP format and standards showing ladder rung numbers and coil and contact cross referencing numbers.
6. Equipment exterior and interior scaled drawings of front, side, elevation, deadfront, front panel devices, and backpan components. Show fabrication methods and details; including material of construction, paint color, door latch and lock, and ventilation system. Show shipping split locations and offloading information. Submit base plan showing allowed conduit entrance areas and bolt hole locations.
7. Drawings shall show UL required information as needed to UL label the equipment in accordance with UL procedures for label applied.
8. Submit full size drawing of all nameplates and tags, as specified herein, to be used on project. Submittal to include the following:
    a. Dimensions of nameplate.
    b. Exact lettering and font for each nameplate.
    c. Color of nameplate.
    d. Color of lettering.
    e. Materials of construction.
    f. Method and materials for attachment.
    g. Drawing showing location of nameplates on each, panel and enclosure.

E. Drilling, Cutting, and Trenching Work Plan

1. Research existing drawings, review site facilities, USA, and/or other means to determine location of existing non-exposed or hidden facilities prior to drilling, cutting, or trenching.
2. Provide submittal of existing documentation with new routes drawn in, photos, or potholing to show plan and routes with all existing facilities located and avoided.
3. Submittal approval will allow Contractor to move forward but will not relieve Contractor of requirement to repair any existing facilities that are damaged during project.

1.11 OPERATING AND MAINTENANCE INFORMATION

A. Operational Training

1. At time of completion, the Contractor shall provide a period of not less than 6 hours training for instruction of operation and maintenance personnel in the use of systems. Instruct all personnel at one time in one session. Make necessary arrangements with manufacturer's representative. Provide product literature and application guides for user's reference during instruction.

B. Operations and Maintenance Manuals

1. Provide Operation and Maintenance manuals per Specifications as described in “Submittal Requirements” in this section with the following additional requirements:
    a. A comprehensive index.
    b. A complete "Record" set of favorably reviewed electrical submittals as provided under subsection “Submittal Requirements” illustrating all components, piping, and electrical connections.
    c. A complete list of the equipment supplied, including serial numbers, ranges, catalog cuts, and pertinent data.

d. Full Specifications on each item.
e. Detailed service, maintenance and operation instructions for each item supplied. Schematic diagrams of all electronic devices shall be included. A complete parts list with stock numbers shall be provided for the components that make up the assembly. All of these shall be originals, no copies.
f. Special maintenance requirements particular to this system shall be clearly defined, along with special calibration and test procedures.
g. Shop drawings in native file format and updated to reflect as-built conditions.
h. Application programs, configurations, calculations, documents or other computer electronic files prepared for this project. Provide all files in native file format such as .dwg, .rss, .xls, .doc, etc.

2. Submit electronic readable PDF file format (email with attachments or download links) of the proposed O&M manuals for review by the Engineer. Submittals shall be delivered timely to the Engineer to allow for review period, corrections, and re-submissions as necessary.
   a. General Contractor supervision must not be circumvented by sending submittals direct to Engineer.

C. At the end of the project hard copy and soft copy electronic PDF files, shall be updated to "as-built" conditions.

PART 2 PRODUCTS

2.01 QUALITY

A. All equipment and materials shall be new, in current production, and the products of reputable suppliers having adequate experience in the manufacture of these particular items. For uniformity, only one manufacturer will be accepted for each type of product.

B. Products specified that have become obsolete (out of current manufacturing, or have been superseded by another product) shall be cross-referenced to a replacement product(s) and provided in lieu of the specified product(s) for no additional cost. Under no conditions, shall products be submitted or furnished that are known (on manufacturer's list of obsolescence) and expected to be removed from current production within 12 months after project submittal. Products found to have been furnished this way will be removed and replaced at Contractor's expense.

C. All equipment shall be designed for the service intended and shall be of rugged construction, of ample strength for all stresses which may occur during fabrication, transportation, erection, and continuous or intermittent operation. All equipment shall be adequately braced and anchored and shall be installed in a neat and workmanlike manner. Appearance and safety, as well as utility, shall be given consideration in the design of details. All components and devices installed shall be standard items of industrial grade, unless otherwise noted, and shall be of sturdy and durable construction suitable for long, trouble free service. Light duty, fragile and competitive grade devices of questionable durability shall not be used.

D. The Contractor should expect that there will be occasional freezing conditions at the project site in outdoor locations. Instrument valves, tubing, instrumentation, and other components which are outdoors and susceptible to damage if frozen, must be provided with internal or external protection. Freeze protection can consist of internal or external active heaters with thermostats and/or passive insulation systems. Active systems can be powered from a nearby receptacle or via the conduit intended for the device.

E. Products that are specified and include a manufacturer, trade name or catalog number are intended to establish a standard of quality, performance, warranty and service. Products that are specified "or equal," do not prohibit the use of equal products of other manufacturers provided they are submitted, identified and promoted as equal, and favorably reviewed by the Engineer prior to procurement and installation.

F. Products submitted as "equal" to the named products will be reviewed for conformance with the Specifications and in comparison with the first named product. If the equal product meets Specifications, but does not have a feature or performance characteristic that is available with the first named product, and that feature or performance is required for this project, then the submitted equal product may be rejected on those grounds.

G. In the event that some claims of the manufacturer of submitted "equal" product are called into question by the Engineer, the Contractor, may be required to prove those claims either prior to installation or during startup of product. If the product does not meet the claims made or Specifications, the product may be rejected by the Engineer and a replacement product must be submitted by the Contractor in its place. All cost for the rejected product, installation, testing, and removal will be the responsibility of the Contractor.

H. Underwriters Laboratories (UL) listing is required for all substituted equipment when such a listing is available for the first named equipment. Extra parts, labor, panel space, power supplies, circuit breakers, and/or GFIC devices shall be provided as necessary for incorporation of specified non-UL components.

I. When required herein or requested by the Engineer, the Contractor shall submit equipment or material samples for test or evaluation. The samples shall be furnished with information as to their source and prepared in such quantities and sizes as may be required for proper examination and tests, with all freight and charges prepaid. All samples shall be submitted before shipment of the equipment or material to the job site and in ample time to permit the making of proper tests, analyses, examinations, rejections, and resubmissions before incorporated into the work.

2.02 NAMEPLATES & TAGS

A. Equipment exterior nameplates Nameplate material shall be rigid laminated black plastic with beveled edges and white lettering; except for caution, warning, and danger nameplates the color shall be red with white lettering. The size of the nameplate shall be as shown on the Drawings. No letters are allowed smaller than 3/16". All nameplates located outdoors shall be UV resistant. Securely fasten nameplates in place using two stainless steel screws, type 316L, if the nameplate is not an integral part of the device. Epoxy cement or glued on nameplates will not be acceptable. Engrave the nameplates with the inscriptions as approved by the Engineer in the submittal.

1. For each major piece of electrical equipment provide a manufacturer's nameplate showing the Contract specified name and number designation, and pertinent ratings such as voltage, # of phases, ratings, etc.
2. For each device with a specific identity (pushbutton, indicator, instrument, etc.) mounted on the exterior or deadfront of a piece of equipment provide a nameplate with the inscription as shown on the Drawings and described herein.
3. Where required by code, provide nameplates denoting information required. For example:
    a. Transformers not in sight of disconnect, furnish nameplate denoting location of feeding circuit breaker or disconnect.
    b. Motor controls without door interlock or disconnecting circuit breaker; furnish nameplate denoting location or feeding circuit breaker or disconnect.
4. Where no inscription is indicated on the Drawings or described herein, furnish nameplates with an appropriate inscription providing the name and number of device.

B. Equipment Interior Nameplates Nameplate material shall be clear plastic with black machine printed lettering as produced by a KROY or similar machine; except caution, warning, and danger nameplates shall have red lettering. The size of the nameplate tape shall be no smaller than 1/2” in height with 3/8" lettering unless otherwise approved by the Engineer. Securely fasten nameplates in place on a clean surface using the adhesion of the tape. For each device with a specific identity (relay, module, power supply, fuse, terminal block, etc.) mounted in the interior of a piece of equipment provide a nameplate with the inscription as shown on the Drawings and described herein. Where no inscription is indicated on the Drawings or described herein, furnish nameplates with an appropriate inscription providing the name and number of device used on the submittal drawings. Stamp the nameplates with the inscriptions as approved by the Engineer in the submittal.

C. Equipment Tags When there is no space or it is impractical to attach an engraved plastic nameplate with screws, as is the case with most field devices and instruments, the Contractor shall attach a tag to the equipment with the same inscriptions as specified above in paragraph A. The tag shall be made from stainless steel material and the size of the nameplate shall be no smaller than 3/8"h x 2"w with 3/16" machine printed or engraved lettering unless otherwise approved by the Engineer. The tag shall be attached to the equipment with stainless steel wire of the type normally used for this purpose.

2.03 DISCONNECTS

A. Disconnect Switch:
1. Disconnect Switch shall be heavy duty, horsepower rated, three pole, single throw, fusible/non-fusible with quick make/break operating mechanism. The enclosure shall be 316 stainless steel and rated NEMA 4X. The enclosed switch shall be rated for 480 Volt, and 10HP (minimum) unless otherwise shown on the Drawings. Provide fuses, auxiliary contacts, or indicators as required by the motor control or one-line diagram. The operator shall actuate the switch side mounted handle and have provisions for up to 3 padlocks. Disconnect switch shall be Cutler Hammer DH series, Square D or equal.

B. Field Control Station:

1. Enclosures shall be NEMA 4X stainless steel with pre-punched holes as a standard product of the pushbutton/switch manufacturer.
2. Control stations in hazardous locations shall be rated for such duty utilizing enclosures rated for the classification or hermetically sealed switch blocks as appropriate.
3. Boxes shall be mounted with regard for architectural and structural requirements. Field control station shall be mounted at 48" height unless otherwise noted.
4. Box dimensions shall be in accordance with size, quantity of conductors, and conduit clearances per NEC Article 370 Requirements.
5. Control station enclosures shall be Allen-Bradley 800H, or equal.

C. ALARM LIGHT AND HORN

1. The alarm horn with red and green stack light tower shall have the following features:
2. LED signal tower, (2) tiers, 100mm diameter, red and green colored lens,
3. Green Permanent on, red flashing
4. Alarm sounder module, 89dB at 1M.
5. Suitable for indoor or outdoor location.
6. 24 VDC powered.
7. light gray body with 360 degree viewing angle, wall mount, NEMA 3R and 4X enclosure
8. Edwards Stacklight 102 Series LED signal tower, (2) tiers, 100mm diameter, red/green, or equal.

2.04 DEVICES

A. Switches

1. General purpose commercial grade switches shall be manufactured in accordance with UL 20. Switches shall be one pole, brown, 20 amps at 277 VAC, 1HP at 120 VAC, 2 HP at 240 VAC. Switches shall have copper alloy contact arm with silver cadmium oxide contacts. Switches shall have slotted terminal screws and a separate green grounding screw. Provide Leviton, Hubbel, or equal.
2. Wall mount commercial grade motion detector switches (denoted with M next to switch symbol in Drawings) shall utilize passive infrared detection with 180 deg field of view to determine if the space is occupied by personnel. The device shall be capable of switching incandescent (800W at 120V) and fluorescent (1200VA at 120V) lamps with electronic ballasts. The device shall feature a manual-off-auto switch. A delay off time adjustment shall be settable from 30 seconds to 30 minutes. The device shall incorporate a photocell with light intensity adjustment to keep the switch from activating when light levels are above setting. Provide Leviton, Hubbel, Wattstopper, or equal.

B. Receptacles

1. General purpose receptacles shall be commercial grade, duplex and rated 20 amps, 120 VAC, 2 pole, 3 wire grounding, NEMA 5-20R configuration, specification grade, and side wired to screw terminals. Face color shall be brown when paired with stainless steel covers. General purpose receptacles shall be specification grade Leviton, Hubbel, or equal.
2. GFI receptacles shall be commercial grade, duplex, brown, 20A, 120V, back and side wired, with "test" and "reset" buttons. "Daisy Chain" connecting multiple

receptacles from one GFI unit is not acceptable. GFI receptacles shall be Leviton, Hubbel, or equal.

3. Boxes shown in NEMA 3R environments and outdoor locations shall be weatherproof while in-use. Furnish in-use weatherproof covers and weatherproof boxes for these areas. Receptacles, plugs, and housings shall be fabricated of impact resistant plastic with o-rings and gaskets to prevent the entrance or water, vapors, and chemicals when unplugged or plugged.
4. Definite purpose receptacles and plugs in NEMA 4 or 4X environments where a receptacle is shown and a device is to be connected continuously, shall be listed as UL type 4, 4X, (Plug).
5. Circular plugs shall be retrofitted onto equipment so as to be compatible with the receptacles to maintain in-use ratings. Furnish Hubbel Watertight Wiring Devices and Accessories, or equal.

PART 3 EXECUTION

3.01 CONSTRUCTION METHODS

A. Equipment shall be assembled and wired by the manufacturer prior to shipment. Field modifications or changes are not allowed without a written "change order" to the Contract. Field changes, however large or small, shall be executed using the components, materials, wiring, labeling, and assembly methods identical to that of the original supplied equipment.

B. Factory as-built Drawings for each custom manufactured control panel or MCC shall be shipped with the equipment and placed inside in waterproof envelopes.

3.02 EQUIPMENT FABRICATION

A. All electrical equipment, including custom manufactured equipment, shall meet the requirements of Underwriters Laboratories (UL) and bear the appropriate label. Panels shall be affixed with UL label prior to shipment and be built in accordance with the UL guidelines and procedure that corresponds to the UL label. Custom control panels shall bear a UL-508A label for general use, minimum, with additional UL labels as required per intended service.

1. Design and furnish a Low Voltage Limited Energy Circuit for any device(s) not bearing a UL listing or registration that are required to be installed into a UL labeled panel.
2. Revise voltages for any electrical parts and equipment that are specified that do not bear the UL listing or registration.

B. Panel cutouts for devices (i.e. indicating lights, switches) shall be cut, punched, or drilled and smoothly finished with rounded edges. Exposed metal from cutouts that are made after the final paint finish has been applied shall be touched up with a matching paint prior to installing device.

C. Equipment doors shall swing freely and close and latch with proper alignment.

D. Component within the electrical equipment shall be securely mounted on an interior subpanel or backpan and arranged for easy servicing. Mounting bolts and screws shall be

front mounted for device removal without special tools or removal of entire mounting panel.

E. A ground bus shall be provided in each enclosure or cabinet. It shall have provisions for connecting a minimum of ten grounding conductors. Screw type lugs shall be provided for connection of grounding conductors. All grounding conductors shall be sized as shown on plans or in accordance with NEC Table 250 95, whichever is larger.

F. Bolts and screws for mounting devices on doors shall have a flush head which blends into the device or door surface. No fastening devices shall project through the outer surfaces of equipment.

3.03 WORKMANSHIP

A. All work in this division shall conform to the codes and standards outlined herein.

B. Installation shall be performed by qualified personnel providing first class workmanship per Electrical Specifications [Electrical General, Qualifications].

C. Maintain equipment installed (or to be installed) in new condition. Protect equipment from damage while in Contractor care from dust, water, or mishaps that are typical to construction sites

D. Confirm that equipment and materials are correct for their intended duty and will be installed per manufacturer guidelines. Equipment and components found to be installed inconsistent with manufacturer guidelines and/or these Specifications will not be acceptable and subject to removal and replacement.

E. Upon completion of daily work, remove excess materials, scraps, and debris from the work area and from the inside of equipment.

F. Upon notification, stop work on any portion of the installation that is determined to be non-compliant with contract or being installed by unqualified personnel.

G. Perform all work to correct improper installations at no additional cost to the owner.

H. Equipment furnished under this contract or provided to Contractor for installation shall be installed in accordance with manufacturer's instructions, installation calculations, and contract documents.

3.04 EQUIPMENT SHIPMENT AND STORAGE

A. Shipment -- Any equipment whose destination (jobsite) is more than 25 miles from the factory shall be carefully protected for shipping. All openings shall be protected by plywood securely fastened to the framework of the equipment. Equipment shall be adequately covered during local delivery.

B. Storage -- From the time of receipt until the equipment is installed and energized, the equipment shall be considered in storage. While in storage, a 120V, 1 phase source of power shall be made available and connected to space heaters in all items of equipment so equipped. Equipment not provided with space heaters shall be provided with a light

bulb or electric heater while in storage to prevent moisture condensation. Unless stored indoors, it shall be a least 1 foot above grade covered with at least 2 layers of heavy polyethylene plastic sheets and anchored to prevent damage by high winds. All equipment shall be protected from dust and moisture prior to and during construction.

3.05 DAMAGED PRODUCTS

A. Damaged products that cannot be repaired to new condition shall be replaced with new products. All equipment and materials shall be in like-new condition at start-up and commissioning.

B. Minor cosmetic damage shall be repaired by spray painting, after properly preparing the surface, all scratches or defects in the finish of the equipment. Only identical paint furnished by the equipment manufacturer shall be used for such purposes.

3.06 INSTALLATION

A. General
1. Install all products per manufacturer's recommendations and the Drawings.
2. Provide all necessary hardware, conduit, wiring, fittings, and devices to connect the electrical equipment provided under other Sections.
3. Furnish and install wiring between adjacent equipment sections that are not completed at factory. Install 1-1/2" minimum diameter insulated chase nipples with lock rings and insulated bushings for thru wiring.
4. Protect wiring insulation from wear by installing rubber cushions, bushings, or strip insulation, or by fastening the wiring to a rigid surface with zip ties and anchors.
5. Provide additional devices, wiring, conduits, relays, signal converters, isolators to complete interfaces of the electrical and instrumentation system.
6. Changing normally open contacts to normally closed contacts or vice versa
7. Adding additional relays to provide more contacts as necessary.
8. All programmable devices (not specifically excluded herein) shall be programmed, set-up and tested by the Contractor prior to startup. Programming and set-up parameters shall be adjusted or changed as directed by the Engineer during start-up and throughout the warranty period.
9. Coordinate with the Engineer and setup all alarm, process, and operation setpoints.
10. Keep a copy of the manufacturer's installation instructions on the jobsite available for review at all times prior to and during the installation of the associated equipment.

B. Panels and enclosures:
1. Install panels and enclosures at the location shown on the Plans or approved by the Engineer.
2. Install level and plumb.
3. Anchored to pad or wall as defined herein or as defined in approved seismic calculations. Assumes 4500 psi strength concrete and 3" minimum from edge of 6" depth concrete pad.
    a. Pad mounted equipment up to 90" height: minimum1/2" 316SS concrete anchors with 5" minimum embedment into 4000 psi concrete. Locate anchors at each of 4 corners per equipment section.

b. Wall mounted equipment up to 400 lbs and mounted into reinforced concrete filled cinder block walls: minimum 3/8" 316SS concrete anchors with 3.5" minimum embedment. Locate anchors at each of 4 corners per panel.

4. Seal all enclosure openings to prevent entrance of insects and rodents.
5. Clearance about electrical equipment shall meet the minimum requirements of NEC 110.26

C. Electrical receptacles, plugs, and switches
1. Electrical plugs, receptacles, cords, and connectors required to power or interface the equipment and panels shall be furnished and installed by the Contractor.
2. Ground fault circuit interrupter receptacles shall be used where noted as GFI on plan or where in outdoor NEMA 3R locations, or in areas that are indoor and in same room as water pipe.
3. Boxes shown in NEMA 3R environments and outdoor locations shall be weatherproof while in-use. Furnish in-use weatherproof covers and weatherproof boxes for these areas.
4. Definite purpose receptacles and plugs in NEMA 4 or 4X environments where a receptacle is shown and a device is to be connected continuously, shall be listed as UL type 4, 4X, (Plug) and NEMA 3R (flip cover).

D. Conduits and Ducts:
1. Install all conduits and ducts per Electrical Specifications [Conduit and Boxes] and [Grounding].
2. Minimum wire bending space at terminals and minimum width of wiring gutters shall comply with NEC tables 312-6 (a) & (b).

E. Wiring, Grounding, and Shielding:
1. Observe proper grounding and shielding practices as this application environment is generally noisy. The shield of shielded cables shall be terminated to ground at one end only, the origination end. The shield at the other end shall be encased in an insulated material to isolate it from ground.

F. Cutting and Patching:
1. The Contractor shall do all cutting and patching required for installing his work. Any cutting which may impair the structure shall require prior approval by the Engineer. Cutting and patching shall be done only by skilled labor of the respective trades. All surfaces shall be restored to their original condition after cutting and patching.

G. Cleaning and Touch up:
1. At the completion of the work, all parts of the installation, including all equipment, exposed conduit, and fittings, shall be thoroughly cleaned of grease and metal cuttings. Any discoloration or other damage to parts of the building, the finish, or the furnishings, due to the Contractor's failure to properly clean the system, shall be repaired by the Contractor.
2. The Contractor shall thoroughly clean any of his exposed work requiring same.
3. Vacuum and clean the inside of all electrical and instrumentation enclosures prior to applying power.
4. The Contractor shall paint scratched or blemished surfaces with the necessary coats of quick drying paint to match existing color, texture and thickness. This

shall include all prime painted electrical equipment including but not limited to enclosures, poles, boxes, devices etc.

3.07 APPLICATION OF POWER

A. The Engineer will direct the energization and de-energization of all existing and new equipment. The Contractor is not authorized to energize or de-energize any equipment unless they have been given written permission to do so or while in the presence of the Engineer.
   1. Any equipment that is under repair, demolition or installation shall be locked off and tagged out of service with Contractor supplied padlocks and tags.
   2. The Contractor is required to comply with NFPA 70E and specifically in regards to safety when working on live equipment. Obtain work permits when needed to do live work.

B. The Contractor is responsible for grounding of high and medium voltage cabling and/or bus during installation and removal of equipment. The contractor is responsible for complying with all California Electrical Safety Orders (ESO) and Occupational Safety and Health Act (OSHA) safety requirements and procedures while working in or near medium voltage equipment.

3.08 WARRANTY

A. The Contractor shall warrant all electrical and instrumentation equipment for a period of 1 year from date of final acceptance. Standard published warranties of equipment which exceed the preceding specified length of time shall be honored by the manufacturer or supplier.

B. The Contractor shall have a staff of experienced personnel available to provide on-site warranty service on 2 working days notice during the warranty period. Such personnel shall be capable of fully testing and diagnosing hardware & software and implementing corrective measures.

3.09 FINAL ACCEPTANCE

A. Final acceptance will be given by the Engineer after the equipment testing is complete, each deficiency has been corrected, final documentation has been provided, and all the requirements of Contract documents have been fulfilled.

B. At the end of the project, following the completion of the field tests, and prior to final acceptance, the Contractor shall provide the following:
   1. Each "operation and maintenance" manual shall be modified or supplemented to reflect all field changes and as built conditions.
   2. Two (2) disk copies of all final documentation to reflect as-built conditions.

C. Keys: Submit two sets of all keys for locks supplied on this project. Wire all keys for each lock securely together. Tag and plainly mark with lock number or equipment identification, and indicate physical location, such as panel or switch number.

END OF SECTION

SECTION 16110
CONDUIT AND BOXES

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Labor, materials, equipment, tools, safety gear, test equipment, incidentals, services, and transportation for a complete electro-mechanical installation as shown on the Drawings, included in these Specifications, or as can be reasonably implied from project descriptions.

B. The scope of work includes:
   1. Furnish and install conduits, wireways, raceways, cable trays, junction boxes, pull boxes, and associated hardware. Provide conduit, fittings, hardware, hangars, mounting channel, and other parts for a complete raceway installation.
   2. Replacement of liquid tight flex conduit that is sun exposed for any conduit that is getting new conductors.
   3. Demolishing conduit and conductors for demolished equipment.
   4. Furnish and install grounding system required by drawings, or if not shown or defined, as required by Article 250 of the NEC.
   5. Installations shall be designed and installed with components meeting the NEMA area designation.

C. Work includes that specified in Electrical Specifications [Electrical General].

1.02 REFERENCES

A. Electrical Specifications [Electrical General]

B. Electrical Specifications [Low Voltage Wire & Data Cable]

C. Electrical Specifications [Grounding]

D. Project Drawings

1.03 QUALIFICATIONS

A. Material furnished under this specification shall be installed by qualified installers meeting requirements specified in Electrical Specifications [Electrical General, Qualifications].

1.04 SUBMITTAL REQUIREMENTS

A. Provide submittals and drawings as specified in Electrical Specifications [Electrical General, Submittal Requirements].

PART 2 PRODUCTS

2.01 CONDUIT, RACEWAYS AND WIREWAYS

A. GENERAL - Conduit, raceways, and wireways, wiring methods, materials, installation shall meet all requirements of the NEC, be UL labeled for the application, and meet the minimum following specifications.

1. All wiring shall be installed in conduits, raceways, or wireways when interconnecting equipment and devices.
    a. The minimum size conduit shall be 3/4-inch unless indicated otherwise on the Drawings or for special connections to equipment.
    b. Provide cords and cord seals for devices or instrumentation requiring waterproof seal to maintain NEMA 4 or 4X ratings. Example devices include lighting and pipe mounted instruments that are located below grade.
2. Conduits may connect into junction boxes or wireways as shown in the drawings or as requested by Contractor and approved by Engineer. Junction boxes (circle with J in drawings) can be as simple as a condulet or JIC box, or larger box as determined by contractor and needed for the installation. Drawing may or may not depict junction box requirements that may be required by code. Wireways or junction boxes shall be rated for area (as noted in the Drawings), or furnish minimum NEMA 4 if not noted.
3. The Contractor shall use conduit material types (SPEC per conduit schedule) as defined below or as otherwise shown in the contract drawings or as specifically called out in the conduit schedule.
    a. Non-exposed underground portions of conduit run shall be PVC-40 for all signals and voltages unless otherwise shown in the conduit schedule.

b. Exposed conduit material (not underground and beyond transition) shall be per the following table unless specifically noted otherwise in the plan drawings. The conduit schedule denotes the conduit type for non-exposed (under-ground, in-concrete, etc.) and does not apply or coordinate with this table. Exposed condulets, elbows, fittings, device boxes, and hardware shall be of the same material and finish as the adjacent conduit.

Location	Material
NEMA 1 or 12	Galvanized rigid steel (GRS)
NEMA 3R	Galvanized rigid steel (GRS)
NEMA 4	PVC-Coated Steel (GRS-PVC)
NEMA4X	PVC-Coated Steel (GRS-PVC)
Class 1 Div 1 or 2 hazardous	PVC-Coated Steel (GRS-PVC)

4. Conduit stubs and transitions:
   a. Conduit transitions shall be GRS-PVC for 6" on either side of the mtransition point (minimum) or as shown in drawing details. Conduit transition is defined as conduit sections emerging from or through concrete or earth or from below to above grade or through walls or vaults, non-exposed to exposed.
   b. Beneath pad mounted electrical equipment, where not exposed, shall be installed or trimmed to 2" or less above slab and have bushing or end bell installed. Overall height of conduit entering into the base of equipment shall be enough for bushings/bells to be installed but be high enough for conduit tags to be installed.
   c. Uniform in height for each panel or section. Conduits end bushings/bells shall not vary in height above slab more than ½" from lowest to highest.
   d. Conduits shall be spaced apart such that bushings and end bells may be installed without interfering with the adjacent conduits.
   e. Transitions to PVC shall include PVC coated locknuts to shield exposed steel pipe threads.
   f. Through walls – shall protrude approximately 2" and include end bell or bushing. Pack space around conduit with non-shrink grout if the thru-hole was core drilled.
   g. From hazardous locations – shall include seal off and/or conduit cable seals as required per NEC.
   h. Conduits for future use shall be capped with coupling and plug. Identify each end with conduit labels.
   i. Existing conduits that are no longer able to be used due to removal of equipment or shown demolished, shall have flexible conduit removed, wires removed or pulled back to the nearest pullbox, coiled and labeled at each end. Disconnect wires at each end.
5. Conduit Tags
   a. All conduits listed in the "Conduit and Wire Routing Schedule" shall have conduit tags at both ends of each conduit run with tag number from schedule identified. This shall include ends within underground pull boxes.

b. All underground conduits shall have conduit tags at both ends of each conduit run. This shall include ends within underground pull boxes.

c. Tags on each conduit shall denote destination of conduit (acronym) and a unique number. Use tags such as 01 and RTU, 02 and MCC, 03 and LP, 05 and P1, 06 and PIT-61, etc. Tag destination acronym shall reverse at the other end of conduit but the number shall stay the same. Two tags may be used if placed back-to-back.

d. All conduits shall have temporary tags during construction. Temporary tags may be made from duct tape with hand written ink marking or suitable equivalent. Temporary tags shall be removed by Contractor at time of installation of permanent tags.

e. Tag material shall be rigid laminated red plastic with white lettering. The size of the tag shall be ¼" thick by 1" round or ¾" x 1" rectangle minimum.

f. Letter height shall be 3/8" minimum. Engrave the tags with the conduit number or acronym. Labeling shall be neatly installed for visibility and shall be clearly legible. Securely fasten tags in place using 20ga stainless steel tie wire through a pilot hole on the tag.

g. Conduit tags shall be Custom manufactured per specification.

6. Supports

a. Cross section of a single channel shall be 1-5/8" x 1-5/8" and cross-section of a double channel shall be 1-5/8" x 3-1/4". The channel wall thickness shall be 12 gauge as applicable.

b. One-Hole clamps shall be intended for pipe mounting on support channels and equipped with clamp-backs. The clamps shall be Efcor, Thomas and Betts, Appleton or equal

c. Spacers, provided to support underground conduits in concrete encasements, shall be plastic. The spacers shall be Carlon, Johns-Manville, Underground Products or equal

d. Anchors shall be expansion type for securing equipment to concrete foundations, floors and walls. Anchors shall have length identification mark on the exposed end of the bolt. Provide Hilti Kwik Bolt TZ, or equal.

e. Stanchions shall be provided as needed to mount equipment and electrical components. Stanchions shall be shop fabricated from welded 4" c-channel, 12" x 12" x ¼" steel base plate, coated with a rust inhibiting primer and top coat of gray polyurethane gloss paint. Attach equipment to the stanchion direct or on a ¼" aluminum sheet sized for the equipment supported.

f. Conduit Hangers shall be trapeze construction, with double channel, 3/8-inch rods and nuts. Suspend from suitable structural support.

g. Support material and finish shall be per the following table unless otherwise noted in the drawings. Brackets, fittings and hardware shall be of the same material and finish.

Location	Material
Indoors NEMA 12	Galvanized steel
Outdoors NEMA 3R	Galvanized steel
Outdoors NEMA 4	Stainless Steel type 316
Corrosive areas NEMA4X	PVC bonded, 40 mil, factory applied

h. Equipment mounting racks shall be designed by installer for rigid equipment and conduit mounting. Racks shall be bolted or welded construction and sized for equipment or as shown on the drawings.

i. Strut channels shall be used for mounting equipment to walls and for supporting conduit runs. Double strut channel type shall be used for fabricating equipment mounting racks as required and/or as detailed on the drawings. Add additional supports to rigid mounting locations as needed to prevent wobbling and to meet seismic requirements. All field cut surfaces of the strut channels shall be deburred and coated to prevent rust.

B. Galvanized Rigid Steel Conduit - (GRS)

1. Manufactured from high-strength steel and hot dipped zinc galvanized inside and out. Conduit and fittings shall meet UL 514B, UL 6, and conform to NEMA RN 2. Conduit shall be capable of being used as an equipment grounding conductor per NEC 250.
2. Provide factory radius elbows where 90 degree bends are required within a GRS conduit run.
3. Cast fittings and device boxes shall be malleable iron or aluminum. Appleton type FS/FD or equal.
4. In hazardous locations, fittings shall meet and be listed UL 886.
5. All fittings, hubs, couplings, pulling elbows and connectors shall be threaded-type. Set-screw type and compression-type are not acceptable. All thread conduit is not allowed over 1/2" exposed length. Cover plates shall be cast iron with sealing gasket in NEMA 3R locations.
6. Conduits entering enclosures shall be fitted with insulated grounding bushing; O-Z "HBLG", Appleton "GIB", or approved equal. All grounding bushings shall be tied to the grounding system with properly sized bonding conductors per the NEC code.
7. Combination expansion-deflection fittings installed exposed shall be Type XD as manufactured by Crouse-Hinds Co.; Type DX as manufactured by O.Z. Gedney Co.; Type DF as manufactured by Appleton Electric Co., or equal

C. Galvanized Rigid and Coated Steel Conduit (GRS-PVC)

1. Galvanized Rigid Steel conduit with a 40-mil thick polyvinylchloride exterior coating and a 2-mil urethane interior coating meeting NEMA RN-1, UL-6 and ETL PVC-001. The bond of the PVC to the zinc coated pipe must be stronger than the tensile strength of the PVC.
2. Provide factory radius elbows where 90 degree bends are required within a GRS-PVC conduit run.
3. Cast fittings and device boxes shall be malleable iron or aluminum with a 40-mil thick PVC coating meeting the same.
4. In hazardous locations, fittings shall meet and be listed UL 886.
5. Provide PVC coated threaded-type fittings, hubs, pulling elbows, couplings, and connectors; set-screw type and compression-type are not acceptable. Form 8 conduit fittings, ½" through 4", must have a tongue-in-groove gasket to effectively seal out the corrosive elements. Covers shall be supplied with plastic encapsulated stainless steel cover screws. Form 8 fittings shall be UL and type 4X and IP69 listed.

6. A PVC Coated Sealing Locknut shall be used on all exposed male threads transitioning into female NPT threads which do not have sealing sleeves, including transitions from PVC couplings/female adapters to PVC Coated GRC elbows in direct burial applications. “PVC Coated Sealing Locknuts” are not to be used in place of a Myers hub
7. A PVC sleeve extending one pipe diameter or two inches, whichever is less, shall be formed at every female fitting opening except unions. The inside sleeve diameter shall be matched to the outside diameter of the conduit.
8. All junction and metal pull boxes shall be galvanized with exterior surfaces PVC coated to 40 mils thickness.
9. Unistrut, strut clamps, pipe straps, and clamp back spacers, shall have 40 mil thick PVC coating. All mounting anchors shall be stainless steel.
10. Conduits entering enclosures shall be fitted with insulated grounding bushing. All grounding bushings shall be tied to the grounding system with properly sized bonding conductors per the NEC code.
11. GRS-PVC conduit to be Robroy Plasti-bond, Perma-Cote, KorKap, T&B OCAL or equal.

D. PVC Conduit, Schedule 40 or 80 (PVC-40, PVC-80)
1. Shall be high impact schedule 40 or 80 polyvinylchloride suitable for use underground, direct burial and for use with 90 C wires, and shall conform to UL 651. Shall be UL listed and labeled for "direct" burial.
2. Elbows, and risers shall be per exposed conduit transition detail. PVC conduit is not allowed above ground or in exposed locations except where specifically indicated.
3. Custom bends (44 deg maximum) shall only be allowed in horizontal underground locations. Custom bends shall be neat, orderly, full diameter, and parallel with other conduits.
4. PVC fittings shall have solvent-weld-type conduit connections. Fittings and device boxes shall be PVC with factory fabricated conduit connections. Provide Carlon or equal.
5. Conduits entering enclosures shall be fitted with a glued male adapter, lock ring and bushing to prevent wire chafing. Conduits entering panels through concrete to an open bottom or entering a pull box shall have a glued end bell fitting.
6. PVC conduit shall be stored on a flat surface and shielded from the sun.

E. Liquid Tight Flexible Non-metallic Conduit (up to 2”) - (FLEX)
1. Liquid tight flexible Nonmetallic Conduit shall be constructed of flexible PVC and have a smooth inner surface with integral crush resistant reinforcement within the conduit and be designated as a Type LFNC-B (for FNMC-B).
2. Liquid tight Flexible Nonmetallic Conduit shall be sunlight, oil, and flame resistant and approved for the installation of electrical conductors in indoor and outdoor applications.
3. Liquid tight Flexible Nonmetallic Conduit shall be listed to UL standard UL1660.
4. Liquid tight flexible non-metallic conduit shall be installed in accordance with Article 356 of the National Electrical Code (NEC) and other applicable sections of the NEC and/or local electrical codes.
5. Liquid tight Fittings shall be listed for the use with liquid tight flexible nonmetallic conduit and shall be marked LFNC-B (FNMC-B).
6. Flexible Non-Metallic Conduit shall be Carlon Carflex or equal.

F. Liquid Tight Flexible Metal Conduit (above 2-1/2") - (FLEX)
   1. Liquid Tight Flexible Metal conduit shall be moisture and oil-proof with PVC jacket extruded over a galvanized flexible steel conduit.
   2. Liquid Tight Flexible Metallic Conduit shall be sunlight, oil, and flame resistant and approved for the installation of electrical conductors in indoor and outdoor applications.
   3. Liquid Tight Flexible Nonmetallic Conduit shall be listed to UL standard UL 360.
   4. Liquid Tight flexible metallic conduit shall be installed in accordance with Article 350 of the National Electrical Code (NEC) and other applicable sections of the NEC and/or local electrical codes.
   5. Liquid Tight Fittings shall be listed for the use with Liquid tight Flexible Metallic Conduit and conform to UL514B.
      a. Outdoors when extension of GRS-PVC: PVC coated galvanized steel with insulated bushings.
      b. Outdoors when extension of GRS: Galvanized steel with insulated bushings.
      c. Indoors or outdoors when extension of stainless steel: 316 stainless steel with sealing ring and insulated bushing.
      d. Indoors: Galvanized steel with insulated bushings.
   6. Flexible Metallic Conduit shall be Electri-Flex Liquatite type LA or equal.

2.02 CONDUIT SEALING BUSHINGS

A. Conduit Sealing Bushings shall provide a positive gas and fluid seal for all styles of conduits, including aluminum, galvanized rigid steel, and PVC.

B. Sizes available range from 3/4" thru 6" in both solid and split styles and available as blank, single, two and three conductors.

C. Seal conduits where indicated within underground pullboxes with conduit cable seals to prevent gasses or liquids from entering pullboxes.

D. Furnish Roxtec RS UG, Crouse Hinds, OZ Gedney, or equal.

2.03 DEVICE BOXES

A. Boxes
   1. Device boxes shall be of zinc-galvanized malleable iron or cast aluminum with shape and size best suited for the particular application, rated for the location installed, and shall be supported directly to structure by means of screws, anchors, or bolts.
   2. Box dimensions shall be in accordance with size, quantity of conductors, and conduit clearances per NEC articles 314 requirements.
   3. Boxes exposed to the weather or in moist locations shall be weatherproof (WP) by means of gasketing under a weatherproof cover.
   4. Boxes connected to GRS-PVC conduit runs shall be PVC coated with 40 mil coating.

B. Device Plates and Covers

1. Indoor general purpose device plates and covers shall be stainless steel. Plates or covers shall be attached with stainless steel screws. An engraved plastic label denoting circuit breaker number and panelboard name shall be affixed to each cover with #4 stainless steel screws.
2. Weatherproof switch, outlet, and receptacle boxes shall be fitted with gasketed covers rated for wet locations. Each access cover shall have a padlockable cover to maintain security and weatherproof integrity even when a plug is connected to the receptacle. Screws and hinge springs shall be stainless steel. Weatherproof access covers shall be Leviton 5977-CL, Cooper 4966, or equal.

2.04 PULL BOXES

A. Junction Boxes
1. Where required for best installation or where specifically called out in the Drawings, junction boxes shall have JIC type construction with hinged door, NEMA 4X rating, manufactured of type 304 stainless steel or as otherwise shown. Door shall be fastened with clamps and stainless steel screws. No devices, screws, rivets, or bolts shall protrude through the exterior surface unless specifically shown on the Drawings. Boxes shall be Hoffman, Circle AW, or equal.

B. Pull Box and Vault Identification
1. Engrave or bead weld box covers with minimum thickness of ¼" x 1" lettering with pullbox name (i.e. PBX-XXX) and purpose (electrical, signal, fiber, telephone, etc.). Provide an additional identifier "high voltage" for boxes with 600 volts or higher.
2. Utility pull boxes shall be labeled per Utility Company standards.

2.05 HOLE PLUGS

A. General
1. Designed to seal unused pushbutton holes, conduit openings and knockout holes against dust, oil and water when modifying existing enclosures.
2. Hammond Manufacturing, or equal

B. Steel Hole Plug
1. 2 color options - ANSI 61 gray or RAL7035 Light Gray
2. Oil resistant gasket.
3. Secured with an 10-24 x 0.55" threaded stud and plated wing nut.
4. Suitable for Type 1, 3, 3R, 4, 12, painted steel or non-metallic.

C. Stainless Steel Hole Plugs
1. Cupped cap to protect rubber gasket and seal.
2. Finished in brushed natural 304 stainless steel finish.
3. Oil resistant gasket.
4. Secured with an 10-24 x 0.55" threaded stud and plated wing nut.
5. Suitable for 4X and stainless steel panels.

PART 3 EXECUTION

3.01 WORKMANSHIP

A. All work in this Section shall conform to the codes and standards specified in Electrical Specifications [Electrical General, Workmanship].

3.02 INSTALLATION

A. System:
   1. Install all products per Electrical Specifications [Electrical General, Installation].

B. Rigid Conduits and Ducts:
   1. Exposed conduits shall be neatly arranged with runs perpendicular or level and parallel to walls. Bends shall be concentric.
   2. Except as expressly indicated or approved, all conduits shall be surface mount on block walls, concealed behind gypsum walls, and buried to required depth below floor slabs.
   3. Pipe threads shall be treated with conductive thread compound.
   4. Installation of the GRS-PVC conduits must be in accordance with the manufacturer's installation procedures using recommended tools.
      a. Apply touch up compound at each fitting sealing sleeve edge to improve watertight seal.
      b. To ensure compliance, the installer(s) must be "manufacturer certified" before installation can proceed.
      c. Certification available by contacting manufacturer's representative and attending a brief instructional course. Valid and unexpired certification card shall be available for review per installer.
   5. Repair GRS-PVC coating utilizing a touch-up compound as provided by the manufacturer of the conduit of the same material as the coating. Overlap beyond the damaged area to cover the PVC coating. Contact from touchup compound to PVC is required to maintain integrity. The entire conduit shall be replaced if the repair exceeds 1" combined length.
   6. A maximum of three equivalent 90 degree elbows are allowed in any continuous run. Install pull boxes where required to limit bends in conduit runs to not more than 270 degrees or where pulling tension would exceed the maximum allowable for the cable.
   7. Route all above grade conduits parallel or perpendicular to structure lines and/or piping. Conduits installed above grade shall be braced in place with stanchions. Expansion joints shall be installed every 100 feet. Bends shall be concentric.
      a. Combination expansion-deflection fittings installed exposed shall be Type XD as manufactured by Crouse-Hinds Co.; Type DX as manufactured by O.Z. Gedney Co.; Type DF as manufactured by Appleton Electric Co., or equal
      b. Conduit unions shall be provided in GRS-PVC and GRS runs to enable conduit assembly and disassembly.
   8. Care shall be exercised to avoid interference with the work of other trades. This work shall be planned and coordinated with the other trades to prevent such interference. Process Pipe, mechanical and HVAC shall have precedence over conduits for routing and space requirements.
   9. Seal each bottom entrance conduit into the MCC and other electrical enclosures with pliable plugging compound sealant to prevent the entrance of gasses, insects

and rodents. Plugging compound sealant shall be Gardner Bender Duct Seal or equal.

10. Seal conduits where indicated from sewer wetwells in underground pullboxes with conduit cable seals. Furnish Roxtec RS UG, Crouse Hinds, or equal.
11. Exposed conduit stubs for future use shall be capped with coupling and plugged. Drill hole in plug for pull rope as necessary.
12. Explosion proof seal-off fittings shall be provided on all conduits that enter or leave hazardous areas per requirements of the National Electrical Code, Chapter 5 and UL 886. The seal-off fitting shall prevent hazardous gases and/or flames from passing from one type area to another through the conduit system. Ceramic or other non-asbestos fiber material and sealing compound shall be placed in the fitting to complete the seal.
13. Hazardous location conduit outlet boxes shall be used in hazardous locations for change in direction, access to conductors and as pull and splice boxes.
14. All spare conduits shall have 1/8" nylon pull ropes installed.

C. Flexible Conduit and Cords

1. Final connections to vibrating equipment such as motors, heaters and fans shall be made with liquid tight flexible conduit.
2. Flexible conduit lengths shall not be greater than 36 inches for sizes up to 2 ½" and 48 inches for 3" and larger conduit.
3. Flexible conduit shall include a ground conductor for equipment bonding in circuits over 30 VDC or as shown in the conduit schedule.
4. Flexible conduit shall only be installed in exposed or accessible locations.
5. Where equipment is cord connected, submersible rated, and conduit connections are not possible without modification, devices and equipment may be free-air cord connected in lieu of flexible conduit. Connection to adjacent rigid conduit shall be through liquid-tight cord connector fitting specifically designed for the purpose and sized appropriately for the cord. Cord connectors shall be rated similar to the adjacent conduit they are connected to: Stainless steel, galvanized or plastic.

D. Excavation and Layout:

1. Trenches for conduit below floor slabs and other underground electrical conduit shall be excavated to the required depths per utility requirements or specific detail. Conduits under floor slabs shall have minimum trench depth to contain bends without any portion of the radius visible at finished grade.
2. Provide minimum 1" space between conduits and lay conduits parallel to each other to the extent possible unless otherwise indicated in drawings and details.
3. Install spacers to support underground conduits. Horizontal and vertical separation shall be maintained by plastic spacers set every four feet. Spacers shall be Carlon Snap-Loc or equal.
4. Underground conduits outside of structures, excluding utility conduits, shall have a minimum cover of 24 inches except under roadways where minimum cover shall be 30 inches or as otherwise shown in the Contract Drawings. Back filling shall be done only after conduits have been inspected.
5. Excavation and back fill of conduits shall conform to the requirements herein and as indicated in drawing details unless otherwise noted. Conduits for other entities (Utilities, etc.) shall be as required and inspected by the governing entity.

6. At all times during the installation of the electrical system, the Contractor shall provide barricades, fences, guard rails, etc., to safeguard all personnel, including small children, from excavated trenches.

E. Device Mounting Heights:

1. Mounting heights of fixtures and devices shall be as follows unless otherwise indicated or when height has to be adjusted to be over or under counter tops.

a.	Wall switches	=>	48 inches
b.	Convenience outlets	=>	18 inches
c.	Telephone outlets	=>	18 inches
d.	Bracket fixtures	=>	7 feet 6 inches

F. Cutting, Coring, Patching and Repairing:

1. The Contractor shall do all cutting and patching required to install his work. Any cutting which may impair the structure will require prior approval. Cutting and patching shall be done only by skilled labor of the respective trades. Where it is becomes necessary to cut into existing work for the purpose of making electrical installations, locate existing post tension cables, rebar and electrical services prior to core drilling using ground penetrating radar or similar technologies. All surfaces shall be restored to their original condition after cutting and patching.

3.03 FIELD ASSISTANCE

A. General: Provide all equipment and supplies necessary to perform all testing. The Owner shall have the option to witness and participate in the on-site tests performed by the installer.

B. Per Electrical Specifications [Factory and Field Testing].

3.04 WARRANTY

A. Provide warranty as specified in Electrical Specifications [Electrical General, Warranty].

END OF SECTION

SECTION 16120
LOW VOLTAGE WIRE & DATA CABLE

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Labor, materials, equipment, tools, safety gear, test equipment, incidentals, services, and transportation for a complete electro-mechanical installation as shown on the Drawings, included in these Specifications, or as can be reasonably implied from project descriptions.

B. The scope of work includes:
   1. Furnish and install wire, splices, lugs, or other miscellaneous devices as defined in this specification.
   2. End to end wiring and terminations for each system, device, instrument, and piece of equipment shown in the Drawings as new, or rehabilitated, or reconnected.
   3. Testing of conductors and completed wired systems.
   4. Installations shall be designed and installed with components meeting the NEMA area designation.

C. Work includes that specified in Electrical Specifications [Electrical General].

1.02 REFERENCES

A. Electrical Specifications [Electrical General]

B. Electrical Specifications [Conduit and Boxes]

C. Electrical Specifications [Grounding]

D. Project Drawings

1.03 QUALIFICATIONS

A. Material furnished under this specification shall be installed by qualified installers meeting requirements specified in Electrical Specifications [Electrical General, Qualifications].

1.04 SUBMITTALS AND DRAWINGS

A. Provide submittals and drawings as specified in Electrical Specifications [Electrical General, Submittal Requirements].

PART 2 PRODUCTS

2.01 WIRING AND ELECTRICAL DEVICES

A. General
   1. General
      a. Provide wiring and electrical devices specified herein and install field and internal panel wiring as shown on the Contract Drawings.
      b. This section applies to all wires or conductors used internal (non-field) to electrical equipment or external for field wiring.
      c. Field wire quantity and size shall be per "Conduit and Wire Routing Schedule."
   2. Analog Signals
      a. Analog signal transmission between electric or electronic instruments shall be 4-20 milliamperes and shall operate at 24 volts DC unless otherwise specified. Milliampere signals shall be current regulated and shall not be affected by changes in load resistance within the unit's rating.
      b. Provide powered current isolators wherever the loops' load resistance exceeds the originating current signal transmitter's rating. Associated shunt resistors shall be located on rail-mounted terminal blocks. Exposed resistor leads shall be insulated with heat-shrink tubing.

B. Low Voltage Wire and Cable (through 600V except instrument signals)
   1. General: Low voltage conductors shall be used for power, control, lighting and miscellaneous circuits. This Section applies to all wires or conductors used internal for all electrical equipment or external for field wiring. Wire shall be new, plainly marked with UL label, gauge, voltage, type of insulation, and manufacturer's name.
      a. Conductors shall be copper with a minimum of 98% conductivity.
      b. Control and instrument wiring shall have tinned copper conductors.
      c. Class C stranding. Solid conductors may be used for lighting and receptacle circuits.
      d. Wire shall be rated 600 volt (min).
      e. Size all conductors per NEC minimum and as shown on the drawings.
         1) Minimum #12 AWG for wires used in power transmission circuits or as defined on the drawings.
         2) Minimum #14 AWG for wires used in signal transmission circuits or as defined on the drawings.
   2. Wire colors and sizes shall not change within the circuit.
   3. Wire shall be properly fused or breaker protected at or below the maximum amperage rating allowed by the NEC.
   4. Control and Power Wiring:
      a. Field wire in conduit:

1) Type XHHW-2, XLPE insulation, color coded, rated 90 °C in wet or dry locations, oil resistant, UL44.
   a) Use for power circuits carrying voltages higher than 200 volts phase to ground.
   b) Color coded by phase and voltage per NEC and table herein.
2) Type THHN / THWN, nylon insulation with thermoplastic jackets, rated 90 °C in dry locations and 75 °C in wet locations, oil resistant, UL83 and UL1063.
   a) Use for power circuits with voltages below 200 volts phase to ground, or control circuits.
   b) Color coded by phase and voltage per NEC and table herein.
3) Minimum #12 AWG for wires used in power transmission circuits or as defined on the drawings.
4) Minimum #14 AWG for wires used in signal transmission circuits or as defined on the drawings.

b. Non-field control panel or factory installed equipment internal wiring:
1) Insulation - PVC jacket, type TEW, MTW, color coded, UL1015 with tinned copper.
2) Option: Insulation – Nylon (polyamide) with thermoplastic cover, color coded, type THHN, THWN, MTW, UL 1063
3) Minimum #14 AWG for wires used for individual conductor circuits 100 volts and above.
4) Minimum #18 AWG for wires used for individual conductor circuits below 100 volts.

c. Field wire in tray (Tray Cable type TC):
1) Individual cables - Insulation type THHN/THWN, rated 90 °C in dry locations and 75 °C in wet locations, oil resistant, UL83.
2) 3 or more conductor plus ground wire in a single cable.
3) UL Listed as sunlight resistant, direct burial, and open wiring.
4) Conductor sizing per ICEA Publication P-54-440 for cable tray and ICEA P-46-426 for conduit
5) Minimum #12 AWG for wires used in power transmission circuits or as defined on the drawings.
6) Minimum #14 AWG for wires used in signal or control transmission circuits or as defined on the drawings.

d. Power cord
1) Flexible wire cord shall be type SOW, SOOW, or G and be provided in 2, 3, or 4 conductor plus ground as required for connected load.

2) EPR insulation, 90 deg C rating, oil and abrasion resistant., overall jacket plus individual conductor jackets. 600V rated
3) Conductors shall be stranded copper.
4) Cord shall be installed with cord grips on each end where it enters termination enclosures.

5. Instrument wiring:
   a. Field: Instrument cables shall have 600V tray cable rated insulation and 100% individual shielded twisted pair #18 (or #16 conductors) with drain wire. Single twisted shielded pair (TSPR) cables shall be Belden 9341 (or 9342), or approved equal. Three wire twisted shielded cables (#18 TS3W) shall be Belden 1036A, 1119A, or equal. See drawings for cable size required.
   b. Non-Field: Instrument cables shall have 300V rated insulation and 100% individual shielded twisted pair #18 conductors with drain wire. Single twisted shielded pair (TSPR.) cables shall be Belden 8760, or approved equal. Three wire shielded cable shall be Belden 8770 or equal.
   c. Field multi-pair instrument cable as required per conduit schedule shall have 300V rated insulation and 100% individual shielded twisted pair #18 conductors with drain wire. Multiple twisted shielded pair (T.S.PR.) cables shall be Belden 9773 thru 9777, or equal.
   d. Multi-pair cable is not allowed (unless specifically called out in conduit schedule or on plans) for use in field or non-field applications. One T.S.PR cable is required for each signal.
6. Manufacturer Supplied Cables
   a. Cables and wiring for special systems provided by the manufacturer with the equipment shall be installed per the manufacturer's recommendations.
7. Data Cable
   a. Data network category 6 cable (indoor) shall consist of 4 pair unshielded twisted pair #23 awg solid copper conductors. The cable shall be rated by IEEE for service intended – plenum and dry.
      1) Cable: IEEE Category 6, various manufacturers.
      2) Connectors: Standard RJ-45 with boot.
   b. Data network cable (outdoor) shall consist of 4 pair foil and braid shielded twisted pair #24 awg solid copper conductors with anti-crosstalk divider, and drain wire. Rated Level 2 Category 6+ Outdoor Carrier by IEEE for use in plenum, conduit, wet or dry.
      1) Cable: IEEE Category 6, Belden 2149a, or equal
      2) Connectors: Grounded RJ-45 with drain wire crimp.
8. Temporary motor or panel hook-up
   a. Temporary cable may be cord without conduit or PVC conduit with wiring. In either case, the cabling must be protected from

damage during construction. Sections may be located out of harms way, buried, or sleeved in steel conduit as needed.

b. Power Circuits: Provide 2, 3, or 4 conductor plus ground power supply cable(s) for temporary pump connections or electrical power circuits. Cables shall be sized for breaker rating amperage, (minimum).

c. Provide multi-conductor (TC) cables for digital control circuits. Provide quantity of conductors as needed.

d. Provide instrument wiring for 4-20 ma instrumentation.

e. Voltage drop in power circuits shall not exceed 15% during motor start and 5% during operation.

C. Color Code

1. All wires #8 and below shall have wire insulation the color specified. Wires #6 and larger may be black with color electrical tape at termination points.
2. No other colors shall be used without prior approval.
3. Color code color code of all wire shall conform with the following table:

WIRE COLOR CODE TABLE

Description	**Phase/Code Letter**	**Field wire or tape color**	**Non-Field Wire Color**
480V, 3 Ph	A	Brown	Brown
	B	Orange	Orange
	C	Yellow	Yellow
240V or 208V, 3 Ph	A	Black	-
	B	Red (Orange if high leg)	-
	C	Blue	-
	Neutral	White	White
240 / 120 V, 1 Ph	L1	Black	Black
	L2	Red	-
24V Positive	24+	Blue	Pink
24V Negative	24-	Gray	Gray
12V Positive	12+	Blue	Red
12V Negative	12-	Black	Black
AC Control		Red	Red (Yellow for foreign circuits)
DC Control		Blue	Blue

Ground	G	Green	Green
Shielded Pair	+	Red, Clear, or White	Clear or White
	-	Black	Black

2.02 WIRE MARKING

A. All panel, enclosure and field wiring shall have wire labels on both ends of each wire. Labeling shall be neatly installed for visibility and shall be clearly legible. Each conductor of instrument shielded signal wiring shall be labeled. Wire labels shall be machine printed with on white heat shrinkable tubing. Each label shall fit a minimum 23 characters, 3/16" in height before shrink. Tubing shall be oversized for the wire and shrunk into place using an electric heat gun. The "shrunk" label shall have just enough give to allow the label to be rotated. Hand lettered wire labels are not acceptable and shall be replaced at the Contractor's expense. Provide Brady "PermaSleeve" or equal.

1. Node Style Wire Identification All wires that are electrically the same (connected to common termination points) and do not pass through a contact or other switching device shall have the same wire identification. The wire labeling code for each end of the same wire shall be identical.
   a. The wire identification code for internal panel wiring shall be the number/letter as designated on the Drawing elementary and/or approved shop drawings.
   b. Wire labeling for field wiring shall contain the field equipment name/tag as a prefix and the pupose. (I.E. FIT071-+ and FIT071-- or P10-124) where + or 124 are the field device terminal block name or purpose. The hierarchy of prefix label names is 1) Instrument Tag, 2) Electrical panel or equipment name, and 3) Equipment name. Therefore, wires from MCC50 P10 cubicle to PLC10 will be labeled MCC50-P10-xx where xx is the terminal number or the purpose. Wires from field pressure switch PSH10 to MCC50 P10 will be labeled PSH-10-xx where xx is the PSH terminal block name.
   c. Wire labels shall be per control panel submittal and/or interconnection submittal drawings using rules described above – Wire labels must be documented prior to printing and before they are applied. Abbreviations may be used in the wire label as long as they are consistent and understandable.
   d. Wire labels for lighting and receptacle circuits shall consist of the panel board and circuit number and a unique node number. (I.E. LP#3-A, LP#3-B, LP#3-N)
   e. Wire labels may be omitted on "neutral jumpers" less than 8" in length.
   f. Wire labelling shall be documented and revised on drawings to as-built conditions.

2.03 ELECTRICAL TAPE / SHRINKABLE INSULATORS

A. Vinyl tape shall be 7 mil, 600 volt rated, flame retardant, hot and cold weather resistant conforming to UL510. Provide 3M Scotch Super 33+ vinyl tape or equal
   1. Vinyl tape for color coding shall be 7 mil, ¾" width, vinyl tape conforming to UL 510. Provide 3M Scotch 35 vinyl tape or equal.

B. Rubber Tape: EPR rubber, 90 deg C continuous rated. Provide 3M 130C rubber tape or equal.

C. Varnished Cambric Tape: Adhesive backed, 7 mil, bias cut cotton tape, coated with yellow insulating varnish. Provide 3M Scotch 2510 or equal.

D. Shrinkable insulators shall be heat shrinkable, polyolefin thick wall sleeves, end caps and cable repair sleeves are designed for use in splicing, sealing and re-jacketing of direct bury secondary cables. The insulators shall comply with UL 486D and be rated up to 1000 Volts. They shall provide long-term reliable performance overhead, underground or submerged with mechanical and environmental protection. Shrinkable insulators shall be 3M ITCSN or 3M IMCSN per manufacturer instructions for the application or equal.

PART 3 EXECUTION

3.01 WORKMANSHIP

A. All work in this Section shall conform to the codes and standards specified in Electrical Specifications [Electrical General, Workmanship].

B. Perform work to remedy non-compliant installations after inspection.

C. Upon notification, stop work on any portion of the installation that is determined to be substandard or being installed by unqualified personnel.

3.02 FABRICATION AND INSTALLATION

A. System:
   1. Install all products specified in Electrical Specifications [Electrical General, Installation].
   2. Panels shall be completely factory wired and tested before shipment.
   3. All spare PLC input / output points shall be wired to terminal blocks.
   4. A minimum of 20% spare unwired terminals shall be provided in each panel.

B. Wiring Methods:
   1. Wiring Separation: Wires carrying 100 volts and above shall be physically separated from lower voltage wiring by using separate bundles or wire

ways with sufficient distance to minimize the introduction of noise, crossing only at 90 degree angles.

2. Harness: All wiring shall be neatly bundled and laced with plastic tie wraps, anchored in place by screw attached retainer. Where space is available, wiring shall be run in slotted plastic wireways with dust covers. Wireways shall be sized such that the wire fill does not exceed 60%. Tie wraps shall be T&B TY RAP or equal.
3. Retainers: Wireways, retainers, and other devices shall be screw mounted with round head 316 stainless steel screws or mechanically mounted by push in or snap in attachments. Glue or sticky back attachment of any type or style shall not be used. Retainers shall be T&B TC series or equal.
4. Hinge Loops: Where wiring crosses hinged surfaces, provide a "U" shaped hinge loop protected by clear nylon spiral wrap. The hinge loop shall be of sufficient length to permit opening and closing the door without stressing any of the terminations or connections. Spiral wrap shall be Graybar T25N or equal.
5. Routing: Wires and cable shall be routed such as to maintain separation between 100 Volt or higher from 100 volt or lower wiring being run in the same duct or bundle. Wires and cables shall have sufficient length to allow slack and to avoid any strain or tension in the wire or cable.
    a. Wires shall be routed in slotted plastic wireways with snap covers. Wires carrying 120 VAC shall be separated as much as possible from other wires and signal cables, and shall be routed only in ducts for 120 VAC. If the power wiring has to cross the signal wiring, the crossing shall be as close to a right angle as possible. Wireways for 24 VDC wiring shall be used for all other wires and cables. Routing of 120 VAC in combined wireways shall be minimized. Wires and cables shall be placed in the wireways in a straight, neat and organized fashion and shall not be kinked, tangled or twisted together. Additional wire ducting shall be provided for use by the electrical subcontractor for routing field wires to their landing points in the each electrical and instrumentation panel.
    b. Provide 2” minimum separation between wireway and terminal blocks.
    c. Wiring not routed in wireways shall be neatly bundled, treed, and laced with plastic ties.

C. Wire Terminations
1. Single wire and cable conductors shall be terminated according to the requirements of the terminal device as follows:
    a. Crimp-on terminals: shall be UL listed, self-insulating sleeve type, with ring or rectangular type tongue, suitable for the size and material of the wire to be terminated, and for use with either solid or stranded conductors.
    b. Terminal Blocks: Remove the last +/- 0.25 inches insulation from of the conductor and insert it under the pressure plate to full length

of the bare portion of the conductor. Tighten the screw to close the pressure plate onto the conductor. No more than two conductors shall be installed in a single terminal. All strands of the conductor shall be captured under the pressure plate.

c. Screw-less terminals: wire shall be stripped back and inserted per the terminal manufacturer's instructions.

2. When stripping insulation from conductors, do not score or damage conductor.
3. The drain wire and stripped end of outer jacket of shielded cables shall be covered with heat shrink insulating tubing. The drain wire shall be covered along its full bare length between the cable jacket cover and the terminal lug and placed on end outer jacket to cover foil.
4. Condulets with wire nut connections shall be supplied for wire termination to devices with leads instead of terminals (i.e. solenoid valves, level probe, etc.).

D. Wire Splicing

1. No wires shall be spliced without prior approval.
2. Where splices are allowed or approved they shall conform to the following:
   a. Wire splicing devices shall be sized according to manufacturer's recommendations.
   b. Splices of #10 and smaller, including fixture taps, shall be made with nylon self insulated twist on wire nuts; T & B "Piggys", Ideal "Wing Nut" or equal.
   c. Splices of #8 and larger shall be hex key screw, two way connectors, insulated with molded high-dielectric strength plastic; NSI Polaris IPL or IPLD Series terminal blocks or equal.

E. Wire Installation

1. Exercise care in pulling wires and cables into conduit or wireways so as to avoid kinking, stressing the cables, or damaging the insulation. Use a UL listed pulling compound for lubrication within conduits as necessary. The raceway construction shall be complete and protected from weather before cable is pulled in. Swab conduits before installing cables and exercise care in pulling, to avoid damage to the insulation or conductors.
2. All wire and cables (with the exception of coaxial antenna cable) shall be installed within UL listed raceways or enclosures. Install all wires and cables in one continuous length unless splices are per Contract Drawings, required to connect equipment or submitted and favorably reviewed.
3. Bundle incoming wire and cables in panels. Zip-tie at intervals of 2” and neatly spread into trees and connect to their respective terminals. Allow sufficient slack in cables for alterations in terminal connections. Do not bundle, tape or tie wires within conduits.

3.03 WARRANTY

A. Provide warranty as specified in Electrical Specifications [Electrical General, Warranty].

END OF SECTION

SECTION 16450
GROUNDING

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Labor, materials, equipment, tools, safety gear, test equipment, incidentals, services, and transportation for a complete electro-mechanical installation as shown on the Drawings, included in these Specifications, or as can be reasonably implied from project descriptions.

B. The scope of work includes:
   1. Furnish and install grounding system required by Drawings, or if not shown or defined, as required by Article 250 of the NEC. Ground conductors shall be sized for the protective device, minimum.
   2. Furnish and install conduits, junction boxes, underground boxes, and associated hardware. Provide hardware, conduit, fittings, and other parts for a complete grounding installation.
   3. Installations shall be designed and installed with components meeting the NEMA area designation.

C. Work includes that specified in Electrical Specifications [Electrical General].

1.02 REFERENCES

A. Electrical Specifications [Electrical General]

B. Electrical Specifications [Low Voltage Wire & Data Cable]

C. Project Drawings

1.03 QUALIFICATIONS

A. Material furnished under this specification shall be installed by qualified installers meeting requirements specified in Electrical Specifications [Electrical General, Qualifications].

1.04 SUBMITTAL REQUIREMENTS

A. Provide submittals and Drawings as specified in Electrical Specifications [Electrical General, Submittal Requirements].

B. Submit manufacturer's product information for connections, clamps, rods, terminals, and grounding system components.

PART 2 PRODUCTS

2.01 GROUNDING SYSTEM

A. General
   1. Grounding conductors shall be sized as shown on the Drawings or in accordance with NEC article 250, whichever is larger.
   2. Components of the grounding electrode system shall be manufactured in accordance with UL 467 - Standard for Safety Grounding and Bonding Equipment.

B. Raceway Grounds
   1. Metallic conduits shall be assembled to provide a continuous ground path. Metallic conduits shall be bonded using insulated grounding bushings.
   2. Provide separate code size wire ground conductor for all conduit types.

C. Equipment and Enclosure Grounds
   1. Electrical and distribution equipment shall be connected to the grounding system. Cables shall be sized as specified.

D. Components
   1. Every piece of equipment shall be grounded per NEC.
   2. Each electrical enclosure shall have a copper ground bus. Screw type fasteners shall be provided on all ground busses for connection of grounding conductors. Ground bus shall be a Challenger GB series, ILSCO CAN series or equal.

PART 3 EXECUTION

3.01 WORKMANSHIP

A. All work in this Section shall conform to the codes and standards specified in specified in Electrical Specifications [Electrical General, Workmanship].

3.02 INSTALLATION

A. Grounding System:
   1. Install all products per Electrical Specifications [Electrical General, Installation].
   2. Each nonmetallic conduit shall contain a code sized grounding conductor.
   3. The system neutral conductor and all equipment and devices required to be grounded by the National Electrical Code shall be grounded in a manner that satisfies the requirements of the National Code.
   4. The system neutral (grounded conductor) shall be connected to the system's grounding conductor at only a single point in the system. This connection shall be made by a removable bonding jumper sized in accordance with the applicable provisions of the National Electrical Code if the size is not shown on the Drawings. The grounding of the system neutral shall be in the enclosure that houses the service entrance main overcurrent protection.
   5. Utilize mechanical connections in accessible locations and exothermic connections in non-accessible or buried locations.
   6. The secondary on all transformers shall be grounded.

7. All raceway systems, supports, enclosures, panels, motor frames, and equipment housings shall be permanently and effectively grounded.
8. Install insulated grounding conductor with feeders and branch circuit conductors in conduits. Size grounding conductors in accordance with NEC. Install from grounding bus of serving panel to ground bus of served panel, grounding screw of receptacles, lighting fixture housing, light switch outlet boxes or metal enclosures of service equipment. Ground conduits by means of grounding bushings on terminations at panelboards and distribution panels with 12ga. conductor to grounding bus
9. All receptacles shall have their grounding contact connected to a grounding conductor.
10. Branch circuit grounding conductors for receptacles or other electrical loads shall be arranged such that the removal of a lighting fixture, receptacle, or other load does not interrupt the ground continuity to any other part of the circuit.
11. Attachment of the grounding conductor to equipment or enclosures shall be by connectors specifically provided for grounding. Mounting, support, or bracing bolts shall not be used as an attachment point for ground conductors.
12. Install grounding electrode conductor and connect to reinforcing steel in foundation footing. Electrically bond building steel to ground system. Bond metal siding not attached to grounded structure.
13. Furnish exothermic grounding connections for all underground connections to wire, rebar, or other steel components required to be grounded.

3.03 FIELD QUALITY CONTROL

A. Inspections:
   1. Ground system shall be inspected prior to cover.

B. Testing:
   1. Complete applicable test forms if provided in testing specifications [Factory and Field Testing]. If form is not provided, furnish results on a vendor standard form.
   2. Test each grounding connection to determine the ground resistance. The grounding test shall be IEEE 81.2 and NETA 7.13. The current reference rod shall be driven at least 100 feet from the ground rod or grid under test. The measurements shall be made at 10-foot intervals beginning 20 feet from the test electrode and ending 80 feet from it, in direct line between the ground rod or center of grid and the current reference electrode. Investigate ground resistance in excess of 1 ohm and revise or install new or additional ground electrodes as needed to reduce point to point resistance to less than 1 ohm.

END OF SECTION

SECTION 16600
FACTORY AND FIELD TESTING

PART 1 GENERAL

1.01 SCOPE OF WORK

A. This Section defines factory and field testing requirements of electrical and instrumentation equipment and as specified in this section and in Electrical Specifications. All equipment provided under Electrical Specifications and electrical equipment provided under other sections shall be tested as specified herein.

B. The System Integrator, and/or Electrical Contractor shall provide all labor, tools, material, power, and technical supervision to perform the specified tests and inspections.

C. The Electrical Contractor shall be present during field testing and assist the System Integrator in testing all equipment. The Electrical Contractor shall be ready to correct any wiring problems found during testing.

D. It is the intent of these tests to ensure that all equipment is operational within industry and manufacturer's tolerances and is assembled in accordance with design plans and Specifications.

E. The Owner and/or Construction Manager may witness testing in effort to insure quality and verify results. The Contractor is required to provide notification 2 weeks prior to any test that are intended to be documented and submitted for approval or are final tests. The Owner and Construction Manager must specifically decline witness of each test to be performed, and the test must be successful, and it must be documented on the day of test, in order for it to not have to be repeated in the presence of an authorized witness. Only the Owner or Construction Manager may assign an authorized witness.

F. All tests shall be documented in writing by the person performing the test on the test forms submitted (and similar to those shown at the end of this section) and signed by the Engineer as satisfactorily completed. The Electrical Contractor or System Integrator performing tests shall keep a detailed log of all tests that failed or did not meet Specifications, including date of occurrence and correction.

1.02 REFERENCES

A. Electrical Specifications [Electrical General]

B. Project Drawings

C. Additional testing may be specified in other Electrical Specifications.

1.03 FACTORY AND FIELD GENERAL REQUIREMENTS

A. Testing General
   1. Prior to any field testing Operation & Maintenance Manuals shall have been submitted and approved.

2. The test forms shall be completed by the contractor during testing and calibration of all equipment. All tests shall be witnessed by the Owner's Representative. Completed test forms shall be given to the Owner's Representative the day of the test. Complete two sets of test forms if Contractor wants to keep a copy.
3. The Contractor shall give the Engineer 10 working days notice of the dates and time for inspections and testing.
4. Include test results in the Maintenance and Operational Manual.
5. As a minimum, all the tests indicated/specified on the test forms shall be performed and test forms filled out by the Contractor.
6. Prepare and submit formal test procedures and forms at least two weeks prior to the start of testing. Testing shall not commence until the test procedures have been reviewed and approved. Submit a combined test procedure submittal with separate sections for factory and field tests.
7. If the results of any of tests are unacceptable, the Contractor shall make corrections and perform the tests again until they are acceptable; these tests shall be done at no additional cost.

B. Failure to Meet Test
1. Any system, material or workmanship which is found defective on the basis of these tests shall be reported immediately following the test. The Contractor shall replace the defective material or equipment and have tests repeated.

C. Safety
1. Testing shall conform to the respective manufacturer's recommendations. All manufacturers' safety precautions shall be followed.
2. Safety, as shown herein and in other divisions, shall be a combination of all methods and practices described. Safety practices may not be determined based on the least restrictive requirement, but instead, on the most restrictive requirement. Obtain clarification if there is any question prior to performing tests.
3. The procedures stated herein are guidelines for the intended tests, the Contractor shall be responsible to modify these tests to fit the particular application and ensure personnel safety. Absolutely no tests shall be performed in such a fashion that personnel safety is jeopardized.
4. The Contractor shall have two or more personnel present at all tests.
5. Two non-licensed portable radios shall be provided by the Contractor for use during testing.
6. Contractor shall comply with California Electrical Safety Orders (ESO) and Occupational Safety and Health Act (OSHA): All test and procedures shall comply with ESO and OSHA as to safety, protective clothing, clearances, padlocks and barriers around electrical equipment energized during testing.
7. The first set of tests to be performed (pre-energization) shall determine the suitability for energization and shall be completed with all power turned off.

1.04 QUALIFICATIONS

A. System Integrator Representative
1. The system integrator representative shall have 1 year experience in field testing of equipment working for the System Integrator or equivalent. If the representative does not demonstrate necessary experience or competence during

testing or start-up, the System Integrator shall provide a representative meeting the required competence and experience.

B. Electrical Contractor Representative
   1. The Electrician shall have 5 years minimum experience working with industrial control systems and have a Journeyman level experience rating.

1.05 SUBMITTAL REQUIREMENTS

A. The Contractor shall ensure that the System Integrator, and all equipment suppliers provide the submittal documentation required in this section. Submittals shall be complete, neat, orderly, and indexed. The Contractor shall check all submittals required under this Division for the correct number of copies, adequate identification, correctness, and compliance with the Contract Specifications and Drawings, and initial all copies certifying compliance.

B. The System Integrator shall assemble and submit for approval complete testing procedures and forms at least two weeks prior to the start of testing. Contractor is responsible for compiling testing procedures and forms from multiple sub-contractors as required.

C. Test submittal shall include: (as applicable)
   1. Proposed procedure for operational testing whether it is performed in the factory or field. Procedure shall include method, simulated I/O requirements, bypass piping, telemetry, and necessary materials and equipment to conduct test.
   2. Test forms (for all tests, factory and field, and regardless of who performs tests). Test forms shall be electronically completed prior to submittal with entry spaces filled to the extent possible. The only remaining data that shall require completion during the test is the test data itself. Test forms shall be provided as illustrated at the end of this section or equal.
   3. Approved shop one-line, elementary diagrams and PLC I/O drawings.
   4. Control strategies photocopied at 75% reduction with room at the side of page for comments on each paragraph or control strategy.

PART 2 PRODUCTS

2.01 TEST EQUIPMENT

A. Test equipment required to perform testing and document results shall be provided by Contractor or System Integrator.

B. Test instruments shall be calibrated to references traceable to the National Institute of Standards and Technology. Instrument calibration shall be current to one year from date of start-up. Test equipment accuracy shall be at least twice the accuracy of instrument being calibrated. Test instrument certificates of calibration shall be on-hand and provided prior to testing.

All test equipment to be used as part of the testing shall be listed in the submitted testing sheets. Contractor supplying the component or system to be tested shall provide all necessary test equipment.

C. The overall accuracy of each input and output loop shall be checked to ensure that it is within manufacturer's Specification tolerances. In no case shall the error exceed 0.25% or 0.04 mA.

PART 3 EXECUTION

3.01 FACTORY TESTING

A. Not required this project.

3.02 FIELD TESTING

A. General Requirements
   1. Field testing is broken down into 4 components
      a. Pre-Energization testing
      b. Pre-Operational Testing
      c. Operational Testing
      d. Trial Period/Commissioning
   2. Project wide, all Pre-Energization testing must be completed prior to Pre-Operational testing, all Pre-Operational testing must be completed prior to Operational Testing, and all Operational Testing must be completed prior to Commissioning.
      a. Any deviation of this order, whether on a component level or larger scale, must be approved.
      b. Out of order testing, if allowed, will be evaluated on a case-by-case basis when brought to the attention of the Owner's Representative. The Owner's Representative may require that the entire system, or portions thereof, be retested once the missing component(s) are installed and functional.
   3. All equipment supplied by the Contractor or others shall be tested by Contractor per these specifications.
   4. Two digital multimeters/signal generators (minimum +/ 0.1% accuracy) , AC current meters, torque wrench, and other specialized test equipment shall be provided by the Contractor for use during testing.
   5. If the equipment is determined not to be ready for testing, the test will be cancelled and rescheduled for a later date.
   6. Faulty and/or incorrect hardware or software operation of major portions of the system may be cause for suspension, cancellation, or restarting of the area of testing, at no additional cost or extension in Contract time.
   7. During the Operational testing period, under the supervision of the System Integrator, the Owner's Representative shall have unlimited and unrestricted access to the usage and testing of all hardware and software in the system.
   8. The System Integrator shall pay all expenses incurred by his personnel including labor, material, transportation, lodging, daily subsistence, and other associated incidental costs during field testing.
   9. Acceptance and witnessing of the tests does not relieve or exclude the Contractor from conforming to the requirements of the Contract Documents.
   10. All modifications to documentation as a result of the tests shall be corrected and completed before the delivery of "as-built" documentation.

11. Copies of the completed and witnessed field testing forms shall be included in the Operation and Maintenance Manual.
12. The various contractors on this project (General Contractor, Electrical Contractor and System Integrator) shall assume the lead role in testing activities as listed below. The Contractor shall obtain assistance of suppliers and/or manufacturers representatives for any major equipment testing.
    a. Electrical Contractor:
        1) Pre Energization Tests
            a) Visual Mechanical Tests
            b) Wire Insulation and Continuity Tests.
        2) Trial Period
        3) Commissioning.
    b. System Integrator:
        1) Pre-Operational Tests
            a) Visual Mechanical Tests
            b) Control panel pre-operational test
            c) MCC pre-operational test
            d) Motor Tests.
            e) PLC I/O point to point tests.
            f) Instrumentation switch tests
            g) Instrumentation transmitter tests.
        2) Operational Tests.
        3) Trial Period
        4) Commissioning
    c. General Contractor
        1) Test Scheduling
        2) Operational Tests.
        3) Trial Period
        4) Commissioning.

B. Electrical Field Tests – The following test shall be performed within each test category. Complete test forms for each electrical panel, instrument, and/or device. Provide separate form for each component to be tested.
    1. Pre-Energization Inspections and Tests:
        a. Visual and Mechanical Inspection Tests
        b. Wire Insulation and Continuity Tests
        c. Grounding System Tests
    2. Pre-Operational Tests:
        a. MCC Pre-operational Tests:
        b. Control Panel Pre-operational Tests:
        c. Motor Testing:
        d. Instrumentation Switch Calibration Tests
        e. Instrument Transmitter Calibration Tests
        f. PLC I/O point tests.
    3. Operational Tests:
        a. After all the previous tests in this subsection are complete, the test forms are completed and signed-off, the Contractor shall conduct operational testing.
        b. Representatives from the General Contractor, Electrical Contractor, System Integrator, and Owner's Representative shall be present during

testing. Operational testing shall be performed by Contractor in the presence of the Owner's Representative.

c. During operational testing the Contractor shall follow the instructions of the Owner. The Owner may place restrictions on operation that must be followed by the Contractor during testing. Any accidents or fines caused by actions of the Contractor where warnings or restrictions were placed, shall be remedied or paid by the Contractor.

d. Alarm Tests
   1) Generate the digital and/or analog signals at the primary device to verify that each PLC I/O point is functional and properly programmed. Verify that all parameters (i.e., setpoints, enable/disable toggle bits, timers, etc.) for the alarms operate according to the Specifications. Multiple alarm states (i.e., LO, LO LO, HI, HI HI, etc.) shall be checked.

e. Operational Control Tests
   1) Generate the digital and/or analog signals at the primary device by raising or lowering the actual measured process. Inject signal into the terminals or utilize a "force" function within the device only as necessary. Verify that each control system is functional and properly configured and programmed.
   2) Each line of control logic in the Control Strategies section shall be checked. When the complete control strategy has been checked, it shall be signed and dated by testing person and person witnessing test.
   3) Verify that all parameters (i.e., setpoints, runtimers, totalization, etc.) operate according to the Specifications.
   4) Verify that all data, setpoints, alarms are being received at SCADA correctly and that all I/O points on screen are true and accurate representations of field information.

f. Other Tests
   1) Force a power failure and power fail/restart of PLC and all other systems. Check the effects of each failure on each piece of equipment and automatic recovery.
   2) Force a PLC communication error. Demonstrate error detection, alarming, and recovery.
   3) Perform additional operational testing that has not already been witnessed.
   4) Perform any additional operational testing as necessary to confirm robust and error free operation under all operational conditions.

4. Trial Period
   a. Station/Equipment shall be activated to automatically run for 5 days, 24 hours per day Monday through Friday.
   b. During the trial period the Owner's Representative will test all modes of operation and will look for errors and malfunctions. A punchlist will be generated to be completed by Contractor and re-tested prior to Commissioning.
   c. If equipment failure occurs during the trial period, the Contractor shall repair or replace the defective equipment and shall begin another trial period, Monday through Friday.

d. This test shall be repeated until all new equipment functions acceptably and without failure for consecutive days.

C. Commissioning:

1. Commissioning shall not commence until Operational testing and System Training are complete with documentation submitted and with prior approval.
2. Commissioning period
   a. The new equipment shall be activated by the Contractor to operate in full automatic for 10 consecutive days, 24 hours per day. Commissioning shall only start on Mondays or Tuesdays.
   b. During Commissioning, the Owner will monitor and run the station in normal automatic mode. If equipment failure occurs during Commissioning, the Contractor shall repair or replace the defective equipment and shall begin another commissioning period after repairs are complete.
   c. Parallel, existing and/or back-up systems shall remain in place and functional during commissioning period. Demolition of parallel, existing or back-up systems shall not begin until commissioning is completed.
   d. This test shall be repeated until the new equipment functions acceptably for a consecutive commissioning period.
   e. Warranty will begin at the start of a successful commissioning period. However, if major hardware failure occurs during commissioning, the warranty and commissioning will restart once the problem has been identified and repaired.

3.03 WARRANTY:

A. Provide warranty per Electrical Specifications [Electrical General, Warranty].

1. The completion of the above tests does not relieve the Contractor from any warranties specified in the Electrical Specifications or other sections.
2. Warranty shall begin on the start date of a successful Commissioning period.

3.04 FINAL ACCEPTANCE:

A. Final Acceptance per Electrical Specifications [Electrical General].

TEST FORMS

Index of Forms:

PC	Power Conductor Test Form
CC	Control Conductor Test Form
IC	Instrumentation Conductor Test Form
VM	Electrical Equipment Visual and Mechanical Inspection Form
CPO	Control Panel Operational Test Form
MOTOR	Motor Test Form
ISC	Instrumentation Switch Calibration Test Form
ITC	Instrumentation Transmitter Calibration Test Form

END OF SECTION

POWER CONDUCTOR TEST FORM

PROJECT NAME: _____ DATE OF TEST: _____

TESTING COMPANY: _____ TEST LOCATION: _____

EQUIPMENT #: _____

INSULATION TESTS						
CONDUIT	PHASE TO GROUND			PHASE TO PHASE		
#	A	B	C	AB	BC	CA

NOTES:

1) Use single form for up to 25 power conduits. Use additional forms as necessary.

2) Disconnect both ends of wiring prior to megger tests.

3) Megger insulation resistances of all 600 volt insulated conductors using a 500 volt megger for 10 seconds minimum (30 seconds minimum for motor leads). Make tests with circuits installed in conduit and isolated from source and load. Each conductor shall be meggered conductor-to-conductor and conductor-to-ground. These tests shall be made on cable after installation with all splices made up and terminations installed but not connected to the equipment.

4) Each megger reading shall not be less than 22 Meg-ohms resistive. Corrective action shall be taken if values are recorded less than 10 Meg-ohms. Conductors with low ohm values, that do not match similar lengths of conductors the same size, shall be replaced at no additional cost to the Owner.

5) Values of different phases of conductors in the same conduit run showing substantially different Meg-ohm values, even if showing above 22 Meg-ohms shall be replaced.

CERTIFIED BY: _____ _____ _____

SIGNATURE COMPANY DATE

WITNESSED BY: _____ _____ _____

SIGNATURE COMPANY DATE

CONTROL CONDUCTOR TEST FORM

PROJECT NAME: _____ DATE OF TEST: _____

TESTING COMPANY: _____ TEST LOCATION: _____

INSULATION TESTS											
COND. # OF #	COND. TO GROUND	CONDUCTOR TO CONDUCTOR									
1		1 TO #	2 TO #	3 TO #	4 TO #	5 TO #	6 TO #	7 TO #	8 TO #	9 TO #	10 TO #
		X									
2		1 TO #	2 TO #	3 TO #	4 TO #	5 TO #	6 TO #	7 TO #	8 TO #	9 TO #	10 TO #
		X	X								
3		1 TO #	2 TO #	3 TO #	4 TO #	5 TO #	6 TO #	7 TO #	8 TO #	9 TO #	10 TO #
		X	X	X							
4		1 TO #	2 TO #	3 TO #	4 TO #	5 TO #	6 TO #	7 TO #	8 TO #	9 TO #	10 TO #
		X	X	X	X						
5		1 TO #	2 TO #	3 TO #	4 TO #	5 TO #	6 TO #	7 TO #	8 TO #	9 TO #	10 TO #
		X	X	X	X	X					
6		1 TO #	2 TO #	3 TO #	4 TO #	5 TO #	6 TO #	7 TO #	8 TO #	9 TO #	10 TO #
		X	X	X	X	X	X				
7		1 TO #	2 TO #	3 TO #	4 TO #	5 TO #	6 TO #	7 TO #	8 TO #	9 TO #	10 TO #
		X	X	X	X	X	X	X			
8		1 TO #	2 TO #	3 TO #	4 TO #	5 TO #	6 TO #	7 TO #	8 TO #	9 TO #	10 TO #
		X	X	X	X	X	X	X	X		
9		1 TO #	2 TO #	3 TO #	4 TO #	5 TO #	6 TO #	7 TO #	8 TO #	9 TO #	10 TO #
		X	X	X	X	X	X	X	X	X	
10		1 TO #	2 TO #	3 TO #	4 TO #	5 TO #	6 TO #	7 TO #	8 TO #	9 TO #	10 TO #
		X	X	X	X	X	X	X	X	X	X

NOTES:

1) Use single form for each conduit.

2) Disconnect both ends of wiring prior to megger tests.

3) Megger insulation resistances of all 600 volt insulated conductors using a 500 volt megger for 10 seconds. Make tests with circuits installed in conduit and isolated from source and load. Each conductor shall be meggered conductor-to-conductor and conductor-to-ground. These tests shall be made on cable after installation with all splices made up and terminations installed but not connected to the equipment.

4) Each megger reading shall not be less than 22 Meg-ohms resistive. Corrective action shall be taken if values are recorded less than 10 Meg-ohms. Conductors with low ohm values, that do not match similar lengths of conductors the same size, shall be replaced at no additional cost to the Owner.

5) Values of different phases of conductors in the same conduit run showing substantially different Meg-ohm values, even if showing above 22 Meg-ohms shall be replaced.

CERTIFIED BY: _____ _____ _____

SIGNATURE COMPANY DATE

WITNESSED BY: _____ _____ _____

SIGNATURE COMPANY DATE

INSTRUMENTATION CONDUCTOR TEST FORM

PROJECT NAME: _____ DATE OF TEST: _____

TESTING COMPANY: _____ TEST LOCATION: _____

CONDUIT NUMBER: _____ EQUIPMENT #: _____

CONTINUITY TESTS			INSULATION TESTS	
CONDUCTOR PAIR # OF #	CONDUCTOR TO CONDUCTOR	CONDUCTOR TO SHIELD	CONDUCTOR TO CONDUCTOR	SHIELD TO GROUND

NOTES:

1) Disconnect both ends of wiring prior to megger tests.

2) Megger insulation resistances of all 600 volt insulated conductors using a 500 volt megger for ten seconds. Make tests with circuits installed in conduit and isolated from source and load. Each conductor shall be meggered conductor-to-conductor and conductor-to-ground. These tests shall be made on cable after installation with all splices made up and terminators installed but not connected to the equipment.

3) Each megger reading shall not be less than 10 Meg-ohms resistive. Corrective action shall be taken if values are recorded less than 10 Meg-ohms. Conductors with low ohm values, that do not match similar lengths of conductors the same size, shall be replaced at no additional cost to the Owner.

4) Continuity Tests: Each instrumentation conductor twisted shielded pair shall have the conductor and shield continuity measured with an ohmmeter. Conductors with high ohm values, that do not match similar lengths of conductors the same size, shall be replaced at no additional cost to the Owner.

CERTIFIED BY: _____ _____ _____

SIGNATURE COMPANY DATE

WITNESSED BY: _____ _____ _____

SIGNATURE COMPANY DATE

ELECTRICAL EQUIPMENT
VISUAL AND MECHANICAL INSPECTION FORM

PROJECT NAME: _____ DATE OF TEST: _____

TESTING COMPANY: _____ TEST LOCATION: _____

EQUIPMENT NAME: _____ EQUIPMENT #: _____

NAMEPLATE DATA (complete as applicable)

MANUFACTURER: _____ ENCLOSURE: _____

MODEL #: _____ U.L. #: _____

VOLTAGE: _____ PHASE: _____

BUS AMPERAGE: _____ SERVICE: _____

BUS TYPE: _____ BUS BRACING: _____

VERTICAL BUS: _____ HORIZONTAL BUS: _____

GROUND BUS: _____ NEUTRAL BUS: _____

SERIES #:

PHYSICAL INSPECTION CHECKLIST

ENTER A-ACCEPTABLE R-NEEDS REPAIR OR REPLACEMENT NA-NOT APPLICABLE

ITEM	CHECK	NOTES
CHECK NON-ELECTRICAL FASTENERS FOR TIGHTNESS		
TORQUE TEST ALL WIRING AND BUS CONNECTIONS		
VERIFY ANCHORAGE IS PER SPECS AND/OR CALCS		
CHECK BUS BRACING AND CLEARANCE		
CHECK MAIN GROUNDING CONNECTION AND SIZE		
VERIFY GROUND BUS BONDING		
VERIFY EQUIPMENT GROUNDS		
VERIFY CONDUIT GROUNDS AND BUSHINGS		
CHECK NEUTRAL BUS AND CONNECTIONS		
VERIFY ALL BREAKERS AND FUSES ARE RATED PROPERLY		
INSPECT FOR BROKEN OR DAMAGED EQUIPMENT		
INSPECT ALIGNMENT OF PANEL AND DOOR		
VERIFY REMOVAL OF ALL DEBRIS AND DUST		
VERIFY WIRE LABELS ARE INSTALLED		
VERIFY ALL WIRE TERMINATIONS		
CHECK FOR PROPER WIRE SIZES		
CHECK FOR PROPER WIRE COLOR CODES		
VERIFY ALL NAMEPLATES		
CHECK FOR PROPER CLEARANCES AND WORKING SPACE		
INSPECT ALL PAINT SURFACES		
CHECK HEATERS AND THERMOSTATS		
CHECK VENTILATION AND FILTERS		
CHECK IF DRAWINGS MATCH EQUIPMENT		
CHECK ACCURACY OF OPERATION & MAINTENANCE		

NOTES:

1) Complete checklist above. Note any items that were found out of compliance.

2) Torque all electrical connections to values defined by equipment manufacturer or per NEC 110-14.

CERTIFIED BY: _____ _____ _____

SIGNATURE COMPANY DATE

WITNESSED BY: _____ _____ _____

SIGNATURE COMPANY DATE

PANEL BOARD TEST FORM

PROJECT NAME: _____ DATE OF TEST: _____

TESTING COMPANY: _____ TEST LOCATION: _____

PANEL NAME: _____ PANEL TAG #: _____

PANELBOARD NAMEPLATE DATA

UL #: _____ MANUFACTURE: _____

MAIN BREAKER RATING: _____ MODEL #: _____

PHASE: _____ VOLTAGE: _____

VERTICAL BUS RATING: _____ BUS AMPERAGE: _____

NEUTRAL BUS RATING: _____ BUS TYPE: _____

GROUND BUS RATING: _____ ENCLOSURE: _____

ENTRY LOCATION: _____ SERIES: _____

PHYSICAL INSPECTION CHECKLIST

ITEM	CHECK	NOTES
TIGHTEN ALL BOLTS AND SCREWS		
TIGHTEN ALL WIRING AND BUS CONNECTIONS		
VERIFY ALL BREAKERS AND FUSES ARE RATED PROPERLY		
CHECK BUS BRACING AND CLEARANCE		
CHECK MAIN GROUNDING CONNECTION AND SIZE		
VERIFY GROUND BUS BONDING		
VERIFY EQUIPMENT GROUNDS		
VERIFY CONDUIT GROUNDS AND BUSHINGS		
CHECK NEUTRAL BUS AND CONNECTIONS		
INSPECT FOR BROKEN OR DAMAGED EQUIPMENT		
INSPECT ALIGNMENT OF PANEL AND DOOR		
VERIFY ANCHORAGE		
VERIFY REMOVAL OF ALL DEBRIS AND DUST		
VERIFY CIRCUIT BREAKER LEGEND PER CONTRACT		
INSPECT ALL PAINT SURFACES		
VERIFY WIRE LABELS ARE INSTALLED		
VERIFY ALL WIRE TERMINATIONS		
VERIFY PANEL SCHEDULE WITH TERMINATIONS		
VERIFY PROPER WIRE SIZE		

NOTES:

1) Complete checklist above by entering a checkmark for acceptable, R for needs repair or attention

CERTIFIED BY: _____ _____ _____

SIGNATURE COMPANY DATE

WITNESSED BY: _____ _____ _____

SIGNATURE COMPANY DATE

CONTROL PANEL PRE-OPERATIONAL TEST FORM

PROJECT NAME: _____ DATE OF TEST: _____

TESTING COMPANY: _____ TEST LOCATION: _____

CONTROL PANEL NAME: _____ CONTROL PANEL TAG #: _____

CONTROL PANEL MANUFACTURER: _____ CONTROL PANEL TYPE: _____

CATEGORY	EQUIPMENT TAG #	DEVICE CHECKS AND TEST								
		CONTROL SWITCHES	OPERATOR INTERFACE	PANEL METERS	PANEL LIGHTS	PANEL NAMEPLATES	PLC POWER SUPPLY	I/O CARDS		
Height										
Voltage										
Function										
CATEGORY	EQUIPMENT TAG #	POWER SUPPLY 1 (V)	POWER SUPPLY 2 (V)	POWER SUPPLY 3 (V)	UPS	PANEL LIGHTS				
Function										
Voltage										

NOTES:

1) Set configurable parameters and verify voltage input prior to applying power.

2) Verify equipment powers up and operates correctly.

3) Perform trip functions and verify equipment returns to normal operation with only necessary operator intervention.

4) Complete checklist above by entering a checkmark (CM) for acceptable, or R for needs repair or attention, or NA for not applicable

Attention Requied:

CERTIFIED BY: _____ _____ _____

SIGNATURE COMPANY DATE

WITNESSED BY: _____ _____ _____

SIGNATURE COMPANY DATE

MOTOR TEST FORM

PROJECT NAME: _____ DATE OF TEST: _____

TESTING COMPANY: _____ TEST LOCATION: _____

MOTOR NAME: _____ MOTOR TAG: _____

SERIAL #: _____

MOTOR NAMEPLATE DATA

MFG:		PHASE:		TYPE:		P.F:		S.F:		NEMA:	
VOLTS:		HP:		DUTY:		RPM:		CODE:		DESIGN:	
FREQ:		FLA:		MODEL:		FRAME #:		ROTATION (CW/CCW):			

INSULATION RESISTANCE TEST PHASE-TO-GROUND/PHASE-TO-PHASE

A: _____ / _____ B: _____ / _____ C: _____ / _____

CONTROL SETTINGS AND TESTS

MOTOR HEATER MEASURED AMPS:	_____ (AMPS)	MOTOR OVERLOAD SETTING:	_____ (AMPS)			
MOTOR THERMAL TRIP TEST:	_____	OVERLOAD RESET TEST:	_____ (YES/NO)			
MINIMUM SPEED (IF VFD):	_____ (HERTZ)	COIL RESISTANCE:	AB	BC	CA	

PHYSICAL MOTOR TESTS - ACTUAL MEASURED VALUES

VOLTAGE (VOLTS)		AMPERAGE (AMPS)		POWER	
AB:	_____ V	A:	_____ A	POWER FACTOR:	_____
BC:	_____ V	B:	_____ A	POWER DRAW:	_____ KW
CA:	_____ V	C:	_____ A	HORSEPOWER:	_____ HP
IMBALANCE:	_____ %	IMBALANCE:	_____ %		

NOTES:

1) Perform coil resistance measurements on motor leads with a low-resistance ohmmeter. Note measurements.

