CITY OF ALAMEDA

SPECIFICATIONS AND PLANS

FOR

GROUP 4 – SEWERAGE PUMP STATION RENOVATIONS FOR RELIABILITY AND SAFETY IMPROVEMENTS

NO. P.W. 08-17-37

NON-MANDATORY PREBID MEETING:	Monday, January 6, 2020, 11:00 a.m.
LOCATION:	City Hall West 950 W. Mall Square, Conference Room 156 Alameda, CA 94501
BID DUE DATE:	Thursday, January 16, 2020 by 2:00 p.m.
LOCATION:	Public Works Department 950 W. Mall Square, Room 110 Alameda, CA 94501

THIS PAGE INTENTIONALLY LEFT BLANK

TABLE OF CONTENTS

CITY ENGINEER'S APPROVAL

THE PROJECT SPECIFICATIONS CONTAINED HEREIN, FOR THE GROUP 4 – SEWERAGE PUMP STATION RENOVATIONS FOR RELIABILITY AND SAFETY IMPROVEMENTS, NO. P.W. 08-17-37, HAVE BEEN APPROVED BY THE CITY ENGINEER IN ACCORDANCE WITH CITY OF ALAMEDA ORDINANCE NO. 3154 AND CALIFORNIA GOVERNMENT CODE 830.6.

Scott Wikstrom, P.E. C56266
City Engineer
City of Alameda, CA

12/3/2019
Date

CITY OF ALAMEDA, CALIFORNIA

SPECIFICATIONS, SPECIAL PROVISIONS AND PLANS
FOR
PUBLIC WORK

SECTION I. PROPOSAL AND CONTRACT REQUIREMENTS

A. GENERAL INFORMATION. The City of Alameda will receive sealed bid at the time and place specified in the advertisement calling for bids for:

GROUP 4 – SEWERAGE PUMP STATION RENOVATIONS FOR RELIABILITY AND SAFETY IMPROVEMENTS NO. P.W. 08-17-37

Electronic specifications and bidder's forms for bidding this project can only be obtained at the City of Alameda website, http://alamedaca.gov/business/bids-rfps, www.cityofalamedaca.gov/Business/Bids-RFPs, or by calling (510) 747-7900. There is no cost for the specifications. **It is the responsibility of each prospective bidder to check the website periodically for updates, such as Addenda.**

B. EXAMINATION OF PLANS, SPECIFICATIONS, SPECIAL PROVISIONS AND SITE OF WORK. The bidder is required to examine carefully the site and the proposal, plans, specifications and contract forms for the work contemplated, and 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 the specifications, the special provisions and the contract.

C. DESIGNATIONS. As used herein "City" shall mean the City of Alameda; "Council" or "City Council" shall mean the Council of the City; "City Manager" shall mean the City Manager of the City; "Engineer" or "City Engineer" shall mean the City Engineer or City Engineer's designee of the City; "Director" shall mean the Public Works Director of the City; and "Contractor" shall mean the bidder who is awarded the contract for the work.

D. PROPOSAL FORM. All bids must be made upon blank forms which are included in these specifications. (Exhibit A)

All bids must give the prices proposed **in figures.** Bids must be signed by the Bidder. If the proposal is signed by an individual, that individual's name and business address must be shown. If made by a firm or partnership, the name and the post office address of each member of the firm or partnership must be shown. If made by a corporation, the proposal must show the name of the state under the laws of which the corporation was chartered and the names, titles, and business addresses of the president, secretary and treasurer.

E. PRESENTING AND MARKING OF BIDS. Bids must be presented to the Public Works Department, 950 W. Mall Square, Room 110, Alameda, California, under sealed cover, plainly marked on the outside, "**GROUP 4 – SEWERAGE PUMP STATION RENOVATIONS FOR**

RELIABILITY AND SAFETY IMPROVEMENTS, NO. P.W. 08-17-37" no later than **2:00 p.m.** on the date set forth in the following paragraph.

A **non-mandatory** pre-bid meeting will be held at City Hall West, 950 W. Mall Square, Conference Room 156, Alameda, California, 94501 on Monday, January 6, 2020. City reserves the right to hold additional prebid meetings as necessary for contractors to visit the site.