2) Perform insulation-resistance test utilizing 500 volt megger and/or accordance with manufacturer's published testing procedures. Motors 200 HP and more test duration 10 minutes, 200 HP and less test duration 1 minute.

3) Perform DC overpotential tests on motors rated 1000 HP and 4000 volts or greater in accordance with ANSI/IEEE Standard 95.

4) Verify that pump/shaft seals are lubricated and that automated lubrication systems are functional.

5) Verify that motor protection/monitoring circuits are installed and connected per contract drawings and manufacturer requirements.

6) Verify that the motor space heater is functional.

7) Perform a rotation test to insure correct shaft direction by "bumping" motor. Reverse as necessary in appropriate place. Phase taping must remain in order on terminals left-to-right once completed.

8) Measure running current and evaluate relative to load conditions and nameplate full-load amperes.

9) Record the voltage and current on all phases while operating under full-load. If voltage or current imbalance is above 2 percent, or if current is above nameplate FLA or expected level, investigate cause and report on findings. Calculate imbalance by dividing (high minus low measurement) by the average measurement of all 3 phases.

10) Vibration tests shall be conducted in cases of discernable abnormal vibration or when ordered by the Engineer (due to perceived excessive vibration). Vibration shall not exceed 0.1 in./sec as measured opposite driven end of motor. Make necessary corrections to reduce vibration below limit at all operational speeds and loads.

COMMENTS:

CERTIFIED BY: _____ _____ _____

SIGNATURE COMPANY DATE

WITNESSED BY: _____ _____ _____

SIGNATURE COMPANY DATE

INSTRUMENTATION SWITCH CALIBRATION TESTS FORM

PROJECT NAME: _____ DATE OF TEST: _____

TESTING COMPANY: _____ TEST LOCATION: _____

INSTRUMENT NAME: _____ INSTRUMENT TAG#: _____

INSTRUMENT UNITS: _____ NAME: _____

TYPE: _____ MODEL: _____

SERIAL #: _____

MANUFACTURER	INSTRUMENT
NAME: _____	UNITS: _____
TYPE: _____	
MODEL: _____	
SERIAL #: _____	

PROCESS SETPOINT	INCREASING TRIP POINT	DECREASING TRIP POINT	DEADBAND	SETPOINT TIME DELAY	ACTUAL TIME DELAY

NOTES:

1) Field test instrumentation and associated control systems in accordance with the specifications and the manufacturer's instructions. Instrumenatation shall function as intended under actual process conditions or shall be repaired or replaced at Contractors expnse.

2) Complete a separate calibration form for each instrument provided.

3) Simulate process variable in field by applying known pressure, temperature, opening/closing measured device, raising/lowering actual level, etc. as required to confirm calibration. This step must be witnessed by inspector.

CERTIFIED BY: _____ _____ _____

SIGNATURE COMPANY DATE

WITNESSED BY: _____ _____ _____

SIGNATURE COMPANY DATE

INSTRUMENTATION TRANSMITTER CALIBRATION TEST FORM

PROJECT NAME: _____ DATE OF TEST: _____

TESTING COMPANY: _____ TEST LOCATION: _____

INSTRUMENT NAME: _____ INSTRUMENT TAG#: _____

MANUFACTURER		INSTRUMENT	
NAME:		RANGE:	
TYPE:		SCALE:	
MODEL:		UNITS:	
SERIAL #:		TRANSMITTER OUTPUT:	
REMOTE SENSOR TYPE:		FACTORY SPECIFIED ACCURACY:	
(If Applicable)		REMOTE SENSOR OUTPUT:	
		(If Applicable)	

DESIGNED VALUE				ACTUAL VALUE			
INPUT SIGNAL	OUTPUT	ENG VALUE	CALCULATED TOLERANCES	INSTRUMENT DISPLAY	INSTRUMENT OUTPUT SIGNAL	PROCESS INDICATOR	LOGIC VALUE

NOTES:

1) With this form, attach and submit factory calibration forms for flowmeters and transmitters that are available from factory.

2) Field test and calibrate instrumentation and associated control systems in accordance with the specifications and the manufacturer's instructions. Instrumentation shall meet specified accuracy or shall be repaired or replace at Contractor's expense.

3) Complete a separate calibration form for each instrument provided.

4) Simulate process variable in field by applying known pressure, temperature, pH, etc. as required to confirm calibration. This step must be witnessed by inspector.

5) Provide parameter value for each parameter changed from factory default.

CERTIFIED BY: _____ _____ _____

SIGNATURE COMPANY DATE

WITNESSED BY: _____ _____ _____

SIGNATURE COMPANY DATE

SECTION 16905
CONTROL PANELS

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Provide complete wired and tested control panels and terminal panels with devices installed per the Drawings and as stated herein.

B. Provide all necessary hardware, conduit, wiring, fittings, and devices to connect the control panel to equipment provided under other Sections.

1.02 REFERENCES

A. Electrical Specifications [Electrical General].

B. Electrical Specifications [Low Voltage Wire & Data Cable]

1.03 SUBMITTAL REQUIREMENTS

A. Provide submittals and Drawings as specified in Electrical Specifications [Electrical General, Submittal Requirements].

B. Submit shop construction Drawings for the Control Panel. The following Drawings shall be provided as a minimum:
   1. Scaled drawings of the Control panel elevation, baseplan. The dimensions and locations of the cutouts shall be dimensioned from the bottom left corner of the door(s).
   2. Scaled drawings of the backpan including all mounted components and wireways.

1.04 OPERATING AND MAINTENANCE INSTRUCTIONS

A. Provide operating instructions as specified in Electrical Specifications [Electrical General].

PART 2 PRODUCTS

2.01 ENCLOSURE

A. The enclosure for the control panel shall be (at minimum) sized as shown in the Contract Drawings.
   1. Arrangement: Where so indicated, the instruments mounted in the panels shall have the nominal size and general arrangement shown. Panel layouts and nameplates shall conform to the approved submittal.
   2. Assembly: Mount all equipment on 12 ga. painted white backpan(s) that is bolted to rear (and sides) of the enclosure. Use drill and tap method for machine thread screws for all internal components on mounting panels. Provide extra mounting

bolts through the rear of the structure if equipment weight exceeds backpanel mounting stud capacity.

3. Hardware: Provide door latch and accessories as detailed in the Contract Drawings or as required to meet NEMA area ratings.
   a. Provide one or two single point latches for panels up to 36" height.
   b. Provide 3 point latching mechanisms for panels over 36" height consisting of rotating handle with latch, extension bars with plastic wheels at ends and guide slots at top and bottom of door, or as otherwise shown on drawings.
   c. Hinges, pins, bolts and screws shall be of 316 stainless steel only.
4. When physical size requirements for individual components are different than that detailed on the Control Panel backpan drawing, the wiring diagrams and specifications herein shall supersede the elevation drawing and the Contractor shall furnish additional panel width as needed to fit the electrical equipment. Deviations with sufficient evidence for the change shall be submitted for approval. The Contractor is required to provide for all equipment including spares and spaces as shown in the wiring diagrams.

2.02 CONTROL PANEL CIRCUIT BREAKERS

A. Furnish circuit breakers and accessories as required per Drawings and application.
   1. Copper busbar systems, up to 480VAC, 115A, 1, 2 or 3 phase as needed for application
   2. Trip rating per Drawings or as needed for protected device. Trip curves as selected by System Integrator.
      a. B curve magnetic trip point: 3 to 5 times the rated current, typically used for computers and electronic equipment with very low inrush loads (PLC wiring).
      b. C curve magnetic trip point: 5 to 10 times the rated current, typically used for small transformers, pilot devices, etc.
      c. D curve magnetic trip point: 10 to 20 times the rated current, typically used for transformers or loads with very high inductive loads.
   3. Quantity of pins and feed in lugs as required.
   4. Auxiliary contact, shunt trip as required in Drawings.
   5. DIN rail mounted, 18mm width per pole, finger safe pressure plate terminals.

B. Motor applications:
   1. UL489 for branch circuit protection up to 40A, 1 to 3 pole.
   2. Minimum 5 kAIC interrupting capacity @ 480 VAC
   3. Alltech, Eaton FAZ, or equal.

C. Control circuit transformers and other Non-motor applications:
   1. UL1077 supplementary protection up to 63 amps, 1 to 2 pole, AC or DC.
   2. Minimum 5 kAIC interrupting capacity @ 480 VAC
   3. Used where a UL489 protective device is upstream powering the circuit (from a panelboard or other source).
   4. Used within control circuits for power supplies, control power transformers, relays and PLC I/O points.
   5. Used in place of fuses that are applied as supplementary protection.
   6. Eaton FAZ, or equal.

2.03 FUSES AND FUSE HOLDER

A. Fuses shall not be used in mains, branch, or control circuits, unless specifically shown in the Drawings or as required to meet panel rating AIC requirements. Circuit breakers shall be furnished and utilized where possible.

B. Fuses used in circuits 200 VAC and above shall be time delay, 13/32" x 1 1/2", and have an interrupting rating of 10,000 AIC at 500 VAC. Fuses shall be Bussman type FNQ or approved equal. Fuse holders shall feature open fuse indication lights and shall be rated 30A at 600 VAC. Fuse holders shall be Bussman Optima Series OPM or equal.

C. Fuses used in 120 VAC shall be time delay, 1/4" x 1 1/4", and have a rating of 250 VAC. Fuses shall be Bussman type MDA or approved equal. Fuse holders shall be of the same manufacturer, series and color as the adjacent terminal blocks and have blown fuse neon indicators. Fuse holders shall be Entrelec ML 10/13.SFL, Allen Bradley 1492-H4 or equal.

D. Fuses used in signal and 24 VDC circuits shall be fast acting, 5mm x 20mm and have a rating of 250 VAC. Fuses shall be Bussman type GMA or approved equal Fuse holders shall be of the same manufacturer, series and color as the adjacent terminal blocks and have blown fuse LED indicators. Fuse holders shall be Entrelec M 4/8.SFDT, Allen Bradley- 1492-H5 or equal

E. Fuses shall be sized in conformance with the NEC.

2.04 TERMINAL BLOCKS AND ACCESSORIES

A. General
   1. Terminal blocks to be clamp type, 0.2 inch spacing, 300 volt, 20 amp, and mounted on 35mm DIN rail. DIN rail shall be same type as used for the relays. Install extra DIN rail on each type of terminal strip with 10% spare terminals for future additions.
      a. Provide larger terminal as necessary based on gauge of connected wiring. Those terminals with 10-gauge larger gauge wiring or more than one 12-gauge wire should be evaluated and changed.
   2. Provide terminal blocks with "follower" plates that compress the wires and have wire guide tangs for ease of maintenance. Terminal blocks that compress the wires with direct screw compression are unacceptable. All power, control and instrument wires entering and leaving a compartment shall terminate on terminal blocks with wire numbers on terminals and on both ends of the wires.
   3. Provide end clamps, separators, din rails, and jumpers to complete terminal block system. See example PLC I/O drawing for additional information. Engineer can provide on request if not available in plans.
   4. Terminal Tags and Markers: Each terminal strip shall have a unique identifying alphanumeric code at one end (i.e.: TB1, TB2, etc.) or as shown in Drawings.
   5. Plastic marking tabs shall be provided to label each terminal block. These marking tabs shall have a unique number/letter for each terminal which is identical to the "elementary" and "loop" diagram wire designation. Numbers on these marking strip shall be machine printed and 1/8” high letters minimum.
   6. Terminal blocks shall be physically separated into groups by the level of signal and voltage served and as shown in the drawings. Power and control wiring

above 100 volts shall have a separate group of terminal blocks from terminal blocks for wiring below 100 volts, intermixing of these two types of wiring on the same group of terminal blocks is not allowed.

B. MCC – Motor Starter Cubicle Terminal Blocks
   1. MCC cubicle terminal blocks shall be pull apart as supplied standard by MCC manufacturer.

C. Power – Power terminal Blocks
   1. Backpan mounted termination blocks shall be rated for 600V (min). The power termination blocks shall be rated to accept Copper or Aluminum cable and rated as shown on Contract one-line diagrams. Termination blocks shall be insulated with molded plastic covering and finger safe cover. Each termination block shall be provided with quantity and size of primary and secondary cable connections as required per installation. The power termination blocks shall be Erico UD, UDJ, BD, TD, or SB series or equal.
   2. Unmounted termination blocks shall be constructed of aluminum and suitable for use with Aluminum and copper wire. Size and quantity of cable connections shall be as required for installation. Termination blocks shall be insulated with molded high-dielectric strength plastic covering and eliminate the need for tape insulation of electric connection. The termination block shall have removable access plugs over the wire entry and hex screw ports. Provide NSI Polaris IPL or IPLD Series terminal blocks or equal.

D. Panel Ground
   1. Each electrical enclosure shall have a copper ground bus. Screw type fasteners shall be provided on all ground busses for connection of grounding conductors. Ground bus shall be a Challenger GB series, ILSCO CAN series or equal.
   2. A 12ga. copper ground wire shall be attached between the ground bar and the panel enclosure, and between the ground bar and the mounting panels. The ground connection to the enclosure and panel shall be made by sanding the paint finish off a small area, drilling a hole for a 0.25 inch bolt and mounting a 0.25-20 bolt to the panel to serve as grounding stud. The grounding stud shall be attached with a nut and flat washers on both sides of the enclosure/panel, and with an inside tooth star lock washer next to the panel surface. The star lock washer shall be on the inside surface of the enclosure, and the front surface of the mounting panel. The grounding wire shall be secured to the stud with a nut and inside tooth star lock washer. These grounding points shall be located within 12 inches of the bottom to the grounding bar. Each terminal strip rail shall be individually grounded by means of a #12 AWG wire to the ground bus.
   3. Components within the panel shall be grounded according to the manufacturer's recommendations.

2.05 COMPONENTS

A. Switches and Pushbuttons
   1. Switches (HS) and pushbuttons (HC) for general purpose applications shall be water and oil tight as defined by NEMA 4X, corrosion resistant as defined by NEMA ICS 6 110.58, U.L. listed, standard 30 mm diameter, with plastic holding nut.

2. Switches and pushbuttons shall have contacts rated NEMA A600 or 10 amperes continuous and 600 VAC. Provide NO and NC contacts to facilitate functional requirements indicated.
3. Engraved black legend plates shall be provided to define each switch and pushbutton function.
4. Selector switch handles and pushbutton caps shall be black unless otherwise noted on drawing. Lock-out stop caps shall be red.
5. Selector switches for hand off auto (HOA) applications shall have the hand position to the left, off in center, and auto in the right position.
6. Pushbuttons and selector switches in hazardous locations shall have hermetically sealed contacts or explosion proof enclosures.
7. Lockout stop pushbuttons shall include padlocking attachment. Pushbutton type shall be coordinated with padlock attachment type.
8. Switches and pushbuttons shall be Allen-Bradley 800H, or equal.

B. Indicating Lights
1. Indicating Lights for general purpose applications shall be NEMA 4X, corrosion resistant as defined by NEMA ICS 6 110.58, U.L. listed, 30 mm diameter, with plastic lens, plastic holding nut, and miniature bayonet lamp base.
2. Lamp shall be full voltage 120 VAC with 28 chip (min) High Intensity LED.
3. Indicating lights shall have contacts rated NEMA A600 or 10 amperes continuous and 600 VAC. Provide NO and NC contacts to facilitate functional requirements indicated.
4. Engraved black legend plates shall be provided to define each lights function.
5. Indicating light type and color of lens shall as follows or as otherwise shown on the Drawings:
   a. Open/On — Green
   b. Closed/Off — Red
   c. Alarm — Amber or Blue
   d. Power On — White
6. Indicating lights designated "PTT" on wiring diagram or shown with push-to-test wiring shall be provided with a push to test switch and wiring.
7. Indication lights shall be Allen-Bradley 800H, or equal.

C. Relays and Timers
1. General: Relays and timers shall be provided with N.O. or N.C. contacts as shown on the Drawings. All spare contacts shown shall be provided. Contacts shall be rated 10 amps minimum at 120 VAC, 60 Hz unless otherwise shown on the Drawings. Coil voltage shall be 120 VAC unless otherwise described or shown on the Drawings. Relays and timers shall be designed for continuous duty. All relays shall be U.L. listed. All relays and sockets shall be the product of a single manufacturer. The following is a summary of abbreviations associated with relays and timers:
   a. CR – Control relay
   b. CRM – Control relay (miniature)
   c. TR – Timing relay
   d. TDOE – Time delay on energization
   e. TDOD – Time delay on de-energization
   f. PR – Power Relay

2. Sockets for plug in relays and timers shall be standard industrial type DIN rail mount with barrier type pressure plate screw terminals. Sockets shall be rated 300 VAC, 10 amps minimum.
   a. Blade 8 or 11 pin for coil voltage above 90 volts AC or DC.
   b. Octal 8 or 11 pin for coil voltage below 90 volts AC or DC.
3. Control relays (CR) shall be plug in type with neon indicating lights and clear see through sealed housing to exclude dust. Provide IDEC Type RR, or equal. Two form C contacts (minimum) shall be provided on each relay.
4. Control relays (CRM) shall be plug in type with LED indicating lights and clear see through sealed housing to exclude dust. Provide Omron MY4ZN series, or equal. Four form C contacts (minimum) shall be provided on each relay.
5. Time delay relays on energization (TR-TDOE) shall be solid-state plug-in relays with adjustable timer ranges from 1 second to 10 hours selectable unless other ranges are shown. Provide LED timer energized indicator lamp. Time delay relays shall be IDEC RTE, or equal.
6. Time Delay Relays (TR-TDOD)
   a. Time delay relays on de-energization (TR-TDOD) (continuous power control input) shall be solid-state plug-in relays with a timer adjustable range from 1 second to 10 hours selectable unless other ranges are shown. Provide LED timer energized indicator lamp. Time delay relays shall be IDEC RTE, or equal.
   b. Time delay relays on de-energization (TR-TDOD) (true off) shall be solid-state plug-in relays with a timer adjustable range from 1 second to 10 minutes unless other ranges are shown. True off time delay relays shall be IDEC GT3F-2, or equal.
7. Power relays (PR) shall be plug in ice cube type with clear sealed housing to exclude dust.
   a. Applications requiring 3PDT contacts rated 20A or 0.5 HP at 120 VAC (minimum), furnish Magnecraft Type 389FXCXC-120A, or equal.
   b. Applications requiring SPDT contacts rated 25A or 1.5 HP at 240 VAC, furnish Magnecraft Type 389FXBXC-120A, or equal.
   c. Furnish compatible blade type relay socket model 70-788EL11-1 or equal.

2.06 POWER SUPPLIES

A. DC Power Supply (PS)
1. The DC power supply shall utilize a switching power stage, rectifier and voltage regulator. The power supply case shall be DIN rail mountable.
2. The power supply shall operate on 120V AC and provide DC output voltage and current as shown in the Contract Drawings.
3. The power supply shall be wired and fused per manufacturer instructions and Contract Drawings. Power supply output shall include self resetting overcurrent protection.
4. Power supplies below 101 Watts output power shall be Class 2 rated.
5. The power supply shall provide 2% voltage regulation for a change of 10% load to 100% full load.
6. The DC power supply shall be IDEC PS5R Series (non-redundant applications), Sola SDN-C, Phoenix Contact Quint Power, or equal.

2.07 MISCELLANEOUS COMPONENTS

A. Wireway: Manufactured from light gray rigid PVC suitable for continuous use at temperatures up to 50 deg C. Wireway shall be 2" height, width as required with 0.5" slot spacing with removable covers. Provide Panduit type "F" or equal.

B. Hardware: 316 stainless steel machine thread screws and bolts, hinge pins, washers, nuts, and lock-washers.

PART 3 EXECUTION

3.01 WORKMANSHIP

A. All work in this Section shall conform to the codes and standards specified in Electrical Specifications [Electrical General, Workmanship].

3.02 FABRICATION

A. Equipment Mounting:
   1. Mount all equipment using manufacturers mounting tabs/holes or brackets where possible. Where not possible, construct custom brackets to panel mount or backpan mount components as shown in the Contract Drawings.
   2. Equipment or laptop shelves shall be provided where shown on the Contract Drawings. Equipment shown on shelves shall not be placed on the bottom of the panel after field installation.
   3. All nuts, bolts, screws, washers and hinges used in the panel shall be stainless steel. All components shall be mounted using bolts or screw fasteners only which are drilled and tapped into the backpan. Pop rivets shall not be allowed within panel except for enclosure support arms.

3.03 INSTALLATION

A. Wiring:
   1. Install all equipment per Electrical Specifications [Electrical General].
   2. All internal and field wiring shall be per Electrical Specifications [Low Voltage Wire].
   3. Panel Wiring: All wiring shall be installed in wireways between terminal blocks and devices. Reference Contract Drawings for Control panel power distribution diagram and control panel elementary diagrams.
   4. Field Wiring: Wireways shall be provided for field wiring. Reference Contract Drawings for control panel power distribution diagram and control panel elementary diagrams.

B. Cleaning:
   1. The Contractor shall clean the inside of the control panel of any dust or debris remaining at the completion of installation and testing.
   2. The Contractor shall exercise care when using a vacuum cleaner or compressed air such as not to damage any component within the panel.

3. Many electrical and computer components are open for ventilation. Falling debris can penetrate the openings and cause equipment failure. Equipment with debris inside shall be removed, cleaned and/or replaced.

3.04 FIELD ASSISTANCE

A. Provide testing as specified in Electrical Specifications [Factory and Field Testing].

3.05 WARRANTY

A. Provide warranty as specified in Electrical Specifications [Electrical General, Warranty].

3.06 FINAL ACCEPTANCE

A. Final Acceptance per Electrical Specifications [Electrical General].

END OF SECTION

SECTION 16940
INSTRUMENTATION

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Furnish, configure, test, commission, and warrant instrumentation as shown in the P&IDs, plans, and/or listed in specification section.

B. Include necessary piping, valves, pressure reducers, mounting brackets or flanges, supports, and anchors to complete installation.

C. Provide sunshades for instrumentation for all instruments that are exposed to direct sunlight.

D. System Integrator selection of instrumentation shall be per manufacturer's recommendation for the application and per specifications. If a manufacturer's recommendation or installation instructions are inconsistent with the Contract installation details or specifications, then the Contractor shall submit an RFI describing the inconsistency. If the inconsistency is due to substitution from the first named equipment, then the responsibility of coordination and any additional cost shall be borne by the Contractor.

E. The Contractor shall coordinate with each supplier of instrumentation to confirm that primary elements are provided in a timely manner, meeting critical path scheduling.

F. The Contractor shall coordinate process connection size, equipment size, and material type, and oversee the installation, calibration, and acceptance testing.

G. Projects that come into contact with drinking water: (NSF-61 certification)
   1. Furnish NSF/ANSI 61 certified products that have undergone testing for any device, valve, instrument, or assembly that will come into contact with drinking water.
   2. The certification determines what contaminants may migrate or leach from the product into drinking water and confirms if they are below the maximum levels allowed to be considered safe.
   3. Flowmeters, pressure transmitters, and chemical analyzers are a few of the products that may fall into this category requirement.

H. Provide all devices, valves, tubing, fittings, wiring, terminal blocks, calibration consumables, initial calibration equipment, accessories, sunshades and enclosures as specified herein and as shown on Contract Drawings.

I. The Contractor shall furnish all tools, calibration equipment, calibration materials, specialized parts and incidentals necessary to integrate the instrument to the application.

J. Contractor shall furnish labor for installation, verification, start-up, calibration, testing and commissioning. Contractor shall prove proper function of instrument prior project completion.

1.02 REFERENCES

A. Electrical Specifications [Electrical General]

B. Electrical Specifications [Factory and Field Testing]

1.03 SUBMITTALS AND DRAWINGS

A. Submit shop documents and drawings for approval in accordance with this subsection and as specified in Electrical Specifications [Electrical General, Submittal Requirements].

B. Submit Operating Instructions (O&M Manuals) for each instrumentation device prior to equipment installation.

1.04 OPERATING AND MAINTENANCE INFORMATION

A. Provide operating instructions as specified in Electrical Specifications [Electrical General, Operating and Maintenance Instructions].

PART 2 PRODUCTS

2.01 QUALITY

A. Electrical Specifications [Electrical General, Quality].

B. All equipment shall be designed and constructed so that in the event of a power interruption, the equipment specified hereunder shall resume normal operation without requiring a manual reset.

C. Signal transmission from remote or field electric and electronic devices shall be 4 20 mA, sourced by a 24 VDC supply internal to the instrument or from a 24 VDC power supply located within the panel that is to receive the signal. Nonstandard transmission methods such as impulse duration, pulse rate, and voltage regulated will not be permitted except where specifically noted.

D. Transmitters or devices located in Class 1, Division 1 hazardous areas shall be rated for hazardous location installations per NEC and UL. Explosion proof enclosures and raceways or current/spark limiting devices located inside or outside of the classified area shall be furnished to comply with code requirements.

E. Outputs of equipment that are not of the standard signals as outlined, shall have the output immediately converted to 4-20 mA signals for remote transmission.

2.02 INSTRUMENT IDENTIFICATION

A. All major instrumentation and equipment items or systems specified in this Division and/or on the P&IDs are identified by tag numbers. Tag field equipment with assigned instrumentation tag number and functional description.
   1. Tags shall be 1/2" stainless steel DYMO impressed tape with 3/16"(minimum) height characters.
   2. Metal tape embosser shall feature a built in hole punching device and scissor cutoff tool.

B. Attach tags to equipment with a 4" long, 20-gage stainless steel wire leash for small devices, or two stainless steel screws for larger instruments; however, such permanent attachment shall not be on an ordinarily replaceable part or in an area that will be subject to unintended overuse fatigue. Make the tag plainly visible.

2.03 PRESSURE COMPONENTS

A. Differential Pressure Switch:
   1. Differential pressure switch shall be UL listed and include SPDT switch rated 15 amps @ 120VAC and enclosed in a NEMA 1 rated housing. Pressure switch shall be diaphragm type and mechanical snap action switch. Switch shall have single trip setpoint adjustment with ability to plumb the desired port for measurement of positive or negative pressures relative to atmosphere. The pressure switch shall be Dwyer 1900 Series Compact Low Differential Pressure Switches or equal.
      a. Setpoint ranges for switches shall be supported by calculations performed by Contractor and completed with initial submittal. Range selection shall be performed by Contractor.

2.04 ANALYTICAL ELEMENTS

A. Gas Monitoring System
   1. Provide sensors for measuring the following gases:
      a. Hydrogen Sulfide (H2S) 0-50ppm, setpoint 2.5 ppm
      b. Combustible Methane (LEL) 0-100%, setpoint 2.5%, 3 wire
   2. System
      a. Operating Voltage - The sensor/transmitter can operate between 20-30 VDC.
      b. The signal from the sensor/transmitter to the monitoring instrument will include 3 relay contacts.
      c. The transmitter shall provide local display of the concentration of gas present. The display will be an integral part of the transmitter enclosure and have three digit LED display.
      d. The sensor/transmitter shall not need to be opened during the calibration process.
      e. Upon initial start-up of the sensor/transmitter, the front panel LCD will show that an initial field calibration has not taken place.
      f. The transmitter will give an indication of when sensor is nearing the end of its useful life by means of the front panel LCD. This indication that the sensor is nearing its useful life will be based on the sensor output. It shall not be based on the time the sensor was in service.

g. The transmitter shall be capable of storing and displaying average, minimum and maximum gas concentrations over selected periods of time.
h. Alarm levels and calibrations shall be adjustable by means of a hand held infrared controller. Transmitter shall display 3 levels of alarm with indicating lights.
i. Sensing elements will be mounted external to the main enclosure dependent on gas measured and approximately 20 feet away. All sensing elements shall be replaceable without opening main enclosure.
j. Sensing Element Warranty - All sensing elements (sensors) will have a minimum useful life of one year. The supplier shall provide replacement sensors at no charge for any sensor that does not meet the minimum requirement.

3. Sensor/transmitter Configuration
   a. Sensor and transmitter enclosure shall be designed to meet Class 1 Division 1 and NEMA 4X corrosion resistant requirements.
   b. Integral sensor/transmitter mounting for those sensors that do not need to be located near the floor or ceiling.
   c. Remote sensor mounting for those sensors that need to be located near the floor or ceiling.
   d. Sensor/transmitter units shall have provisions for mounting to a wall or panel.
4. Calibration equipment.
   a. Provide gas calibration kit for each sensor type provided.
5. Spare Parts.
   a. One year supply of consumable materials as recommended by manufacturer.
6. The sensor/transmitter shall be Mine Safety Appliances Ultima X Gas Monitor, or equal.

2.05 MOTOR OR EQUIPMENT PROTECTION DEVICES

A. Amperage Switch:
   1. Amperage switch shall be self powered and provide a closed contact which closes the output contact when current is measured through the integral current transformer above adjustable setpoint (1-6, 6-40, or 40-175 amps selectable). The switch shall have an accuracy of 5% and repeatability of 1/2% of full scale (minimum). Switch shall include LED for quick visual indication of contact status. Operating temperature range shall be -20 deg C to 50 deg C. Transducer shall have separate zero and span and time delay adjustments. Insulation between output and case shall be rated at 1000VAC. Amperage switch shall be as manufactured by Neilsen-Kuljian (NK technologies) ASX series or equal.

PART 3 EXECUTION

3.01 WORKMANSHIP

A. Instrumentation work shall conform to workmanship standards specified in Electrical Specifications [Electrical General, Workmanship].

B. The Contractor shall employ personnel who are skilled and experienced in the installation and connection of equipment defined in this section. Contractor qualifications are specified in Electrical Specifications [Electrical General].

C. Verify that all equipment and materials fit properly.

D. All instrumentation configuration, programming and calibration shall be completed prior to the start of field tests.

E. Equipment without approved submittals shall not be installed.

F. All equipment shall be properly stored indoors while awaiting installation. Protect installed equipment from construction debris or mishaps. The Contractor will replace any equipment that is not in new condition at the time of installation and/or start-up.

G. Perform work to remedy non-compliant installations after inspection.

3.02 INSTALLATION

A. Install and supply all products necessary to provide an operational instrumentation system. This shall include the following:
   1. Contract Drawings are intended to show the basic functional requirements of the instrumentation system. Insufficient detail does not relieve the Contractor from the responsibility to provide a complete and functioning system. If additional detail or clarification is required, the Contractor shall request such information prior to installation.
   2. Provide relays, signal converters, isolators, boosters, power conditioners, circuit cards, and other miscellaneous devices as required for the compatible and functional interface.
   3. Provide analog loop isolators where required to eliminate "ground loops."
   4. The instrumentation and accessory equipment shall be installed in accordance with the manufacturer's instructions and located as shown on the Drawings or as approved. When manufacturer's installation literature specifies a particular location or orientation in a process line due to measurement accuracy considerations, the installation shall be in conformance with the manufacturer's instructions.

B. Instrument installation methods.
   1. Install instruments at the location shown on the Plans or approved. Instruments enclosures shall be NEMA rated for the installed location.
   2. Install level and plumb.
   3. All instruments shall be provided with floor stands or wall brackets as shown in installation details or as required for functional installation.
   4. Mounting stands shall be custom manufactured of aluminum channel with base plate unless otherwise noted in installation detail.
   5. Mounting channels (unistrut), and spacers shall be galvanized steel above ground outdoors and stainless steel below ground (wetwell), unless otherwise noted in installation details.
   6. All screws, bolts and anchors shall be stainless steel.

C. Wiring and raceway installation methods:

1. Terminal blocks shall be provided at all instrument cable junctions and all wires shall be identified at such junctions.
2. Instrumentation wiring shall be run without splices between instruments, terminal boxes, or panels.

D. Wiring, grounding, and shielding: The following practices shall be observed unless modified by manufacturer's standards.
1. Each electronic equipment chassis shall be grounded to power ground.
2. Shielded twisted pair, shielded triad, or manufacturer supplied cables only shall be used for analog signals and communications signals.
3. Drain wire of shielded cables used for analog inputs to the PLC shall be connected at the PLC unit only. Shield shall be isolated from ground at all other termination points including transmitters.
4. Drain wire of shielded cables used for analog outputs from the PLC shall be connected at signal receiving device only. Shield shall be isolated from ground at all other termination points.
5. If electrical interference noise is imposed on DC status and alarm signals, then they shall be re-routed or wire changed to shielded twisted pair cables.
6. Each shield drain wire which is not connected to ground shall be cut off covered with a heat shrink insulating boot at cable jacket end. Shields shall be connected together at each transition from one cable to another for an effectively continuous shield circuit.

3.03 SUPPLIER SERVICES

A. The Contractor shall be responsible for each supplier of equipment to provide the following minimum services for each type of instrument supplied. Each supplier shall provide a qualified instrumentation field technician to perform services listed herein. Contractor shall supply all calibration materials necessary to commission unit and shall not use any consumable materials that are intended to be furnished for the first period of use.
1. Advise and instruct Contractor on proper installation requirements.
2. Inspect, calibrate, test, and place equipment in operation. Calibrate instruments to values as shown in the instrument index or as noted herein. If instrument spans are required to change (within instrument range) during startup for process reasons, the Contractor shall change them as directed by the Engineer.
3. Programmable devices shall be programmed and tested prior to startup. Programming shall be adjusted or changed as directed by the Engineer at any time prior to final acceptance.
4. Perform testing in the presence of Engineer.
5. Visit the project site as often as required and spend as much time as necessary to ensure accurate and operational instrumentation.
6. Provide training as specified in FIELD ASSISTANCE.

3.04 FIELD ASSISTANCE

A. The instrument supplier shall provide a minimum of one (1) hour of field training to instruct Owner’s personnel in the use, operation, calibration, programming, and maintenance on each type of "field" instrument.

3.05 SPARE PARTS

A. Provide spare parts as described in each products section herein and specified in Electrical Specifications [Electrical General, Spare Parts].

B. Contractor shall supply all calibration materials necessary to commission unit and shall not use any consumable materials that are intended to be handed over to the Owner as defined in the instrument specifications.

3.06 WARRANTY

A. Provide warranty as specified in Electrical Specifications [Electrical General, Warranty].

3.07 FINAL ACCEPTANCE

A. Final Acceptance per Electrical Specifications [Electrical General].

END OF SECTION

APPENDIX A

ROHNERT PARK PUMP STATION WET WELL CONDITION ASSESSMENT, PS2 SECTIONS, V&A, DECEMBER 8, 2016

3.3 PS2 Wet Well

3.3.1 pH, Penetration Depth, and Soundings

Physical evaluation was performed on the interior concrete surfaces of the PS2 wet well as shown in Table 3-5. These results indicate that the concrete is generally in good condition, with a shallow depth of degradation over most of the surface area. Penetration depth of 1/4 in. below the water line shows that the concrete may be somewhat soft, or that certain operating conditions may expose the walls in this zone periodically, leading to degradation. A surface pH as low as 6 shows that there may be a minor amount of hydrogen sulfide present in the wet well atmosphere, leading to surface degradation.

Table 3-5. pH, Penetration, and Sounding Results

Location	Concrete pH	Concrete Penetration Depth (in.)	Soundings	Notes
West wall, between Pump 2 and Pump 3 suction pipes, approx. 66 in. above invert	10	1/4	Sound, hard concrete	
West wall, between Pump 2 and Pump 3 suction pipes, between approx. 24 and 72 in. above invert	–	–	Sound, hard concrete	
North wall, near northwest corner, approx. 18 in. above invert, in area of exposed aggregate	12	1/8	–	
West, north, and sloped east walls at northwest corner, within approx. 6 ft. of corner, from invert to approx. 7 ft. above invert	–	–	Generally sound, hard concrete	Some dull sounds (indicative of soft material), possibly due to slime layer
North wall, below northeast hatch opening, approx. 5 ft. above sloped surface, in area of exposed aggregate	8	3/16	Sound, hard concrete	pH was 11 at 3/16-in. depth, indicating shallow degradation depth
North wall, below northeast hatch opening, approx. 5 ft. above sloped surface, outside area of exposed aggregate	6	1/8	Sound, hard concrete	pH was 9 at 1/8-in. depth, indicating minor degradation penetrating into the concrete

3.3.2 Visual and Qualitative Evaluation

In general, the concrete interior surfaces of the wet well were in good condition with respect to corrosion, but there were numerous localized defects that result in an overall rating of VANDA Level 2 for the PS2 wet well. The defects observed within the PS2 wet well were as follows:

- There was medium-diameter exposed aggregate in several locations:
  - On the walls at or just below the apparent normal water line (Photo 3-23).
  - At the bottom of the north wall at the northwest corner of the wet well (Photo 3-24).
  - On the sloped east wall at the south end of the wet well.

Photo 3-23. Exposed aggregate near water line on north wall (typical).

Photo 3-24. Exposed aggregate at bottom of north wall.

- There were bug holes and rock pockets in the concrete. The bug holes (Photo 3-25) were widespread and were more prevalent at lower elevations. The rock pockets were predominantly on the west wall (Photo 3-26), which is the shared wall between the wet well and dry well, particularly in the lowest 2 feet of the wall (Photo 3-27). There was one apparent rock pocket (it may instead have been a hole in the concrete) that was at least 6 inches deep (Photo 3-28). These are probably construction defects (poor consolidation), but they tend to reduce the effective cover over the reinforcing steel. The rock pockets in particular may provide a pathway for corrosive substances to reach the reinforcing steel.
- There were apparent voids in concrete fill around the suction pipes. These may also provide a pathway for corrosive substances to reach the reinforcing steel.

Photo 3-25. Bug holes on north wall near crossover pipe from PS1.

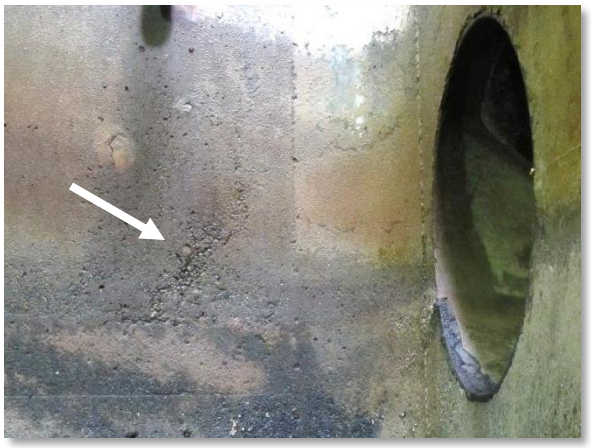


Photo 3-26. Rock pocket on west wall near northwest corner.

Photo 3-27. Rock pocket near bottom of west wall.

Photo 3-28. Ruler inserted 6 inches into rock pocket or hole near base of west wall.

- There was efflorescence and cracking visible on the ceiling (Photo 3-29) and on the bottom of the walkway that runs along the east wall (Photo 3-30). There was also seepage below the wall running along the edge of the walkway (Photo 3-31), and vertical crack in the wall (Photo 3-32). These cracks may also provide a pathway for corrosive substances to reach the reinforcing steel.

Photo 3-29. Cracking and efflorescence on wet well ceiling. Some cracks run across nearly the full width of the wet well.

Photo 3-30. Typical cracking and efflorescence on bottom surface of walkway.

Photo 3-31. Seepage at bottom of wall along walkway. Standing water on the walkway appears to be seeping through. This may be related to the efflorescence.

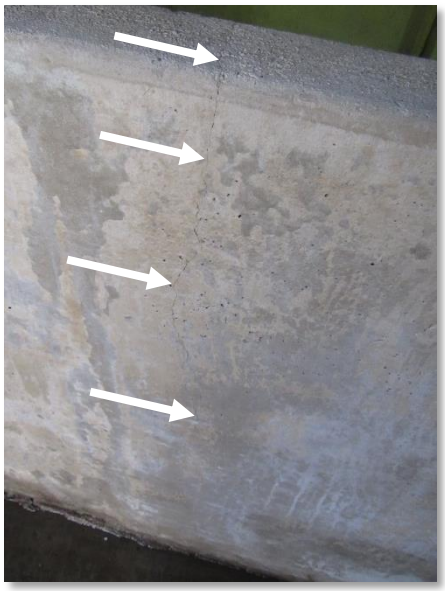


Photo 3-32. Hairline crack in wall along edge of walkway.

- There appeared to have been a mortar overlay that was originally applied to much or all of the interior surface. This mortar overlay was degraded and coming loose where it was present (Photo 3-33).
- There were rough patches in the ceiling in a few locations, and spalling around the hatch frames at the north end of the wet well (Photo 3-34).

- The safety chains at the ends of the walkway had corroded links, resulting in not all of the chains being functional (Photo 3-35).
- The bottom edge of the sloped east wall was rough, as though the formwork had been irregular in this area.
- Additional documentation of metallic, mechanical, electrical, and other items within the PS2 wet well is presented in Appendix A.

Photo 3-33. Degraded mortar overlay at northwest corner.

Photo 3-34. Rough patch in ceiling (below) and spalling of concrete around hatch frame (above).

Photo 3-35. Corroded and non-functional safety chains (typical).

3.3.3 Surface Penetrating Radar Scans

SPR scanning was conducted at two locations within the PS2 wet well. One location was on the north wall near the northwest corner, below the crossover pipe inlet from PS1. The other location was on

the west wall between the Pump 1 and Pump 2 suction pipes. The scans measured the depth and spacing of the reinforcing bars crossing the scan path.

Table 3-6 summarizes the depth and spacing of the reinforcing steel as measured at the SPR scanning locations. The minimum depth of concrete cover over the reinforcing steel at the SPR scan locations was 2.7 inches, which is more than the minimum depth of 2 inches recommended as a guideline for this type of structure (see Section 2.6). It is possible that the thickness of the concrete cover is less at locations that were not scanned. Also, it should be noted that some of the defects (bug holes, rock pockets, etc.) noted in Section 3.3.2 may reduce the effective depth of cover over the reinforcing steel.

Table 3-6. SPR Scan Results for PS2 Wet Well

Location	Bar Direction	Reinforcing Bar Depth (in.)			Reinforcing Bar Spacing (in.)		
		Min.	Avg.	Max.	Min.	Avg.	Max.
North wall, approx. 1 to 5 feet east of west wall, from approx. 1 to 6 feet above invert (see note a)	Horizontal	4.6	5.5	6.4	8.5	11.1	12.3
North wall, approx. 2 feet east of west wall, from approx. 1 to 6 feet above invert	Vertical	3.1	3.9	5.2	11.0	12.1	13.6
West wall, between Pump 1 and Pump 2 suction pipes, approx. 18 in. above invert, below step in wall (see note b)	Horizontal	3.4	3.6	3.8	9.8	9.8	9.8
West wall, between Pump 1 and Pump 2 suction pipes, approx. 4 to 6 ft. above invert, above step in wall (see note b)	Horizontal	4.0	4.3	4.6	11.8	12.6	13.6
West wall, between Pump 1 and Pump 2 suction pipes, approx. 4 to 6 ft. above invert, above step in wall (see note c)	Vertical	2.7	2.9	3.2	11.8	12.0	12.2

a. An additional horizontal bar was found in this area at a depth of 2.9 inches. This bar was not on the same grid as the others.
b. Two additional horizontal bars were found in the vicinity of the step in the wall, at depths of 4.2 and 6.2 inches. These bars were not on the same grid as the others.
c. Additional vertical bars (not included in the table findings) were found adjacent to the pipe penetrations.

3.3.4 Pump Suction Bells

The wet well contains four suction bells and pipes, which were evaluated visually and qualitatively. The suction line for Pump 1 does not appear to be in use. Visually, the suction bells appeared to be in good condition, and evidence of significant corrosion was not found. As a result, ultrasonic thickness testing was not performed on the suction bells. The suction bells appeared to be welded steel, and the weld seams and markings were clearly visible. The flange nuts and bolts appeared to

be in good condition beneath the slime layer. The coating and lining on the suction bells appeared to be in fair condition, with some chipping at edges and seams. Photo 3-36 through Photo 3-39 illustrate the suction bells and pipes.

Photo 3-36. Pump suction bells.

Photo 3-37. Typical bolt on suction bell flange; appears to be in good condition under slime.

Photo 3-38. Coating chipped on edge of Pump 2 suction bell (typical).

Photo 3-39. Interior of Pump 2 suction bell (typical). Note possible chipping or erosion of coating at weld seam.

3.4 PS2 Grinder Chamber

3.4.1 pH, Penetration Depth, and Soundings

Physical evaluation was performed on the interior concrete surfaces of the PS2 grinder chamber as shown in Table 3-7. These results indicate that the concrete is in good condition. The grinder chamber probably experiences a relatively non-corrosive atmosphere because it is open to the air.

Table 3-7. pH, Penetration, and Sounding Results

Location	Concrete pH	Concrete Penetra-tion Depth (in.)	Soundings	Notes
South wall near southeast corner, at apparent water line	–	Negligible		
South wall near southeast corner, above apparent water line	–	Negligible		
South and southeast walls between main inlet and upstream slide gate, below grating	–	–	Sound, hard concrete	
North and northeast walls between main inlet and upstream slide gate, below grating	–	–	Sound, hard concrete	
North wall between upstream slide gate and grinders, above grating, both sides of vertical crack	–	–	Sound, hard concrete	

3.4.2 Visual and Qualitative Evaluation

In general, the concrete interior surfaces of the PS2 grinder chamber were in good condition with respect to corrosion, resulting in an overall rating of VANDA Level 1. Photo 3-40 shows typical conditions inside the grinder chamber channels. However, there were some localized defects:

- There was an isolated area of spalling above the main outlet to the wet well (Photo 3-41).
- The grating and grating supports appear to be in good condition, except for the nuts and anchor bolts holding the support angles in place, which appear to be moderately to significantly corroded (Photo 3-42). This applies to the gratings directly above the channels and also to the gratings at grade level.
- There is a vertical crack in the approximate center of the north wall. The crack extends most of the height of the wall and exhibits some efflorescence (Photo 3-43 and Photo 3-44). There were other minor cracks in a few other locations as well, apparently randomly distributed.

- There was an isolated area of spalling and apparent reinforcing steel corrosion on the north wall at the bottom of the stairway (Photo 3-45). This location is in between the grinder chamber and wet well.
- As with the PS2 wet well, there appeared to have been a mortar overlay that was originally applied to much or all of the interior surface. This mortar overlay was degraded and coming loose where it was present.
- Additional documentation of metallic, mechanical, electrical, and other items within the PS2 grinder chamber is presented in Appendix A.

Photo 3-40. General view looking upstream in south grinder channel.

Photo 3-41. Spalling of concrete above outlet from grinder chamber to wet well.

Photo 3-42. Corroded nuts and bolts holding grating supports to walls (typical).

Photo 3-43. Crack near center of north wall.

Photo 3-44. Crack near center of north wall.

Photo 3-45. Isolated spalling on north wall outside grinder chamber (above bottom of stairway).

3.4.3 Surface Penetrating Radar Scans

SPR scanning was conducted at one location within the PS2 grinder chamber. The scan location was on the south and southeast walls at the southeast corner of the chamber, extending downstream from the main inlet. The scans measured the depth and spacing of the reinforcing bars crossing the scan path.

Table 3-8 summarizes the depth and spacing of the reinforcing steel as measured at the SPR scanning locations. The minimum depth of concrete cover over the reinforcing steel at the SPR scan locations was 2.5 inches, which is more than the minimum depth of 2 inches recommended as a guideline for this type of structure (see Section 2.6). It is possible that thickness of the concrete cover is less at locations that were not scanned.

Table 3-8. SPR Scan Results for PS2 Grinder Chamber

Location	Bar Direction	Reinforcing Bar Depth (in.)			Reinforcing Bar Spacing (in.)		
		Min.	Avg.	Max.	Min.	Avg.	Max.
South wall near southeast corner	Vertical	2.6	2.6	2.7	11.6	12.1	12.6
South wall near southeast corner	Horizontal	3.4	3.6	3.8	12.0	12.1	12.2
Southeast (diagonal) wall at southeast corner	Vertical	2.5	3.2	3.9	15.3	15.3	15.3

4.0 CONCLUSIONS

4.3 PS2 Wet Well

13. In general, the concrete interior surfaces of the wet well were in good condition with respect to corrosion, but there were numerous localized defects that result in an overall rating of VANDA Level 2. The defects included medium-diameter exposed aggregate; bug holes, rock pockets, and voids; spalling around the hatch frames; and cracking and efflorescence, particularly on the ceiling and walkway. A full listing of the observed defects can be found in Section 3.3.2.
14. The depth of concrete cover over the reinforcing steel was adequate in the areas that were scanned. However, some of the defects listed above may serve as a pathway for corrosive substances to reach the reinforcing steel.
15. The pump suction bells appeared to be in good condition. The coatings and linings on the suction bells appeared to be in fair to good condition.

4.4 PS2 Grinder Chamber

16. The concrete interior surfaces of the grinder chamber were in good condition and were rated VANDA Level 1. However, there were some localized defects, including a crack in the north wall, corrosion of the grating anchor bolts, and minor concrete spalling. A full listing of the observed defects can be found in Section 3.4.2.

5. Improve access to the wet well. Some possibilities include the following:
    a. Add a fixed base for a davit arm near the opening.
    Consider ways to make access below the landing easier:
        - Add a hatch in the landing.
        - Remove part of the landing.
        - Remove other obstructions in the wet well such as the frame structures.
6. Consider providing a gate to shut off the crossover pipe from PS1 to PS2, so that full isolation of each station can be provided when there is work taking place in either wet well.

5.2 PS1 Diversion Structure

7. Consider coating the interior of the diversion structure in order to extend its useful life. The coating systems recommended above for the wet wells above can be used in the diversion structure, although exposure to sunlight may cause the coating to chalk or discolor. This will not prevent the coating from performing its protective function. Coating this structure does not need to be a high priority because of the minimal concrete degradation that was observed, but it may be cost-effective to do in conjunction with one of the wet wells. Coating the structure interior would also be an opportunity to coat the north pipe connection plug and seal the crack in the east pipe inlet to prevent further degradation.
8. If the diversion structure is not coated, reassess the concrete interior surfaces on a 10-year i on. Monitor the e
9. C the gate lifts.

5.3 PS2 Wet Well

10. Resurface and coat the interior of the wet well. Based on the current condition, this is a short- to medium-term (within 2 to 5 years) recommendation that will serve to extend the useful life of the structure. Recommendations for a lining system are as follows:
    a. Surface Preparation – Prior to the application of the epoxy novolac or polyurethane coating below, the existing concrete should be prepared by high-pressure water jetting at 5,000 psi to remove soft concrete and debris and abrasive blasting to remove deteriorated concrete. Any exposed, corroded reinforcing steel should be evaluated by a structural engineer to determine if repairs need to be made. Exposed reinforcing steel should be treated with a corrosion inhibitor such as Sika Armatec 110 EpoCem or approved equal. Then the concrete substrate should be resurfaced up to the approximate original surface by spray-applying or hand-applying a repair mortar such as BASF MasterEmaco S488 CI, Tnemec Series 217 Mortarcrete or approved equal. Note that if the repair mortar is spray-applied, the repair surface should be hand-finished to a surface suitable for coating.
    b. Epoxy Novolac Coating System – Epoxy novolac coatings such as Raven Lining Systems' Raven 405, Sauereisen Sewergard 210S, or an approved equal offer

excellent resistance to chemicals and sulfuric acid. Polyurethane products such as Raven Lining Systems' Raven 505, GET Endura Flex 1988, or Sherwin Williams Sherflex S are also recommended. The application requires a two-step process after the concrete has been cleaned, abraded and resurfaced:

- Spray application of an epoxy primer at 2 to 5 mils.
- Spray application of the epoxy novolac or polyurethane coating at 125 mils.

11. Consider recoating and relining the pump suction bells with a high solids epoxy such as Carboline 890, PPG Amercoat 240, or International Paint Bar Rust 231. Abrasive blast per SSPC SP 10 and apply two coats at a dry film thickness of 5 to 6 mils per coat.
12. Address the other individual issues that were noted. The safety chains at the ends of the walkway should be prioritized for immediate repair.
13. Consider providing a gate to shut off the crossover pipe from PS1 to PS2, so that full isolation of each station can be provided when there is work taking place in either wet well.

5.4 PS2 Grinder Chamber

14. Monitor the interior of the grinder chamber for signs of degradation. At this time, a coating is not recommended because the grinder chamber is open to the air and appears to experience a low degradation rate.
15. Seal the vertical crack in the north wall by injecting a urethane grout.
16. Address the other individual issues that were noted. The replacement of the anchor bolts and nuts for the gratings should be prioritized for immediate repair. The new anchor bolts and nuts should be 316 stainless steel for corrosion resistance. Install insulating gaskets between the bolts/nuts and beams if the existing beams are made of dissimilar metals such as aluminum or galvanized steel.

APPENDIX A. DOCUMENTATION OF METALLIC, MECHANICAL, ELECTRICAL, AND OTHER ITEMS

PS2 Wet Well

Photo A-26. Piping and conduits or hydraulic lines above and inside main inlet to wet well.

Photo A-27. Piping and duct at southwest corner.

Photo A-28. Conduit or piping at invert of main inlet.

Photo A-29. Piping on ceiling. Note corroded hangers and strut channel supports.

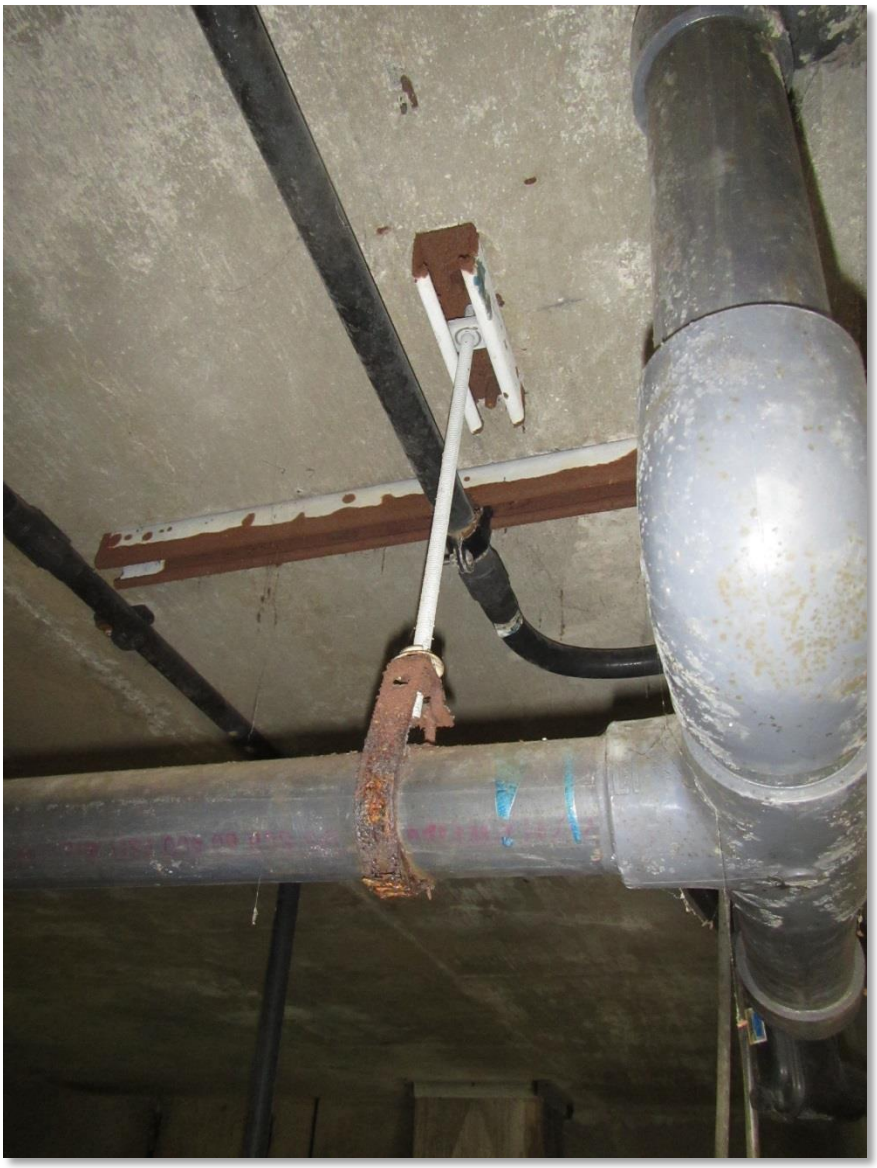


Photo A-30. Piping on ceiling. Note corroded hangers and strut channel supports.

Photo A-31. Corrosion on hydraulic lines and supports.

Photo A-32. Piping and conduits inside wet well. Note corrosion at conduit fittings.

Photo A-33. Non-potable water piping at southeast corner with corrosion at threaded joints.

Photo A-34. Piping and duct at northwest corner.

Photo A-35. Additional view of piping and duct at northwest corner.

Photo A-36. Closer view of duct at northwest corner.

Photo A-37. Duct at southwest corner. Note corrosion of hanger rods.

Photo A-38. Duct at southwest corner has standing water inside.

Photo A-39. Corrosion at conduit threads for light fixture (typical).

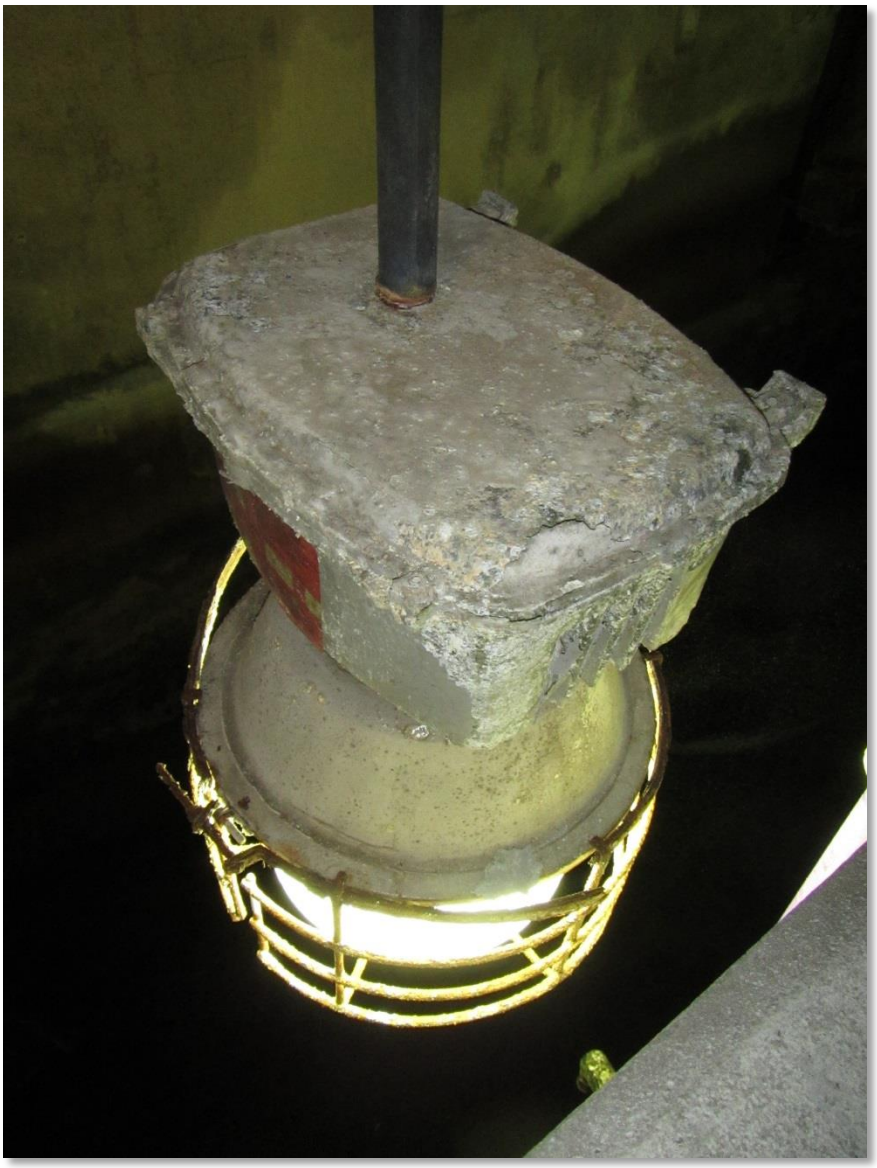


Photo A-40. Light fixture adjacent to platform. Note corrosion at threads on conduit, which is the only support for the fixture. Also note corroded cage around lens. Cage was easily removed by hand by City staff.

Photo A-41. Corroded cage from light fixture after removal by City staff.

Photo A-42. Float at southwest corner.

Photo A-43. Corrosion at welds on access gate for wet well platform. Also note roughened concrete where it was installed.

PS2 Grinder Chamber

Photo A-44. General view, looking east inside grinder chamber. Grating panels at bottom were removed for access to channels.

Photo A-45. Truncated conduits or pipes above main outlet to wet well.

Photo A-46. Piping exiting main outlet to wet well.

Photo A-47. Piping on south wall.

Photo A-48. Disused stop-plate guides (typical). Note that mortar overlay is spalling off of the guides.

Photo A-49. Disused stop-plate guides (typical). Note that mortar overlay is spalling off of the guides.

Photo A-50. Typical slide gate frame (at left). Per City staff, the slide gates and frames are stainless steel but were coated with Line-X. This coating has failed, and is peeling off in large sheets.

Photo A-51. Slide gate and grinder in south channel.

Photo A-52. Hydraulic lines, etc., in north channel.

Photo A-53. Disused bracket on channel wall, reportedly for a former bar screen installation.

Photo A-54. Upstream slide gate in north channel. Note sagging (disbonded) Line-X coating on gate and guides.

Photo A-55. Apparently disused bracket embedded in wall (at left).

Photo A-56. Typical brackets for grinders.

Photo A-57. Downstream slide gate in south channel. Note uneven (disbonded) Line-X coating.

Photo A-58. Main inlet to grinder chamber.

Photo A-59. View inside main inlet to grinder chamber.

Photo A-60. View inside main inlet to grinder chamber.

Photo A-61. Light fixture inside grinder chamber.

Photo A-62. Corrosion at conduit threads (typical). Also note tool marks and coating damage at left.

Appendix D - Planning Level Opinions of Probable Cost

City of Rohnert Park
Project: Emergency Sewer Pond and Wet Well Lining
PS2 Wet Well

ENR Construction Cost Index:		
	Jan-17	11,609.44

Item Description	Quantity	Unit	Unit Cost	Total Cost
Temporary Bypass Pumping	1	LS	$10,000	$10,000
Repair Safety Chains	1	LS	$2,000	$2,000
Rehabilitate Existing Concrete and Install Protective Epoxy Coating (100% solid)	2,990	SF	$50	$149,500
Renew Coating on Suction Bells	1	LS	$5,000	$5,000
Lighting Improvements	1	LS	$15,000	$15,000
Motor-Actuated Sluice Gate between PS1 and PS2	1	EA	$50,000	$50,000
Construction Subtotal				$231,500
Mobilization/Demobilization (4%)				$9,260
Contractor's Bonds and Insurance (3%)				$6,945
Contractor's Overhead and Profit (15%)				$34,725
Estimated Bid Price				$282,430
Construction Contingency (30%)				$84,729
Total Estimate of Probable Construction Cost				$367,159
Engineering/CM				
- Contract Documents (10%)	1	LS		$36,716
- Engineering Support During Construction - Office (4%)	1	LS		$14,686
- Construction Management - Field (14%)	1	LS		$51,402
Grand Total				**$470,000**

City of Rohnert Park
Project: Emergency Sewer Pond and Wet Well Lining
Ventilation PS2 Wet Well

ENR Construction Cost Index:		
	Jan-17	11,609.44

Item Description	Quantity	Unit	Unit Cost	Total Cost
Temporary Bypass Pumping	1	LS	$5,000	$5,000
Install Go/No Go Warning System at Wet Well Entrance	1	LS	$5,000	$5,000
Install CGD and Connect to the Go/No Go Warning System	1	LS	$5,000	$5,000
Install Fan Proving Switches and Connect to the Go/No Go Warning System	1	LS	$5,000	$5,000
Replace Supply and Exhaust Air Ductwork with Stainless/FRP Ducts	1	LS	$20,000	$20,000
Replace Supply Fan (3,500 cfm) with Non-sparking Unit and Explosion Proof Motor	1	EA	$7,500	$7,500
Replace Exhaust Fan (3,850 cfm) with Non-sparking Unit and Explosion Proof Motor	1	EA	$7,500	$7,500
Construction Subtotal				$55,000
Mobilization/Demobilization (4%)				$2,200
Contractor's Bonds and Insurance (3%)				$1,650
Contractor's Overhead and Profit (15%)				$8,250
Estimated Bid Price				$67,100
Construction Contingency (30%)				$20,130
Total Estimate of Probable Construction Cost				$87,230
Engineering/CM				
- Contract Documents (12%)	1	LS		$10,468
- Engineering Support During Construction - Office (4%)	1	LS		$3,489
- Construction Management - Field (14%)	1	LS		$12,212
Grand Total				**$114,000**

City of Rohnert Park
Project: Emergency Sewer Pond and Wet Well Lining
Grinder Vault at PS2

ENR Construction Cost Index:		
	Jan-17	11,609.44

Item Description	Quantity	Unit	Unit Cost	Total Cost
Temporary Bypass Pumping	1	LS	$15,000	$15,000
Replace Existing Anchor Bolts and Nuts with 316 Stainless Steel Items	1	LS	$2,500	$3,000
Seal the North Wall Vertical Crack by Grout Injection	1	LS	$5,000	$5,000
Construction Subtotal				$23,000
Mobilization/Demobilization (4%)				$920
Contractor's Bonds and Insurance (3%)				$690
Contractor's Overhead and Profit (15%)				$3,450
Estimated Bid Price				$28,060
Construction Contingency (30%)				$8,418
Total Estimate of Probable Construction Cost				$36,478
Engineering/CM				
- Contract Documents (14%)	1	LS		$5,107
- Engineering Support During Construction - Office (4%)	1	LS		$1,459
- Construction Management - Field (14%)	1	LS		$5,107
Grand Total				**$49,000**

APPENDIX B

SITE PHOTOS

Wet Well: Pipes and Conduits, Replace All Supports

Wet Well: Pipes and Conduits at Flow Through Channel from Grinder Pit, Remove Unused Hydraulic Lines Above Flow Through Channel, Burn Back and Plug

Wet Well: Conduits at Flow Through Channel from Grinder Pit

Wet Well: Conduits and Pipes, Remove Unused Hydraulic Lines and Supports

Wet Well: Conduits and Pipes, Replace Drain Pipe and All Supports

Wet Well: Pipes & Fittings, Remove Hose Holder

Wet Well: Ducting and Drain Pipe, Replace Drain Pipe and Supports

Wet Well: Ducting and Conduits

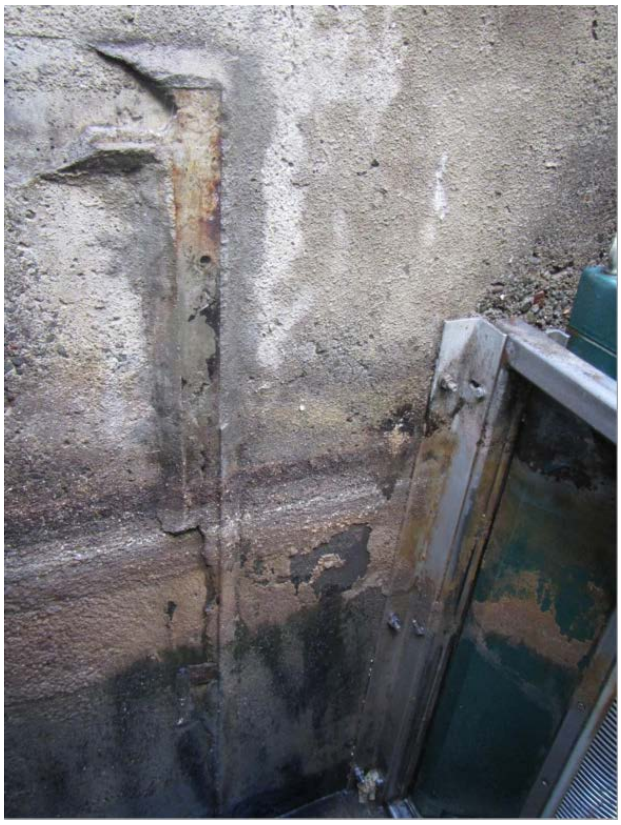
Wet Well: Invert and Pump Suction Elbows

Wet Well: Piping, Lights and Conduits

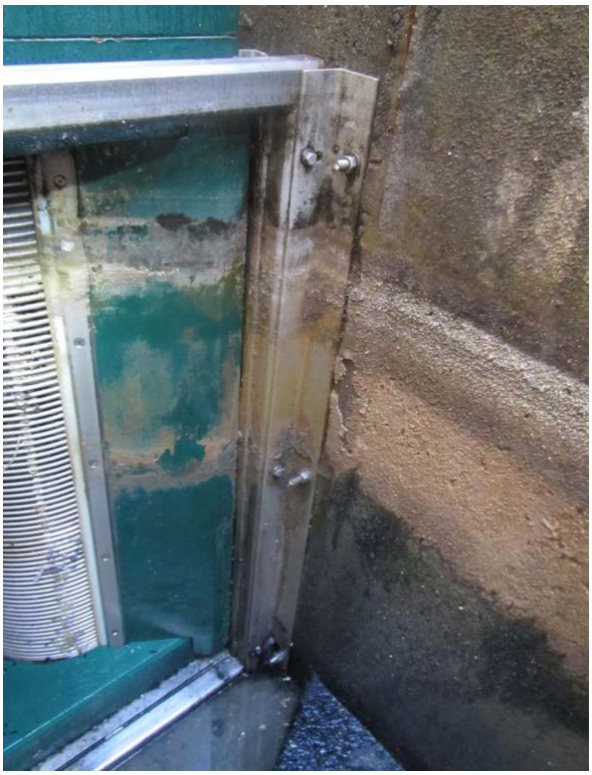
Grinder Pit: Wall Above Flow Through Channel, Burn Back Abandoned Conduits and Plug, Repair Concrete, Confirm Source of Infiltration is From Stairs Above

Grinder Pit: Unused Bracket, Remove and Burn Back Anchor Bolts

Grinder Pit: Slide Gates and Grating

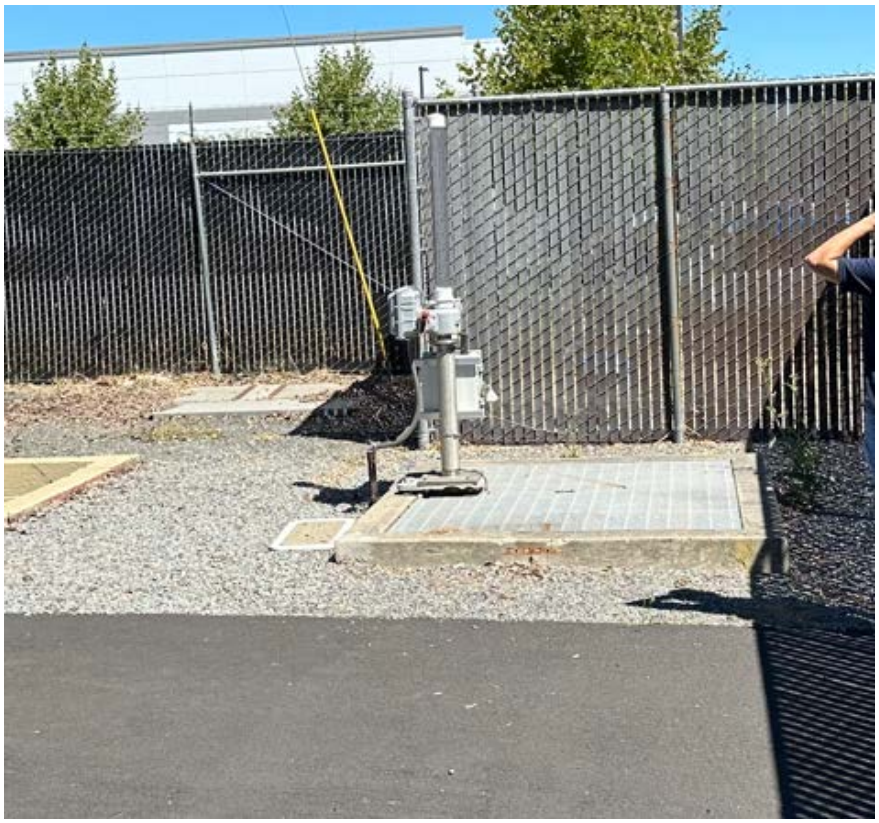


Grinder Pit: Remove Unused Bracket



Grinder Pit: Grinder and Grinder Bracket, Remove and Reinstall Grinder Bracket

Grinder Pit: Remove Unused Slide Gate Brackets (Typical of 8), Remove and Reinstall or Replace 2" SCH 40 PVC Reclaimed Water Main



Diversion Structure: Bypass Pumping Required from Diversion Structure

Connection Point for Bypass Pipe

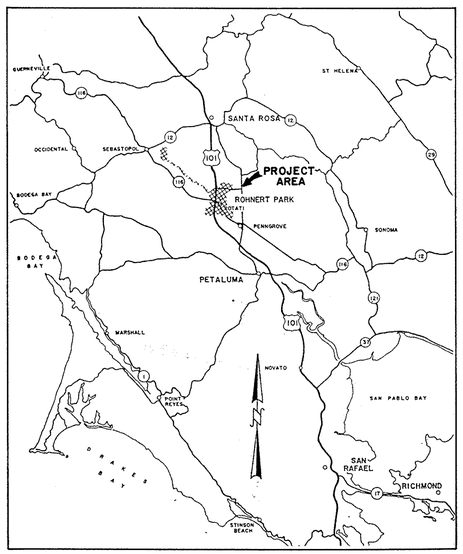
APPENDIX C

RECORD DRAWINGS, WASTEWATER PUMP STATION IMPROVEMENTS, PROJECT NO. 1988-20

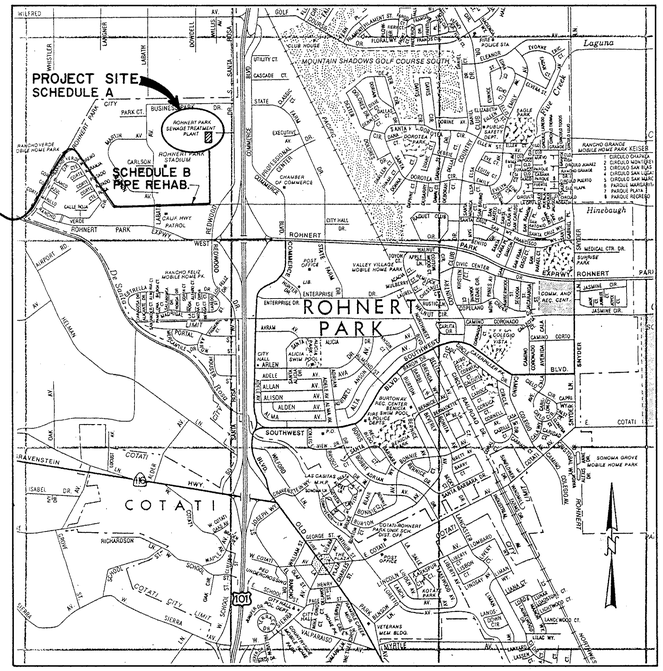
CITY OF ROHNERT PARK
SONOMA COUNTY, CALIFORNIA

WASTEWATER PUMP STATION IMPROVEMENTS

PROJECT No. 1988-20



VICINITY MAP



PROJECT AREA

CITY COUNCIL:

David L. Eck, Mayor
Arthur F. Hollingsworth, Jr.
Warren K. Hopkins
James Reilly
Linda Spiro

CITY MANAGER:

Joseph Netter

CITY ENGINEER:

Roland Brust

466 Part 1

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

Roland V. Brust 1/15/92

WINZLER & KELLY
CONSULTING ENGINEERS

SHEET INDEX

COVER SHEET

G1 = SHEET INDEX

G2 = SITE AND FENCING PLAN

G3 = ABBREVIATIONS

G4 = SYMBOLS

G5 = HYDRAULIC PROFILE AND SYSTEM HEAD CURVES

G6 = SOIL LOGS AND SITE PLAN

C1 = DEMOLITION PLAN

C2 = SITE PLAN

C3 = TRENCH, BEDDING, AND THRUST BLOCK DETAILS

C4 = MANHOLE DETAILS

C5 = MANHOLE DETAILS

C6 = MANHOLE DETAILS

C7 = MISCELLANEOUS DETAILS

C8 = MISCELLANEOUS DETAILS

C9 = SLIDE GATE DETAILS

C10 = GRINDER VAULT AND DETAILS

C11 = GRINDER VAULT DETAILS

C12 = GRADING PLAN

L1 = NOTES AND SCHEDULE

L2 = PLANTING PLAN

L3 = IRRIGATION PLAN

A1 = FLOOR PLANS

A2 = EXTERIOR ELEVATIONS

A3 = ROOF PLAN AND REFLECTED CEILING PLAN

A4 = BUILDING SECTIONS

A5 = ARCHITECTURAL DETAILS

A6 = ARCHITECTURAL DETAILS

A7 = MAINTENANCE BUILDING – FLOOR PLAN

A8 = MAINTENANCE BUILDING – ROOF PLAN

A9 = MAINTENANCE BUILDING – ELEVATIONS AND SECTIONS

A10 = MAINTENANCE BUILDING – ARCHITECTURAL DETAILS

S1 = GENERAL STRUCTURAL NOTES AND TYPICAL DETAILS

S2 = TYPICAL STRUCTURAL DETAILS

S3 = FOUNDATION, FLOOR FRAMING AND PLATFORM FRAMING PLANS

S4 = ROOF FRAMING PLAN AND DETAILS

S5 = STRUCTURAL DETAILS

S6 = STRUCTURAL DETAILS

S7 = STRUCTURAL DETAILS

S8 = STRUCTURAL DETAILS

S9 = MAINTENANCE BUILDING – FOUNDATION PLAN

S10 = MAINTENANCE BUILDING – ROOF FRAMING PLAN

S11 = MAINTENANCE BUILDING – STRUCTURAL DETAILS

M1 = MECHANICAL PLAN

M2 = MECHANICAL SECTIONS

M3 = HVAC DETAILS AND NOTES

M4 = BUILDING PLUMBING PLAN

M5 = PLUMBING DETAILS

M6 = PIPE SUPPORT DETAILS

M7 = MECHANICAL DETAILS

M8 = MAINTENANCE BUILDING PLAN

M9 = MAINTENANCE BUILDING – DETAILS

E1 = ELECTRICAL LEGEND AND ABBREVIATIONS

E2 = ELECTRICAL SITE PLAN

E3 = ELECTRICAL FLOOR PLAN

E4 = LIGHTING PLAN

E5 = SECTIONS AND DETAILS

E6 = SINGLE LINE DIAGRAM AND PANEL SCHEDULES

E7 = PIPING AND INSTRUMENTATION DIAGRAM

E8 = CONTROL SCHEMATICS

E9 = CONTROL SCHEMATICS

E10 = DETAILS AND TABLES

E11 = ELECTRICAL DETAILS

E12 = MAINTENANCE BUILDING– ELECTRICAL FLOOR LIGHTING PLAN

E13 = MAINTENANCE BUILDING– ELECTRICAL PANEL SCHEDULES AND DETAILS

FILE: 0848CG01
DATE: 01/14/92

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 ——— 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

NO.	DATE	REVISIONS	BY	APPR.

REGISTERED CIVIL ENGINEER
ROBERT F. KELLY
Exp. 12/31/92
No. 11005
STATE OF CALIFORNIA

DSGN	R.F.K.	CHKD	R.F.K.
DRWN	R.M.	SCALE	N.T.S.

approved _____ date 1/16/92
approved _____ date _____

WINZLER & KELLY
CONSULTING ENGINEERS
495 TESCONI CIRCLE..99 PARK CTR. SANTA ROSA, CA 95401 (707)523-1010

CITY OF ROHNERT PARK
WASTEWATER PUMP STATION IMPROVEMENTS
SHEET INDEX

JOB NO. 90-848-C
SHEET G-1

INSTALL 1335 LF OF 8' CHAIN LINK FENCE

1½" PVC WATER

0.5'

℄

NATIVE GRASS

BEGIN FENCE AT EXISTING CORNER POST ANGLE FENCE TO FIRST POST, 0.5' OFF PROPERTY LINE. SEE FENCE DETAIL THIS SHEET.

REMOVE (E) FENCE (530 LF) INSTALL NEW FENCE

EXIST. MH NO. 1 RIM EL. = 94.24 ± (PLANT BENCH MARK)

INSTALL 498 LF OF CHAIN LINK FENCE

94.0

94.0

1" H.B. (EXIST.)

93.5

93.5

OXIDATION POND NO. 3

OXIDATION POND NO. 1

GRADING SEE C-12

LAWN

(E) PUMP STA.

(N) 3' PED GATE

(N) 12' GATE

SEE C2 FOR FENCE LOCATION

(N) PUMP STA

REMOVE & REINSTALL NEW FENCE, ENTRY TO NE COR.

(E) CTRL BLDG.

LAWN SEE C-2

INSTALL TWIN 16' CHAIN LINK GATES WITH ROLLERS AND AUTOMATIC OPENING DEVICE.

KEY LOCK

NEW WORK

REPAIR 200 sf SLOPE SEE TYPICAL SECTION THIS SHEET

SEDIMENTATION BASIN

(N) GARAGE SEE A-7 & S-9

SEE C-12

160'(N) FENCE REMOVE EXIST.

AREA LIGHTS

0.5'

℄

94.0

100'

S=10%

93.0

NATIVE GRASS

24" PLANT EFFLUENT

30" SEDIMENTATION BASIN EFFLUENT

295'(N) FENCE REMOVE EXIST.

REMOVE (E) FENCE

TO S.R.

220'(N) FENCE REMOVE EXIST.

INLET-OUTLET STRUCTURE (TYP)

18" POND RETURN LINE

INSTALL 783' OF 8' CHAIN LINK FENCE

(E) NATIVE GRASS NO WORK REQUIRED

93.5

NEW WORK

ACCESS RAMP (TYP.)

100'

15' TYP.

S=10%

10' TYP.

92.7

SLEEVE AND EXTEND TO 8' 3 SIDES

POND DISTRIBUTION & COLLECTION AND POND RETURN CONTROL STRUCTURE.

EXIST. FENCE TO REMAIN

CONNECT TO(N) CHAIN LINK FENCE

93.5

30" INLET-OUTLET POND LINE

S=10%

92.7

100'

24" INLET-OUTLET POND LINE.

INSTALL 619 LF OF 8' CHAIN LINK FENCE

REMOVE EXISTING WIRE FENCE AND INSTALL 537 LF. OF 8' CHAIN LINK FENCE.

OXIDATION POND NO. 2

AREA LIGHT, SEE SHT. E-2

PAVE

4" BLUE SHALE

LAWN

NATIVE GRASS (NO CHANGE)

93.5

93.5

REMOVE EX. DIKE

CHLORINATION POND

REMOVE EX. INLET STRUCTURE AND PLUG EXISTING PIPES

REMOVE EX. BAFFELS AND ASSOCIATED CONCRETE STRUCTURE PLUG EXISTING PIPES

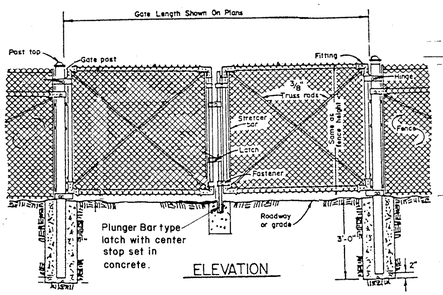
5' FROM TOE OF DIKE

REMOVE EX. DIKE

INSTALL 590 LF OF 8' CHAIN LINK FENCE

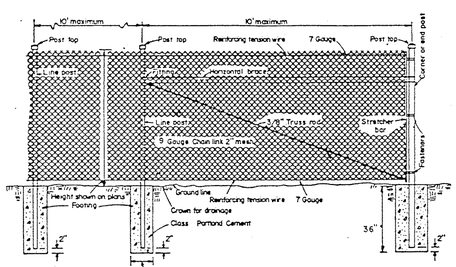
POST & BRACE REQUIREMENTS

LOCATION	TYPE	MIN. SIZE
END AND CORNER POSTS	PIPE	
LINE POSTS	PIPE	
BRACES	PIPE	
GATE POSTS	PIPE	



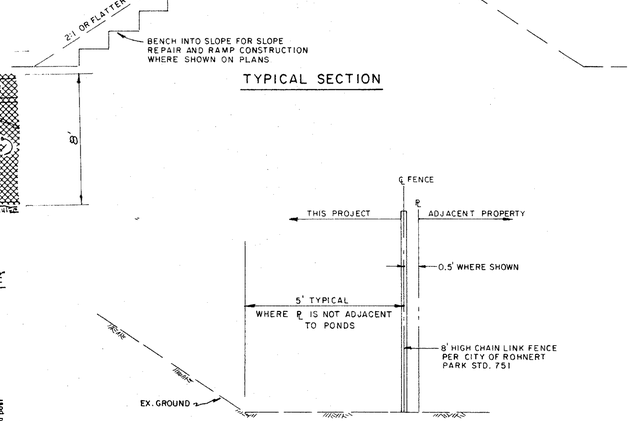
ELEVATION

DOUBLE SWING GATES



ELEVATION

CHAIN LINK FENCE



TYPICAL SECTION

FENCE LOCATION DETAIL

VERIFY SCALES

BAR IS ONE INCH ON ORIGINAL DRAWING.

0 1"

IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

GRAPHIC SCALE

60' 0 60' 120'

1" = 60'

NO.	DATE	REVISIONS	BY	APPR.

REGISTERED CIVIL ENGINEER ROBERT F. KELLY Exp 12/31/98 No. 11005 STATE OF CALIFORNIA

DSGN	L.E.	CHKD	R.F.K.
DRWN	R.M.	SCALE	1"=60'

approved ____ date 4/15/97

approved ____ date ____

WINZLER & KELLY

CONSULTING ENGINEERS

495 TESCONI CIRCLE, #9 PARK CTR. SANTA ROSA, CA 95401 (707) 523-1010

RECORD DRAWING

THESE RECORD DRAWINGS HAVE BEEN PREPARED, IN PART, ON THE BASIS OF INFORMATION COMPILED AND FURNISHED BY THE PROJECT CONTRACTOR AND OTHERS. THE ENGINEER WILL NOT BE RESPONSIBLE FOR ANY ERRORS OR OMISSIONS WHICH HAVE BEEN INCORPORATED INTO THIS DOCUMENT AS A RESULT. FIELD VERIFICATION OF CRITICAL FACTS AND DATA SHOULD BE MADE IF THESE DOCUMENTS ARE TO BE USED AS A BASIS FOR FUTURE WORK.

CITY OF ROHNERT PARK

WASTEWATER PUMP STATION IMPROVEMENTS

SITE & FENCING PLAN

JOB NO. 90-848-C

SHEET G-2

ABBREVIATIONS

AB	ANCHOR BOLT, AGGREGATE BASE
AC	ASBESTOS CEMENT, ASPHALT CONCRETE
ACI	AMERICAN CONCRETE INSTITUTE
ADJ	ADJUSTABLE
AGGR	AGGREGATE
AISC	AMERICAN INSTITUTE OF STEEL CONSTRUCTION
AL	ALUMINUM
ALTN	ALTERNATE
APROX	APPROXIMATE
AUTO	AUTOMATIC
AUX	AUXILIARY
@	AT
B	BOTTOM
BVC	BEGINNING OF VERTICAL CURVE
BD	BOARD
BF	BLIND FLANGE
BLDG	BUILDING
BLK	BLOCK
BM	BENCHMARK
BSP-40	BLACK STEEL PIPE, SCHEDULE 40
BSP-80	BLACK STEEL PIPE, SCHEDULE 80
BV	BALL VALVE
C	CHANNEL (BEAM)
CA	COMPRESSED AIR
CAB	CABINET
CB	CATCH BASIN
CEIL	CEILING
CFM	CUBIC FEET PER MINUTE
CFS	CUBIC FEET PER SECOND
CIP	CAST IRON PIPE
CIMJ	CAST IRON PIPE MECHANICAL JOINT
CISP	CAST IRON SOIL PIPE
CJ	CONSTRUCTION JOINT
CL2	CHLORINE
CLR	CLEAR
CL	CENTERLINE
CMP	CORRUGATED METAL PIPE
CMU	CONCRETE MASONRY UNIT
CO	CLEANOUT
COL	COLUMN
CONCR	CONCRETE
CONT	CONTINUOUS
COORD	COORDINATE
COP	COPPER PIPE
CPVC	CHLORINATED PVC, SCHEDULE 80
CU	CUBIC
CU FT	CUBIC FOOT
CU IN	CUBIC INCH
CU YD	CUBIC YARD
CV	CHECK VALVE
C	DEGREE CELCIUS
d	PENNY (NAIL SIZE)
DR	DRAIN
DBL	DOUBLE
DET	DETAIL
DF	DOUGLAS FIR
DI	DROP INLET
DIA	DIAMETER
DIAG	DIAGONAL
DIP	DUCTILE IRON PIPE
DIMJ	DUCTILE IRON MECHANICAL JOINT
DN	DOWN
D/P	DIFFERENTIAL PRESSURE
DWG	DRAWING
EA	EACH
EF	EACH FACE
EFFL	EFFLUENT
EL	ELEVATION
ELB	ELBOW
ELC	ELECTRONICAL LOAD CENTER
ELEC	ELECTRIC, ELECTRICAL
ENG	ENGINEER
EO	EMERGENCY OVERFLOW
EQPT	EQUIPMENT
ES	EACH SIDE
EVC	END VERTICAL CURVE
EW	EACH WAY
EWEF	EACH WAY EACH FACE
EXH	EXHAUST
E	EXISTING
EXP	EXPOSED
EXP AB	EXPANSION ANCHOR BOLT
FB	FLAT BAR, FLOOR BEAM
FC	FLEXIBLE COUPLING
FCA	FLANGED COUPLING ADAPTER
FDN	FOUNDATION
FF	FINISHED FLOOR
FG	FINISH GRADE
FIG	FIGURE
FL	FLOW LINE
FL	FLOOR
FLG	FLANGE
FLH	FLAT HEAD
FNSH	FINISH
FO	FACE OF
FOC	FACE OF CURB
FOM	FACE OF MASONRY
FRP	FIBERGLASS REINFORCED PLASTIC
FT	FOOT OR FEET
FTG	FOOTING
FWD	FORWARD
F	DEGREE FAHRENHEIT
GA	GAUGE
GAL	GALLON
GALV	GALVANIZED
GB	GRADE BREAK
GI	GALVANIZED IRON
GC	GROOVED COUPLING
GCF	GROOVED COUPLING FITTING
GL	GLASS
GPD	GALLONS PER DAY
GPH	GALLONS PER HOUR
GPM	GALLONS PER MINUTE
GSP	GALVANIZED STEEL PIPE
GTV	GATE VALVE
GYP	GYPSUM
HB	HOSE BIB
H2O	WATER
H2O2	HYDROGEN PEROXIDE
HGT	HEIGHT
HM	HOLLOW METAL
HORIZ	HORIZONTAL
HP	HORSEPOWER, HIGH POINT
HWR	HOT WATER RETURN
HWS	HOT WATER SUPPLY
ID	INSIDE DIAMETER
IN	INCH
INFL	INFLUENT
INSTM	INSTRUMENTATION
INSUL	INSULATION
INVT	INVERT
JT	JOINT
L	ANGLE
LAB	LABORATORY
LAV	LAVATORY
LB	POUND
LB/CU FT	POUNDS PER CUBIC FOOT
LF	LINEAR FEET
LH	LEFT HAND
LPG	LIQUEFIED PETROLEUM GAS
LR	LONG RADIUS
LS	LIME SLURRY
MAS	MASONRY
MAX	MAXIMUM
MCC	MOTOR CONTROL CENTER
MECH	MECHANICAL
MFR	MANUFACTURER
MGD	MILLION GALLONS PER DAY
MH	MANHOLE
MIN	MINIMUM
MISC	MISCELLANEOUS
MJ	MECHANICAL JOINT
MTS	MILL TYPE STEEL PIPE
MWS	MAXIMUM WATER SURFACE
NG	NATURAL GAS
NIC	NOT IN CONTRACT
NO	NUMBER
NOM	NOMINAL
NPT	NATIONAL PIPE THREADS
NTS	NOT TO SCALE
OC	ON CENTER
OD	OUTSIDE DIAMETER
OSD	OPEN SITE DRAIN
OXY	OXYGEN
OZ	OUNCE
PG&E	PACIFIC GAS & ELECTRIC COMPANY
PE	PLAIN END
PI	POINT OF INTERSECTION
PL	PLATE (STEEL)
PLYWD	PLYWOOD
PP	POWER POLE
PPL	POLYPROPYLENE LINED
PRC	POINT OF REVERSE CURVE
PREFAB	PREFABRICATED
PROP	PROPERTY
PRV	PRESSURE REDUCING VALVE (OR PRESSURE RELIEF)
PT	POINT OF TANGENCY
P/S	PRIMARY SLUDGE
PSF	POUNDS PER SQUARE FOOT
PSI	POUNDS PER SQUARE INCH
PSIG	POUNDS PER SQUARE INCH (GAUGE)
PV	PLUG VALVE
PVC	POLYVINYL CHLORIDE PLASTIC PIPE, SCHED
PVI	POINT OF VERTICAL INTERSECTION
PW	PLANT WASTE
RA	RETURN AIR
R	RADIUS
RC	RELATIVE COMPACTION
RCP	REINFORCED CONRETE PIPE
R & D	REMOVE & DISPOSE
RD	ROOF DRAIN
RDW	REDWOOD
REF	REFER OR REFERENCE
REFR	REFRIGERATOR
REINF	REINFORCED, REINFORCING, REINFORCE
REQD	REQUIRED
RH	RODHOLE
RL	RAIN LEADER
RLS	RUBBER LINED STEEL
RSP	ROCK SLOPE PROTECTION
R/W	RIGHT OF WAY
RV	ROOF VENT
RM	ROOM
RST	REINFORCIN STEEL
S	I-BEAM
SLP	SLOPE
SCFM	STANDARD CUBIC FEET PER MINUTE
SCHED	SCHEDULE
SCR	SONOMA COUNTY RECORDS
SD	STORM DRAIN
SECT	SECTION
SG	SLIDE GATE
SHT	SHEET
SHS	SOLIDS HANDLING SYSTEM
SIM	SIMILAR
SLG	SLUICE GATE
SM	SCUM
SP	SPACE OR SPACES
SPC	SPENT CARBON
SPEC	SPECIFICATIONS
SQ	SQUARE
SQ FT	SQUARE FEET
SQ IN	SQUARE INCHES
SS	SANITARY SEWER
SST	STAINLESS STEEL
STA	STATION
STD	STANDARD
STL	STEEL
STRUCT	STRUCTURAL
SUSP	SUSPENDED
SW	SURFACE WASH
SYMM	SYMMETRICAL
T	TOP
T&B	TOP AND BOTTOM
TC	TOP OF CURB
T&G	TONGUE AND GROOVE
TAN	TANGENT
TDH	TOTAL DYNAMIC HEAD
TECH	TECHNICAL
TEL	TELEPHONE
TEMP	TEMPERATURE
THR	THRUST
TOG	TOP OF GRATE
THD	THREAD
TO	TOP OF
TOC	TOP OF CONCRETE
TOS	TOP OF STEEL
TOD	TOP OF DIKE
TYP	TYPICAL
UBC	UNIFORM BUILDING CODE
UMC	UNIFORM MECHANICAL CODE
UPC	UNIFORM PLUMBING CODE
UH	UNIT HEATER
UNO	UNLESS NOTED OTHERWISE
UR	URINAL
V	VENT, VOLT
VC	VERTICAL CURVE
VCP	VITRIFIED CLAY PIPE
VERT	VERTICAL
VTR	VENT THROUGH ROOF
W/	WITH
W/O	WITHOUT
W	WIDE FLANGE (BEAM), WATER
WC	WATER CLOSET
W/H	WATER HEATER
W.S.	WATERSTOP
WSL	WATER SURFACE LEVEL
1-W	NO. 1 WATER, POTABLE
2-W	NO. 2 WATER CHLORINATED EFFLUENT
WR	WEIR GATE
YD	YARD

NOTES:

1. SEE ELECTRICAL AND INSTRUMENTATION DRAWINGS FOR ELECTRICAL AND INSTRUMENTATION ABBREVIATIONS.
2. CONTACT THE ENGINEER FOR ABBREVIATIONS NOT LISTED OR FOR CLARIFICATION.

FILE: 0848CC02
DATE: 04/02/91

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

NO.	DATE	REVISIONS	BY	APPR.

REGISTERED CIVIL ENGINEER
ROBERT F. KELLY
Exp 12/31/92
No. 11005
STATE OF CALIFORNIA

DSGN	RFK	CHKD	
DRWN	DHD	SCALE	NONE

approved _____ date 1/15/92
approved _____ date _____

WINZLER & KELLY
CONSULTING ENGINEERS
495 TESCONI CIRCLE, #9 PARK CTR. SANTA ROSA, CA 95401 (707)523-1010

CITY OF ROHNERT PARK
WASTEWATER PUMP STATION IMPROVEMENTS
ABBREVIATIONS

JOB NO. 90-848-C
SHEET G-3

123996

VALVE (IN STREET)

GATE VALVE (TYPE DESIGNATED)

DIAPHRAGM VALVE

PLUG VALVE

SEAT PORT
ECCENTRIC PLUG VALVE

BUTTERFLY VALVE

BUTTERFLY DAMPER

BALL VALVE

GLOBE VALVE

ANGLE VALVE

FLOW
CHECK VALVE

BALL CHECK VALVE

BALL CHECK (SPRING LOADED)

E
ELECTRIC MOTORIZED VALVE *

P
PNEUMATIC OPERATED VALVE *

DIAPHRAGM ACTUATOR *

S
SOLENOID OPERATED VALVE *

H
HYDRAULIC OPERATED VALVE *

3-WAY VALVE

PRESSURE REGULATING VALVE *

PRESSURE OR VACUUM RELIEF VALVE

C
COCK

NEEDLE VALVE

N.C.
VALVE NORMALLY CLOSED

NONFREEZE HOSE BIB

HOSE BIB, (SIZE SHOWN)

FIRE HYDRANT

S
SAMPLE VALVE

P
V
VACUUM REGULATING VALVE

2W SYSTEM HOSE BIB

PIPING EXPANSION JOINT WITH SLIDE GUIDE SUPPORT

PINCH VALVE

* ON LOSS OF POWER-PNEUMATIC ELECTRICAL OR HYDRAULIC

F.O. FAIL OPEN

F.C. FAIL CLOSED

F.L.P. FAIL LAST POSITION

FLUSHING CONNECTION

PIG INSERTION FITTING

SIGHT FLOW INDICATOR

WYE STRAINER

CHEMICAL INJECTION POINT

FLEXIBLE CONNECTOR

UNION

PIPING - TURNING UP

PIPING - TURNING DOWN

FLANGE JOINT

MECHANICAL JOINT

BELL & SPIGOT JOINT

HUB JOINT

FLANGE COUPLING ADAPTOR

FLEXIBLE COUPLING

FLEXIBLE COUPLING WITH THRUST TIES

GROOVED COUPLING

2" 3"
REDUCER (SIZES SHOWN)

OR
ECCENTRIC REDUCER

EYEWASH AND SHOWER

PIPE SUPPORTS

END CAP (SCREWED - WELDED - FLANGED)

HOSE RACK

FLOOR DRAIN

CO
CLEANOUT

G-1
FABRICATED GATE

G-3
FABRICATED GATE WITH HANDWHEEL

SLUICE GATE

0-40 PSI
GAGE AND RANGE IN PSI, FT. H_2O, OR INCHES HG

TEE

CROSS

DRAIN

FE
FLOW ELEMENT

GAGE (W/COCK)

REDUCER

MIXER

CENTRIFUGAL PUMP (DRY PIT)

CENTRIFUGAL PUMP (WET PIT)

PISTON PUMP

DIAPHRAGM PUMP

PROGRESSIVE CAVITY PUMP

GEAR OR BLOWER (POSITIVE DISPLACEMENT)

COMPRESSOR (PISTON)

COMPRESSOR (CENTRIFUGAL OR BLOWER)

EJECTOR

CHEMICAL FEED PUMP

FLOWMETER - TYPE INDICATED

FLOWMETER - PROPELLER TYPE (DISC, TURBINE)

FLOWMETER - ORIFICE TYPE

FLOWMETER - ROTAMETER TYPE

FLOWMETER - FLOW TUBE TYPE

CHLORINE GAS LEAK DETECTOR

DOUBLE CHECK VALVE BACKFLOW PREVENTER

REDUCED PRESSURE BACKFLOW PREVENTER

SCR
SILICONE CONTROLLED RECTIFIER

FLOAT SWITCH

STATIC MIXER

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

NO.	DATE	REVISIONS	BY	APPR.

REGISTERED CIVIL ENGINEER
ROBERT F. KELLY
Exp 12/31/92
No. 11005
STATE OF CALIFORNIA

DSGN		CHKD	
DRWN		SCALE	

approved [signature] date 4/15/92

approved date

WINZLER & KELLY
CONSULTING ENGINEERS
495 TESCONI CIRCLE...#9 PARK CTR. SANTA ROSA, CA 95401 (707)523-1010

CITY OF ROHNERT PARK

WASTEWATER PUMP STATION IMPROVEMENTS

SYMBOLS

JOB NO. 90-848-C

SHEET G-4

SMALL PUMP

LARGE PUMPS

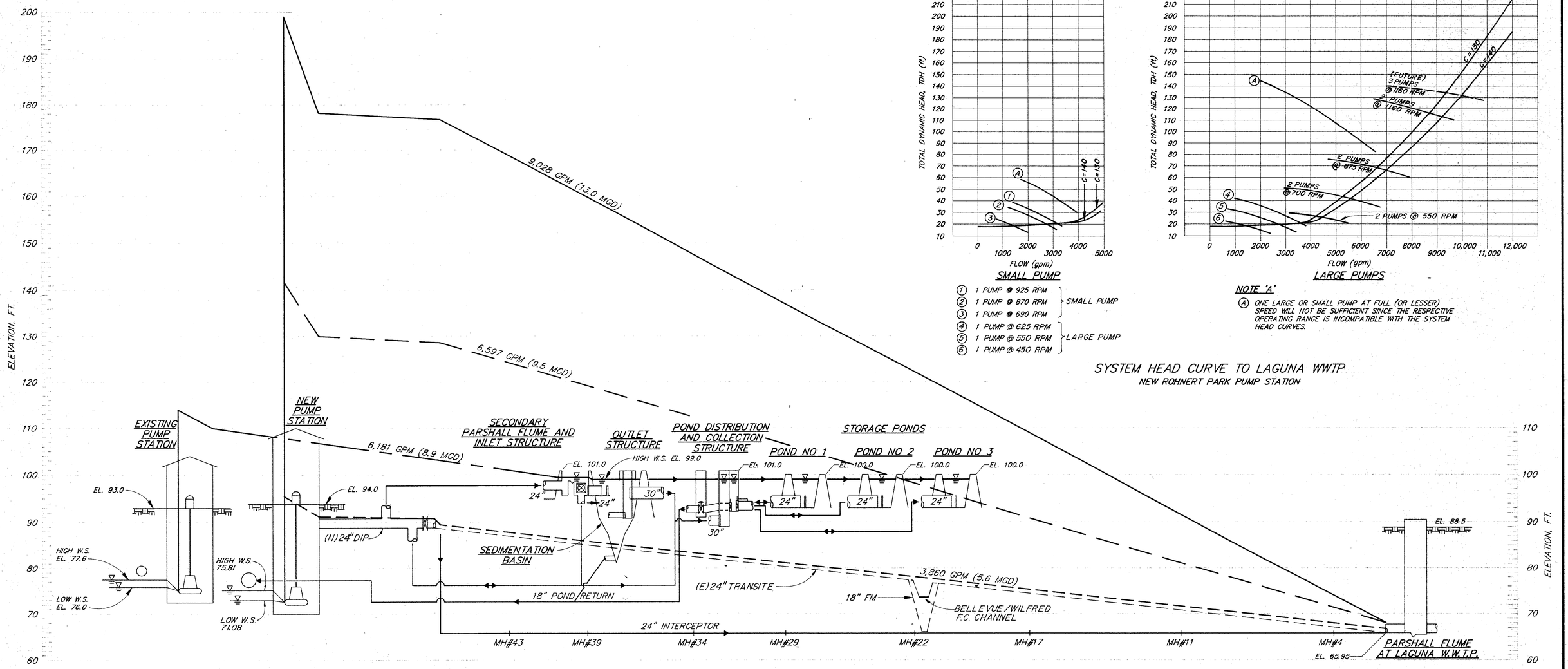
(1) 1 PUMP @ 925 RPM
(2) 1 PUMP @ 870 RPM
(3) 1 PUMP @ 690 RPM
} SMALL PUMP

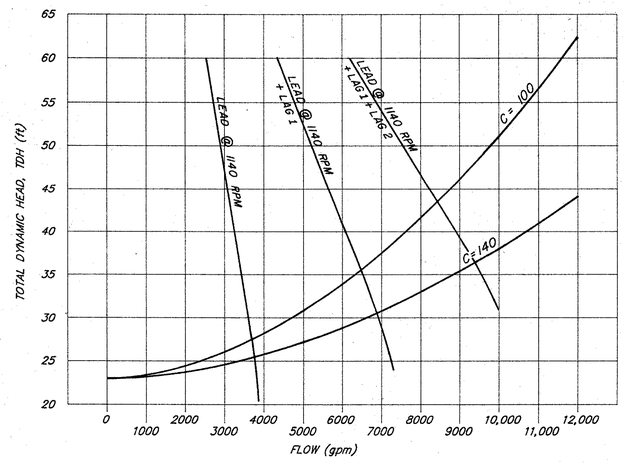
(4) 1 PUMP @ 625 RPM
(5) 1 PUMP @ 550 RPM
(6) 1 PUMP @ 450 RPM
} LARGE PUMP

NOTE 'A'

(A) ONE LARGE OR SMALL PUMP AT FULL (OR LESSER) SPEED WILL NOT BE SUFFICIENT SINCE THE RESPECTIVE OPERATING RANGE IS INCOMPATIBLE WITH THE SYSTEM HEAD CURVES.

SYSTEM HEAD CURVE TO LAGUNA WWTP
NEW ROHNERT PARK PUMP STATION





SYSTEM HEAD CURVE TO SEDIMENTATION POND
EXISTING ROHNERT PARK PUMP STATION

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 ——— 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

FILE: 0848CG05
DATE: 08/05/91

NO.	DATE	REVISIONS	BY	APPR.

REGISTERED CIVIL ENGINEER — ROBERT F. KELLY — Exp 12/31/92 — No. 11005 — STATE OF CALIFORNIA

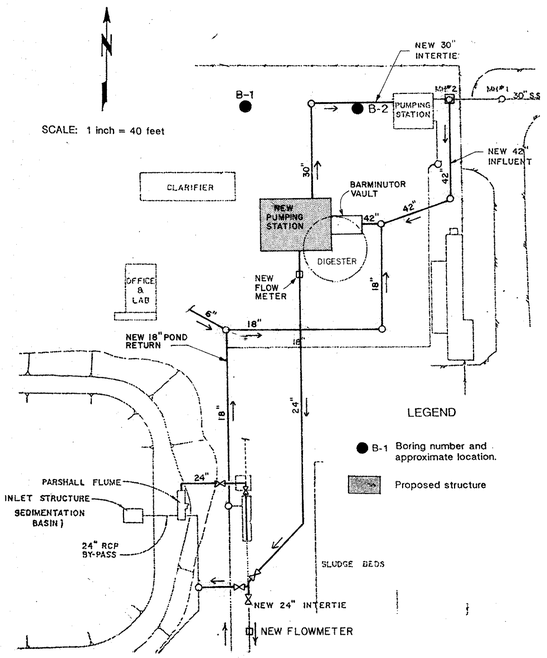
DSGN	D.K.D.	CHKD	R.F.K.
DRWN	G.C.	SCALE	N.T.S.

approved _____ date 4/15/92
approved _____ date _____

WINZLER & KELLY
CONSULTING ENGINEERS
695 TESCONI CIRCLE, 69 PARK CTR. SANTA ROSA, CA 95401 (707)523-1010

CITY OF ROHNERT PARK
WASTEWATER PUMP STATION IMPROVEMENTS
HYDRAULIC PROFILE & SYSTEM HEAD CURVES

JOB NO. 90-848-C
SHEET G-5



SITE PLAN
1" = 40'

SHOWN FOR RELATIONSHIP OF SOILS BORING ONLY

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS		LTR	DESCRIPTION	MAJOR DIVISIONS		LTR	DESCRIPTION
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	GW	Well-graded gravels or gravel sand mixtures, little or no fines.	FINE GRAINED SOILS	SILTS AND CLAYS LL<50	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.
		GP	Poorly-graded gravels or gravel sand mixture, little or no fines.			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.
		GM	Silty gravels, gravel-sand-clay mixtures.			OL	Organic silts and organic silty-clays of low plasticity
		GC	Clayey gravels, gravel-sand-clay mixtures.		SILTS AND CLAYS LL>50	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts
	SAND AND SANDY SOILS	SW	Well-graded sands or gravelly sands, little or no fines.			CH	Inorganic clays of high plasticity, fat clays.
		SP	Poorly-graded sands or gravelly sands, little or no fines.			OH	Organic clays of medium to high plasticity.
		SM	Silty sands, sand-silt mixtures.	HIGHLY ORGANIC SOILS		Pt	Peat and other highly organic soils.
		SC	Clayey sands, sand-clay mixtures.				

Standard penetration split spoon sample

Modified California sampler

Shelby tube sample

Water level observed in boring

* No recovery

NFWE No free water encountered

NOTE: The lines separating strata on the logs represent approximate boundaries only. The actual transition may be gradual. No warranty is provided as to the continuity of soil strata between borings. Logs represent the soil section observed at the boring location on the date of drilling only.

BORING LOG LEGEND

LABORATORY: Dry Density pcf	Moisture Content %	Compress. Strength tsf	Other Tests	FIELD: Blows/ft	Sample	Depth (feet)	Lithology	U.S.C.S. Designation	SOIL DESCRIPTION
93	24		LL=51 PI=36	10				CH	CLAY - Dark gray, medium stiff, moist to very moist.
94	27			13		5		CL	CLAY - Silty, very sandy, light brown, medium stiff, very moist.
93	28			13		10			- Medium grained sand lens, wet.
92	30			21		15		CL	CLAY - Silty, blue-gray, stiff, moist, thin gravel lens.
				18		20			- Occasional thin sand lenses.
90	33		phi=34 C=1.3 ksf	18		20			- Clays becoming more plastic with depth, less silt.
65	59	0.5		13		25			
						30			
83	39			13		35		CL	CLAY - Blue-gray, stiff, very moist.
94	29			20		40 45			Boring terminated at 46.5 feet. Pipe installed to 45 feet.

SURFACE ELEVATION: feet
TOTAL DEPTH: 46.5 feet
GROUND WATER DEPTH: ▽ ATD, ▽ 24 days
LOGGED BY: John Finnigsmier
EQUIPMENT: Rotary Wash
DIAMETER of BORING: 6"
DATE DRILLED: 30-4-90

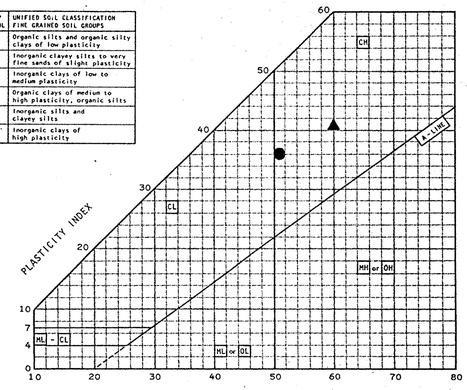
LOG OF EXPLORATION BORING
B-1

LABORATORY: Dry Density pcf	Moisture Content %	Compress. Strength tsf	Other Tests	FIELD: Blows/ft	Sample	Depth (feet)	Lithology	U.S.C.S. Designation	SOIL DESCRIPTION
86	32		LL=60 PI=41	10				CH	CLAY - Dark gray, medium stiff, very moist.
						5		CL	CLAY - Brown, medium stiff, moist to very moist.
104	23			23		10		SC	SAND - Medium to coarse grained, very clayey, brown, medium dense, wet, sandy clay lenses.
95	29		phi=39 C=1.6 ksf	19		15			
				20		20		CL	CLAY - Brown, stiff, moist.
99	25			22		20		CL	CLAY - Blue-gray, stiff to very stiff, very moist.
90	31	1.0				25			- Thin silt lens.
63	61			9		30			- Becoming more plastic with depth, less silt.
84	38			16		40		CL	CLAY - Blue-gray, stiff, very moist.
91	29			23		45 50			Boring terminated at 48.5 feet.

SURFACE ELEVATION: feet
TOTAL DEPTH: 48.5 feet
GROUND WATER DEPTH: ▽ ATD
LOGGED BY: John Finnigsmier
EQUIPMENT: Rotary Wash
DIAMETER of BORING: 6"
DATE DRILLED: 30-4-90

LOG OF EXPLORATION BORING
B-2

GROUP SYMBOL	UNIFIED SOIL CLASSIFICATION FINE GRAINED SOIL GROUPS
OL	Organic silts and organic silty clays of low plasticity
ML	Inorganic clayey silts to very fine sands of slight plasticity
CL	Inorganic clays of low to medium plasticity
OH	Organic clays of medium to high plasticity, organic silts
MH	Inorganic silts and clayey silts
CH	Inorganic clays of high plasticity



TEST SYMBOL	BORING NO.	SAMPLE NO.	LIQUID LIMIT	PLASTICITY INDEX	CLASSIFICATION
●	B-1	1½	51	36	Clay (CH)
▲	B-2	2½	60	41	Clay (CH)

PLASTICITY CHART

Direct Shear Test Results

Boring	Sample Depth (ft)	Dry Unit Weight (pcf)	Moisture Content (%)	Normal Stress (psf)	Shear Stress (psf)
B-1	20.5	89	33.3	1000	2006
		89	33.0	3000	3336
		91	31.9	5000	4631

ϕ = 34 degrees
Cohesion = 1300 psf

Boring	Sample Depth (ft)	Dry Unit Weight (pcf)	Moisture Content (%)	Normal Stress (psf)	Shear Stress (psf)
B-2	12.5	100	25.2	1000	2437
		94	29.1	3000	4002
		92	30.5	5000	5618

ϕ = 39 degrees
Cohesion = 1600 psf

DIRECT SHEAR TEST RESULTS

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

GRAPHIC SCALE
40' 0 40' 80'
1" = 40'

NO.	DATE	REVISIONS	BY	APPR.

REGISTERED CIVIL ENGINEER ROBERT F. KELLY Exp 12/31/92 No. 11005 STATE OF CALIFORNIA

DSGN	L.E.	CHKD	R.F.K.
DRWN	D.H.D.	SCALE	AS SHOWN

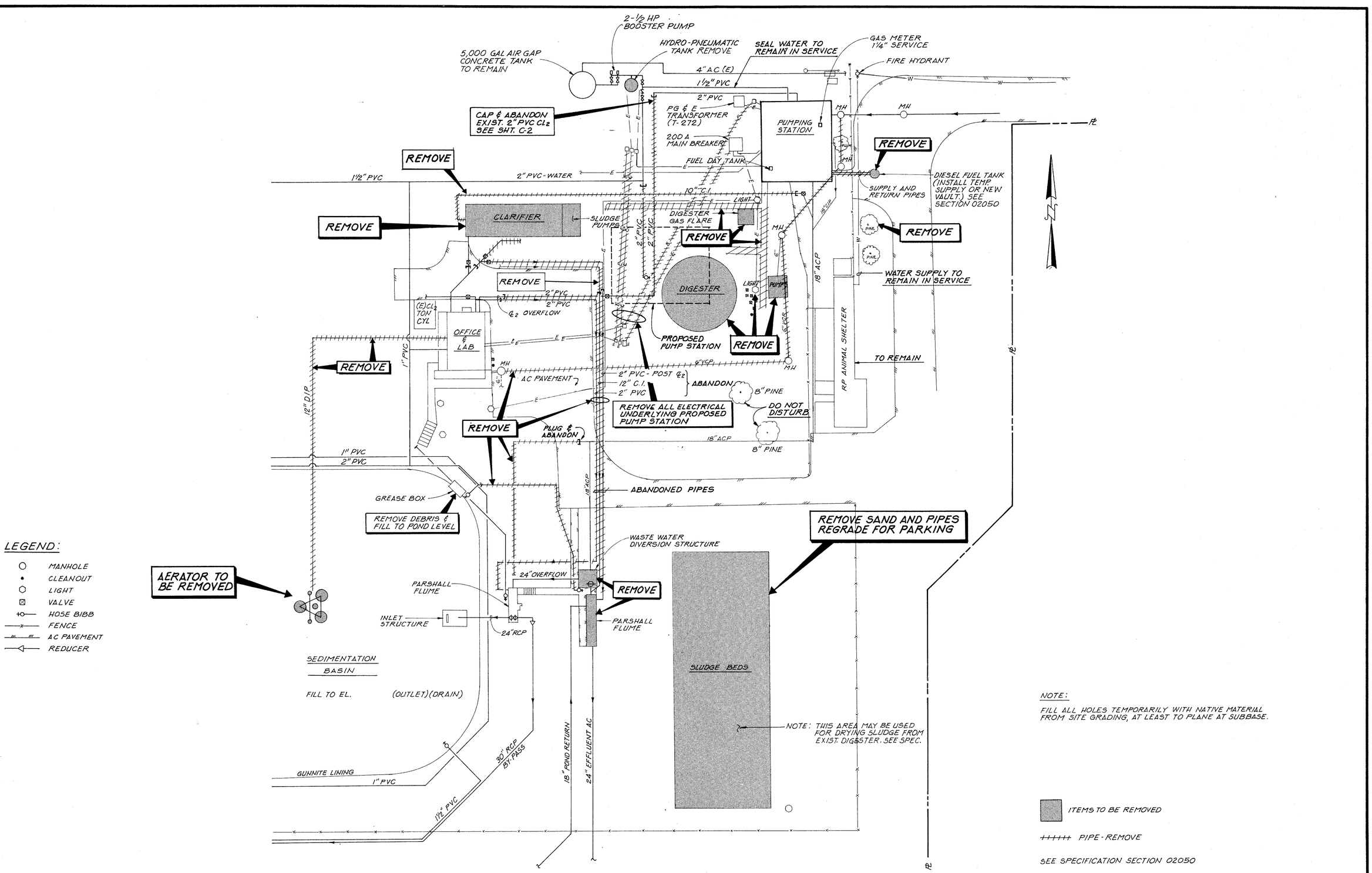
approved [signature] date 1/15/92
approved date

WINZLER & KELLY
CONSULTING ENGINEERS
495 TESCONI CIRCLE, #9 PARK CTR. SANTA ROSA, CA 95401 (707) 523-1010

CITY OF ROHNERT PARK
WASTEWATER PUMP STATION IMPROVEMENTS
SOIL LOGS & SITE PLAN

JOB NO. 90-848-C
SHEET G-6

123998



VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

GRAPHIC SCALE
20' 0 20' 40'
1" = 20'

NO.	DATE	REVISIONS	BY	APPR.

REGISTERED CIVIL ENGINEER
ROBERT F. KELLY
Exp. 12/31/82
No. 11005
STATE OF CALIFORNIA

DSGN	L.E.	CHKD	R.F.K.
DRWN	R.M.	SCALE	1" = 20'

approved _____ date 1/15/82
approved _____ date _____

WINZLER & KELLY
CONSULTING ENGINEERS
495 TESCONI CIRCLE, #9 PARK CTR. SANTA ROSA, CA 95401 (707) 523-1010

CITY OF ROHNERT PARK
WASTEWATER PUMP STATION IMPROVEMENTS
DEMOLITION PLAN

JOB NO. 90-848-C
SHEET C-1

INLET EL.=82.0 F.L.

8"G.V. W/EXT. TO GRADE

60'-8" DIP POND DRAIN

LP

TO 1000 GALLON PETRO VAULT

OFFICE

CL2

2 CONCRETE WALK TO BE REMOVED AND REPLACED AFTER UNDERGROUND WORK IS COMPLETE.

2 ABANDON EXIST. 2" PVC WATER UP TO CORNER OF POND, AT CORNER OF POND, TIE EXIST. 2" PVC INTO NEW 2½" IRRIGATION LINE AS SHOWN ON SHT. L-3.

2 CL2 LINE TO BE RELOCATED AS TO MAINTAIN MIN. 3' COVER WITHIN GRADING LIMITS.

TIE TO (E) 18" ACP PLUGGED

TOP EL @ CORN. = 101.85

24" FL= 96.00

24" RCP

FLUME

INSTALL 60" SSMH #1
IG (E) 30" = 96.10
IG (N) 24" = 96.35

24" RCP

30" RCP

EXISTING 30"x24" REDUCER

INSTALL 24"x18" ECCENTRIC REDUCER

INSTALL 28 LF 24" DIP

TIE-IN TO EXIST. 18" RCP & INSTALL 60" SSMH #2

INSTALL 2" AIR RELIEF & 24"x24" TEE

INSTALL 24"x24" WYE

I.G. 88.36 ±

CONC. S/W

ELEC.

18" DI (E) FLUME REMOVE

24" FL= 88.46

18" FL= 90.78

V1 V2 V3 V4 V5

ARV

TOP EL @ CORN. 89.27

INSTALL 3-24" ~~FINCH~~ VALVES PER DETAIL 1/C-7 TYP.

SEE DETAIL "A" BELOW FOR CONTINUATION.

S=0.00

CAUTION 2
SEE DETAIL "B" FOR PROTECTING 18" ACP DURING CONSTRUCTION. 18" ACP SEWER WILL EXTEND INTO SUBGRADE DURING CONSTRUCTION.

(E) WASTEWATER DIVERSION STRUCTURE } REMOVE

INSTALL 45 LF 24" DIP

CONC S/W

24" DIP

POTHOLE

AVOID CONFLICT

I.G. 90.93

2" PVC

INSTALL 105 LF - 18" DIP

S=0.0351

I.G. 81.10

INSTALL 31 LF - 6" DIP

INSTALL SSMH # 3
I.G. (IN) = 88.25 (6")
I.G. (IN) = 87.25 (18")
I.G. (OUT) = 81.0 (18")

5' DROP MH

ASPHALT

℄ EL. 90.63

TRENCH

1" DIESEL PIPE

INSTALL 32 LF - 2" PVC Cl2

2" DRAINS TO MH (TYP ALL VAULTS.

INSTALL 24"x18" TEE

10 LF - 1½" SST X-TRUCOAT

INSTALL 760 LF - 2" GALVANIZED STEEL PIPE W/ X-TRU COAT

2" PVC
12" CIP
2" PVC
} ABANDON

INSTALL SOLENOID VAULT PER DETAIL 2/C-7

3/4" HOSE BIBB

INSTALL 18" & 24" ~~FINCH~~ VALVES PER DETAIL 1/C-7

65 LF - 1½" SST

45 LF - 1½" SST

70 LF - 1½" SST

45°

G.B
I.G. = 88.36

INSTALL 111 LF - 24" DIP

S=0.20

ASPHALT

I.G. 86.0

24"x18" REDUCER

18 LF - 18" DIP

30 LF - 18" DIP

I.G. = 86.0

2" DRAIN TO MH

INSTALL 18" TRANSDUCER FLOWMETER PER DETAIL 3/C-7

CAP END OF MAIN

ELEC.

SEE SHT M-4 FOR CONNECTION DETAILS

INSTALL 1" WATER SERVICE WITH REDUCED PRESSURE BACKFLOW PREVENTER PER DETAIL 3/C-8 W/1" GATE VALVE.

PROPOSED PUMP STATION SITE

24" FL. SPOOL & MANIFOLD 18" FUTURE UNDER (BF)

CONNECT 18" RIP W/ 18x24 RED. & FLEX. ADAPTOR.

I.G. = 77.60

INSTALL 53 LF - 30" DIP

S=0.00300

INSTALL 60" SSMH
I.G. (IN) = 71.44
I.G. (OUT) = 71.34

(N) DIESEL PIPE

1000 GALLON PETRO VAULT SEE 2/C-8

I.G. = 75.37

(E) DIGESTER

CONC S/W

IRRIG.

CORNER FILLED POSTS

TEST BORING

S=0.00286

INSTALL 42 LF - 30" DIP

2" PVC Cl2

1" PVC

(E) 4" AC

2 INSTALL 6" C900 PVC MAIN. TIE TO 8" @ ST. & TO TANK FLOAT. (KEEP 4" IN SVC)

TIE (N) 2" TO EXISTING WATER MAIN WITH FITTINGS AS REQUIRED

SHEET PILE OR TIGHT SHORING REQD. HERE TO (E) PUMP STA.

REMOVE AND REPLACE 2" PVC (Cl2) FOR LIMITS SHOWN.

SEE L3 FOR IRRIG. CONN.

BREACH VAULT & GROUT IN PLACE

REMOVE (E) FENCE INSTALL (N) FENCE 6" INSIDE R., SEE SH. G-2.

RECONNECT TO EXIST. OUTLET AT BLDG. (Cl2)

REMOVE EXIST. SSMH & TIE 30" VCP FROM BLDG. TO SLIDE GATE VAULT WITH FLANGED COUPLING ADAPTOR AS REQUIRED.

INSTALL 30" FLANGED SPOOL W/BF

INSTALL 30" SLIDE GATE & 42" SLIDE GATE PER DETAIL 4/C-5

(N) FENCE

CURB

ASPHALT

INSTALL 30" MARSH Mc BIRNEY METER SEE 1/C-8

FL=77.2

SS MH 1

14" FL= ± 77.8

14" ±

14 ±

FIRE HYDRANT PER DETAIL 6/C-8

TIE (N) 4" TO EXISTING AIR GAP TANK OUTLET WITH FITTINGS AS REQ'D.

5000 GAL AIR GAP CONCRETE TANK (E)

TIE (N) 6" TO EXISTING WATER MAIN WITH FLANGED COUPLING ADAPTOR AS REQ'D. 6x6 x 6" TEE

(REMOVE) ON COMPLETION HYDRO PNEUMATIC TANK (E) MAINTAIN IN SERVICE

INSTALL SEATON WARNING TAPE OVER PIPE (POTABLE WATER)

INSTALL 2" PVC WATER TO BE REMOVED & REPLACED WITH MIN. 3' COVER IN LIMITS OF NEW PAVING. TIE BACK TO EXIST. 2" PVC OUTSIDE PAVING LIMITS.

INSTALL 154 LF - 2" PVC C/2

INSTALL FIRE HYDRANT PER DETAIL 6/C-8

INSTALL SEATON WARNING TAPE OVER PIPES (POTABLE WATER)

TEST WELL

SEE BORING B-1 SHEET G-6

INSTALL 130 LF - 6" PVC

INSTALL 130 LF - 4" PVC

(REMOVE) 2 - 1½ HP BOOSTER PUMPS

2" PVC

12" PVC POST CHLORINATION

2" PVC OVER FLOW CHLORINATION

12" CIP SLUDGE

INSTALL 100 LF - 18" DIP

S=0.0225 GRADE MAY CHANGE DUE TO DRAIN

INSTALL SSMH #4

I.G. (IN) = 78.05
I.G. (OUT) = 77.95

6" FL= 85.6

6" SS MH 6

CONC S/W

INSTALL 57 LF - 18" DIP

S=0.022

PUMP

6" VCP

INSTALL 72" SSMH #5

I.G. (IN) = 76.71 (18")
I.G. (IN) = 76.71 (42")
I.G. (OUT) = 76.61 (BOX)

6" FL= 85.5 SS MH 5

6" FL= 87.4

TIE TO DAY TANK

INSTALL 43 LF 42" DIP S=0.00300

10" CIP

18" ACP

2" DRAIN TO MH

(E) PUMP STATION

(N) FENCE W/ 3' GATE & 12' DBL. GATE, S/M. EXIST.

FL= 77.22

(N) 6 LF - 30" DIP

18" CIP

SS MH 2

30" FL= 77.2

SS MH 8

FL= 84.9

I.G. (IN) = 76.94
I.G. (OUT) = 76.84

INSTALL 55 LF - 42" DIP S=0.00300

INSTALL 72" SSMH # 6

DIESEL I.G. = 77.10 (42") INSTALL 42" SLIDE GATE

GRINDER VAULT SEE C-10

(N) 1" DIESEL PIPE DOUBLE WALL

VALVE BURNER

(E) 1-ELEC. CONTROL PANEL

TRANSFORMER (E)

I.G. = 77.22

ELEC.

GM

LUM

PLUMB

GATE

TANK

GATE

PGE

TEL

GUY

FH

FH

JA

DOG KENNEL

SHED

PINE

PINE

ASPHALT

18" ACP

18" TRANSDUCER FLOW METER FOR DETAIL 3/C-7

INSTALL (N) 6" LATERAL

POTHOLE

TO BE ABANDONED

TO MAINTENANCE BUILDING

2" PVC

INSTALL 24" ELECTROMAGNETIC FLOW METER PER DETAIL 4/C-7

EXIST 24" AC

24" DIP

24" DIP

24" DIP

V2

25' MIN.

SEE DETAIL 4/C-7 FOR COUPLING LOCATION.

DETAIL "A"

1" = 10'

EXIST. GRADE

#4 @ 12" O.C.

FINISH GRADE

24"

6" MIN.

18" ACP

BOTTOM OF SUBGRADE

6" TYP.

"B" TYPICAL CONCRETE CAP

2 N.T.S.

NOTE:

EXTEND 2" WATER FROM S.W.COR. P.S. TO GARAGE
EXTEND 1" GAS FROM (E) METER TO GARAGE
EXTEND ELECTRICAL POWER TO GARAGE, SEE E-13 & E-12
EXTEND 1" TELEPHONE CONDUIT TO PUMP STA., SEE E-12
EXTEND 3/4" IDS CONDUIT TO PUMP STA. SEE E-12

LEGEND:

NEW (N)

SCREENED } EXISTING (E)

VALVE

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

GRAPHIC SCALE
10' 0 10' 20'
1" = 10'

NO.	DATE	REVISIONS	BY	APPR.
2	8/25/92	ABANDON 2" PVC		

REGISTERED CIVIL ENGINEER ROBERT F. KELLY Exp. 12/31/92 No. 11005 STATE OF CALIFORNIA

DSGN	R.F.K.	CHKD	R.F.K.
DRWN	G.C.	SCALE	1"=10'

approved [signature] date 1/13/93

approved date

WINZLER & KELLY
CONSULTING ENGINEERS
495 TESCONI CIRCLE, #9 PARK CTR. SANTA ROSA, CA 95401 (707) 523-1010

RECORD DRAWING

THESE RECORD DRAWINGS HAVE BEEN PREPARED, IN PART, ON THE BASIS OF INFORMATION COMPILED AND FURNISHED BY THE PROJECT CONTRACTOR AND OTHERS. THE ENGINEER WILL NOT BE RESPONSIBLE FOR ANY ERRORS OR OMISSIONS WHICH HAVE BEEN INCORPORATED INTO THIS DOCUMENT AS A RESULT. FIELD VERIFICATION OF CRITICAL FACTS AND DATA SHOULD BE MADE IF THESE DOCUMENTS ARE TO BE USED AS A BASIS FOR FUTURE WORK.

CITY OF ROHNERT PARK

WASTEWATER PUMP STATION IMPROVEMENTS

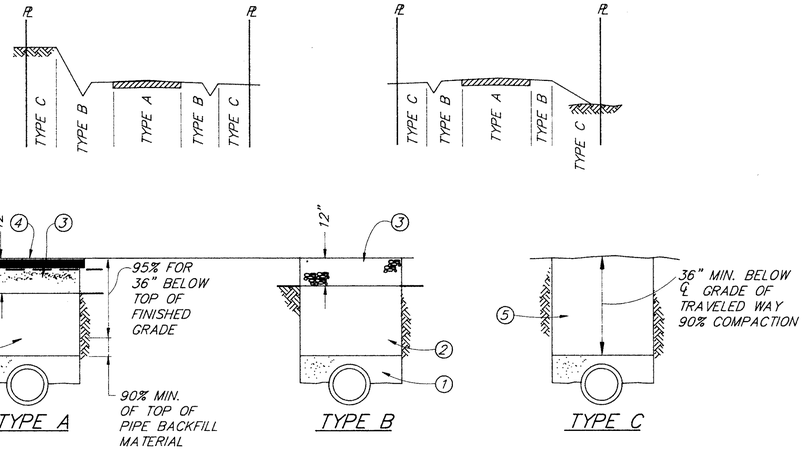
SITE PLAN 1

JOB NO. 90-848-C

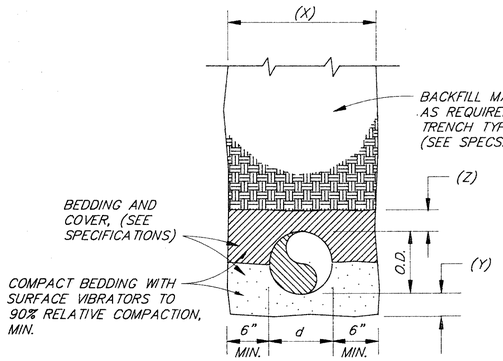
SHEET C-2

NOTES:

1. BEDDING MATERIAL PER TYPICAL PIPE BEDDING DETAIL
2. CLASS "B" BACKFILL (SEE SPECS)
3. CLASS 2 AGGREGATE BASE MATERIAL SHALL BE COMPACTED TO A MINIMUM OF 95% RELATIVE COMPACTION. AGGREGATE BASE THICKNESS SHALL BE EQUAL TO THAT OF EXISTING ROAD BASE, BUT IN NO CASE SHALL THICKNESS BE LESS THAN 12" LIFTS 6" MAX.
4. TRENCH SHALL BE PAVED WITH ASPHALT CEMENT WHOSE THICKNESS IS EQUAL TO THE THICKNESS OF THE EXISTING ROAD SURFACE, BUT IN NO CASE SHALL BE LESS THAN 3" THICK.
5. REPLACE WITH NATIVE MATERIAL RELATIVE COMPACTED TO 90%.
6. ROADWAY PAVEMENT SHALL BE SAW CUT AND REMOVED FOR 6" ON EACH SIDE OF TRENCH.



1/— TRENCH DETAILS – FORCE MAIN

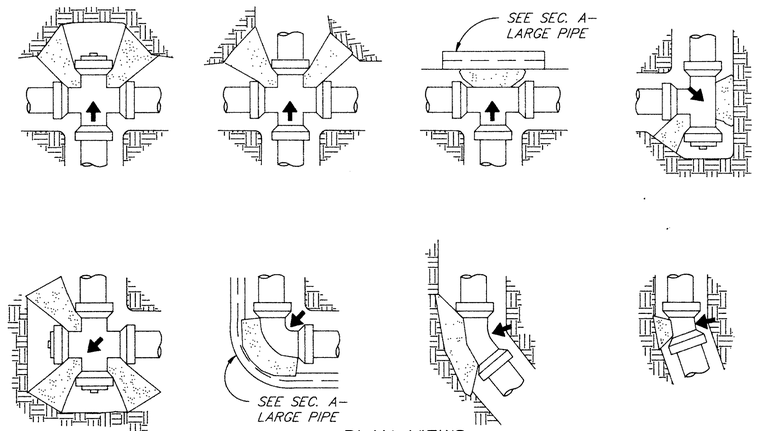


PIPE BEDDING DETAILS

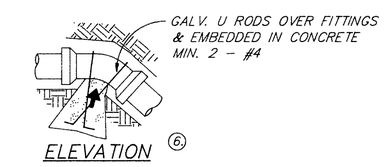
TRENCH DIMENSION CHART				
PIPE SIZE	(X) TRENCH WIDTH MIN.	(X) TRENCH WIDTH MAX.	(Y) BEDDING (MIN.)	(Z) COVER (MIN.)
2",4"&6"	d + 12"	24"	3"	6"
8"	20"	26"	3"	6"
10"	22"	28"	4"	6"
12"	24"	30"	4"	6"
18"	30"	36"	15"	17"
20"	38"	44"	16"	18"
24"	42"	48"	18"	20"
30"	48"	54"	23"	23"
36"	54"	60"	26"	28"

NOTES:

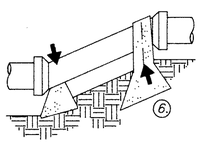
1. WIDER TRENCHES SHALL REQUIRE HIGHER STRENGTH PIPE AND/OR SPECIAL BEDDING.
2. DIFFERING TRENCH WIDTHS REQUIRE PRIOR APPROVAL OF OWNER'S REPRESENTATIVE.



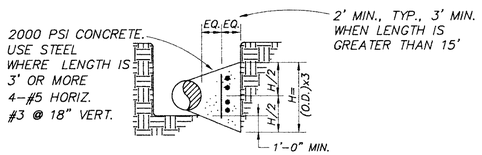
PLAN VIEWS



ELEVATION



ELEVATION



TYPICAL SECTION–A

THRUST BLOCK VOLUME (CU. YD.)

FITTING SIZE	90° BEND	45° BEND	22 1/2° BEND	11 1/4° BEND
15"	10.0	5.5	2.5	1.0
18"	13.5	7.5	3.5	1.0
24"	24.5	13.5	7.0	2.5

NOTES:

1. CONCRETE THRUST BLOCKS ARE TO BE POURED AGAINST UNDISTURBED EARTH OR STRUCTUAL BACKFILL.
2. KEEP CONCRETE CLEAR OF JOINTS AND ACCESSORIES.
3. VOLUMES AND SPECIAL BLOCKING DETAILS SHOWN ON THE PLANS TAKE PRECEDENCE OVER VOLUMES AND BLOCKING DETAILS SHOWN ON THIS STANDARD DETAIL.
4. ALL BURIED PIPE EXCEPT FLANGED, SCREWED, SOLVENT WELDED PVC OR WELDED STEEL PIPE SPECIFIED TO BE PRESSURE TESTED SHALL BE PROVIDED WITH CONCRETE THRUST BLOCKS AT ALL DIRECTIONAL CHANGES UNLESS OTHERWISE NOTED.
5. THRUST BLOCKS SHALL NOT BE LOCATED OR SIZED TO ENCASE ADJACENT PIPES OR FITTINGS.
6. THE SIZE AND WEIGHT OF ALL UPLIFT THRUST BLOCKS SHALL BE AS DETERMINED BY ENGINEER (ALSO STEEL REQUIRED).
7. THE BEARING AREAS ARE BASED ON TEST PRESSURE OF 150 PSI AND ALLOWABLE SOIL BEARING STRESS OF 1000 POUNDS PER SQUARE FOOT. TO COMPUTE BEARING AREAS FOR DIFFERENT TEST PRESSURES AND SOIL BEARING STRESSES, USE THE FOLLOWING EQUATION:

   BEARING AREA = (TEST PRESSURE / 150) x (1000 / SOIL BEARING STRESS) x (TABLE VALUE)

BEARING AREA OF THRUST BLOCK IN SQ. FT.

PIPE SIZE	TEE, WYE, PLUG OR CAP	90° BEND	45° BEND	22 1/2° BEND
15"	15.0	21.5	12.0	6.0
18"	19.0	27.0	15.0	8.0
24"	34.0	48.0	26.5	14.0

STANDARD THRUST BLOCK DETAILS

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

NO.	DATE	REVISIONS	BY	APPR.

REGISTERED CIVIL ENGINEER — ROBERT F. KELLY — Exp 12/31/92 — No. 11005 — STATE OF CALIFORNIA

DSGN	L.E.	CHKD	R.F.K.
DRWN	L.A.W.	SCALE	N.T.S.

approved — date 1/16/91

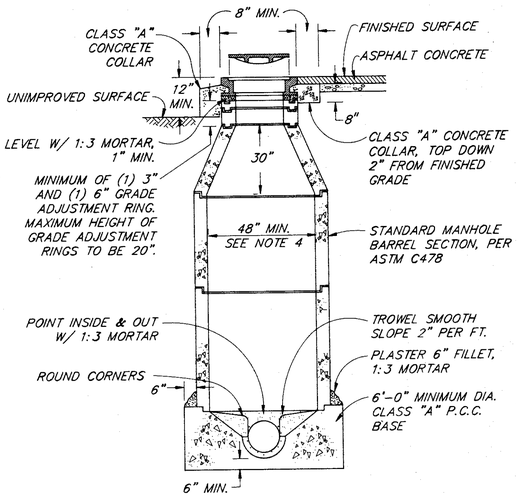
approved — date

WINZLER & KELLY
CONSULTING ENGINEERS
495 TESCONI CIRCLE, #9 PARK CTR. SANTA ROSA, CA 95401 (707)523-1010

CITY OF ROHNERT PARK
WASTEWATER PUMP STATION IMPROVEMENTS
TRENCH, BEDDING & THRUST BLOCK DETAILS

JOB NO. 90-848-C
SHEET C–3

FILE: 0848CC03
DATE: 11/18/91

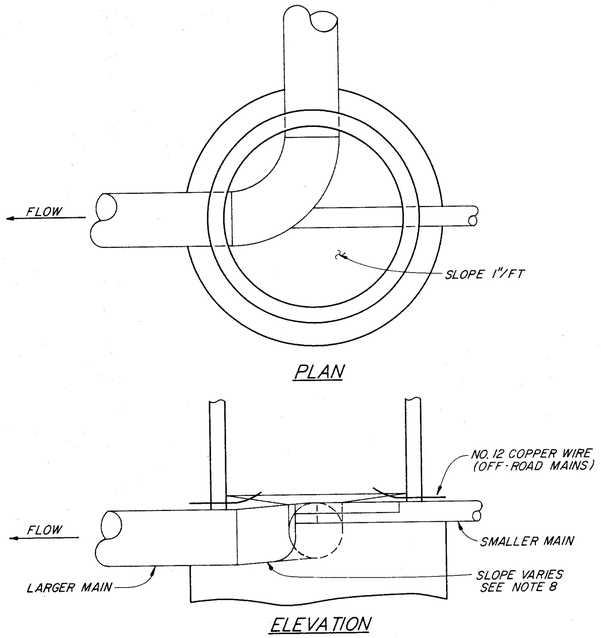


NOTES:

1. WHEN MANHOLES ARE INSTALLED IN UNIMPROVED AREAS, THE TOP OF THE COVER SHALL BE A MINIMUM OF 1 FOOT ABOVE ADJACENT FINISHED GRADE.
2. SET ALL BARREL SECTIONS, TAPER BARREL SECTIONS AND GRADE ADJUSTMENT RINGS IN PLASTIC GASKET, SEAL WITH RAM-NEK OR APPROVED EQUAL.
3. CONE SECTION MAY BE EITHER CONCENTRIC OR ECCENTRIC UNLESS OTHERWISE SPECIFIED BY THE ENGINEER.
4. LARGER DIAMETER BARRELS MAY BE REQUIRED UNDER SPECIAL CIRCUMSTANCES. SEE PLANS.
5. CONTRUCT ALL FLOW CHANNELS OF PIPE WHEREVER POSSIBLE. AFTER LOWER RING SECTION IS SET BREAK OUT TOP HALF OF PIPE FLUSH WITH INSIDE FACE OF M.H. WALL AND CONSTRUCT SHELF AND U-SHAPED CHANNEL. MAKE ELEVATION CHANGES GRADUALLY AND DIRECTIONAL CHANGES WITH SMOOTH CURVES.
6. BARREL AND TAPER SECTIONS MAY BE CAST IN PLACE AS APPROVED AND DIRECTED BY THE ENGINEER.
7. A FLEXIBLE COUPLING AS APPROVED BY THE ENGINEER, SHALL BE INSTALLED IN THE SEWER MAIN WITHIN 12" OF THE BASE OF THE MANHOLE.
8. BASE SHALL BE POURED FULL THICKNESS TO UNDISTURBED SIDES OF EXCAVATION OR SHALL BE FORMED.

1 — STANDARD PRECAST CONCRETE SANITARY SEWER MANHOLE

NOT TO SCALE — PUMP STATION

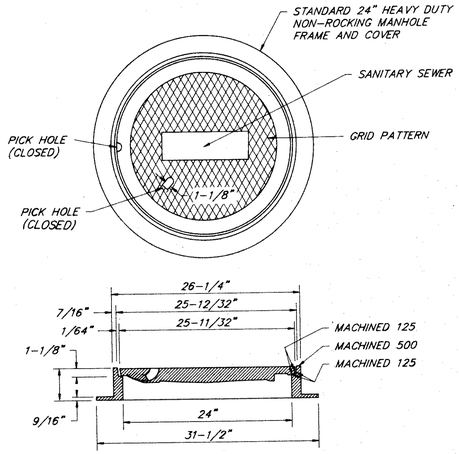


NOTES:

1. THE FLOW CHANNEL SHALL BE OPEN FOR THE FULL WIDTH OF MANHOLE d= I.D. OF PIPE.
2. THE SHELF (SLOPED 1" PER FT.) SHALL HAVE BROOM FINISH.
3. ALL PIPES SHALL BE SEALED IN WITH A 4" MORTAR FILLET. FOR PLASTIC PIPE, TWO WATERSTOPS SHALL BE ADDED AT EACH PIPE PENETRATION.
4. ANY SIDE INLET SHALL ENTER MANHOLE WITH INVERT AT LEAST 0.10' ABOVE INVERT OF OUTLET. IF PIPE SIZE INCREASES THROUGH MANHOLE, A DROP MANHOLE IS REQUIRED WHERE I.G. OF INLET IS OVER 6" ABOVE CROWN OF OUTLET.
5. MAINTAIN FULL PIPE DIAMETER AROUND SWEEP. DO NOT FAN-OUT. PROVIDE SMOOTH TRANSITION.
6. SEWER MAINS WHICH ARE STRAIGHT THROUGH MANHOLES AND HAVE THE SAME PIPE DIAMETER SHALL BE SLOPED THE SAME AS THE SEWER MAIN.
7. STANDARD MANHOLES WITH 90° BENDS WILL NORMALLY HAVE THE INLET SET 0.10' ABOVE THE OUTLET.
8. AT JUNCTION MANHOLES WHERE THE PIPE SIZE CHANGES, THE TOP OF THE SMALLER PIPE SHALL BE LEVEL WITH THE TOP OF THE LARGER PIPE.

3 — PIPE SIZE CHANGE AT MANHOLE

NOT TO SCALE — AT PUMP STATION



NOTES:

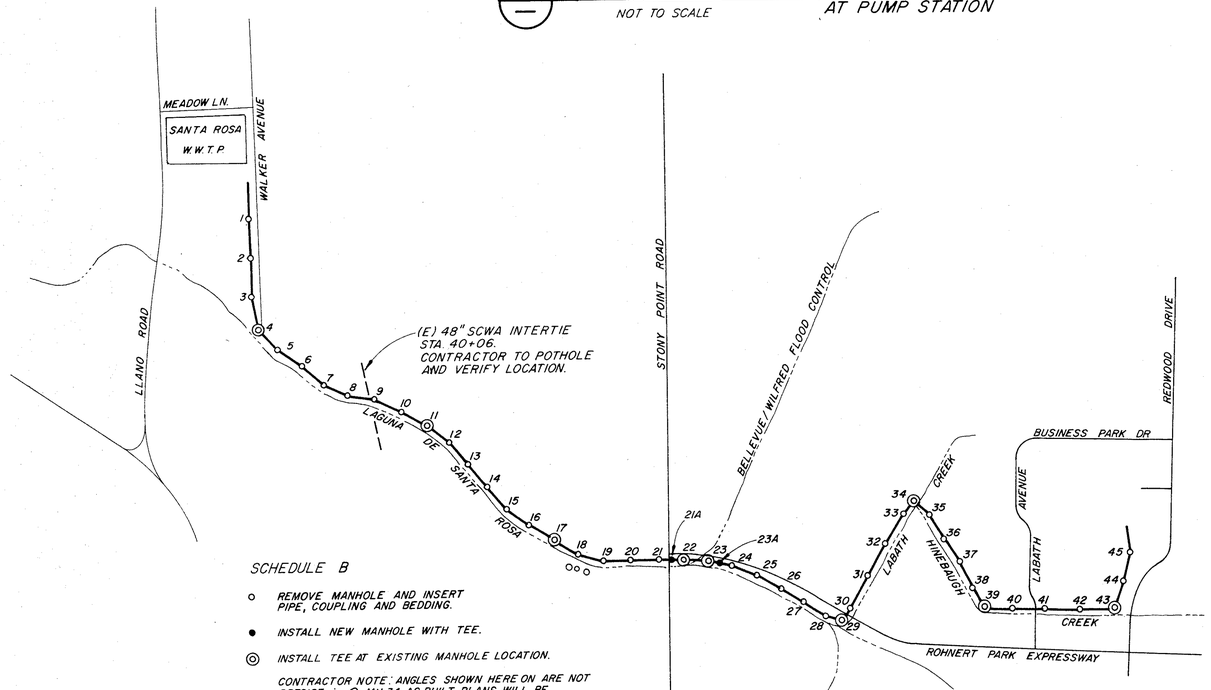
1. ALL CASTINGS SHALL BE DIPPED IN ASPHALT PAINT.
2. ALL MATERIAL USED IN MANUFACTURING SHALL CONFORM TO A.S.T.M. DESIGNATION A-159-G3000, OR OF UNITED STATES GOVERNMENT SPECIFICATIONS QQ1-652B.
3. MINIMUM WEIGHT COMPONENTS : COVER - 130 POUNDS FRAME - 135 POUNDS

APPROVED MANHOLE FRAME AND COVER

PHOENIX IRON WORKS CAT. NO. P-1090
PINKERTON FOUNDRY CAT. NO. A-640
EMPIRE FOUNDRY CAT. NO. M2-224
VALLEY IRON AND STEEL CAT. NO. 127
SOUTH BAY FOUNDRY SBF-1900
DIAMOND T MODEL 11Y

2 — STANDARD MANHOLE FRAME AND COVER

NOT TO SCALE



SCHEDULE B

- ○ REMOVE MANHOLE AND INSERT PIPE, COUPLING AND BEDDING.
- ● INSTALL NEW MANHOLE WITH TEE.
- ◎ INSTALL TEE AT EXISTING MANHOLE LOCATION.

CONTRACTOR NOTE: ANGLES SHOWN HERE ON ARE NOT PRECISE, ie @ MH 34, AS BUILT PLANS WILL BE FURNISHED TO CONTRACTOR. SEE TABLE 1 SHT. C-5.

4 — FORCE MAIN PLAN

NOT TO SCALE

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

NO.	DATE	REVISIONS	BY	APPR.

REGISTERED CIVIL ENGINEER — ROBERT F. KELLY — Exp 12/31/92 — No. 11005 — STATE OF CALIFORNIA

DSGN	D.D.	CHKD	R.F.K.
DRWN	L.A.W./D.H.D.	SCALE	SHOWN

approved — date 1/16/92
approved — date

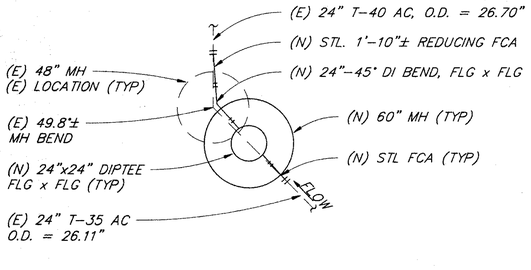
WINZLER & KELLY
CONSULTING ENGINEERS
495 TESCONI CIRCLE..#9 PARK CTR. SANTA ROSA, CA 95401 (707)523-1010

RECORD DRAWING
THESE RECORD DRAWINGS HAVE BEEN PREPARED, IN PART, ON THE BASIS OF INFORMATION COMPILED AND FURNISHED BY THE PROJECT CONTRACTOR AND OTHERS. THE ENGINEER WILL NOT BE RESPONSIBLE FOR ANY ERRORS OR OMISSIONS WHICH HAVE BEEN INCORPORATED INTO THIS DOCUMENT AS A RESULT. FIELD VERIFICATION OF CRITICAL FACTS AND DATA SHOULD BE MADE IF THESE DOCUMENTS ARE TO BE USED AS A BASIS FOR FUTURE WORK.

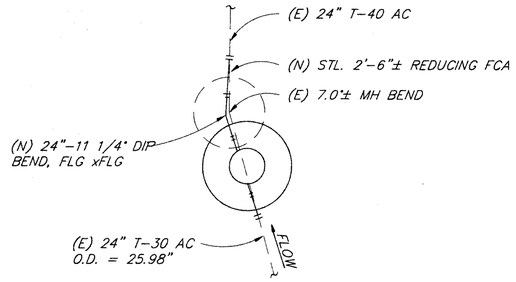
CITY OF ROHNERT PARK
WASTEWATER PUMP STATION IMPROVEMENTS
MANHOLE DETAILS

JOB NO. 90-848-C
SHEET C-4

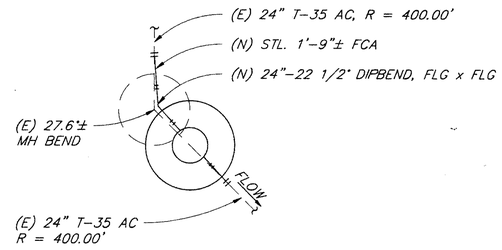
FILE: 0848CC04
DATE: 06/12/91



1 — MANHOLE NO. 4
N.T.S.



2 — MANHOLE NO. 23
N.T.S.



3 — MANHOLE NO. 34
N.T.S.

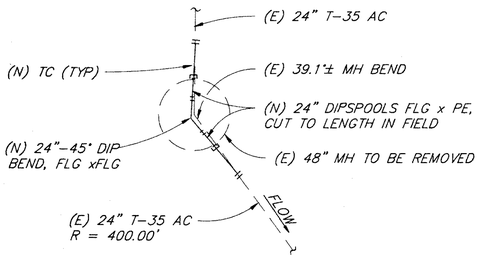
DEPTH

TABLE 1

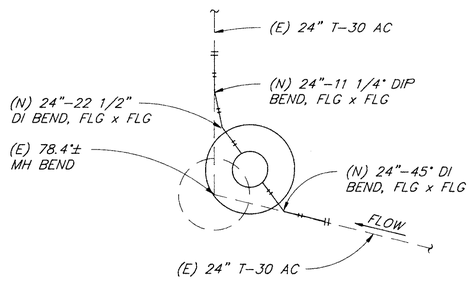
INTERCEPTOR MANHOLE SUMMARY

STATION	MH	PIPE ANGLE (°)	REQUIRED BEND(S) (°)		COUPL DEFL (°/EA)	ELEVATIONS LG.(IN) (FT)	ELEVATIONS LG.(OUT) (FT)	ELEVATIONS H.G. (FT)	INSTALL FITTING	THR BLK (FT³)	(S) PIPE
5+00	1			18		66.66	66.66	84.30	24" FL. SPOOL		T45
9+50	2			12		67.11	67.11	79.00	24" FL. SPOOL		T40
14+00	3			12		67.56	67.56	79.50	24" FL. SPOOL		T40
*18+50	4	49.8	45	12	2.40	68.05	68.01	79.75	24"x24" FL. TEE	5	T40
20+39	5			12		68.55	68.55	80.00	24" FL. SPOOL		T35
25+42	6			11		69.05	69.05	80.00	24" FL. SPOOL		T35
30+63	7			11		69.51	69.51	80.10	24" FL. SPOOL		T35
36+04	8	1.0		11	0.50	69.99	69.99	80.60	24" FL. SPOOL		T35
40+53	9			10		70.50	70.50	81.62	24" FL. SPOOL		T35
45+00	10			10		70.99	70.99	81.00	24" FL. SPOOL		T35
49+35	11			10		71.47	71.47	81.30	24"x24" FL. TEE		T35
54+16	12			10		72.00	72.00	81.50	24" FL. SPOOL		T35
59+23	13			10		72.46	72.46	81.90	24" FL. SPOOL		T35
64+65	14			9.5		72.94	72.94	82.40	24" FL. SPOOL		T35
69+68	15			9.5		73.44	73.44	83.00	24" FL. SPOOL		T35
74+70	16			9		73.94	73.94	83.70	24" FL. SPOOL		T35
79+49	17			8.5		74.42	74.42	83.00	24"x24" FL. TEE		T35
83+24	18	0.2		10	0.10	74.83	74.83	85.10	24" FL. SPOOL		T40
88+18	19	0.2		12	0.10	75.20	75.50	86.80	24" FL. SPOOL		T35
93+23	20			10		75.71	75.71	85.00	24" FL. SPOOL		T35
98+00	21	4.8		9	2.40	76.19	76.19	84.50	24" FL. SPOOL		T35
101+03	21A			7		76.50	76.50	83.90	24"x24" FL. TEE		T35
101+13	22	5.30		7	2.65	76.90	76.51	83.80	24"x24" FL. TEE		T40
104+25	23	7.00	114	7	2.13	78.74	78.45	85.50	24"x24" FL. TEE		T30
104+35	23A			6.5		78.75	78.75	85.50	24"x24" FL. TEE		T30
105+88	24			6.5		78.90	78.90	85.30	24" FL. SPOOL		T30
110+63	25			7		79.40	79.40	86.50	24" FL. SPOOL		T30
115+52	26			6.5		79.90	79.90	86.40	24" FL. SPOOL		T30
120+52	27			6.5		80.40	80.40	87.00	24" FL. SPOOL		T30
125+50	28			6.5		80.90	80.90	87.70	24" FL. SPOOL		T30
128+25	29	4.10		6.5	2.05	81.22	81.13	87.80	24"x24" FL. TEE		T30
130+90	30	4.20		6.5	2.10	81.45	81.45	87.90	24" FL. SPOOL		T30
136+02	31			6		81.96	81.96	88.00	24" FL. SPOOL		T30
141+00	32			5.5		82.45	82.45	88.20	24" FL. SPOOL		T30
145+99	33			5.5		83.18	82.95	88.30	24" FL. SPOOL		T35
147+45	34	27.60	22½	5	***2.98	83.46	83.36	88.50	24"x24" FL. TEE	9	T35
149+51	35	39.10	45	4.5	***2.95	83.83	83.73	88.40	24" FL. SPOOL	12	T35
154+33	36	"		5		84.28	84.28	88.00	24" FL. SPOOL		T35
158+70	37			5		84.68	84.68	89.70	24" FL. SPOOL		T35
163+08	38			5	0.50	85.08	85.08	90.40	24" FL. SPOOL		T35
168+15	39			5.5	0.50	85.49	85.49	91.20	24"x24" FL. TEE		T35
172+56	40			6		85.89	85.89	91.70	24" FL. SPOOL		T30
177+20	41			6		86.30	86.30	92.45	24" FL. SPOOL		T30
181+84	42			6.5		86.71	86.71	93.20	24" FL. SPOOL		T30
**0+00	43	78.40	45,22½,114	6.5	0.18	87.25	87.12	93.90	24"x24" FL. TEE	22	T30
5+03	44			6.5		87.70	87.70	94.00	24" FL. SPOOL		T35
10+09	45	11.70	114	6	0.22	88.15	88.15	94.10	24" FL. SPOOL		T35

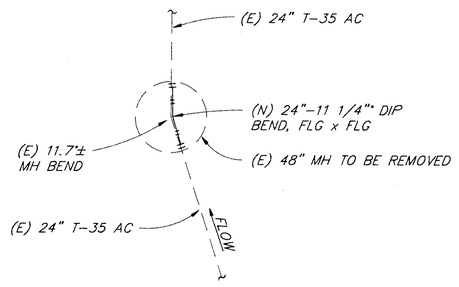
+ STATION EQN. → STA. 15+46 = STA. 18+50
** STATION EQN. → STA. 186+38 = STA. 0+00
*** PIPE ANGLE POINT WITH A PIPE RADIUS OF CURVATURE OF R=400.00'



4 — MANHOLE NO. 35
N.T.S.



5 — MANHOLE NO. 43
N.T.S.



6 — MANHOLE NO. 45
N.T.S.

NOTES:

1. SEE C-3 FOR THRUST BLOCKS.
2. SEE MANHOLE SUMMARY ABOVE.

SCHEDULE B

FILE: 0848CC05
DATE: 07/29/91

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 — 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

NO.	DATE	REVISIONS	BY	APPR.

REGISTERED CIVIL ENGINEER
ROBERT F. KELLY
Exp. 12/31/92
No. 11005
STATE OF CALIFORNIA

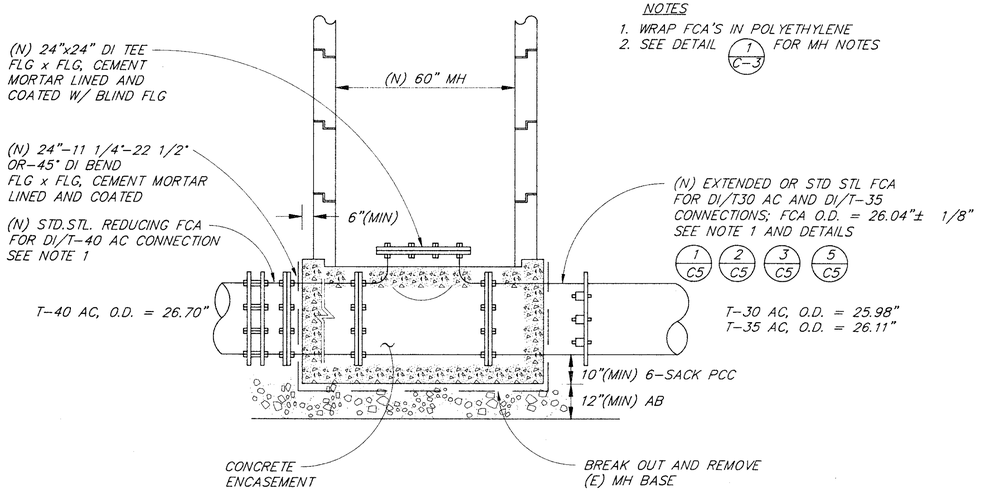
DSGN	D.K.D.	CHKD	R.F.K.
DRWN	L.A.W.	SCALE	N.T.S.

approved — date 1/15/92
approved — date

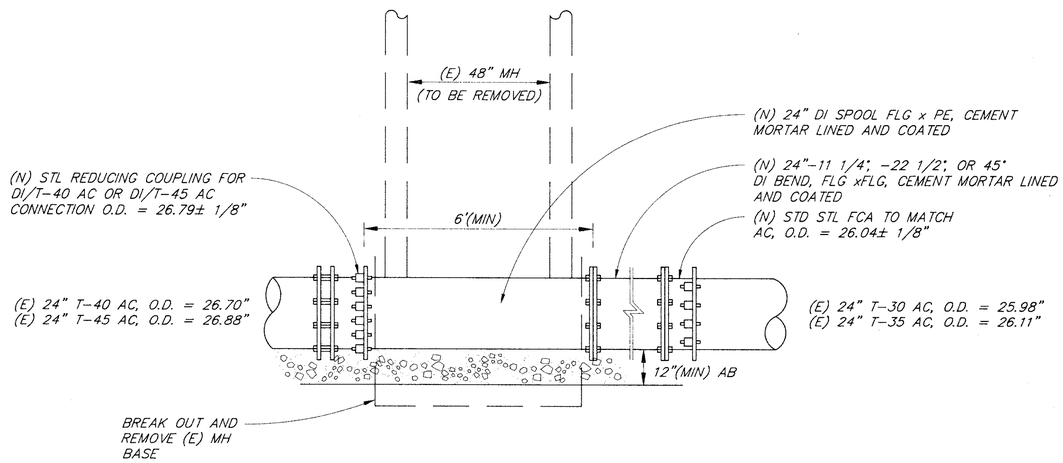
WINZLER & KELLY
CONSULTING ENGINEERS
495 TESCONI CIRCLE, #9 PARK CTR. SANTA ROSA, CA 95401 (707)523-1010

CITY OF ROHNERT PARK
WASTEWATER PUMP STATION IMPROVEMENTS
MANHOLE DETAILS

JOB NO. 90-848-C
SHEET C-5



1/C4 TYPICAL TEE INSTALLATION
SCALE 1/2"=1'



2/C4 TYPICAL SPOOL INSTALLATION
SCALE 1/2"=1'

- FORCE MAIN DETAILS -

SCHEDULE B

FILE: 0848CC06
DATE: 01/14/92

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

NO.	DATE	REVISIONS	BY	APPR.

REGISTERED CIVIL ENGINEER
ROBERT F. KELLY
No. 11005
Exp 12/31/92
STATE OF CALIFORNIA

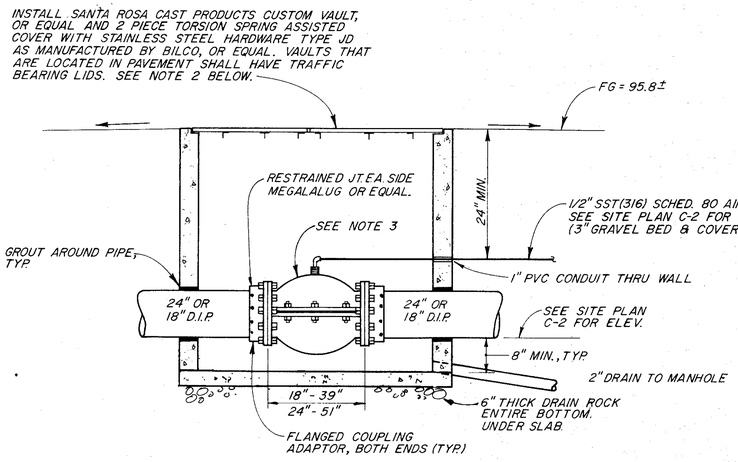
DSGN	L.E./D.D.	CHKD	R.F.K.
DRWN	L.A.W.	SCALE	N.T.S.

approved [signature] date 1/15/92
approved date

WINZLER & KELLY
CONSULTING ENGINEERS
495 TESCONI CIRCLE..#9 PARK CTR. SANTA ROSA, CA 95401 (707)523-1010

CITY OF ROHNERT PARK
WASTEWATER PUMP STATION IMPROVEMENTS
MANHOLE & BOLT DETAILS

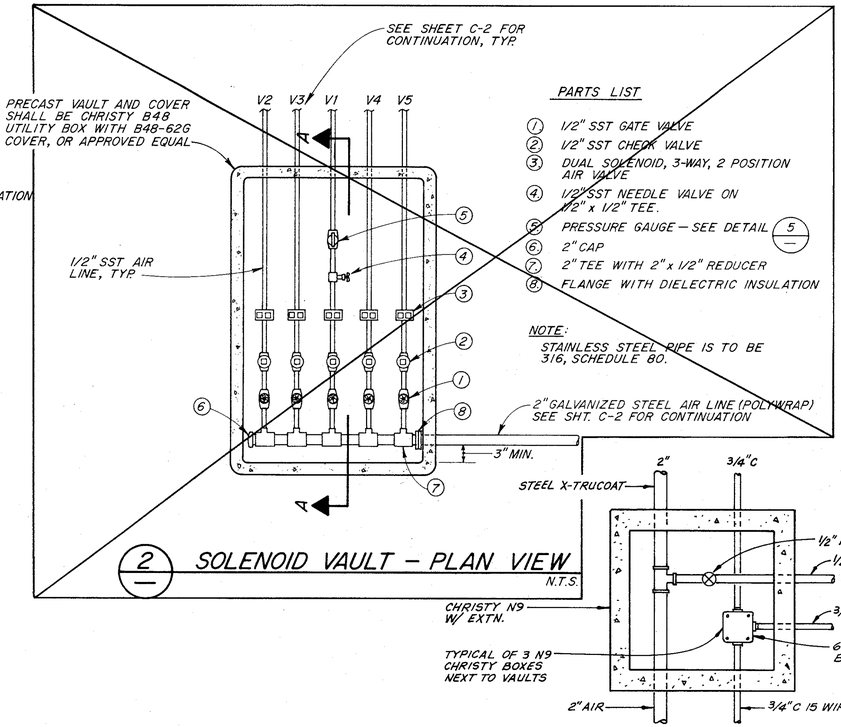
JOB NO. 90-848-C
SHEET C-6



NOTES:

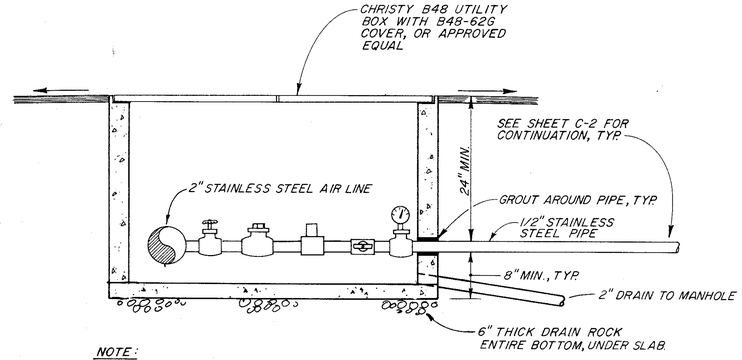
1. VAULTS SHALL BE BEDDED ON MINIMUM 6" THICK, 3/4" DRAIN ROCK, AGAINST 90° COMPACTED BASE. THE GRAVEL BED SHALL EXTEND TO A 4" MINIMUM BEYOND ALL SIDES OF THE VAULT. VAULT SHALL BE SET FLUSH WITH PAVEMENT SURFACE.
2. FOR 24" PINCH VALVES, VAULTS SHALL BE 6' x 4' AND FOR THE 18" PINCH VALVE, THE VAULT SHALL BE 5' x 4'.
3. PINCH VALVE SHALL BE RED VALVE TYPE 'A' AIR OPERATED OR EQUAL.
4. VAULTS AND COVERS ARE CUSTOM ORDERED. ALLOW SUFFICIENT DELIVERY TIME.
5. ALL VAULT TO HAVE 4" MIN. CONCRETE BASE & 2" DRAIN TO M.H.

1 — PINCH VALVE
N.T.S.



2/— SOLENOID VAULT — PLAN VIEW
N.T.S.

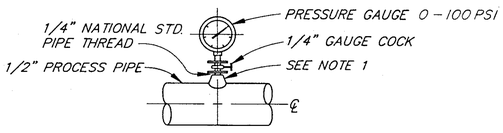
2/— SOLENOID BOX - PLAN VIEW
N.T.S.



NOTE:

1. VAULTS SHALL BE BEDDED ON MINIMUM 6" THICK, 3/4" DRAIN ROCK, AGAINST 90% COMPACTED BASE. THE GRAVEL BED SHALL EXTEND TO A 4" MINIMUM BEYOND ALL SIDES OF THE VAULT. VAULT SHALL BE SET FLUSH WITH PAVEMENT SURFACE.

SECTION A-A
N.T.S.

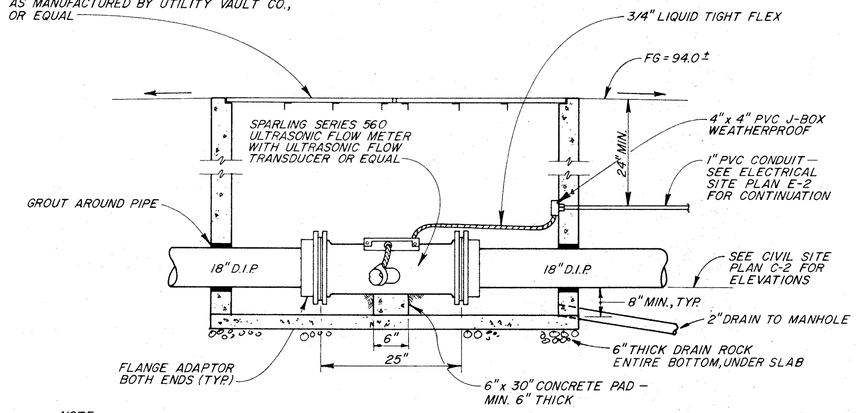


PRESSURE GAUGE

NOTE:

1. FOR STEEL, GALVANIZED STEEL, AND PVC 2 1/2" AND SMALLER USE A BUSHING IN A TEE.

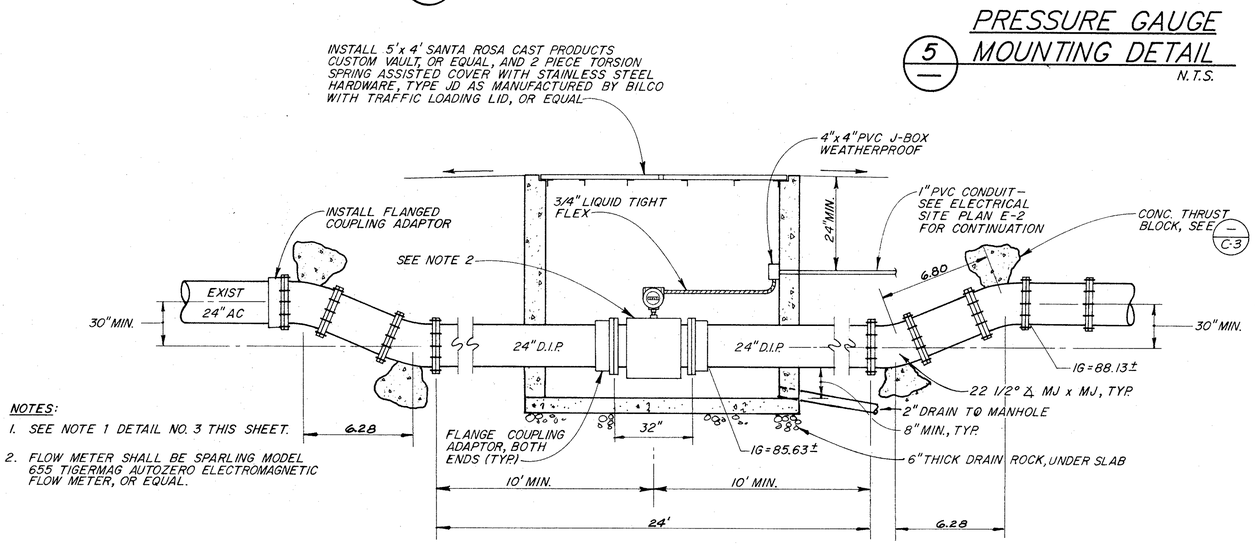
5/— PRESSURE GAUGE MOUNTING DETAIL
N.T.S.



NOTE:

1. VAULTS SHALL BE BEDDED ON MINIMUM 6" THICK, 3/4" DRAIN ROCK, AGAINST 90% COMPACTED BASE. THE GRAVEL BED SHALL EXTEND TO A 4" MINIMUM BEYOND ALL SIDES OF THE VAULT. VAULT SHALL BE SET FLUSH WITH PAVEMENT SURFACE. PROVIDE 4" BASE SLAB & 2" DRAIN TO M.H.

3/— FLOW METER (TRANSDUCER TYPE)
N.T.S.



NOTES:

1. SEE NOTE 1 DETAIL NO. 3 THIS SHEET.
2. FLOW METER SHALL BE SPARLING MODEL 655 TIGERMAG AUTOZERO ELECTROMAGNETIC FLOW METER, OR EQUAL.

4/— FLOW METER (ELECTROMAGNETIC TYPE)
N.T.S.

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 — 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

NO.	DATE	REVISIONS	BY	APPR.

REGISTERED CIVIL ENGINEER — ROBERT F. KELLY — Exp 12/31/92 — No. 11005 — STATE OF CALIFORNIA

DSGN	L.E.	CHKD	R.F.K.
DRWN	D.H.D.	SCALE	

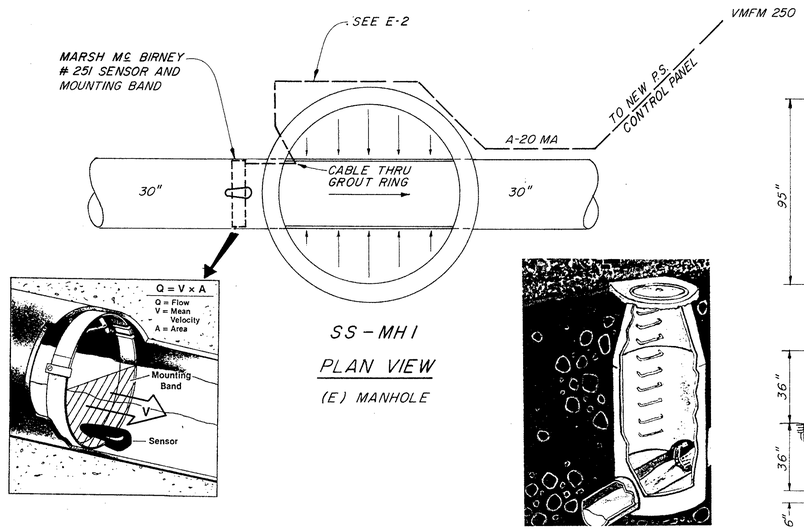
approved [signature] date 1/15/93
approved date

WINZLER & KELLY
CONSULTING ENGINEERS
495 TESCONI CIRCLE, #9 PARK CTR. SANTA ROSA, CA 95401 (707) 523-1010

RECORD DRAWING
THESE RECORD DRAWINGS HAVE BEEN PREPARED, IN PART, ON THE BASIS OF INFORMATION COMPILED AND FURNISHED BY THE PROJECT CONTRACTOR AND OTHERS. THE ENGINEER WILL NOT BE RESPONSIBLE FOR ANY ERRORS OR OMISSIONS WHICH HAVE BEEN INCORPORATED INTO THIS DOCUMENT AS A RESULT. FIELD VERIFICATION OF CRITICAL FACTS AND DATA SHOULD BE MADE IF THESE DOCUMENTS ARE TO BE USED AS A BASIS FOR FUTURE WORK.

CITY OF ROHNERT PARK
WASTEWATER PUMP STATION IMPROVEMENTS
MISCELLANEOUS DETAILS

JOB NO. 90-848-C
SHEET C-7

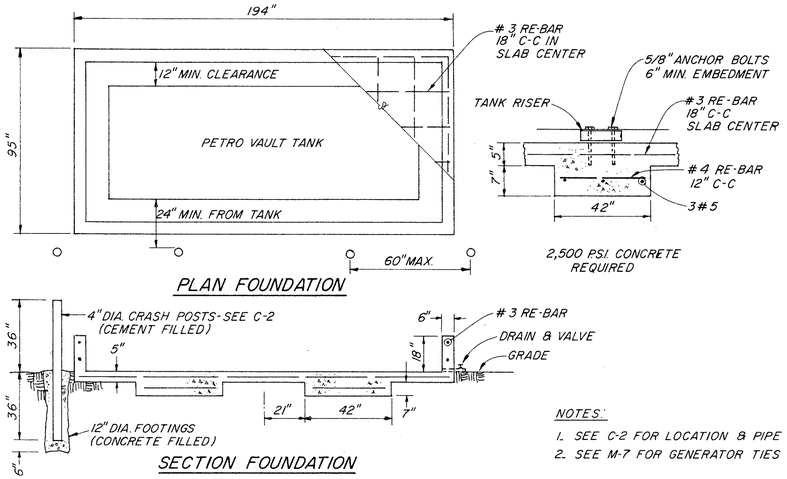


SS - MH I

PLAN VIEW

(E) MANHOLE

1 VMFM FLOWMETER
N.T.S.



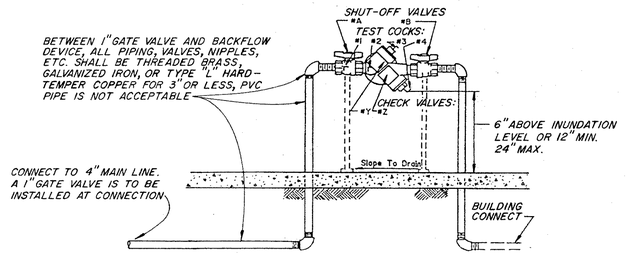
PLAN FOUNDATION

2,500 PSI. CONCRETE REQUIRED

SECTION FOUNDATION

NOTES:
1. SEE C-2 FOR LOCATION & PIPE
2. SEE M-7 FOR GENERATOR TIES

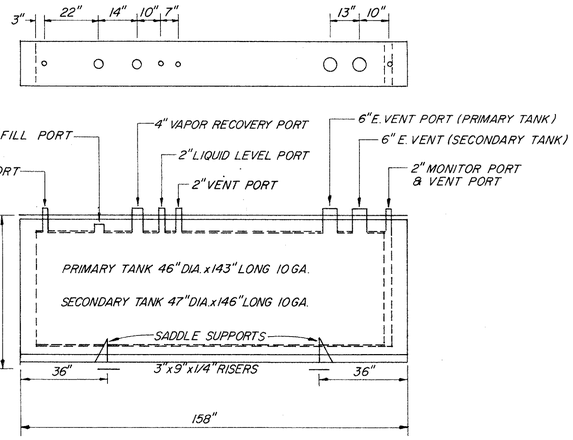
2 DIESEL TANK FOUNDATION
N.T.S.



NOTES:

1. APPROVED REDUCED PRESSURE BACKFLOW DEVICE SHALL BE AS SHOWN ON "LIST OF APPROVED BACKFLOW PREVENTION DEVICES" (OF LATEST REVISION) BY THE UNIVERSITY OF SOUTHERN CALIFORNIA FOUNDATION FOR CROSS-CONNECTION CONTROL AND HYDRAULIC RESEARCH.
2. A VALVE OF THE SAME SIZE AS THE BACKFLOW PREVENTER SHALL BE INSTALLED ON EACH SIDE OF THE BACKFLOW PREVENTION ASSEMBLY. VALVES SHALL BE THREADED FORD BALL VALVES OR EQUAL.

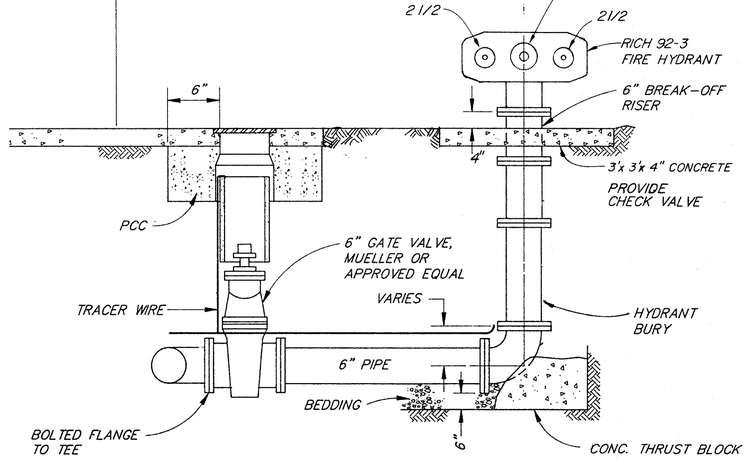
3 REDUCED PRESSURE BACKFLOW PREVENTER
N.T.S.



SANNIPOLI PETRO VAULT SECTIONS TANK

4 DIESEL TANK
N.T.S.

SEE SPECS FOR EQUAL ALT.



NOTE:
PRECAST CONCRETE VALVE BOX CENTERED AND OVER VALVE WRENCH NUT AND SET FLUSH WITH SURFACE.

5 TYPICAL FIRE HYTRANT INSTALLATION
N.T.S.

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

NO.	DATE	REVISIONS	BY	APPR.

REGISTERED CIVIL ENGINEER ROBERT F. KELLER 5/12/91/92 No. 11005 STATE OF CALIFORNIA

DSGN	L.E.	CHKD	R.F.K.
DRWN	D.H.D.	SCALE	NONE

approved [signature] date 1/15/92
approved date

WINZLER & KELLY
CONSULTING ENGINEERS
495 TESCONI CIRCLE, #9 PARK CTR. SANTA ROSA, CA 95401 (707) 523-1010

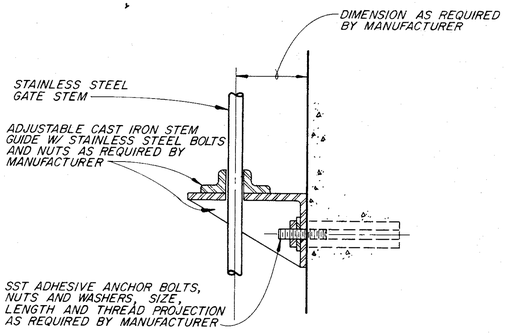
CITY OF ROHNERT PARK

WASTEWATER PUMP STATION IMPROVEMENTS

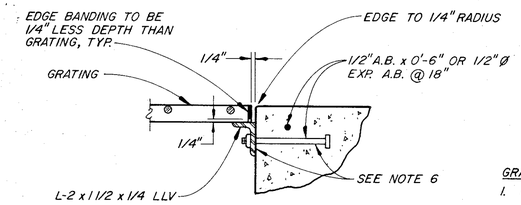
MISCELLANEOUS DETAILS

JOB NO. 90-848-C

SHEET C-8



1 STEM GUIDE INSTALLATION
N.T.S.



TYPICAL GRATING DETAIL
N.T.S.

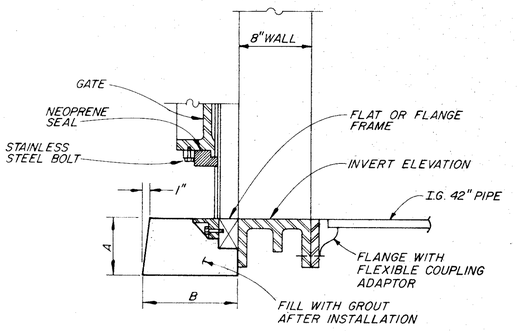
FOOT TRAFFIC	
MAXIMUM SPAN	ALUMINUM (in.)
5'-6"	2"
6'-0"	2 1/4"
6'-6"	2 1/4"
7'-0"	2 1/2"

GRATING NOTES:

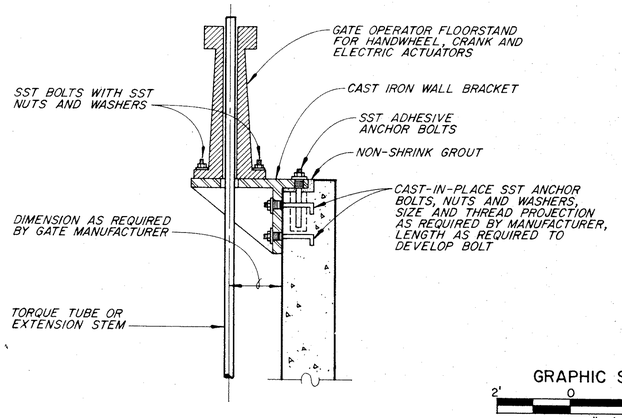
1. EXTEND GRATING CONTINUOUSLY OVER GATE GUIDES AND GATES.
2. NOTCH GRATING SUPPORTS AT GATES AS REQUIRED.
3. FOR GRATING SPAN SEE PLAN.
4. WIDTH OF GRATING SECTIONS SHALL NOT EXCEED 3'-0".
5. SHOP DRAWINGS SHALL BE SUBMITTED TO THE ENGINEER BASED ON FIELD DIMENSIONS PRIOR TO FABRICATION.
6. METAL FOR SUPPORTS OF ALUMINUM GRATING TO BE SAME AS GRATING EXCEPT METAL SUPPORTS THAT ARE TO BE EMBEDDED IN CONCRETE SHALL BE TYPE 316 STAINLESS STEEL.
7. SEE SPECIFICATIONS SECTION 05531
8. BEARING BAR THICKNESS FOR GRATING TO BE 3/16" MINIMUM.
9. BAND ALL EDGES WITH 3/16" x DEPTH OF BEARING BAR.
10. PROVIDE MISCELLANEOUS GRATING FASTENERS AS REQUIRED.

LARGEST DIMENSION EITHER WIDTH OR HEIGHT	MIN. BLOCKOUT	
	A	B
30" THRU 42"	8"	20"

NOTE:
GATE SHOWN IN RAISED POSITION. FILL WITH GROUT AFTER GATE INSTALLATION.

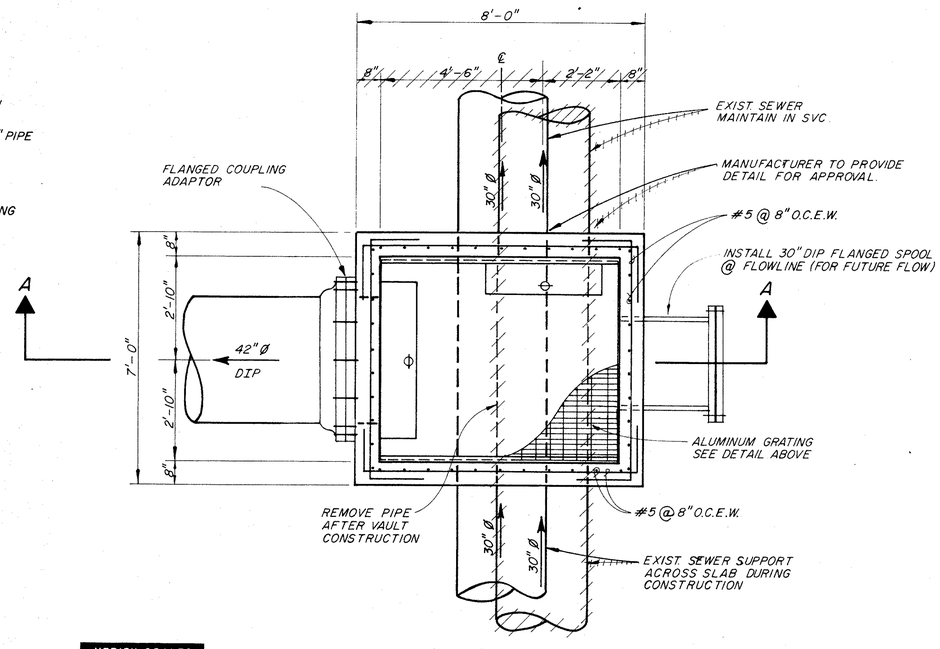


2 FLUSH BOTTOM SLUICE GATE BLOCKOUT
N.T.S.

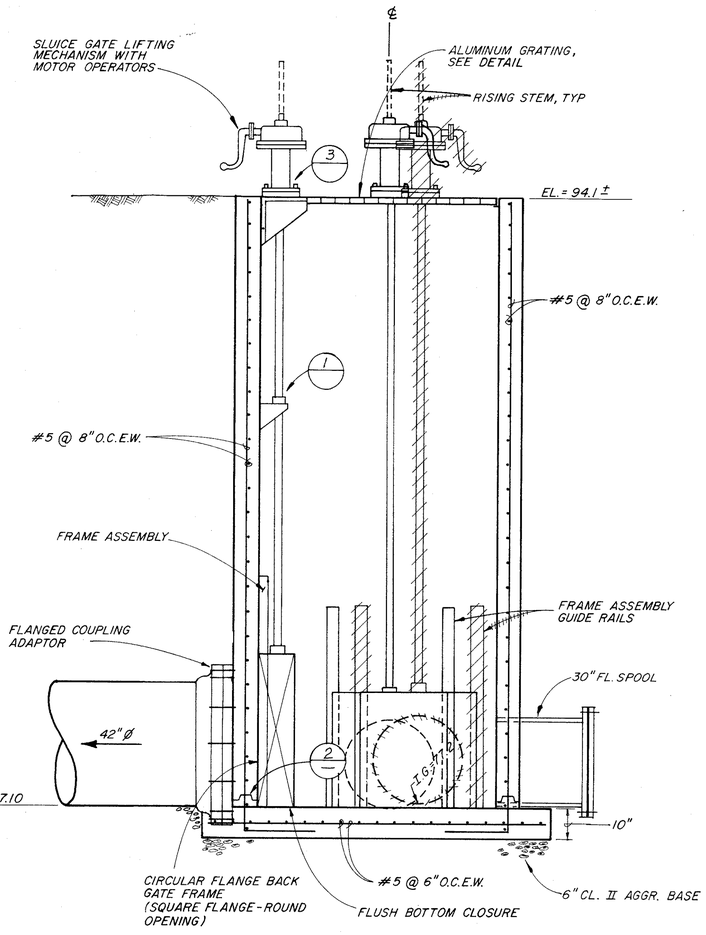


3 FLOOR STAND INSTALLATION
N.T.S.

GRAPHIC SCALE
2' 0 2' 4'
1/2" = 1'-0"



4 PLAN
1/2" = 1'-0"



SECTION A-A
1/2" = 1'-0"

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

NO.	DATE	REVISIONS	BY	APPR.