Bids will be opened in the Public Works Department, 950 W. Mall Square, Room 110, Alameda, California**, at 2:01 p.m. on Thursday, January 16, 2020.**

F. BIDDER'S GUARANTY. All bids shall be accompanied by one of the following forms of bidder's guaranty: cash, a cashier's check, a certified check, or a bidder's bond executed by an admitted surety insurer, made payable to the City of Alameda. The security shall be in an amount equal to at least ten percent (10%) of the amount bid. A bid shall not be considered unless one of the forms of bidder's security is enclosed with it. If, in lieu of depositing cash, a cashier's check, or a certified check, the bidder submits a bidder's bond, the said bond shall, in form, be satisfactory to the City Attorney of the City of Alameda. A Bid Bond form is provided in Exhibit H.

Said bidder's guaranty which is submitted according to the above paragraph shall, in the event of the failure, for any reason, of the successful bidder or bidders to execute the contract as awarded, be deemed to be liquidated damages to be retained in full by the City of Alameda, but shall not be construed as a penalty for failure to execute said contract. The full amount of the said bidder's guaranty shall also be retained in full by the City of Alameda as consideration payable to the City of Alameda for engineering, accounting and clerical services in formulating specifications for such bid or bids, for advertising costs to the City of Alameda in connection with such bid or bids, and further, as consideration for the award of such contract to such bidder or bidders.

Any bid bond submitted under this Section shall incorporate therein by reference, or otherwise, all of the provisions of Section I, Item F, of these specifications.

G. RETURN OF BIDDER'S GUARANTIES. Within ten (10) days after the award of the contract, the Public Works staff will return the proposal guaranties accompanying the bids which are not to be considered in making the award. All other proposal guaranties will be held until the contract has been finally executed, after which they will be returned to the respective bidders whose bids they accompanied.

H. TAXES. Bids must include all state and federal taxes applicable to the transaction.

I. SUBCONTRACTORS. All contractors shall comply with the State Subletting and Subcontracting Fair Practices Act, located in Sections 4100 through 4112 of the California Public Contract Code. A copy of said Act is available in the office of the City Engineer. Said Act is hereby made a part of the specifications on the above-mentioned job and all contractors submitting bids shall accompany the bid with information regarding subcontractors as therein provided. All Subcontractors shall have a current City of Alameda business license.

J. REJECTION OR RETURN OF BIDS. Bids may be rejected if they show any alterations of form, additions not called for, conditional or alternative bids, incomplete bids, erasures or irregularities of any kind. The right is reserved to reject any and all bids. The City reserves the right to return bids unopened.

K. BID PROTEST. Any bid protest must be submitted in writing to the Public Works Director, City of Alameda Public Works Department, City Hall West, 950 West Mall Square, Room 110, Alameda, CA 94501 before 5:00 p.m. of the 5th business day following the posting date of the Notice of Intent to Award.

1. The initial protest document shall contain a complete statement of: the legal grounds for the protest; all the facts relevant to the protest; and the form of relief requested and the legal basis for such relief.
2. The protest shall refer to all the specific portions of the document which forms the legal grounds for the protest.
3. The protest shall include the name, address, and telephone number of the person representing the protesting party.
4. The party filing the protest shall concurrently transmit a copy of the initial protest document and any attached documentation to all other parties with a direct financial interest which may be adversely affected by the outcome of the protest. Such parties shall include all other Bidders or proposers who appear to have a reasonable prospect of receiving an award depending upon the outcome of the protest.
5. The Public Works Director will issue a decision on the protest. If the Public Works Director determines that a protest is frivolous, the party originating the protest may be determined to be irresponsible and that party may be determined to be ineligible for future contract awards.
6. The procedure and time limits set forth in this paragraph are mandatory and are the Bidder's sole and exclusive remedy in the event of Bid protest and failure to comply with these procedures shall constitute a waiver of any right to further pursue the bid protest, including filing a Government Code Claim or legal proceedings.

L. AWARD OF CONTRACT. The award of contract, if it be awarded, will be to the responsible bidder who submits the lowest and best bid and whose proposal complies with all requirements described herein. The award, if made, will be made within ninety (90) days after the opening of the bids. All bids will be compared on the basis of the Engineer's estimate of quantities of work to be done. Once awarded, this contract may be mutually extended on a year-by-year basis, for up to four (4) additional years, based on satisfactory performance of all aspects of this contract. The Public Works Director shall, on or before April 1, submit written notice that the contract is to be extended upon the same terms and costs (plus an annual increase to consumer price index for the San Francisco Bay Area appropriate to the trades associated with the work for the previous calendar year) as the existing contract. In the event of a delay the City reserves the right to hold the Bidder to its bid for 90 days from the date the contract is awarded.