REGISTERED CIVIL ENGINEER — ROBERT F. KELLY — Exp 12/31/97 — No. 11005 — STATE OF CALIFORNIA

DSGN	L.E.	CHKD	R.F.K.
DRWN	D.H.D.	SCALE	SHOWN

approved _____ date 1/15/97
approved _____ date _____

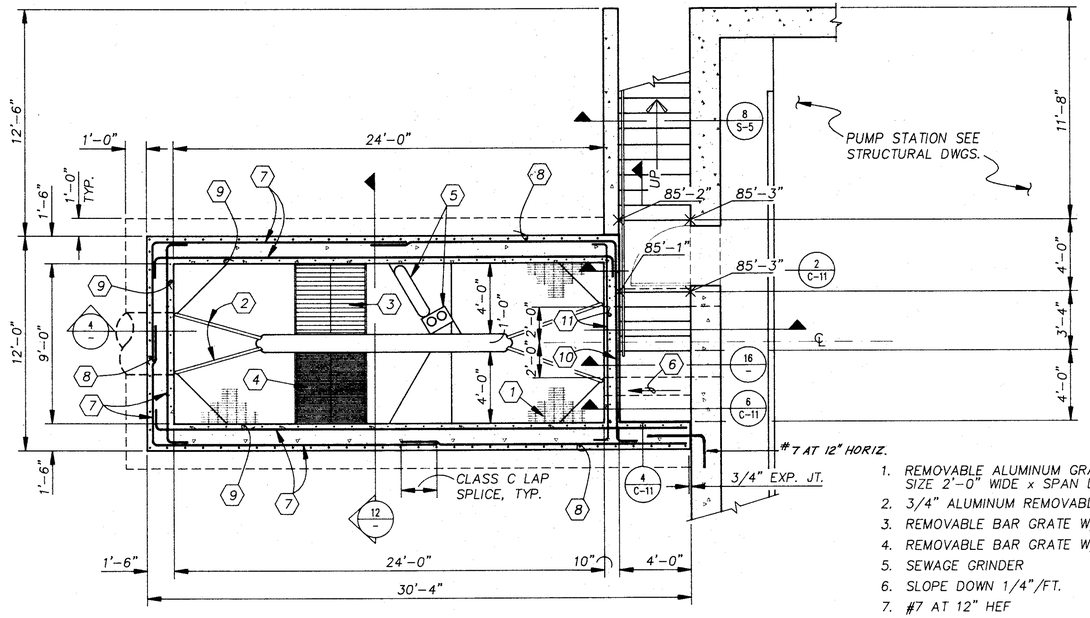
WINZLER & KELLY
CONSULTING ENGINEERS
495 TESCONI CIRCLE, #9 PARK CTR. SANTA ROSA, CA 95401 (707) 523-1010

RECORD DRAWING

THESE RECORD DRAWINGS HAVE BEEN PREPARED, IN PART, ON THE BASIS OF INFORMATION COMPILED AND FURNISHED BY THE PROJECT CONTRACTOR AND OTHERS. THE ENGINEER WILL NOT BE RESPONSIBLE FOR ANY ERRORS OR OMISSIONS WHICH HAVE BEEN INCORPORATED INTO THIS DOCUMENT AS A RESULT. FIELD VERIFICATION OF CRITICAL FACTS AND DATA SHOULD BE MADE IF THESE DOCUMENTS ARE TO BE USED AS A BASIS FOR FUTURE WORK.

CITY OF ROHNERT PARK
WASTEWATER PUMP STATION IMPROVEMENTS
SLIDE GATE DETAILS

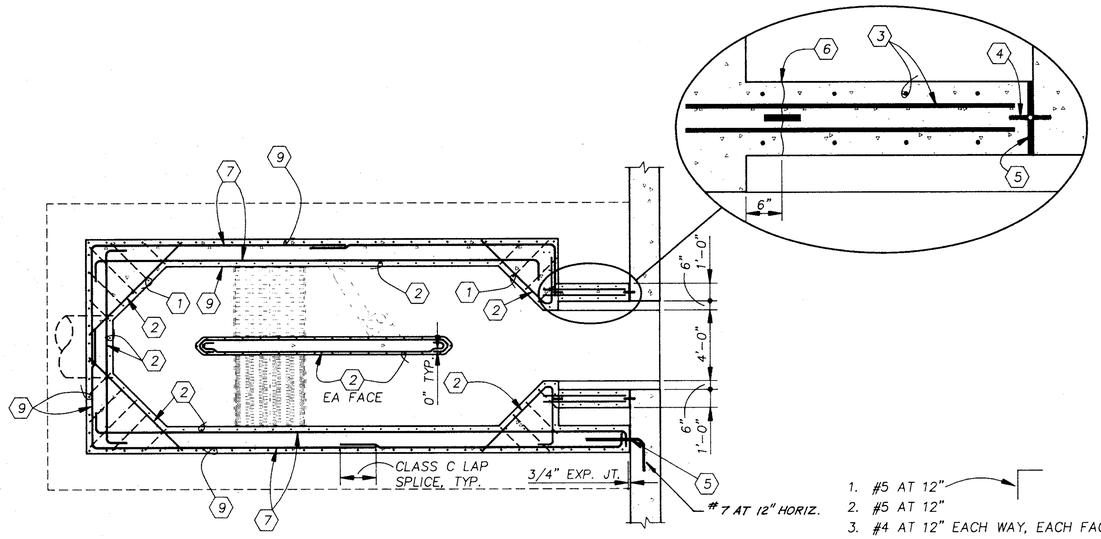
JOB NO. 90-848-C
SHEET C-9



2 / C-10 GRINDER VAULT PLAN

1/4"=1'-0"

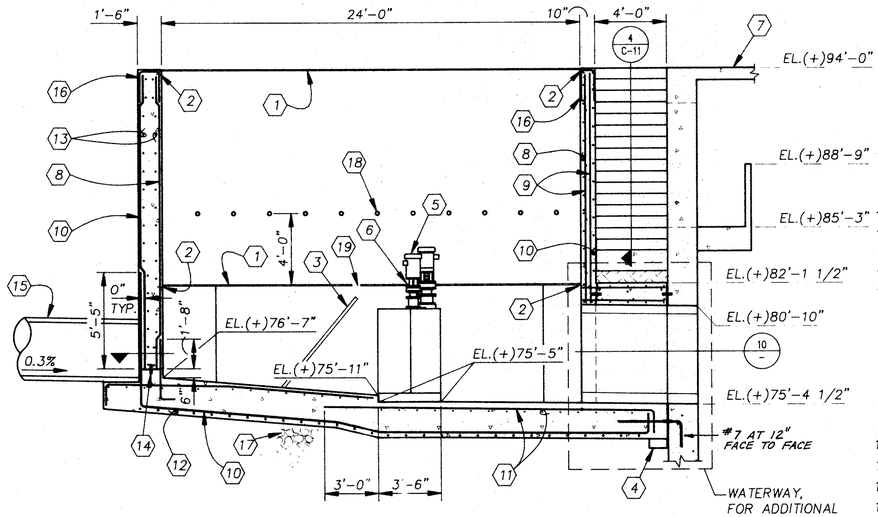
1. REMOVABLE ALUMINUM GRATING– MAX SIZE 2'–0" WIDE x SPAN LENGTH
2. 3/4" ALUMINUM REMOVABLE STOP GATE
3. REMOVABLE BAR GRATE W/3" OPENINGS
4. REMOVABLE BAR GRATE W/1" OPENINGS
5. SEWAGE GRINDER
6. SLOPE DOWN 1/4"/FT.
7. #7 AT 12" HEF
8. ~~#7~~ AT 12" VERTICAL
9. #5 AT 12" VERTICAL
10. #7 AT 12" HORIZONTAL
11. #5 AT 12" HORIZONTAL



10 / C-10 GRINDER VAULT PLAN SECTION

1/4"=1'-0"

1. #5 AT 12"
2. #5 AT 12"
3. #4 AT 12" EACH WAY, EACH FACE
4. 6" PLASTIC WATERSTOP
5. 3/4" PREMOLDED JOINT FILLER
6. CJ W/ ROUGHENED SURFACE AND 6" STEEL WATERSTOP
7. #7 AT 12" HEF
8. #7 AT 12"
9. WATERPROFFING AT BASE SLAB AND INSIDE FACE OF ALL WALLS TO 1'–0" ABOVE GRATING

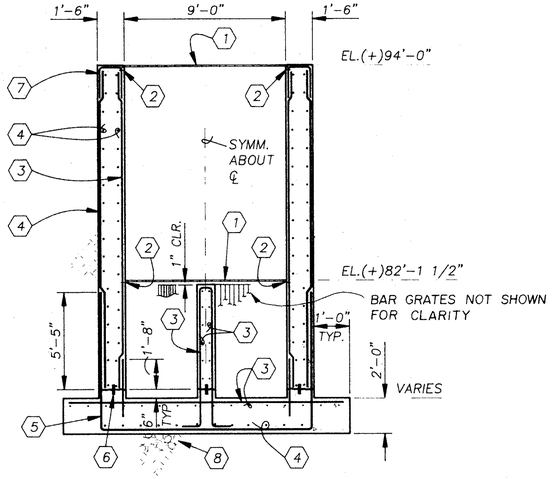


4 / C-10 GRINDER VAULT SECTION

1/4"=1'-0"

NOTE: BACKFILL SOILS AT GRINDER VAULT PER TYPICAL DETAIL FOR PUMP STATION, DWG. S-3

1. REMOVABLE ALUMINUM GRATING
2. SST GRATE FRAME W/SST ANCHORS
3. REMOVABLE BAR GRATE W/3" OPNGS
4. 12" x 6" CONT. UNREINFORCED PAD
5. SEWAGE GRINDER
6. CUT GRATING FOR EQUIPMENT PENETRATION AND WELD BAND BAR, SAME SIZE AS BEARING BARS AROUND PERIMETER OF OPENING
7. PUMP STATION, SEE STRUCTURAL DRAWINGS
8. #5 AT 12"
9. #5 AT 12" VEF
10. #7 AT 12"
11. #5 AT 12" EACH WAY
12. #9 AT 12"
13. #7 AT 12" HEF
14. CJ W/ROUGHENED SURFACE & 6" STEEL WATERSTOP
15. FOR CONTINUATION SEE CIVIL DRAWINGS
16. #5 AT 12" (1'-8")
17. 1'–6" GRAVEL BASE PER SOILS REPORT
18. 3/8"ø SST EYE BOLTS AT 48" EACH SIDE OF VAULT
19. 6" WIDE HOLE IN GRATING ABOVE BAR GRATES, TYPICAL

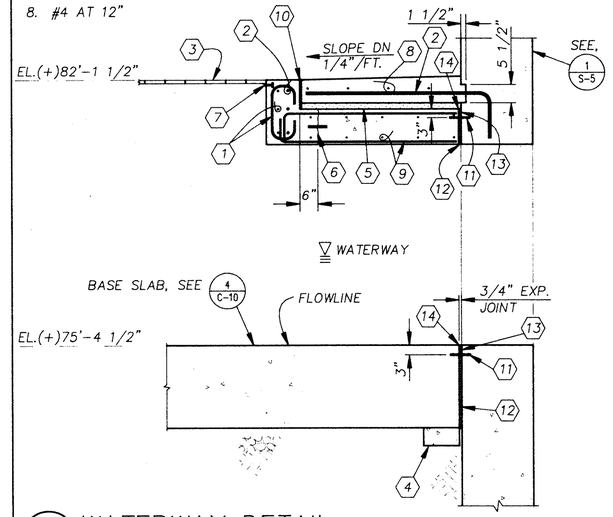


12 / C-10 GRINDER VAULT SECTION

1/4"=1'-0"

NOTE: BACKFILL SOILS AT GRINDER VAULT PER TYPICAL DETAIL FOR PUMP STATION, DWG. S-3.

1. REMOVABLE ALUMINUM GRATING
2. SST GRATE FRAME W/SST ANCHORS
3. #5 AT 12"
4. #7 AT 12"
5. #9 AT 12"
6. CJ W/ROUGHENED SURFACE & 6" STEEL WATERSTOP
7. #5 AT 12" (1'-8")
8. 1'–6" GRAVEL BASE PER SOILS REPORT
9. #4 AT 12" EA WAY, EF
10. 1/2" PREMOLDED JT FILLER W/JT SEALANT
11. 6" PLASTIC WATERSTOP
12. 3/4" PREMOLDED JOINT FILLER
13. JT SEALANT TO WITHIN 1/2" OF T/SLAB
14. RADIUS EDGE



16 / C-10 WATERWAY DETAIL

1/2"=1'-0"

GRAPHIC SCALES

4' 0 4' 8'

1/4" = 1'-0"

2' 0 2' 4'

1/2" = 1'-0"

VERIFY SCALES

BAR IS ONE INCH ON ORIGINAL DRAWING.

0 1"

IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

FILE: 848CS011
DATE: 04/01/91

NO.	DATE	REVISIONS	BY	APPR.

REGISTERED PROFESSIONAL ENGINEER — STEPHEN JOHN COX — No. C 043243 — Exp. 3/31/92 — CIVIL — STATE OF CALIFORNIA

DSGN	S.C./D.D.	CHKD	S.C.
DRWN	S.B.	SCALE	SHOWN

approved _____ date 1/15/92

approved _____ date _____

WINZLER & KELLY
CONSULTING ENGINEERS
495 TESCONI CIRCLE, #9 PARK CTR. SANTA ROSA, CA 95401 (707)523-1010

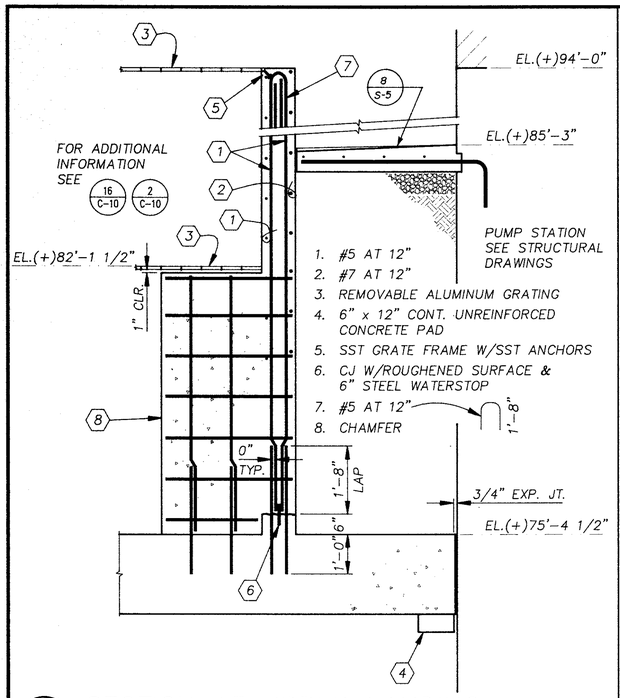
RECORD DRAWING

THESE RECORD DRAWINGS HAVE BEEN PREPARED, IN PART, ON THE BASIS OF INFORMATION COMPILED AND FURNISHED BY THE PROJECT CONTRACTOR AND OTHERS. THE ENGINEER WILL NOT BE RESPONSIBLE FOR ANY ERRORS OR OMISSIONS WHICH HAVE BEEN INCORPORATED INTO THIS DOCUMENT AS A RESULT. FIELD VERIFICATION OF CRITICAL FACTS AND DATA SHOULD BE MADE IF THESE DOCUMENTS ARE TO BE USED AS A BASIS FOR FUTURE WORK.

CITY OF ROHNERT PARK
WASTEWATER PUMP STATION IMPROVEMENTS
GRINDER VAULT & DETAILS

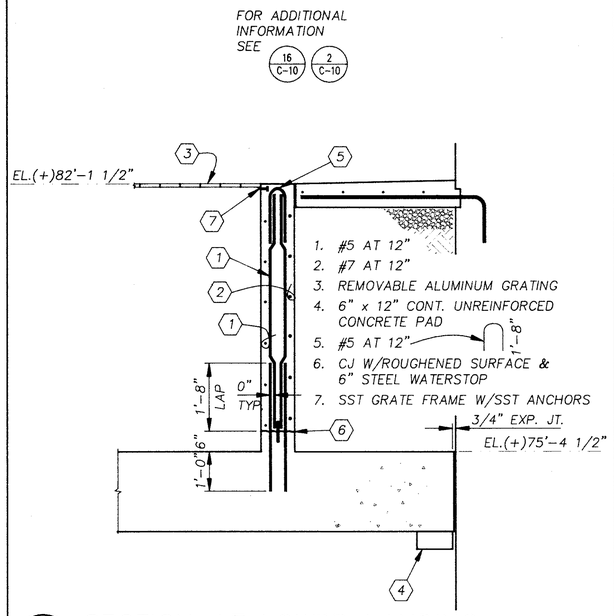
JOB NO. 90-848-C

SHEET C-10



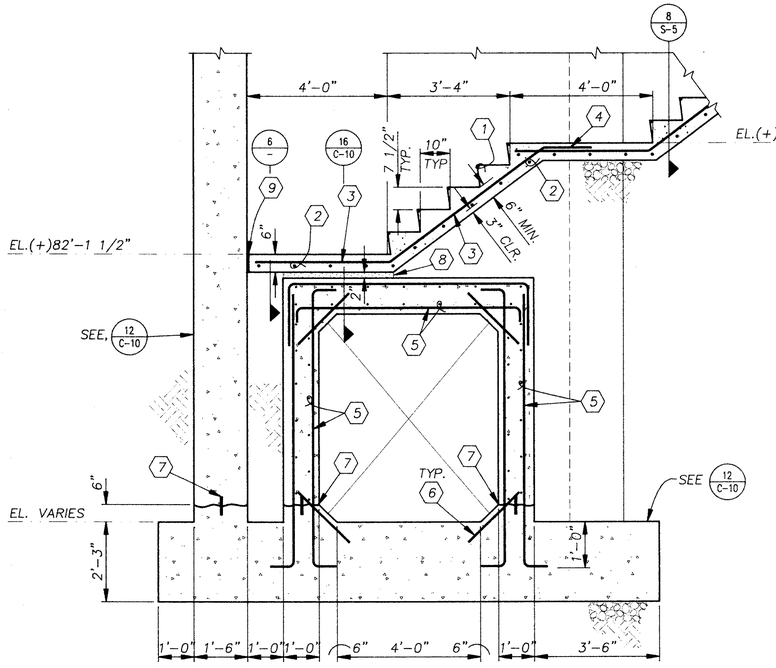
2 / C-11 SECTION AT UPPER LANDING

1/2"=1'-0"



6 / C-11 SECTION AT LOWER LANDING

1/2"=1'-0"



4 / C-11 SECTION AT WATERWAY

1/2"=1'-0"

FILE: 848CS016
DATE: 04/01/91

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

GRAPHIC SCALE
2' 0 2' 4'
1/2" = 1'-0"

NO.	DATE	REVISIONS	BY	APPR.

REGISTERED PROFESSIONAL ENGINEER — STEPHEN JOHN COX — No. C 043243 Exp. 3/31/92 — CIVIL — STATE OF CALIFORNIA

DSGN	S.C.	CHKD	S.C.
DRWN	S.B.	SCALE	SHOWN

approved _____ date 4/15/91

approved _____ date _____

WINZLER & KELLY
CONSULTING ENGINEERS
495 TESCONI CIRCLE, #9 PARK CTR. SANTA ROSA, CA 95401 (707)523-1010

CITY OF ROHNERT PARK

WASTE - PUMP STATION IMPROVEMENTS

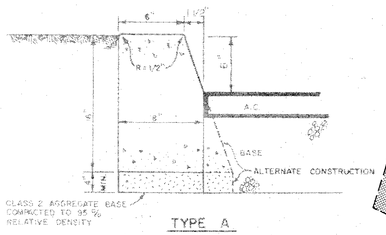
GRINDER VAULT DETAILS

JOB NO. 90-848-A

SHEET C-11 —

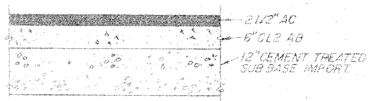
NOTE:
1. OUTSIDE EDGE OF SIDEWALK SHALL HAVE TOOLED EDGE

TYPICAL SIDEWALK SECTION
N.T.S



TYPE A

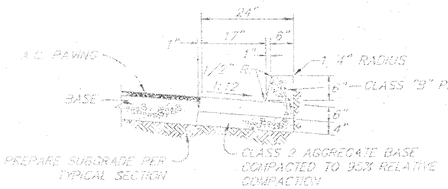
STREET MEDIAN CURB "CURB ONLY"
N.T.S



STRUCTURAL SECTION
N.T.S

(1) IT IS THE INTENT OF THIS CONTRACT TO USE 1600 YD OF STOCKPILED & REPROCESSED FILL FROM THE SPOILS PILES W OF THE NEW PUMP STATION. ALL MUST BE CEMENT TREATED AND USED AS SUBBASE. EXCESS NATIVE TO BE MOVED TO SPOILS SITE SOUTH OF MAINTENANCE BUILDING

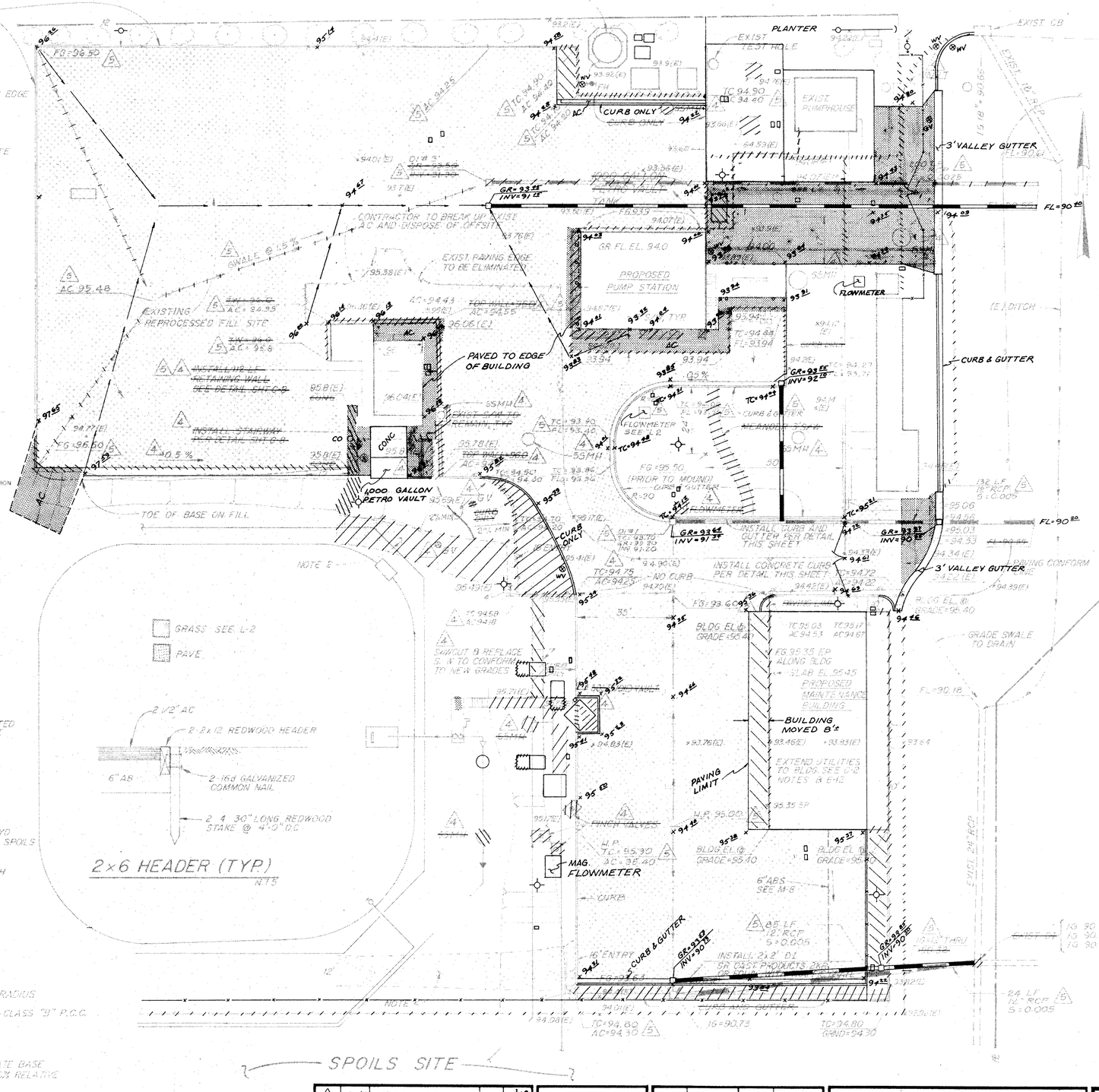
2×6 HEADER (TYP.)
N.T.S

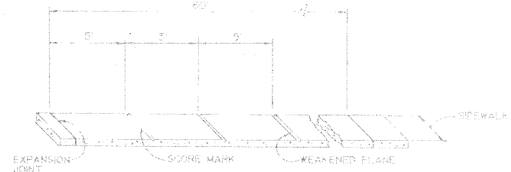


CURB & GUTTER
N.T.S

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING.
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

GRAPHIC SCALE
20' 0 20' 40'
1" = 20'





NOTES:
1. WEAKENED PLANE=1/6" WIDE x 1" DEEP IN SIDEWALKS, 1/4" WIDE x 3" DEEP IN CURB AND GUTTER.
2. EXPANSION JOINTS MATERIAL TO BE 1/4" THICK PREMOLDED JOINT FILLER FULL THICKNESS OF CONCRETE. APPROVED MECHANICAL JOINTS MAY BE USED IN WALKS IN LIEU OF EXPANSION JOINTS.
3. SCORE MARK FOR SIDEWALKS 6' AND MORE IN WIDTH LONGITUDINAL SCORE MARK ALONG CENTER OF WALK.
4. EXPANSION JOINTS SHALL BE INSTALLED IN THE CURB AND GUTTER AT ALL CURB RETURNS.
5. EXPANSION JOINTS SHALL BE PLACED IN THE SIDEWALK AT THE SAME LOCATION AS THOSE IN THE CURB AND GUTTER WHEN THE SIDEWALK IS ADJACENT TO THE CURB AND GUTTER, UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
6. SIDEWALK SHALL HAVE A 2" BASE OF SAND, 4" CONCRETE SLAB AND SLOPE 1/4" PER FOOT TOWARD THE STREET.
7. NOT USED
8. DESIGN SHALL CONFORM TO THESE REQUIREMENTS EXCEPT AS OTHERWISE APPROVED BY THE CITY ENGINEER.

TYPICAL SPACING WEAKENED PLANES SCORE MARKS, & EXPANSION JOINT
N.T.S

VALLEY GUTTER DETAIL
NTS N.T.S
CONSTRUCT AS ASPHALT SWALE

1. 1ST 6" OF MATERIAL THAT IS REQUIRED TO BE REMOVED SHALL BE SPREAD IN SPOILS SITE. GRADE SITE TO DRAIN AFTER SPREADING MATERIAL (SOUTH OF HOLDING POND) COMPACT TO 92% AFTER GRADING
2. PROVIDE 16' TO 12' WIDE ACCESS ROAD TO TOP OF DIKE, GRADE FOR EVEN SLOPE, CUT OR FILL AS REQD. PROVIDE 10" CEMENT TREATED BASE (FROM EXIST. STOCKPILE) & 2" AC, TO TOP OF DIKE.
3. TO SHALL BE COORDINATED WITH SHT. C-2 FOR ALL UNDERGROUND CONFLICTS.
4. USE CL V RCP WHERE PIPE WILL HAVE LESS THAN 24" COVER IN A TRAFFIC AREA
5. SEE SOIL CEMENT UNDERDRAIN DETAILS, ADDENDUM NO 1.

HHHH = NOT BUILT UNDER THIS CONTRACT
×95.38 = AS BUILT ELEVATIONS
= EXIST. AC 1993

NO.	DATE	REVISIONS	BY	APPR.
2	2/25/92	ADDENDUM NO.2	LE	WK
4	10/12/92	REVISE SD & GRADING ADD RET. WALL	LE	WK
5		REVISE SD & GRADING	JG/LE	WK
6	10/29/93	AS BUILTS	AEB	

REGISTERED CIVIL ENGINEER ROBERT F. KELLY Exp 12/31/92 No. 11005 STATE OF CALIFORNIA

DSGN	L.E.	CHKD	R.F.K.
DRWN	R.M.M.	SCALE	1"= 20'

approved _____ date 1/15/92

approved _____ date _____

WINZLER & KELLY
CONSULTING ENGINEERS
495 TESCONI CIRCLE, #9 PARK CTR. SANTA ROSA, CA 95401 (707) 523-1010

RECORD DRAWING
THESE RECORD DRAWINGS HAVE BEEN PREPARED, IN PART, ON THE BASIS OF INFORMATION COMPILED AND FURNISHED BY THE PROJECT CONTRACTOR AND OTHERS. THE ENGINEER WILL NOT BE RESPONSIBLE FOR ANY ERRORS OR OMISSIONS WHICH HAVE BEEN INCORPORATED INTO THIS DOCUMENT AS A RESULT. FIELD VERIFICATION OF CRITICAL FACTS AND DATA SHOULD BE MADE IF THESE DOCUMENTS ARE TO BE USED AS A BASIS FOR FUTURE WORK.

CITY OF ROHNERT PARK
WASTEWATER PUMP STATION IMPROVEMENTS

JOB NO. 90-848-C
SHEET C-12 A B

NOTES

GENERAL:

1. CONTRACTOR TO VERIFY ALL SITE CONDITIONS AND UTILITY LOCATIONS PRIOR TO THE START OF WORK.
2. CONTRACTOR TO PROVIDE A 1 YEAR GUARANTEE ON ALL MATERIALS & WORKMANSHIP FROM DATE OF FINAL ACCEPTANCE.
3. CONTRACTOR TO PROVIDE 60 DAYS MAINTENANCE FROM THE DATE OF PRE-FINAL ACCEPTANCE. DESIGN ISSUES ARE ASSUMED TO HAVE BEEN RESOLVED PRIOR TO START OF MAINTENANCE. THE LANDSCAPE ARCHITECT IS NOT RESPONSIBLE FOR MAINTENANCE PROBLEMS. HOWEVER, THE PROJECT WILL CONTINUE TO BE MONITORED BY EITHER THE LANDSCAPE ARCHITECT OR OWNER. SHOULD PROBLEMS ARISE THE CONTRACTOR IS REQUIRED TO NOTIFY THE LANDSCAPE ARCHITECT IMMEDIATELY SO APPROPRIATE TECHNICAL ASSISTANCE AND DIRECTION CAN BE DETERMINED. MAINTENANCE INCLUDES ALL TYP. HORTICULTURAL PRACTICES REQUIRED TO MAINTAIN THE HEALTH OF THE PLANTINGS AND THE PROPER OPERATION OF IRRIGATION SYSTEM INCLUDING SCHEDULING & REPLACEMENT &/OR REPAIR OF DEFECTIVE EQUIPMENT. THERE WILL BE A FINAL WALKTHRU TO CLOSE THE CONTRACT AT THE END OF THE MAINTENANCE PERIOD. THE CONTRACTOR MAY BE REQUIRED TO REPLACE PLANTS OR DO OTHER REPAIRS PRIOR TO FINAL ACCEPTANCE.
4. ALL CONSTRUCTION IS TO BE PER CITY OF ROHNERT PARK CONSTRUCTION STANDARDS.
5. CONTRACTOR TO CONTACT LANDSCAPE ARCHITECT PRIOR TO START OF WORK.

PLANTING:

6. BACKFILL MIX TO CONSIST OF 25% NITROLIZED REDWOOD OR FIR SAWDUST TO 75% PULVERIZED NATIVE SOIL.
7. ALL PLANTS TO BE OF CORRECT SPECIES, WELL FORMED, AND FREE OF PESTS OR DISEASE. UNAVAILABILITY WILL NOT BE GROUNDS FOR SUBSTITUTIONS.
8. ALL SUBSTITUTIONS TO BE APPROVED BY THE LANDSCAPE ARCHITECT AND CITY OF ROHNERT PARK.
9. CONTRACTOR TO PROVIDE THE NUMBER OF PLANT MATERIALS AND IRRIGATION EQUIPMENT AS SHOWN ON THE DRAWINGS. THE LISTS ARE MERELY A GUIDE.
10. SOIL PREPARATION WORK TO CONSIST OF TILLING ALL AREAS TO BE PLANTED TO A DEPTH OF 4" AND FINISH GRADING INCLUDING REMOVAL OF ROCKS AND DEBRIS AND OBTAINING POSITIVE DRAINAGE TO FEATURE EXISTING IN THE FIELD OR TO BE CONSTRUCTED AS PART OF THIS WORK.
11. ALL PLANTED AREAS AND TREE AND VINE WELLS SHALL BE TREATED W/A NON-SPECIFIC PRE-EMERGENT HERBICIDE PRIOR TO PLANTING, AND TOP DRESSED WITH 2" DEPTH - 3/4" FIR BARK AFTER PLANTING.
12. GROUND COVERS EXTEND UNDER TREES AND SHRUBS AS ILLUSTRATED.
13. THE CONTRACTOR SHALL REMOVE ALL COMPACTED BASE ROCK AND CONSTRUCTION DEBRIS AND LOOSEN AND CULTIVATE COMPACTED SOILS IN EXCESS OF 85% IN THE PLANTING AREAS. ONCE HOLES HAVE BEEN DUG FOR THE TREES THEY SHALL BE FILLED WITH WATER TO TEST ADEQUATE DRAINAGE. TEST IS TO BE OBSERVED BY OWNER OR AGENT. IF ADEQUATE DRAINAGE IS NOT ACHIEVED, THE CONTRACTOR WILL BE REQUESTED TO CULTIVATE SOIL TO A GREATER DEPTH AND/OR ADD OTHER DRAINAGE STRUCTURES. FINAL DRAINAGE TREATMENT TO BE DETERMINED BY LANDSCAPE ARCHITECT AND TO BE AT NO ADDITIONAL COST TO OWNER.
14. IF REQUIRED TOPSOIL GENERATED FROM ON-SITE GRADING MAY BE USED IF IT MEETS THE FOLLOWING CRITERIA. TOPSOIL SHALL CONSIST OF A UNIFORM NATURAL LOAM, FREE FROM LUMPS, CLODS, SODS, STONES LARGER THAN 3/4 OF AN INCH IN ANY DIMENSION, STICKS, WOODS, CINDERS, CONCRETE, OR ANY OTHER FOREIGN OR UNDESIRABLE MATERIALS. TOPSOIL SHALL CONTAIN A MINIMUM OF 5% AND NOT MORE THAN 20% ORGANIC MATTER DETERMINED BY LOSS ON IGNITION OF MOISTURE FREE SAMPLES. THE ACIDITY RANGE OF THE TOPSOIL PRIOR TO TREATMENT AS SPECIFIED HEREIN SHALL BE BETWEEN PH 5.0 AND PH 6.0 INCLUSIVE. THE MECHANICAL ANALYSIS OF THE TOPSOIL SHALL BE AS FOLLOWS:

PASSING	RETAINED ON	PERCENT
1" SCREEN		100
RETAINED ON 1/4" SCREEN	3 (MAX) NO. 100 USS MESH SIEVE	40 TO 60
NO. 100 USS MESH SIEVE		40 TO 60

IF REQUIRED TOPSOIL SHALL NOT BE DELIVERED UNTIL REPRESENTATIVE SAMPLES PROPOSED FOR USE HAVE BEEN FURNISHED BY THE CONTRACTOR AND APPROVED BY THE OWNER OR AGENT. WHEN REQUESTED TO DO SO, THE CONTRACTOR SHALL FURNISH AT HIS OWN EXPENSE, A CERTIFIED ANALYSIS OF THE TOPSOIL MADE BY AN APPROVED SOIL TESTING LABORATORY. POSITIVE DRAINAGE IS TO BE MAINTAINED TO EXISTING FEATURES IN THE FIELD. SEE CIVIL DRAWINGS FOR GRADING PLAN.

15. ALL TREES IN LAWN ARE TO HAVE 24" DIAMETER CUT OUTS AROUND THE TRUNKS.

IRRIGATION:

16. DIRECT BURIAL UF#14 WIRE TO BE USED. ALL CONNECTIONS TO BE PENTITE. WIRE TO BE TAPED/BUNDLED EVERY 10' WITH 24" LOOPS TO BE LEFT IN VALVE BOXES.
17. LINE LOCATIONS MAY BE MINIMALLY ADJUSTED. LINES ARE TO BE INSTALLED PARALLEL AND ADJACENT TO CURBS AND SIDEWALKS WHEREVER POSSIBLE.
18. STAMPED "CONSTRUCTION RECORD" DRAWINGS DEPICTING ACTUAL INSTALLATION LOCATIONS INCLUDING ALL CHANGES/ADJUSTMENTS TO SYSTEM TO BE PROVIDED TO THE OWNER AND CITY AT A QUALITY ACCEPTABLE TO THE OWNER AND CITY.
19. TRENCHES TO BE BACKFILLED WITH CLEAN NATIVE SOIL, NO ROCKS OR CLODS, AND TO BE COMPACTED TO 95% BY JETTING.
20. ALL PIPE UNDER PAVEMENT TO BE IN A SCHEDULE 40 CHASE AS LISTED UNDER MATERIALS. THE CHASE SHALL EXTEND 18" BEYOND THE LIMIT OF PAVEMENT.
21. MAIN LINE TO BE FLUSHED CLEAN AND PRESSURE TESTED PRIOR TO INSTALLATION OF THE LATERAL LINE. TEST TO BE IN PRESENCE OF CITY CONSTRUCTION INSPECTOR AND TO BE 125 PSI FOR ONE HOUR.
22. CONTRACTOR IS TO VERIFY OPERATING PRESSURE AND GALLONAGE FOR ALL HOOK UPS AND TO PROVIDE A WRITTEN STATEMENT OF WATER AVAILABILITY TO THE LANDSCAPE ARCHITECT PRIOR TO INSTALLATION OF THE IRRIGATION SYSTEM.
23. CONTROLLER LOCATION TO BE APPROVED BY CITY. CONTROLLER TO BE GROUNDED TO A GROUND ROD WITH MAIN DISCONNECT LOCATED BETWEEN TIE IN AND CONTROLLER. 110/120 SERVICE IS REQUIRED.
24. LINES SHOWN IN PAVEMENT INSIDE A CHASE TO BE LOCATED WHERE SHOWN. OTHER LINE AND EQUIPMENT MAY BE SHOWN SCHEMATICALLY IN PAVEMENT BUT IS TO BE INSTALLED IN ADJACENT PLANTER AREAS.
25. ALL NEW LATERAL LINE IS TO BE FLUSHED CLEAN PRIOR TO HEAD INSTALLATION.
26. THE CONTRACTOR IS RESPONSIBLE TO PROVIDE COMPLETE COVERAGE AND IS REMINDED THAT THE IRRIGATION PLAN IS A SCHEMATIC DRAWING. FIELD CONDITIONS OR DISCREPANCIES FOUND ON THE DRAWINGS AFFECTING FINAL LAYOUT AND COVERAGE ARE TO BE BROUGHT TO THE ATTENTION OF THE LANDSCAPE ARCHITECT FOR CLARIFICATION AND RESOLUTION PRIOR TO FINAL INSTALLATION.
27. BUBBLERS ARE TO BE PLACED AROUND ROOT BALL EVENLY AND LOCKED INTO PLACE WITH THE JUTE NET STAKE OR EQUAL TIE DOWN SYSTEM. BUBBLERS ARE TO BE PLACED SO THAT THEY ARE 2" ABOVE MULCH SO THAT VISIBLE INSPECTION OF THEIR OPERATION CAN BE DONE.
28. ALL HEADS TO BE ADJUSTED SO THAT THE ANGLE AND THE RADIUS OF SPRAY ACHIEVES MAXIMUM COVERAGE WITH A MINIMUM OF OVERTHROW ON WALKS OR STRUCTURES AND FENCES.
29. THE CONTRACTOR SHALL PROVIDE A NUMBERED VALVE SCHEDULE TO BE PERMANENTLY MOUNTED AND PLASTIC LAMINATED INSIDE THE CONTROLLER DOOR.

CITY OF ROHNERT PARK NOTES

IRRIGATION:

1. ALL CONSTRUCTION IS TO BE PER CITY OF ROHNERT PARK CONSTRUCTION STANDARDS.
2. IRRIGATION CONTROLLERS SHALL BE 120V SYSTEM (NO BATTERIES).
3. POP-UP IRRIGATION HEADS ARE TO BE INSTALLED AT ALL CURB LINES, EDGES OF SIDEWALKS AND RIGHT-OF-WAY LINES.
4. PVC SHALL BE SPECIFIED FOR ALL IRRIGATION CONNECTIONS. NO GALVANIZED IRON PIPE OR FITTINGS WILL BE ALLOWED.
5. A BACKFLOW PREV. ASSEM. SHALL BE LOCATED 12' BEHIND IRRIGATION WATER METER.
6. THE BCKFLW PREV. VALVE ASSEMBLY SHALL BE INSTALLED WITH A MAXIMUM CLEARANCE OF 12" ABOVE FINISH GRADE AND SHALL PLACED WITHIN A CITY APPROVED LANDSCAPE SCREEN.
7. IRRIGATION PSI DESIGN MAXIMUM = 35 PSI.
8. ALL PLUMBING AND FITTINGS ARE TO BE BRASS FROM THE WATER METER THRU THE PIPE EXTENDING 12" BEYOND THE IN-GROUND 90 ELBOW ON THE DOWNSTREAM SIDE OF THE ASSEMBLY AND ARE TO CONNECT TO THE EXISTING PLUMBING BY MEANS OF A UNION.
9. THE RISER PIPE ON THE UPSTREAM SIDE OF THE DOUBLE CHECK VALVE ASSEMBLY SHALL BE ONE SOLID LENGTH OF PIPE.
10. THE BACKFLOW PREV.ASSEM. INSTALLATION SHALL BE ABOVE GROUND AND AN INSPECTION BY A PUBLIC WORKS DESIGNEE IS REQUIRED BEFORE BACKFILLING. CONTACT THE PUBLIC WORKS DEPARTMENT AT 584-7730 FOR THIS INSPECTION.
11. PER TITLE 17 OF THE CALIFORNIA ADMINISTRATIVE CODE EACH DOUBLE CHECK VALVE ASSEMBLY SHALL BE TESTED AT THE TIME OF INSTALLATION BEFORE BEING PLACED IN SERVICE. THIS TESTING SHALL BE COMPLETED ON CITY TEST AND MAINTENANCE FORMS BY CITY APPROVED TESTERS ONLY. TEST FORMS AND A LIST OF APPROVED TESTERS ARE AVAILABLE FROM THE PUBLIC WORKS DEPARTMENT, 600 ENTERPRISE DRIVE. THERE IS A FEE FOR THIS TEST.
12. A CONCRETE PAD SHALL BE INSTALLED BELOW THE BACKFLOW PREV.ASSEM. IT SHALL BE 4" THICK; EXTEND A MINIMUM OF 6" BEYOND OUTSIDE DIMENSIONS OF ASSEMBLY, WIDTHWISE. THE PAD SHALL BE LEVEL.

MATERIALS LIST

KEY	NO.	DESCRIPTION	MFG'S. NOS. AND NOTES
— — —	-	MAIN LINE PVC SCHED. 40	24"UNDER PVMT. W/6"SAND BED IN CHASE 18" UNDER EARTH
———	-	LATERAL LINE CLASS 200 PVC	24"UNDER PVMT.W/6"SAND BASE IN CHASE 12"UNDER EARTH
POC	1	POINT OF CONNECTION	SEE CIVIL DRWGS FOR EXACT LINE LOCATION
═══	-	IRRIGATION LINE IN PVC SCHED. 40 CHASE	CHASE TO BE SIZED 2X AS LARGE AS LINE
⊠	1	AUTOMATIC CONTROLLER	IRRITROL MC-18A PLUS
—⊖—	1	BACKFLOW PREVENTION	FEBCO 825Y-2"
⊗	16	REMOTE CONTROL VALVES	HARDIE 100-1"
◐ ○ ●	-	TURF POP-UPS	HUNTER PGP-ADJ-4" NOZ. 6 & 8 AND AS REQUIRED.
○	-	FLOOD BUBBLERS	TORO 570 FB 100-PC CONTRACTOR TO PROVIDE (2) 1 GPM BUBBLERS PER 15 GALLON PLANTS & (1) 1 GPM BUBBLER PER 1 & 5 GALLON PLANTS.
NOTES:	1. SPRAY SYMBOLS REPRESENT (○) HALF; (◑) QUARTER ARCS; (●) FULL ARCS. 2. SYSTEM IS DESIGNED FOR A MAXIMUM OF 45 GPM AT 40 PSI FOR FLOOD BUBBLERS AND SPRAYS.		
⦸	15	QUICK COUPLERS	RAINBIRD 33RC

PLANT LIST

KEY	NO.	BOTANICAL NAME	COMMON NAME	SIZE NOTES
		TREES		
	13	PYRUS KAWAKAMI	EVERGREEN PEAR	15 GAL
	2	GLEDITSIA TRIACANTHOS	HONEY LOCUST	15 GAL
	3	JUNIPERUS CHINENSIS 'TORULOSA'	HOLLYWOOD JUNIPER	15 GAL
	14	PHOTINIA FRASERI - SHRUB	-	15 GAL
	9	SEQUOIA SEMPERVIRENS 'SOQUEL'	COAST REDWOOD	15 GAL
		SHRUBS		
		JUNIPERUS CHINENSIS	JUNIPER (VARIETY TO MATCH EXISTING)	1 GAL 36" O.C.
	9	PITTOSPORUM TENUIFOLIUM	-	5 GAL
		RAPHIOLEPSIS INDICA 'BALLERINA'	DWARF INDIA HAWTHORN	1 GAL 42" O.C.
		GROUNDCOVERS AND VINES		
		LAWN - HYBRID SOD	MIX EQUAL QUANTITIES: 'FALCON' 'MUSTANG' 'REBEL' @ 10#/1000 SF CONWEB WOOD FIBRE @ 1800#/AC CALCIUM NITRATE (15.5-0-0) @ 6#/1000 SF	
	-	LONICERA JAPONICA 'HALLIANA'	HALLS HONEYSUCKLE	1 GAL 10'-0" O.C.
	-	GELSEMIUM SEMPERVIRENS	CARONLINA JESSAMINE	1 GAL 10'-0" O.C.

These Documents are the property of MFR ASSOCIATES. Any unauthorized use without written consent is prohibited by law. MFR ASSOCIATES disclaims any responsibility for these Documents if used whole or in part at any other location.

© Copyright 1991 MFR ASSOCIATES

466

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

NO.	DATE	REVISIONS	BY	APPR

REGISTERED LANDSCAPE ARCHITECT
MAISHA RUTH
Lic. #2238
Signature: Maisha Ruth
Date: 11-14-91
STATE OF CALIFORNIA

DSGN	JP	CHKD	MR
DRWN	JP	SCALE	N.T.S.

approved [signature] date 4/15/92
approved [signature] date 4/15/92

WINZLER & KELLY
CONSULTING ENGINEERS
495 TESCONI CIRCLE #9 PARK CTR SANTA ROSA, CA 95401 (707)523-1010

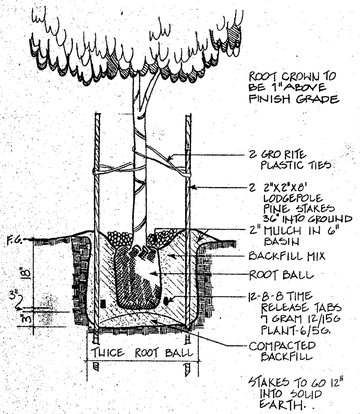
MFR Associates
LANDSCAPE ARCHITECTURE
RESOURCE PLANNING

CITY OF ROHNERT PARK
WASTEWATER PUMP STATION IMPROVEMENTS
NOTES SCHEDULE

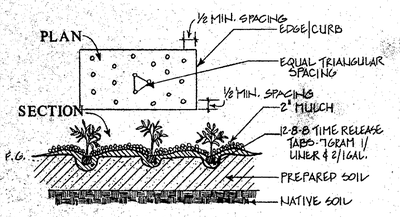
JOB NO.

SHEET
L-1

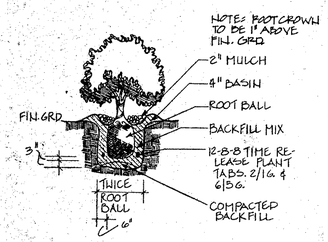
123996



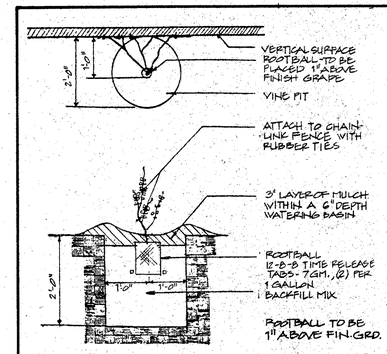
1 TREE PLANTING N.T.S.



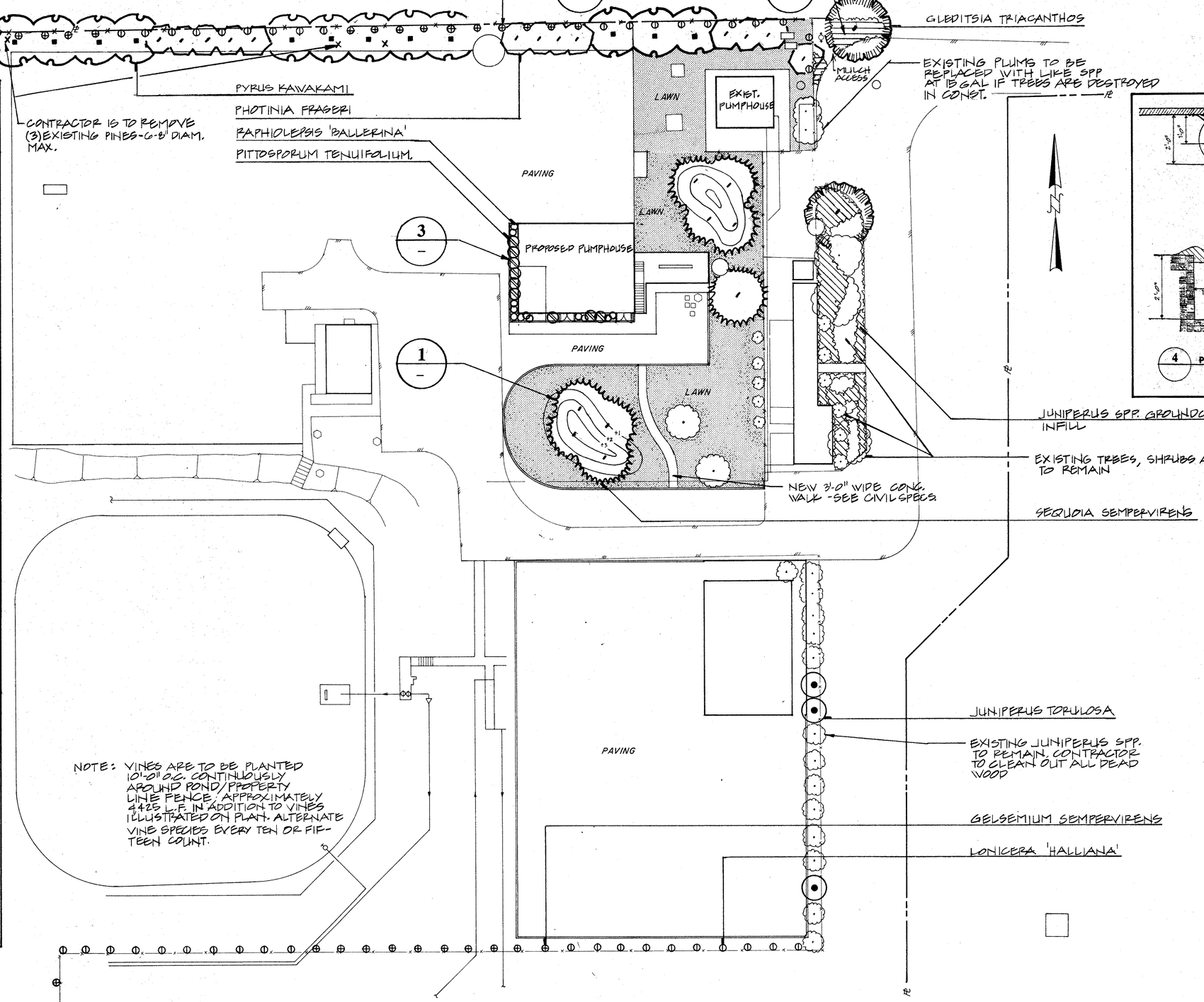
2 GROUND COVER PLANTING N.T.S.



3 SHRUB PLANTING N.T.S.



4 PLANTING FOR VINES



GRAPHIC SCALE
20' 0 20' 40'
1" = 20'

460

These Documents are the property of MFR ASSOCIATES. Any unauthorized use without written consent is prohibited by law. MFR ASSOCIATES disclaims any responsibility for these Documents if used whole or in part at any other location.

© Copyright 1991 MFR ASSOCIATES

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

NO.	DATE	REVISIONS	BY	APPR.

REGISTERED LANDSCAPE ARCHITECT — MAISHA RUTH — Lic. #2238 — Signature: Maisha Ruth — 11-14-91 Date — STATE OF CALIFORNIA

DSGN	JP	CHKD	MR
DRWN	JP	SCALE	1" = 20'-0"

approved [signature] date 1/16/92
approved [signature] date 1/15/92

WINZLER & KELLY
CONSULTING ENGINEERS
495 TESCONI CIRCLE, #9 PARK CTR. SANTA ROSA, CA 95401 (707) 523-1010

MFR Associates
LANDSCAPE RESOURCE ARCHITECTURE PLANNING

CITY OF ROHNERT PARK

WASTEWATER PUMP STATION IMPROVEMENTS

PLANTING PLAN

JOB NO.

SHEET L-2

123996

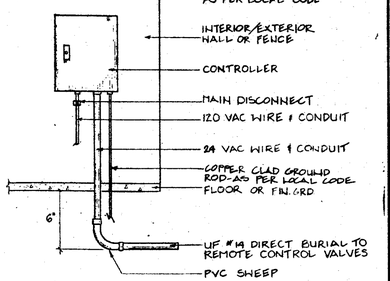
NOTE: TYPICAL AT POND PERIMETER/ FENCELINE, CONTROL VALVES ARE TO SERVICE 40-45 GPM MAX. FOR FLOOD BUBBLERS.

NOTE: MAINLINE IS TO CONTINUOUSLY LOOP AROUND PROJECT PERIMETER - 4,425 L.F.

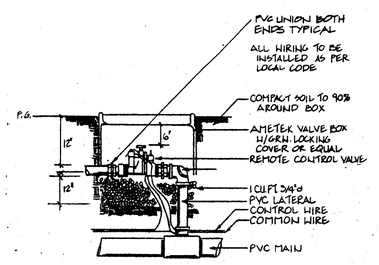
THE CONTRACTOR SHALL INSTALL QUICK COUPLING VALVES EVERY 300' ALONG PL FENCE

SEE ELECT. PLANS 5

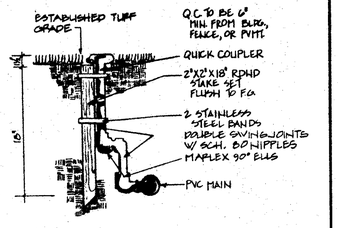
NOTE: FLOOD BUBBLERS ON NEW JUNIPERS ARE A TEMPORARY INSTALLATION UNTIL PLANT ESTABLISHMENT.



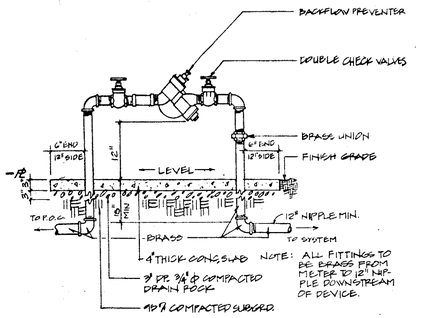
5 CONTROLLER/WALL MOUNT N.T.S.



6 REMOTE CONTROL VALVE N.T.S.

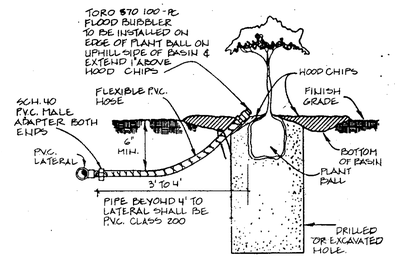


7 QUICK COUPLER N.T.S.

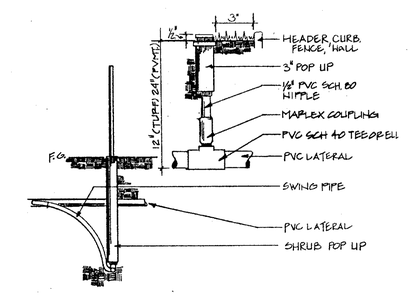


8 BACKFLOW PREVENTER N.T.S.

USE ROHNERT PARK STANDARD



9 BUBBLER/SPRINKLER N.T.S.



10 TURF/SHRUB POP UP N.T.S.

NOTE: TYPICAL AT POND PERIMETER/ PROPERTY LINE FENCE, CONTROL VALVES ARE TO SERVICE 40-45 GPM MAXIMUM FOR FLOOD BUBBLERS

NOTE: MAINLINE IS TO LOOP AROUND PROJECT PERIMETER CONTINUOUSLY. - 4,425 L.F.

THE CONTRACTOR SHALL INSTALL QUICK COUPLING VALVES EVERY 300' ALONG PL FENCE

GRAPHIC SCALE
20' 0 20' 40'
1" = 20'

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

RECORD DRAWING
THESE RECORD DRAWINGS HAVE BEEN PREPARED, IN PART, ON THE BASIS OF INFORMATION COMPILED AND FURNISHED BY THE PROJECT CONTRACTOR AND OTHERS. THE ENGINEER WILL NOT BE RESPONSIBLE FOR ANY ERRORS OR OMISSIONS WHICH HAVE BEEN INCORPORATED INTO THIS DOCUMENT AS A RESULT. FIELD VERIFICATION OF CRITICAL FACTS AND DATA SHOULD BE MADE IF THESE DOCUMENTS ARE TO BE USED AS A BASIS FOR FUTURE WORK.

These Documents are the property of MFR ASSOCIATES. Any unauthorized use without written consent is prohibited by law. MFR ASSOCIATES disclaims any responsibility for these Documents if used whole or in part at any other location.
© Copyright 1991 MFR ASSOCIATES

4/66

NO.	DATE	REVISIONS	BY	APPR.

REGISTERED LANDSCAPE ARCHITECT
MARISHA RUTH
Lic. #2236
Signature
11-14-91
Date
STATE OF CALIFORNIA

DSGN	JP	CHKD	MR
DRWN	JP	SCALE	1" = 20'-0"

approved date 1/16/92
approved date 1/15/92

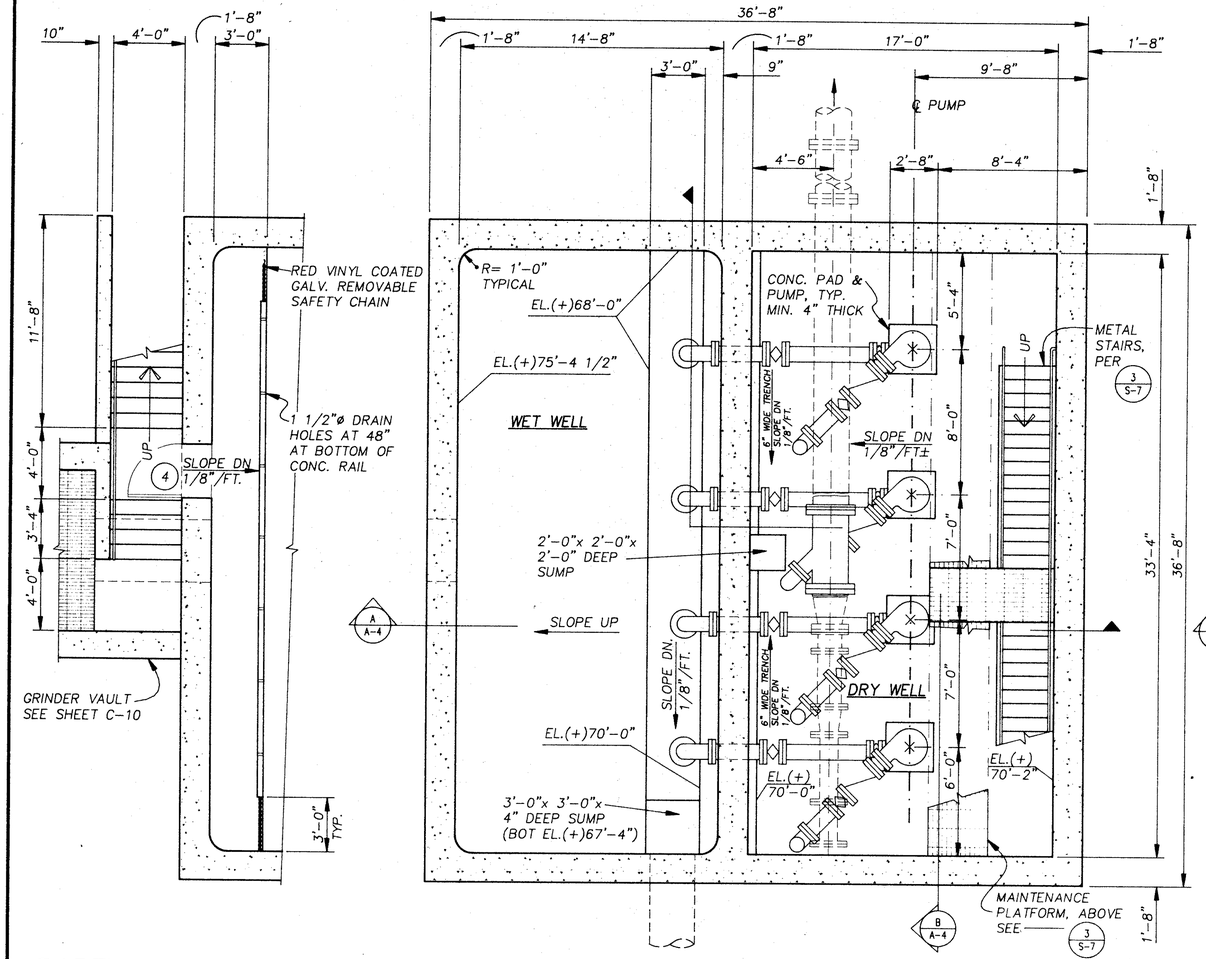
WINZLER & KELLY
CONSULTING ENGINEERS
495 TESCONI CIRCLE, #9 PARK CTR. SANTA ROSA, CA 95401 (707) 523-1010

MFR Associates
LANDSCAPE ARCHITECTURE RESOURCE PLANNING

CITY OF ROHNERT PARK
WASTEWATER PUMP STATION IMPROVEMENTS
IRRIGATION PLAN

JOB NO.

SHEET L-3



PARTIAL PLAN AT PLATFORM

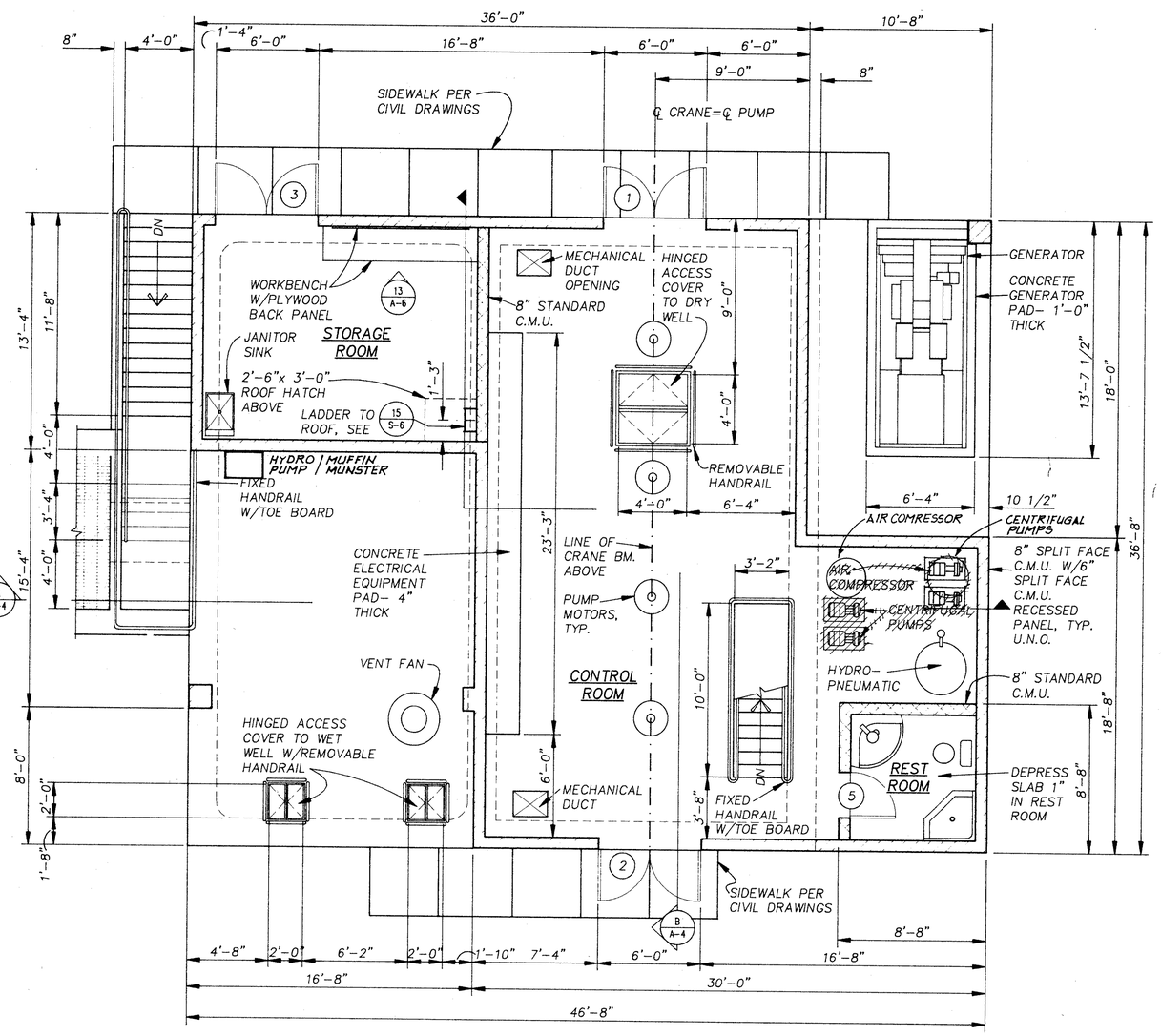
T/SLAB EL.(+)85'-3" 1/4"=1'-0"

N

DRY WELL & WET WELL FLOOR PLAN

T/SLAB EL. VARIES 1/4"=1'-0"

N



CONTROL ROOM FLOOR PLAN

T/SLAB EL.(+)94'-0" 1/4"=1'-0"

N

ROOM FINISH SCHEDULE

NAME	FLOOR MATERIAL	N. WALL MATERIAL	E. WALL MATERIAL	S. WALL MATERIAL	W. WALL MATERIAL	CEILING MATERIAL	CEILING HEIGHT	REMARKS
CONTROL ROOM	CONCRETE W/EPOXY COATING	C.M.U., PAINTED	C.M.U., PAINTED	C.M.U., PAINTED	C.M.U., PAINTED	WATER RESISTANT GYPSUM BOARD, PAINTED	12'-0"	
STORAGE ROOM	CONCRETE W/EPOXY COATING	C.M.U., PAINTED	C.M.U., PAINTED	C.M.U., PAINTED	C.M.U., PAINTED	WATER RESISTANT GYPSUM BOARD, PAINTED	12'-0"	
REST ROOM	CERAMIC TILE, W/CERAMIC BASE	C.M.U., PAINTED	C.M.U., PAINTED	C.M.U., PAINTED	C.M.U., PAINTED	WATER RESISTANT GYPSUM BOARD, PAINTED	8'-0"	FURR OUT FOR CEILING BELOW TRUSS
DRY WELL	CONCRETE W/EPOXY COATING	CONCRETE, PAINTED	CONCRETE, PAINTED	CONCRETE, PAINTED	CONCRETE, PAINTED	CONCRETE	24'-0"	
WET WELL	CONCRETE W/WATER-PROOFING	CONCRETE, W/WATER-PROOFING	CONCRETE W/WATER-PROOFING	CONCRETE, W/WATER-PROOFING	CONCRETE W/WATER-PROOFING	CONCRETE	24'-0"	
PLATFORM (IN WET WELL)	CONCRETE	←		SEE WET WELL		→	24'-0"	

GENERAL PLAN NOTES

1. ◯ INDICATES DOOR NUMBER FOR ADDITIONAL INFORMATION SEE 11/A-6
2. REST ROOM INTERIOR ELEVATIONS PER 10/A-6
3. FOR TYPICAL HANDRAIL DETAILS, SEE 16/A-5 8/A-6

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

GRAPHIC SCALE
4' 0 4' 8'
1/4"=1'-0"

NO.	DATE	REVISIONS	BY	APPR.

REGISTERED PROFESSIONAL ENGINEER
STEPHEN JOHN COX
No. C 043243
Exp. 3/31/92
CIVIL
STATE OF CALIFORNIA

DSGN	S.C.	CHKD	S.C.
DRWN	S.B.	SCALE	SHOWN

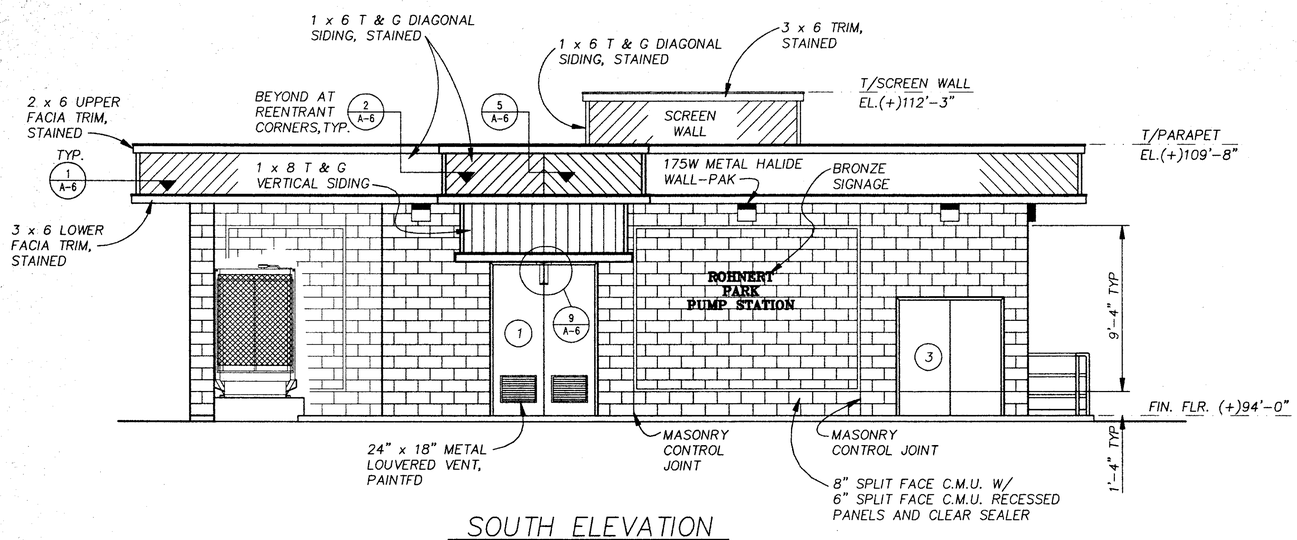
approved ____ date 1/16/92
approved ____ date 1/15/92

WINZLER & KELLY
CONSULTING ENGINEERS
495 TESCONI CIRCLE, #9 PARK CTR. SANTA ROSA, CA 95401 (707)523-1010

RECORD DRAWING
THESE RECORD DRAWINGS HAVE BEEN PREPARED, IN PART, ON THE BASIS OF INFORMATION COMPILED AND FURNISHED BY THE PROJECT CONTRACTOR AND OTHERS. THE ENGINEER WILL NOT BE RESPONSIBLE FOR ANY ERRORS OR OMISSIONS WHICH HAVE BEEN INCORPORATED INTO THIS DOCUMENT AS A RESULT. FIELD VERIFICATION OF CRITICAL FACTS AND DATA SHOULD BE MADE IF THESE DOCUMENTS ARE TO BE USED AS A BASIS FOR FUTURE WORK.

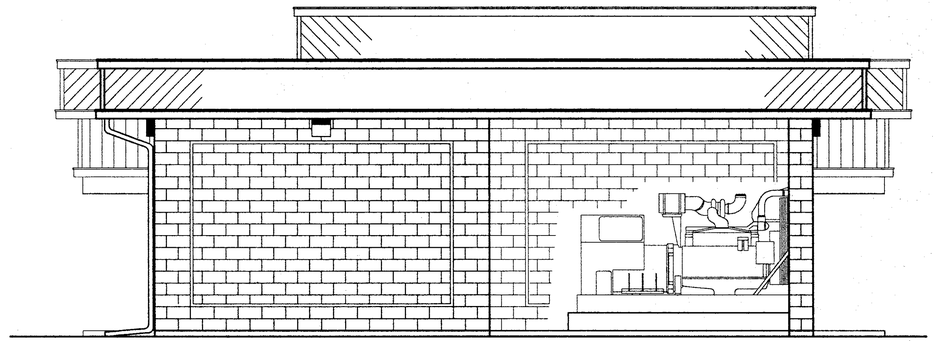
CITY OF ROHNERT PARK
WASTEWATER PUMP STATION IMPROVEMENTS
FLOOR PLANS

JOB NO. 90-848-C
SHEET A-1
—



SOUTH ELEVATION

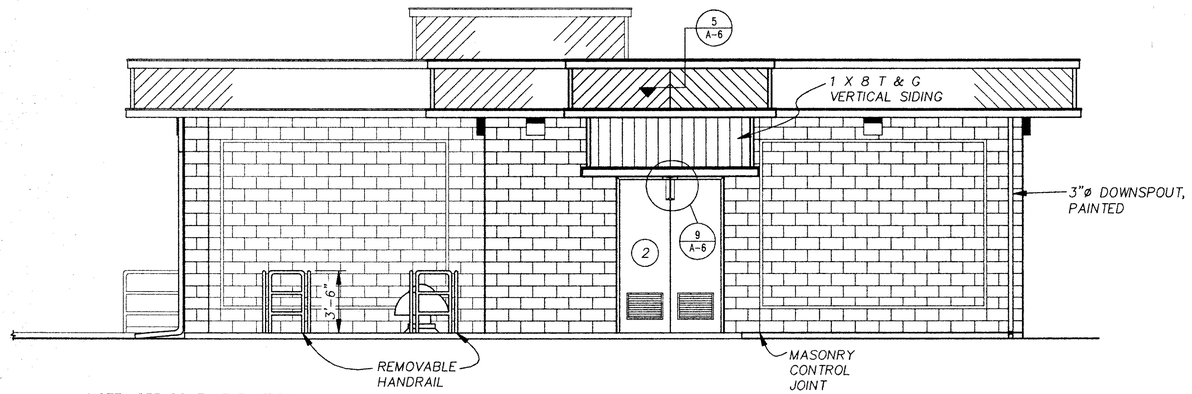
1/4"=1'-0"



NOTE: SEE SOUTH ELEVATION FOR ADDITIONAL INFORMATION.

WEST ELEVATION

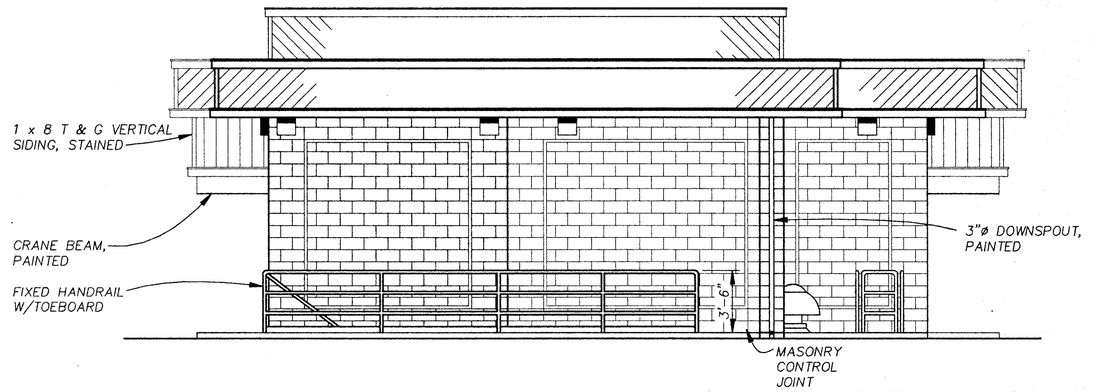
1/4"=1'-0"



NOTE: SEE SOUTH ELEVATION FOR ADDITIONAL INFORMATION.

NORTH ELEVATION

1/4"=1'-0"



NOTE: SEE SOUTH ELEVATION FOR ADDITIONAL INFORMATION.

EAST ELEVATION

1/4"=1'-0"

GENERAL NOTE

1. ◯ INDICATES DOOR NUMBER FOR ADDITIONAL INFORMATION SEE 11 A-6

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

GRAPHIC SCALE
4' 0 4' 8'
1/4" = 1'-0"

NO.	DATE	REVISIONS	BY	APPR.

REGISTERED PROFESSIONAL ENGINEER
STEPHEN JOHN COX
No. C 043243
Exp. 3/31/92
CIVIL
STATE OF CALIFORNIA

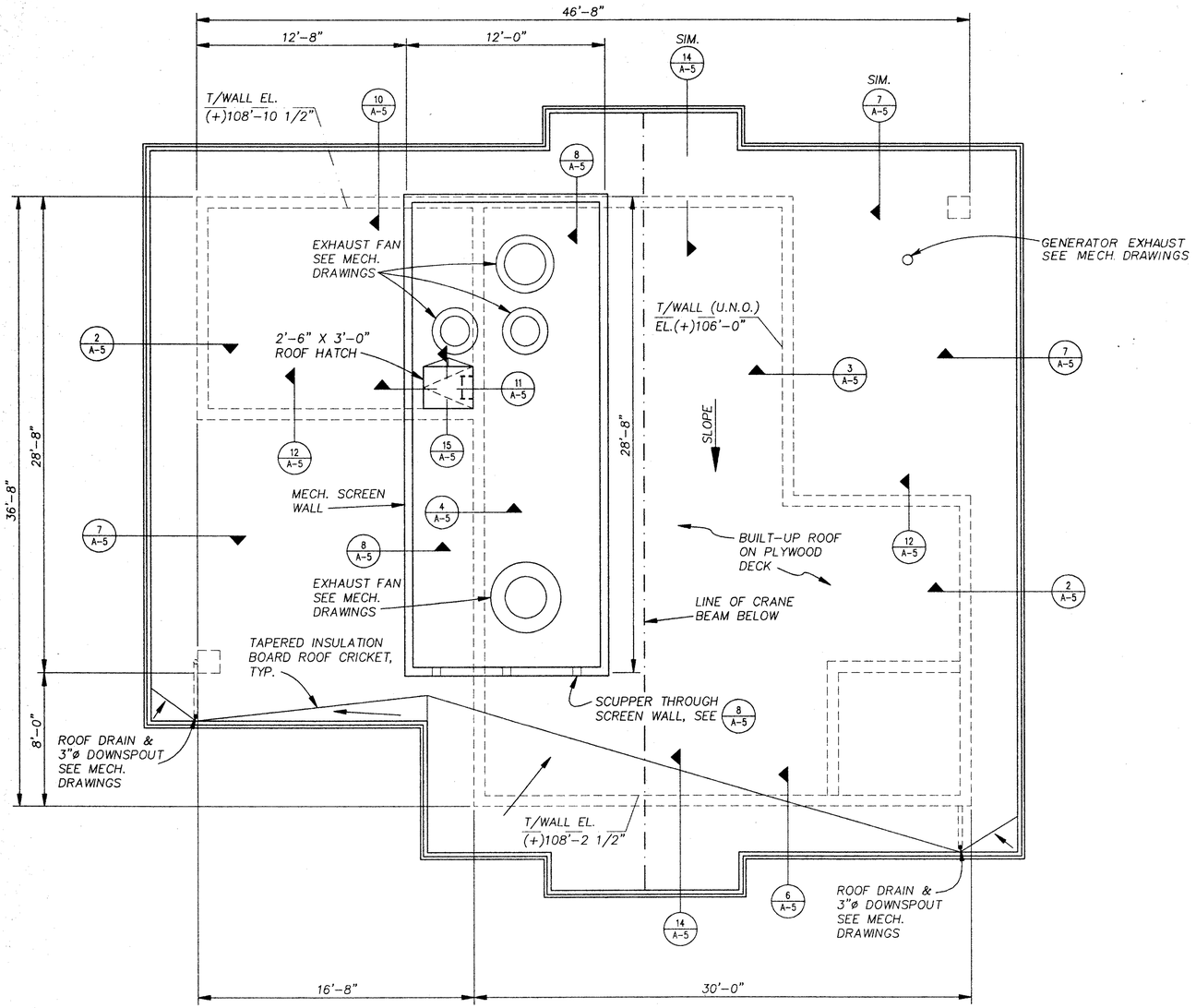
DSGN	S.C.	CHKD	S.C.
DRWN	S.B.	SCALE	SHOWN

approved _____ date 4/15/92
approved _____ date _____

WINZLER & KELLY
CONSULTING ENGINEERS
495 TESCONI CIRCLE, #9 PARK CTR. SANTA ROSA, CA 95401 (707)523-1010

CITY OF ROHNERT PARK
WASTEWATER PUMP STATION IMPROVEMENTS
EXTERIOR ELEVATIONS

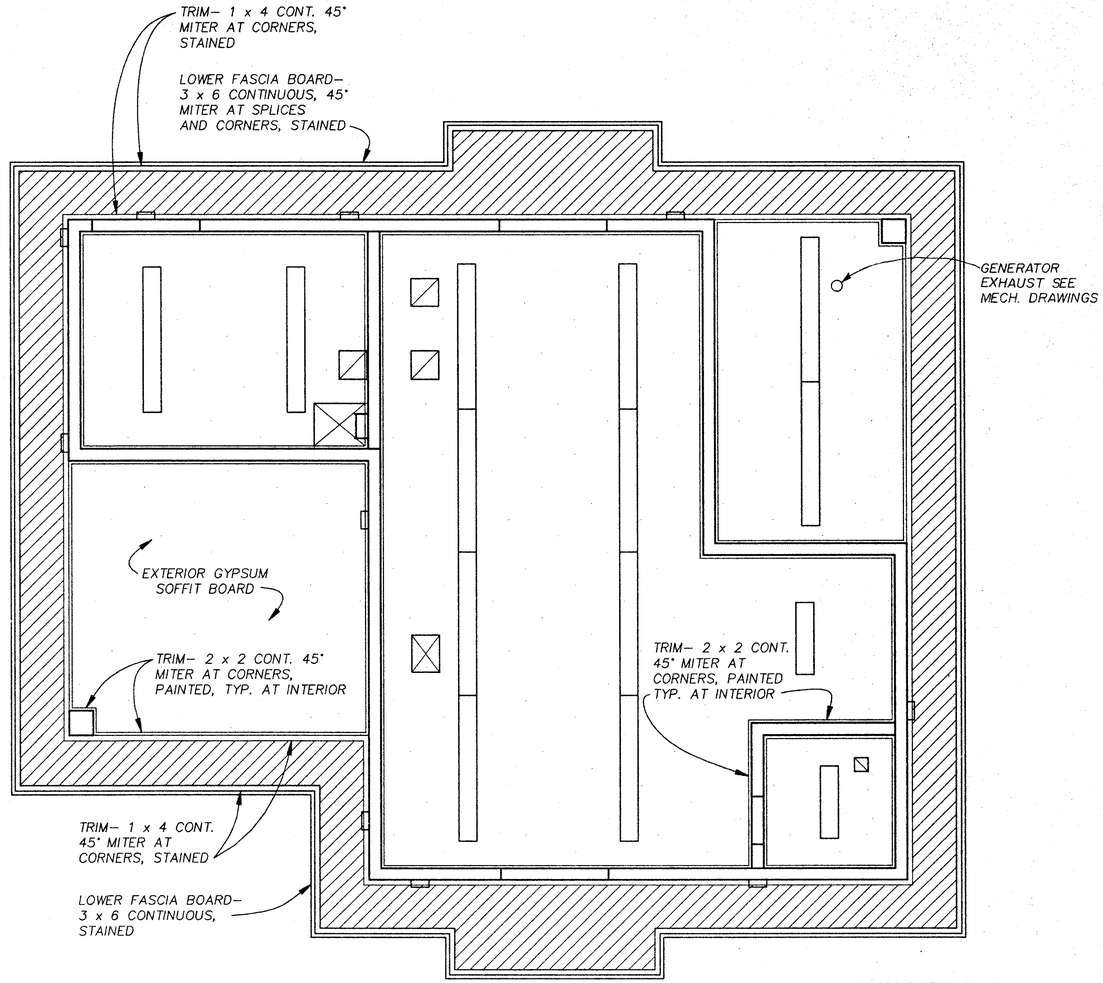
JOB NO. 90-848-A
SHEET A-2



ROOF PLAN

1/4"=1'-0"

N



NOTE: CAULK ALL TRIM JOINTS DURING INSTALLATION.

REFLECTED CEILING PLAN

1/4"=1'-0"

N

LEGEND

- WATER RESISTANT GYPSUM BOARD OR EXTERIOR SOFFIT CEILING, PAINTED
- 1 X 6 DIAG. (45°) TONGUE & GROOVE, STAINED
- LIGHTING FIXTURE, SEE ELECTRICAL DRAWINGS

GENERAL PLAN NOTES

1. PROVIDE CEILING SPACE AND SOFFIT VENTILATION OPENINGS EQUAL TO 1/150 OF THE TOTAL ENCLOSED AREA IN ACCORDANCE WITH UBC 3205(C).

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

GRAPHIC SCALE
4' 0 4' 8'
1/4"=1'-0"

NO.	DATE	REVISIONS	BY	APPR.

REGISTERED PROFESSIONAL ENGINEER
STEPHEN JOHN COX
No. C 043243
Exp. 3/31/92
CIVIL
STATE OF CALIFORNIA

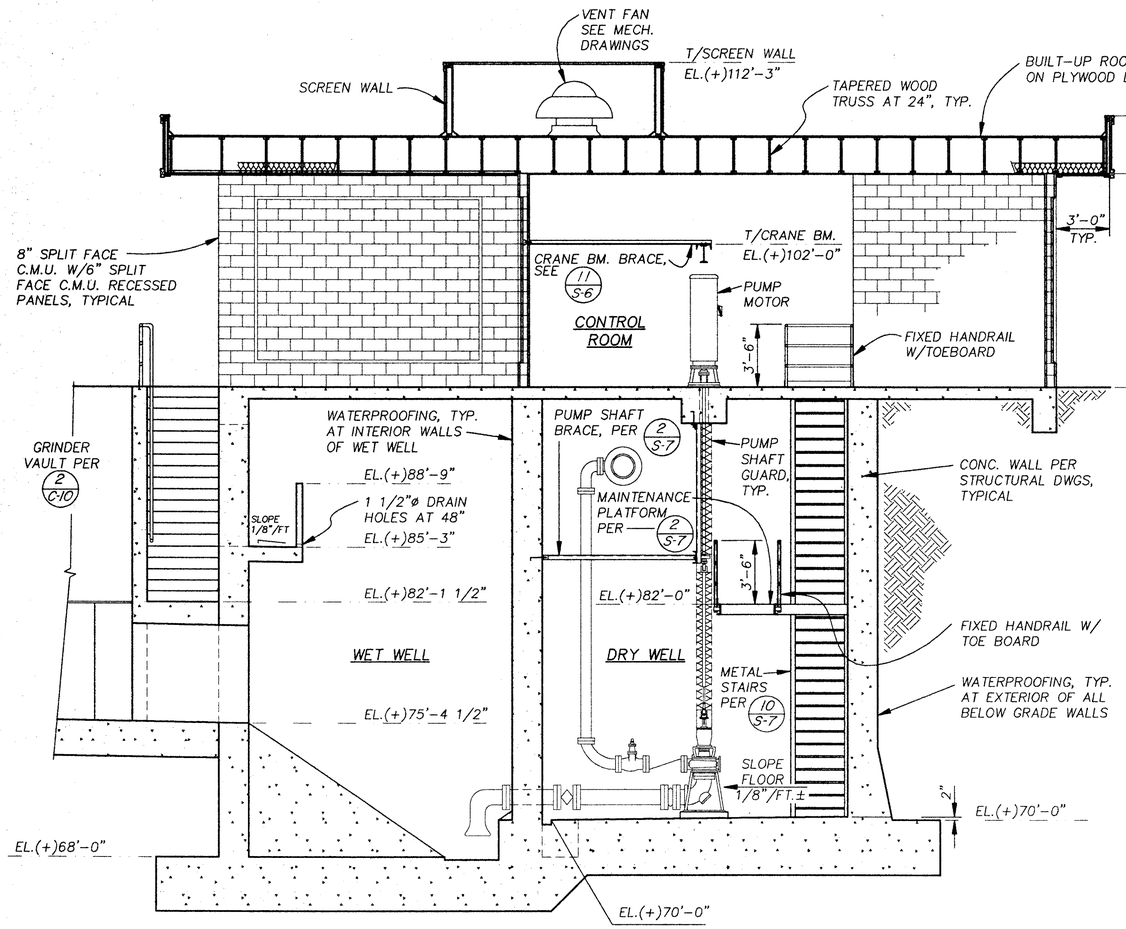
DSGN	S.C.	CHKD	S.C.
DRWN	S.B.	SCALE	SHOWN

approved date 1/15/92
approved date

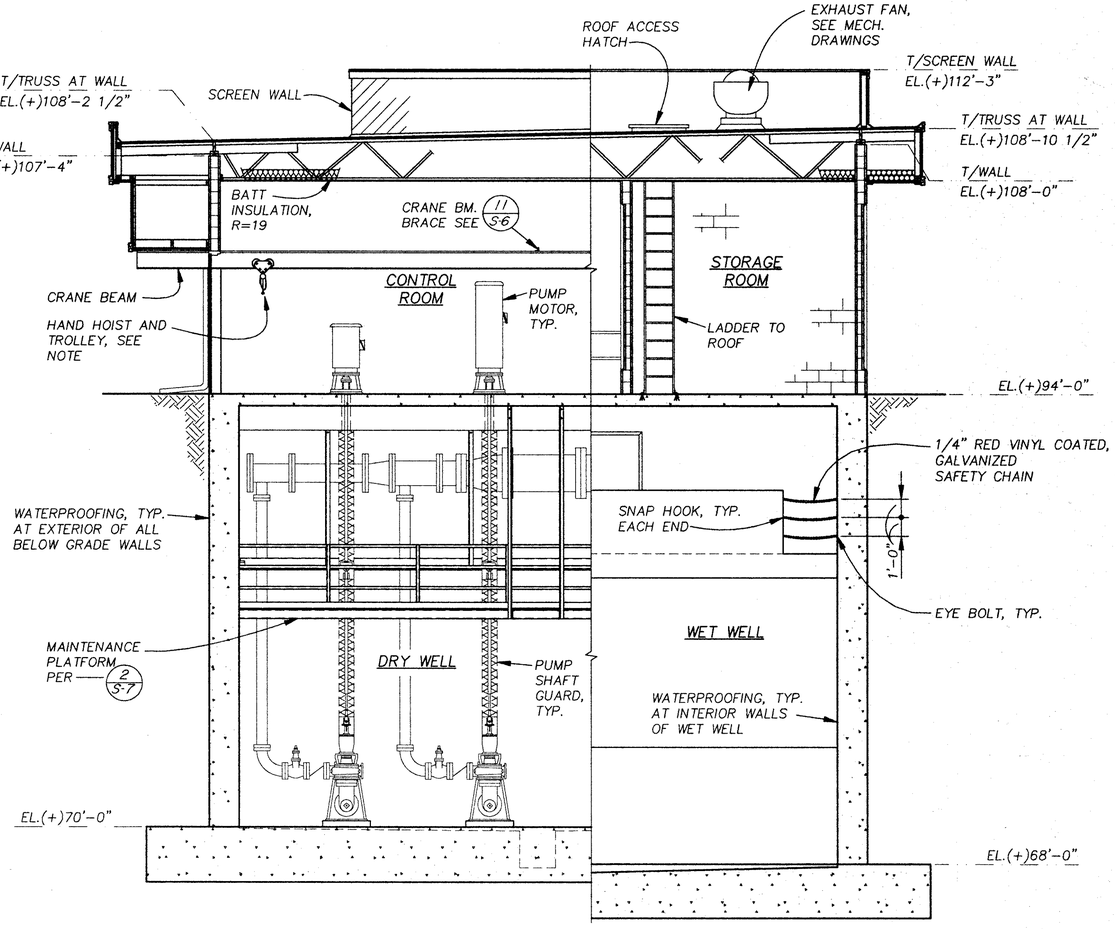
WINZLER & KELLY
CONSULTING ENGINEERS
495 TESCONI CIRCLE, #9 PARK CTR. SANTA ROSA, CA 95401 (707)523-1010

CITY OF ROHNERT PARK
WASTEWATER PUMP STATION IMPROVEMENTS
ROOF PLAN & REFLECTED CEILING PLAN

JOB NO. 90-848-C
SHEET A-3



A/A-4 BUILDING SECTION
1/4"=1'-0"



NOTE: HAND HOIST AND TROLLEY SHALL BE AS MANUFACTURED BY B.E. WALLACE PRODUCTS CORP., FRAZER, PA. OR APPROVED EQUAL, ONE TON CAPACITY

HOIST- MODEL 5-1TL-8
TROLLEY- MODEL 70-202

INSTALL PER MANUFACTURER'S INSTRUCTIONS.

B/A-4 BUILDING SECTION
1/4"=1'-0"

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

GRAPHIC SCALE
4' 0 4' 8'
1/4"=1'-0"

NO.	DATE	REVISIONS	BY	APPR.

REGISTERED PROFESSIONAL ENGINEER
STEPHEN JOHN COX
No. C 043243
Exp. 3/31/92
CIVIL
STATE OF CALIFORNIA

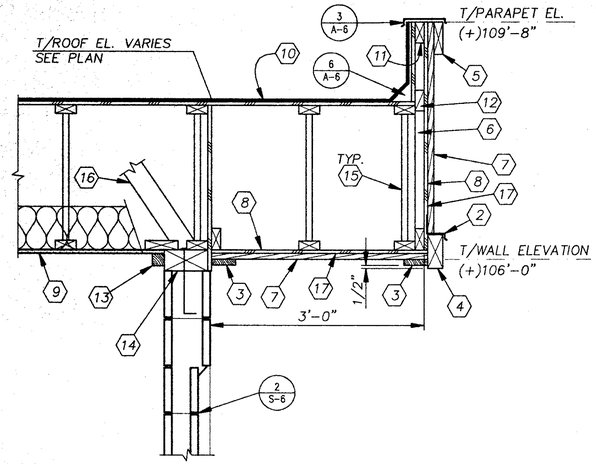
DSGN	S.C.	CHKD	S.C.
DRWN	S.B.	SCALE	SHOWN

approved _____ date 4/15/92
approved _____ date _____

WINZLER & KELLY
CONSULTING ENGINEERS
495 TESCONI CIRCLE, #9 PARK CTR. SANTA ROSA, CA 95401 (707)523-1010

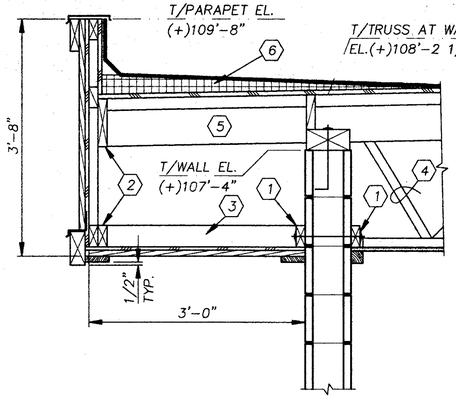
CITY OF ROHNERT PARK
WASTEWATER PUMP STATION IMPROVEMENTS
BUILDING SECTIONS

JOB NO. 90-848-C
SHEET A-4



1. R-19 BATT INSULATION
2. COPPER FLASHING — 3" / 1/2"
3. TRIM- 1 x 4
4. LOWER FASCIA BOARD- 3 x 6
5. UPPER FASCIA BOARD- 2 x 6
6. 2 x 4 FLAT STUDS AT 24"
7. 1 x 6 DIAG. (45°) TONGUE & GROOVE SIDING
8. PLYWOOD SHEATHING
9. 5/8" WATER RESISTANT GYP. BD. CEILING
10. BUILT-UP-ROOFING
11. 2 x 4 FLAT, TOP & BOTTOM
12. 2 x FLAT BLOCKING BTWN. STUDS
13. TRIM- 2 x 2
14. SILL PLATE- SEE STRUCTURAL DWGS.
15. TAPERED TRUSS
16. BRACING- SEE STRUCTURAL DWGS.
17. BUILDING PAPER

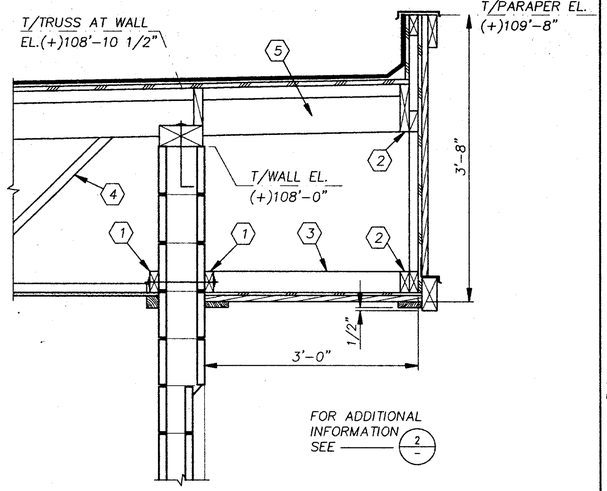
2 / A-5 1"=1'-0"



FOR ADDITIONAL INFORMATION SEE 2/-

1. 2 x 4 LEDGER
2. 2 x CONT.
3. 2 x 4 AT 24"
4. TAPERED TRUSS
5. 2 x OUTRIGGER
6. TAPERED INSULATION BOARD ROOF CRICKET, SEE PLAN

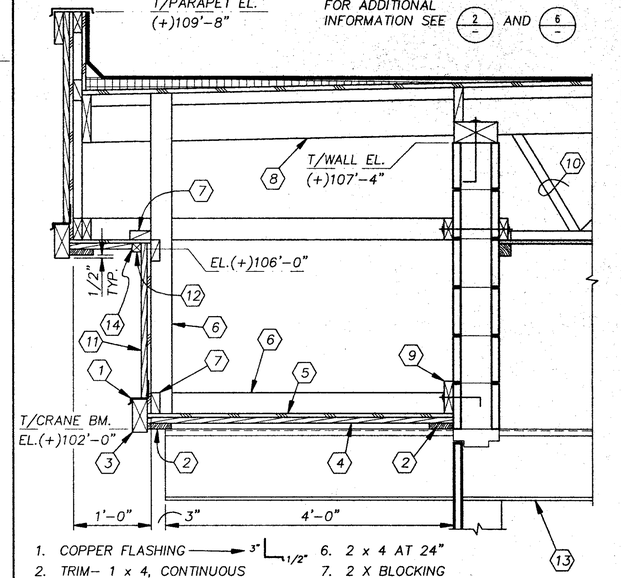
6 / A-5 1"=1'-0"



FOR ADDITIONAL INFORMATION SEE 2/-

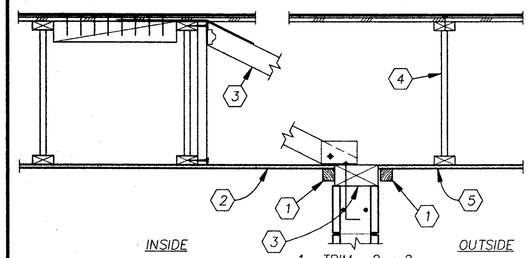
1. 2 x 4 LEDGER W/5/8"ø A.B. AT 32"
2. 2 x CONT.
3. 2 x 4 AT 24"
4. TAPERED TRUSS
5. 2 x OUTRIGGER

10 / A-5 1"=1'-0"



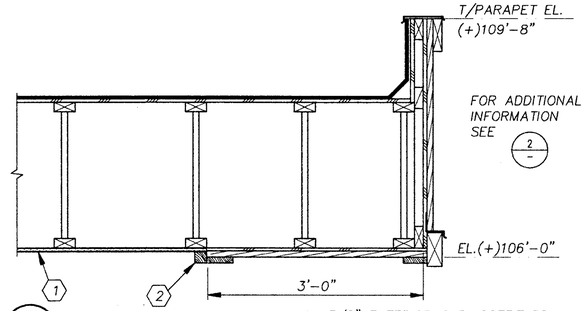
1. COPPER FLASHING — 3" / 1/2"
2. TRIM- 1 x 4, CONTINUOUS
3. LOWER FASCIA BD.- 3 x 6 CONT.
4. 1 x 6 DIAG. (45°) TONGUE & GROOVE SIDING
5. PLYWOOD SHEATHING W/ BUILDING PAPER
6. 2 x 4 AT 24"
7. 2 X BLOCKING
8. 2 x OUTRIGGER
9. 2 x 6 LEDGER
10. TAPERED TRUSS
11. 1 x 8 VERT TONGUE & GROOVE SIDING
12. 2 x 2 CORNER BOARD
13. CRANE BEAM
14. CAULK

14 / A-5 NTS



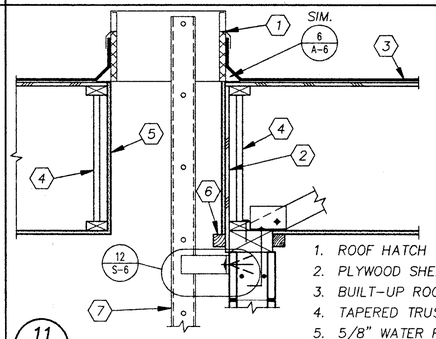
1. TRIM- 2 x 2
2. 5/8" WATER RESISTANT GYP. BD. CEILING
3. SILL PLATE AND BRACE PER STRUCTURAL DRAWINGS
4. TAPERED TRUSS
5. 5/8" EXTERIOR GYPSUM SOFFIT BOARD

3 / A-5 1"=1'-0"



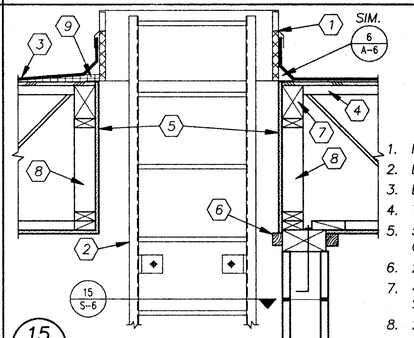
1. 5/8" EXTERIOR GYP. SOFFIT BD.
2. TRIM- 2 x 2

7 / A-5 1"=1'-0"



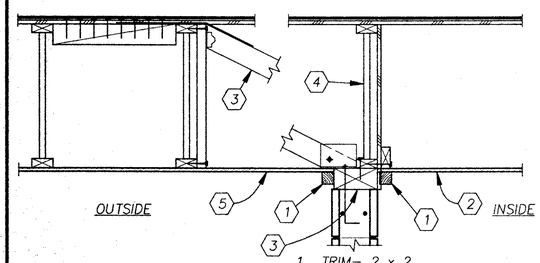
1. ROOF HATCH
2. PLYWOOD SHEATHING
3. BUILT-UP ROOFING
4. TAPERED TRUSS
5. 5/8" WATER RESISTANT GYP. BD.
6. 2 x TRIM
7. LADDER

11 / A-5 1"=1'-0"



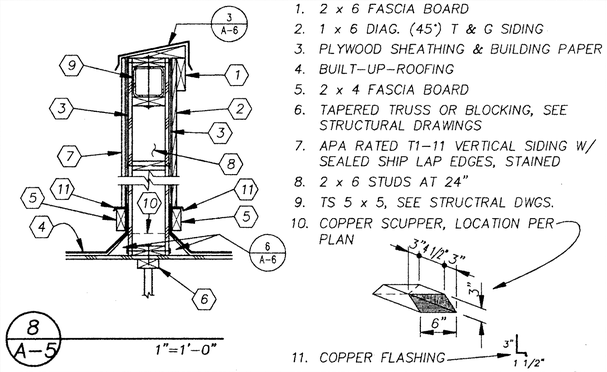
1. ROOF HATCH — 15/S-6
2. LADDER PER
3. BUILT-UP ROOFING
4. TAPERED TRUSS
5. 5/8" WATER RESISTANT GYPSUM BOARD
6. 2 x TRIM
7. 4 x BEAM, SEE STRUCTURAL DWGS.
8. 2 x 4 FRAMING
9. TAPERED INSULATION ROOF CRICKET, SEE PLAN

15 / A-5 1"=1'-0"



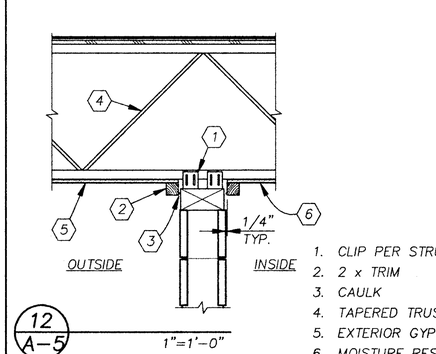
1. TRIM- 2 x 2
2. 5/8" WATER RESISTANT GYP. BD. CEILING
3. SILL PLATE AND BRACE PER STRUCTURAL DRAWINGS
4. TAPERED TRUSS
5. 5/8" EXTERIOR GYPSUM SOFFIT BOARD

4 / A-5 1"=1'-0"



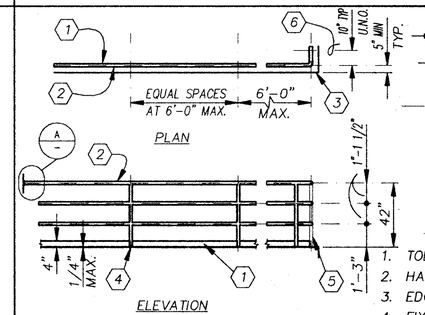
1. 2 x 6 FASCIA BOARD
2. 1 x 6 DIAG. (45°) T & G SIDING
3. PLYWOOD SHEATHING & BUILDING PAPER
4. BUILT-UP-ROOFING
5. 2 x 4 FASCIA BOARD
6. TAPERED TRUSS OR BLOCKING, SEE STRUCTURAL DRAWINGS
7. APA RATED T1-11 VERTICAL SIDING W/ SEALED SHIP LAP EDGES, STAINED
8. 2 x 6 STUDS AT 24"
9. TS 5 x 5, SEE STRUCTRAL DWGS.
10. COPPER SCUPPER, LOCATION PER PLAN
11. COPPER FLASHING — 3" / 1 1/2"

8 / A-5 1"=1'-0"



1. CLIP PER STRUCTURAL DWGS.
2. 2 x TRIM
3. CAULK
4. TAPERED TRUSS
5. EXTERIOR GYPSUM SOFFIT BOARD
6. MOISTURE RESISTANT GYPSUM BOARD

12 / A-5 1"=1'-0"



1. TOE BOARD
2. HANDRAIL
3. EDGE OF CONCRETE
4. FIXED OR REMOVABLE ANCHORAGE PER PLAN
5. POST BEYOND
6. CENTERLINE OF POST

16 / A-5 NTS

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

GRAPHIC SCALE
1' 0 1' 2'
1" = 1'

NO.	DATE	REVISIONS	BY	APPR.

REGISTERED PROFESSIONAL ENGINEER — STEPHEN JOHN COX — No. C 043243 — Exp. 3/31/92 — CIVIL — STATE OF CALIFORNIA

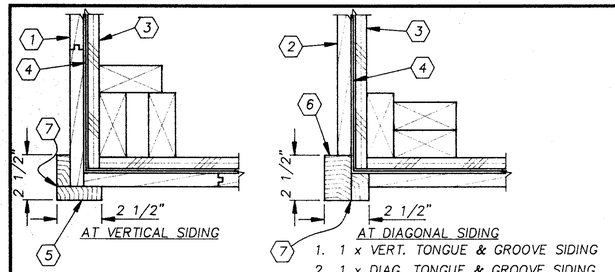
DSGN	S.C.	CHKD	S.C.
DRWN	S.B.	SCALE	SHOWN

approved _____ date 4/16/92
approved _____ date _____

WINZLER & KELLY
CONSULTING ENGINEERS
495 TESCONI CIRCLE..#9 PARK CTR. SANTA ROSA, CA 95401 (707)523-1010

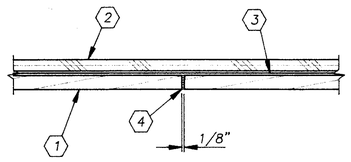
CITY OF ROHNERT PARK
WASTEWATER PUMP STATION IMPROVEMENTS
ARCHITECTURAL DETAILS

JOB NO. 90-848-A
SHEET A-5 —



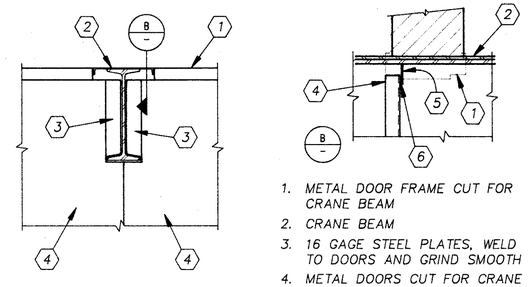
1. 1 x VERT. TONGUE & GROOVE SIDING
2. 1 x DIAG. TONGUE & GROOVE SIDING
3. PLYWOOD SHEATHING
4. BUILDING PAPER
5. 1 x CORNER BOARD TRIM
6. 2 x CORNER BOARD TRIM
7. CAULK DURING CONSTRUCTION

1 / A-6 — 3"=1'-0"



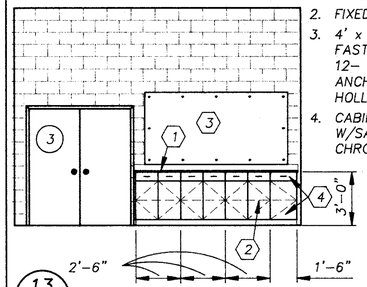
1. 1 x 6 DIAG. TONGUE & GROOVE SIDING
2. 5/8" PLYWOOD SHEATHING
3. BUILDING PAPER
4. CAULK

5 / A-6 — 3"=1'-0"



1. METAL DOOR FRAME CUT FOR CRANE BEAM
2. CRANE BEAM
3. 16 GAGE STEEL PLATES, WELD TO DOORS AND GRIND SMOOTH
4. METAL DOORS CUT FOR CRANE BEAM
5. 16 GAGE STEEL PLATES, WELD TO CRANE BEAM
6. WEATHER STRIPPING

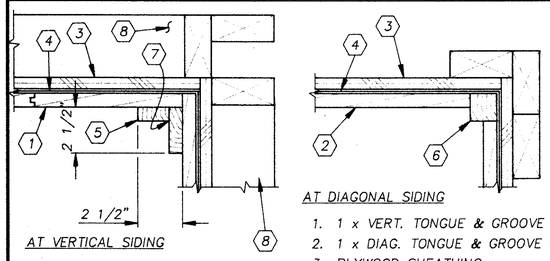
9 / A-6 — 1"=1'-0"



1. 1" PLYWOOD TOP SURFACE, SANDED FINISH
2. FIXED PLYWOOD SHELF, SANDED FINISH
3. 4' x 8' x 1/2" PLYWOOD PANEL FASTENED TO MASONRY WALL W/ 12– #10 SCREWS INTO WALL ANCHOR INSERTS SUITABLE FOR HOLLOW BLOCK APPLICATION
4. CABINET & DRAWER FACES– PLYWOOD W/SANDED AND PAINTED FINISH AND CHROME PLATED HARDWARE

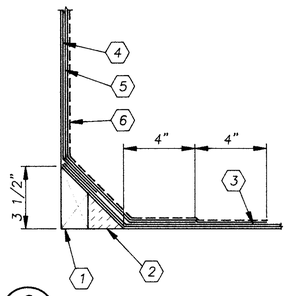
13 / A-6 — 1/4"=1'-0"

◯ INDICATES DOOR NUMBER FOR ADDITIONAL INFORMATION SEE (11/–)



1. 1 x VERT. TONGUE & GROOVE SIDING
2. 1 x DIAG. TONGUE & GROOVE SIDING
3. PLYWOOD SHEATHING
4. BUILDING PAPER
5. 1 x CORNER BOARD TRIM
6. 2 x 2 CORNER BOARD
7. CAULK DURING CONSTRUCTION
8. HORIZ. BLOCKING AT 24"

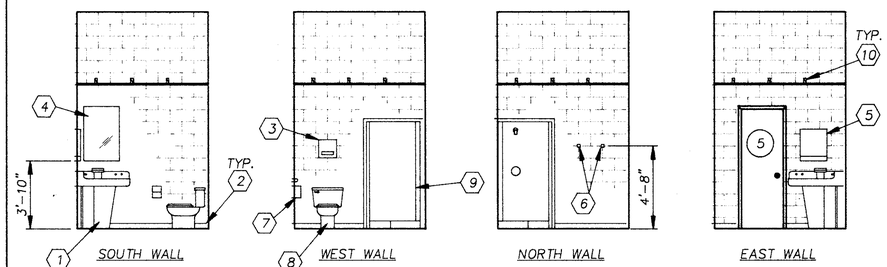
2 / A-6 — 3"=1'-0"



NOTE: NUMBER OF PLIES SHOWN FOR ROOFING, BASE FLASHING, ETC. IS FOR ILLUSTRATIVE PURPOSES ONLY.

1. TREATED WOOD NAILER
2. FIBER CANT STRIP
3. BUILT–UP ROOFING
4. BASE FELT
5. BASE FLASHING
6. 4" STRIP FLASHING OVER BASE FLASHING JOINTS

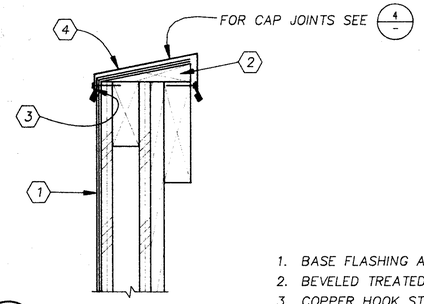
6 / A-6 — 3"=1'-0"



1. SINK
2. CERAMIC BASE
3. TOILET SEAT COVER DISPENSER
4. MIRROR WITH SOAP DISPENSER
5. PAPER TOWEL DISPENSER W/WASTE RECEPTACLE
6. TOWEL PIN
7. TOILET PAPER HOLDER
8. WATER CLOSET
9. SHOWER STALL– SEE MECHANICAL DRAWINGS
10. FURR OUT FOR CEILING

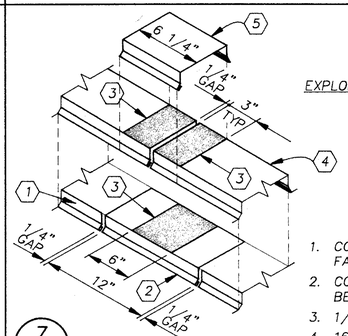
10 / A-6 — REST ROOM ELEVATIONS — 1/4"=1'-0"

◯ INDICATES DOOR NUMBER FOR ADDITIONAL INFORMATION SEE (11/–)



1. BASE FLASHING AND FELT
2. BEVELED TREATED WOOD NAILER
3. COPPER HOOK STRIP WITH COPPER FASTENERS AT 4"
4. 16 OZ. COPPER CAP

3 / A-6 — 3"=1'-0"



EXPLODED VIEW

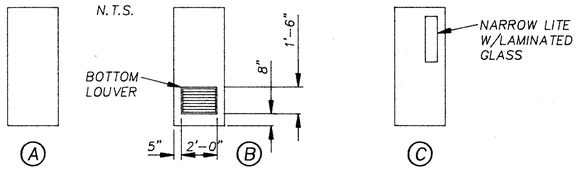
1. COPPER HOOK STRIP W/COPPER FASTENERS AT 4"
2. COPPER FLASHING CAP CENTERED BELOW CAP JOINT
3. 1/16" THICK SEALANT BED
4. 16 OZ. COPPER CAP
5. 16 OZ. JOINT COVER

7 / A-6 — NO SCALE

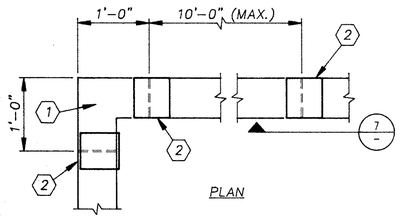
DOOR SCHEDULE

NO.	SIZE	DOOR MAT.	DOOR TYPE	DOOR FINISH	FRAME MAT.	FRAME FINISH	DETAILS HEAD	DETAILS JAMB	DETAILS SI	HARDWARE	REMARKS
1	PAIR 2'–10"x 8'–0"x 1 3/4"	H.M.	B	PTD.	H.M.	PTD.	12/A–6	12/A–6	16/A–6	1	CUT HEAD FOR CRANE BM.
2	PAIR 2'–10"x 8'–0"x 1 3/4"	H.M.	B	PTD.	H.M.	PTD.	12/A–6	12/A–6	16/A–6	1	PER 9/A–6
3	PAIR 2'–10"x 6'–8"x 1 3/4"	H.M.	A	PTD.	H.M.	PTD.	12/A–6	12/A–6	16/A–6	2	
4	3'–0"x 6'–8"x 1 3/4"	H.M.	A	PTD.	H.M.	PTD.	12/A–6	12/A–6	16/A–6	3	UNDERCUT B. OF DOOR 1"
5	2'–4"x 6'–8"x 1 3/4"	H.M.	A	PTD.	H.M.	PTD.	12/A–6	12/A–6	——	4	
6	2'–8"x 6'–8"x 1 3/4"	H.M.	C	PTD.	H.M.	PTD.	12/A–6	12/A–6	16/A–6	5	MAINTENANCE BUILDING
7	2'–8"x 6'–8"x 1 3/4"	H.M.	C	PTD.	H.M.	PTD.	12/A–6	12/A–6	16/A–6	5	MAINTENANCE BUILDING

DOOR TYPES
N.T.S.



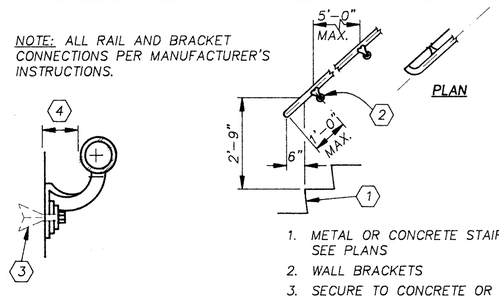
11 / A-6 — DOOR SCHEDULE — N.T.S.



1. SINGLE PIECE PRE–FABRICATED COPPER CORNER CAP
2. COPPER CAP EXPANSION JOINT

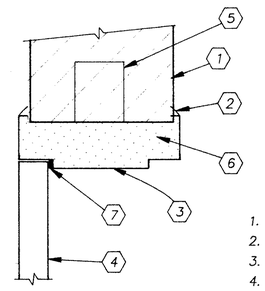
4 / A-6 — 1"=1'-0"

NOTE: ALL RAIL AND BRACKET CONNECTIONS PER MANUFACTURER'S INSTRUCTIONS.



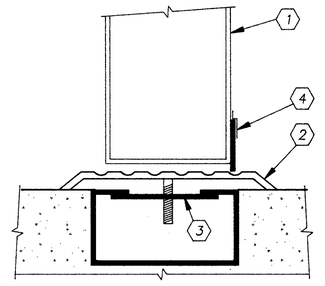
1. METAL OR CONCRETE STAIRWAY, SEE PLANS
2. WALL BRACKETS
3. SECURE TO CONCRETE OR MASONRY
4. AS REQD TO SATISFY ALL NATIONAL STATE, & LOCAL STANDARDS, REGULATIONS, & CODE REQUIREMENTS, INCLUDING OSHA

8 / A-6 — NTS



1. C.M.U. WALL
2. CAULK– CONT. BOTH SIDES
3. H.M. DOOR FRAME
4. DOOR PER SCHEDULE
5. ANCHORS
6. GROUT FRAME SOLID
7. WEATHER STRIPPING

12 / A-6 — 3"=1'-0"



1. HOLLOW METAL DOOR
2. THRESHOLD
3. THRESHOLD HOLDER
4. DOOR BOTTOM

16 / A-6 — FULL SCALE

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

GRAPHIC SCALES
0 1'
3" = 1'
4' 0 4' 8'
1/4" = 1'-0"

NO.	DATE	REVISIONS	BY	APPR.

REGISTERED PROFESSIONAL ENGINEER — STEPHEN JOHN KELLY — No. C 043243 Exp. 3/31/92 — CIVIL — STATE OF CALIFORNIA

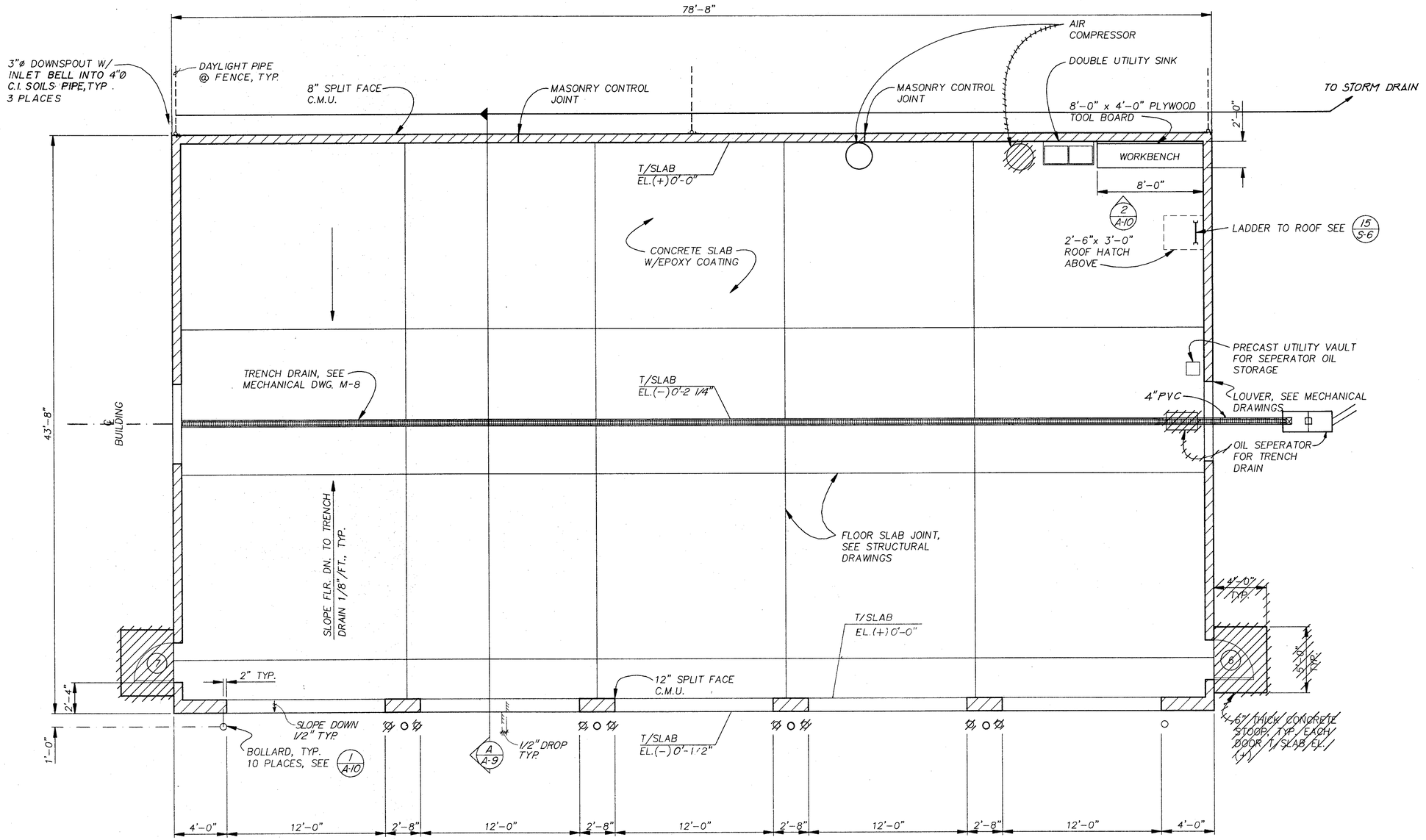
DSGN	S.C.	CHKD	S.C.
DRWN	S.B.	SCALE	SHOWN

approved [signature] date 1/15/92
approved date

WINZLER & KELLY
CONSULTING ENGINEERS
495 TESCONI CIRCLE, #9 PARK CTR. SANTA ROSA, CA 95401 (707)523–1010

CITY OF ROHNERT PARK
WASTEWATER PUMP STATION IMPROVEMENTS
ARCHITECTURAL DETAILS

JOB NO. 90-848-A
SHEET A–6 / –



FLOOR PLAN

1/4"=1'-0"

GENERAL NOTES

1. ○ INDICATES DOOR NUMBER FOR ADDITIONAL INFORMATION SEE 11 A-6
2. REFERENCE FINISH FLOOR EL.(+)0'-0" = DATUM EL. 95.45

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

GRAPHIC SCALE
4' 0 4' 8'
1/4"=1'-0"

NO.	DATE	REVISIONS	BY	APPR.

REGISTERED PROFESSIONAL ENGINEER
STEPHEN JOHN COE
No. C 043243
Exp. 3/31/92
CIVIL
STATE OF CALIFORNIA

DSGN	S.C.	CHKD	S.C.
DRWN	S.B.	SCALE	SHOWN

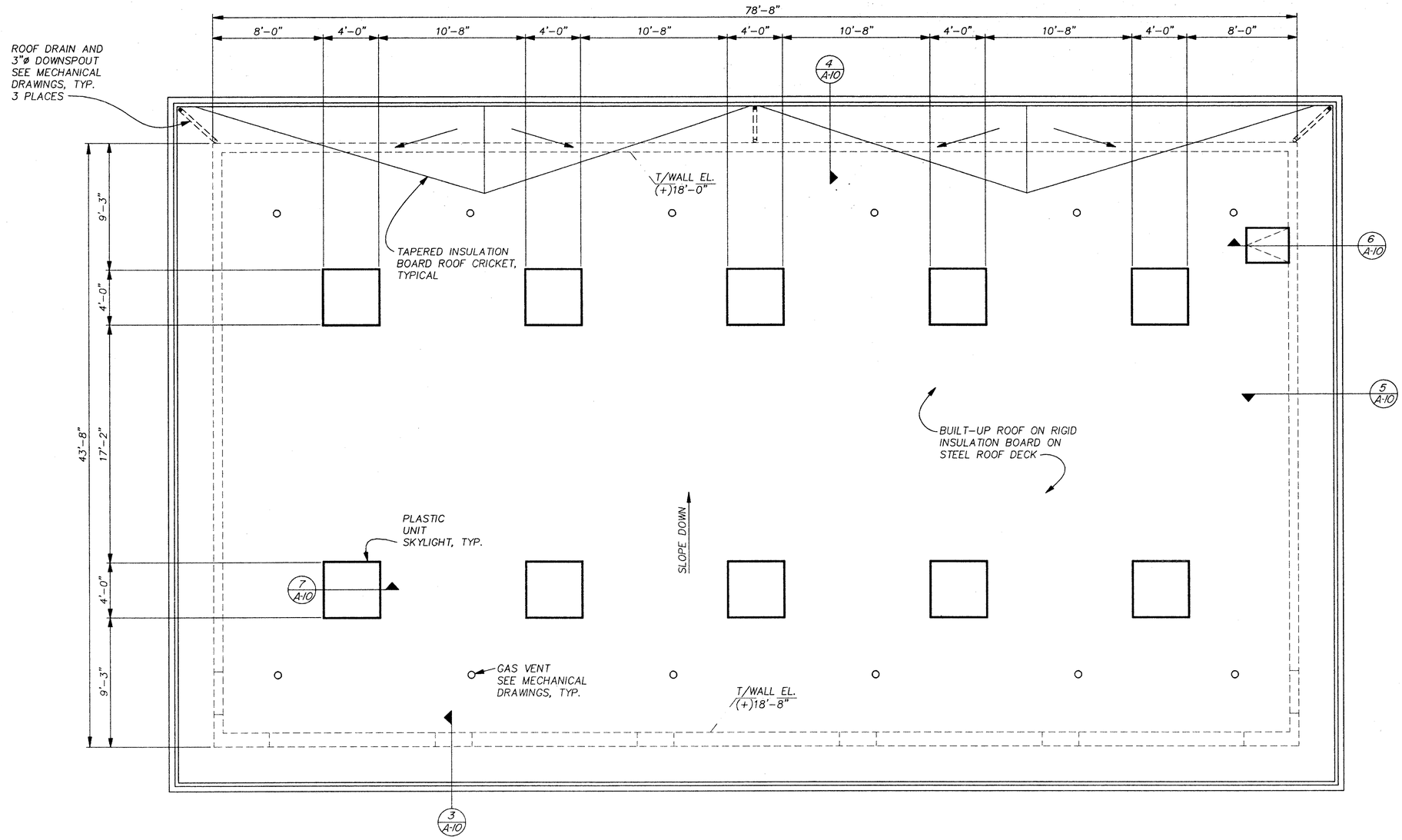
approved _____ date 4/15/92
approved _____ date _____

WINZLER & KELLY
CONSULTING ENGINEERS
495 TESCONI CIRCLE,#9 PARK CTR. SANTA ROSA, CA 95401 (707)523-1010

CITY OF ROHNERT PARK
WASTEWATER PUMP STATION IMPROVEMENTS
MAINTENANCE BUILDING FLOOR PLAN

JOB NO. 90-848-C
SHEET A-7 —

DWG. NO. 848CA07



ROOF PLAN

1/4"=1'-0"

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

GRAPHIC SCALE
4' 0 4' 8'
1/4" = 1'-0"

NO.	DATE	REVISIONS	BY	APPR.

REGISTERED PROFESSIONAL ENGINEER
STEPHEN JOHN [illegible]
No. C 043243
Exp. 3/31/92
CIVIL
STATE OF CALIFORNIA

DSGN	S.C.	CHKD	S.C.
DRWN	S.B.	SCALE	SHOWN

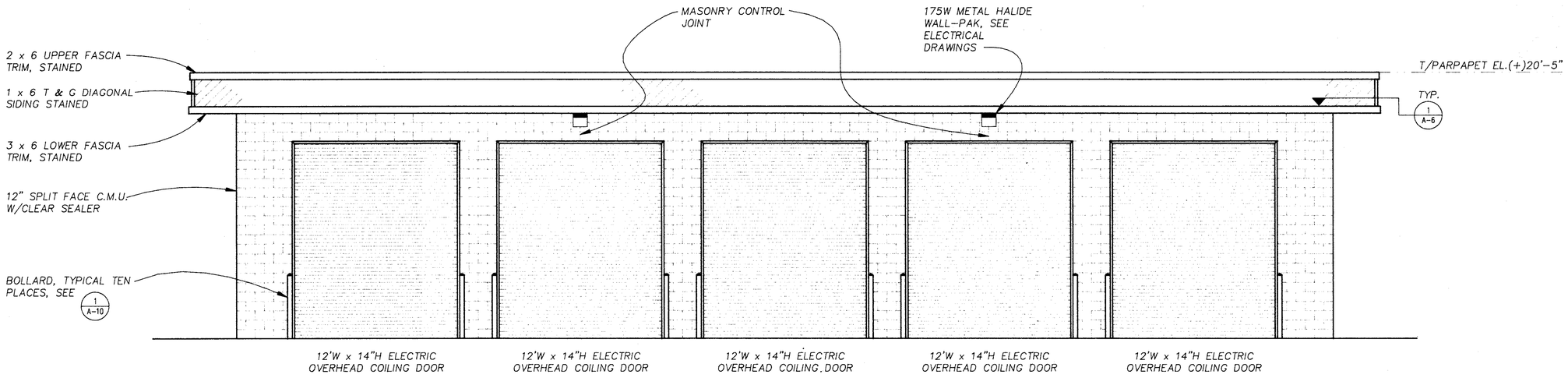
approved [illegible] date 4/16/92
approved date

WINZLER & KELLY
CONSULTING ENGINEERS
495 TESCONI CIRCLE, #9 PARK CTR. SANTA ROSA, CA 95401 (707)523-1010

CITY OF ROHNERT PARK
WASTEWATER PUMP STATION IMPROVEMENTS
MAINTENANCE BUILDING ROOF PLAN

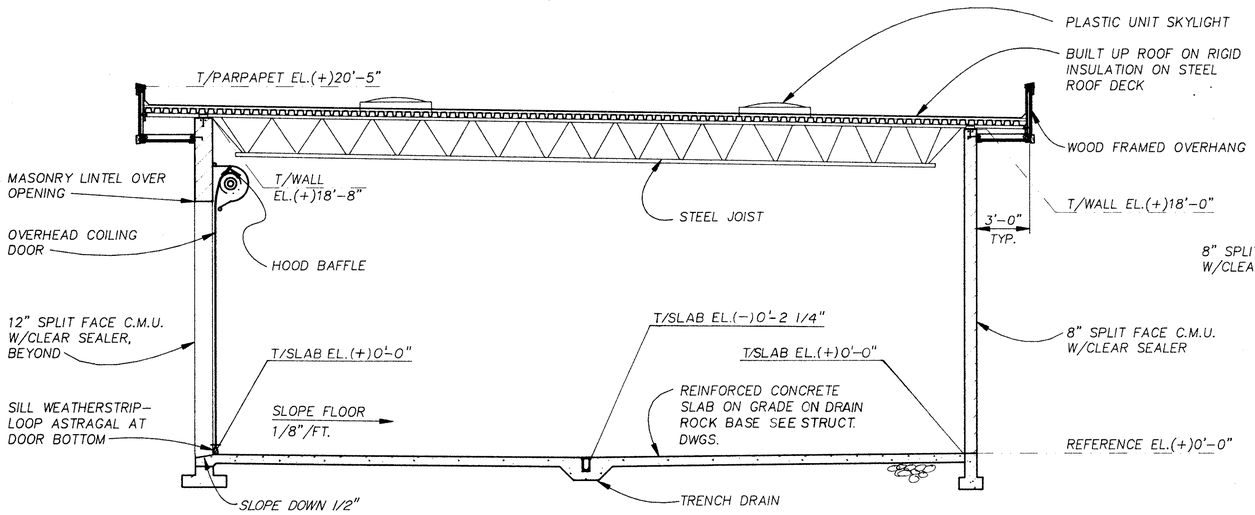
JOB NO. 90-848-C
SHEET A-8

Dwg. No. 848CA08



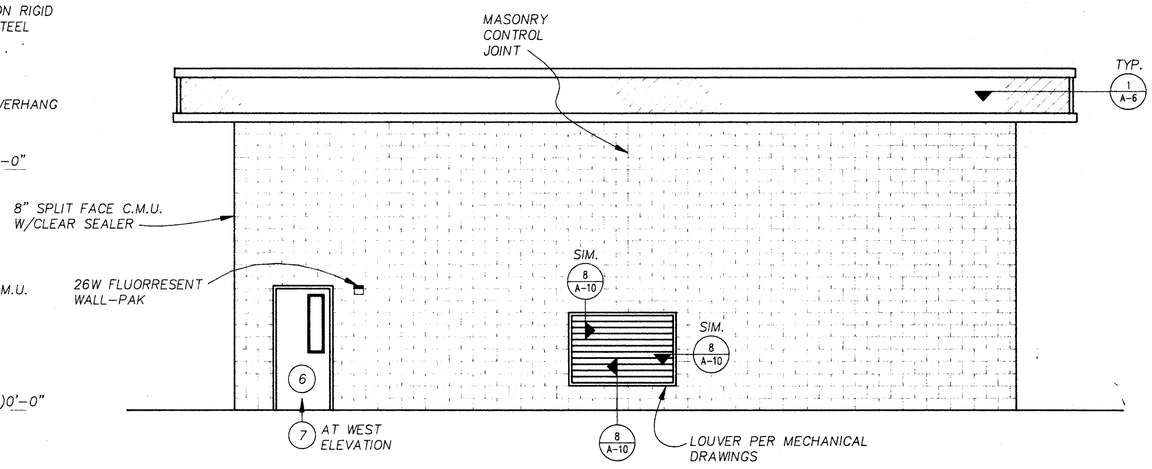
WEST ELEVATION

1/4"=1'-0"



A A-9 **SECTION**

1/4"=1'-0"



SOUTH ELEVATION (NORTH ELEVATION SIM.)

1/4"=1'-0"

GENERAL NOTE

1. ◯ INDICATES DOOR NUMBER FOR ADDITIONAL INFORMATION SEE 11 A-6
2. REFERENCE FINISH FLOOR, ELEV. (+)0'-0" = DATUM ELEV. 95.45

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

GRAPHIC SCALE
4' 0 4' 8'
1/4" = 1'-0"

NO.	DATE	REVISIONS	BY	APPR.

REGISTERED PROFESSIONAL ENGINEER
STEPHEN JOHN CLIFF
No. C 043243
Exp. 3/31/92
CIVIL
STATE OF CALIFORNIA

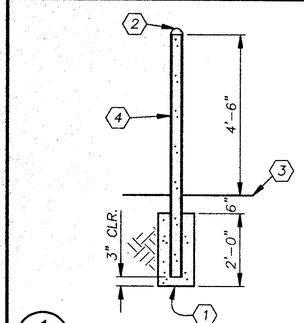
DSGN	S.C.	CHKD	S.C
DRWN	S.B.	SCALE	SHOWN

approved _____ date 1/10/92
approved _____ date _____

WINZLER & KELLY
CONSULTING ENGINEERS
495 TESCONI CIRCLE.#9 PARK CTR. SANTA ROSA, CA 95401 (707)523-1010

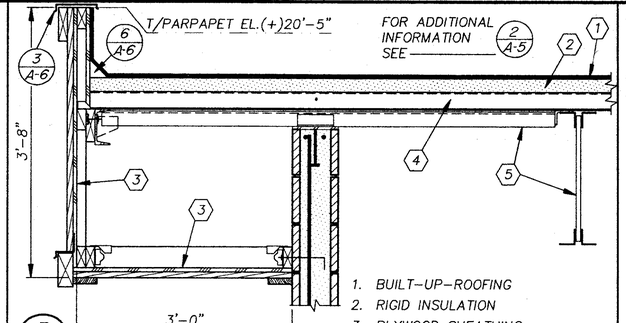
CITY OF ROHNERT PARK
WASTEWATER PUMP STATION IMPROVEMENTS
MAINTENANCE BUILDING ELEVATIONS & SECTION

JOB NO. 90-848-C
SHEET A-9 —



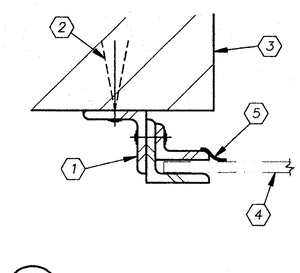
1. 1'-0"ø CONCRETE BASE
2. HEMISPHERICAL CONCRETE CAP
3. FINISH GRADE PER CIVIL DWGS.
4. 4"ø STANDARD WEIGHT GALVANIZED STEEL PIPE CONCRETE FILLED, PAINTED FINISH

1 / A-10 — 1/2"=1'-0"



1. BUILT-UP-ROOFING
2. RIGID INSULATION
3. PLYWOOD SHEATHING
4. STEEL ROOF DECK
5. FRAMING PER STRUCTURAL DWGS.

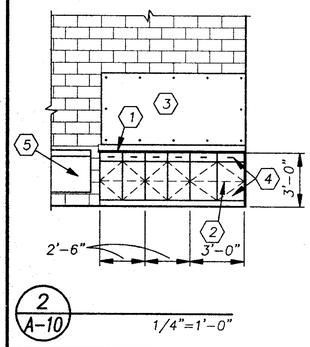
5 / A-10 — 1"=1'-0"



1. JAMB GUIDE
2. ANCHORAGE PER DOOR MFR. SPECIFICATIONS
3. MASONRY WALL JAMB
4. OVERHEAD COILING DOOR
5. WEATHERSTRIPPING

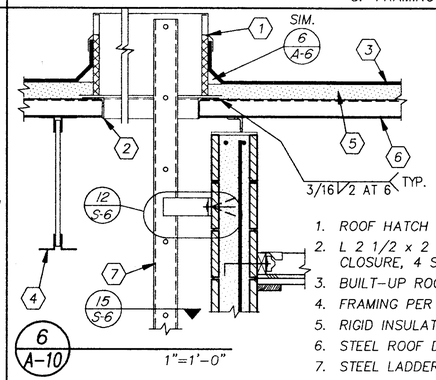
9 / A-10 — 3"=1'-0"

13 / A-10



1. 1" PLYWOOD TOP SURFACE, SEALED SANDED FINISH
2. FIXED PLYWOOD SHELF, SANDED FINISH
3. 4' x 8' x 1/2" PLYWOOD PANEL FASTENED TO MASONRY WALL W/ 12- #10 SCREWS INTO WALL ANCHOR INSERTS SUITABLE FOR HOLLOW BLOCK APPLICATION
4. CABINET & DRAWER FACES- PLYWOOD W/SANDED AND PAINTED FINISH AND CHROME PLATED HARDWARE
5. UTILITY SINK, SEE MECHANICAL DWGS.

2 / A-10 — 1/4"=1'-0"

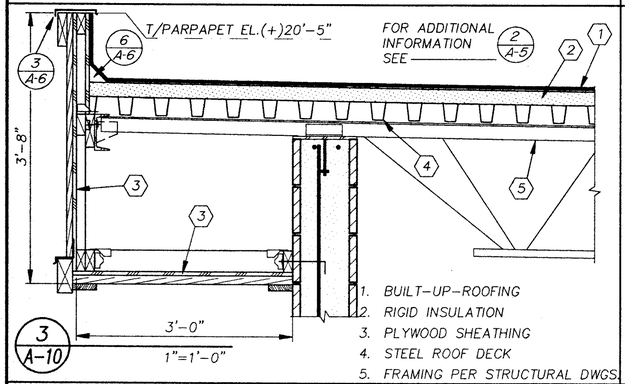


1. ROOF HATCH
2. L 2 1/2 x 2 1/2 x 3/16 DECK CLOSURE, 4 SIDES OF OPENING
3. BUILT-UP ROOFING
4. FRAMING PER STRUCTURAL DWGS.
5. RIGID INSULATION
6. STEEL ROOF DECK
7. STEEL LADDER

6 / A-10 — 1"=1'-0"

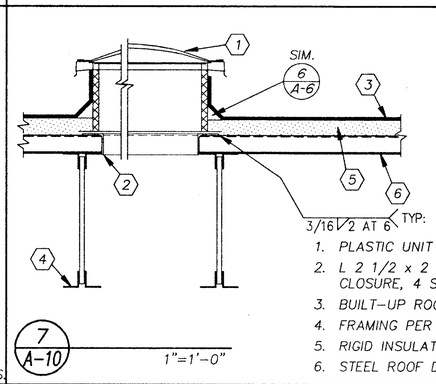
10 / A-10

14 / A-10



1. BUILT-UP-ROOFING
2. RIGID INSULATION
3. PLYWOOD SHEATHING
4. STEEL ROOF DECK
5. FRAMING PER STRUCTURAL DWGS.

3 / A-10 — 1"=1'-0"

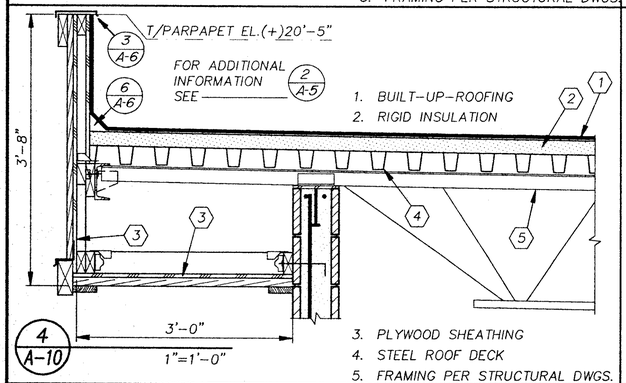


1. PLASTIC UNIT SKYLIGHT
2. L 2 1/2 x 2 1/2 x 3/16 DECK CLOSURE, 4 SIDES OF OPENING
3. BUILT-UP ROOFING
4. FRAMING PER STRUCTURAL DWGS.
5. RIGID INSULATION
6. STEEL ROOF DECK

7 / A-10 — 1"=1'-0"

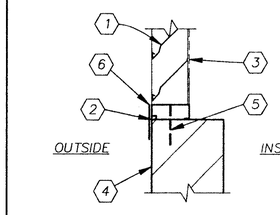
11 / A-10

15 / A-10



1. BUILT-UP-ROOFING
2. RIGID INSULATION
3. PLYWOOD SHEATHING
4. STEEL ROOF DECK
5. FRAMING PER STRUCTURAL DWGS.

4 / A-10 — 1"=1'-0"



1. LOUVER, SEE MECHANICAL DWGS.
2. SEALANT
3. INSECT SCREEN
4. MASONRY WALL
5. ANCHORAGE PER LOUVER MFR. SPECIFICATIONS
6. FLAT FLANGE

8 / A-10 — 1 1/2"=1'-0"

12 / A-10

16 / A-10

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 — 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

GRAPHIC SCALES
2' 0 2' 4'
1/2" = 1'-0"
1' 0 1' 2'
1" = 1'

NO.	DATE	REVISIONS	BY	APPR.

REGISTERED PROFESSIONAL ENGINEER — STEPHEN JOHN COX — No. C 043243 Exp. 3/31/92 — CIVIL — STATE OF CALIFORNIA

DSGN	S.C.	CHKD	S.C.
DRWN	S.B.	SCALE	SHOWN

approved — date 1/15/92
approved — date

WINZLER & KELLY
CONSULTING ENGINEERS
495 TESCONI CIRCLE..#9 PARK CTR. SANTA ROSA, CA 95401 (707)523-1010

CITY OF ROHNERT PARK
WASTEWATER PUMP STATION IMPROVEMENTS
MAINTENANCE BUILDING ARCHITECTURAL DETAILS

JOB NO. 90-848-C
SHEET A-10

DWG. NO. 848CA10

GENERAL STRUCTURAL NOTES

GENERAL REQUIREMENTS

DESIGN DATA

Code: 1988 Uniform Building Code (UBC)

Floor Dead Load: based on concrete density - 150 pcf
Floor Live Load: 150 psf

Roof Dead Load: 15 psf
Roof Live Load: 20 psf

Wind Load: 80 mph. Exposure C. I-1.0

Seismic: Zone 4 Z-0.40; I-1.0;
Rw-6; C-2.75.
Soil Pressure: Per soils report No. 41-1622-01 by Kleinfelder, Inc., dated June 15, 1990.

Allowable Total Load S.P.-1500 psf
Equivalent Fluid Pressure (lateral)- 90 pcf

NOTES TO CONTRACTOR

Drawings do not include requirements for the safety of the structure, equipment, or persons during construction. The contractor shall take all measures necessary to safely perform the work, including but not limited to, erection methods, bracing, shoring, rigging, guys, scaffolding and formwork.

Observation visits to the site by the Engineer shall not include inspection of the above items nor will the Engineer be responsible for the Contractor's means, methods, techniques, or sequences of construction.

Unless noted otherwise, all details are typical as indicated by references or titles. Refer to Arch., Mech., Elect., and Civil drawings for location and details of inserts, openings, curbs, pads, etc., and dimensions not shown on structural drawings. Notes on details shall take precedence over General Structural Notes (G.S.N.) and typical details. The Contractor shall notify the Engineer of any conflicts before proceeding with the work.

Special Inspections, in accordance with UBC Section 306 are required for the following portions of the work:
Concrete
Concrete Anchors
Reinforcing Steel
Welding
Structural Masonry

EARTHWORK:

Foundations shall bear on a coarse rock base over native soil as required by the soils report.

The top 8" below concrete slabs on grade shall consist of an coarse rock base meeting the requirements of the soils report, u.n.o.

All loose material shall be removed from surfaces to receive concrete.

CONCRETE

Design:

Appl.	Min. Strength at 28 Days
Foundations, Walls	4000 psi
All Other Conc.	4000 psi

Construction joints in floors shall be located within the middle third of spans of slabs, beams, and girders. Joint locations within these limitations shall be determined by the Contractor, subject to approval by Engineer. All surfaces shall be clean and free of laitance. Surfaces called out on the drawings as "roughened" shall be raked to a full amplitude of 1/4".

CONCRETE REINFORCING

Bars: New Billet (Type N or S) per ASTM A615, Grade 60.

Welding: No welding of reinforcing bars permitted without approval by Engineer.

Minimum Bar Embedment: For development length of straight and hooked bars in tension, per ACI-318, u.n.o.

Minimum Bar Lap: Class C (Class B if alternate splices staggered one lap length, min.) per ACI 318, u.n.o.
Spliced bars in beams, slabs and footings shall be at the same level, u.n.o.

Concrete protection for reinforcing:

Slabs and joists:
#5 and smaller ..... 1 1/2"
#6 and larger ..... 2"
Beams and columns:
Stirrups and ties ..... 2"
Principal reinforcement ... 2 1/2"
Walls ..... 2"
Footings and base slabs:
At unformed surfaces and bottoms in contact with earth ..... 3"
Top of footings- same as slabs

MASONRY

Concrete Masonry Units: Per ASTM C90, Grade N-1, compressive strength 1900 psi at 28 days (net area).

Mortar: Per ASTM C270, Type S, compressive strength 1800 psi at 28 days.

Grout: Per ASTM C476, compressive strength 2000 psi at 28 days.

Specified compressive strength of masonry, f'm - 1500 psi per U.B.C. Table No. 24-C.

MASONRY REINFORCING

Bars: New Billet (Type N or S) per ASTM A615, Grade 60.

Welding: No welding of reinforcing bars is permitted without prior approval by Engineer.

Bar lap: 48 bar diameters, u.n.o.

Horizontal joint reinforcement: Per ASTM A82, truss or ladder type with two #9 ga. longitudinal wires. Install in first and second bed joints, 8" apart immediately above and below openings and in bed joints at 16" intervals elsewhere. Reinforcement in the second bed joint above and below openings shall extend two feet beyond jambs. All other reinforcement shall be continuous, except at masonry control joints. Lap side rods 6" min. at all splices. Fabricated corner and tee sections shall be used at all wall corners and intersections.

Horizontal reinforcement: Use 2- #5 continuous in all bond beams, u.n.o.

Vertical reinforcement: As noted on the drawings and a minimum of one #5 vertical continuous at all wall ends, corners and intersections, each side of openings and control joints, and at 24" o.c. maximum spacing elsewhere. Vertical reinforcement which is interrupted by pockets or openings shall be made continuous each side.

Bond beam reinforcing interrupted by pockets or openings shall be made continuous above and below.

METALS

MATERIALS

Rolled Shapes & Plates: Per ASTM A36, Fy-36 ksi.

Pipes: Per ASTM A501, Fy-36 ksi.

Structural Tubing: Per ASTM A500, Grade B, Fy-46 ksi.

WELDING

Welding of structural steel shall conform to AWS D1.1 with electrodes conforming to AWS A5.1, E-70 series. All welding shall be performed by welders currently certified for the types of welds called for.

BOLTING

Bolts: ASTM A307.

Anchor bolts, plain threaded bars: ASTM A36 or ASTM A307.

Holes: 1/16" greater than bolt size, except 3/16" greater than anchor bolt size, u.n.o.

All bolts shall be installed with steel washers.

TIMBER

GENERAL REQUIREMENTS

Openings for roof penetrations: Do not cut joists or other structural members.

Nailing of wood members: As indicated on the drawings, and not less than Uniform Building Code Table #25 O-Nailing Schedule.

STRUCTURAL LUMBER

Structural Lumber (4 x and larger):
Douglas Fir-Larch Grade #1
Other structural lumber: Douglas Fir-Larch Grade #2

SHEATHING

Roof sheathing: 19/32" APA Rated plywood sheathing, 32/16, Exposure 1.

DIAPHRAGM NAILING

Roof: 10d Common at 6" at boundaries and edges.
10d Common at 12" at intermediate framing members.

PREFABRICATED WOOD TRUSSES

Trusses, and related bracing shall be sized and detailed to fit the dimensions and carry loads indicated on the plans. All designs shall be in accordance with all applicable provisions of the building code.

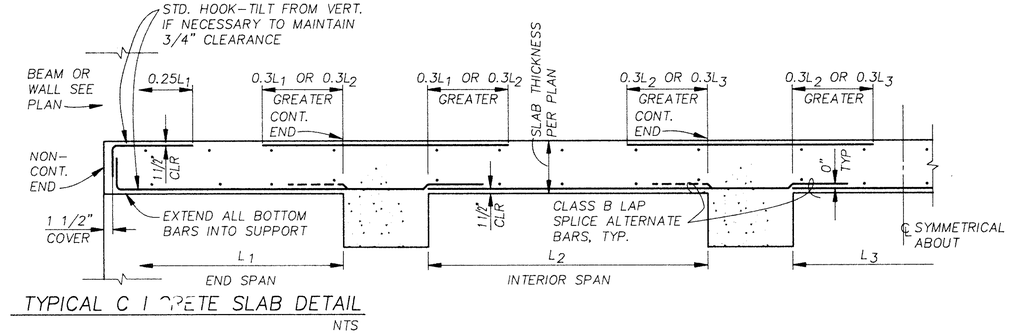
GLUE-LAMINATED BEAMS

Allowable Unit Stresses:
Fbxx- 2400 psi
Fc⊥ - 650 psi
Fv - 165 psi
E - 1.8 x 10^6 psi

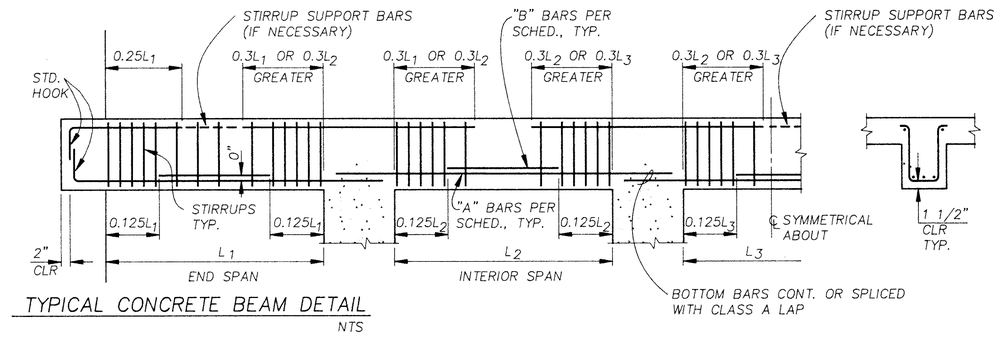
ABBREVIATION LIST

AB	ANCHOR BOLT
ADD'L	ADDITIONAL
ARCH	ARCHITECT/ARCHITECTURAL
&	AND
B	BOTTOM
BD	BOARD
BM	BEAM
BN	BOUNDARY NAILING
BTWN	BETWEEN
C	CHANNEL
CJ	CONSTRUCTION JOINT
CL	CENTERLINE
CLR	CLEAR
CMU	CONCRETE MASONRY UNIT
CNTRD	CENTERED
CONC	CONCRETE
CONT	CONTINUOUS
d	PENNY (NAIL SIZE)
DBL	DOUBLE
DET	DETAIL
DIA	DIAMETER
DIAG	DIAGONAL
DIM	DIMENSION
DL	DEAD LOAD
DN	DOWN
DWG	DRAWING
EA	EACH
EF	EACH FACE
EL	ELEVATION
EMBED	EMBEDMENT
EQUIP	EQUIPMENT
EXP	EXPANSION
FN	FACE NAIL
FT	FEET
GA	GAGE
GALV	GALVANIZED
GLB	GLU-LAM BEAM
GSN	GENERAL STRUCTURAL NOTES
GYP	GYPSUM
HEF	HORIZONTAL EACH FACE
HORIZ	HORIZONTAL
INFO	INFORMATION
JT	JOINT
L	ANGLE
LB	POUND
LOC	LOCATION
MAX	MAXIMUM
MB	MACHINE BOLT
MC	CHANNEL
MCJT	MASONRY CONTROL JOINT
MECH	MECHANICAL
MFR	MANUFACTURE
MIN	MINIMUM
MISC	MISCELLANEOUS
NTS	NOT TO SCALE
#	NUMBER
OPG	OPENING
PVC	POLYVINYL CHLORIDE
REINF	REINFORCING
REQD	REQUIRED
SCHED	SCHEDULE
SIM	SIMILAR
STD	STANDARD
SYMM	SYMMETRICAL
T & G	TONGUE AND GROOVE
T/	TOP OF
TYP	TYPICAL
UON	UNLESS OTHERWISE NOTED
VEF	VERTICAL EACH FACE
VERT	VERTICAL
W/	WITH

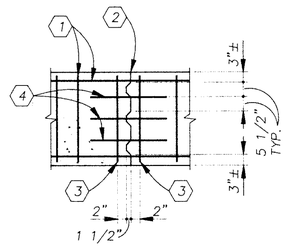
VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.



TYPICAL C I CRETE SLAB DETAIL
NTS

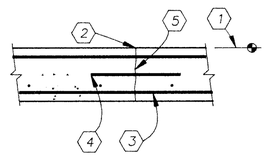


TYPICAL CONCRETE BEAM DETAIL
NTS



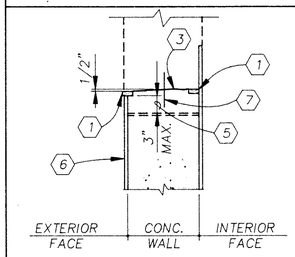
TYPICAL CONCRETE BEAM CONSTRUCTION JOINT
NTS

1. BEAM REINF. PER PLAN
2. CONSTRUCTION JOINT LOCATION PER G.S.N.
3. SHEAR REINF. EA. SIDE OF JOINT, SAME SIZE AS BEAM SHEAR REINF.
4. JOINT REINF.- #6 x 4'-2" AT 8" EACH FACE OF BEAM, CENTERED ON CONSTRUCTION JOINT (MIN. 2 BARS EACH FACE)



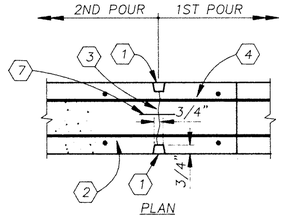
TYPICAL CONCRETE SLAB CONSTRUCTION JOINT
NTS

1. FINISH FLOOR ELEVATION
2. CONSTRUCTION JOINT LOCATION PER G.S.N.
3. SLAB REINF. PER PLAN, CONT. THRU JOINT
4. SLAB JOINT REINF., CNTR'D ON JOINT- #4 x 2'-0" AT 12"
5. ROUGHENED SURFACE



SECTION

HORIZ. CONSTRUCTION JOINT



PLAN

VERTICAL CONSTRUCTION JOINT

TYPICAL CONCRETE WALL CONSTRUCTION JOINT
NTS

1. CONT. WOOD STRIP
2. REINF. CONT. THRU JOINT
3. CLEAN & ROUGHENED SURFACE
4. CLASS B LAP SPLICE STAGGER ALTERNATE SPLICES HORIZ. LENGTH, MIN. ONE LAP
5. DIMENSION TO LAST FORM TIE
6. FORMING
7. 6" STEEL WATERSTOP

NOTE:
SEAL EXTERIOR WALL JOINTS AFTER STRIPPING FORMS.

NO.	DATE	REVISIONS	BY	APPR.

REGISTERED PROFESSIONAL ENGINEER
STEPHEN JOHN COX
No. C 043243
Exp. 3/31/92
CIVIL
STATE OF CALIFORNIA

DSGN	S.C.	CHKD	S.C.
DRWN	S.B.	SCALE	SHOWN

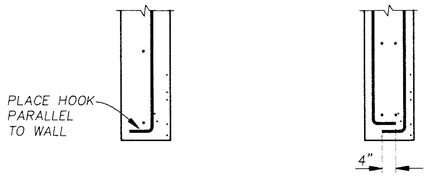
approved _____ date 1/15/92
approved _____ date

WINZLER & KELLY
CONSULTING ENGINEERS
495 TESCONI CIRCLE, #9 PARK CTR. SANTA ROSA, CA 95401 (707)523-1010

CITY OF ROHNERT PARK
WASTEWATER PUMP STATION IMPROVEMENTS
GENERAL STRUCTURAL NOTES AND TYPICAL DETAILS

JOB NO 90-848-A
SHEET S-1 / -

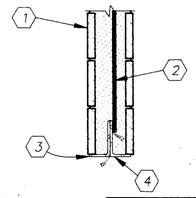
1
2
466 part 2
-



SINGLE CURTAIN DOUBLE CURTAIN

TYP. REINF. AT TOP, BOTTOM, SIDES OF OPENINGS AND WALL ENDS

NTS

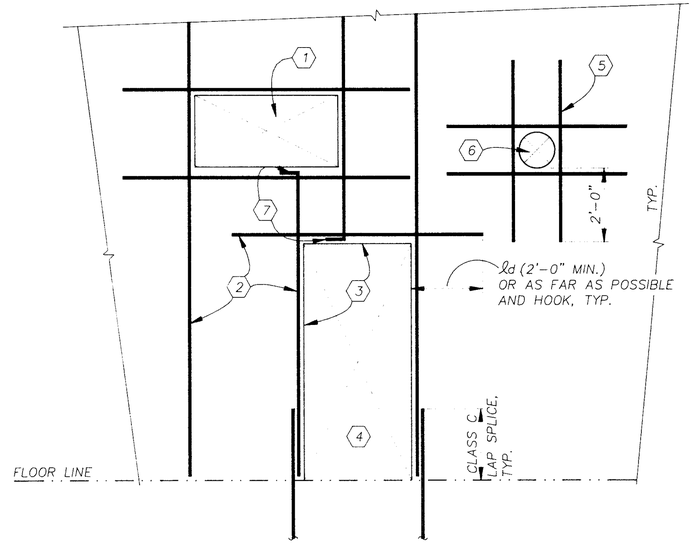


1. MASONRY WALL & REINF. PER PLAN
2. WELD VERTICAL REINFORCING TO LINTELS
3. SHORE LINTELS AT MIDSPAN WHEN SPAN EXCEEDS 6'-0"
4. DOUBLE ANGLE, SIZE PER CHART

OPENING WIDTH	ANGLES	BEARING EA. JAMB
3'-0"...5'-11"	3 1/2 x 3 1/2 x 1/4	4"
6'-0"...7'-11"	5 x 3 1/2 x 5/16 (LLV)	4"

TYPICAL MASONRY LINTEL

NTS



1. MISC. OPENING, 4'-0" MAX. DIM. BOTH WAYS
2. OPENING REINF. 2- #9
3. SEE "TYP. REINF. AT TOP, BOTTOM, SIDES OF OPENINGS AND WALL ENDS" DET., TYP.
4. DOOR OPENING, PER ARCH. DWGS.
5. #7 EF AT DOUBLE CURTAIN WALL REINF.
6. PIPE PENETRATION THRU WALL; MAX 12"ø PROVIDE SEAL RING PER MECHANICAL DRAWINGS
7. 90° HOOK, TYP.

NOTES:

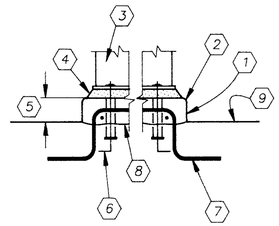
A) WHERE OPENINGS IN A HORIZ. LINE ARE CLOSER TOGETHER THAN THE WIDTH OF THE MAX. ADJACENT OPENING, PLACE HORIZ. OPENING REINF. CONT BETWEEN OPENINGS.

B) EXTEND VERT. OPENING REINF. CONT. FLOOR TO FLOOR OR FLOOR TO ROOF

C) WALL REINF. PER PLAN OR SCHED. BETWEEN OPENING REINF.

TYPICAL OPENINGS IN CONC. WALL

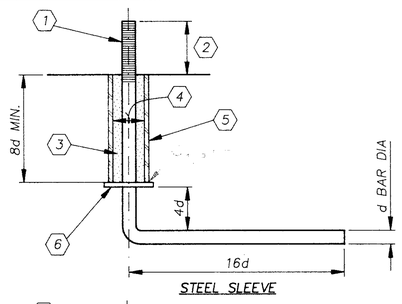
NTS



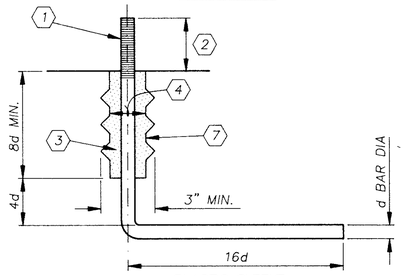
1. PAD SIZE PER PLAN OR AS REQUIRED BY EQUIPMENT MFR.
2. 3/4" TOOLED RADIUS EDGE
3. EQUIPMENT BASE
4. 1 1/2" GROUT
5. PER PLAN OR AS REQUIRED BY EQUIPMENT MFR., 4" MIN.
6. EQUIP. ANCHOR BOLTS W/SLEEVES
7. #4 ⌐¬ AT 12" EACH WAY, U.N.O.
8. ROUGHENED SURFACE
9. T/SLAB PER PLAN

TYPICAL EQUIPMENT PAD

NTS



STEEL SLEEVE



PLASTIC SLEEVE

1. ANCHOR BOLT SIZE AS SHOWN OR AS REQUIRED BY MFR.
2. PROJECTION AS REQUIRED
3. GROUT
4. d + 1", MIN.
5. STEEL SLEEVE
6. MALLEABLE IRON WASHER, 3"ø MIN.
7. ANCHOR BOLT SLEEVE

TYPICAL MACHINERY ANCHOR BOLT

NTS

NOTES:

A) FOR ROUND OPG USE CIRCUMSCRIBING RECT-ANGLE FOR REINF. APPLICATION.

B) PROVIDE EXTRA BARS (NOT SHOWN) PARALLEL TO SIDES OF OPGS EQUAL TO AREAS OF INTERRUPT-ED SLAB BARS. EXTEND FULL LENGTH OF SPAN AND/OR LENGTH OF TOP BARS AS APPLICABLE.

C) TYP. AT OPGS UP TO 4'-0" MAX., U.N.O.

1. 4'-0" MAX.
2. 1- #5 BAR AT TOP
3. 2- #5 BARS AT CENTER OF SLAB, TYP.
4. EXTEND BARS 2'-6" BEYOND SIDES OF OPENING OR AS FAR AS POSSIBLE & HOOK

TYP. REINF AT SMALL OPENINGS IN CONC. SLAB

NTS

1. BOND BEAM REINFORCING
2. METAL ANCHORS 1/8" X 1" GROUTED IN PLACE AT 16" IN MORTAR JOINTS (OMIT AT MCJT) 1" 8" 1"
3. CORNER BARS AS SHOWN W/LAP LENGTH PER G.S.N.

NOTE: DETAIL SIMILAR AT BOND BEAMS W/DOUBLE REINF.

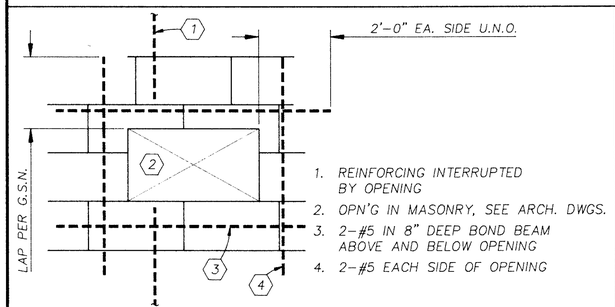
TYPICAL CORNER AND INTERSECTION OF MASONRY WALL

NTS

1. FINISH FLOOR ELEVATION
2. CONCRETE SLAB
3. AGGREGATE BASE COURSE
4. JOINT SEALANT
5. BONDBREAKER OR BACKUP ROD TO PREVENT BOND & KEEP SEALANT OUT OF JOINT
6. FIBERBOARD STRIP OR SAWCUT OR PREMOLDED PLASTIC INSERT (USE FIBERBOARD OR INSERT OPTION AT CONCEALED SLABS ONLY)
7. SAWCUT SLOT FOR JOINT SEALANT
8. SLAB REINF. PER PLAN, CUT REINF AT JOINT, PROVIDE GREASED PLAIN DOWEL BARS WHERE NOTED ON PLANS

TYP. CONTROL JOINT IN CONC. SLAB ON GRADE

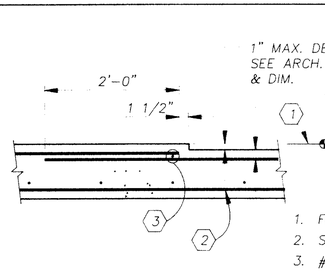
NTS



1. REINFORCING INTERRUPTED BY OPENING
2. OPN'G IN MASONRY, SEE ARCH. DWGS.
3. 2-#5 IN 8" DEEP BOND BEAM ABOVE AND BELOW OPENING
4. 2-#5 EACH SIDE OF OPENING

TYPICAL OPENINGS IN MASONRY WALL

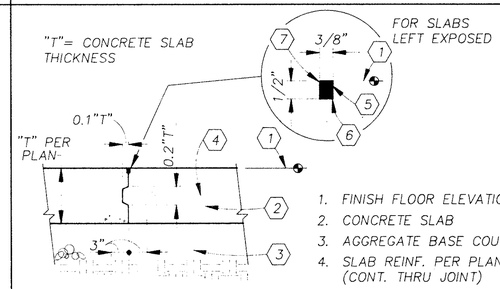
NTS



1. FLOOR ELEVATION, PER PLAN
2. SLAB REINFORCING PER PLAN
3. #5 CONT.

TYPICAL DEPRESSED SLAB

NTS



1. FINISH FLOOR ELEVATION
2. CONCRETE SLAB
3. AGGREGATE BASE COURSE
4. SLAB REINF. PER PLAN (CONT. THRU JOINT)
5. JOINT SEALANT
6. BONDBREAKER OR BACKUP ROD
7. SLOT FORMED FOR JOINT SEALANT BY REMOVABLE CAP

TYP. CONSTRUCTION JT. IN CONC. SLAB ON GRADE

NTS

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

NO.	DATE	REVISIONS	BY	APP'D

REGISTERED PROFESSIONAL ENGINEER — STEPHEN JOHN COX — No. C 043243 Exp. 3/31/92 — CIVIL — STATE OF CALIFORNIA

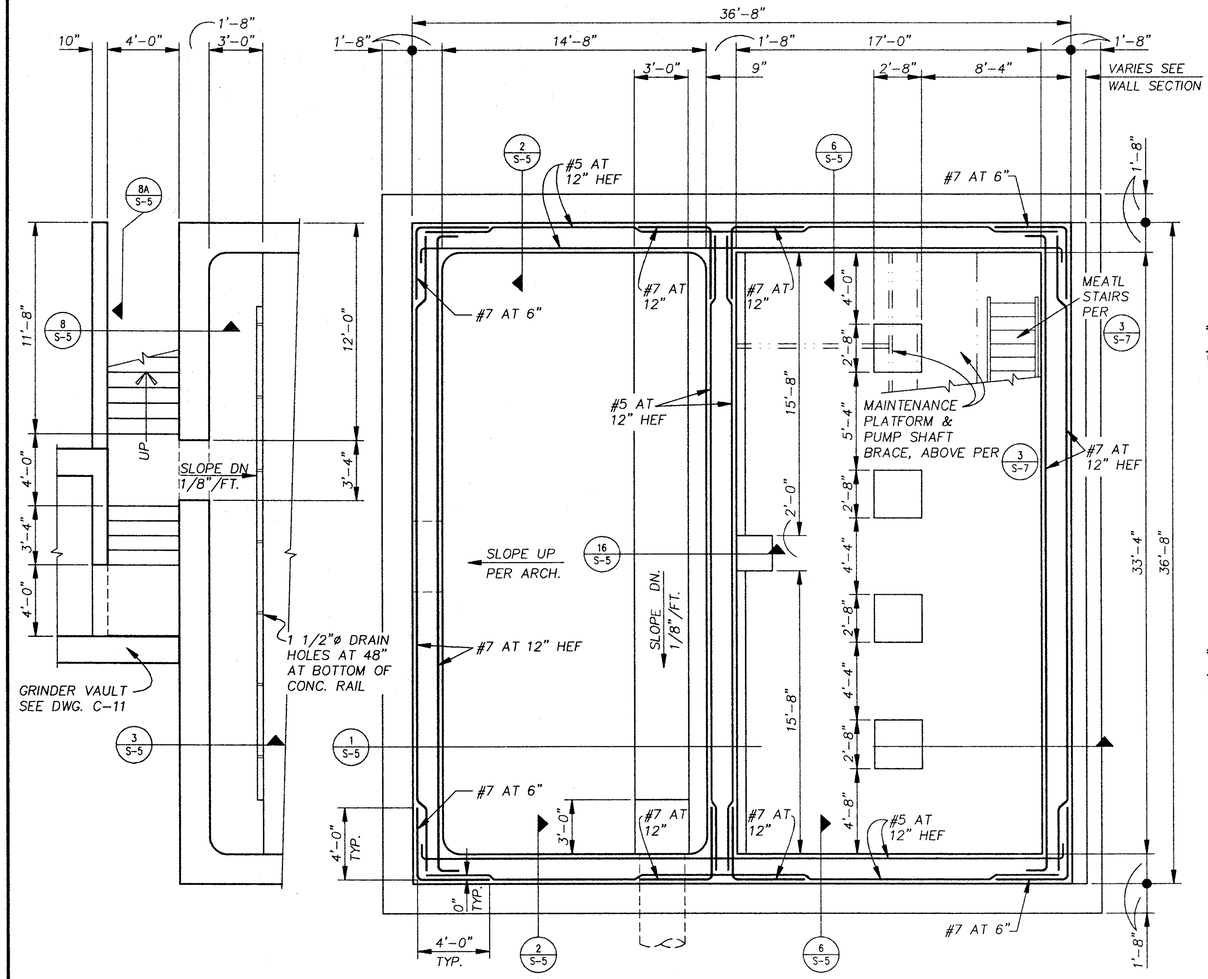
DSGN:	S.C.	CHKD	S.C.
DRWN:	S.B.	SCALE	SHOWN

approved — date 1/15/92
approved — date

WINZLER & KELLY
CONSULTING ENGINEERS
495 TESCONI CIRCLE, #9 PARK CTR. SANTA ROSA, CA 95401 (707)523-1010

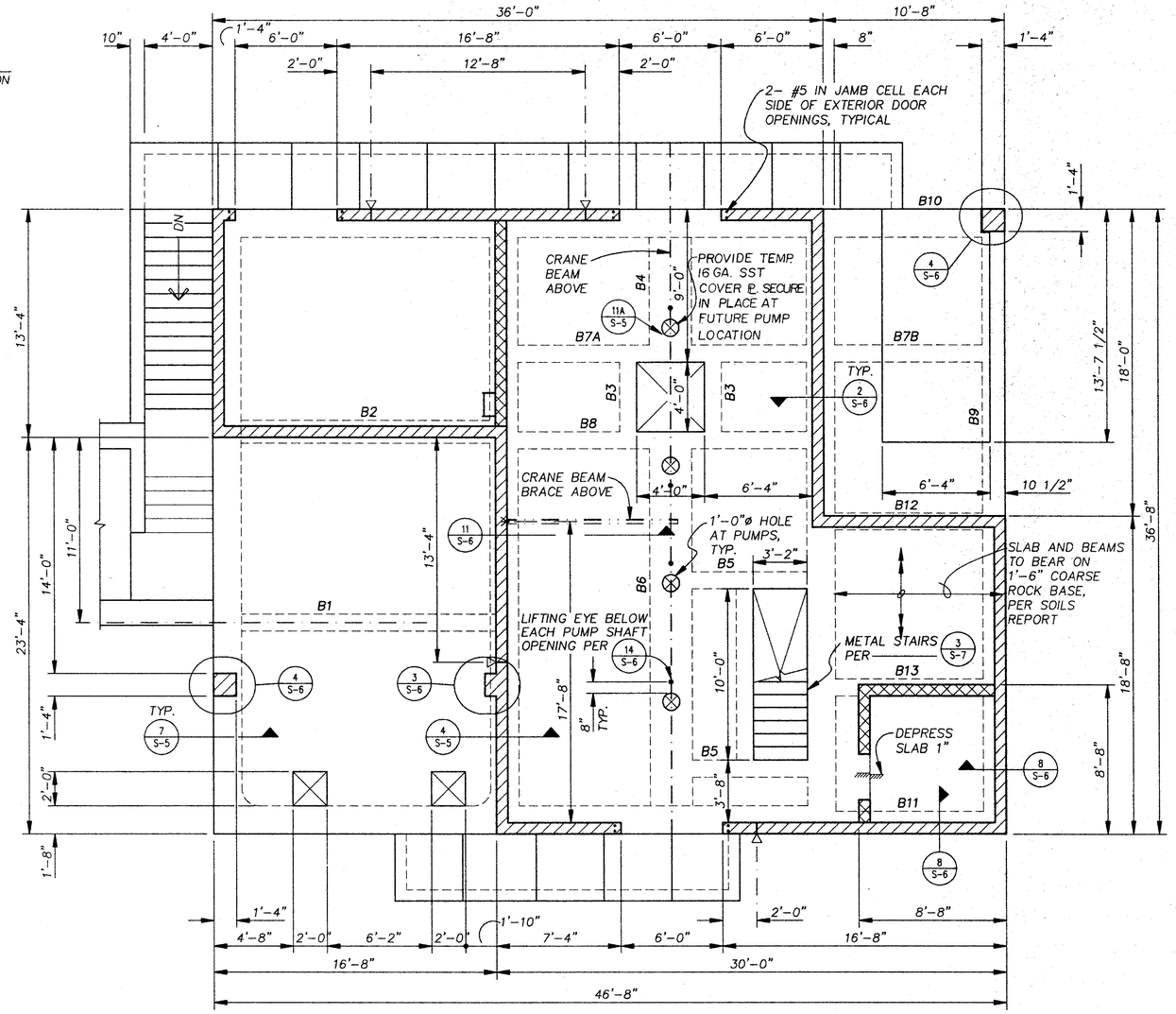
CITY OF ROHNERT PARK
WASTEWATER PUMP STATION IMPROVEMENTS
TYP. STRUCTURAL DETAILS

JOB NO. 90-848-A
SHEET S-2
-



PARTIAL PLAN AT PLATFORM

T/SLAB EL.(+)85'-3" 1/4"=1'-0"



FLOOR FRAMING PLAN

T/SLAB EL.(+)94'-0" 1/4"=1'-0"

FOUNDATION PLAN

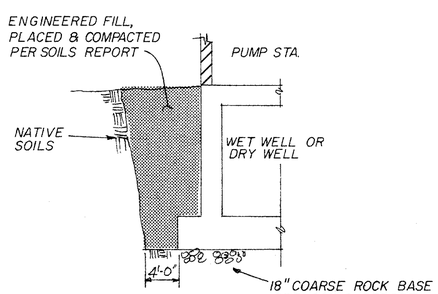
T/SLAB EL. VARIES 1/4"=1'-0"

NOTES:

1. BASE MAT AND VERTICAL WALL REINF. NOT SHOWN FOR CLARITY, SEE SECTIONS AND DETAILS.
2. BASE MAT SHALL BEAR ON 1'-6" OF COARSE ROCK BASE, PER SOILS REPORT
3. ▨ 8" STANDARD C.M.U.

GENERAL PLAN NOTES

1. REFER TO GENERAL STRUCTURAL NOTES AND TYPICAL DETAILS, SHEETS S-1 AND S-2 FOR ADDITIONAL INFORMATION NOT SHOWN.
2. REFER TO ARCH., MECH. & ELECTRICAL DWGS FOR ADDITIONAL INFORMATION, OPENINGS, ELEVATIONS AND DIMENSIONS NOT SHOWN.
3. △ INDICATES MASONRY CONTROL JOINT, SEE — 7 S-6
4. CONCRETE SLAB: 8" THICK W/#4 AT 12" TOP BARS AND #4 AT 10" BOTTOM BARS EACH WAY, TYP. U.N.O. PROVIDE 90ø STD. HOOKS AT ENDS OF BARS INTERRUPTED BY OPENINGS, TYP.
5. FOR BEAM SIZE AND REINF., SEE BEAM SCHEDULE — 11 S-5
6. REINF. AT TRANSITION OF 8" C.M.U. TO 6" C.M.U. PER — 5 S-6



1/— TYPICAL BACKFILL DETAIL N.T.S.

GRAPHIC SCALE
4' 0 4' 8'
1/4"=1'-0"

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

NO.	DATE	REVISIONS	BY	APPR.

REGISTERED PROFESSIONAL ENGINEER — STEPHEN JOHN BOX — No. C 045243 — Exp. 3/31/92 — CIVIL — STATE OF CALIFORNIA

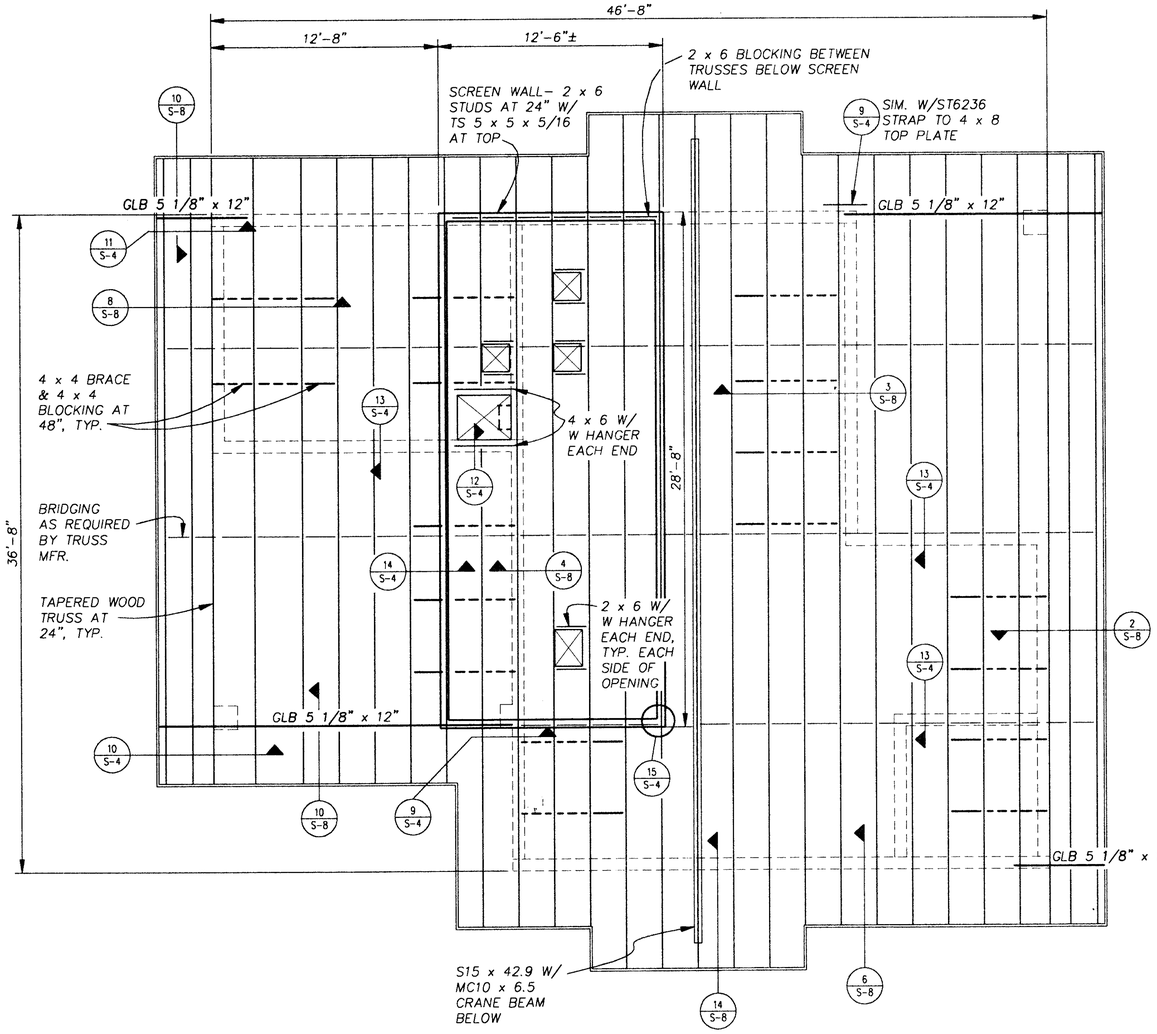
DSGN	S.C.	CHKD	S.C.
DRWN	S.B.	SCALE	SHOWN

approved Richard L. Kelly date 1/15/92
approved date

WINZLER & KELLY
CONSULTING ENGINEERS
495 TESCONI CIRCLE, #9 PARK CTR. SANTA ROSA, CA 95401 (707)523-1010

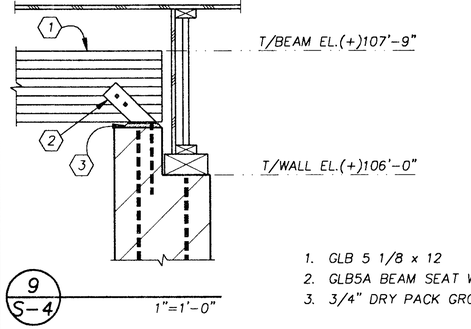
CITY OF ROHNERT PARK
WASTEWATER PUMP STATION IMPROVEMENTS
FOUNDATION, FLOOR FRAMING & PLATFORM FRAMING PLANS

JOB NO. 90-848-C
SHEET S-3 —



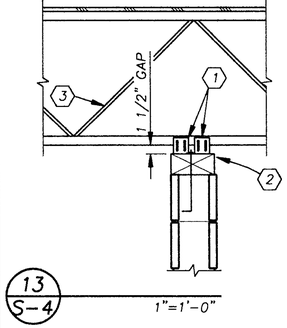
ROOF FRAMING PLAN

1/4"=1'-0"



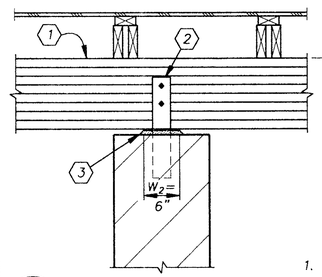
1. GLB 5 1/8 x 12
2. GLB5A BEAM SEAT W/2- 1/2"ø M.B.
3. 3/4" DRY PACK GROUT

9 S-4 — 1"=1'-0"



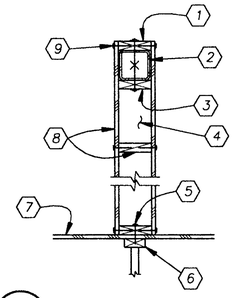
1. 2 DTC CLIPS AT EACH TRUSS
2. 4 x 8 LEDGER W/5/8"ø A.B. AT 48"
3. TAPERED TRUSS AT 24"

13 S-4 — 1"=1'-0"



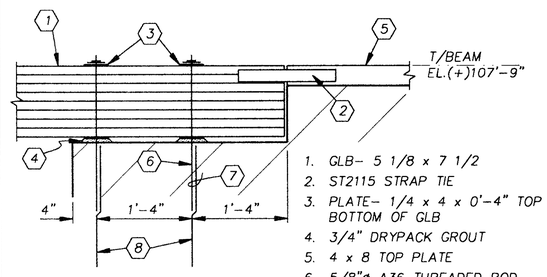
1. GLB 5 1/8 x 12
2. CB5 BASE W/2- 5/8"ø M.B.
3. 3/4" DRY PACK

10 S-4 — 1"=1'-0"



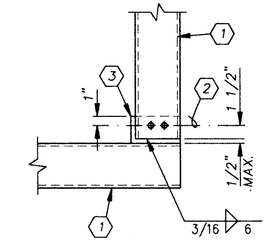
1. 2 x 6 TOP PLATE W/5/8"ø M.B. AT 24"
2. TS 5 x 5 x 5/16
3. 2 x 6 PLATE
4. 2 x 6 STUDS AT 24"
5. 16d AT 8"
6. TRUSS OR 2 x 6 BLOCKING BELOW WALL
7. PLYWOOD ROOF SHEATHING, SEE G.S.N.
8. 3/8" PLYWOOD SHEATHING EACH SIDE, BLOCK ALL SHEATHING PANEL EDGES W/SOLID 2 x BLOCKING
9. 8d AT 6" TYPICAL AT EDGES AND PANEL JOINTS, 8d AT 12" AT INTERMEDIATE MEMBERS

14 S-4 — 1"=1'-0"



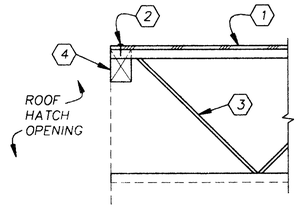
1. GLB- 5 1/8 x 7 1/2
2. ST2115 STRAP TIE
3. PLATE- 1/4 x 4 x 0'-4" TOP & BOTTOM OF GLB
4. 3/4" DRYPACK GROUT
5. 4 x 8 TOP PLATE
6. 5/8"ø A36 THREADED ROD
7. 30" LAP SPLICE
8. #5 VERTICAL IN GROUTED CELL, FULL HEIGHT OF WALL

11 S-4 — 1"=1'-0"



1. TS 5 x 5 x 5/16 AT TOP OF SCREEN WALL
2. 2- 5/8"ø A307 BOLTS
3. 1/4" SHEAR PLATE SLOT TS FOR CONNECTION

15 S-4 — 1 1/2"=1'-0"



1. PLYWOOD SHEATHING PER G.S.N.
2. BN
3. TAPERED TRUSS
4. 4 x 6 W/ W HANGER EACH END, NOTCH AT TRUSS BEARING

12 S-4 — 1"=1'-0"

16 S-4

GENERAL PLAN NOTES

1. REFER TO GENERAL STRUCTURAL NOTES AND TYPICAL DETAILS, SHEETS S-1 AND S-2 FOR ADDITIONAL INFORMATION NOT SHOWN.
2. REFER TO ARCH., MECHANICAL, & ELECTRICAL DRAWINGS FOR ADDITIONAL INFORMATION, ELEVATIONS & DIMENSIONS NOT SHOWN.

GRAPHIC SCALES

4' 0 4' 8' — 1/4"=1'-0"

1' 0 1' 2' — 1"=1'

0 1' 2" — 1 1/2"=1'

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

NO.	DATE	REVISIONS	BY	APPR.