Bid protests, contracts, bonds, insurance, and other documents identified in these specifications and these special provisions are to be delivered to the following City address: City of Alameda, City Hall West, Public Works Department, 950 West Mall Square, Room 110, Alameda, CA 94501.

M. EXECUTION OF CONTRACT. The contract, in form and content satisfactory to the City, will be awarded at a regular City Council meeting (first and third Tuesdays of each month, except August). At least five (5) business days prior to the anticipated award date, the Contractor will be notified of apparent award status and requested to provide the documents necessary to complete the contract process. Required documentation shall include two (2) copies of the contract executed by the Contractor, proof of insurance and Payment and Performance bonds. The Contractor will be given five (5) business days from the date the City Council awards the contract to obtain the relevant bonds and insurance along with any other documents required for submission.

No proposal shall be considered binding upon the City until the execution of the contract. Failure to execute a contract and file acceptable bonds and insurance as provided herein within the time frame outlined above shall be just cause for the annulment of the award and the forfeiture of the bidder's guaranty.

N. CONTRACT BONDS. The Contractor shall furnish two good and sufficient bonds. One of the bonds shall be executed in a sum equal to at least one hundred percent (100%) of the contract price, which shall be furnished as required by the Terms of Section 3247 to 3252 of the Civil Code of the State of California (see Exhibit G). The other bond shall guaranty faithful performance of the said contract by the Contractor and shall be executed in a sum equal to at least one hundred percent (100%) of the contract price (see Exhibit F). Bonds shall be furnished by a surety company satisfactory to the City of Alameda.

Whenever any surety or sureties on any such bonds, or any bonds required by law for the protection of the claims of laborers and materials, become insufficient or the City Engineer has cause to believe that such surety or sureties have become insufficient, a demand in writing may be made of the Contractor for further bond or bonds or additional surety not exceeding that originally required, as is considered necessary, taking into account the extent of the work remaining to be done. Thereafter no payment shall be made upon such contract to the Contractor, or any assignee of the Contractor, until such further bond or bonds or additional surety has been furnished. Faithful performance bonds, whether by individual or corporate surety, shall in addition to other terms and conditions, contain the conditions that (1) death of the named principal shall not operate as a release of the obligation hereunder of the surety, and (2) extensions of time, if any, granted by the City to Contractor for performance of the work covered by said bond shall extend for a like time the period of limitations during which surety shall remain bound by the said undertaking.

SECTION II. LEGAL RELATIONS AND RESPONSIBILITIES

A. LAWS TO BE OBSERVED. The Contractor shall keep himself fully informed of all existing and future state and federal laws and all municipal ordinances and regulations of the City of Alameda 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.

B. PROJECT STABILIZATION AGREEMENT. This project is subject to and shall be performed under the Project Stabilization Agreement ("PSA") between the City of Alameda and the Building and Construction Trades Council of Alameda County and its affiliated local unions. Contractors submitting bids must provide evidence of acceptance of the terms and conditions of the PSA at the time of bid. Specifically, contractor must submit the completed and signed "Agreement to be Bound to PSA" (included in Exhibit A, Bidder's Proposal). Additionally, all contractors and subcontractors of any tier on this project will be required to execute the Agreement to be Bound to PSA and be subject to the PSA prior to contract award.

C. DEPARTMENT OF INDUSTRIAL RELATIONS COMPLIANCE AND PREVAILING WAGE REQUIREMENTS ON PUBLIC WORKS PROJECTS.

1. Effective January 1, 2015, no Contractor or Subcontractor may be listed on a bid proposal for a public works project (submitted after March 1, 2015) unless registered with the Department of Industrial Relations pursuant to Labor Code Section 1725.5 (with the limited exceptions from this requirement for bid purposed only under Labor code Section 1771.1(a)). Register at https://www.dir.ca.gov/Public-Works/Contractor-Registration.html

2. No Contractor or Subcontractor may be awarded a contract for public work on a public works project (awarded on or after April 1, 2015) unless registered with the Department of Industrial Relations pursuant to Labor Code Section 1725.5.

3. This project is subject to compliance monitoring and enforcement by the Department of Industrial Relations.

4. The Prime Contractor is required to post job site notices prescribed by regulations. See 8 Calif. Code Regulation §16451(d).