REGISTERED PROFESSIONAL ENGINEER — STEPHEN JOHN COX — No. C 043243 — Exp. 3/31/92 — CIVIL — STATE OF CALIFORNIA

DSGN	S.C.	CHKD	S.C.
DRWN	S.B.	SCALE	SHOWN

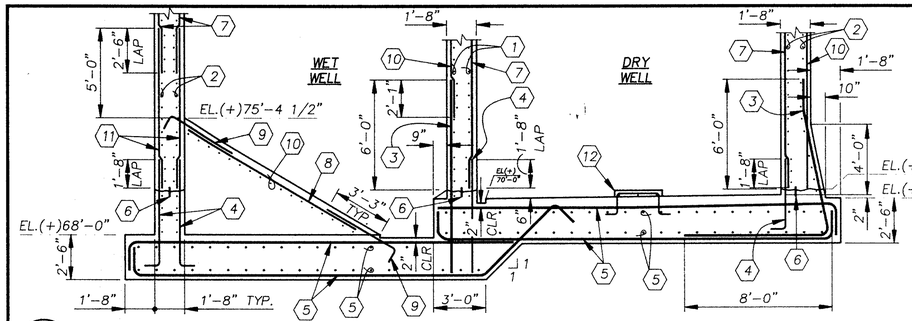
approved [signature] date 1/15/92

approved date

WINZLER & KELLY
CONSULTING ENGINEERS
495 TESCONI CIRCLE, #9 PARK CTR. SANTA ROSA, CA 95401 (707)523-1010

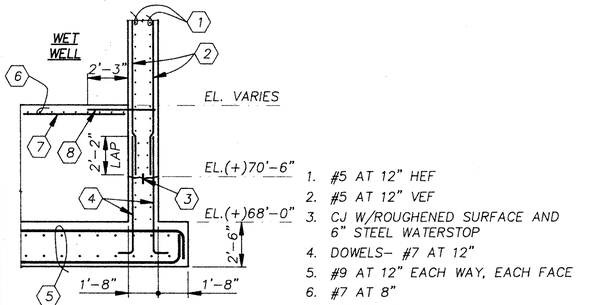
CITY OF ROHNERT PARK
WASTEWATER PUMP STATION IMPROVEMENTS
ROOF FRAMING PLAN & DETAILS

JOB NO. 90-848-C
SHEET S-4



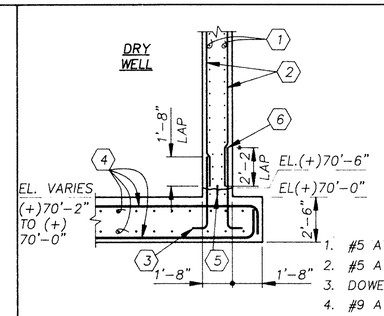
1 S-5 BASEMAT AND WALL SECTION
1/4"=1'-0"

1. #5 AT 12" HEF
2. #7 AT 12" HEF
3. DOWELS– #9 AT 12"
4. DOWELS– #5 AT 12"
5. #9 AT 12" EACH WAY, EACH FACE
6. CJ W/ROUGHENED SURFACE AND 6" STEEL WATERSTOP
7. #7 AT 12"
8. #7 AT 8"
9. DOWELS– #7 AT 8"
10. #5 AT 12"
11. #9 AT 12" VEF
12. CONC. PUMP PAD, LOC. PER PLAN



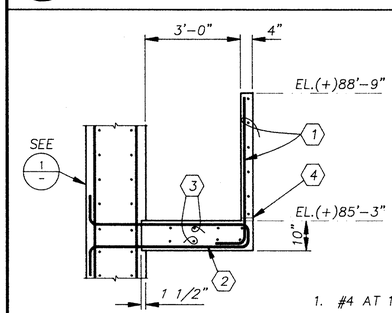
2 S-5 SECTION AT END WALL
1/4"=1'-0"

1. #5 AT 12" HEF
2. #5 AT 12" VEF
3. CJ W/ROUGHENED SURFACE AND 6" STEEL WATERSTOP
4. DOWELS– #7 AT 12"
5. #9 AT 12" EACH WAY, EACH FACE
6. #7 AT 8"
7. #5 AT 12"
8. DOWELS– #5 AT 12", EMBED 1'-3" MIN. INTO WALL



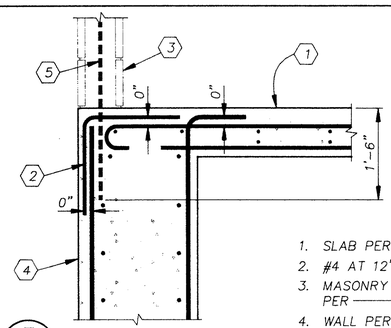
6 S-5 SECTION AT END WALL
1/4"=1'-0"

1. #5 AT 12" HEF
2. #5 AT 12" VEF
3. DOWELS– #5 AT 12"
4. #9 AT 12" EACH WAY, EACH FACE
5. CJ W/ROUGHENED SURFACE AND 6" STEEL WATERSTOP
6. DOWELS– #7 AT 12"



3 S-5 PLATFORM SECTION
1/2"=1'-0"

1. #4 AT 12" EACH WAY, CENTERED
2. #5 AT 8"
3. #7 AT 12" EACH FACE
4. DRAIN HOLES PER ARCH.



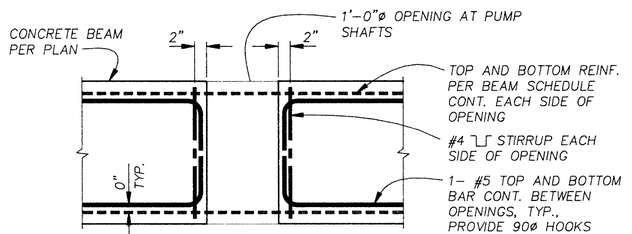
7 S-5 SECTION AT GROUND LEVEL
1"=1'-0"

1. SLAB PER PLAN
2. #4 AT 12"
3. MASONRY WALL WHERE OCCURS, PER 2/S-6
4. WALL PER FOUNDATION PLAN
5. #5 DOWEL TO MATCH AND LAP VERTICAL MASONRY WALL REINFORCING

BEAM SCHEDULE

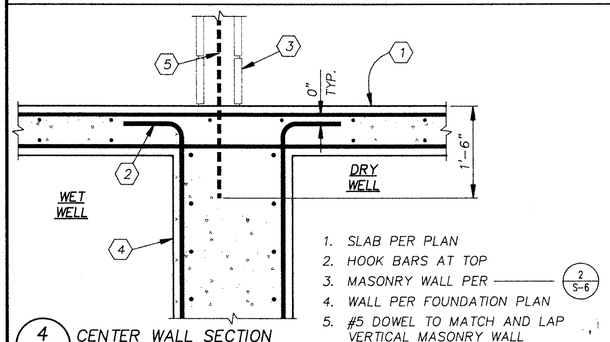
MARK	SIZE		BOTTOM BARS		TOP BARS	STIRRUP TIES			REMARKS
	WIDTH	DEPTH	"A" BARS	"B" BARS		SIZE	TYPE	SPACING FROM EACH END	
B1	12"	18"	2– #7	2– #7	4– #5	#3		1 AT 3 1/2", 9 AT 7"	
B2	12"	24"	2– #7	2– #7	4– #7	#4		1 AT 5", 7 AT 10"	
B3	12"	18"	2– #5		2– #5				
B4	30"	24"	2– #5	6– #5	4– #5				SEE DETAIL A
B5	12"	18"	2– #5		2– #5				
B6	30"	24"	2– #7	4– #7	4– #7	#4		1 AT 5", R AT 10"	SEE DETAIL A
B7A	12"	24"	2– #7		2– #7	#3		1 AT 5", 6 AT 10"	☐ STIRRUPS AT OPENING
B7B	12"	24"	2– #7		2– #7 CE 2– #5 DCE	#3		1 AT 5", 4 AT 10"	
B8	12"	24"	2– #7	1– #7	3– #7	#3		1 AT 5", R AT 10"	☐ STIRRUPS AT OPENING
B9	16"	30"	3– #9	2– #9	3– #7	#4	☐	1 AT 6", R AT 12"	"B" BAR SECOND LAYER
B10	20"	30"	3– #9		8– #9	#4	☐	1 AT 4", 4 AT 8", R AT 12"	TOP BARS IN TWO LAYERS
B11	20"	30"	3– #9		8– #9	#4	☐	1 AT 4", 4 AT 8", R AT 12"	TOP BARS IN TWO LAYERS T/BM EL(+)93'-11"
B12	12"	24"	2– #7		2– #7 CE 2– #5 DCE	#3		1 AT 5", 4 AT 10"	
B13	12"	24"	2– #7		2– #7 CE 2– #5 DCE	#3		1 AT 5", 4 AT 10"	

NOTES:
1. REFER TO G.S.N. AND ALL TYPICAL DETAILS INCLUDING "TYPICAL CONCRETE BEAM DETAIL"
2. DCE=DISCONTINUOUS END, CE=CONTINUOUS END, R=REST



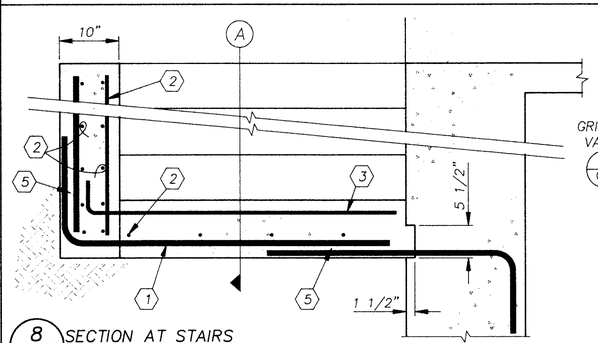
DETAIL A (AT PUMP SHAFT)

11 S-5



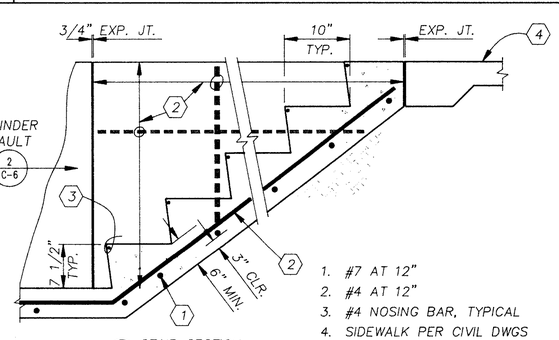
4 S-5 CENTER WALL SECTION
1"=1'-0"

1. SLAB PER PLAN
2. HOOK BARS AT TOP
3. MASONRY WALL PER 2/S-6
4. WALL PER FOUNDATION PLAN
5. #5 DOWEL TO MATCH AND LAP VERTICAL MASONRY WALL REINFORCING



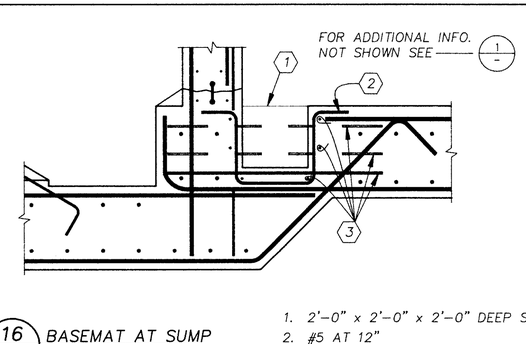
8 S-5 SECTION AT STAIRS
1"=1'-0"

NOTE: SEE DWG C-11 FOR ADD'L INFO.



A STAIR SECTION

1. #7 AT 12"
2. #4 AT 12"
3. #4 NOSING BAR, TYPICAL
4. SIDEWALK PER CIVIL DWGS
5. CLASS C LAP



16 S-5 BASEMAT AT SUMP
1/2"=1'-0"

1. 2'-0" x 2'-0" x 2'-0" DEEP SUMP
2. #5 AT 12"
3. 3– #5 x 6'-0" EA. SIDE OF SUMP

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

GRAPHIC SCALES
1/4" = 1'-0"
1/2" = 1'-0"
1" = 1'

NO.	DATE	REVISIONS	BY	APPR.

REGISTERED PROFESSIONAL ENGINEER
STEPHEN JOHN COX
No. C 043243
Exp. 3/31/92
CIVIL
STATE OF CALIFORNIA

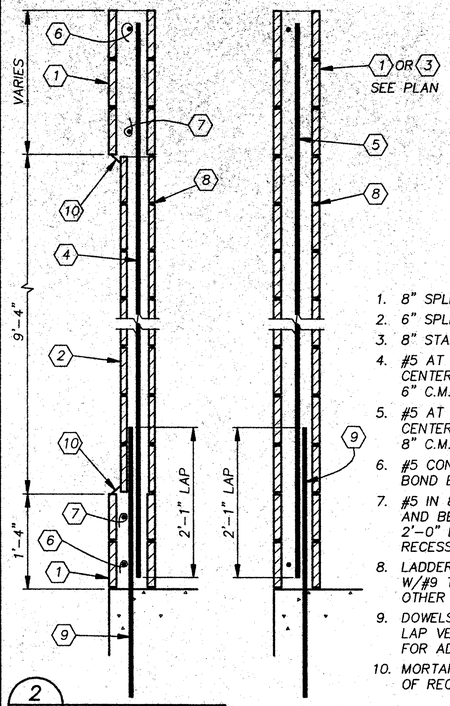
DSGN	S.C.	CHKD	S.C.
DRWN	S.B.	SCALE	SHOWN

approved date 1/15/92
approved date

WINZLER & KELLY
CONSULTING ENGINEERS
495 TESCONI CIRCLE, #9 PARK CTR. SANTA ROSA, CA 95401 (707)523-1010

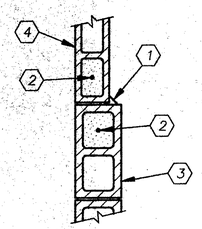
CITY OF ROHNERT PARK
WASTEWATER PUMP STATION IMPROVEMENTS
STRUCTURAL DETAILS

JOB NO. 90-848-A
SHEET S-5 –



1. 8" SPLIT FACE C.M.U.
2. 6" SPLIT FACE C.M.U.
3. 8" STANDARD C.M.U.
4. #5 AT 24" VERTICAL CENTERED IN CELL OF 6" C.M.U.
5. #5 AT 24" VERTICAL CENTERED IN CELL OF 8" C.M.U.
6. #5 CONTINUOUS IN 8" BOND BEAM
7. #5 IN 8" BOND BEAM ABOVE AND BELOW TO EXTEND MIN. 2'-0" BEYOND EDGES OF RECESSED PANELS
8. LADDER TYPE JOINT REINF.- W/#9 TIE WIRES AT EVERY OTHER COURSE
9. DOWELS TO MATCH AND LAP VERTICAL REINF., FOR ADD'L INFO SEE (4 & 7 / S-5)
10. MORTAR WASH, FOUR SIDES OF RECESSED PANEL

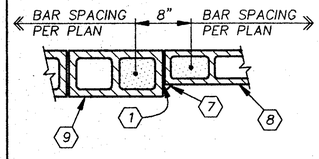
2 / S-6 — 1"=1'-0"



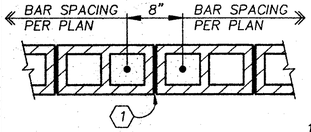
NOTE: FOR CONDITION AT MASONRY CONTROL JOINT SEE (7 / -)

1. MORTAR WASH
2. PROVIDE #5 VERTICAL IN GROUTED CELL EACH SIDE OF TRANSITION FROM 8" TO 6"
3. 8" SPLIT FACE C.M.U.
4. 6" SPLIT FACE C.M.U.

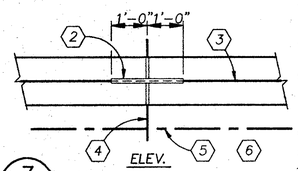
5 / S-6 — 1"=1'-0"



PLAN AT 8" C.M.U TO 6" C.M.U. TRANSITION



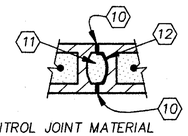
PLAN AT 8" C.M.U. TO 8" C.M.U



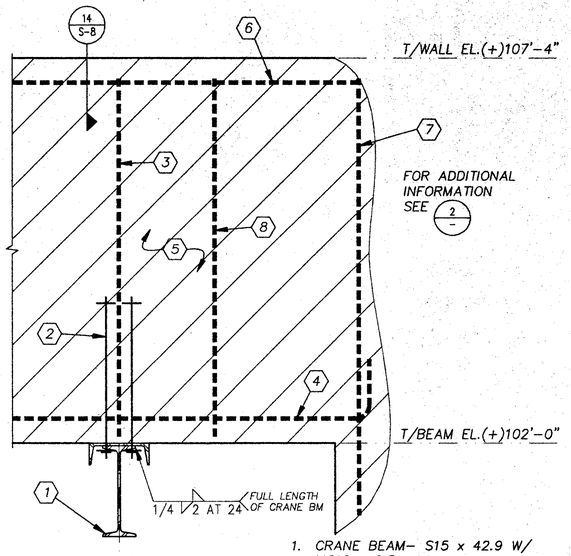
ELEV.

7 / S-6 — NO SCALE

ALTERNATIVE METHOD



1. CONTROL JOINT MATERIAL AND SEALANT
2. SLEEVE TO BREAK BOND
3. CONT. BOND BM. W/REINF. CONT. THRU CONTROL JOINT
4. CONTROL JOINT MATERIAL NOT TO EXTEND THRU BD BM.
5. HORIZONTAL JOINT REINF. DISCONTINUED AT CONTROL JT.
6. VERTICAL REINF. NOT SHOWN IN ELEVATION FOR CLARITY
7. MORTAR WASH
8. 6" C.M.U.
9. 8" C.M.U.
10. JOINT SEALANT
11. GROUT VOID SOLID
12. BUILDING PAPER



1. CRANE BEAM- S15 x 42.9 W/ MC10 x 6.5
2. 2- 3/4"ø x 24" LONG A.B.
3. 2- #5 VERTICAL AT A.B.
4. 2- #5 BOTTOM BARS
5. SOLID GROUT LINTEL
6. 2- #5 CONT. TOP BARS IN 8" BOND BEAM
7. 2- #5 VERTICAL IN CELL ADJACENT TO JAMB
8. #5 VERTICAL AT 24"

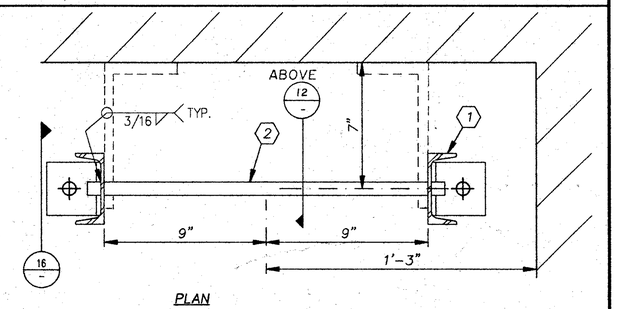
10 / S-6 — 1"=1'-0"

1. CRANE BEAM- S15 x 42.9
2. MC10 x 6.5 CONTINUOUS
3. L 2 1/2 x 2 1/2 x 3/16 W/2- 1/2"ø M.B.
4. PLATE- 1/4 x 3 x 0'-3" W/ 3/4"ø EXP. BOLT INTO GROUTED CELL

11 / S-6 — 1"=1'-0"

13 / S-6

14 / S-6



PLAN

1. RAIL- C4 x 5.4
2. RUNG- BAR 3/4"ø AT 12"

15 / S-6 — 3"=1'-0"

1. #5 VERTICAL EACH CELL
2. 2- #5 VERTICAL
3. MORTAR WASH
4. #2 AT 8" IN MORTAR JOINTS

3 / S-6 — 1"=1'-0"

1. #5 VERTICAL EACH CELL
2. #2 AT 8" IN MORTAR JOINTS

4 / S-6 — 1"=1'-0"

EL.(+)94'-0"

NOTE: FOR ADDITIONAL INFORMATION NOT SHOWN SEE (7 / 5-5)

1. DEPRESS BEAM TOP BARS AND TOP OF STIRRUPS AS REQUIRED
2. SLAB REINF. PER PLAN
3. BEAM PER PLAN

8 / S-6 — 1"=1'-0"

EL.(+)105'-8" & (+)99'-8" AT PUMP STATION

EL.(+)12'-0" & (+)6'-0" AT MAINTENACE BUILDING

1. RAIL- C4 x 5.4
2. L8 x 4 x 1/2 x 0'-3"
3. 3/4"ø EXPANSION BOLT W/ MIN. 4" EMBEDMENT

12 / S-6 — 3"=1'-0"

1. RAIL- C4 x 5.4
2. L3 x 3 x 1/4 W/1- 3/4"ø EXPANSION BOLT W/ MIN. 4" EMBEDMENT

16 / S-6 — 3"=1'-0"

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

GRAPHIC SCALES
0 1'
3" = 1'
1' 0 1' 2'
1" = 1'

NO.	DATE	REVISIONS	BY	APPR.

REGISTERED PROFESSIONAL ENGINEER — STEPHEN JOHN COX — No. C 043243 — Exp. 3/31/92 — CIVIL — STATE OF CALIFORNIA

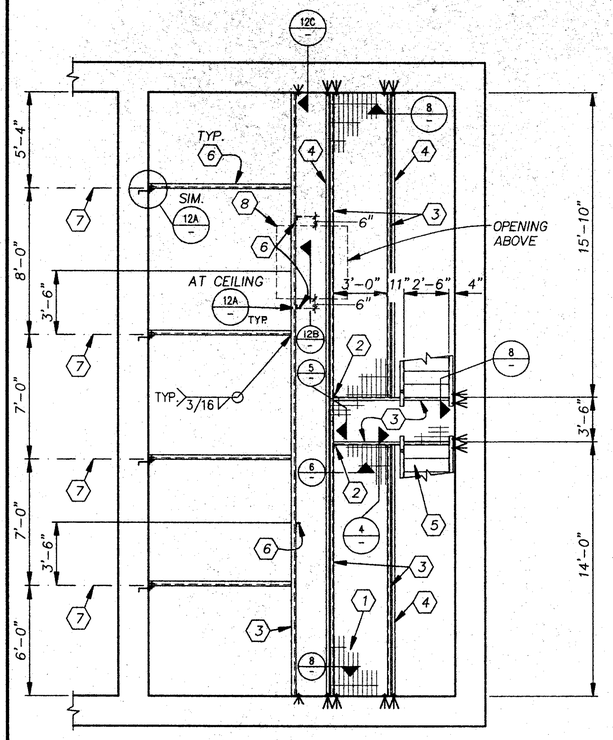
DSGN	S.C.	CHKD	S.C.
DRWN	S.B.	SCALE	SHOWN

approved — date 1/15/92
approved — date

WINZLER & KELLY
CONSULTING ENGINEERS
495 TESCONI CIRCLE, #9 PARK CTR. SANTA ROSA, CA 95401 (707)523-1010

CITY OF ROHNERT PARK
WASTEWATER PUMP STATION IMPROVEMENTS
STRUCTURAL DETAILS

JOB NO. 90-848-A
SHEET S-6 / -

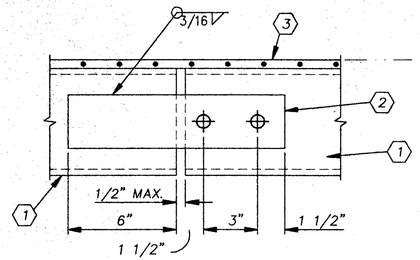


PLAN–MAINTENANCE PLATFORM

T/GRATING EL.(+)

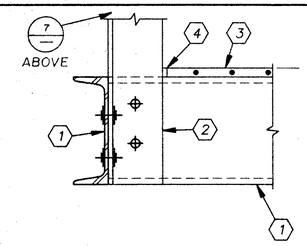
1. GRATING
2. SUPPORT FROM CEILING L 3 x 3 x 1/4– SEE (7/–)
3. C9 x 13.4
4. 42" HIGH FIXED HANDRAIL W/ TOE BOARD
5. STAIRS– SEE (10/–)
6. L 3 x 3 x 1/4 HANGER
7. CENTERLINE OF PUMP SHAFT
8. REMOVABLE SECTION OF C9x13.4 W/ BOLTED CONNECTION EA. END PER (5/–) SIM.

3/S-7 1/4"=1'-0"



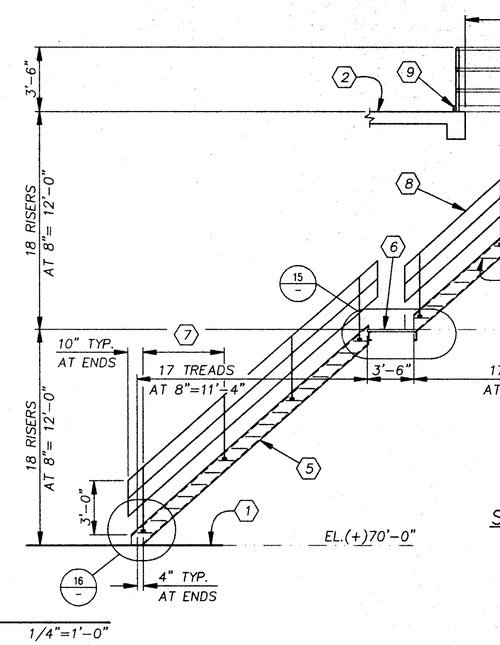
1. C 9 x 13.4
2. PLATE– 3/16 x 3 W/2– 5/8"ø BOLTS IN HORIZ. SLOTTED HOLES
3. GRATING

5/S-7 3"=1'-0"



1. C 9 x 13.4
2. L 3 x 3 x 1/4 W/2– 5/8"ø BOLTS TO EACH CHANNEL STAGGER BOLTS
3. GRATING
4. BAND BAR

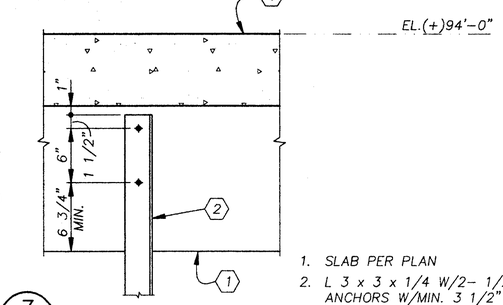
6/S-7 3"=1'-0"



STAIR ELEVATION

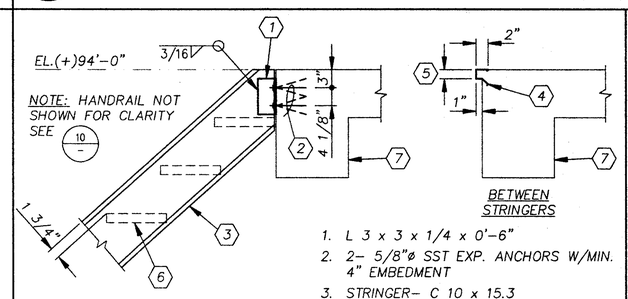
1. DRY WELL FLOOR
2. CONTROL ROOM FLOOR
3. 1" NOSING, TYPICAL
4. STAIR TREAD
5. STRINGER– C 10 x 15.3
6. GRATING
7. EQUAL SPACING 5'–0" MAX.
8. FIXED HANDRAIL– FOR ADDITIONAL INFORMATION SEE (16/A-5)
9. TOE BOARD

10/S-7 1/4"=1'–0"



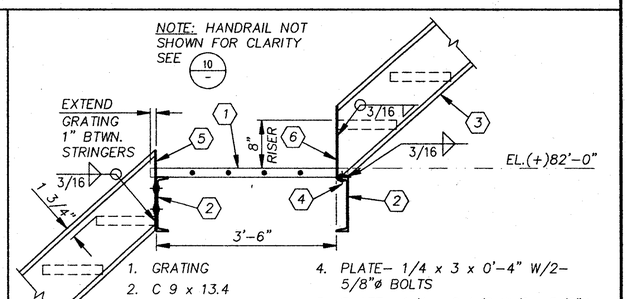
1. SLAB PER PLAN
2. L 3 x 3 x 1/4 W/2– 1/2"ø SST EXP. ANCHORS W/MIN. 3 1/2" EMBEDMENT
3. BEAM PER PLAN

7/S-7 1 1/2"=1'–0"



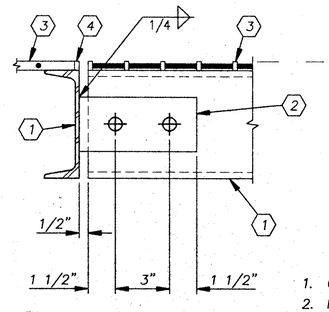
1. L 3 x 3 x 1/4 x 0'–6"
2. 2– 5/8"ø SST EXP. ANCHORS W/MIN. 4" EMBEDMENT
3. STRINGER– C 10 x 15.3
4. 14 GA. SST METAL NOSING
5. TREAD THICKNESS
6. STAIR TREAD
7. BEAM PER PLAN

11/S-7 1"=1'–0"



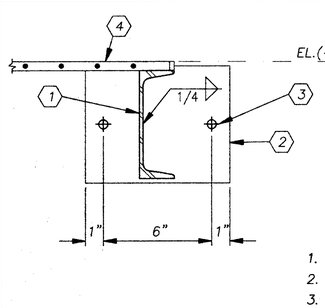
1. GRATING
2. C 9 x 13.4
3. STRINGER– C10x 15.3
4. PLATE– 1/4 x 3 x 0'–4" W/2– 5/8"ø BOLTS
5. PLATE– 1/4 x 2 1/2 W/2– 5/8"ø BOLTS
6. END PLATE– 3/16"
7. STAIR TREAD

15/S-7 1"=1'–0"



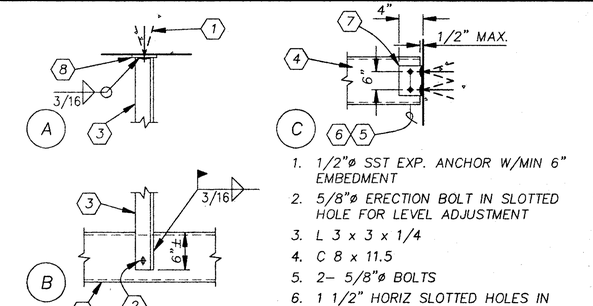
1. C 9 x 13.4
2. PLATE– 3/16 x 6 W/2– 5/8"ø BOLTS
3. GRATING
4. BAND BAR

4/S-7 3"=1'–0"



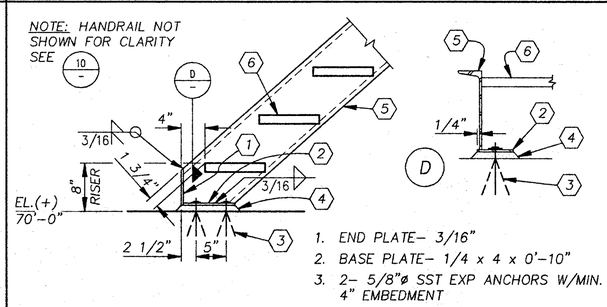
1. C 9 x 13.4
2. PLATE– 1/4 x 9 1/4 x 0'–8"
3. 2– 1/2"ø SST EXPANSION ANCHORS W/MIN. 3 1/2" EMBEDMENT
4. GRATING

8/S-7 3"=1'–0"



1. 1/2"ø SST EXP. ANCHOR W/MIN 6" EMBEDMENT
2. 5/8"ø ERECTION BOLT IN SLOTTED HOLE FOR LEVEL ADJUSTMENT
3. L 3 x 3 x 1/4
4. C 8 x 11.5
5. 2– 5/8"ø BOLTS
6. 1 1/2" HORIZ SLOTTED HOLES IN CHANNEL
7. L 4 x 3 x 1/4 x 0'–8" W/ 2– 1/2"ø SST EXP. ANCHORS W/MIN. 6" EMBED
8. PLATE 3/16 x 4 x 0'–4"

12/S-7 1"=1'–0"

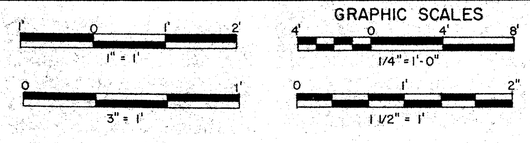


1. END PLATE– 3/16"
2. BASE PLATE– 1/4 x 4 x 0'–10"
3. 2– 5/8"ø SST EXP ANCHORS W/MIN. 4" EMBEDMENT
4. 3/4"± GROUT
5. STRINGER– C 10 x 15.3
6. STAIR TREAD

16/S-7 1"=1'–0' & 1 1/2"=1'–0"

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

GRAPHIC SCALES



NO.	DATE	REVISIONS	BY	APPR.

REGISTERED PROFESSIONAL ENGINEER
STEPHEN JOHN COX
No. C 043243
Exp. 3/31/92
CIVIL
STATE OF CALIFORNIA

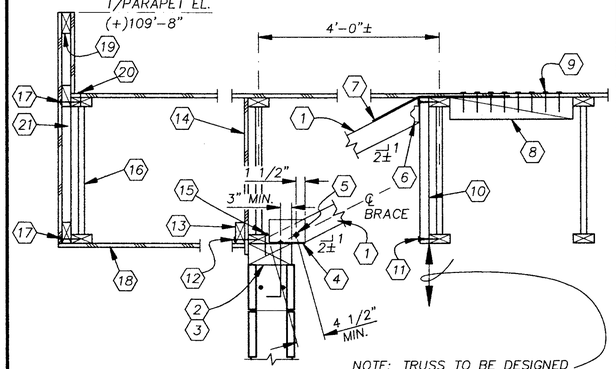
DSGN	S.C.	CHKD	S.C.
DRWN	S.B.	SCALE	SHOWN

approved _____ date 1/15/92
approved _____ date _____

WINZLER & KELLY
CONSULTING ENGINEERS
495 TESCONI CIRCLE..#0 PARK CTR. SANTA ROSA, CA 95401 (707)523-1010

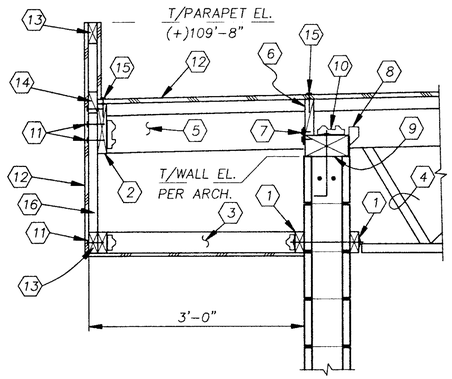
CITY OF ROHNERT PARK
WASTEWATER PUMP STATION IMPROVEMENTS
STRUCTURAL DETAILS

JOB NO. 90-848-A
SHEET S-7



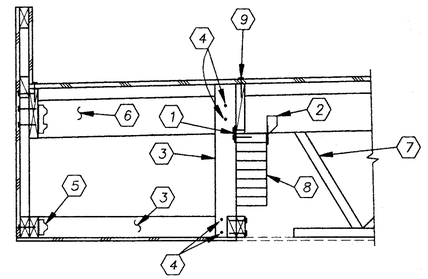
1. 4 x 4 BRACE AT 48"
2. 4 x 8 TOP PLATE
3. 3/4"ø A.B. AT 48"
4. L 4 x 4 x 1/4 x 0'-6"
5. 5/8"ø M.B.
6. A34 EACH SIDE
7. LSTA 24 CENTER OVER TRUSS
8. 4 x 4 BLOCKING
9. 7– 10d NAILS, PLYWOOD TO BLOCKING
10. 2 x 8
11. 2– 1/4"ø x 5" LAG SCREWS, TO TOP & BOTTOM CHORD OF TRUSS
12. 16d AT 8"
13. 2 x 4 NAILER
14. 5/8" PLYWD SHEATHING W/8d AT 6" TO TOP & BOTTOM CHORD OF TRUSS
15. 16d AT 4"
16. TAPERED TRUSS AT 24"
17. 2– 12d FN AT EACH STUD
18. PLYWOOD SHEATHING– SEE G.S.N.
19. 2 x 4 CONT. TOP & BOTTOM
20. BN
21. 2 x 4 AT 24"

2 / S-8 — 1"=1'-0"



1. 2 x 4 LEDGER W/5/8"ø A.B. AT 48"
2. 2 x 8 W/A35 TO EACH TRUSS OUTRIGGER
3. 2 x 4 AT 24" W/A34 EA. END
4. TAPERED TRUSS AT 24"
5. DOUBLE 2 x 6 TRUSS OUTRIGGER, BY TRUSS MFR.
6. 2 x BLOCKING BETWEEN TRUSSES
7. A35F AT 24"
8. H3 AT EACH TRUSS
9. 4 x 8 TOP P W/3/4"ø A.B. AT 48"
10. A35 AT EACH TRUSS
11. 2– 12d FN AT EACH STUD
12. PLYWOOD SHEATHING– SEE G.S.N.
13. 2 x 4 CONT. TOP & BOTTOM
14. 2 x 4 BLOCKING BETWEEN STUDS W/12d AT 12" FN TO 2 x 8
15. BN
16. 2 x 4 AT 24"

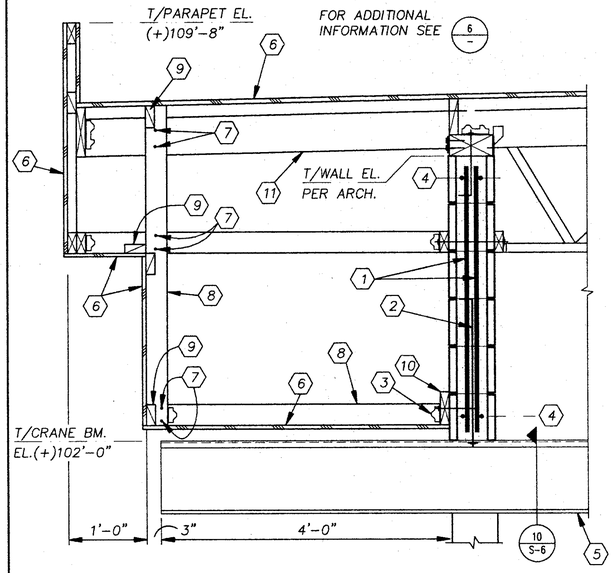
6 / S-8 — 1"=1'-0"



FOR ADDITIONAL INFORMATION SEE 6/–

1. A35F AT 24"
2. H3 AT EACH TRUSS
3. 2 x 4 AT 24"
4. 2– 12d FN
5. A34 CLIP
6. 2– 2 x 6 TRUSS OUTRIGGERS BY TRUSS MFR.
7. TAPERED TRUSS AT 24"
8. GLB 5 1/8 x 12
9. BN

10 / S-8 — 1"=1'-0"



1. 2– #5 VERT. AT A.B.
2. 2– 3/4"ø x 24" LONG A.B.
3. A34 CLIP EACH END
4. 2– #5
5. CRANE BEAM– S15 x 42.9 W/ MC10 x 6.5
6. PLYWOOD SHEATHING– SEE G.S.N.
7. 2– 12d FN
8. 2 x 4 AT 24"
9. 2 x BLOCKING
10. 2 x 6 LEDGER W/5/8"ø A.B. AT 48"
11. DOUBLE 2 x 6 TRUSS OUTRIGGERS BY TRUSS MFR

14 / S-8 — NTS

3 / S-8 — 1"=1'-0"

7 / S-8

11 / S-8

15 / S-8

4 / S-8 — 1"=1'-0"

8 / S-8

12 / S-8

16 / S-8

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

GRAPHIC SCALE
1' 0 1' 2'
1" = 1'

NO.	DATE	REVISIONS	BY	APPR.

REGISTERED PROFESSIONAL ENGINEER — STEPHEN JOHN COX — No. C 043243 — Exp. 3/31/92 — CIVIL — STATE OF CALIFORNIA

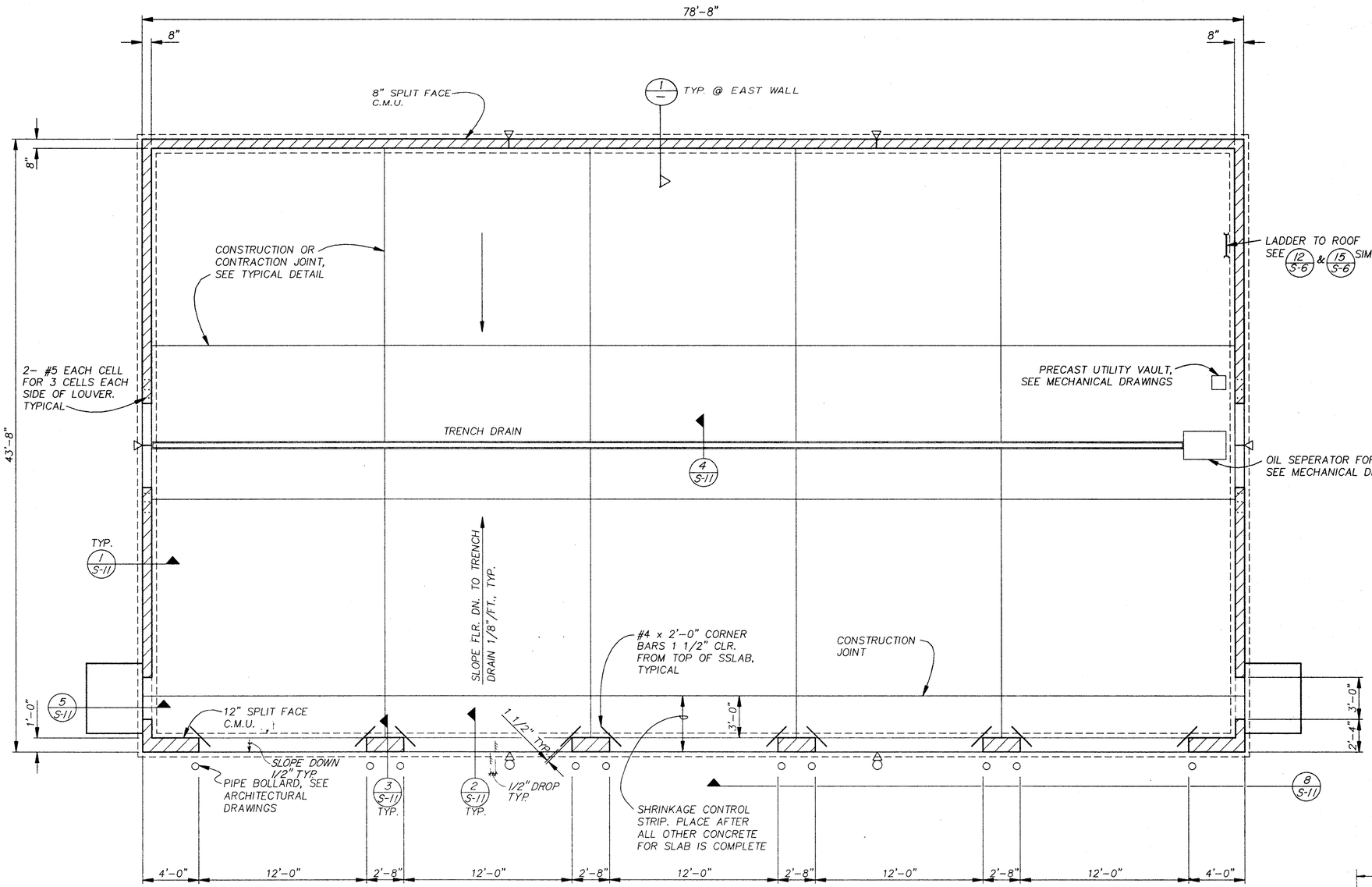
DSGN	S.C.	CHKD	S.C.
DRWN	S.B.	SCALE	SHOWN

approved — date 4/15/92
approved — date

WINZLER & KELLY
CONSULTING ENGINEERS
495 TESCONI CIRCLE, #9 PARK CTR. SANTA ROSA, CA 95401 (707)523-1010

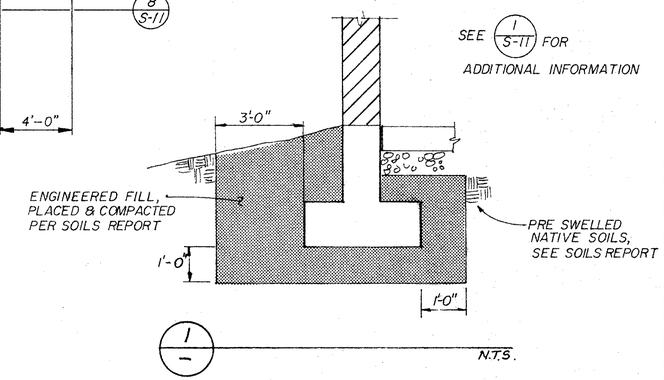
CITY OF ROHNERT PARK
WASTEWATER PUMP STATION IMPROVEMENTS
STRUCTURAL DETAILS

JOB NO. 90-848-A
SHEET S-8 / –



GENERAL PLAN NOTES

1. REFER TO GENERAL STRUCTURAL NOTES AND TYPICAL DETAILS, SHEETS S-1 AND S-2 FOR ADDITIONAL INFORMATION NOT SHOWN
2. REFER TO ARCHITECTURAL, MECHANICAL AND ELECTRICAL DRAWINGS FOR ADDITIONAL INFORMATION, ELEVATIONS, AND DIMENSIONS NOT SHOWN
3. △ INDICATES MASONRY CONTROL JOINT, SEE 7/S-6
4. △ INDICATES MASONRY CONTROL JOINT ABOVE, SEE 7/S-6
5. CONCRETE SLAB ON GRADE: 6" THICK W/ WWF 6 x 6– W2.9 x W2.9 ON 8" COARSE DRAIN ROCK PER SOILS REPORT.
6. MASONRY WALL REINFORCING:
   8" C.M.U.: #5 AT 24" VERTICAL, #5 AT 10'-0" HORIZONTAL, 2– #6 HORIZONTAL AT TOP OF WALL
   12" C.M.U.: 2– #5 AT 8" VERTICAL, SOLID GROUTED. FOR ADDITIONAL INFO SEE, 8/S-11 SEE PLAN AND GENERAL STRUCTURAL NOTES FOR JOINT REINFORCING AND ADDITIONAL REINFORCING REQUIREMENTS.



FOUNDATION PLAN

T/SLAB EL.(+)0"–0" 1/4"=1'-0"

GRAPHIC SCALE
4' 0 4' 8'
1/4" = 1'-0"

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

NO.	DATE	REVISIONS	BY	APPR.

REGISTERED PROFESSIONAL ENGINEER
STEPHEN JOHN COX
No. C 043243
Exp. 3/31/92
CIVIL
STATE OF CALIFORNIA

DSGN	G.G.	CHKD	S.C.
DRWN	S.B.	SCALE	SHOWN

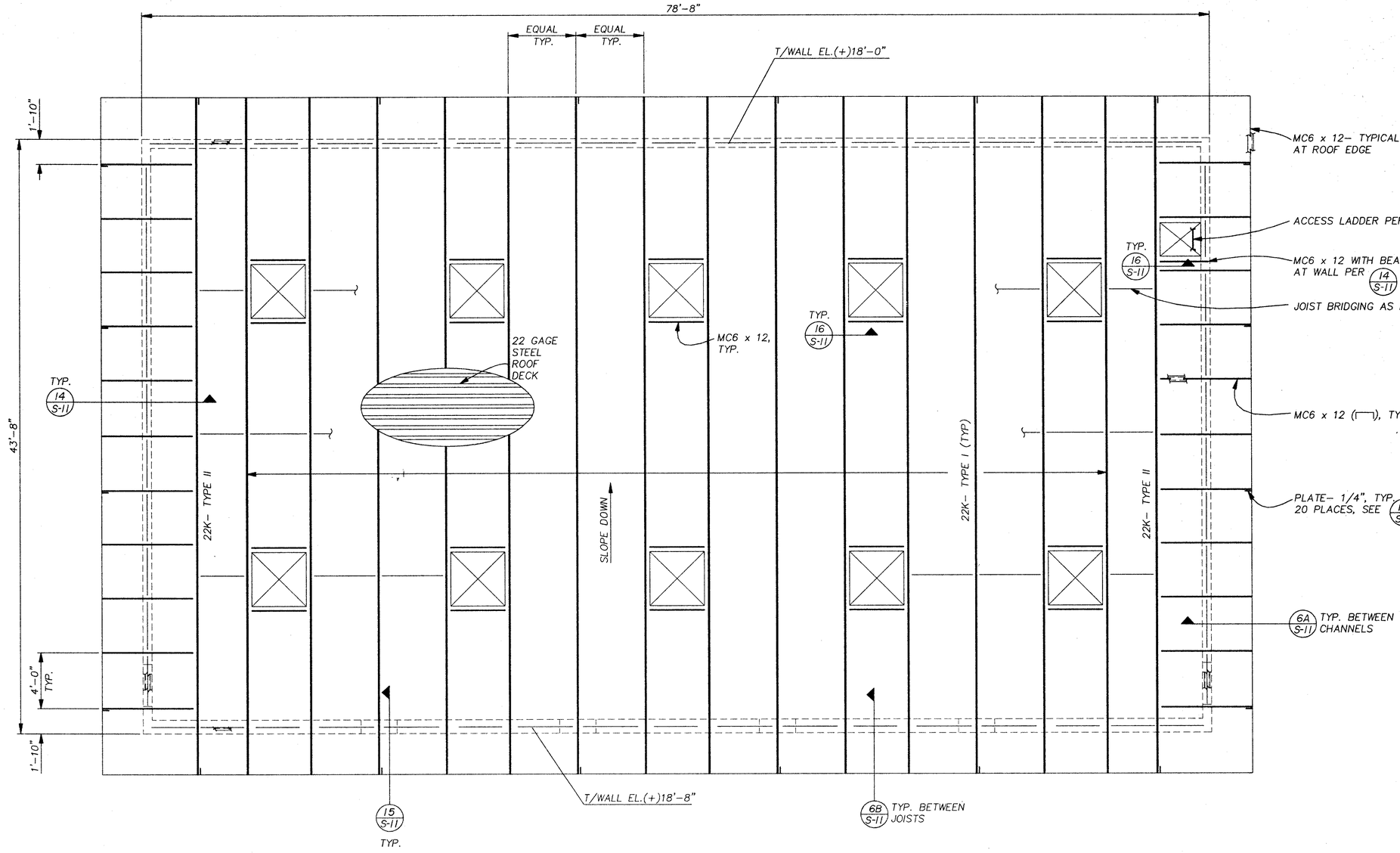
approved [signature] date 1/15/92
approved date

WINZLER & KELLY
CONSULTING ENGINEERS
495 TESCONI CIRCLE, #9 PARK CTR. SANTA ROSA, CA 95401 (707)523-1010

CITY OF ROHNERT PARK
WASTEWATER PUMP STATION IMPROVEMENTS
MAINTENANCE BUILDING FOUNDATION PLAN

JOB NO. 90-848-C
SHEET S-9 —

DWG. NO. 848CS09



GENERAL PLAN NOTES

1. REFER TO GENERAL STRUCTURAL NOTES AND TYPICAL DETAILS, SHEETS S-1 AND S-2 FOR ADDITIONAL INFORMATION NOT SHOWN
2. REFER TO ARCHITECTURAL, MECHANICAL AND ELECTRICAL DRAWINGS FOR ADDITIONAL INFORMATION, ELEVATIONS, AND DIMENSIONS NOT SHOWN
3. DESIGN LOADS:

   ROOF DL = 18.0 PSF
   ROOF LL = 20.0 PSF

   SEISMIC AND WIND LOADS PER GENERAL STRUCTURAL NOTES.
4. FOR LOADING DIAGRAMS OF STEEL JOISTS, SEE 10 S-11
5. STEEL ROOF DECK AND CONNECTIONS SHALL PROVIDE A MINIMUM DIAPHRAGM SHEAR CAPACITY OF 480 PLF

ROOF FRAMING PLAN

1/4"=1'-0"

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

GRAPHIC SCALE
4' 0 4' 8'
1/4" = 1'-0"

NO.	DATE	REVISIONS	BY	APPR.

REGISTERED PROFESSIONAL ENGINEER
STEPHEN JOHN [illegible]
No. C 043243
Exp. 3/31/92
CIVIL
STATE OF CALIFORNIA

DSGN	G.G.	CHKD	S.C.
DRWN	S.B.	SCALE	SHOWN

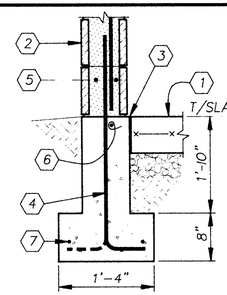
approved [signature] date 1/15/92
approved date

WINZLER & KELLY
CONSULTING ENGINEERS
495 TESCONI CIRCLE.,#9 PARK CTR. SANTA ROSA, CA 95401 (707)523-1010

CITY OF ROHNERT PARK
WASTEWATER PUMP STATION IMPROVEMENTS
MAINTENANCE BUILDING ROOF FRAMING PLAN

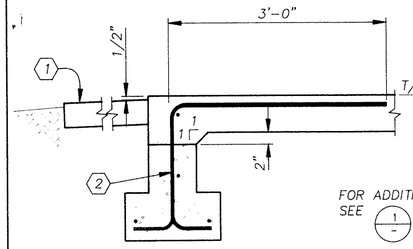
JOB NO. 90-848-C
SHEET S-10

DWG. NO. 848CS10



1. SLAB PER PLAN
2. WALL PER PLAN
3. 1/4" PREMOLDED JOINT FILLER W/SEALANT
4. #5 DOWELS TO MATCH AND LAP VERT. WALL REINFORCING SPACING– ALTERNATE HOOKS
5. 2– #5 IN 8" DEEP BOND BEEM
6. #4 CONTINUOUS
7. 2– #4 CONTINUOUS

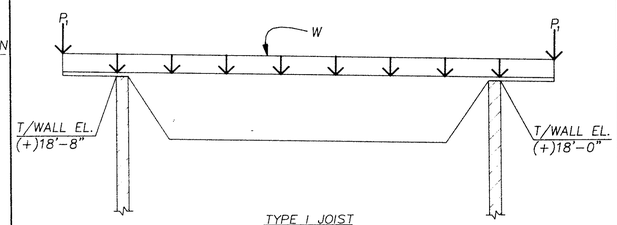
1 S-11 — 1"=1'-0"



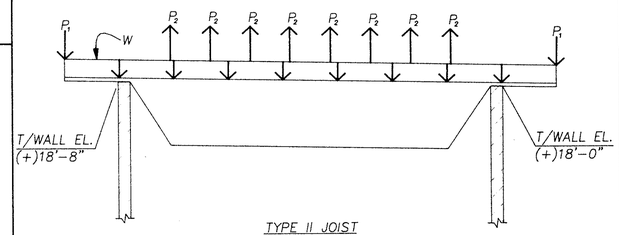
FOR ADDITIONAL INFORMATION SEE 1/–

1. CONCRETE STOOP PER PLAN
2. #4 AT 12"

5 S-11 — 1"=1'-0"



TYPE I JOIST

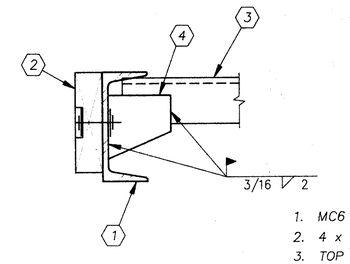


TYPE II JOIST

	DL	LL	W_{NET}
P1 (LBS)	440	0	–
P2 (LBS)	220	120	–
W (LB/FT)	90	100	–55

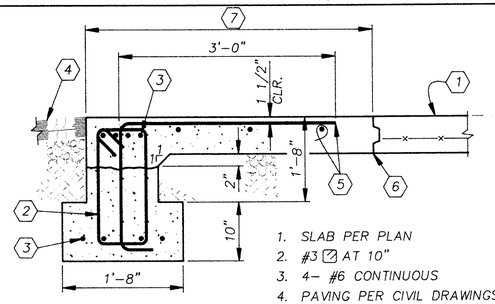
1. DL = ROOF DEAD LOAD
2. LL = ROOF LIVE LOAD
3. W_{NET} = NET UPLIFT FROM WIND = 0.75DL– (WIND UPLIFT)

10 S-11 — NTS



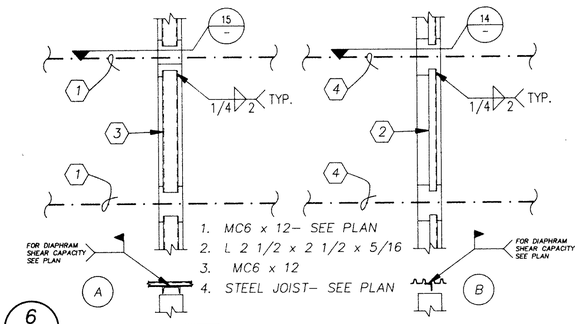
1. MC6 x 12 x CONT.
2. 4 x 6 CONTINUOUS
3. TOP CHORD OF TRUSS OR MC6 x 12 PER PLAN
4. PLATE– 1/4", SEE PLAN FOR LOCATION

13 S-11 — 3"=1'-0"



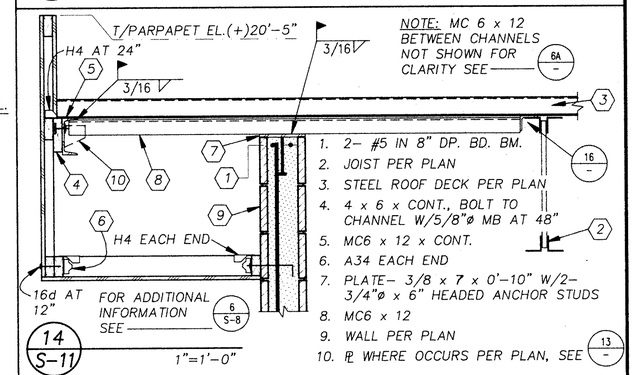
1. SLAB PER PLAN
2. #3 ⊘ AT 10"
3. 4– #6 CONTINUOUS
4. PAVING PER CIVIL DRAWINGS
5. #4 AT 12" EACH WAY
6. CONSTRUCTION JOINT
7. SHRINKAGE CONTROL STRIP, SEE PLAN

2 S-11 — 1"=1'-0"



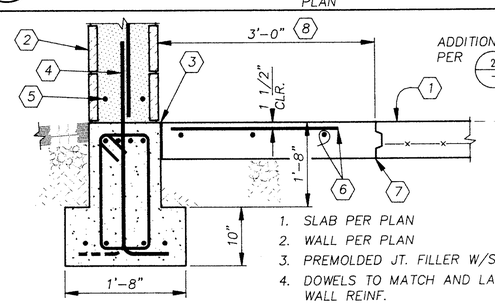
1. MC6 x 12– SEE PLAN
2. L 2 1/2 x 2 1/2 x 5/16
3. MC6 x 12
4. STEEL JOIST– SEE PLAN

6 S-11 — 1/2"=1'-0"



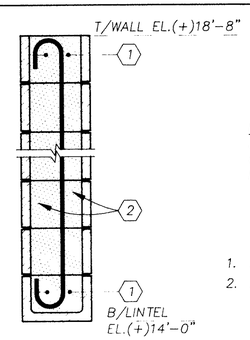
1. 2– #5 IN 8" DP. BD. BM.
2. JOIST PER PLAN
3. STEEL ROOF DECK PER PLAN
4. 4 x 6 x CONT., BOLT TO CHANNEL W/5/8"ø MB AT 48"
5. MC6 x 12 x CONT.
6. A34 EACH END
7. PLATE– 3/8 x 7 x 0'-10" W/2– 3/4"ø x 6" HEADED ANCHOR STUDS
8. MC6 x 12
9. WALL PER PLAN
10. ℄ WHERE OCCURS PER PLAN, SEE 13/–

14 S-11 — 1"=1'-0"



1. SLAB PER PLAN
2. WALL PER PLAN
3. PREMOLDED JT. FILLER W/SEALANT
4. DOWELS TO MATCH AND LAP VERT. WALL REINF.
5. 2– #5 IN 8" DEEP BOND BEAM
6. #4 AT 12" EACH WAY
7. CONSTRUCTION JOINT
8. SHRINKAGE CONTROL STRIP, SEE PLAN

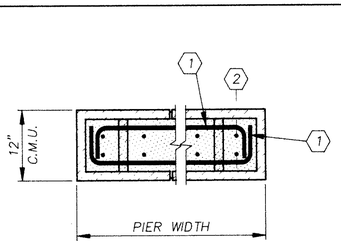
3 S-11 — 1"=1'-0"



NOTE: JOIST BEARING AND ROOF OVERHANG NOT SHOWN FOR CLARITY

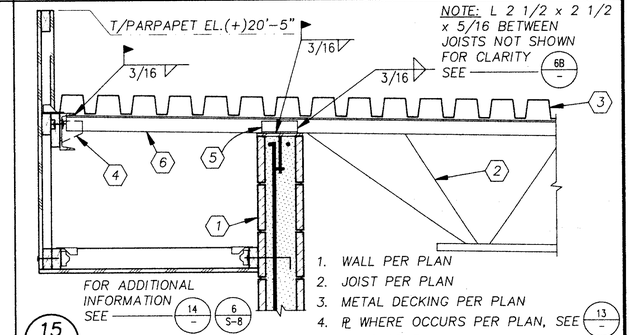
1. 2– #6 CONTINUOUS
2. 2– #5 AT 32"

7 S-11 — 1"=1'-0"



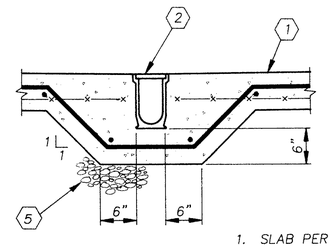
1. 2– #5 IN 8" DEEP BOND BEAM
2. 2– #5 EACH CELL

11 S-11 — 1"=1'-0"



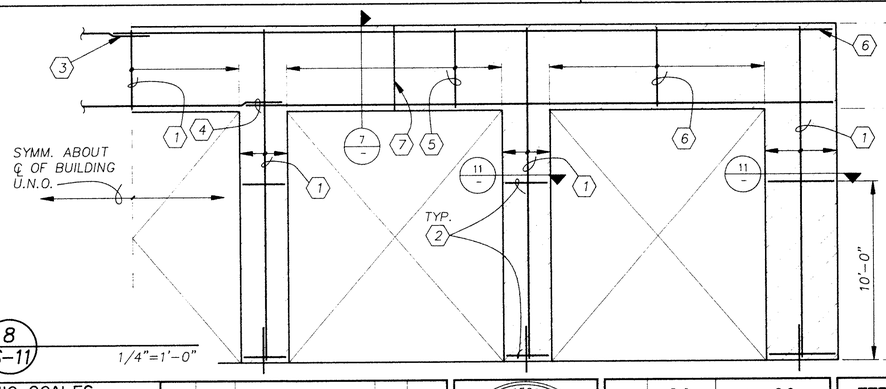
1. WALL PER PLAN
2. JOIST PER PLAN
3. METAL DECKING PER PLAN
4. ℄ WHERE OCCURS PER PLAN, SEE 13/–
5. JOIST SEAT
6. JOIST TOP CHORD EXTENSION

15 S-11 — 1"=1'-0"



1. SLAB PER PLAN
2. TRENCH DRAIN– SEE SHEET M-8
3. #4 CONTINUOUS, TYP.
4. #4 AT 12" 2'-0" 2'-0"
5. 8" COARSE ROCK BASE

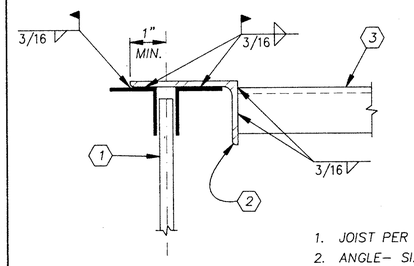
4 S-11 — 1"=1'-0"



1. 2– #5 EACH CELL
2. 2– #5 HORIZ. IN 8" DEEP BOND BEAM– TYPICAL
3. SPLICE BARS AT MIDSPAN
4. SPLICE BARS AT SUPPORTS
5. #5 AT 32"
6. 2– #6 CONTINUOUS IN 8" DEEP BOND BEAM
7. MASONRY CONTROL JOINT, SEE PLAN

NOTE: SOLID GROUT ALL MASONRY SHOWN

8 S-11 — 1/4"=1'-0"

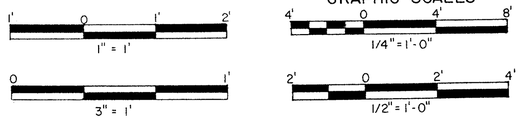


1. JOIST PER PLAN
2. ANGLE– SIZE AS REQUIRED, 1/4" MIN. THICKNESS
3. FRAMING PER PLAN

16 S-11 — 3"=1'-0"

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

GRAPHIC SCALES



NO.	DATE	REVISIONS	BY	APPR.

REGISTERED PROFESSIONAL ENGINEER — STEPHEN JOHN COX — No. C 043243 — Exp. 3/31/92 — CIVIL — STATE OF CALIFORNIA

DSGN	S.C.	CHKD	S.C.
DRWN	S.B.	SCALE	SHOWN

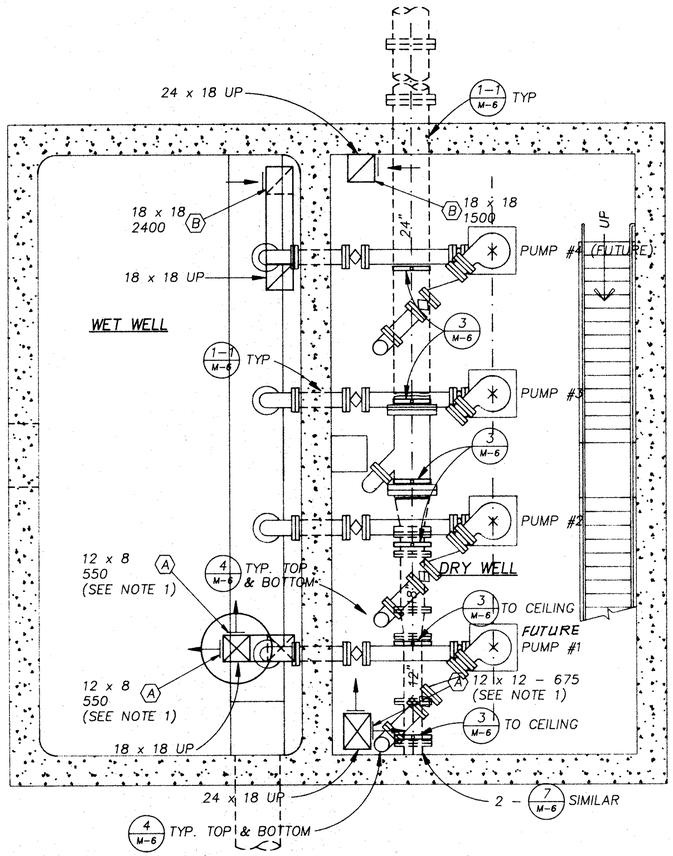
approved — date 1/15/92
approved — date

WINZLER & KELLY
CONSULTING ENGINEERS
495 TESCONI CIRCLE, #9 PARK CTR. SANTA ROSA, CA 95401 (707)523-1010

CITY OF ROHNERT PARK
WASTEWATER PUMP STATION IMPROVEMENTS
MAINTENANCE BUILDING STRUCTURAL DETAILS

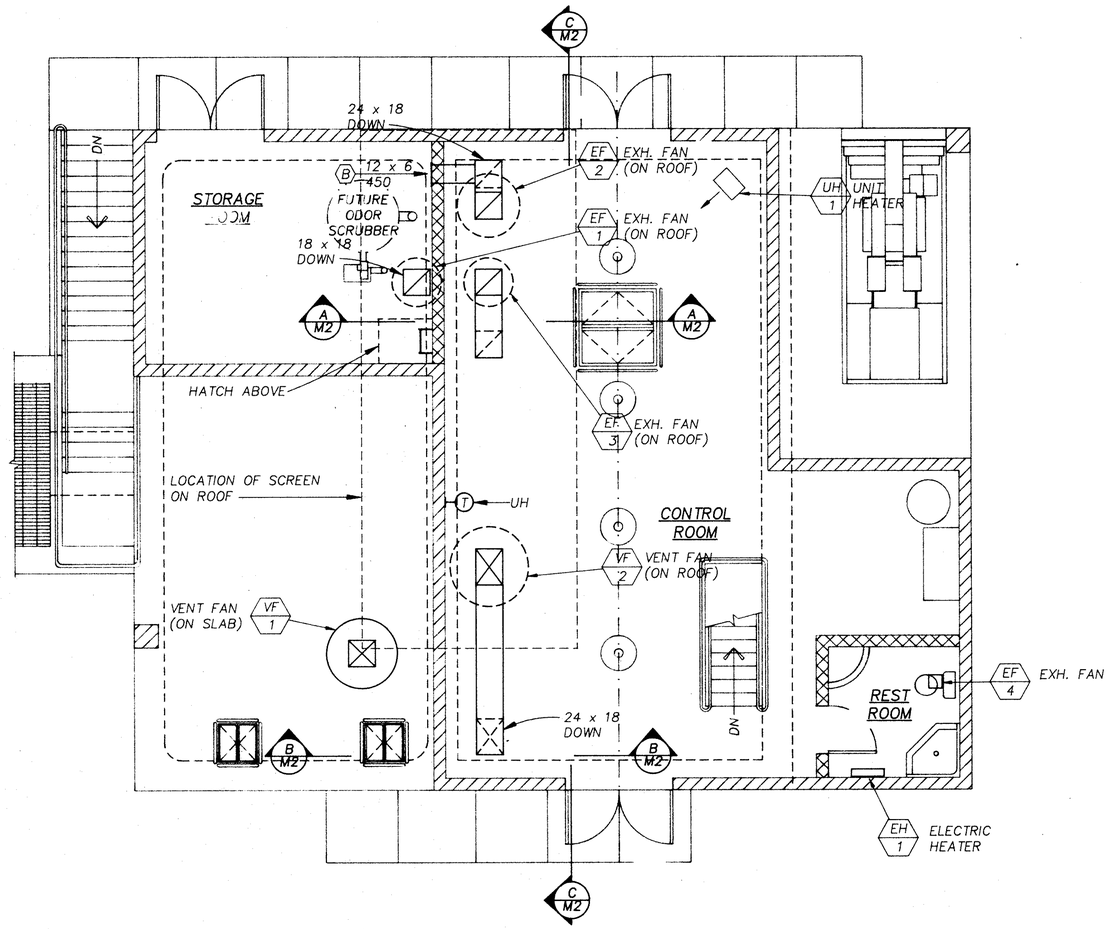
JOB NO. 90-848-C
SHEET S-11 / –

DWG. NO. 848CS11



DRY WELL & WET WELL FLOOR PLAN

1/4"=1'-0"



CONTROL ROOM FLOOR PLAN

FIN. FL. EL.(+)94'-0"

1/4"=1'-0"

NOTE: DISCHARGE MANIFOLD MAY BE FLANGED DUCTILE IRON OR FUSION DIPPED EPOXY STEEL. ALL SUCTION PIPE AND VALVES TO BE 12" WITH REDUCER AT PUMP IF REQUIRED. ALL DISCHARGE PIPE AND VALVES TO BE 12" EXCEPT 10" AT 50HP PUMP. PROVIDE REDUCER IF REQUIRED. PROVIDE FLEXIBLE COUPLING AT SUCTION AND DISCHARGE.

SHEET NOTES:

1. 2-GRILLES REQUIRED, MOUNTED AT HIGH & LOW LEVEL, SEE DWG. M-2.

GRAPHIC SCALE
4' 0 4' 8'
1/4"=1'-0"

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

FILE: 0848CM01
DATE: 01/14/92

NO.	DATE	REVISIONS	BY	APPR.

REGISTERED PROFESSIONAL ENGINEER DAVID S. CROMWELL MECHANICAL M024583 Exp. 7-30-94 STATE OF CALIFORNIA

DSGN	M.R.	CHKD	D.S.
DRWN	D.H.D.	SCALE	1"=4'

approved _____ date 4/15/92
approved _____ date _____

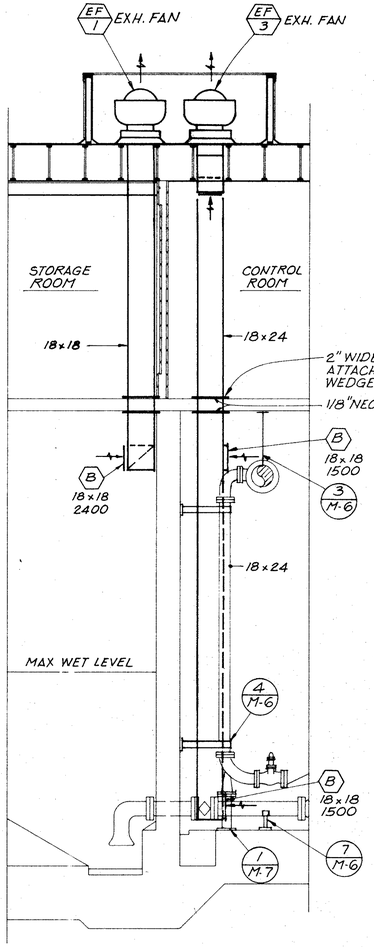
WINZLER & KELLY
CONSULTING ENGINEERS
495 TESCONI CIRCLE, #9 PARK CTR. SANTA ROSA, CA 95401 (707)523-1010

RECORD DRAWING

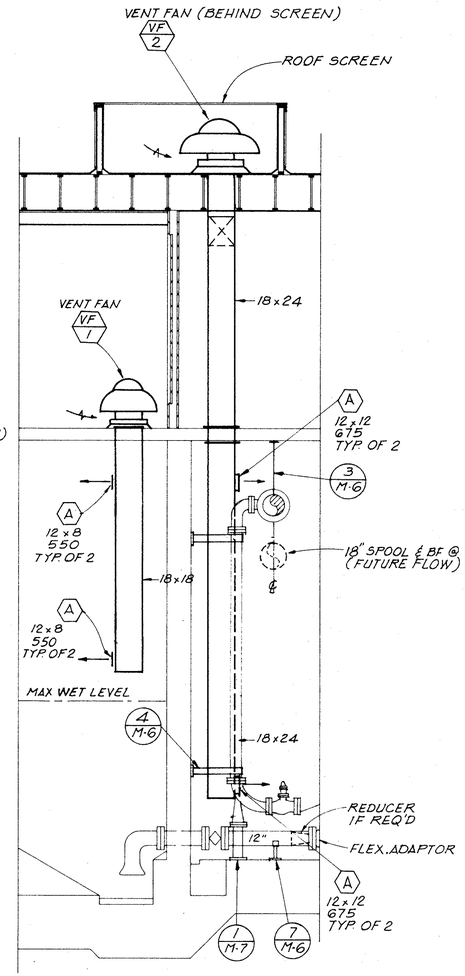
THESE RECORD DRAWINGS HAVE BEEN PREPARED, IN PART, ON THE BASIS OF INFORMATION COMPILED AND FURNISHED BY THE PROJECT CONTRACTOR AND OTHERS. THE ENGINEER WILL NOT BE RESPONSIBLE FOR ANY ERRORS OR OMISSIONS WHICH HAVE BEEN INCORPORATED INTO THIS DOCUMENT AS A RESULT. FIELD VERIFICATION OF CRITICAL FACTS AND DATA SHOULD BE MADE IF THESE DOCUMENTS ARE TO BE USED AS A BASIS FOR FUTURE WORK.

CITY OF ROHNERT PARK
WASTEWATER PUMP STATION IMPROVEMENTS
MECHANICAL PLAN

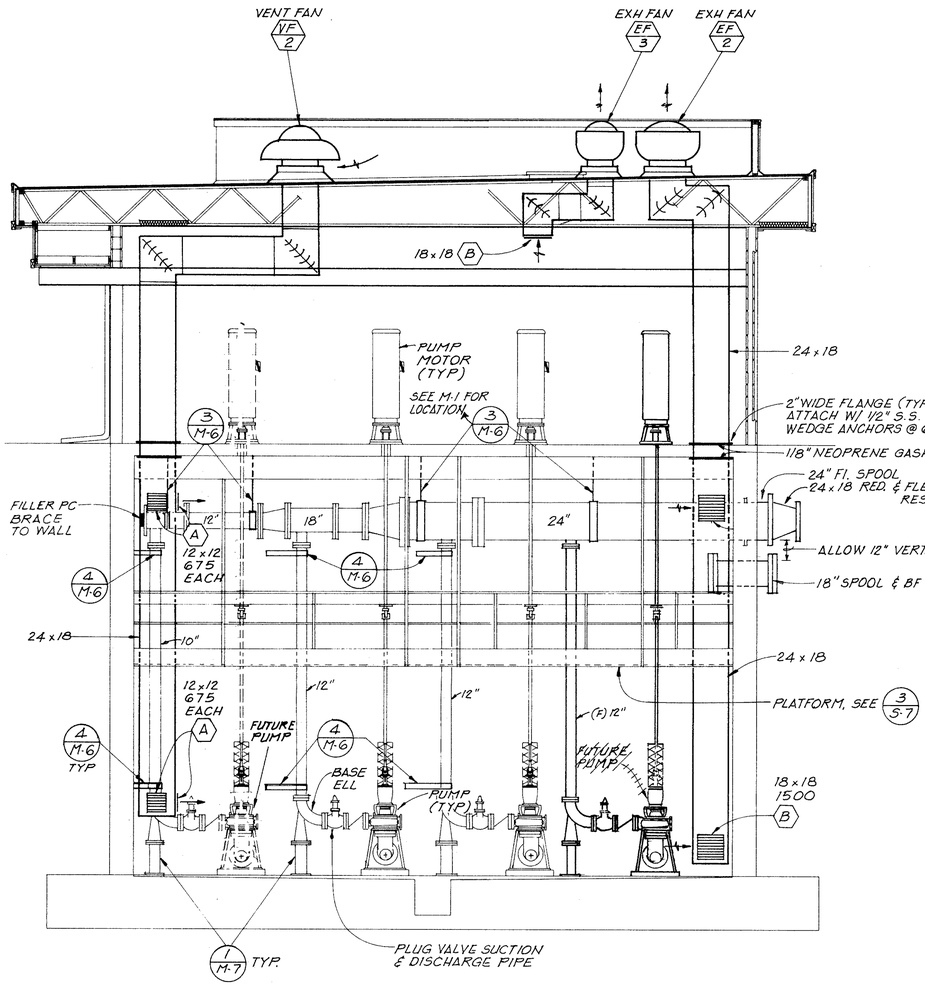
JOB NO. 90-848-C
SHEET M-1



A M-1 BUILDING SECTION
1/4"=1'-0"



B M-1 BUILDING SECTION
1/4"=1"-0"



C M-1 BUILDING SECTION
1/4"=1'-0"

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

GRAPHIC SCALE
4' 0 4' 8'
1/4"=1'-0"

NO.	DATE	REVISIONS	BY	APPR.

REGISTERED PROFESSIONAL ENGINEER
DAVID M. SCHEIBEL
M024583
Exp. 9-30-94
MECHANICAL
STATE OF CALIFORNIA

DSGN	M.R.	CHKD	D.S.
DRWN	R.M.	SCALE	SHOWN

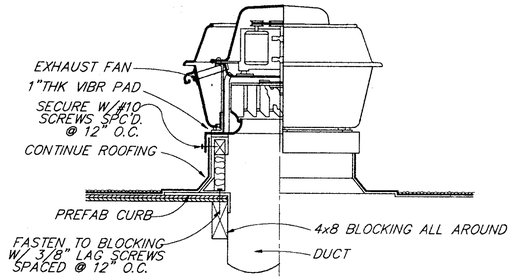
approved _____ date 4/15/92
approved _____ date _____

WINZLER & KELLY
CONSULTING ENGINEERS
495 TESCONI CIRCLE, #9 PARK CTR. SANTA ROSA, CA 95401 (707)523-1010

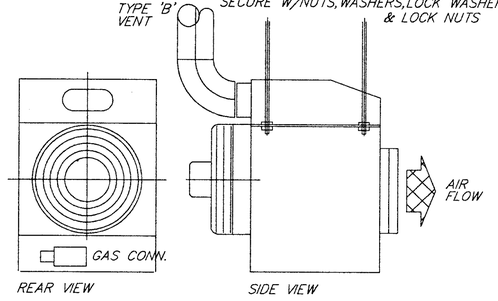
RECORD DRAWING
THESE RECORD DRAWINGS HAVE BEEN PREPARED, IN PART, ON THE BASIS OF INFORMATION COMPILED AND FURNISHED BY THE PROJECT CONTRACTOR AND OTHERS. THE ENGINEER WILL NOT BE RESPONSIBLE FOR ANY ERRORS OR OMISSIONS WHICH HAVE BEEN INCORPORATED INTO THIS DOCUMENT AS A RESULT. FIELD VERIFICATION OF CRITICAL FACTS AND DATA SHOULD BE MADE IF THESE DOCUMENTS ARE TO BE USED AS A BASIS FOR FUTURE WORK.

CITY OF ROHNERT PARK
WASTEWATER PUMP STATION IMPROVEMENTS
MECHANICAL SECTIONS

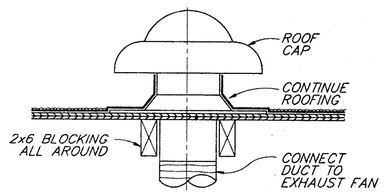
JOB NO. 90-848-C
SHEET M-2



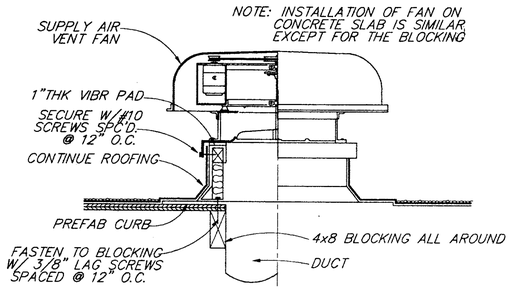
1 ROOF EXHAUST FAN
NOT TO SCALE (M0031)



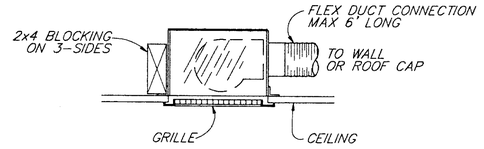
2 GAS-FIRED UNIT HEATER
NOT TO SCALE



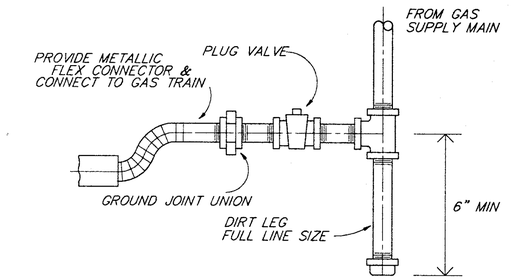
3 ROOF CAP
NOT TO SCALE (M0001)



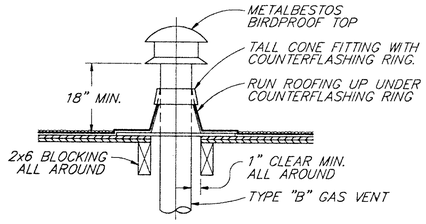
4 ROOF VENT FAN
NOT TO SCALE (M0108)



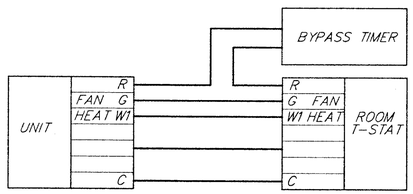
5 CEILING MOUNTED CABINET FAN
NOT TO SCALE



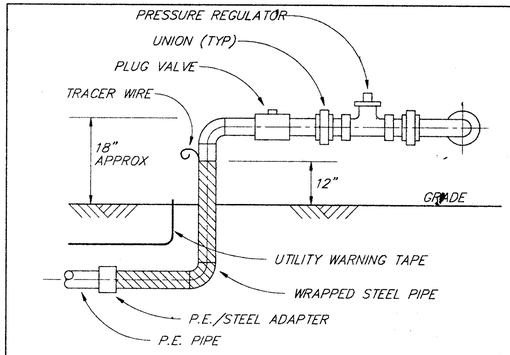
6 GAS PIPING CONNECTION
NOT TO SCALE (M0009)



7 GAS VENT THRU ROOF
NOT TO SCALE (M0002)



8 CONTROL DIAGRAM
NOT TO SCALE (M0018)



9 BUILDING GAS SERVICE
NOT TO SCALE (M1010)

EQUIPMENT LIST

EF 1
EXHAUST FAN (WET WELL) WEIGHT: 125 LBS
CAPACITY: 2400 CFM @ 0.25" ESP & 975 RPM
ELECTRICAL: 208V/3/PH, 1/3 HP
CONSTRUCTION: ALL ALUMINUM, EXPLOSION PROOF MOTOR
CONFIGURATION: UPBLAST DISCHARGE, BELT DRIVE
ACCESSORIES: ALUMINUM BIRDSCREEN, BUILT-IN DISCONNECT
PREFAB ROOF CURB
KNOWN COMPLYING PRODUCT: LOREN COOK ACRU-B,165R4B

VF 1
SUPPLY FAN (WET WELL) WEIGHT: 250 LBS
CAPACITY: 2200 CFM @ 0.25" ESP & 855 RPM
ELECTRICAL: 208V/3/PH, 1/3 HP
CONSTRUCTION: ALL ALUMINUM, EXPLOSION PROOF MOTOR
CONFIGURATION: PROPELLER FAN, BELT DRIVE
ACCESSORIES: ALUMINUM BIRDSCREEN, BUILT-IN DISCONNECT
PREFAB ROOF CURB
KNOWN COMPLYING PRODUCT: LOREN COOK 24SEP5

EF 2
EXHAUST FAN (DRY WELL) WEIGHT: 150 LBS
CAPACITY: 3450 CFM @ 0.25" ESP & 990 RPM
ELECTRICAL: 208V/3/PH, 1/2 HP
CONSTRUCTION: ALL ALUMINUM, EXPLOSION PROOF MOTOR
CONFIGURATION: UPBLAST DISCHARGE, BELT DRIVE
ACCESSORIES: ALUMINUM BIRDSCREEN, BUILT-IN DISCONNECT
PREFAB ROOF CURB
KNOWN COMPLYING PRODUCT: LOREN COOK ACRU-B,180R5B

VF 2
SUPPLY FAN (DRY WELL) WEIGHT: 260 LBS
CAPACITY: 4365 CFM @ 0.25" ESP & 775 RPM
ELECTRICAL: 208V/3/PH, 3/4 HP
CONSTRUCTION: ALL ALUMINUM
CONFIGURATION: PROPELLER FAN, BELT DRIVE
ACCESSORIES: ALUMINUM BIRDSCREEN, BUILT-IN DISCONNECT
PREFAB ROOF CURB
KNOWN COMPLYING PRODUCT: LOREN COOK 30SEP6

EF 3
EXHAUST FAN (CONTROL ROOM) WEIGHT: 125 LBS
CAPACITY: 1750 CFM @ 0.125" ESP & 880 RPM
ELECTRICAL: 208V/3/PH, 1/6 HP
CONSTRUCTION: ALL ALUMINUM, EXPLOSION PROOF MOTOR
CONFIGURATION: UPBLAST DISCHARGE, BELT DRIVE
ACCESSORIES: ALUMINUM BIRDSCREEN, BUILT-IN DISCONNECT
PREFAB ROOF CURB
KNOWN COMPLYING PRODUCT: LOREN COOK ACRU-B,150R2B

UH 1 (FUTURE)
UNIT HEATER (CONTROL ROOM) WEIGHT: 75 LBS
CAPACITY: 60,000 BTUH
AIRFLOW: 980 CFM, 1/35 HP
ELECTRICAL: 120V/1PH, 135 WATTS, 1.9 FLA
CONFIGURATION: VERTICAL CABINET
HORIZONTAL AIR THROW W/STANDARD LOUVER
ACCESSORIES: 24V CONTROL VOLTAGE TRANSFORMER
SPARK IGNITED INTERMITTENT PILOT
SUSPENSION HANGERS & RODS, T-STAT & RELAY KIT
KNOWN COMPLYING PRODUCT: REZNOR, MODEL F, SIZE 75

EF 4
EXHAUST FAN (TOILET)
CAPACITY: 158 CFM @ 0.25" ESP & 1150 RPM
ELECTRICAL: 120V/1PH, 105 WATTS
CONFIGURATION: CEILING MOUNTED
ACCESSORIES: ROOF CAP 10-FR LEK-TROL SPEED CONTROL
KNOWN COMPLYING PRODUCT: PENN ZEPHYR JR.

EH 1
ELECTRIC HEATER (TOILET)
CAPACITY: 1707 BTUH
ELECTRICAL: 120V/1PH, 500 WATTS
CONSTRUCTION: ALUMINUN FINNED ELEMENT
ACCESSORIES: BUILT-IN THERMOSTAT
KNOWN COMPLYING PRODUCT: MARKEL RPH1-5A

A
SUPPLY DIFFUSER
ALUMINUM CONSTRUCTION WITH INTEGRAL OPPOSED BLADE DAMPER
GRILLES ON 3/4" CENTERS, WHITE FINISH
KNOWN COMPLYING PRODUCT: KRUEGER 5880H

B
EXHAUST REGISTER
ALUMINUM CONSTRUCTION WITH INTEGRAL OPPOSED BLADE DAMPER
GRILLES ON 3/4" CENTERS, WHITE FINISH
KNOWN COMPLYING PRODUCT: KRUEGER S580H

DUCT LEGEND & ABBREVIATIONS

SUPPLY DUCT

RETURN OR EXHAUST DUCT

SQUARE ELBOW W/TURNING VANES

A-80 — DUCT CONNECTION SIZE
300 — AIRFLOW, CFM
REGISTER TYPE

(T) THERMOSTAT

0848CM03
11/19/91

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

NO.	DATE	REVISIONS	BY	APPR.

REGISTERED PROFESSIONAL ENGINEER DAVID M. KELLY M024583 Exp. 9-30-94 MECHANICAL STATE OF CALIFORNIA

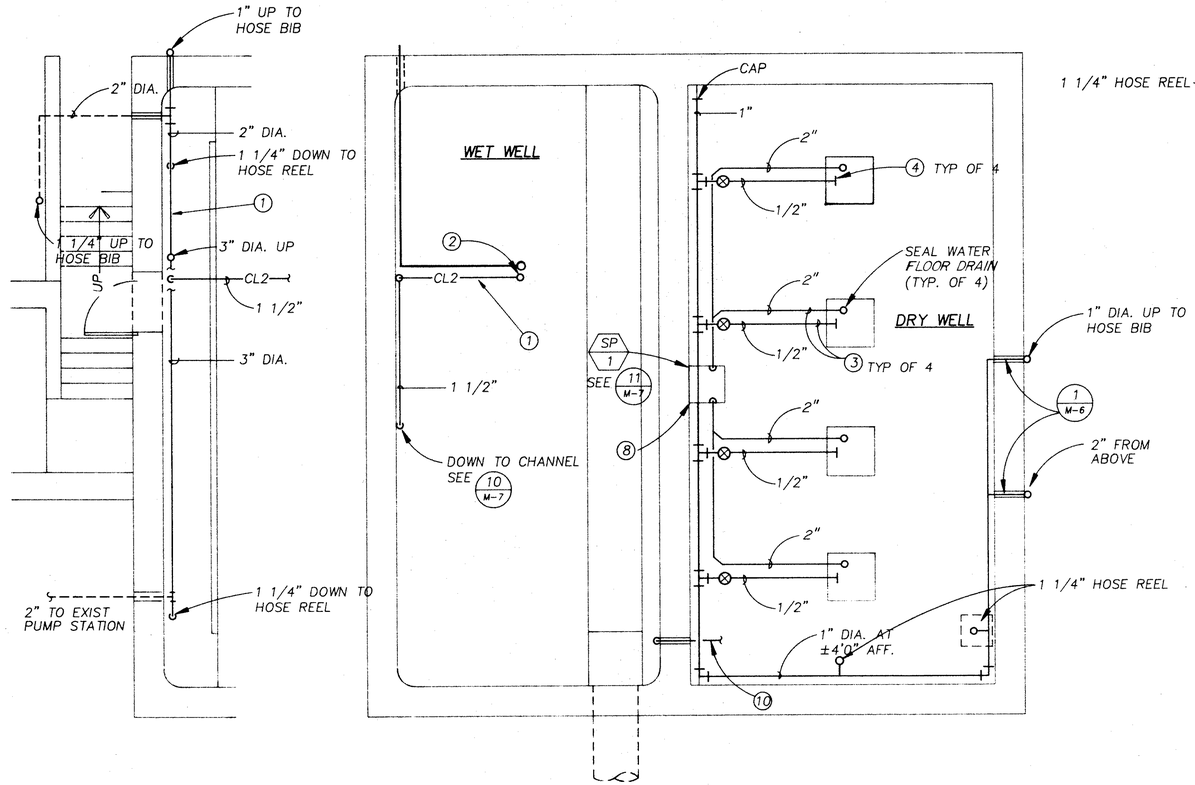
DSGN | CHKD
DRWN | SCALE SHOWN
approved Richard D. Brust date 4/16/92
approved date

WINZLER & KELLY
CONSULTING ENGINEERS
495 TESCONI CIRCLE, #9 PARK CTR. SANTA ROSA, CA 95401 (707)523-1010

WK

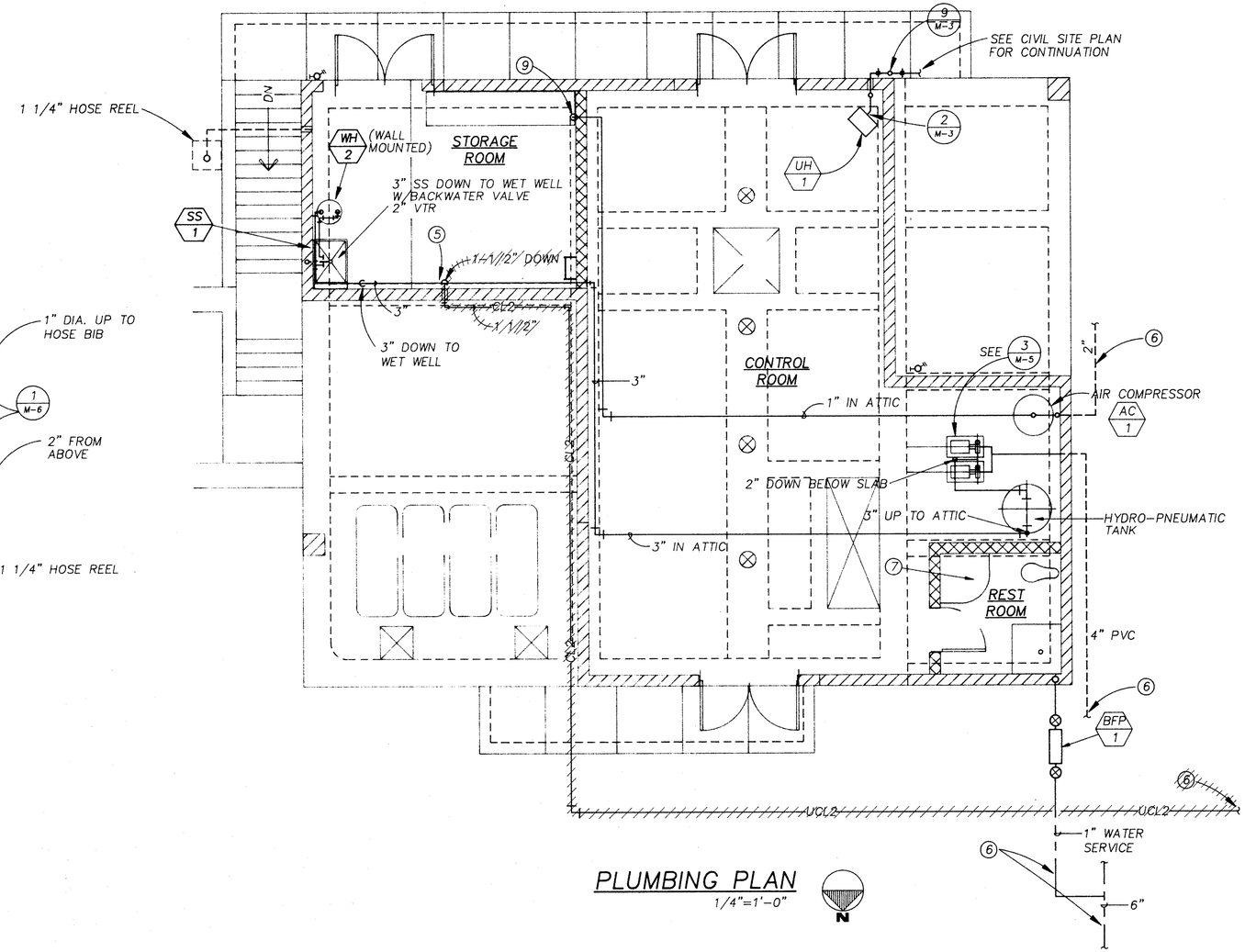
CITY OF ROHNERT PARK
WASTEWATER PUMP STATION IMPROVEMENTS
HVAC DETAILS & NOTES

JOB NO. 90-848-C
SHEET M-3



PARTIAL PLUMBING PLAN AT PLATFORM

1/4"=1'-0"



PLUMBING PLAN AT FOUNDATION

1/4"=1'-0"

PLUMBING PLAN

1/4"=1'-0"

SHEET NOTES

1. KEEP TIGHT TO UNDERSIDE OF SLAB
2. CHLORINE MIXTURE FROM INJECTOR
3. ATTACH SEAL WATER PIPING SUPPORTS TO LARGE DIAMETER FLANGES. SEE 5 M-5
4. PUMP BEARING SEAL WATER
5. CHLORINE AND WATER VALVED STUB-OUTS FOR FUTURE INJECTOR
6. SEE CIVIL SITE PLANS FOR CONTINUATION
7. SEE PART PLANS 1 M-5 AND 2 M-5 FOR PLUMBING IN THIS AREA
8. SEE DETAIL 11 M-7
9. PROVIDE 1/2" ID QUICK CONNECT HOSE FITTING
10. SANITARY SEWER PIPING FROM RESTROOM ABOVE. SEE 2 M-5

GRAPHIC SCALE

4' 0 4' 8'

1/4"=1'-0"

VERIFY SCALES

BAR IS ONE INCH ON ORIGINAL DRAWING.

0 1"

IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

FILE: 0848CM04
DATE: 01/14/92

NO.	DATE	REVISIONS	BY	APPR.

REGISTERED PROFESSIONAL ENGINEER DAVID H. DAVEN M024583 Exp. 9-30-94 MECHANICAL STATE OF CALIFORNIA

DSGN	D.S.	CHKD	R.F.K.
DRWN	D.H.D.	SCALE	1/4"=1'0"

approved _____ date 4/15/92

approved _____ date _____

WINZLER & KELLY
CONSULTING ENGINEERS
495 TESCONI CIRCLE, #9 PARK CTR. SANTA ROSA, CA 95401 (707)523-1010

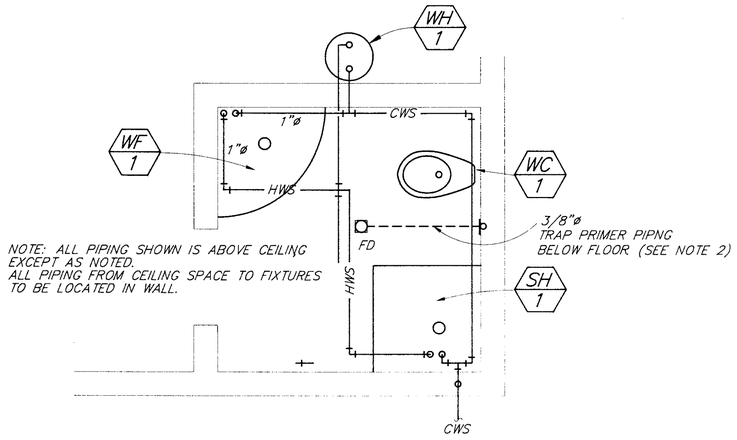
RECORD DRAWING

THESE RECORD DRAWINGS HAVE BEEN PREPARED, IN PART, ON THE BASIS OF INFORMATION COMPILED AND FURNISHED BY THE PROJECT CONTRACTOR AND OTHERS. THE ENGINEER WILL NOT BE RESPONSIBLE FOR ANY ERRORS OR OMISSIONS WHICH HAVE BEEN INCORPORATED INTO THIS DOCUMENT AS A RESULT. FIELD VERIFICATION OF CRITICAL FACTS AND DATA SHOULD BE MADE IF THESE DOCUMENTS ARE TO BE USED AS A BASIS FOR FUTURE WORK.

CITY OF ROHNERT PARK
WASTEWATER PUMP STATION IMPROVEMENTS
BUILDING PLUMBING PLAN

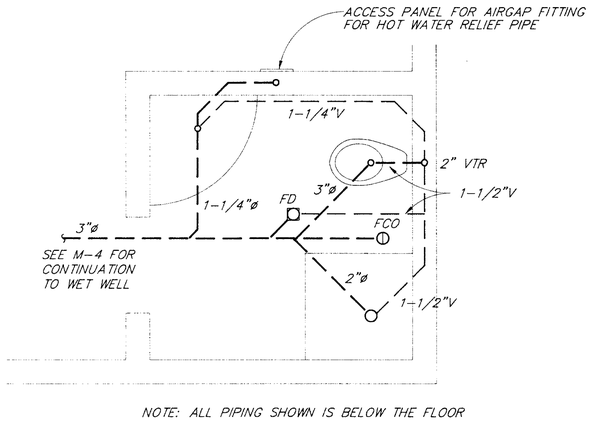
JOB NO. 90-848-C

SHEET M-4



1 PART PLAN – WATER

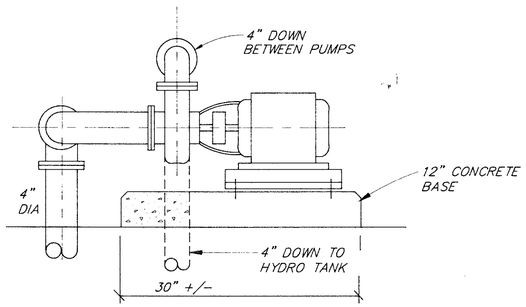
1/2" = 1'- 0"



NOTE: ALL PIPING SHOWN IS BELOW THE FLOOR

2 PART PLAN – DWV

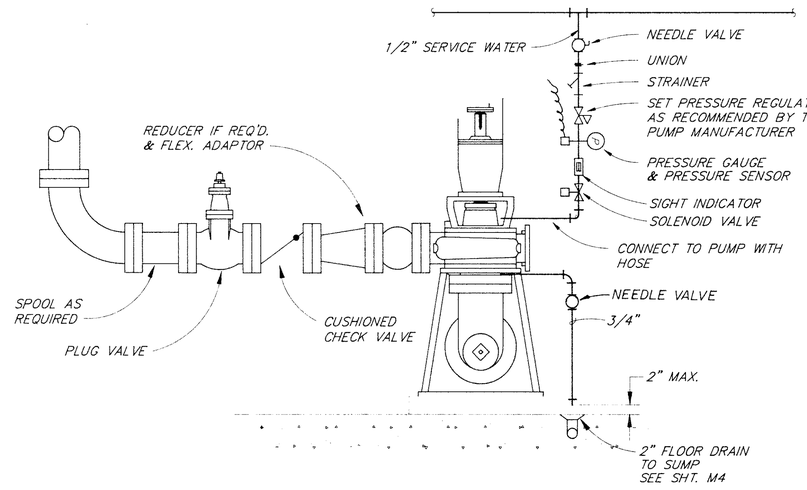
1/2" = 1'- 0"



3 BASE MOUNTED PUMP (PROCESS WATER)

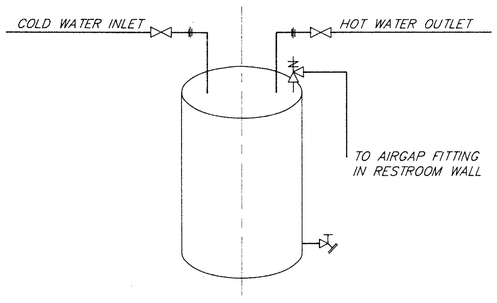
SEE 5/M7

NOT TO SCALE



5 PUMP SEAL PIPING (SEWAGE PUMPS)

NOT TO SCALE



4 DOMESTIC WATER HEATER

NOT TO SCALE

NOTES

1) SEE SPECIFICATION SECTION 15400 FOR STANDARDS, MATERIAL & EXECUTION OF ALL PLUMBING WORK.

2) PROVIDE A 1/2" TRAP PRIMER VALVE & CONNECTION FROM THE WATER CLOSET TO THE FLOOR DRAIN. CONCEAL THE TRAP PRIMER VALVE IN THE WALL AND MAKE ACCESSIBLE WITH A COVER PLATE

3) CONNECTIONS FOR FIXTURE PIPING SHALL BE SIZED IN CONFORMANCE WITH THE UNIFORM PLUMBING CODE (1991).

PLUMBING FIXTURES & EQUIPMENT

WC 1 — WATER CLOSET WHITE VITREOUS CHINA, ELONGATED BOWL, BOTTOM OUTLET 1.5 GPF, WHITE OPEN FRONT SEAT WITH LID SLOAN FLUSH VALVE #111
KNOWN COMPLYING MANUFACTURER: AMERICAN STANDARD 2234.015

WF 1 — WASH FOUNTAIN FOOT OPERATED WATER FLOW, 54" CORNER , TYPE KFC SUPPLY WATER & VENTS THRU WALL, BOTTOM OUTLET, WHITE TERRAZZO BOWL POWDERED SOAP DISPENSER
KNOWN COMPLYING MANUFACTURER: BRADLEY MODEL KHC-554 (54")

SH 1 — SHOWER ONE PIECE WHITE FIBERGLASS, CORNER INSTALLED, 36" x 36" ENCLOSURE, SHOWER ROD & CURTAIN, HAND HELD SHOWER HEAD WITH CHROME PLATED HOSE
KNOWN COMPLYING MANUFACTURER: FLORESTONE MODEL 36-CORNER

SS 1 — SERVICE SINK 36" x 24" x 10" HIGH, ONE PIECE MOLDED CHEMICAL RESISTANT CONSTRUCTION, 3" CENTER DRAIN
ACESSORIES: 5/8" HOSE , 30 FEET LONG W/STAINLESS STEEL CLAMPS FAUCET W/VACUUM BREAKER, DOUBLE STOPS & BUCKET HOOK W/BRACE, MOP HANGER W/3-CLAMPS, STAINLESS STEEL RIM GUARDS #304 20 GAUGE, WEDGE LOK SEAL, 36" STAINLESS STEEL BACKWALL PANELS
KNOWN COMPLYING MANUFACTURER: FLORESTONE MODEL MSR 3624

P 1 — CENTRIFUGAL PUMP CLOSE COUPLED, SINGLE STAGE, BRONZE FITTED
CAPACITY: 80 GPM @ 120 FT HEAD & 1750 RPM
ELECTRICAL: 7.5 HP, 480 V/3PH
KNOWN COMPLYING MANUFACTURER: BELL & GOSSETT, BERKELEY

WH 1 — ELECTRIC WATER HEATER (INSTALLED WEIGHT 310 LBS)
CAPACITY: 30 GALLONS (HEIGHT: 29.75")
ELECTRICAL: 120V/1PH 1500W 13.0 AMPS
ACCESSORIES: RELIEF VALVE, DRAIN VALVE
KNOWN COMPLYING MANUFACTURER: LOCHINVAR MODEL JRC030-E

WH 2 — ELECTRIC WATER HEATER WALL MOUNTED, (INSTALLED WEIGHT 150 LBS)
CAPACITY: 12 GALLONS
ELECTRICAL: 120V/1PH, 1500 WATT ELEMENT, 13.0 AMPS
ACCESSORIES: RELIEF VALVE, DRAIN VALVE
KNOWN COMPLYING MANUFACTURER: LOCHINVAR MODEL EJC012-E

SP 1 — PUMP ROOM SUMP PUMP
CAPACITY: 130 GPH @ 20 FT HEAD ELECTRICAL: 120V/1PH, 1/6 HP
ACCESSORIES: AUTOMATIC MERCURY LEVEL SWITCH
KNOWN COMPLYING MANUFACTURER: TEEL 2P087

AC 1 — AIR COMPRESSOR
CAPACITY: 9.5 CFM @ 100 PSIG DISCHARGE
ELECTRICAL: 208V/1PH, 5 HP
ACCESSORIES: 60 GALLON VERTICAL RECEIVER
KNOWN COMPLYING MANUFACTURER: SPEEDAIRE No. 52185

ET 1 — EXPANSION TANK – 30 PSIG AIR CHARGE
STEEL SHELL, HEAVY DUTY BUTYL DIAPHRAGM
CAPACITY: 264 GALLONS CONNECTION: 3"NPTF
KNOWN COMPLYING MANUFACTURER: AMTROL WX-1000L

LEGEND

BUILDING WATER SERVICE		SANITARY SEWER	
PROCESS WATER, UNDERGROUND		VENT PIPING	
PROCESS WATER, ABOVEGROUND		CHLORINE GAS, UNDERGROUND	UCL2
DOMESTIC COLD WATER	CWS	CHLORINE GAS, WITHIN BLDG	CL2
DOMESTIC HOT WATER	HWS		

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

GRAPHIC SCALE
2' 0 2' 4'
1/2" = 1'-0"

FILE: 0840CM05
DATE: 01/14/92

NO.	DATE	REVISIONS	BY	APPR

REGISTERED PROFESSIONAL ENGINEER — DAVID K. KELLEY — M024583 Exp 9-30-94 — MECHANICAL — STATE OF CALIFORNIA

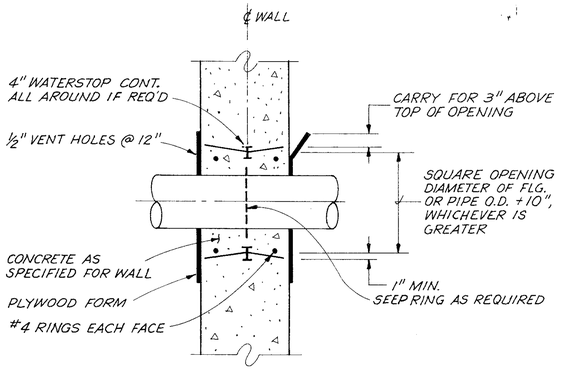
DSGN	E.O.	CHKD	D.S.
DRWN	M.R.	SCALE	AS NOTED

approved [signature] date 4/15/92
approved date

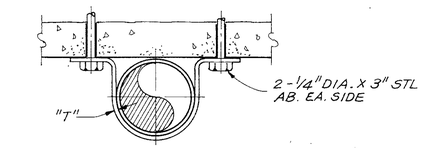
WINZLER & KELLY
CONSULTING ENGINEERS
495 TESCONI CIRCLE.,#9 PARK CTR. SANTA ROSA, CA 95401 (707)523-1010

CITY OF ROHNERT PARK
WASTEWATER PUMP STATION IMPROVEMENTS
PLUMBING DETAILS

JOB NO. 90-848-C
SHEET M-5



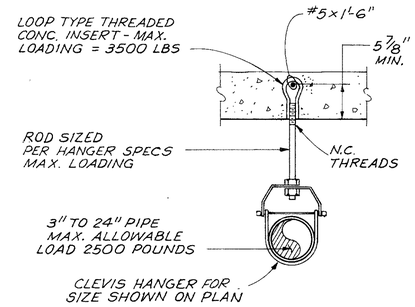
TYPE 1
6" PIPE & LARGER



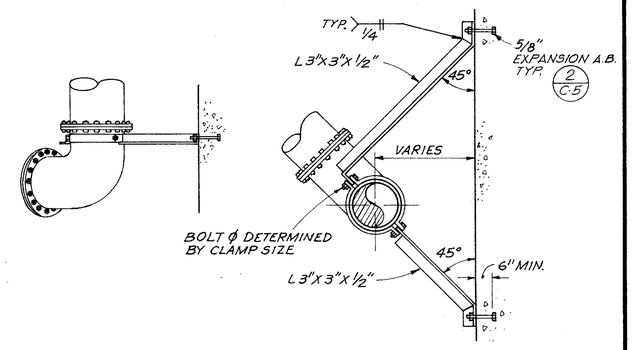
PIPE CLAMP MATERIAL : CARBON STEEL, GALV.

PIPE CLAMP DIMENSIONS		
PIPE SIZE	WIDTH	"T"
½" THRU 1¼"	7/8"	3/16"
1½" TRU 2"	1"	1/4"
2½" THRU 4"	2"	1/4"

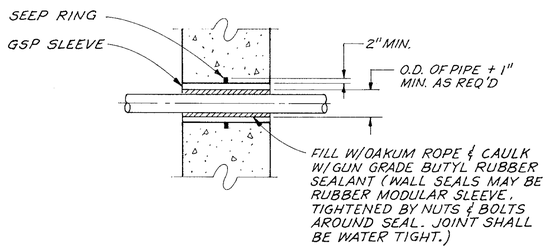
2 STD. PIPE SUPPORT - TYPE 1
N.T.S.



3 STD. PIPE SUPPORT-TYPE 2
N.T.S.



4 STD. PIPE SUPPORT-TYPE 3
N.T.S.



TYPE 2
4" PIPE & SMALLER

NOTES:

1. PROVIDE SLEEVE THRU SLABS, ABOVE GROUND WALLS, AND AS PER PLANS.
2. 4" AND SMALLER PVC PIPE SHALL HAVE SLEEVE IN WALL AND FLOOR, EXTEND SLEEVE 4" ABOVE FLOOR.
3. ALL PVC AND METAL PIPE SHALL HAVE SLEEVE IN WALL.
4. CONTRACTOR MAY INSTALL PIPE THIMBLES AT ALL PIPE THRU WALL LOCATIONS.
5. SEE STRUCTURAL DETAILS FOR SPECIAL REINF. AT OPENINGS.

1 PIPE BLOCKOUT AND SLEEVE
N.T.S.

5 STD. PIPE SUPPORT-TYPE 4
N.T.S.

6 STD. PIPE SUPPORT-TYPE 5
N.T.S.

PIPE DIA.	A PIPE SIZE	B MIN.	B MAX.	C PIPE SIZE	MAX. O.D. OF PIPE
8	3	13-9/16	18-1/16	2-½	9-1/8
10	3	14-5/8	19-1/8	2-½	11-1/8
12	3	15-5/8	20-1/8	2-½	13-½
14	4	18-7/8	23-3/8	3	14
16	4	19-7/8	24-3/8	3	16
18	6	22-¼	26-¾	4	18
20	6	23-¼	27-¾	4	20
22	6	24-¼	28-¾	4	22
24	6	26-½	31	4	24

7 STD. PIPE SUPPORT-TYPE 6
N.T.S.

NOTE :
WHEN "H" IS LESS THAN 10" THE #4 BARS NEED NOT BE CAST IN THE SLAB

8 STD. PIPE SUPPORT-TYPE 7
N.T.S.

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

NO.	DATE	REVISIONS	BY	APPR.

REGISTERED CIVIL ENGINEER — ROBERT F. KELLY — EXP 12/31/92 — No. 11005 — STATE OF CALIFORNIA

DSGN	L.E.	CHKD	R.F.K.
DRWN	G.C.	SCALE	AS SHOWN

approved — date 4/15/92
approved — date

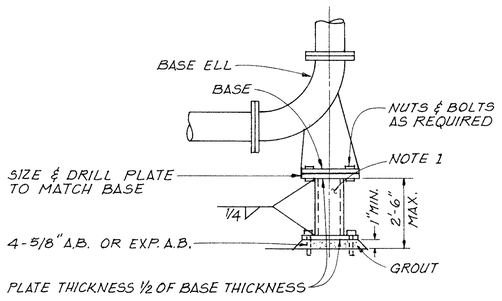
WINZLER & KELLY
CONSULTING ENGINEERS
495 TESCONI CIRCLE, #9 PARK CTR. SANTA ROSA, CA 95401 (707) 523-1010

CITY OF ROHNERT PARK
WASTEWATER PUMP STATION IMPROVEMENTS
PIPE SUPPORT DETAILS

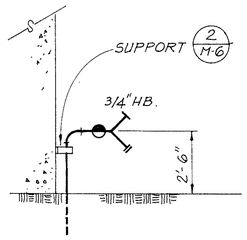
JOB NO. 90-848-C
SHEET M-6

NOTE :

1. USE 2½"DIA. UP TO 10" PIPE, SCHEDULE 40. USE 4" DIA. ABOVE 10" PIPE, SCHEDULE 40.



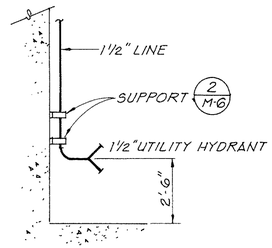
1 STD. BASE ELBOW, TEE OR CROSS SUPPORT-TYPE 6
N.T.S.



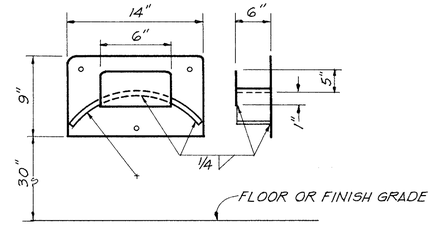
NOTE :

INSTALL NON-FREEZE HOSE BIB ON ALL EXTERIOR INSTALLATIONS.

2 EXTERIOR HOSE BIB
N.T.S.



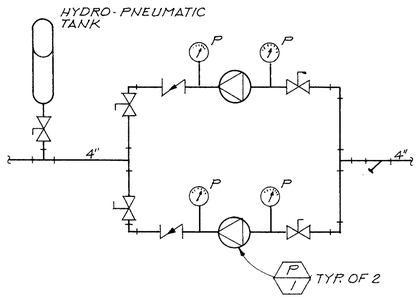
3 UTILITY HYDRANT
N.T.S.



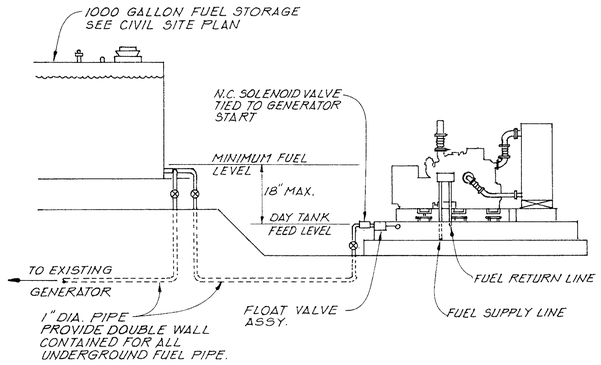
NOTES:

1. ENTIRE UNIT SHALL BE AL.-¼" PI.
2. ATTACH TO WALL W/3-¼" SST. EXP. A.B.
3. GRIND ALL EDGES SMOOTH.

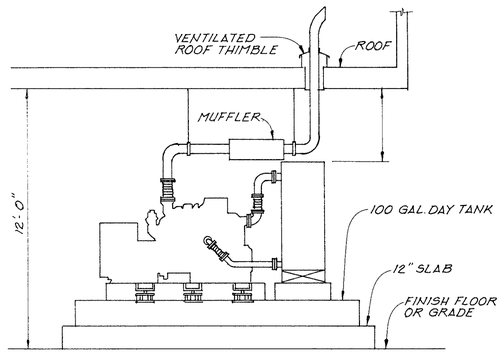
4 HOSE RACK
N.T.S.



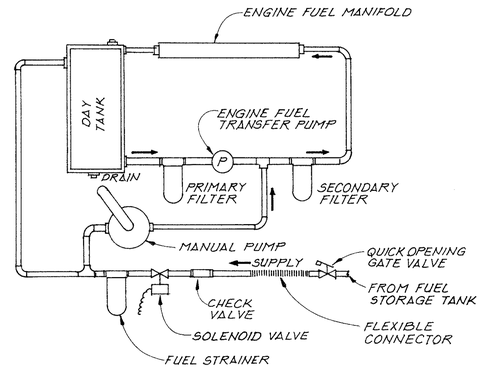
PIPING SCHEMATIC
5 DUPLEX BOOSTER PUMP
N.T.S.



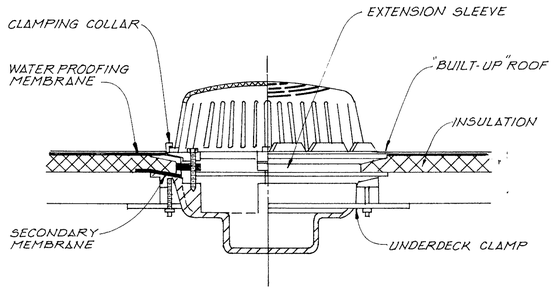
6 GENERATOR PIPING
N.T.S.



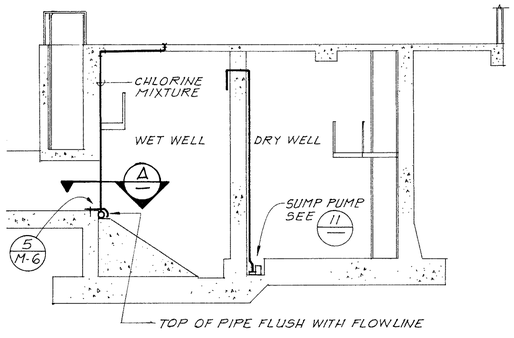
7 GENERATOR EXHAUST SYSTEM
N.T.S.



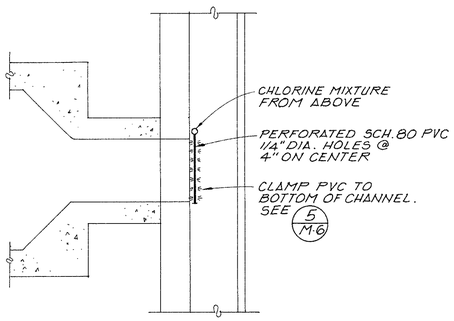
8 GENERATOR DIESEL FUEL SYSTEM
N.T.S.



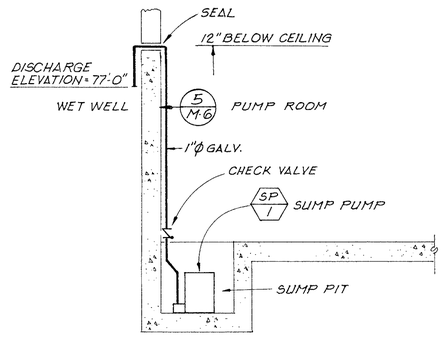
9 ROOF DRAIN INSTALLATION
N.T.S.



10 CHLORINE MIXTURE CHANNEL DISCHARGE
N.T.S.



A SECTION
N.T.S.



11 PUMP ROOM SUMP PUMP
1/2" = 1'-0"

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

2' 0 2' 4'
1/2" = 1'-0"

NO.	DATE	REVISIONS	BY	APPR.

REGISTERED CIVIL ENGINEER ROBERT F. KELLY Exp. 11/30/92 No. 11005 STATE OF CALIFORNIA

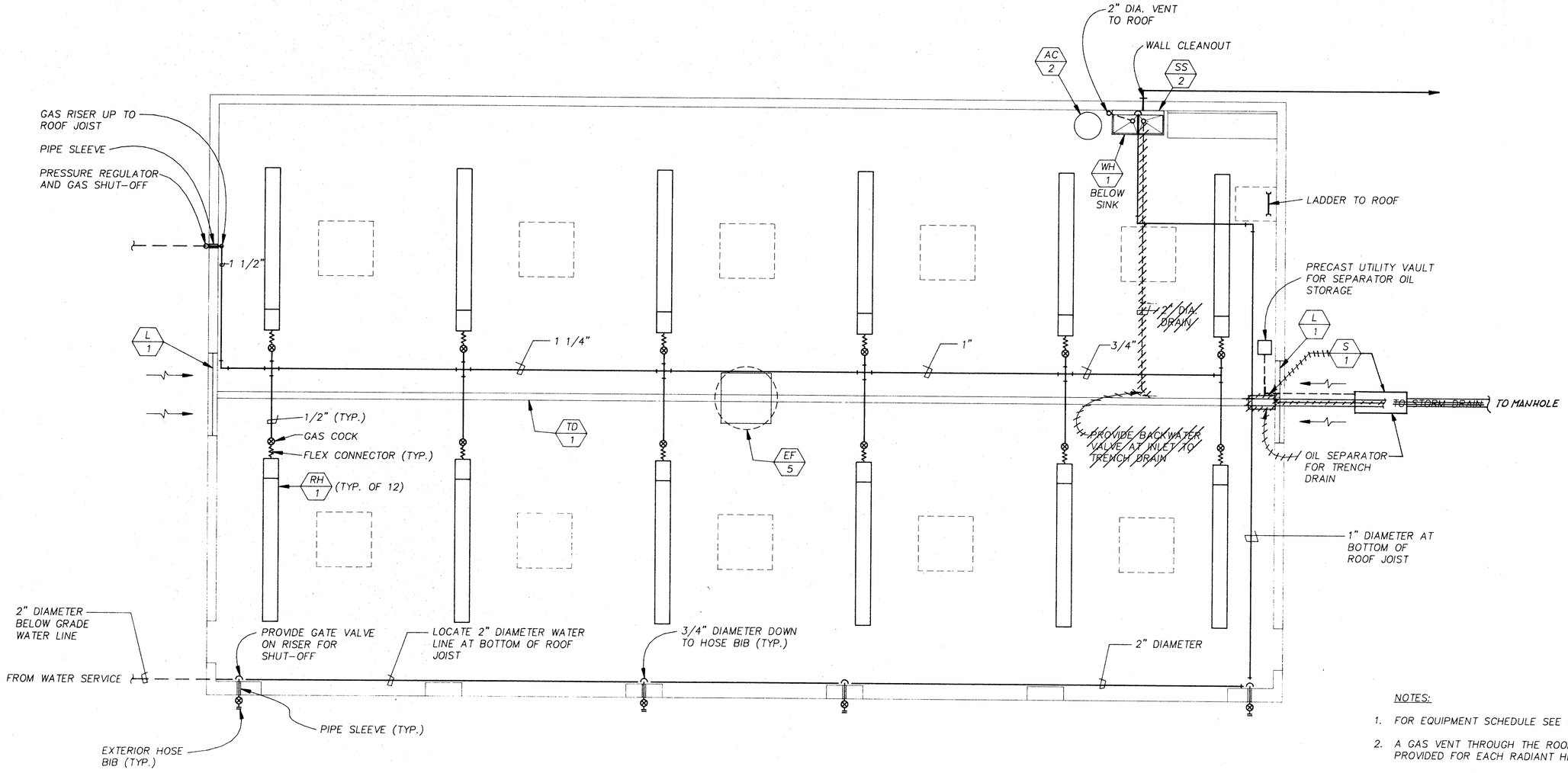
DSGN	L.E.	CHKD	R.F.K.
DRWN	R.M.	SCALE	AS SHOWN

approved [signature] date 4/15/92
approved date

WINZLER & KELLY
CONSULTING ENGINEERS
495 TESCONI CIRCLE, #9 PARK CTR. SANTA ROSA, CA 95401 (707) 523-1010

CITY OF ROHNERT PARK
WASTEWATER PUMP STATION IMPROVEMENTS
MECHANICAL DETAILS

JOB NO. 90-848-C
SHEET M-7



PLAN

1/4"=1'-0"

NOTES:

1. FOR EQUIPMENT SCHEDULE SEE SHEET M-9
2. A GAS VENT THROUGH THE ROOF WILL BE PROVIDED FOR EACH RADIANT HEATER.
3. PROVIDE SUPPORT FOR THE RADIANT HEATERS AS RECOMMENDED BY THE MANUFACTURER.

GRAPHIC SCALE
4' 0 4' 8'
1/4"=1'-0"

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

NO.	DATE	REVISIONS	BY	APPR.

REGISTERED PROFESSIONAL ENGINEER
M024583
Exp. 9-30-94
MECHANICAL
STATE OF CALIFORNIA

DSGN	D.S.	CHKD	D.S.
DRWN	S.B.	SCALE	SHOWN

approved _____ date 4/15/97
approved _____ date _____

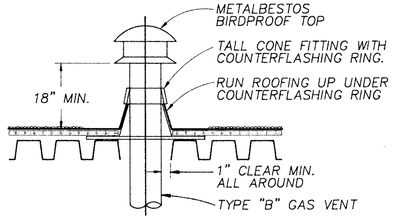
WINZLER & KELLY
CONSULTING ENGINEERS
495 TESCONI CIRCLE..#9 PARK CTR. SANTA ROSA, CA 95401 (707)523-1010

RECORD DRAWING
THESE RECORD DRAWINGS HAVE BEEN PREPARED, IN PART, ON THE BASIS OF INFORMATION COMPILED AND FURNISHED BY THE PROJECT CONTRACTOR AND OTHERS. THE ENGINEER WILL NOT BE RESPONSIBLE FOR ANY ERRORS OR OMISSIONS WHICH HAVE BEEN INCORPORATED INTO THIS DOCUMENT AS A RESULT. FIELD VERIFICATION OF CRITICAL FACTS AND DATA SHOULD BE MADE IF THESE DOCUMENTS ARE TO BE USED AS A BASIS FOR FUTURE WORK.

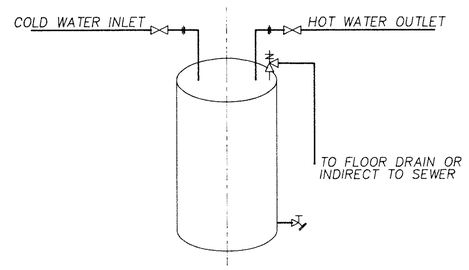
CITY OF ROHNERT PARK
WASTEWATER PUMP STATION IMPROVEMENTS
MAINTENANCE BUILDING PLAN

JOB NO. 90-848-C
SHEET M-8

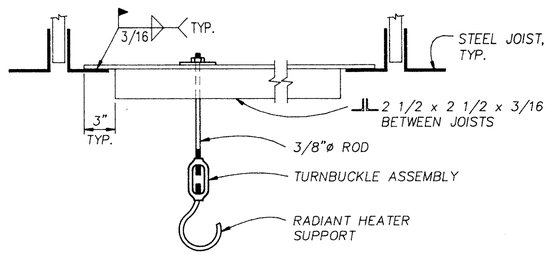
DWG. NO. 848CM1



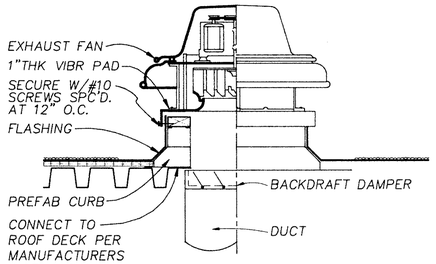
1 GAS VENT THRU ROOF
NOT TO SCALE



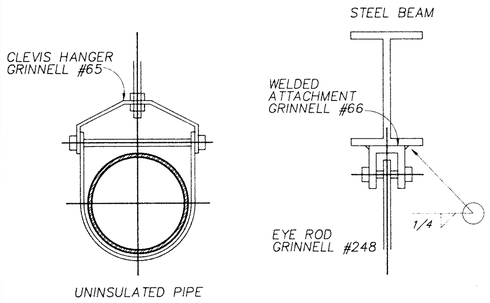
4 DOMESTIC WATER HEATER
NOT TO SCALE



7 RADIANT HEATER SUSPENSION
NOT TO SCALE

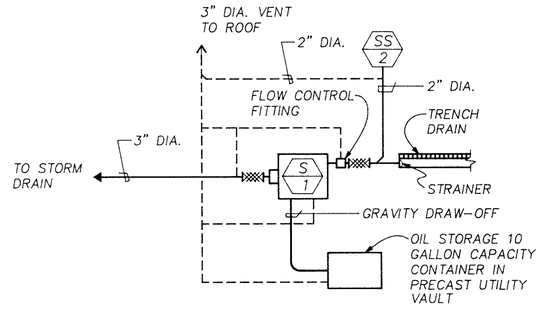


2 ROOF EXHAUST FAN
NOT TO SCALE

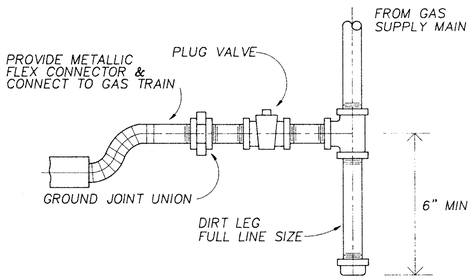


5 PIPE HANGER
NOT TO SCALE

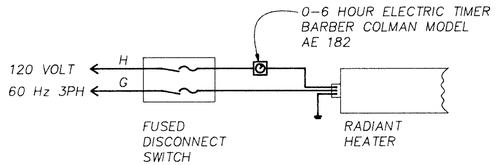
MAX PIPE SIZE: 4" DIA



8 DRAIN AND VENT SCHEMATIC
NOT TO SCALE



3 GAS PIPING CONNECTION
NOT TO SCALE



6 RADIANT HEATER WIRING SCHEMATIC
NOT TO SCALE

EQUIPMENT LIST

RH 1
INFRARED NATURAL GAS-FIRED HEATER
CAPACITY: 40 MBTUH
ELECTRICAL: 120V/1 PH, 5.5 AMPS (STARTING) 1.0 AMPS (RUNNING);
CONFIGURATION: CEILING HUNG
ACCESSORIES: ALL ALUMINIZED RADIANT TUBE ASSEMBLY; ALUMINUM REFLECTOR; ONE HOUR TIMER CONTROL.
KNOWN COMPLYING PRODUCT: ROBERTS GORDON VANTAGE II

EF 5
EXHAUST FAN
CAPACITY: 6000 CFM AT 0.375 IN H20 SP & 900 RPM
ELECTRICAL: 120V/1PH; 1 1/2 HP
CONFIGURATION: ROOF MOUNTED UPBLAST CENTRIFUGAL
WEIGHT: 260 LBS.
ACCESSORIES: ALUMINUM BIRDSCREEN; BUILT IN DISCONNECT; PREFAB ROOF CURB.
KNOWN COMPLYING PRODUCT: LOREN COOK MODEL ACRU-B 225 R8B

AC 2
AIR COMPRESSOR
CAPACITY: 11.5 SCFM AT 100 PSIG DISCHARGE
ELECTRICAL: 208V/1 PH, 3 HP DIRECT DRIVE TEFC MOTOR
ACCESSORIES: 60 GALLON VERTICAL RECEIVER PACKAGE
KNOWN COMPLYING PRODUCT: ATLAS COPCO L SERIES MODEL D360V

WH 1
ELECTRIC WATER HEATER
CAPACITY: 6 GALLONS
ELECTRICAL: 120V/1 PH, 1500 WATT ELEMENT, 13 AMPS
CONFIGURATION: BELOW UTILITY SINK
ACCESSORIES: RELIEF AND DRAIN VALVE
KNOWN COMPLYING PRODUCT: LOCHINVAR MODEL EJCO12-E

SS 2
UTILITY SINK 46" L x 21 " W x 14" DP
CAPACITY: 40 GALLONS
CONFIGURATION: WALL MOUNTED DOUBLE SINK; CHEMICAL RESISTANT ONE PIECE CONSTRUCTION
ACCESSORIES: FAUCET; 2" GRID DRAIN, TRAP, STRAINER, & TAILPIECE
KNOWN COMPLYING PRODUCT: FLORESTONE MODEL WMD SINK; FISHER SERIES #3510 FAUCET

L 1
WALL MOUNTED LOUVER 72" x 48" x 4" DP
EXTRUDED ALUMINUM FRAME AND BLADES; EXPANDED ALUMINUM BIRDSCREEN IN REMOVABLE FRAME
KNOWN COMPLYING PRODUCT: AMERICAN WARMING AND VENTILATING MODEL LE-21

S 1
OIL INTERCEPTOR
CAPACITY: 20 GPM FLOWRATE
CONFIGURATION: 3" DIA. INLET/OUTLET; 2 EA 3" DIA VENT CONNECTIONS; 2 EA 1 1/2" ADJUSTABLE GRAVITY DRAW OFF CONNECTIONS
ACCESSORIES: FLOW CONTROL FITTING; SEDIMENT BASKET; CLEANOUT
KNOWN COMPLYING PRODUCT: J.R. SMITH MODEL 8510

TD 1
TRENCH DRAIN
6" PRESLOPED
CONFIGURATION: POLYMER CONCRETE WITH GALVANIZED HEAVY DUTY GRATE COVER FOR FREQUENT HEAVY AXLE LOADS UP TO 32,000 LBS.
KNOWN COMPLYING PRODUCT: POLYCAST 600 SERIES BY QUAZITE, LENOIR CITY, TN

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

NO.	DATE	REVISIONS	BY	APPR.

REGISTERED PROFESSIONAL ENGINEER
WILLIAM D. SWEN
M024583
Exp. 9-30-94
MECHANICAL
STATE OF CALIFORNIA

DSGN	D.S.	CHKD	D.S.
DRWN	S.B.	SCALE	SHOWN

approved _____ date 1/15/92
approved _____ date _____

WINZLER & KELLY
CONSULTING ENGINEERS
495 TESCONI CIRCLE.#9 PARK CTR. SANTA ROSA, CA 95401 (707)523-1010

CITY OF ROHNERT PARK
WASTEWATER PUMP STATION IMPROVEMENTS
MAINTENANCE BUILDING MECHANICAL DETAILS

JOB NO. 90-848-C
SHEET M-9

DWG. NO. 848CM7

APPENDIX D

GRINDER INSTALLATION INSTRUCTIONS

JWC Environmental
A Sulzer Brand

SECTION 3 INSTALLATION AND STARTUP

3.1 INTRODUCTION

SECTION 3 describes installation, checkout, and start-up of the CDD-XDS2.0 grinder.

No special equipment or tool is required for grinder installation. Standard tools, a multimeter and lifting equipment with the proper load rating are required.

3.2 UNPACKING AND STORAGE

The grinder is carefully packaged for shipment to the installation site. Do not remove any components from the shipping crate/carton until an inventory is taken.

1. Inspect the shipping container. Report any damage to the shipping container immediately to the carrier and send a copy to the company representative.
2. Inspect the grinder for missing, loose, or damaged components. The grinder is shipped completely assembled and ready to install. Contact JWCE or a local representative if parts are missing, loose, or damaged.
3. Inspect the grinder options included with the order as defined in the corresponding Operation & Maintenance manual. If parts are missing, loose, or damaged, contact JWCE or a local representative.
4. Close and seal all shipping containers after inspection for shortages and damage. Store the unit and components in the shipping containers indoors in an environment between -40° F (-40° C) and 115° F (46° C) until time for installation. Try not to reopen the storage containers until time of installation.

Extended storage may cause grease to separate. A small amount of lubricant may leak from greased areas. Unless leakage is excessive (more than one [1] tablespoon) this will not cause any problems. The grease homogenizes to its original consistency when the gears are run. The motor and speed reducer have been lubricated at the factory.

3.3 INSTALLATION

The following paragraphs describe the installation of the frame into the channel followed by the installation of the grinder into the installed frame. A minimum amount of civil work is required during installation.

Read and understand the associated motor controller manual before operating the grinder.

3.3.1 Frame Installation

The grinder is normally installed into a frame assembly for a channel or to a wet well site configuration. The channel frame is a minimum ¼ inch less than the width of the channel to allow for a non-interfering fit when the frame is placed in position. Perform the following procedure to install the frame.

⚠

DO NOT LIFT HEAVY EQUIPMENT OVERHEAD OF PERSONNEL. ENSURE ALL PERSONNEL SAFETY REGULATIONS AND EQUIPMENT SAFEGUARDS ARE OBSERVED AND ENFORCED WHEN LIFTING HEAVY OBJECTS.

⚠

Do Not Force The Frame Into The Channel Or Distort The Frame During Installation. Immediately Remove The Frame From The Channel And Modify The Channel If Any Interference Is Encountered During Installation. Avoid Frame Distortion, Bending, Or Other Damage While Tightening The Anchor Bolts. Misalignment Of The Grinder, Improper Installation, And Faulty Operation Of The Grinder System Can Occur If The Frame Is Distorted Or Damaged.

1. Attach lifting cables to the frame, positioning the lifting cables so that the frame lifts evenly.
2. Lift slowly with a straight, even, pull and lower the frame into the channel, positioning it in the designated location. Make sure the frame is level.

⚠

Use Longer Than ½-13 X 3 Inch Bolts If Required By The Seismic Conditions Or Type Of Concrete. JWCE Shall Not Be Responsible For Damage To The Equipment, Damage To The Channel, Or Inadequate Performance Due To Improper Installation Of The Grinder.

3. Adjust frame flanges to channel walls and floor. Attach the frame to the channel wall and floor using ½-13 UNC x 3 inch anchor bolts. The anchor bolts are not supplied by JWCE. Do not final tighten the anchor bolts at this step.

4. Level the frame using shims, if necessary. Now tighten the anchor bolts.

5. Fill any gaps between the frame and the channel wall or floor with grout or silicone.

3.3.2 Grinder Installation

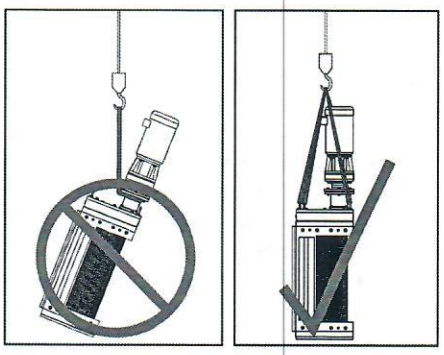
Install the grinder per the following procedure:

1. Verify all fasteners are tight and secure.

2. Attach lifting cables to all four grinder hoisting rings. Refer to FIGURE 3-1.

3. Position the lifting cables to ensure that the grinder lifts evenly.

FIGURE 3-1 GRINDER LIFTING



⚠ DO NOT ATTEMPT TO LIFT THE GRINDER USING LESS THAN THE FOUR EYEBOLTS.

4. Lift the grinder using a slow and even pull and position the grinder over the installation site.

5. Carefully lower the grinder into the frame angle guides until seated on the bottom of the frame (refer to FIGURE 3-2). Make sure there are no gaps between the grinder and the frame large enough for solids to pass through.

6. Verify the guide slots are engaged in the vertical angles welded to the frame.

7. Verify the grinder is resting on the floor of the channel frame. The grinder should not shift or move once installed in the frame.

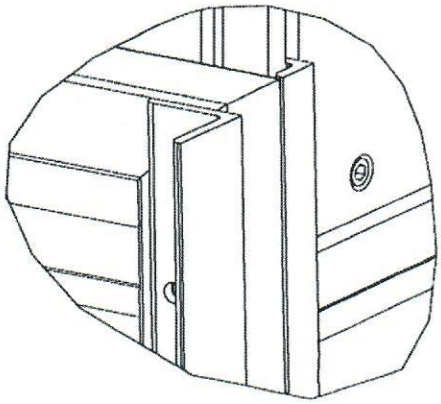
3.3.3 Motor Controller

1. Verify the motor controller is securely mounted and power to the motor controller is open, locked out, and tagged. Refer to the corresponding motor controller manual for applicable grinder power connection information and guidelines.

2. Verify the available power source has the same voltage and frequency as the voltage and frequency listed on the electric motor nameplates.

⚠ VERIFY AC POWER IS TAGGED OUT BEFORE CONNECTING THE GRINDER MOTOR.

FIGURE 3-2 GRINDER INSTALLATION



⚠ DO NOT USE ANY FLAMMABLE MATERIAL FOR SEALING THE CONNECTIONS TO AN EXPLOSION PROOF (TEXP) MOTOR.

3. Connect the motor to the power source following good practices as outlined in the National Electric Code and per any local, state, and federal codes which may apply.

4. Proceed to Paragraph 3.4 to perform grinder start-up and checkout.

3.4 STARTUP AND CHECKOUT

Verify all mechanical and electrical connections are secure and connected.

PART 5 – DRAWINGS

City of Rohnert Park

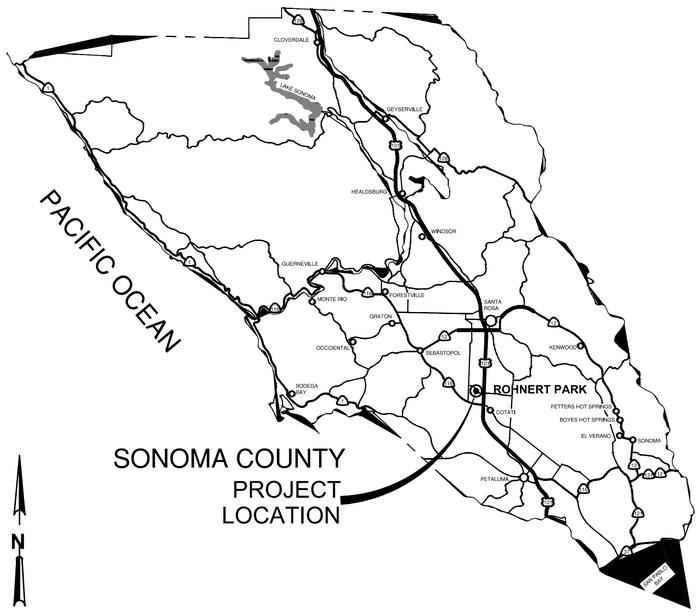
WET WELL LINING PUMP STATION 2

CITY PROJECT NO. 2017-09

PREPARED BY

SCHAAF & WHEELER
CONSULTING CIVIL ENGINEERS

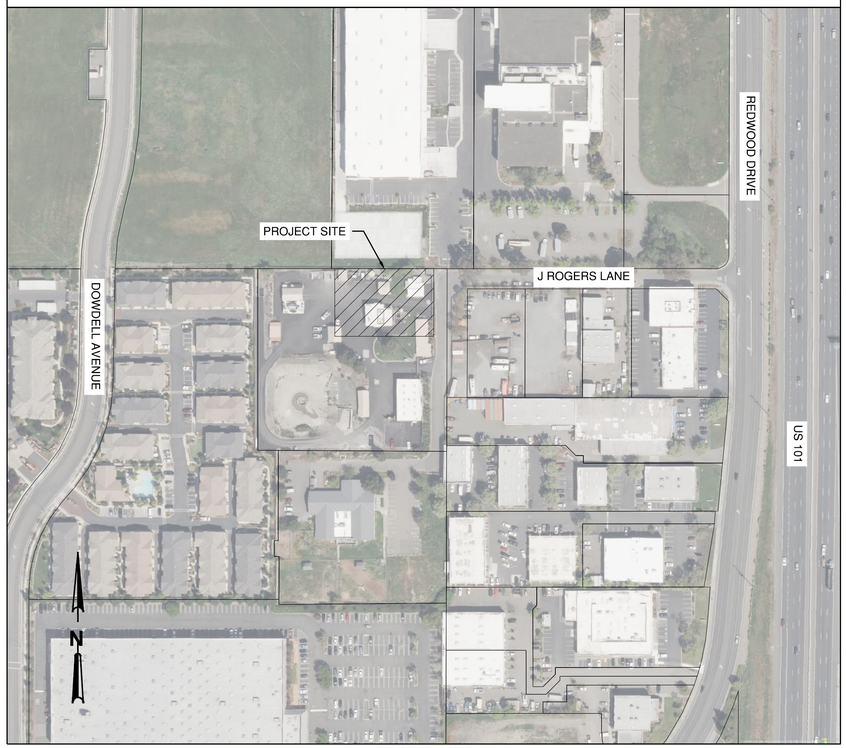
VICINITY MAP



SCALE: NTS

SHEET INDEX		
SHEET NO.	DRAWING NO.	DRAWING TITLE
1	T-1	TITLE SHEET
2	T-2	NOTES, ABBREVIATIONS & LEGEND SHEET
3	C-1	PUMP STATION SITE LAYOUT
4	C-2	DEMOLITION PLAN
5	C-3	IMPROVEMENT PLAN
6	C-4	MECHANICAL PLAN
7	C-5	MECHANICAL SECTIONS
8	D-1	DETAIL SHEET
9	D-2	DETAIL SHEET
10	D-3	STRUCTURAL DETAIL SHEET
11	E-1	ELECTRICAL SYMBOLS AND ABBREVIATIONS
12	E-2	VENTILATION CONTROL PANEL
13	E-3	PANELBOARD SCHEDULES
14	E-4	GROUND LEVEL POWER AND CONTROL PLAN
15	E-5	LOWER LEVEL POWER AND CONTROL PLAN
16	E-6	ROOF POWER AND CONTROL PLAN

LOCATION MAP



SCALE: NTS

CITY OF ROHNERT PARK
130 AVRAM AVENUE
ROHNERT PARK, CALIFORNIA 94928
PHONE: (707) 588-2232 FAX: (707) 794-9242

REV. NO.	DATE	DESCRIPTION	BY

SCHAAF & WHEELER
CONSULTING CIVIL ENGINEERS
2200 RANGE AVENUE, SUITE #201
SANTA ROSA, CA 95403
(707) 528-4848

REGISTERED PROFESSIONAL ENGINEER
BENJAMIN L. SHICK
No. 58812
CIVIL
STATE OF CALIFORNIA

APPROVED:

3-31-2026

DATE

JULIAN DE ANDA, P.E. 82463
CITY ENGINEER,
CITY OF ROHNERT PARK

WET WELL LINING PUMP STATION 2

Project No. 2017 - 09

TITLE SHEET

DESIGNED BY:	JTV
DRAWN BY:	JTV
CHECKED BY:	BLS
DATE:	MARCH 2026
PROJECT:	2017-09
DWG NO:	T-1
SHEET	1 OF 16
	SHEETS

GENERAL NOTES

1. ALL MATERIALS AND WORKMANSHIP SHALL CONFORM TO THE GENERAL AND SPECIFIC PROVISIONS, STANDARD DRAWINGS, AND REQUIREMENTS OF THE CITY OF ROHNERT PARK.
2. NO CHANGE TO THE PROJECT IMPROVEMENT PLANS SHALL BE PERMITTED WITHOUT PRIOR APPROVAL BY THE CITY ENGINEER AND DESIGN ENGINEER.
3. CONTRACTOR AGREES TO ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE CONSTRUCTION OF THIS PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY; THAT THIS REQUIREMENT SHALL APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS; AND THAT THE CONTRACTOR SHALL DEFEND, INDEMNIFY AND HOLD THE CITY AND ENGINEER HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT, EXCEPT TO THE EXTENT ARISING FROM THE SOLE NEGLIGENCE OF THE CITY OR ENGINEER.
4. INFORMATION CONCERNING EXISTING UTILITIES IS NOT GUARANTEED; LOCATIONS SHOWN ON THE PLANS ARE APPROXIMATIONS ONLY. CONTRACTOR SHALL REQUEST THAT UNDERGROUND FACILITIES BE LOCATED AND MARKED IN THE FIELD A MINIMUM OF 48 HOURS PRIOR TO THE START OF CONSTRUCTION BY CALLING UNDERGROUND SERVICE ALERT (U.S.A.) AT 800-642-2444. CONTRACTOR SHALL EXCAVATE WITH CAUTION TO AVOID UTILITY DAMAGE. CONTRACTOR IS LIABLE FOR ALL UTILITY DAMAGE REPAIR AS A RESULT OF HIS OPERATIONS.
5. CONTRACTOR SHALL NOTIFY THE CITY OF ROHNERT PARK AT LEAST 48 HOURS IN ADVANCE OF THE START OF ANY CONSTRUCTION ACTIVITY. ALL UTILITY SHUTDOWNS ARE TO BE COORDINATED THROUGH THE CITY PUBLIC WORKS DEPARTMENT. ANY TEMPORARY SUSPENSION OF THE WORK OR SUBSEQUENT RESUMPTION OF WORK REQUIRES THE NOTIFICATION OF THE CITY AND THE ENGINEER.
6. EXISTING UTILITIES SHALL BE LEFT IN PLACE DURING CONSTRUCTION. BRACING, SHORING, AND SUPPORT FOR EXISTING UTILITIES SHALL BE APPROVED BY THE APPLICABLE UTILITY ENGINEER. CONTRACTOR SHALL NOTIFY UTILITY ENGINEERS AT LEAST 48 HOURS IN ADVANCE OF THE START OF ANY RELATED CONSTRUCTION ACTIVITY.
7. ALL CHANGES TO PUMP OPERATION SHALL BE COORDINATED WITH CITY OF ROHNERT PARK O&M, CONTACT **DAVIDE FURTADO** AT 707-909-5250. ANY TEMPORARY SUSPENSION OF THE WORK OR SUBSEQUENT RESUMPTION OF WORK REQUIRES THE NOTIFICATION OF THE CITY AND THE ENGINEER.
8. CONTRACTOR SHALL EXCAVATE AND EXPOSE ALL UTILITY CROSSINGS OR CONNECTIONS AFFECTED BY THE WORK. ALL EXISTING UTILITIES SHALL BE ADEQUATELY SUPPORTED AND PROTECTED TO THE SATISFACTION OF THE CITY. IN THE EVENT OF DAMAGE TO ANY UTILITY OCCASIONED BY THE CONTRACTOR OPERATIONS, THE CONTRACTOR, AT HIS SOLE COST AND EXPENSE, WILL IMMEDIATELY CAUSE REPAIRS TO BE MADE TO THE SATISFACTION OF THE AFFECTED UTILITY. NOTIFY THE ENGINEER OF ANY ADJUSTMENTS NECESSITATED BY WAY OF CONFLICT WITH EXISTING UTILITIES.
9. CONTRACTOR SHALL PROVIDE ALL LIGHTS, SIGNS, BARRICADES, FLAG MEN, CONES OR OTHER DEVICES NECESSARY TO PROVIDE FOR PUBLIC SAFETY IN ACCORDANCE WITH THE SPECIFICATIONS.
10. ALL PERMANENT IMPROVEMENTS NOT IDENTIFIED FOR REMOVAL OR DAMAGED BY THE CONTRACTOR SHALL BE RESTORED TO THEIR ORIGINAL LOCATION AND CONDITION BY THE CONTRACTOR USING NEW MATERIALS AS DIRECTED BY THE ENGINEER.
11. THE CONTRACTOR SHALL NOTIFY, BY CIRCULAR, ALL BUSINESS ESTABLISHMENTS AND RESIDENCES LOCATED IN AREAS AFFECTED BY THE WORK ONE WEEK PRIOR TO START OF CONSTRUCTION. AT A MINIMUM, ALL RESIDENTS AND BUSINESS ESTABLISHMENTS WITHIN 100 FEET OF THE WORK AREAS SHALL BE NOTIFIED. A DRAFT OF THE CIRCULAR (OFFICIAL NOTICE) SHALL BE SUBMITTED TO THE CITY FOR REVIEW AND APPROVAL.
12. ALL SURPLUS AND UNSUITABLE MATERIAL SHALL BE REMOVED FROM PUBLIC RIGHT-OF-WAY.
13. THE CONTRACTOR SHALL NEITHER WASTE NOR DEPOSIT ANY HAZARDOUS MATERIALS ON THE GRADING SURFACES OR WITHIN THE GRADED CUT AND FILL AREAS OF THIS PROJECT, INCLUDING BUT NOT LIMITED TO GASOLINE OR DIESEL FUELS, MOTOR OILS OR TRANSMISSION FLUIDS, ANTIFREEZE, HYDRAULIC FLUIDS, LUBRICANTS, STARTING FLUIDS AND FILTERS, AND/OR CONTAINERS FOR THESE PRODUCTS. HAZARDOUS MATERIAL SPILLS THAT OCCUR AS A RESULT OF EITHER EQUIPMENT FAILURES OR VANDALISM, INCLUDING ALL ADJACENT CONTAMINATED SOILS, SHALL BE REMOVED AND TRANSPORTED TO AN ENVIRONMENTALLY APPROVED DISPOSAL SITE. ALL REMOVAL, TRANSPORTATION AND DISPOSAL COSTS SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR OR HIS SUBCONTRACTORS.
14. OVERNIGHT PARKING OF CONSTRUCTION EQUIPMENT IN THE PUBLIC RIGHT-OF-WAY SHALL NOT BE PERMITTED, EXCEPT AT LOCATION(S) APPROVED BY THE CITY ENGINEER.
15. CONTRACTOR SHALL PROVIDE ADEQUATE DUST CONTROL AND KEEP MUD AND DEBRIS OFF THE PUBLIC RIGHT-OF-WAY AT ALL TIMES.
16. CONTRACTOR SHALL MAINTAIN A COPY OF THE PROJECT PLANS ON THE JOBSITE AT ALL TIMES.
17. CONTRACTOR SHALL EXERCISE DUE CARE AND CONCERN TO AVOID INJURY TO EXISTING FACILITIES IMPROVEMENTS, UTILITIES, AND PROPERTY.
18. ALL PUMP STATION DISCHARGE PIPING AND FORCE MAIN PIPING CONNECTIONS SHALL BE MECHANICALLY RESTRAINED. MJ CONNECTIONS SHALL BE RESTRAINED USING EBAA MEGALUGS OR CITY APPROVED EQUAL.
19. CONTRACTOR SHALL CONDUCT WORK IN ACCORDANCE WITH THE 2024 CALTRANS STANDARD SPECIFICATIONS, AND CITY'S SPECIFICATIONS.
20. CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS, PIPE SIZES, MATERIAL, ETC. PRIOR TO CONSTRUCTION. IF FIELD ELEVATIONS AND MEASUREMENTS ARE SIGNIFICANTLY DIFFERENT THAN WHAT IS SHOWN ON THE PLANS, CONTRACTOR SHALL NOTIFY THE CITY PRIOR TO PROCEEDING WITH CONSTRUCTION OF THE IMPROVEMENTS. FIELD ADJUSTMENTS MAY BE NECESSARY TO CONSTRUCT THE IMPROVEMENTS.
21. CONTRACTOR SHALL RESTORE SURFACE TO PRE-CONSTRUCTION CONDITIONS.
22. DESIGN AND CONSTRUCTION OF ALL SITE ALTERATIONS SHALL COMPLY WITH THE 2022 CALIFORNIA BUILDING CODE, 2022 CALIFORNIA FIRE CODE, 2022 PLUMBING CODE, 2022 ELECTRICAL CODE, 2022 CALIFORNIA MECHANICAL CODE, AND THE CITY OF ROHNERT PARK MUNICIPAL CODE.

CONCRETE COATING NOTES

1. A MORTAR AND EPOXY COATING SYSTEM SHALL BE APPLIED TO THE EXISTING WET WELL AND GRINDER CHAMBER AS INDICATED ON THE DRAWINGS, AND AS DETAILED IN THE SPECIFICATIONS.
2. REPAIR ANY CRACKS, BUG HOLES, SPALLED AREAS, HOLES, LEAKS, OR EVIDENCE OF LEAKS WITH MORTAR OR GROUT AS RECOMMENDED BY THE EPOXY COATING MANUFACTURER.
3. WHETHER SPRAY OR TROWEL APPLICATION IS USED, THE APPLICATION SHALL BE ACCORDING TO THE PRINCIPLES OF GOOD WORKMANSHIP OUTLINED IN SSPC-PA1-82 AND SHALL PROVIDE A FINISH WHICH IS CONTINUOUS, UNIFORM IN THICKNESS, AND VERIFIED FREE OF PORES OR OTHER DEFECTS USING ELECTRICAL DISCONTINUITY TESTING (HIGH VOLTAGE SPARK TESTING).
4. COATINGS SHALL BE APPLIED TO ALL CONCRETE SURFACES AS DETAILED ON THE PLANS.
5. UNLESS OTHERWISE NOTED, MORTAR COATING SHALL HAVE A **1-INCH MINIMUM COATING THICKNESS**. MINIMUM COATING THICKNESS SHALL BE MEASURED FROM THE FLAT SURFACE OF EXISTING CONCRETE. WHERE PITTING, CRACKING, CORROSION, AND HOLES ARE PRESENT ADDITIONAL COATING THICKNESS WILL BE REQUIRED.

SEWER FLOW RATES

1. THE CITY'S PUMP STATION 1 WILL PROVIDE CONVEYANCE OF SEWAGE INFLOWS DURING THE PROJECT. THE CONTRACTOR IS REQUIRED TO PROVIDE BYPASS PUMPING CAPABILITIES DURING CONSTRUCTION TO CONVEY THE FULL PUMP STATION INFLOWS IN THE EVENT THAT PUMP STATION 1 IS NOT OPERATIONAL, OR IF THE INFLOWS EXCEED THE CAPACITY OF PUMP STATION 1.
2. THE CONTRACTOR IS RESPONSIBLE FOR MAINTAINING AND CONVEYING ALL INFLOWS TO THE SEWER PUMP STATION AT ALL TIMES DURING CONSTRUCTION.
3. CONTRACTOR SHALL PROVIDE TEMPORARY BYPASS PUMPS WITH LEVEL CONTROLS, ALARMS, AND POWER SUFFICIENT TO BYPASS PEAK DRY WEATHER FLOW DURING CONSTRUCTION AND TESTING.
4. THE ESTIMATED PEAK DRY WEATHER FLOW RATE IS LISTED IN THE TABLE BELOW.
5. SEE TECHNICAL SPECIFICATIONS SECTION 01531 FOR ADDITIONAL REQUIREMENTS.

SEWER FLOW DATA	
PUMP STATION	ESTIMATED PDWF (MGD)
STATION 2	6 MGD

STRUCTURAL TESTING & SPECIAL INSPECTION

STRUCTURAL SPECIAL INSPECTION AND TESTING GENERAL:
THESE PROVISIONS SHALL GOVERN THE QUALITY, WORKMANSHIP, AND REQUIREMENTS FOR WORK COVERED. MATERIALS OF CONSTRUCTION AND TESTS MUST CONFORM TO THE 2022 CBC. THE CONTRACTOR MUST PROVIDE A MINIMUM OF 48 HOUR NOTICE TO THE SPECIAL INSPECTION AGENCY FOR WORK THAT REQUIRES SPECIAL INSPECTION. THE CONTRACTOR MUST PROVIDE THE SPECIAL INSPECTOR WITH THE USE OF A LIFT OR OTHER EQUIPMENT AS REQUIRED TO ALLOW ACCESS TO THE WORK THAT REQUIRES INSPECTION. THE CONTRACTOR MUST PROVIDE THE SPECIAL INSPECTOR ACCESS TO THE APPROVED PLANS AND SPECIFICATIONS AND RETAIN SPECIAL INSPECTION RECORDS AT THE JOB-SITE.

DEFINITIONS:
CONTINUOUS SPECIAL INSPECTION: THE FULL-TIME OBSERVATION OF WORK REQUIRING SPECIAL INSPECTION BY AN APPROVED SPECIAL INSPECTOR WHO IS PRESENT IN THE AREA WHERE THE WORK IS BEING PERFORMED.
PERIODIC SPECIAL INSPECTION: THE PART-TIME OR INTERMITTENT OBSERVATION OF WORK REQUIRING SPECIAL INSPECTION BY AN APPROVED SPECIAL INSPECTOR WHO IS PRESENT IN THE AREA WHERE THE WORK HAS BEEN OR IS BEING PERFORMED AND AT THE COMPLETION OF THE WORK.

REFERENCE STANDARDS:
CALIFORNIA BUILDING CODE 2022 (CBC) AND ALL STANDARDS REFERENCED BY THE CBC.

REPORT REQUIREMENTS:
SPECIAL INSPECTORS MUST KEEP RECORDS OF INSPECTIONS, AND MUST FURNISH INSPECTION REPORTS TO THE BUILDING OFFICIAL AND TO THE REGISTERED DESIGN PROFESSIONAL IN RESPONSIBLE CHARGE. REPORTS MUST INDICATE THAT THE WORK INSPECTED WAS OR WAS NOT COMPLETED IN CONFORMANCE TO THE APPROVED CONSTRUCTION DOCUMENTS. DISCREPANCIES MUST BE BROUGHT TO THE IMMEDIATE ATTENTION OF THE CONTRACTOR FOR CORRECTION. IF THEY ARE NOT CORRECTED, THE DISCREPANCIES MUST BE BROUGHT TO THE ATTENTION OF THE BUILDING OFFICIAL AND TO THE REGISTERED DESIGN PROFESSIONAL IN RESPONSIBLE CHARGE PRIOR TO THE COMPLETION OF THAT PHASE OF THE WORK. A FINAL REPORT DOCUMENTING THE REQUIRED SPECIAL INSPECTIONS AND CORRECTION OF ANY DISCREPANCIES NOTED IN THE INSPECTIONS MUST BE SUBMITTED AT A POINT IN TIME AGREED UPON PRIOR TO THE START OF THE WORK BY THE PERMIT APPLICANT AND THE BUILDING OFFICIAL.

SCHEDULE OF STRUCTURAL INSPECTION AND TESTING:
SPECIAL INSPECTIONS ARE REQUIRED PER CBC SECTIONS 1704 AND 1705:

- STEEL:
  - -- PERIODICALLY VERIFY MATERIAL OF STRUCTURAL STEEL.
  - -- PERIODICALLY VERIFY DIAMETER, GRADE, TYPE, LENGTH, AND EMBEDMENT.
  - -- PERIODICALLY VERIFY MEMBER LOCATIONS, BRACES, STIFFENERS, AND APPLICATION OF JOINT DETAILS AT EACH CONNECTION COMPLY WITH CONSTRUCTION DOCUMENTS.
  - -- STRUCTURAL STEEL BOLTING:
    - --- PRIOR TO BOLTING: INSPECT TASKS FOR EACH BOLTED CONNECTION, IN ACCORDANCE WITH QA TASKS LISTED IN AISC 360, TABLE N5.6-1.
    - --- DURING BOLTING: OBSERVE THE QA TASKS LISTED IN AISC 360, TABLE N5.6-2.
    - --- AFTER BOLTING: PERFORM TASKS FOR EACH BOLTED CONNECTION IN ACCORDANCE WITH QA TASKS LISTED IN AISC 360, TABLE N5.6-3.
- PLUMBING, MECHANICAL, AND ELECTRICAL COMPONENTS FOR SEISMIC RESISTANCE:
  - -- PERIODICALLY INSPECT DURING THE ANCHORAGE OF OTHER ELECTRICAL EQUIPMENT.
  - -- PERIODICALLY INSPECT DURING THE INSTALLATION AND ANCHORAGE OF HVAC DUCTWORK THAT WILL CONTAIN HAZARDOUS MATERIALS.

SCOPE OF WORK

THE PROJECT CONSISTS OF IMPROVING THE EXISTING PUMP STATION 2 GRINDER CHAMBER, WET WELL, AND VENTILATION SYSTEM. WORK INCLUDES INSTALLATION OF LINING OF WET WELL, INSTALLATION OF LINING OF GRINDER CHAMBER, INSTALLATION OF GRINDER SUPPORT BOLTS, REMOVAL OF BAR SCREEN BRACKETS, INSTALLATION OF NEW STAINLESS STEEL CLAMPS IN THE WET WELL, INSTALLATION OF NEW BUBBLER TUBE IN THE WET WELL, REPLACEMENT OF PUMP STATION 2 BATHROOM SEWER LINE WITHIN THE WET WELL, INSTALLATION OF NEW EMERGENCY BYPASS LINE, REPLACEMENT OF WET WELL AND DRY WELL FANS, REPLACEMENT OF HVAC DUCTING IN PUMP STATION 2, INSTALLATION OF VENTILATION MONITORING SYSTEM, INSTALLATION OF GO/NO-GO ALARMS AT ENTRANCE TO THE WET WELL, INSTALLATION OF GAS DETECTION EQUIPMENT, AND INSTALLATION OF NEW ELECTRICAL EQUIPMENT.

ABBREVIATIONS

(E)	EXISTING
(N)	NEW
AB	AGGREGATE BASE
APPROX.	APPROXIMATELY
CI	CAST IRON
CONC	CONCRETE
DIA	DIAMETER
DI	DUCTILE IRON
EA	EACH
EL	ELBOW
ELEV	ELEVATION
FT^2	SQUARE FEET
GALV	GALVANIZED
GPM	GALLONS PER MINUTE
HDPE	HIGH-DENSITY POLYETHYLENE
INV	INVERT
LBS	POUNDS
LF	LINEAR FEET
MAX	MAXIMUM
MIN	MINIMUM
NC	NATIONAL COURSE
NTS	NOT TO SCALE
OC	ON CENTER
PDWF	PEAK DRY WEATHER FLOW
PWWF	PEAK WET WEATHER FLOW
PVC	POLYVINYLCHLORIDE
S.S.	STAINLESS STEEL
SCH	SCHEDULE
SS	SANITARY SEWER
STL	STEEL
TYP	TYPICAL
USA	UNDERGROUND SERVICE ALERT
W/	WITH

LEGEND

	EXISTING	NEW
SANITARY SEWER	SS	SS
DEMO/ABANDON		
CONCRETE		
DETAIL CALLOUT		X DETAIL # / X SHEET #
EARTH		
CLASS II AB		
NON-SHRINK GROUT		

CITY OF ROHNERT PARK
130 AVRAM AVENUE
ROHNERT PARK, CALIFORNIA 94928
PHONE: (707) 588-2232 FAX: (707) 794-9242

REV. NO.	DATE	DESCRIPTION	BY

SCHAAF & WHEELER
CONSULTING CIVIL ENGINEERS
2200 RANGE AVENUE, SUITE #201
SANTA ROSA, CA 95403
(707) 528-4848

REGISTERED PROFESSIONAL ENGINEER — BENJAMIN L. SHICK — No. 88124 — CIVIL — STATE OF CALIFORNIA

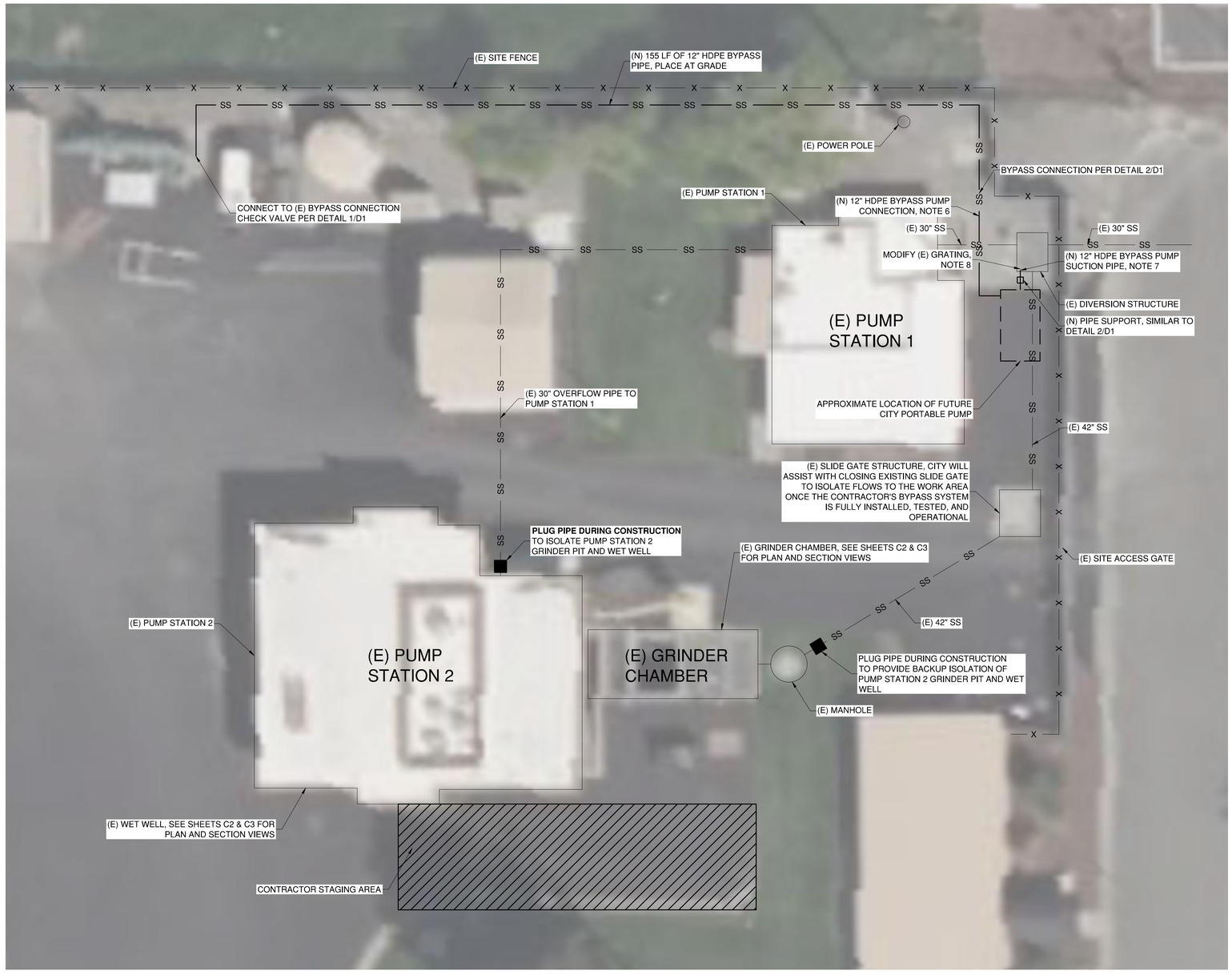
APPROVED:
3-31-2026
DATE
JULIAN DE ANDA, P.E. 82463
CITY ENGINEER,
CITY OF ROHNERT PARK

WET WELL LINING PUMP STATION 2
Project No. 2017 - 09
NOTES, ABBREVIATIONS & LEGEND SHEET

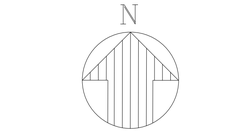
DESIGNED BY:	JTV
DRAWN BY:	JTV
CHECKED BY:	BLS
DATE:	MARCH 2026
PROJECT:	2017-09
DWG NO:	T-2
SHEET	**2 OF 16**
	SHEETS

NOTES:

1. CONTRACTOR SHALL ISOLATE PUMP STATION 2 DURING CONSTRUCTION TO COMPLETE THE WORK.
2. EXISTING PIPES SHALL BE PLUGGED AS SHOWN HEREIN AND AS SPECIFIED.
3. CONTRACTOR SHALL PERFORM BYPASS PUMPING FROM THE EXISTING DIVERSION STRUCTURE. CONTRACTOR MAY UTILIZE THE NEW 12" HDPE BYPASS PIPE FOR BYPASS PUMPING.
4. CONTRACTOR SHALL FLUSH THE BYPASS PIPE WITH POTABLE OR RECYCLED WATER UPON COMPLETION OF BYPASS PUMPING.
5. REFERENCE SPECIFICATIONS SECTION 01531 FOR ADDITIONAL CONSTRAINTS AND REQUIREMENTS.
6. CONTRACTOR SHALL PROVIDE 12" HDPE PIPE TO CONNECT THE CITY'S BYPASS PUMP TO THE BYPASS PIPE CONNECTION. THE CITY'S BYPASS PUMP WILL BE INSTALLED AFTER CONSTRUCTION IS COMPLETED. THE CONNECTION PIPE SHALL INCLUDE BENDS, 316 FLANGE BOLT KITS, FLANGE ADAPTERS AND BACKING RINGS ON BOTH ENDS TO ACCOMMODATE THE BYPASS CONNECTION AND FUTURE PUMP LOCATION. THE CONTRACTOR SHALL COORDINATE WITH THE CITY TO DETERMINE THE EXACT LOCATION THAT THE BYPASS PUMP WILL BE INSTALLED AND HOW THE CONNECTION SHALL BE MADE. THE CONTRACTOR SHALL ANTICIPATE THAT THE PIPE MAY BE UP TO 25' IN LENGTH.
7. CONTRACTOR SHALL PROVIDE 12" HDPE SUCTION PIPE FOR THE CITY'S BYPASS PUMP. THE CITY'S BYPASS PUMP WILL BE INSTALLED AFTER CONSTRUCTION IS COMPLETED. THE SUCTION PIPE SHALL INCLUDE BENDS, 316 FLANGE BOLT KITS, FLANGE ADAPTER AND BACKING RING TO CONNECT TO THE PUMP. THE CONTRACTOR SHALL COORDINATE WITH THE CITY TO DETERMINE THE EXACT LOCATION THAT THE BYPASS PUMP WILL BE INSTALLED AND HOW THE CONNECTION SHALL BE MADE. THE CONTRACTOR SHALL ANTICIPATE THAT THE PIPE MAY BE UP TO 25' IN LENGTH. THE PIPE SHALL EXTEND VERTICALLY TO 1' ABOVE THE INVERT OF THE DIVERSION STRUCTURE AND SHALL BE ANCHORED TO THE WALL OF THE DIVERSION STRUCTURE WITH THREE EQUALLY SPACED PIPE RISER CLAMPS, ANVIL FIGURE 261SS, OR APPROVED EQUAL, 316 STAINLESS STEEL. THE CLAMP SIZE SHALL BE ADJUSTED TO MATCH THE OUTSIDE DIAMETER OF THE PIPE, WHICH MAY REQUIRE CUSTOM FABRICATION. THE CLAMPS SHALL BE ANCHORED TO THE WALL WITH 316 STAINLESS STEEL THREADED RODS AND ADHESIVE ANCHORS.
8. CONTRACTOR SHALL MODIFY EXISTING GRATING TO ACCOMMODATE EXTENSION OF NEW SUCTION PIPE THROUGH GRATING. CONTRACTOR SHALL SUBMIT PROPOSED MODIFICATIONS TO THE CITY FOR REVIEW AND APPROVAL PRIOR TO CONSTRUCTION.



SITE PLAN
SCALE: 1" = 10'



SCALE: 1 INCH = 10 FEET

CITY OF ROHNERT PARK
130 AVRAM AVENUE
ROHNERT PARK, CALIFORNIA 94928
PHONE: (707) 588-2232 FAX: (707) 794-9242

REV. NO.	DATE	DESCRIPTION	BY

SCHAAF & WHEELER
CONSULTING CIVIL ENGINEERS
2200 RANGE AVENUE, SUITE #201
SANTA ROSA, CA 95403
(707) 528-4848

REGISTERED PROFESSIONAL ENGINEER — BENJAMIN L. SHICK — No. 93814 — CIVIL — STATE OF CALIFORNIA

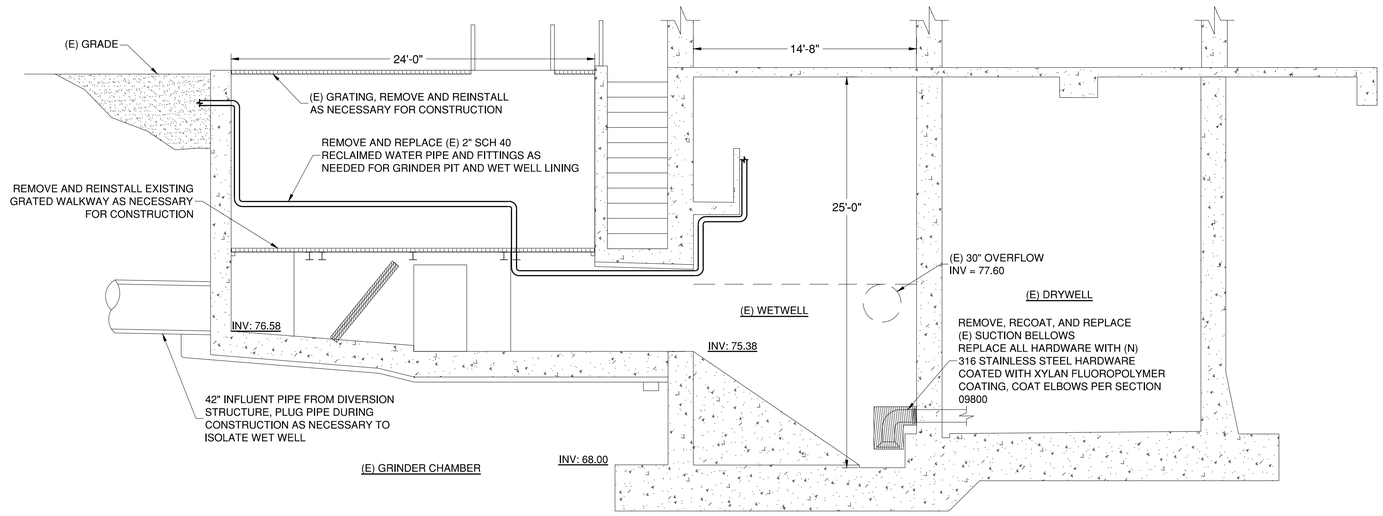
APPROVED:
3-31-2026
DATE
JULIAN DE ANDA, P.E. 82463
CITY ENGINEER,
CITY OF ROHNERT PARK

WET WELL LINING PUMP STATION 2

Project No. 2017 - 09

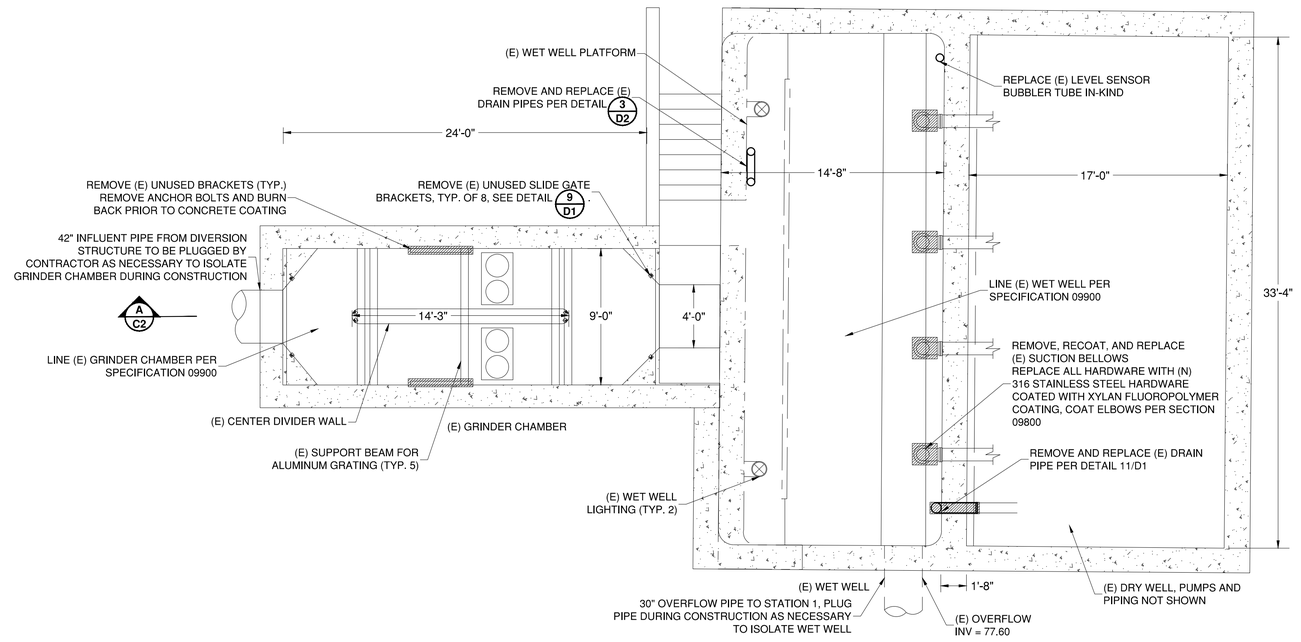
PUMP STATION SITE LAYOUT

DESIGNED BY:	JTV
DRAWN BY:	JTV
CHECKED BY:	BLS
DATE:	MARCH 2026
PROJECT:	2017-09
DWG NO:	C-1
SHEET	3 OF 16
	SHEETS



DEMOLITION SECTION A/C2

SCALE: 1" = 5'



PLAN

SCALE: 1" = 5'

CITY OF ROHNERT PARK
130 AVRAM AVENUE
ROHNERT PARK, CALIFORNIA 94928
PHONE: (707) 588-2232 FAX: (707) 794-9242

REV. NO.	DATE	DESCRIPTION	BY

SCHAAF & WHEELER
CONSULTING CIVIL ENGINEERS
2200 RANGE AVENUE, SUITE #201
SANTA ROSA, CA 95403
(707) 528-4848

REGISTERED PROFESSIONAL ENGINEER BENJAMIN L SHAW No. 58812 CIVIL STATE OF CALIFORNIA

APPROVED:

3-31-2026

DATE

JULIAN DE ANDA, P.E. 82463
CITY ENGINEER,
CITY OF ROHNERT PARK

WET WELL LINING PUMP STATION 2

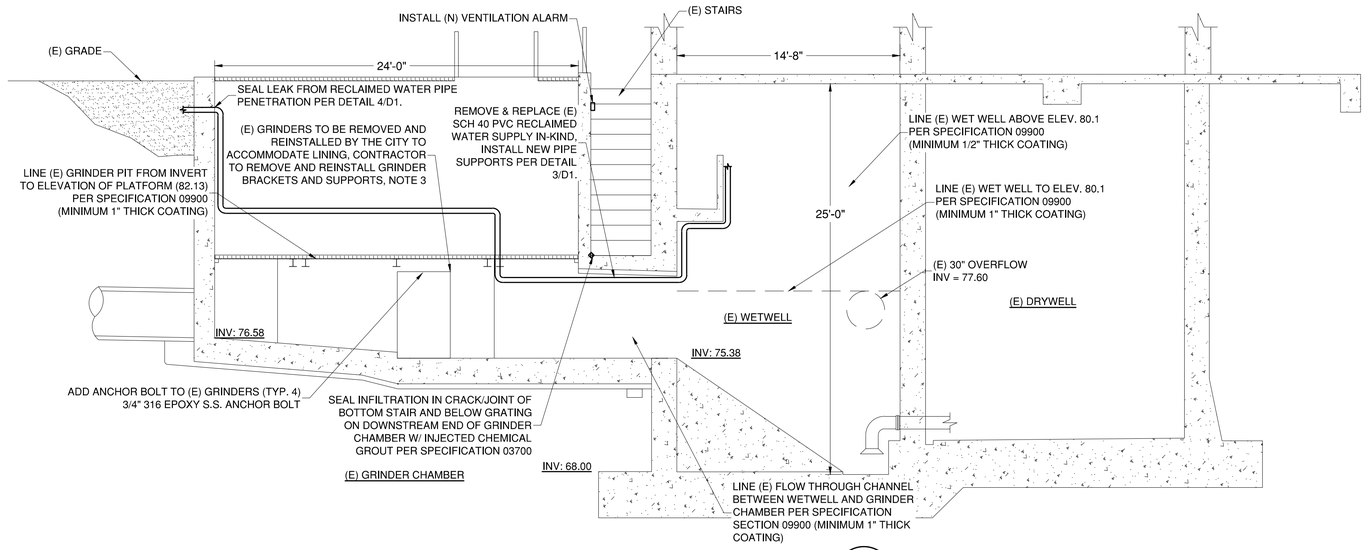
Project No. 2017 - 09

DEMOLITION PLAN

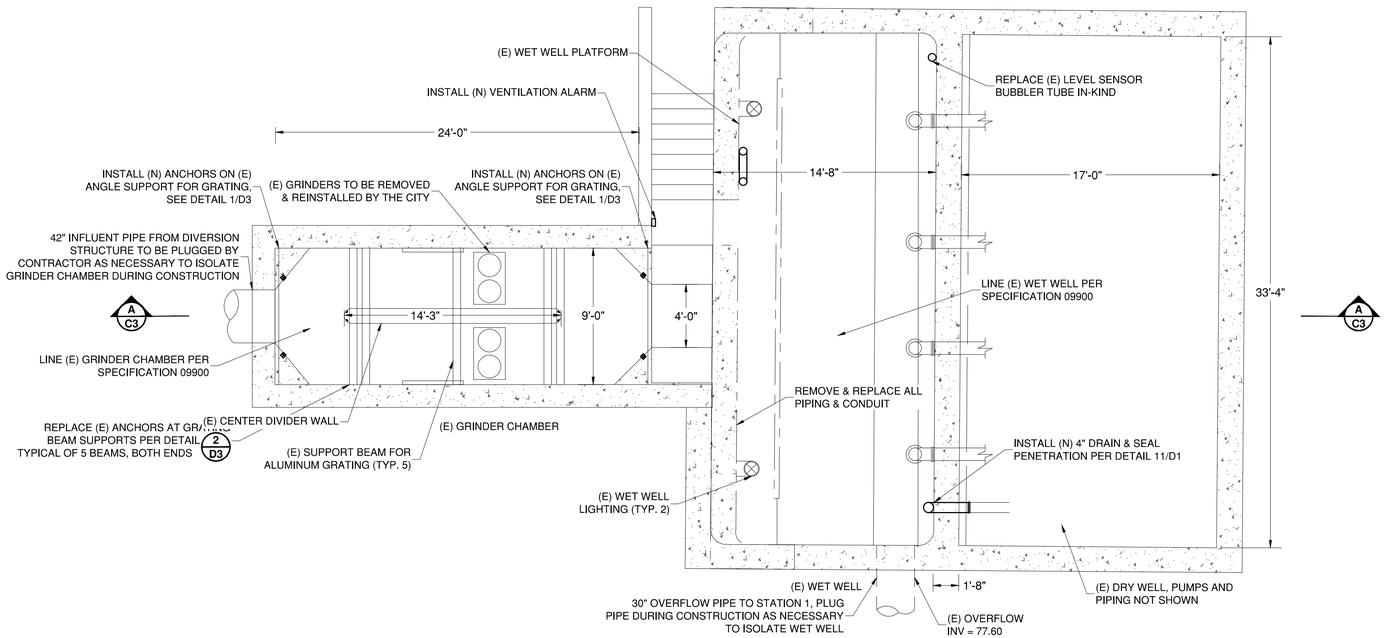
DESIGNED BY:	JTV
DRAWN BY:	JTV
CHECKED BY:	BLS
DATE:	MARCH 2026
PROJECT:	2017-09
DWG NO:	C-2
SHEET	**4 OF 16**
	SHEETS

NOTES:
1. REMOVE AND REINSTALL ALL EXISTING CONDUITS, PIPES, AND LIGHT FIXTURES AS NEEDED FOR LINING.
2. REMOVE AND REPLACE ALL CONDUIT AND PIPE SUPPORTS WITHIN GRINDER PIT AND WET WELL PER DETAIL 7/D1 AND SHEET D2. SEE ELECTRICAL SHEETS FOR ADDITIONAL IMPROVEMENTS AND REQUIREMENTS.
3. CONTRACTOR SHALL REMOVE AND REINSTALL (E) GRINDER SUPPORT BRACKETS APPROXIMATELY 3" AWAY FROM EXISTING, TYPICAL OF 4 BRACKETS. TRIM AND BURN BACK (E) ANCHORS, INSTALL NEW 316 STAINLESS STEEL ANCHORS PER INSTALLATION GUIDE WHICH IS INCLUDED AS AN ATTACHMENT TO THE SPECIFICATIONS AND PER THE MANUFACTURER'S RECOMMENDATIONS. GRINDERS ARE JWC ENVIRONMENTAL, CHANNEL MONSTER CDD4016-XD2.0. EACH BRACKET SHALL BE REINSTALLED WITH THREE 1/2-INCH ADHESIVE ANCHOR THREADED RODS AND NUTS, 3-INCH MINIMUM EMBEDMENT, 316 STAINLESS STEEL.