5. Effective April 1, 2015, All Contractors and Subcontractors must furnish electronic certified payroll records directly to the Labor Commissioner at: https://www.dir.ca.gov/Public-Works/Certified-Payroll-Reporting.html

D. PREVAILING WAGES:

1. The Contractor is aware of the requirements of California Labor Code sections 1720 et seq. and 1770 et seq., as well as California Code of Regulations, Title 8, section 16000 et seq. ("Prevailing Wage Laws"), which require the payment of prevailing wage rates and the performance of other requirements on certain "public works" projects. Since this Project

involves a “public work” project, as defined by the Prevailing Wage Laws, Contractor shall fully comply with such Prevailing Wage Laws. Contractor’s failure to comply with the Prevailing Wage Law may constitute a default under the contract for performance of the work which would entitle the City to rescind the contract or exercise other remedies as provided by law or the contract.

2. The Contractor shall obtain a copy of the prevailing rates of per diem wages at the commencement of this contract from the website of the Division of Labor Statistics and Research of the Department of Industrial Relations located at www.dir.ca.gov/dlsr/. In the alternative, the Contractor may view a copy of the prevailing rates of per diem wages at the City’s Public Works Department, Building 1, 950 W. Mall Square, Room 110, Alameda. The Contractor shall make copies of the prevailing rates of per diem wages for each craft, classification or type of worker needed to perform work on the Project available to interested parties upon request, and shall post copies at the Contractor’s principal place of business and at the Project site. The Contractor shall defend, indemnify, and hold the City, its elected officials, officers, employees, volunteers, and agents free and harmless from any claims, liabilities, costs, penalties or interest arising out of any failure or allege failure to comply with the Prevailing Wage Laws and/or the City's Labor Compliance Program (hereinafter referred to as "LCP"), if any.

3. If this project is funded in whole or in part with Federal monies and subject to the provisions of the Davis-Bacon Act, the successful bidder shall pay not less than the wage rates determined by the Secretary of Labor. The Federal wage rates shall apply unless the State wage rates are higher. The Federal Wage Rates applicable to the contract are those current within ten (10) days of the bid due date.

4. The Contractor and all subcontractors shall pay and shall cause to be paid each worker engaged in work on the Project not less than the general prevailing rate of *per diem* wages determined by the Director, regardless of any contractual relationship which may be alleged to exist between the Contractor or any Subcontractor and such workers.

5. The Contractor and all subcontractors shall pay and shall cause to be paid to each worker needed to execute the work on the Project travel and subsistence payments, as such travel and subsistence payments are defined in the applicable collective bargaining Contracts filed with the Department of Industrial Relations in accordance with Labor Code § 1773.8.

6. If during the period any bid for work on this Project remains open, the Director of Industrial Relations determines that there has been a change in any prevailing rate of *per diem* wages in the locality in which this public work is to be performed, such change shall not alter the wage rates in the Notice calling for Bids or the contract subsequently awarded.

7. Pursuant to Labor Code §1775, the Contractor shall as a penalty to the City, forfeit Fifty Dollars ($50.00) for each calendar day, or portion thereof, for each worker paid less than the prevailing rate of *per diem* wages, determined by the Director, for such craft or classification in which such worker is employed for any public work done under the Contract by the Contractor or by any Subcontractor under it. The amount of the penalty shall be determined by the Labor Commission. In addition, the difference between such prevailing rate of *per diem* wage and the amount paid to each worker for each calendar day or portion thereof for which each worker was paid less than the prevailing rate of *per diem* wage shall be paid to each work by the Contractor.

8. Any worker employed to perform work on the Project, which work is not covered by any craft or classification listed in the general prevailing rate of *per diem* wages determined by the Director, shall be paid not less than the minimum rate of wages specified therein for the

craft or classification which most nearly corresponds to the work on the Project to be performed by them, and such minimum wage rate shall be retroactive to time of initial employment of such person in such craft or classification.

9. For those crafts or job classifications requiring special prevailing wage determinations, please contact the Division of Labor Statistics and Research, Prevailing Wage Unit, P.O. Box 420603, San Francisco, CA 94142-0603, (415) 703-4774 or check out the web site at www.dir.ca.gov.

E. HOURS OF LABOR.

1. As provided in Article 3 (commencing at §1810), Chapter 1, Part 7, Division 2 of the Labor Code, eight (8) hours of labor shall constitute a legal day's work. The time of service of any worker employed at any time by the Contractor or by any Subcontractor on any subcontract under this Contract, upon the work or upon any part of the work contemplated by this Contract, is limited and restricted to eight (8) hours during any one calendar day and forty (40) hours during any one calendar week, except as hereinafter provided. Notwithstanding the provision hereinabove set forth, work performed by employees of Contractor in excess of eight (8) hours per day and forty (40) hours during any one week shall be permitted upon this public work provided that the employees' compensation for all hours worked in excess of eight (8) hours per day at not less than one and one-half (1-1/2) times the basic rate of pay.

2. The Contractor shall pay to the City a penalty of Twenty-five Dollars ($25.00) for each worker employed in the execution of this Contract by the Contractor, or by any Subcontractor, for each calendar day during which such worker is required or permitted to work more than eight (8) hours in any calendar day and forty (40) hours in any one (1) calendar week, in violation of the provisions of Article 3 (commencing at §1810), Chapter 1, Part 7, Division 2 of the Labor Code, unless compensation for the workers so employed by Contractor is not less than one and one-half (1-1/2) times the basic rate of pay for all hours worked in excess of eight (8) hours per day.

3. Holiday and overtime work, when permitted by law, shall be paid for at a rate of at least one and one-half (1½) times the above specified rate of *per diem* wages, unless otherwise specified. Holidays shall be defined in the Collective Bargaining Contract applicable to each particular craft, classification, or type of worker employed.

F. CERTIFIED PAYROLL.

1. Contractor's attention is directed to California Labor Code Section 1776, which requires Contractor and any subcontractors to keep an accurate payroll record and which imposes inspection requirements and penalties for non-compliance. Contractor is responsible for the submission of copies of payrolls by all subcontractors. Each payroll submitted shall be accompanied by a "Statement of Compliance", signed by the Contractor or subcontractor or his/her agent who pays or supervises the payment of the persons employed under the contract, and shall certify the following:

a. That the payroll for each payroll period contains the name, social security number, and address of each employee, his or her correct classification, including applicable area and group code, hourly rates of wages paid, daily and weekly number of hours worked, deductions made and actual wages paid, and that such information is correct and complete;

b. That such laborer or mechanic (including each helper, apprentice and trainee)

employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions; and

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

2. If the Contractor or a subcontractor does not work during the payroll period, a Statement of Non-Working Days must be submitted for each day not worked.

3. In the event of noncompliance with the requirements of such section after 10 Days written notice specifying in what respects compliance is required, the CONTRACTOR shall forfeit as a penalty to the CITY, $25.00 for each calendar Day, or portion thereof, for each worker, until strict compliance is effectuated. Upon the request of the Division of Apprenticeship Standards or the Division of Labor Standards Enforcement, such penalties shall be withheld from progress payments then due.

G. APPRENTICES.

1. Attention is directed to the provisions in sections 1777.5 and 1777.6 of the Labor Code concerning the employment of apprentices by the Contractor or any subcontractor under him on contracts greater than $30,000 or 20 working days. The Contractor and any subcontractor under him shall comply with the requirements of Sections 1777.5 and 1777.6 in the employment of apprentices.

2. Section 1777.5 requires the Contractor or subcontractor employing workers 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, if they have not previously applied and are covered by the local apprenticeship standards.

3. The Contractor is required to make contributions to funds established for the administration of apprenticeship programs if: (1) the Contractor 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; or (2) if the Contractor is not a signatory to an apprenticeship fund and if the funds administrator is unable to accept Contractor' required contribution. The Contractor or subcontractor shall pay a like amount to the California Apprenticeship Council.

4. 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.

H. LABOR DISCRIMINATION. No discrimination shall be made in the employment of persons upon public works because of the race, color, sex, religion, age, national origin, sexual orientation, or physical disability of such persons and every Contractor for public works violating this section is subject to all the penalties imposed for a violation of the provisions of the Labor Code, and, in particular, Section 1735.

I. REGISTRATION OF CONTRACTORS. Before submitting bids, contractors shall be licensed in accordance with the provisions of Chapter 9, Division 3, of the Business and Professional Code of the State of California. All Contractors must have an "A" license or a "C" license that allows them to complete the work specified herein, in a professional manner consistent with these specifications.