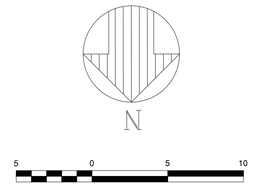
PUMP STATION SURFACE AREA TO BE COATED		
LOCATION	SURFACE AREA (FT^2)	COATING SYSTEM
GRINDER CHAMBER & CHANNEL	820	CEMENTITIOUS COATING: 1" EPOXY COATING: 1"
WET WELL BELOW ELEV. 80.1	1300	CEMENTITIOUS COATING: 1" EPOXY COATING: 1"
WET WELL ABOVE ELEV. 80.1	1418	CEMENTITIOUS COATING: $\frac{3}{8}$" EPOXY COATING: $\frac{1}{4}$"



IMPROVEMENT SECTION A/C3
SCALE: 1" = 5'



PLAN
SCALE: 1" = 5'



CITY OF ROHNERT PARK
130 AVRAM AVENUE
ROHNERT PARK, CALIFORNIA 94928
PHONE: (707) 588-2232 FAX: (707) 794-9242

REV. NO.	DATE	DESCRIPTION	BY

SCHAAF & WHEELER
CONSULTING CIVIL ENGINEERS
2200 RANGE AVENUE, SUITE #201
SANTA ROSA, CA 95403
(707) 528-4848

REGISTERED PROFESSIONAL ENGINEER BENJAMIN L SHICK No. 98812 CIVIL STATE OF CALIFORNIA

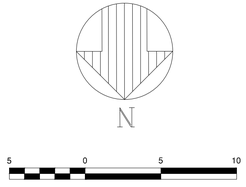
APPROVED:
3-31-2026
DATE
JULIAN DE ANDA, P.E. 82463
CITY ENGINEER,
CITY OF ROHNERT PARK

WET WELL LINING PUMP STATION 2
Project No. 2017 - 09
IMPROVEMENT PLAN

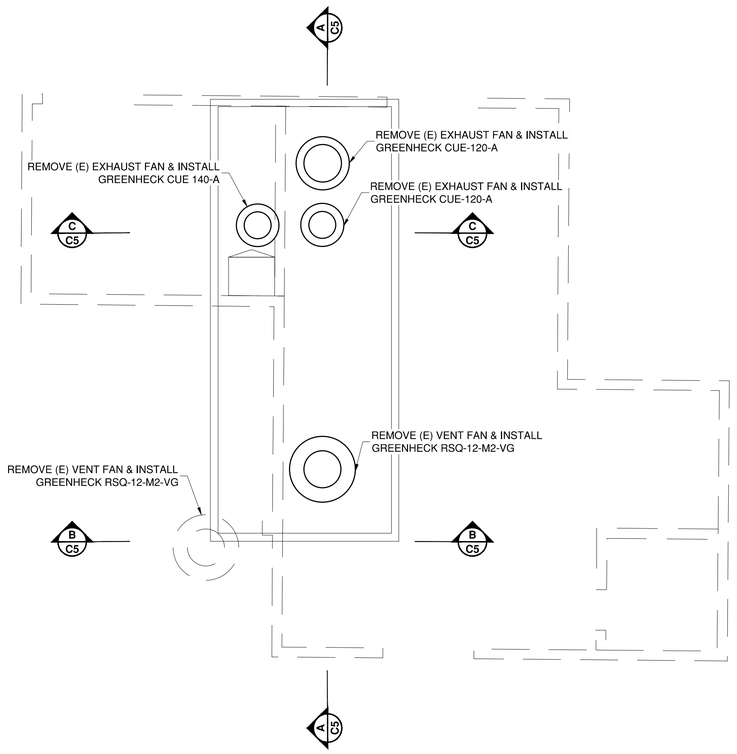
DESIGNED BY:	JTV
DRAWN BY:	JTV
CHECKED BY:	BLS
DATE:	MARCH 2026
PROJECT:	2017-09
DWG NO:	C-3
SHEET	**5 OF 16**
	SHEETS

NOTES:

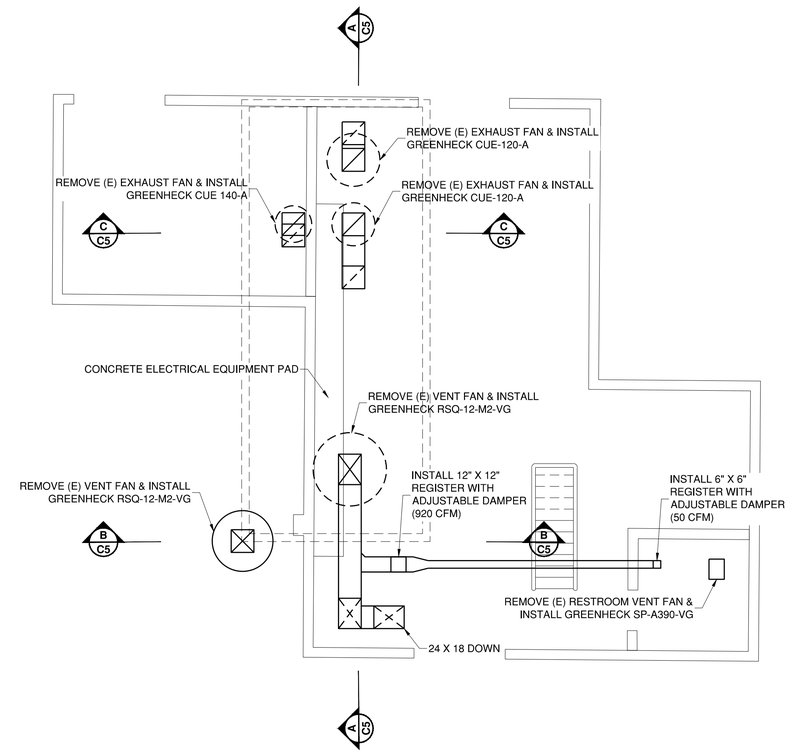
1. PROVIDE THE SUPPLY FANS WITH 2-INCH WASHABLE ALUMINUM FILTERS AND AN INSECT SCREEN.
2. THE CONTRACTOR IS RESPONSIBLE FOR FIELD LOCATING ALL DUCTWORK, SUPPORTS, CONDUIT, AND MOUNTING LOCATIONS. CONTRACTOR SHALL PROVIDE SHOP DRAWINGS OF FIELD FIT DUCTWORK, CONDUIT, SUPPORTS, AND MOUNTING LOCATIONS.
3. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING A COMPLETE AND OPERABLE SUPPLY AND EXHAUST VENTILATION SYSTEM ADHERING TO ALL APPLICABLE CODES INCLUDING THE CALIFORNIA BUILDING CODE, THE CALIFORNIA ELECTRICAL CODE, AND NFPA 820.
4. CONTRACTOR SHALL SIZE FAN AND DUCTING TO PROVIDE POSITIVE PRESSURE WITHIN DRYWELL.
5. SEE ELECTRICAL SHEETS FOR ADDITIONAL IMPROVEMENTS AND REQUIREMENTS.
6. ALL EQUIPMENT AND INSTALLATION SHOWN IS NEW UNLESS OTHERWISE NOTED AS (E) OR EXISTING.
7. EXISTING PUMP STATION PIPING, PUMPS, AND MISCELLANEOUS EQUIPMENT ARE NOT SHOWN ON THIS SHEET.



SCALE: 1 INCH = 5 FEET



ROOF PLAN
SCALE: 1" = 5'



GROUND LEVEL PLAN
SCALE: 1" = 5'

CITY OF ROHNERT PARK
130 AVRAM AVENUE
ROHNERT PARK, CALIFORNIA 94928
PHONE: (707) 588-2232 FAX: (707) 794-9242

REV. NO.	DATE	DESCRIPTION	BY

SCHAAF & WHEELER
CONSULTING CIVIL ENGINEERS
2200 RANGE AVENUE, SUITE #201
SANTA ROSA, CA 95403
(707) 528-4848

REGISTERED PROFESSIONAL ENGINEER BENJAMIN L. SHUCK No. 58812 CIVIL STATE OF CALIFORNIA

APPROVED:

3-31-2026

DATE

JULIAN DE ANDA, P.E. 82463
CITY ENGINEER,
CITY OF ROHNERT PARK

WET WELL LINING PUMP STATION 2

Project No. 2017 - 09

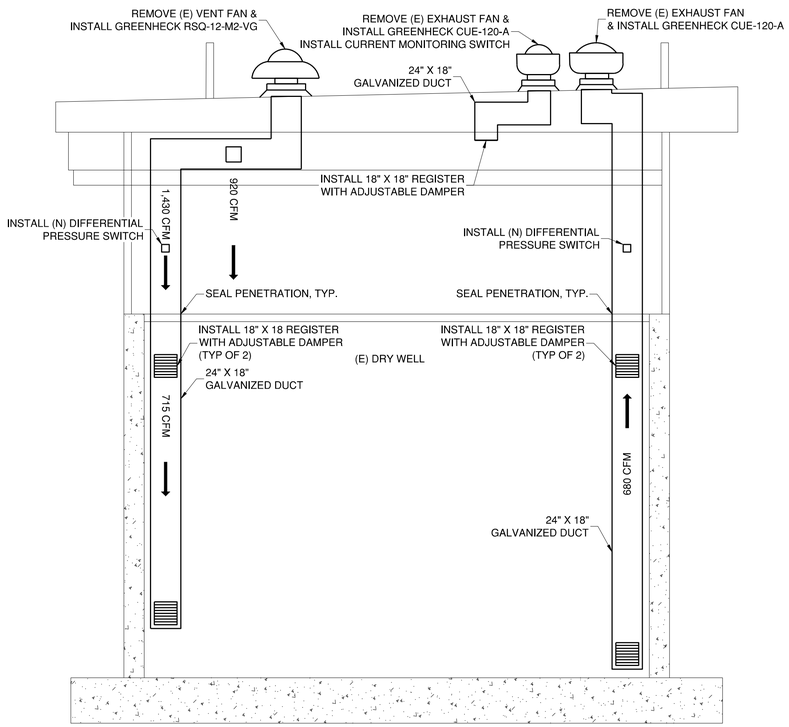
MECHANICAL PLAN

DESIGNED BY:	JTV
DRAWN BY:	JTV
CHECKED BY:	BLS
DATE:	MARCH 2026
PROJECT:	2017-09
DWG NO:	C-4

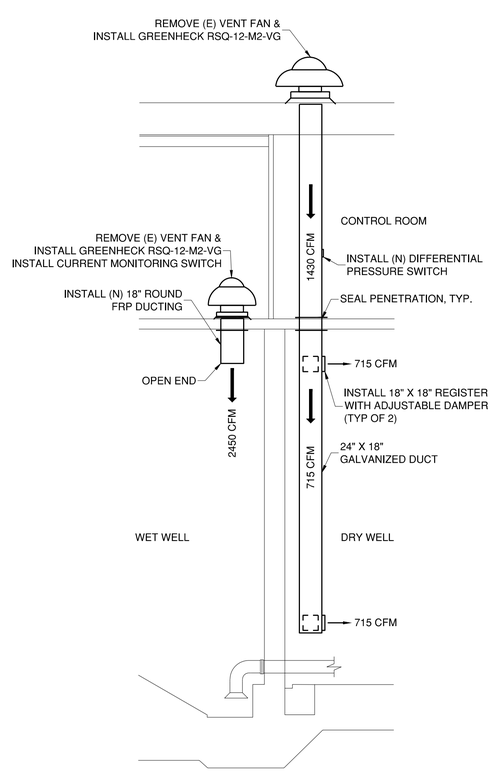
SHEET
6 OF 16
SHEETS

NOTES:

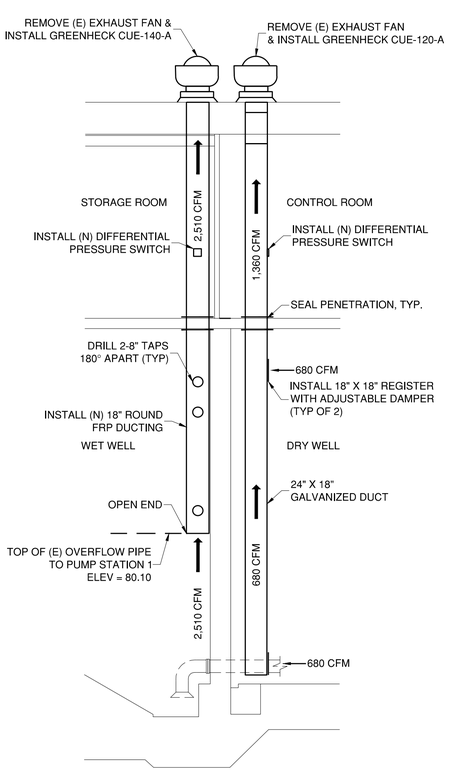
1. PROVIDE THE SUPPLY FANS WITH 2-INCH WASHABLE ALUMINUM FILTERS AND AN INSECT SCREEN.
2. THE CONTRACTOR IS RESPONSIBLE FOR FIELD LOCATING ALL DUCTWORK, SUPPORTS, CONDUIT, AND MOUNTING LOCATIONS. CONTRACTOR SHALL PROVIDE SHOP DRAWINGS OF FIELD FIT DUCTWORK, CONDUIT, SUPPORTS, AND MOUNTING LOCATIONS.
3. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING A COMPLETE AND OPERABLE SUPPLY AND EXHAUST VENTILATION SYSTEM ADHERING TO ALL APPLICABLE CODES INCLUDING THE CALIFORNIA BUILDING CODE, THE CALIFORNIA ELECTRICAL CODE, AND NFPA 820.
4. CONTRACTOR SHALL SIZE FAN AND DUCTING TO PROVIDE POSITIVE PRESSURE WITHIN DRYWELL.
5. SEE ELECTRICAL SHEETS FOR ADDITIONAL IMPROVEMENTS AND REQUIREMENTS.
6. ALL EQUIPMENT AND INSTALLATION SHOWN IS NEW UNLESS OTHERWISE NOTED AS (E) OR EXISTING.
7. EXISTING PUMP STATION PIPING, PUMPS, AND MISCELLANEOUS EQUIPMENT ARE NOT SHOWN ON THIS SHEET.



IMPROVEMENT SECTION A C5
SCALE: 1" = 5'



IMPROVEMENT SECTION B C5
SCALE: 1" = 5'



IMPROVEMENT SECTION C C5
SCALE: 1" = 5'

CITY OF ROHNERT PARK
130 AVRAM AVENUE
ROHNERT PARK, CALIFORNIA 94928
PHONE: (707) 588-2232 FAX: (707) 794-9242

REV. NO.	DATE	DESCRIPTION	BY

SCHAAF & WHEELER
CONSULTING CIVIL ENGINEERS
2200 RANGE AVENUE, SUITE #201
SANTA ROSA, CA 95403
(707) 528-4848

REGISTERED PROFESSIONAL ENGINEER BENJAMIN L. SHUCK No. 58812 CIVIL STATE OF CALIFORNIA

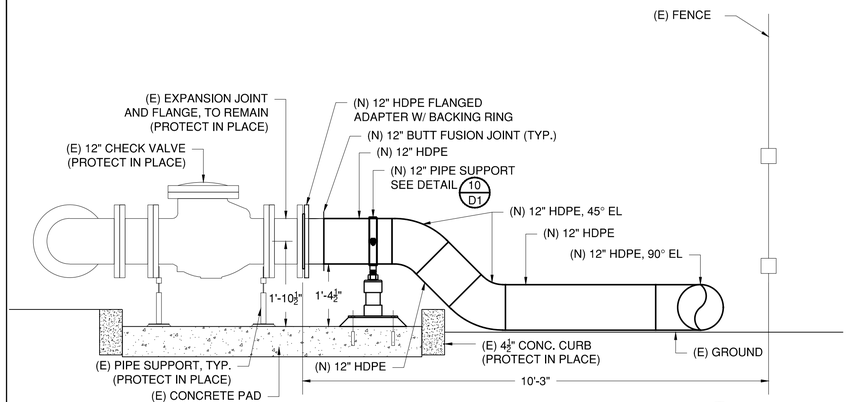
APPROVED:
3-31-2026
DATE
JULIAN DE ANDA, P.E. 82463
CITY ENGINEER,
CITY OF ROHNERT PARK

WET WELL LINING PUMP STATION 2

Project No. 2017 - 09

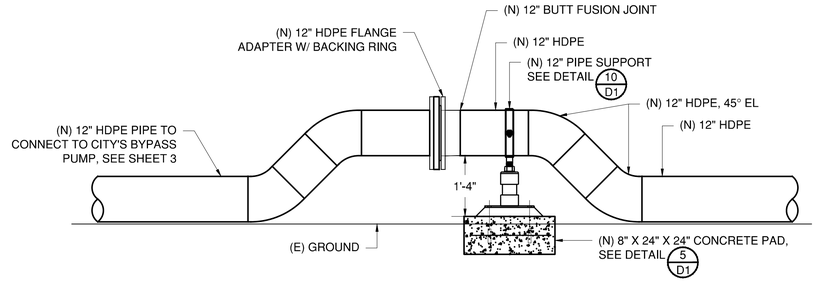
MECHANICAL SECTIONS

DESIGNED BY:	JTV
DRAWN BY:	JTV
CHECKED BY:	BLS
DATE:	MARCH 2026
PROJECT:	2017-09
DWG NO:	C-5
SHEET	**7 OF 16** SHEETS



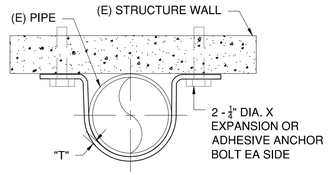
BYPASS PIPE CONNECTION TO EXISTING CHECK VALVE DETAIL 1/D1

SCALE: NTS



BYPASS CONNECTION AT DIVERSION STRUCTURE DETAIL 2/D1

SCALE: NTS

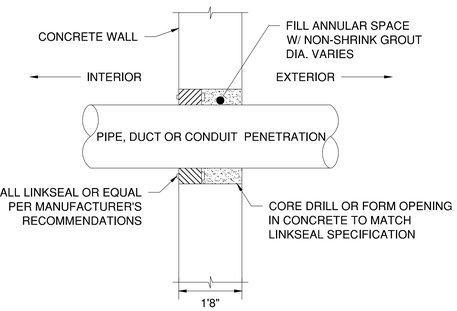


NOTE:
PIPE CLAMP AND ALL HARDWARE SHALL BE 316 STAINLESS STEEL

PIPE CLAMP DIMENSIONS		
PIPE SIZE	**WIDTH**	**"T"**
½" TO 1¼"	7/8"	3/16"
1½" TO 2"	1"	1/4"
2½" TO 4"	2"	1/4"

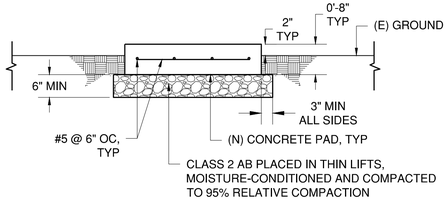
PIPE SUPPORT DETAIL -1 3/D1

SCALE: NTS



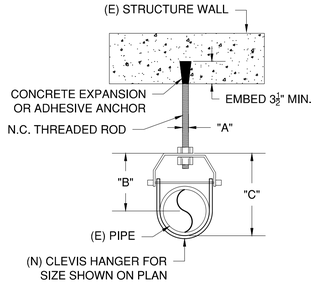
INTERIOR/EXTERIOR WALL PENETRATION DETAIL 4/D1

SCALE: NTS



CONCRETE PAD DETAIL 5/D1

SCALE: NTS

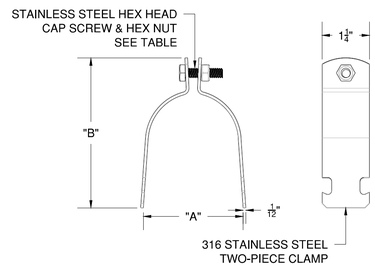


CLEVIS HANGER DIMENSIONS			
PIPE SIZE	**A**	**B**	C
½" TO 2"	⅜"	2 3/16" TO 3 5/16"	2 11/16" TO 4½"
1½" TO 2"	⅜"	2 13/16" TO 3 5/16"	3 13/16" TO 4½"
2½" TO 4"	½" TO ⅝"	4 1/16" TO 5 3/16"	5½" TO 7 13/16"

NOTE:
ALL MATERIALS AND HARDWARE SHALL BE 316 STAINLESS STEEL

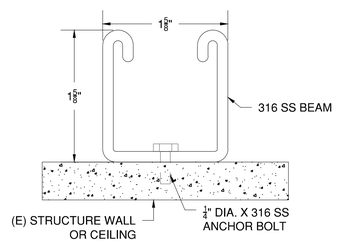
PIPE CLEVIS SUPPORT DETAIL 6/D1

SCALE: NTS



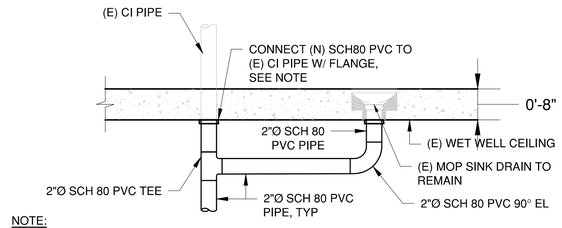
HEAD HEAD CAP & HEX NUT				
PIPE SIZE	**CAP & NUT SIZE**	**SUPPORT SPACING**	**A**	**B**
½" TO 2"	¼" X 1"	36"	1¼" TO 2 5/8"	1 5/8" TO 3 3/8"
1½" TO 2"	⅜" X 1	36"	2⅓" TO 2 5/8"	2 5/8" TO 3 3/8"
2½" TO 4"	⅜" X 1¼"	48"	3 ⅜" TO 5"	4 5/8" TO 5 11/12"

NOTE:
ALL MATERIALS AND HARDWARE SHALL BE 316 STAINLESS STEEL



PIPE AND CONDUIT SUPPORT DETAIL 7/D1

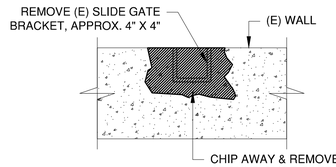
SCALE: NTS



NOTE:
CONTRACTOR SHALL TRIM (E) DRAIN PIPE & INSTALL (N) SCH 80 PIPE. CONTRACTOR SHALL INSTALL (N) FLANGE, PER SPECIFICATION, BETWEEN (N) AND (E) DRAIN PIPE.

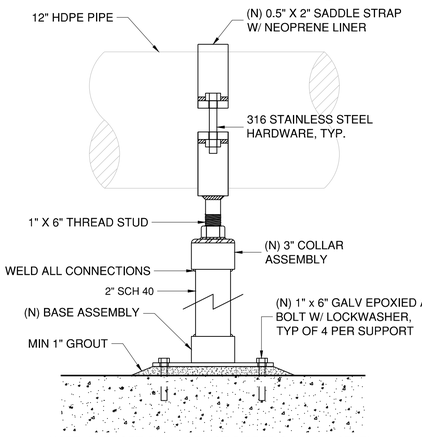
DRAIN PIPE PENETRATION DETAIL 8/D1

SCALE: NTS



SLIDE GATE BRACKET REMOVAL DETAIL 9/D1

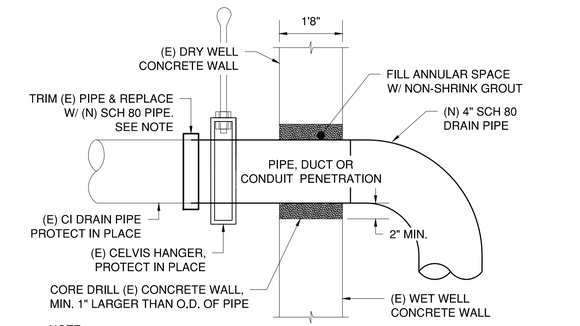
SCALE: NTS (PLAN VIEW)



NOTE: SUPPORT SHALL BE HOT-DIPPED GALV A36 STEEL.
STANDON C92 PIPE SUPPORT, OR APPROVED EQUAL

PIPE SUPPORT DETAIL 10/D1

SCALE: NTS



NOTE:
CONTRACTOR SHALL TRIM (E) DRAIN PIPE & INSTALL (N) SCH 80 PIPE. CONTRACTOR SHALL INSTALL (N) 316 STAINLESS STEEL COUPLING WITH SHEAR RING, TO CONNECT (N) AND (E) DRAIN PIPE.

DRY WELL/WET WELL WALL PENETRATION DETAIL 11/D1

SCALE: NTS

CITY OF ROHNERT PARK
130 AVRAM AVENUE
ROHNERT PARK, CALIFORNIA 94928
PHONE: (707) 588-2232 FAX: (707) 794-9242

REV. NO.	DATE	DESCRIPTION	BY

SCHAAF & WHEELER
CONSULTING CIVIL ENGINEERS
2200 RANGE AVENUE, SUITE #201
SANTA ROSA, CA 95403
(707) 528-4848

REGISTERED PROFESSIONAL ENGINEER — BENJAMIN L. SLACK — No. 88812 — CIVIL — STATE OF CALIFORNIA

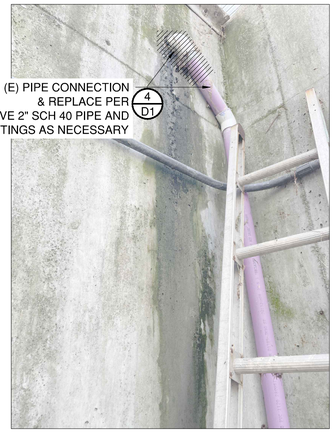
APPROVED:
3-31-2026
DATE
JULIAN DE ANDA, P.E. 82463
CITY ENGINEER,
CITY OF ROHNERT PARK

WET WELL LINING PUMP STATION 2

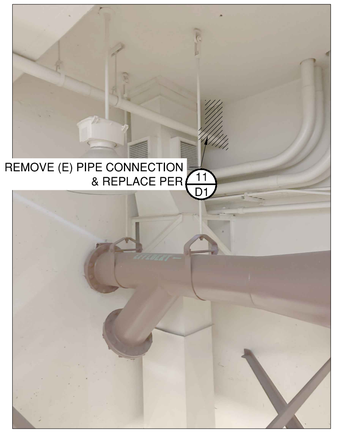
Project No. 2017 - 09

DETAIL SHEET

DESIGNED BY:	JTV
DRAWN BY:	JTV
CHECKED BY:	BLS
DATE:	MARCH 2026
PROJECT:	2017-09
DWG NO:	D-1
SHEET	**8 OF 16** SHEETS



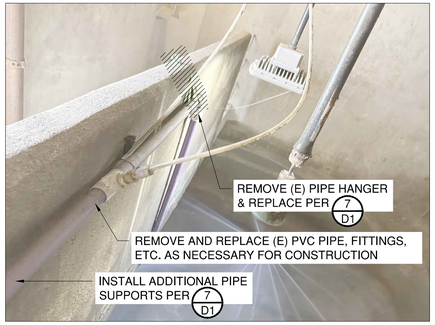
GRINDER CHAMBER DRAIN PIPE DETAIL 1 D2
SCALE: NTS



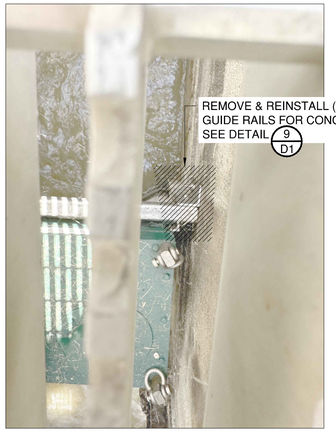
DRAIN CONNECTION THROUGH DRY WELL WALL 2 D2
SCALE: NTS

DRAIN CONNECTION THROUGH WET WELL WALL 3 D2
SCALE: NTS

REMOVAL AND REPLACEMENT OF SAFETY CHAINS 4 D2
SCALE: NTS



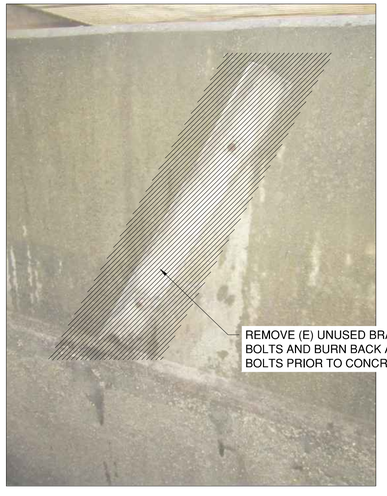
CONDUIT SUPPORT PLACEMENT IN WETWELL 5 D2
SCALE: NTS



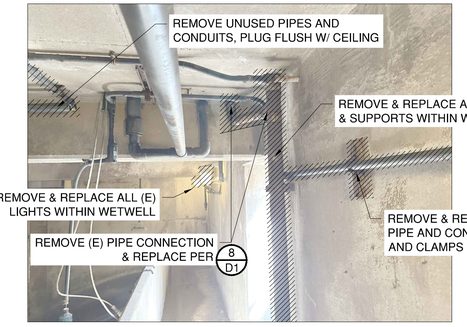
SLIDE GATE RAIL SYSTEM REMOVAL 6 D2
SCALE: NTS

SLIDE GATE RAIL SYSTEM REMOVAL 7 D2
SCALE: NTS

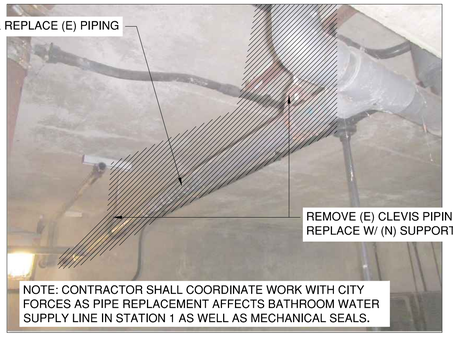
BUBBLER TUBE SENSOR REMOVAL AND REPLACEMENT 8 D2
SCALE: NTS



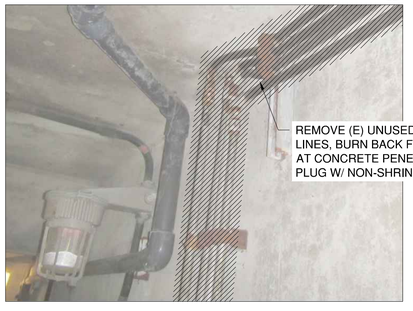
REMOVAL OF UNUSED GRINDER CHAMBER BRACKETS 9 D2
SCALE: NTS



DRAIN CONNECTION THROUGH WET WELL CEILING 10 D2
SCALE: NTS



REMOVAL & REPLACEMENT OF CLEVIS SUPPORTS 11 D2
SCALE: NTS



REMOVAL OF UNUSED HYDRAULIC LINES 12 D2
SCALE: NTS

CITY OF ROHNERT PARK
130 AVRAM AVENUE
ROHNERT PARK, CALIFORNIA 94928
PHONE: (707) 588-2232 FAX: (707) 794-9242

REV. NO.	DATE	DESCRIPTION	BY

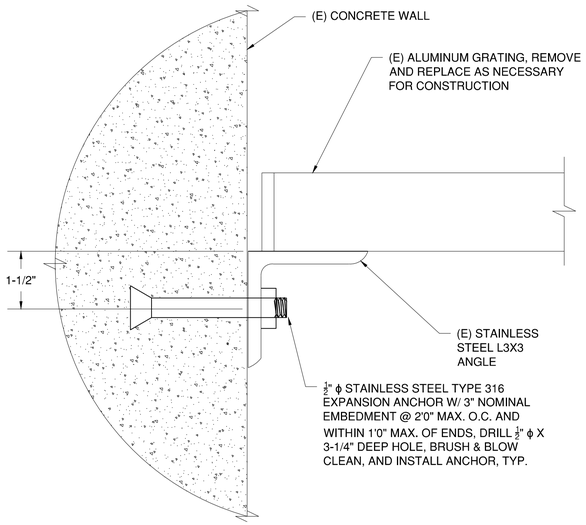
SCHAAF & WHEELER
CONSULTING CIVIL ENGINEERS
2200 RANGE AVENUE, SUITE #201
SANTA ROSA, CA 95403
(707) 528-4848

REGISTERED PROFESSIONAL ENGINEER BENJAMIN L. SHICK No. 88139 CIVIL STATE OF CALIFORNIA

APPROVED:
3-31-2026
DATE
JULIAN DE ANDA, P.E. 82463
CITY ENGINEER,
CITY OF ROHNERT PARK

WET WELL LINING PUMP STATION 2
Project No. 2017 - 09
DETAIL SHEET

DESIGNED BY:	JTV
DRAWN BY:	JTV
CHECKED BY:	BLS
DATE:	MARCH 2026
PROJECT:	2017-09
DWG NO:	D-2
SHEET	9 OF 16
	SHEETS

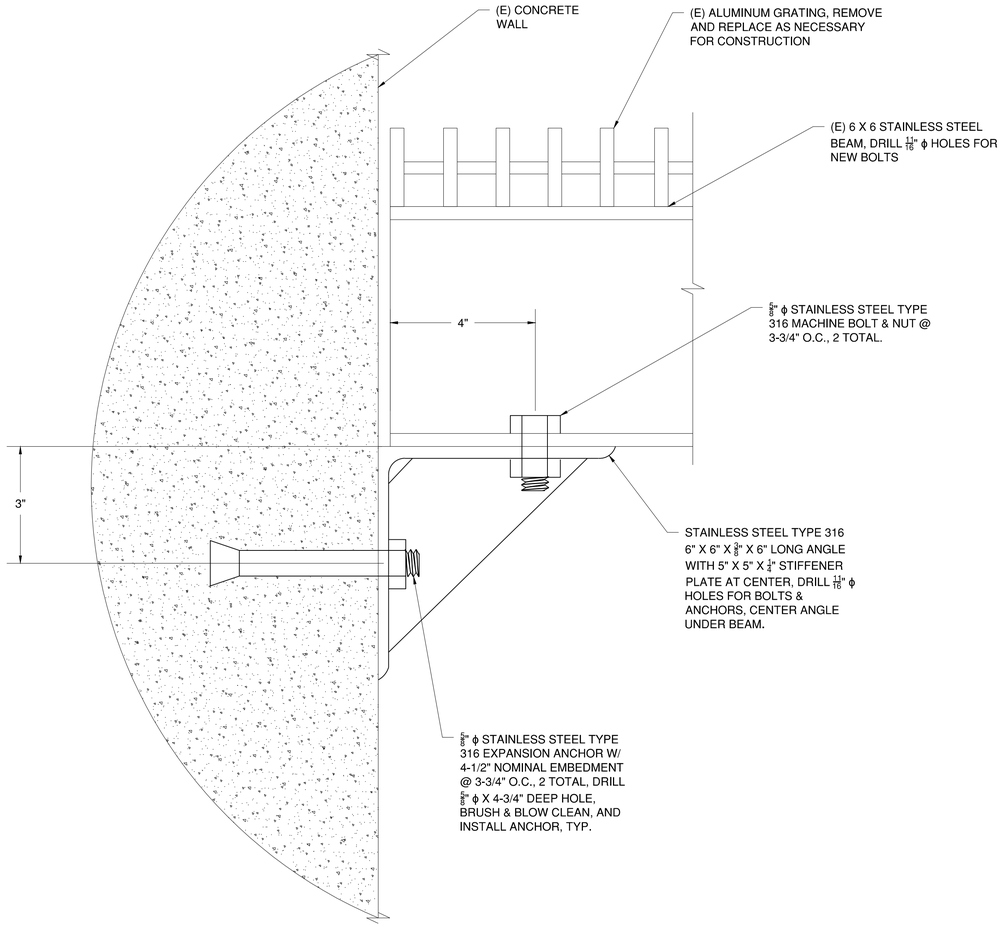


NEW ANCHORS AT GRATING ANGLE SUPPORTS (1 / D3)

SCALE: NTS

GENERAL STRUCTURAL NOTES & SPECIFICATIONS:

1. BASIS OF DESIGN: 2022 CALIFORNIA BUILDING CODE.
2. ALL MATERIALS, WORKMANSHIP, TESTING, AND INSPECTION SHALL CONFORM TO THE CALIFORNIA BUILDING CODE, 2022 EDITION, AND LOCAL BUILDING CODES.
3. DETAILS SHOWN ARE TYPICAL, AND APPLY TO SIMILAR CONDITIONS, UNLESS NOTED OTHERWISE.
4. SPECIAL INSPECTION OF EXPANSION ANCHOR INSTALLATION SHALL BE PROVIDED BY THE OWNER'S REPRESENTATIVE INCLUDING ANCHOR TYPE AND SIZE, HOLE SIZE AND CLEANLINESS, TIGHTENING TORQUE, AND COMPLIANCE WITH THE ICC EVALUATION REPORT.
5. DRILLED HOLES FOR NEW ANCHORS IN EXISTING CONCRETE SHALL NOT CUT EXISTING REINFORCING STEEL. HOLES STRIKING EXISTING REINFORCING STEEL SHALL BE ABANDONED, PATCHED, AND RELOCATED.
6. STAINLESS STEEL MATERIAL SPECIFICATIONS:
   SHAPES AND PLATES: ASTM A320, TYPE 316.
   WELDING: AWS D1.6.
   MACHINE BOLTS: ASTM F593, TYPE 316.
   NUTS: ASTM F594, TYPE 316.
7. EXPANSION ANCHORS IN CONCRETE SHALL BE "KWIK BOLT TZ2" ANCHORS AS MANUFACTURED BY HILTI, INC. OR APPROVED EQUAL. PREPARATION OF HOLES AND INSTALLATION OF ANCHORS SHALL CONFORM TO THE MANUFACTURER'S RECOMMENDATIONS AND ICC-ES REPORT NO. ESR-4266.



NEW ANCHORS AT GRATING BEAM SUPPORTS (2 / D3)

SCALE: NTS

CITY OF ROHNERT PARK
130 AVRAM AVENUE
ROHNERT PARK, CALIFORNIA 94928
PHONE: (707) 588-2232 FAX: (707) 794-9242

REV. NO.	DATE	DESCRIPTION	BY

SCHAAF & WHEELER
CONSULTING CIVIL ENGINEERS
2200 RANGE AVENUE, SUITE #201
SANTA ROSA, CA 95403
(707) 528-4848

REGISTERED PROFESSIONAL ENGINEER — BENJAMIN L SHICK — No. 93812 — CIVIL — STATE OF CALIFORNIA

APPROVED:

3-31-2026

DATE

JULIAN DE ANDA, P.E. 82463
CITY ENGINEER,
CITY OF ROHNERT PARK

WET WELL LINING PUMP STATION 2

Project No. 2017 - 09

STRUCTURAL DETAIL SHEET

DESIGNED BY:	JTV
DRAWN BY:	JTV
CHECKED BY:	BLS
DATE:	MARCH 2026
PROJECT:	2017-09
DWG NO:	D-3
SHEET	**10 OF 16**
	SHEETS

COMPONENTS

SYMBOL	DESCRIPTION
RES	RESISTOR
SV	SOLENOID COIL
HTR	HEATER
	CAPACITOR
	DIODE
	DIODE, ZENER
MOV	METAL OXIDE VARISTOR
	AUDIBLE ALARM
1	MOTOR STARTER NEMA SIZE SHOWN
? HP	3 PHASE MOTOR ? = MOTOR HP
M	3 PHASE MOTOR
M	SINGLE PHASE MOTOR
	TRANSFORMER SIZE AND VOLTAGE AS SHOWN
M	UTILITY POWER METER
N G	NEUTRAL AND GROUND WITH DISCONNECT LINK
	UFER GROUND
	GROUND ROD OR SYSTEM
	CURRENT TRANSFORMER RATIO AS NOTED
	DISCONNECT SWITCH SIZED PER FEEDER
PDB	POWER DISTRIBUTION BLOCK

SWITCHES – OPERATOR

SYMBOL	DESCRIPTION
SW	TOGGLE OR DISCONNECT SWITCH
PB	PUSHBUTTON – NORMALLY OPEN, MOMENTARY ACTION
PB	PUSHBUTTON – NORMALLY CLOSED, MOMENTARY UNLESS LOS (LOCK OUT STOP) WHERE MECHANICALLY HELD
PB	PUSHBUTTON, MECHANICALLY CONNECTED, DOUBLE CIRCUIT – NORMALLY CLOSED AND NORMALLY OPEN
HAND OFF AUTO	SELECTOR SWITCH, 3 POSITION – CONTACT STATUS SHOWN EXISTS I.E. AT POSITION OF HAND, OFF, OR AUTO
	SELECTOR SWITCH, 2 POSITION – MIDDLE POSITION IS DELETED
	ALTERNATE METHOD: X00 = HAND 00X = AUTO, 0X0 = OFF
	POTENTIOMETER

SWITCHES – PROCESS

SYMBOL	DESCRIPTION
FS	FLOW SWITCH – CLOSES UPON INCREASING FLOW
FS	FLOW SWITCH – OPENS UPON INCREASING FLOW
LS	LEVEL SWITCH – CLOSES UPON INCREASING LEVEL
LS	LEVEL SWITCH – OPENS UPON INCREASING LEVEL
PS	PRESSURE SWITCH – CLOSES UPON INCREASING PRESSURE (DECREASING VACUUM)
PS	PRESSURE SWITCH – OPENS UPON INCREASING PRESSURE (DECREASING VACUUM)
TS	TEMPERATURE SWITCH – CLOSES UPON INCREASING TEMPERATURE
TS	TEMPERATURE SWITCH – OPENS UPON INCREASING TEMPERATURE
ZS	LIMIT SWITCH – CLOSES AT SET LIMIT
ZS	LIMIT SWITCH – OPENS AT SET LIMIT
WS	TORQUE SWITCH – CLOSES UPON INCREASING TORQUE
WS	TORQUE SWITCH – OPENS UPON INCREASING TORQUE

DEVICES – FRONT PANEL

SYMBOL	DESCRIPTION
X	INDICATING LIGHT, LETTER "X" INDICATES COLOR: R=RED G=GREEN, A=AMBER, W=WHITE Y=YELLOW, B=BLUE
PTT X	INDICATING LIGHT, PUSH TO TEST

DEVICES – PROTECTIVE

SYMBOL	DESCRIPTION
S	CT SHORTING TERMINAL BLOCK
PTS	FUSED POTENTIAL TRANSFORMER, 208 / 120 V SECONDARY OR AS SHOWN
PM	POWER MONITOR
SPD	SURGE PROTECTION DEVICE
VMR	VOLTAGE MONITORING RELAY
OL	THERMAL OVERLOAD CONTACT
	THERMAL OVERLOAD ELEMENT
	FUSE
2	CONTACTOR, (NEMA) SIZE SHOWN

DEVICES – RELAY

SYMBOL	DESCRIPTION
M1	CONTACTOR OR STARTER M1
CR 1	CONTROL RELAY CR1
TR 2	TIME DELAY RELAY TR2 – ADJUSTABLE TIME DELAY RANGE & SETTING AS SHOWN
TDOE TDOD	TIME DELAY ON ENERGIZATION TIME DELAY ON DE–ENERGIZATION
107, 121	REFERENCED RELAY WITH N.O. CONTACT ON LINE 107 N.C. CONTACT ON LINE 121
CR1 (105)	NORMALLY OPEN, RELAY CONTACT – ACTUATED BY RELAY CR1 COIL LOCATED ON LINE 105
CR1	NORMALLY CLOSED, RELAY CONTACT – ACTUATED BY RELAY CR1
TR2	NORMALLY OPEN, TIME DELAY RELAY CONTACT – CONTACT CLOSES AFTER TR2 IS ENERGIZED
TR2	NORMALLY CLOSED, TIME DELAY RELAY CONTACT – CONTACT OPENS AFTER TR2 IS ENERGIZED
TR2	NORMALLY OPEN, TIME DELAY RELAY CONTACT – CONTACT OPENS AFTER TR2 IS DE–ENERGIZED
TR2	NORMALLY CLOSED, TIME DELAY RELAY CONTACT – CONTACT CLOSES AFTER TR2 IS DE–ENERGIZED
TR2	CONTACT OPENS AND CLOSES IN A TIMED REPEAT CYCLE

DEVICES – PROTECTIVE

SYMBOL	DESCRIPTION
Y xA xP xT	LOW VOLTAGE MOLDED CASE, INSULATED CASE OR POWER CIRCUIT BREAKER. RATINGS AS SHOWN IN DRAWINGS AND AS DEFINED BELOW: xA: CIRCUIT BREAKER AMERAGE xAT: AMPERAGE TRIP xAF: AMPERAGE FRAME xP: NUMBER OF POLES xT: TRIP PROTECTION MCP: MOTOR CIRCUIT PROTECTION TM: THERMAL MAGNETIC L: LONG TIME DELAY S: SHORT TIME DELAY I: INSTANTANEOUS TRIP G: GROUND FAULT A: ARC FLASH PROTECTION 100% DUTY RATED PER SPECIFICATIONS
100% NO MARKINGS	y: BREAKER FEATURES / OPTIONS
S	– SHUNT TRIP
K	– KIRK–KEY INTERLOCK
M	– MANUALLY CHARGED PUSHBUTTON OPERATION
E	– ELECTRICALLY CHARGED PUSHBUTTON OPERATION
52	MEDIUM VOLTAGE CIRCUIT BREAKER TRIP FUNCTIONS PER DRAWINGS AND SPECIFICATIONS
MFR	MULTIFUNCTION RELAY PER SPECIFICATIONS

WIRING – CONNECTIONS

SYMBOL	DESCRIPTION
	PANEL OR EQUIPMENT WIRING
	FIELD WIRING
	CONDUCTORS – NOT CONNECTED
	CONDUCTORS – CONNECTED
	GROUND CONNECTION
	PLUG AND RECEPTACLE
	INCOMING LINE
123	TERMINAL BLOCKS WITH TERMINAL NUMBER AS SHOWN OR AS DETERMINED BY SUBMITTAL
123	DISCONNECTING TERMINAL BLOCK
	FUSE
SHIELD CONDUCTOR	SHIELDED CABLE

PLAN – SYMBOLS

SYMBOL	DESCRIPTION
	CONDUIT, EXPOSED
	CONDUIT, IN SLAB OR BELOW GRADE
	CONDUIT, CONCEALED IN WALL OR CEILING
	CONDUIT STUBBED OUT & CAPPED
	CONDUIT STUBBED FOR FUTURE USE
	CONDUIT BENDS TOWARD OBSERVER
	CONDUIT BENDS AWAY FROM OBSERVER
	CONDUIT ENDS
J	FLEXIBLE CONDUIT CONNECTION FROM J–BOX TO EQUIPMENT
	CONDUIT CHANGE IN ELEVATION
G	BARE COPPER GROUND WIRE
G	GROUND CONNECTION BOLTED TYPE
G	GROUND CONNECTION EXOTHERMIC WELD TYPE
	DISCONNECT SWITCH
	TELEPHONE/DATA RECEPTACLE 2 PORT TA568A, 2 CAT 6 CABLES
#	CONDUIT REFERENCE TO SCHEDULE
T	THERMOSTAT
E	EYS SEAL
J	JUNCTION BOX
B	CONDUIT SEALING BUSHING
	PULL BOX OF SIZE SHOWN (CHRISTY BOX SIZE MINIMUM)
A a #	LIGHTING/MECHANICAL FIXTURE # – CIRCUIT BREAKER NUMBER A – FIXTURE SCHEDULE REF. a – CONTROL SWITCH REFERENCE
WP #7 WP	DUPLEX RECEPTACLE # – CIRCUIT BREAKER NUMBER WP – WEATHERPROOF (IF SHOWN) GFI – GROUND FAULT TYPE
aM	TOGGLE SWITCH a – FIXTURES CONTROLLED 3 – 3 WAY M = MOTION DETECTOR T = TIMER SWITCH
	SPECIAL RECEPTACLE AS REQUIRED FOR EQUIPMENT TO BE CONNECTED

MISCELLANEOUS ABBREVIATIONS

&	AND	N	NEUTRAL
@	AT	NC	NORMALLY CLOSED
A	AMBER, AMPERES	NDL	NEUTRAL DISCONNECT LINK
AC	ALTERNATING CURRENT	NHC	NORMALLY HELD CLOSED
ACK	ACKNOWLEDGE	NHO	NORMALLY HELD OPEN
AFF	ABOVE FINISHED FLOOR	NIC	NOT IN CONTRACT
AH	AMP HOUR	NO	NORMALLY OPEN
AI	ANALOG INPUT	NTS	NOT TO SCALE
AIC	AMP INTERRUPTING CAPACITY SYMMETRICAL	(N)	NEW
AM	AMP METER	OC	ON CENTER
AO	ANALOG OUTPUT	OI, OIT	OPERATOR INTERFACE
AWG	AMERICAN WIRE GUAGE	OL	OVERLOAD
ATS	AUTOMATIC TRANSFER SWITCH	ORP	OXIDATION REDUCTION POTENTIAL
BATT	BATTERY	PB	PUSHBUTTON
BFC	BELOW FINISHED CEILING	PBX	PULL BOX
BOD	BIOCHEMICAL OXYGEN DEMAND	PDB	POWER DISTRIBUTION BLOCK
BPF	BAND PASS FILTER	PE	POLYETHYLENE
BYP	BYPASS	PF	POWER FACTOR
C	CONDUIT	PFR	POWER FAIL RELAY
CAP	CAPACITOR	PH	HYDROGEN ION CONCENTRATION
CB	CIRCUIT BREAKER	PLC	PROGRAMMABLE LOGIC CONTROLLER
CKT	CIRCUIT	PM	POWER MONITOR
COAX	COAXIAL CABLE	PNL	PANEL
COMM	COMMUNICATION	POT	POTENTIOMETER
CR	CONTROL RELAY	PR	POWER RELAY
CT	CURRENT TRANSFORMER	PRI	PRIMARY
CS	CONSTANT SPEED	PROVIDE	FURNISH, INSTALL, AND CONNECT
CU	COPPER	PS	PRESSURE SWITCH
DC	DIRECT CURRENT	PT	POTENTIAL TRANSFORMER
DET	DETAIL	PTT	PUSH TO TEST
DI	DIGITAL INPUT	PVC	POLYVINYLCHLORIDE
DISC	DISCONNECT	PWR	POWER
DO	DIGITAL OUTPUT	REF	REFERENCE
DPDT	DOUBLE POLE DOUBLE THROW	RFI	RADIO FREQUENCY INTERFERENCE
DWG	DRAWING	RMS	ROOT MEAN SQUARE
E–DTL	ELECTRICAL DRAWING DETAIL	RTD	RESISTANCE TEMPERATURE DETECTOR
ELEV	ELEVATION	RST	RESET
ENET	ETHERNET	RVAT	REDUCE VOLTAGE AUTO TRANSFORMER
ETM	ELAPSED TIME METER	RTU	REMOTE TERMINAL UNIT
ESW	ETHERNET SWITCH	(R)	REUSE EXISTING – RELOCATE, RECONNECT
(E)	EXISTING	SCH	SCHEDULE
FCS	FIELD CONTROL STATION	SEC	SECONDARY, SECOND
FLA	FULL LOAD AMPS	SECS	SECONDS
FLEX	FLEXIBLE LIQUID TIGHT CONDUIT	SEL	SELECTOR
FS	FULL SPEED, FLOW SWITCH	SFA	SERVICE FACTOR AMPS
FVNR	FULL VOLTAGE NON–REVERSING	SPEC	SPECIFICATION
FVR	FULL VOLTAGE REVERSING	SPD	SURGE PROTECTIVE DEVICE
FWD	FORWARD	SS	STAINLESS STEEL
(F)	FUTURE	SSRC	STAINLESS STEEL RIGID CONDUIT
GALV	GALVANIZED	SSS	SOLID STATE STARTER
GFI	GROUND FAULT INTERRUPTER	STT	START
GND	GROUND	STP	STOP
GRS	GALVANIZED RIGID STEEL CONDUIT	SV	SOLENOID VALVE
GRS–PVC	PVC COATED GRS CONDUIT	SW	SWITCH
HI	HIGH	SWBD	SWITCHBOARD
HIM	HUMAN INTERFACE MODULE	SYM	SYMMETRICAL
HOA	HAND OFF AUTO	TB	TERMINAL BLOCK
HP	HORSE POWER	TC	TIME CLOCK
HS	HAND SWITCH	TDOD	TIME DELAY ON DE–ENERGIZATION
HTR	HEATER	TDOE	TIME DELAY ON ENERGIZATION
HZ	HERTZ	TELCO	TELEPHONE COMPANY
HZD	HAZARD	TM	THERMAL MAGNETIC
I	INTERLOCK	TEMP	TEMPERATURE
I/O	INPUT/OUTPUT	TR	TIME DELAY RELAY
INST	INSTANTANEOUS	TRIAD	TWISTED AND SHIELDED 3 CONDUCTOR
ISR	INTRINSICALLY SAFE RELAY	TS	TEMPERATURE SWITCH
IS	INTRINSICALLY SAFE	TSPR, TSP	TWISTED AND SHIELDED PAIR
J, JBX	JUNCTION BOX	TVSS	TRANSIENT VOLTAGE SURGE SUPPRESSOR
K	KILO, PREFIX	TYP	TYPICAL
LA	LIGHTNING ARRESTOR	UG	UNDERGROUND
LC	LIGHTING CONTACTOR	ULH	ULTRA LOW HARMONIC
LEL	LOWER EXPLOSION LIMIT	UON	UNLESS OTHERWISE NOTED
LOS	LOCK OUT STOP	UPS	UNINTERRUPTIBLE POWER SUPPLY
LP	LIGHTING PANELBOARD	V	VOLTAGE
LS	LIMIT SWITCH	VA	VOLT AMPS
M	MOTOR CONTACTOR	VAR	VOLT AMPS REACTIVE
MAG	MAGNETIC FLOWMETER	VFD	VARIABLE FREQUENCY DRIVE
MAX	MAXIMUM	VLV	VALVE
MCC	MOTOR CONTROL CENTER	VM	VOLTMETER
MCM	THOUSAND CIRCULAR MILS	VMR	VOLTAGE MONITOR RELAY
MCP	MOTOR CIRCUIT PROTECTOR	VR	VOLTAGE RELAY
MCS	MOLDED CASE SWITCH	W	WATTS
MFG	MANUFACTURER	WP	WEATHER PROOF, NEMA 3R
MH	MANHOLE	WTP	WATER TREATMENT PLANT
MIN	MINIMUM, MINUTE	WWTP	WASTE WATER TREATMENT PLANT
MOV	MOTOR OPERATED VALVE	XFMR	TRANSFORMER
MTR	MOTOR	Z	IMPEDANCE
MUX	MULTIPLEXER	ZS	LIMIT SWITCH
MV	MEDIUM VOLTAGE, MOTORIZED VALVE		

FRISCH ENGINEERING, INC.
CONSULTING ELECTRICAL ENGINEERS
13405 FOLSOM BLVD, UNIT 600
FOLSOM, CA 95630
PH 916 353 1025
FX 916 353 1028

FILE: 2410N-E01.DWG DATE: MAR 24, 2026 TIME: 10:48:34AM

CITY OF ROHNERT PARK
130 AVRAM AVENUE
ROHNERT PARK, CALIFORNIA 94928
PHONE: (707) 588-2232 FAX: (707) 794-9242

REV. NO.	DATE	DESCRIPTION	BY

SCHAAF & WHEELER
CONSULTING CIVIL ENGINEERS
2200 RANGE AVENUE, SUITE #201
SANTA ROSA, CA 95403
(707) 528-4848

REGISTERED PROFESSIONAL ENGINEER – THOMAS P. FRISCH – No. E15761 – ELECTRICAL – STATE OF CALIFORNIA

APPROVED: 3-31-2026

DATE

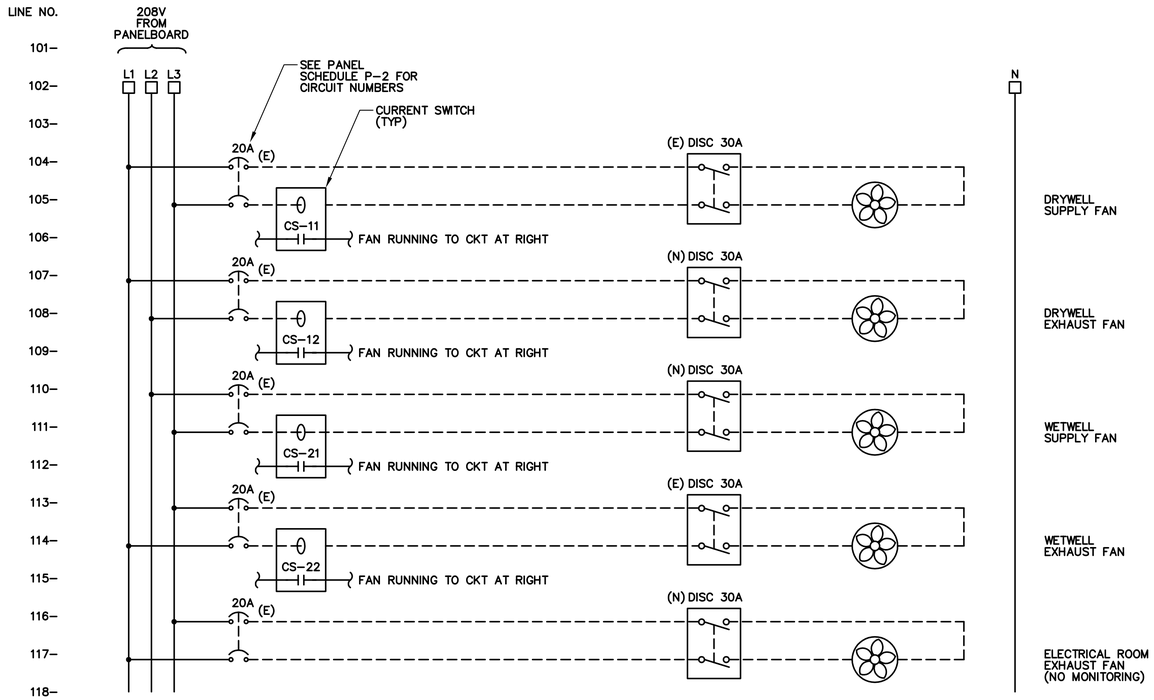
JULIAN DE ANDA, P.E. 82463
CITY ENGINEER,
CITY OF ROHNERT PARK

WET WELL LINING PUMP STATION 2

Project No. 2017 - 09

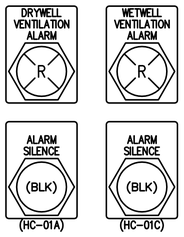
ELECTRICAL SYMBOLS AND ABBREVIATIONS

DESIGNED BY:	TPF
DRAWN BY:	NTC
CHECKED BY:	TPF
DATE:	MARCH 2026
PROJECT:	2017-09
DWG NO:	E-1
SHEET	11 OF 16
	SHEETS

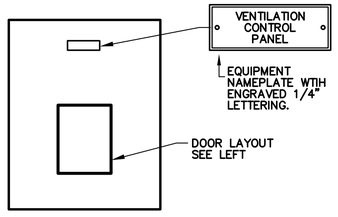


VENTILATION FANS WIRING DIAGRAM

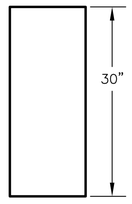
INSTALL CURRENT SWITCHES IN PANELBOARD AS INDICATED
REPLACE FANS UTILIZING EXISTING CIRCUITS



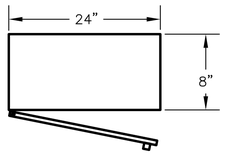
DOOR LAYOUT



FRONT VIEW



SIDE ELEVATION



TOP VIEW

CONTROL PANEL ELEVATION

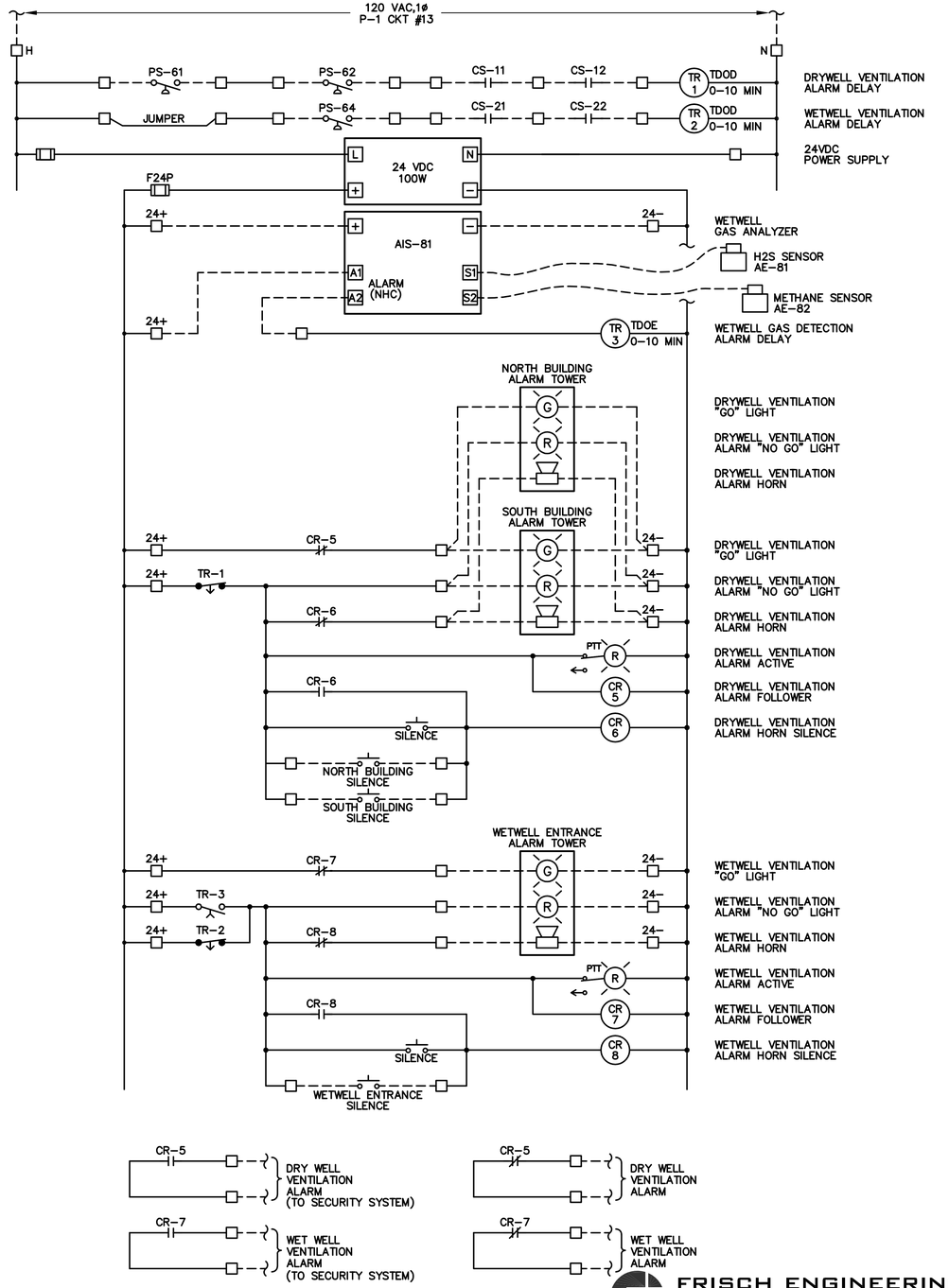
NEMA 1, INDOOR (1)

PANEL FABRICATION METHODS

1. NEMA 1, INDOOR WALLMOUNT INSTALLATION.
2. ALL SEAMS CONTINUOUS WELDED.
3. OUTER DOORS TO BE PADLOCKABLE WITH HEAVY DUTY SINGLE POINT LATCHES.
4. DOOR HINGES AND PINS SHALL BE 316 STAINLESS STEEL.
5. NO SCREWS, RIVETS, OR BOLTS SHALL PROTRUDE EXTERNALLY.
6. INTERNAL SCREWS, BOLTS, AND NUTS SHALL BE MACHINE THREAD.
7. PLASTIC SCREW MOUNTED NAMEPLATES SHALL BE PROVIDED FOR ALL DEVICES ON DEADFRONT SCREWS SHALL BE STAINLESS STEEL.
8. FABRICATION AND WIRING SHALL CONFORM TO U.L. AND NEMA STANDARDS.
9. ALL WIRING SHALL BE PERMANENTLY LABELLED WITH WIRE MARKERS ON BOTH ENDS.
10. WIRING DIAGRAMS SHALL BE PLACED IN A PLASTIC DRAWING HOLDER PERMANENTLY ATTACHED TO THE INSIDE OF THE FRONT DOOR.
11. AS – BUILT WIRING DIAGRAMS SHALL BE SHIPPED WITH EQUIPMENT.

DRAWING REFERENCED NOTES:

(1) CONTROL ENCLOSURE SHALL BE HOFFMAN CONCEPT MODEL NUMBER CSD302408 PAINTED STEEL CONSTRUCTION OR EQUAL. PROVIDE DOOR LATCHES, BACKPAN, AND ANY OTHER PARTS TO COMPLETE PANEL.



CONTROL PANEL WIRING DIAGRAM

FRISCH ENGINEERING, INC.
CONSULTING ELECTRICAL ENGINEERS
13405 FOLSOM BLVD, UNIT 600
FOLSOM, CA 95630
PH 916 353 1025
FX 916 353 1028

FILE: 2410N-E02.DWG DATE: MAR 24, 2026 TIME: 10:48:43AM

CITY OF ROHNERT PARK
130 AVRAM AVENUE
ROHNERT PARK, CALIFORNIA 94928
PHONE: (707) 588-2232 FAX: (707) 794-9242

REV. NO.	DATE	DESCRIPTION	BY

SCHAAF & WHEELER
CONSULTING CIVIL ENGINEERS
2200 RANGE AVENUE, SUITE #201
SANTA ROSA, CA 95403
(707) 528-4848

REGISTERED PROFESSIONAL ENGINEER
THOMAS P. FRISCH
No. E15761
ELECTRICAL
STATE OF CALIFORNIA

APPROVED:
3-31-2026
DATE
JULIAN DE ANDA, P.E. 82463
CITY ENGINEER,
CITY OF ROHNERT PARK

WET WELL LINING PUMP STATION 2

Project No. 2017 - 09

VENTILATION CONTROL PANEL

DESIGNED BY:	TPF
DRAWN BY:	NTC
CHECKED BY:	TPF
DATE:	MARCH 2026
PROJECT:	2017-09
DWG NO:	E-2
SHEET	12 OF 16 SHEETS

PANEL P-1

EXISTING MODIFY AS NOTED

LOCATION: ELECTRICAL ROOM
ENCLOSURE: SURFACE
AIC RATING: 10 KAIC

120/208 VOLTS, 3 PHASE, 4 WIRE
200 AMP BUS
150 AMP MAIN BREAKER

EXISTING VENTILATION FAN CIRCUITS TO BE REUSED

FURNISH NEW CIRCUIT BREAKER FOR VENTILATION PANEL

EXISTING VENTILATION FAN CIRCUITS TO BE REUSED

BKR NO.	DESCRIPTION	LOAD VA	PHASE AMPS A	PHASE AMPS B	PHASE AMPS C	AMPS/ POLE	BKR NO.
1	CONTROL ROOM LIGHTS	500	4.2			20/1	1
3	PLC	500		4.2		20/1	3
5	EXHAUST FAN E ROOM	200			1.7	20/2	5
7		200	1.7				7
9	SUPPLY FAN WET WELL	200		1.7		20/2	9
11		200			1.7		11
13	VENTILATION CONTROL PANEL	100	0.8			20/1	13
15	BLDG EXT LIGHTS	650		5.4		20/1	15
17	BLDG EXT LIGHTS	300			2.5	20/1	17
19	SITE AREA LIGHTS	300	2.5			20/2	19
21		300		2.5			21
23	WET WELL LIGHTS	300			2.5	20/1	23
25	DRY WELL LIGHTS	300	2.5			20/1	25
27	CHLORINATORS – OFF	0		0.0		20/1	27
29	SPACE	0			0.0		29
31	SPARE	0	0.0			20/1	31
33	SPACE	0		0.0			33
35	SPACE	0			0.0		35
37	ROOF PLUGS + LIGHTS	200	1.7			20/1	37
39	WORK BENCH RECPT	200		1.7		20/1	39
41	RADIO REPEATER	50			0.4	20/1	41

BKR NO.	AMPS/ POLE	PHASE AMPS A	PHASE AMPS B	PHASE AMPS C	LOAD VA	DESCRIPTION	BKR NO.
2	20/1	2.5			300	RESTROOM LIGHTS AND FAN	2
4	20/2		1.7		200	EXHAUST FAN DRY WELL	4
6				1.7	200		6
8	20/2	1.7			200	SUPPLY FAN DRY WELL	8
10			1.7		200		10
12	20/2			3.3	400	EXHAUST FAN WET WELL	12
14		3.3			400		14
16	20/2		2.5		300	CONTROL RM RECPTS	16
18				2.5	300		18
20	20/1	5.0			600	CONTROL RM RECPTS	20
22	20/1		5.0		600	CONTROL RM RECPTS	22
24	20/1			1.7	200	DRY WELL RECPTS	24
26	20/1	1.7			200	RESTROOM RECPTS	26
28	20/1		12.5		1500	RESTROOM HEATER	28
30	20/1			0.0	0	STORAGE RM RECPTS	30
32	20/1	0.0			0	EXTERIOR RECPTS	32
34	20/1		0.0		0	EFFLUENT FLOW	34
36	20/3			0.0	0	SURGE PROTECTION	36
38		0.0			0		38
40			0.0		0		40
42				0.0	0	SPACE	42

PHASE	A	B	C
LEFT SIDE AMPS	13.3	15.4	8.8
LEFT SIDE KVA	1.60	1.85	1.05
TOTAL PHASE KVA	3.30	4.65	2.15
TOTAL PHASE AMPS	27.5	38.8	17.9
% OF AVERAGE	98	138	64

NEUTRAL

GROUND

A	B	C	PHASE
14.2	23.3	9.2	RIGHT SIDE AMPS
1.70	2.80	1.10	RIGHT SIDE KVA

10.10	TOTAL KVA
28.03	TOTAL AMPS @ 208V, 3P
0.80	DEMAND FACTOR
8.08	LOAD KVA

NOTES:
1 MEANS OF WIRE COLOR CODING SHALL BE POSTED ON PANELBOARD PER NEC 210 (4)
2 ASTERISK (*) DENOTES GFI BREAKER REQUIRED WITH 5 MA SENSITIVITY
3 TILDA (~) DENOTES GFI BREAKER REQUIRED WITH 30 MA SENSITIVITY

CONDUIT & WIRE ROUTING SCHEDULE

REV	CONDUIT DETAILS TAG NO.	FROM	TO	QTY	SIZE	TYPE	POWER WIRE QTY	POWER WIRE SIZE	CONTROL WIRE QTY	CONTROL WIRE SIZE	GROUND SIZE	NOTES
	C01	VENTILATION CONTROL PANEL	NORTH BUILDING WALL J-BOX	1	1"	SPEC	–	–	8	#14	#14	
	C02	VENTILATION CONTROL PANEL	SOUTH BUILDING WALL J-BOX	1	1"	SPEC	–	–	8	#14	#14	
	C10A	VENTILATION CONTROL PANEL	SECURITY ALARM PANEL J-BOX	1	1-1/2"	SPEC	–	–	16	#14	#14	
	C10B	SECURITY ALARM PANEL J-BOX	SECURITY ALARM PANEL	1	1"	SPEC	–	–	8	#14	#14	
	C10C	SECURITY ALARM PANEL J-BOX	PANELBOARD J-BOX	1	1"	SPEC	–	–	8	#14	#14	
	C10D	PANELBOARD J-BOX	PANELBOARD P1	1	1"	SPEC	–	–	8	#14	#14	
	C10E	PANELBOARD J-BOX	CONTROL PANEL	1	1"	SPEC	–	–	4	#14	#14	
	C61	PRESSURE SWITCH PS-64	PRESSURE SWITCH PS-61	1	3/4"	SPEC	–	–	2	#14	#14	
	C62	VENTILATION CONTROL PANEL	PRESSURE SWITCH PS-62	1	3/4"	SPEC	–	–	6	#14	#14	
	C64	PRESSURE SWITCH PS-62	PRESSURE SWITCH PS-64	1	3/4"	SPEC	–	–	4	#14	#14	
	C81A	VENTILATION CONTROL PANEL	WETWELL ENTRANCE J-BOX	1	1"	SPEC	–	–	12	#14	#14	
	C81B	WETWELL ENTRANCE J-BOX	GAS SENSOR SWITCH	1	3/4"	SPEC	–	–	4	#14	#14	
	C81C	GAS SENSOR SWITCH	GAS SENSORS	1	1"	SPEC	–	–	2	MFG CABLES	#14	
	L13	PANELBOARD P1	VENTILATION CONTROL PANEL	1	3/4"	SPEC	2	#12	–	–	#12	

FRISCH ENGINEERING, INC.
CONSULTING ELECTRICAL ENGINEERS
13405 FOLSOM BLVD, UNIT 600
FOLSOM, CA 95630
PH 916 353 1025
FX 916 353 1028

FILE: 2410N-E03.DWG DATE: MAR 24, 2026 TIME: 10:48:49AM

CITY OF ROHNERT PARK
130 AVRAM AVENUE
ROHNERT PARK, CALIFORNIA 94928
PHONE: (707) 588-2232 FAX: (707) 794-9242

REV. NO.	DATE	DESCRIPTION	BY

SCHAAF & WHEELER
CONSULTING CIVIL ENGINEERS
2200 RANGE AVENUE, SUITE #201
SANTA ROSA, CA 95403
(707) 528-4848

REGISTERED PROFESSIONAL ENGINEER
THOMAS P. FRISCH
No. E15761
ELECTRICAL
STATE OF CALIFORNIA

APPROVED:

3-31-2026

DATE

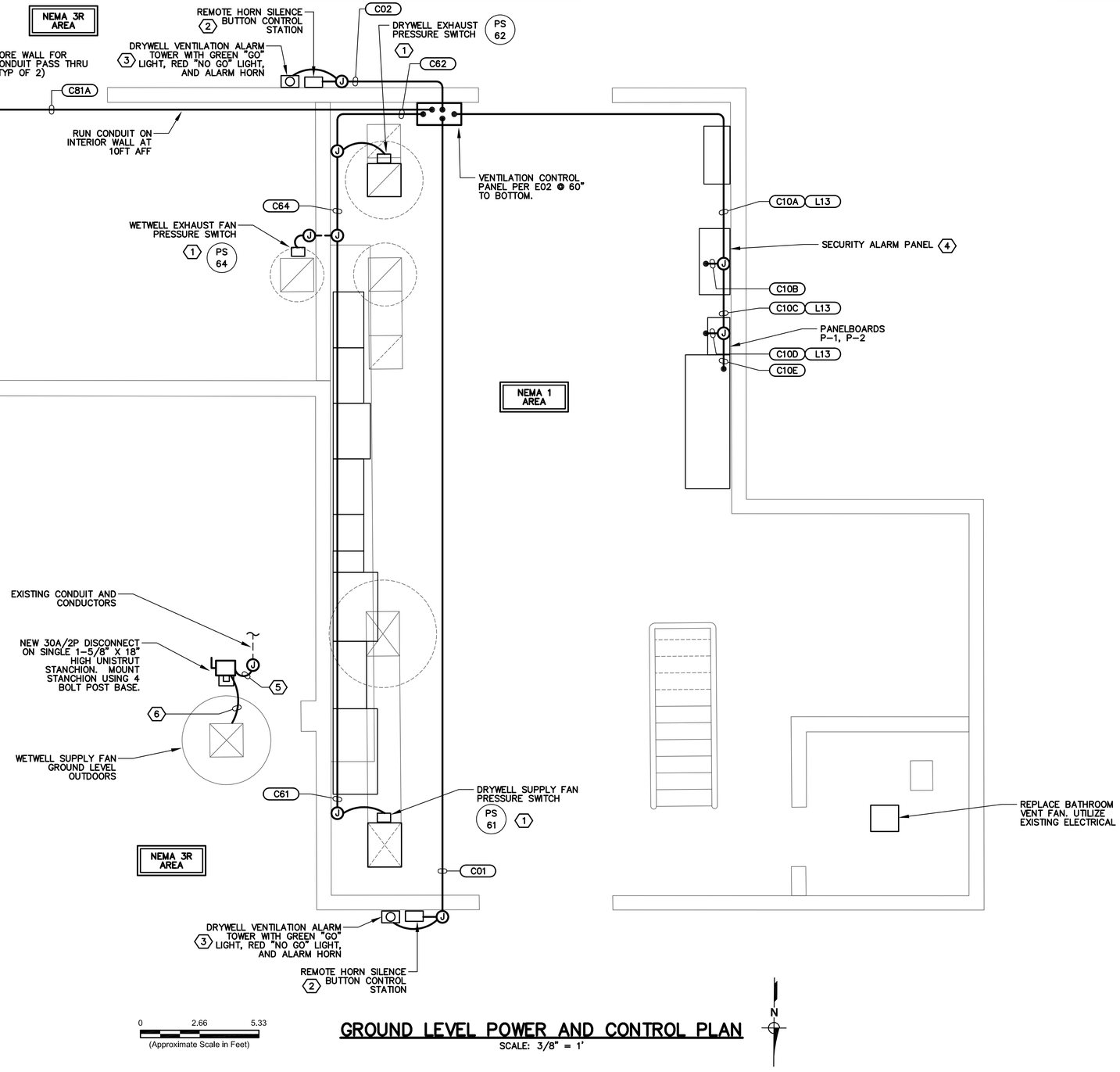
JULIAN DE ANDA, P.E. 82463
CITY ENGINEER,
CITY OF ROHNERT PARK

WET WELL LINING PUMP STATION 2

Project No. 2017 - 09

PANELBOARD AND CONDUIT SCHEDULES

DESIGNED BY:	TPF
DRAWN BY:	NTC
CHECKED BY:	TPF
DATE:	MARCH 2026
PROJECT:	2017-09
DWG NO:	E-3
SHEET	13 OF 16
	SHEETS



GROUND LEVEL POWER AND CONTROL PLAN

SCALE: 3/8" = 1'

DRAWING REFERENCED NOTES:

1. MOUNT PRESSURE SWITCHES TO DUCTWORK INSIDE BUILDING AT 8 FT AFF.
2. MOUNT BUTTON CONTROL STATION AT 48" ABOVE GRADE. WIRING AS REQUIRED PER DWG E-2.
3. MOUNT ALARM TOWER AT 8' ABOVE GRADE. WIRING AS REQUIRED PER DWG E-2.
4. SECURITY PANEL MODIFICATIONS AND CONFIGURATION BY OTHERS. CONTRACTOR TO COORDINATE WITH CITY TO TEST SYSTEM ALARM.
5. REPLACE FLEX CONDUIT TO DISCONNECT (E) CONDUCTORS
6. NEW FLEX CONDUIT AND CONDUCTORS FROM DISCONNECT TO NEW FAN

ELECTRICAL PLAN NOTES:

1. SEE ELECTRICAL SYMBOLS AND ABBREVIATIONS DRAWING FOR SYMBOL DEFINITION.
2. ALL WORK SHALL CONFORM TO LOCAL CODES AND NATIONAL ELECTRIC CODE.
3. SITEPLAN ACCURATE FOR ELECTRICAL WORK ONLY. COORDINATE WITH OTHER DISCIPLINES.
4. CONFIRM HOOKUP REQUIREMENTS FOR ELECTRICAL AND MECHANICAL EQUIPMENT PRIOR TO INSTALLING UNDERGROUND CONDUIT AND STUB-UPS. MISSING CONDUITS, INCORRECT SIZING, OR OTHER ISSUES MUST BE BROUGHT TO THE ATTENTION OF ENGINEER PRIOR TO BACKFILL.
5. CONDUIT ROUTING IS SHOWN GENERALLY DIAGRAMATIC AND DOES NOT INDICATE TRENCH WIDTH OR TRENCH LAYOUT. FOR CONDUITS OUTSIDE BUILDINGS, IF CONTRACTOR WANTS TO RUN CONDUITS IN ROUTES OTHER THAN THOSE SHOWN FOR ANY REASON, THEN HE SHALL SUBMIT THE PLAN FOR APPROVAL PRIOR TO INSTALLATION. SPECIFY REASON FOR CHANGE.
6. USE SS EXPANSION WEDGE ANCHORS OR EPOXY ANCHORS AS NECESSARY FOR EQUIPMENT MOUNTING.
7. CONDUITS SIZE, TYPE AND FILL DEFINED BY TAG NAME IN CONDUIT AND WIRE ROUTING SCHEDULE.
8. INSTALL UNDERGROUND NON-DUCTBANK CONDUITS PER ELECTRICAL DETAIL LVC.
9. CONDUIT TRANSITIONS SHALL BE PER EXPOSED CONDUIT TRANSITION DETAIL ECT.
10. EXPOSED CONDUIT TYPE AND FITTINGS TO BE USED ABOVE TRANSITION SHALL BE PER AREA CLASSIFICATION DEFINED IN CONDUIT SPECIFICATIONS AND EQUIPMENT SPECIFIC DETAIL.
11. REPAIR SURFACE TO PREVIOUS CONDITION FOR ALL UNDERGROUND CONDUIT ROUTES. GROUT, CAULK, AND PAINT ANY PENETRATIONS INTO STRUCTURES FOR WATERTIGHT SEAL.

FRISCH ENGINEERING, INC.
CONSULTING ELECTRICAL ENGINEERS
13405 FOLSOM BLVD, UNIT 600
FOLSOM, CA 95630
PH 916 353 1025
FX 916 353 1028

FILE: 2410N-E04.DWG DATE: MAR 24, 2026 TIME: 10:48:57AM

CITY OF ROHNERT PARK
130 AVRAM AVENUE
ROHNERT PARK, CALIFORNIA 94928
PHONE: (707) 588-2232 FAX: (707) 794-9242

REV. NO.	DATE	DESCRIPTION	BY

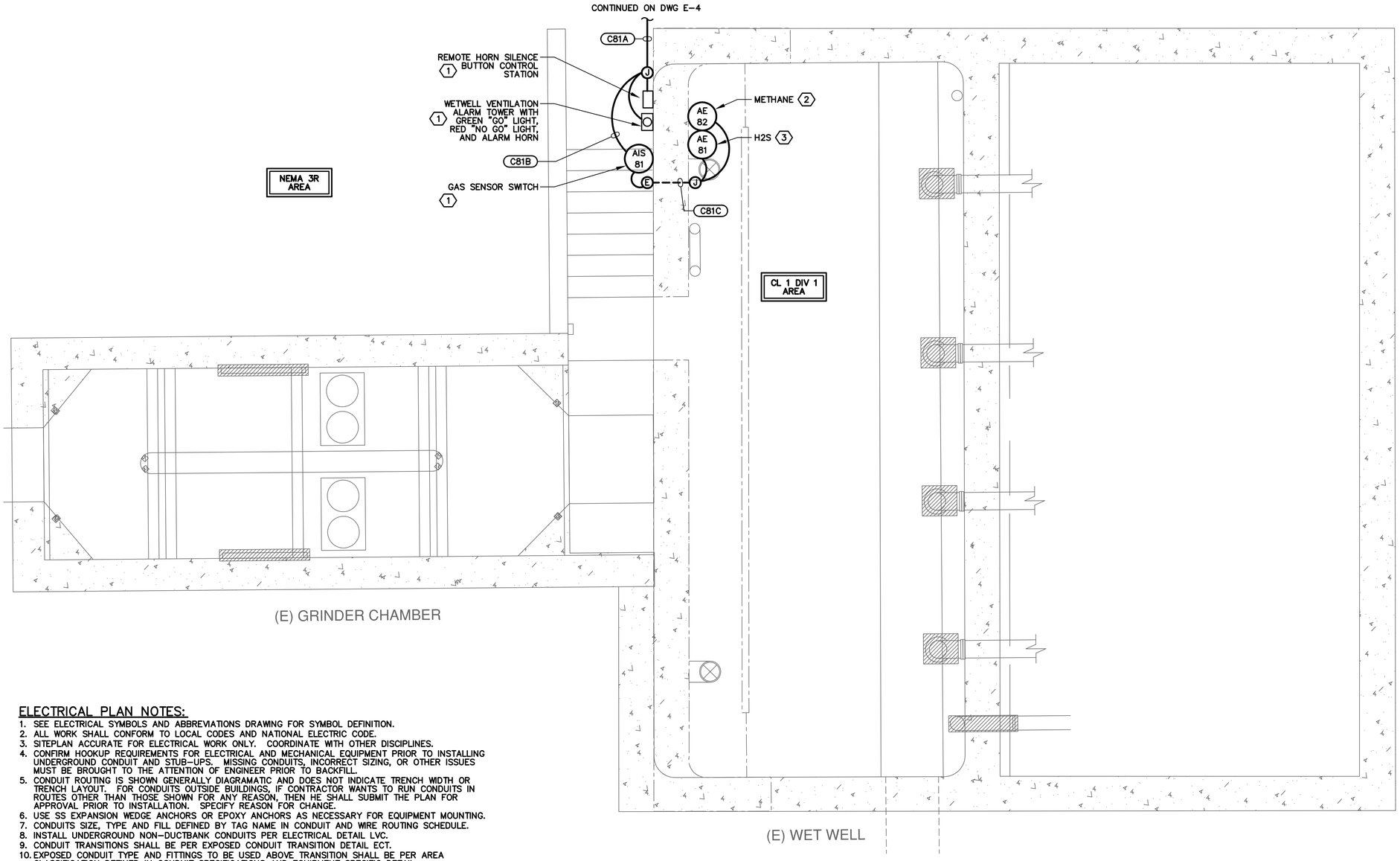
SCHAAF & WHEELER
CONSULTING CIVIL ENGINEERS
2200 RANGE AVENUE, SUITE #201
SANTA ROSA, CA 95403
(707) 528-4848

REGISTERED PROFESSIONAL ENGINEER
THOMAS P. FRISCH
No. E15761
ELECTRICAL
STATE OF CALIFORNIA

APPROVED:
3-31-2026
DATE
JULIAN DE ANDA, P.E. 82463
CITY ENGINEER,
CITY OF ROHNERT PARK

WET WELL LINING PUMP STATION 2
Project No. 2017 - 09
GROUND LEVEL POWER AND CONTROL PLAN

DESIGNED BY:	TPF
DRAWN BY:	NTC
CHECKED BY:	TPF
DATE:	MARCH 2026
PROJECT:	2017-09
DWG NO:	E-4
SHEET	**14 OF 16**
	SHEETS



DRAWING REFERENCED NOTES:

1. MOUNT OUTSIDE DEVICES AT 48" ABOVE UPPER STAIR LANDING. WIRING AS REQUIRED PER DWG E-2.
2. LOCATE METHANE SENSOR 6" FROM CEILING IN WETWELL.
3. LOCATE H2S SENSOR 6" FROM FLOOR IN WETWELL.

ELECTRICAL PLAN NOTES:

1. SEE ELECTRICAL SYMBOLS AND ABBREVIATIONS DRAWING FOR SYMBOL DEFINITION.
2. ALL WORK SHALL CONFORM TO LOCAL CODES AND NATIONAL ELECTRIC CODE.
3. SITEPLAN ACCURATE FOR ELECTRICAL WORK ONLY. COORDINATE WITH OTHER DISCIPLINES.
4. CONFIRM HOOKUP REQUIREMENTS FOR ELECTRICAL AND MECHANICAL EQUIPMENT PRIOR TO INSTALLING UNDERGROUND CONDUIT AND STUB-UPS. MISSING CONDUITS, INCORRECT SIZING, OR OTHER ISSUES MUST BE BROUGHT TO THE ATTENTION OF ENGINEER PRIOR TO BACKFILL.
5. CONDUIT ROUTING IS SHOWN GENERALLY DIAGRAMATIC AND DOES NOT INDICATE TRENCH WIDTH OR TRENCH LAYOUT. FOR CONDUITS OUTSIDE BUILDINGS, IF CONTRACTOR WANTS TO RUN CONDUITS IN ROUTES OTHER THAN THOSE SHOWN FOR ANY REASON, THEN HE SHALL SUBMIT THE PLAN FOR APPROVAL PRIOR TO INSTALLATION. SPECIFY REASON FOR CHANGE.
6. USE SS EXPANSION WEDGE ANCHORS OR EPOXY ANCHORS AS NECESSARY FOR EQUIPMENT MOUNTING.
7. CONDUITS SIZE, TYPE AND FILL DEFINED BY TAG NAME IN CONDUIT AND WIRE ROUTING SCHEDULE.
8. INSTALL UNDERGROUND NON-DUCTBANK CONDUITS PER ELECTRICAL DETAIL LVC.
9. CONDUIT TRANSITIONS SHALL BE PER EXPOSED CONDUIT TRANSITION DETAIL ECT.
10. EXPOSED CONDUIT TYPE AND FITTINGS TO BE USED ABOVE TRANSITION SHALL BE PER AREA CLASSIFICATION DEFINED IN CONDUIT SPECIFICATIONS AND EQUIPMENT SPECIFIC DETAIL.
11. REPAIR SURFACE TO PREVIOUS CONDITION FOR ALL UNDERGROUND CONDUIT ROUTES. GROUT, CAULK, AND PAINT ANY PENETRATIONS INTO STRUCTURES FOR WATERTIGHT SEAL.

0 2.66 5.33
(Approximate Scale in Feet)

LOWER LEVEL POWER AND CONTROL PLAN

SCALE: 3/8" = 1'

N

FRISCH ENGINEERING, INC.
CONSULTING ELECTRICAL ENGINEERS
13405 FOLSOM BLVD, UNIT 600
FOLSOM, CA 95630
PH 916 353 1025
FX 916 353 1028

FILE: 2410N-E04.DWG DATE: MAR 24, 2026 TIME: 10:49:05AM

CITY OF ROHNERT PARK
130 AVRAM AVENUE
ROHNERT PARK, CALIFORNIA 94928
PHONE: (707) 588-2232 FAX: (707) 794-9242

REV. NO.	DATE	DESCRIPTION	BY

SCHAAF & WHEELER
CONSULTING CIVIL ENGINEERS
2200 RANGE AVENUE, SUITE #201
SANTA ROSA, CA 95403
(707) 528-4848

REGISTERED PROFESSIONAL ENGINEER
THOMAS P. FRISCH
No. E15761
ELECTRICAL
STATE OF CALIFORNIA

APPROVED:

3-31-2026

DATE

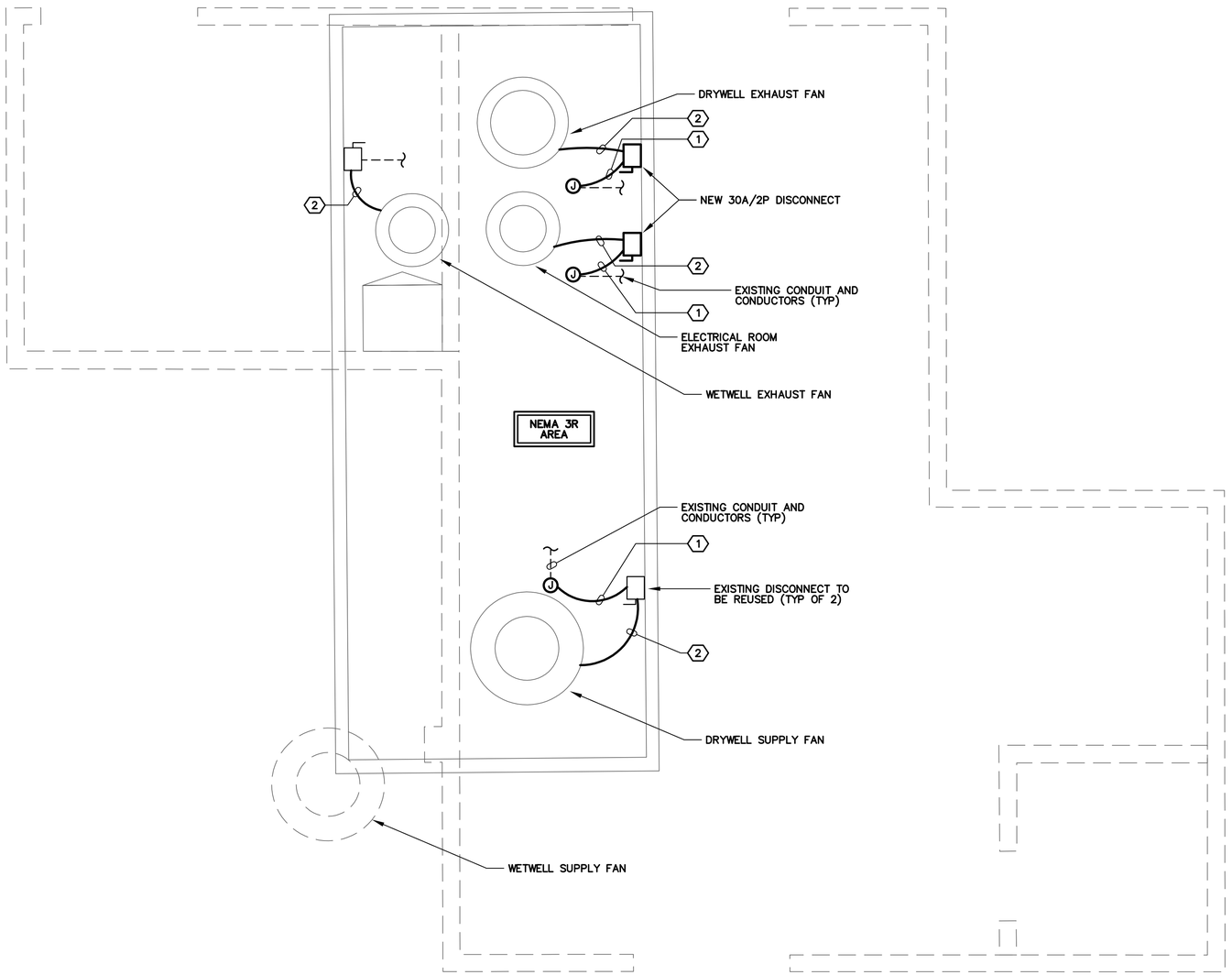
JULIAN DE ANDA, P.E. 82463
CITY ENGINEER,
CITY OF ROHNERT PARK

WET WELL LINING PUMP STATION 2

Project No. 2017 - 09

LOWER LEVEL POWER AND CONTROL PLAN

DESIGNED BY:	TPF
DRAWN BY:	NTC
CHECKED BY:	TPF
DATE:	MARCH 2026
PROJECT:	2017-09
DWG NO:	E-5
SHEET	**15 OF 16**
	SHEETS



DRAWING REFERENCED NOTES:

1. REPLACE FLEX CONDUIT TO DISCONNECT (E) CONDUCTORS
2. NEW FLEX CONDUIT AND CONDUCTORS FROM DISCONNECT TO NEW FANS

ELECTRICAL PLAN NOTES:

1. SEE ELECTRICAL SYMBOLS AND ABBREVIATIONS DRAWING FOR SYMBOL DEFINITION.
2. ALL WORK SHALL CONFORM TO LOCAL CODES AND NATIONAL ELECTRIC CODE.
3. SITEPLAN ACCURATE FOR ELECTRICAL WORK ONLY. COORDINATE WITH OTHER DISCIPLINES.
4. CONFIRM HOOKUP REQUIREMENTS FOR ELECTRICAL AND MECHANICAL EQUIPMENT PRIOR TO INSTALLING UNDERGROUND CONDUIT AND STUB-UPS. MISSING CONDUITS, INCORRECT SIZING, OR OTHER ISSUES MUST BE BROUGHT TO THE ATTENTION OF ENGINEER PRIOR TO BACKFILL.
5. CONDUIT ROUTING IS SHOWN GENERALLY DIAGRAMATIC AND DOES NOT INDICATE TRENCH WIDTH OR TRENCH LAYOUT. FOR CONDUITS OUTSIDE BUILDINGS, IF CONTRACTOR WANTS TO RUN CONDUITS IN ROUTES OTHER THAN THOSE SHOWN FOR ANY REASON, THEN HE SHALL SUBMIT THE PLAN FOR APPROVAL PRIOR TO INSTALLATION. SPECIFY REASON FOR CHANGE.
6. USE SS EXPANSION WEDGE ANCHORS OR EPOXY ANCHORS AS NECESSARY FOR EQUIPMENT MOUNTING.
7. CONDUITS SIZE, TYPE AND FILL DEFINED BY TAG NAME IN CONDUIT AND WIRE ROUTING SCHEDULE.
8. INSTALL UNDERGROUND NON-DUCTBANK CONDUITS PER ELECTRICAL DETAIL LVC.
9. CONDUIT TRANSITIONS SHALL BE PER EXPOSED CONDUIT TRANSITION DETAIL ECT.
10. EXPOSED CONDUIT TYPE AND FITTINGS TO BE USED ABOVE TRANSITION SHALL BE PER AREA CLASSIFICATION DEFINED IN CONDUIT SPECIFICATIONS AND EQUIPMENT SPECIFIC DETAIL.
11. REPAIR SURFACE TO PREVIOUS CONDITION FOR ALL UNDERGROUND CONDUIT ROUTES. GROUT, CAULK, AND PAINT ANY PENETRATIONS INTO STRUCTURES FOR WATERTIGHT SEAL.

0 2.66 5.33
(Approximate Scale in Feet)

ROOF POWER AND CONTROL PLAN

SCALE: 3/8" = 1'

N

FRISCH ENGINEERING, INC.
CONSULTING ELECTRICAL ENGINEERS
13405 FOLSOM BLVD, UNIT 600
FOLSOM, CA 95630
PH 916 353 1025
FX 916 353 1028

FILE: 2410N-E04.DWG DATE: MAR 24, 2026 TIME: 10:49:13AM

CITY OF ROHNERT PARK
130 AVRAM AVENUE
ROHNERT PARK, CALIFORNIA 94928
PHONE: (707) 588-2232 FAX: (707) 794-9242

REV. NO.	DATE	DESCRIPTION	BY

SCHAAF & WHEELER
CONSULTING CIVIL ENGINEERS
2200 RANGE AVENUE, SUITE #201
SANTA ROSA, CA 95403
(707) 528-4848

REGISTERED PROFESSIONAL ENGINEER
THOMAS P. FRISCH
No. E15761
ELECTRICAL
STATE OF CALIFORNIA

APPROVED:
3-31-2026
DATE
JULIAN DE ANDA, P.E. 82463
CITY ENGINEER,
CITY OF ROHNERT PARK

WET WELL LINING PUMP STATION 2

Project No. 2017 - 09

ROOF POWER AND CONTROL PLAN

DESIGNED BY:	TPF
DRAWN BY:	NTC
CHECKED BY:	TPF
DATE:	MARCH 2026
PROJECT:	2017-09
DWG NO:	E-6
SHEET	**16 OF 16**
	SHEETS