J. PERMITS AND LICENSES. The Contractor shall procure all permits and licenses, including City of Alameda business licenses, pay all charges and fees, and give all notices necessary and incidental to the due and lawful prosecution of the work. However, the contractor will be reimbursed for construction permit fees. The estimated cost shown as an allowance in the bid proposal is only for bidding purposes. Payment shall be made for the actual cost of the permit. The cost for a City of Alameda business license is not reimbursable. Each Subcontractor shall have a current City of Alameda business license.

The following permit(s) and/or license(s) are required for this project:

1. **A City of Alameda Business License from the City of Alameda, 2263 Santa Clara Avenue, Finance Department, Room 220, Alameda**.
2. **"No Parking, Tow Away" signs and Excavation Permit from City Hall, 2263 Santa Clara Avenue, Planning and Building Services, Room 190, Alameda.**
3. **Combination Building Permit (E19-0382, E19-0383, E19-0384, E19-0385, E19-0386, E19-0387, E19-0388) from the City of Alameda, 2263 Santa Clara Avenue, Room 190, Alameda. The City of Alameda Building Permits have been applied for and paid for, the Contractor is responsible for obtaining the permit prior to commencing work and adhering to all requirements.**
4. **Bay Area Air Quality Management District (BAAQMD) to install and operate the standby engine-generator sets. Reference technical specification section 01410-3.01.**
4. **Wastewater Discharge Permit from the East Bay Municipal Utility District (EBMUD) if the Contractor plans to discharge dewatering disposal water to the City's sewer system. Reference technical specification section 02300-3.08.C**
5. **Prime Contractor must possess a valid Class A contractor's license.**

K. PATENTS. The Contractor shall assume all costs arising from the use of patented materials, equipment, devices or processes used on or incorporated in the work, and agrees to indemnify and hold harmless the City of Alameda, its officers, employees and agents from all suits at law or actions of any nature, damages, royalties and costs on account of the use of any patented materials, equipment, devices or processes.

L. RESPONSIBILITY FOR DAMAGES. The City of Alameda, its officers, employees and agents shall not be answerable or accountable in any manner for any loss or damage to the work or any part thereof, nor to any material or equipment used in performing the work, nor for injury or damage to any person or persons, either workers or the public, nor for damage to adjoining property from any cause whatsoever during the progress of the work nor at any time before final acceptance.

M. CONTRACTOR'S RESPONSIBILITY FOR THE WORK. Except as provided above, until formal acceptance of the work by the City, the Contractor shall have the charge and care thereof and shall bear the risk of injury or damage to any part thereof by the action of the elements or from any other cause, whether arising from the execution or from the non-execution of the work. The Contractor shall rebuild, repair, restore and make good all injuries or damages to any portion of the work occasioned by any of the above causes before final acceptance and shall bear the expense thereof, except such injuries or damages occasioned by acts of the Federal Government or the public enemy. The Contractor will not be responsible for the cost of repairing or restoring damage to the work, which damage is determined to have been proximately caused by an act of God, in excess of 5% of the contracted amount.

N. SAFETY PROVISIONS. The Contractor shall conform to the rules and regulations pertaining to safety established by the California Division of Occupational Safety and Health of the Industrial Relations Department (CAL-OSHA).

O. NO PERSONAL LIABILITY. Neither the City Council, City Manager, the City Engineer, nor any other City officer, authorized assistant or agent shall be personally responsible for any liability arising under this contract.

P. RESPONSIBILITY OF CITY. The City of Alameda shall not be held responsible for the care or protection of any material or parts of the work prior to final acceptance, except as expressly provided in these specifications.

Q. PUBLIC CONVENIENCE AND SAFETY. The Contractor shall so conduct operations as to cause the least possible obstruction and inconvenience to public traffic. The Contractor shall furnish, erect and maintain such fences, barriers, lights and signs as are necessary or as required by the Engineer to give adequate warning to the public at all times that the work is in progress and of any dangerous conditions to be encountered as a result of the work or of the presence of the Contractor's equipment or machinery.

The use of Flex-o-Lite Model No. 501, or approved equal, will be permitted only in specifically approved locations and only to the extent of 50 percent of the total amount of necessary lighting. Other models of lesser candle power may be permitted in some approved locations at a lesser percentage.

If the work involves the construction of a street or highway, the following additional provisions shall apply:

All traffic shall be permitted to pass through the work, unless other existing streets are stipulated as detours in the special provisions. Residents and businesses along the affected street or highway shall be provided passage as far as practicable; convenient access to driveways, houses and public buildings along the street or highway shall be maintained and temporary crossings shall be provided and maintained in good condition. No more than one cross or intersecting street or highway shall be closed at any time without the approval of the Engineer.

Contractor shall submit to the Engineer at the pre-construction meeting a Traffic Control Plan for any work that will impact vehicular traffic in the area. The Contractor must have an approved plan prior to commencing of work. All Traffic Control Plans must be in conformance with Caltrans regulations and guidelines.

The Contractor shall furnish, install and maintain such facilities as barricades, traffic signs, and flagmen, as may be necessary to advise the public of construction hazards and to control traffic.

The Traffic Control Plan shall cover, at minimum, all phases of work scheduled to occur in the first twenty (20) working days that will impact vehicular, pedestrian and bicycle traffic in the area. The Traffic Control Plan shall allow residents on the streets impacted ample “on street” parking within one (1) block of their homes. The Contractor shall have an approved Traffic Control Plan prior to commencing of work in the field. Contractor shall submit subsequent additions to the Traffic Control Plan in a timely manner to allow for the Engineer’s review and shall be in conformance with Caltrans regulations and guidelines.

At least 72 hours prior to beginning work on a section of street, curb or sidewalk that will affect use of the parking lane, the Contractor shall notify, by approved "No Parking - Tow Away" signs on barricades, all affected property owners, residents, businesses and agencies adjacent to that section of street. The “No-Parking” signs shall state the days, dates, and hours of parking lane closure, and shall be placed along the street on each side at no more than 50 feet spacing. The Contractor shall notify the Engineer at least one (1) working day in advance of the intent to post No-Parking signs, so that the timely posting can be verified by the Inspector. The Contractor is permitted to list up to one (1) working day before and one (1) working day after the scheduled days of work, as shown in the latest approved schedule on signs, in order to bracket the approved scheduled date of work. The Contractor shall remove the “No Parking” signs as soon as the parking lane is re-opened to parking.

If the Contractor is unable to meet the scheduled and noticed time for the work, the Contractor shall immediately notify the Engineer and remove the posted "No-Parking" signs. The Contractor shall submit a new scheduling request in writing to the Engineer. Upon written approval of the Engineer, the Contractor shall post signs at least 72 hours prior to beginning work per the revised schedule.

Work hours are limited between 8:00 A.M. and 5:00 P.M., except for vicinity of schools where the work hours are limited between 9:00 A.M. and 3:00 P.M.

Contractors must coordinate with the Alameda Unified School District and any private school on the streets that are in the vicinity of schools.

R. NOTICES TO CONTRACTOR. Any notice required to be given to the Contractor by the City of Alameda or by the City Engineer or by any officer of said City may be given to said Contractor at the address shown in the Contractor’s proposal. Such notice may be given by mailing a copy of said notice to the Contractor to such address by United States certified mail. Evidence of such mailing shall be deemed the equivalent of personal services of said notice.

S. UTILITIES. The location of railroad tracks, utility facilities and other structures shall be the responsibility of the Contractor. The Contractor shall contact the owners of those tracks, facilities and structures for any information that may be required. The Contractor shall contact Underground Services Alert (USA) at 800-642-2444 forty-eight (48) hours prior to commencement of work.

Where existing sewers and storm drains cross or interfere in any way with construction under this contract, they shall be left in place and the Contractor shall work around them, or where feasible and practical, the Contractor may, with the permission of the City Engineer, remove and replace them at his/her own expense. Precautions shall be exercised to provide bearing under existing sewer lines so encountered to preclude settlement during or after the term of the contract. In the event that some of these sewers are abandoned, they may, with the permission of the City Engineer, be removed and not replaced. The Contractor shall provide submittals for the Engineer's review and approval for supporting utilities.

The owners of pipes, wires, conduits, vaults and other utilities (other than sewers) located in the City streets which could conflict with the proposed work will be notified by the City Engineer to remove or adjust the same, without cost to the Contractor, to such extent as will allow the prosecution of the work described herein according to the necessities thereof and in accordance with these specifications. Wherever and whenever the Contractor anticipates working in an area from which utilities must be removed at the expense of others, he/she shall notify the City Engineer sufficiently in advance (a minimum of ten (10) working days) to permit the owners thereof to rearrange or abandon such utilities, and he/she shall cooperate with the owners thereof in the performance of the work under this contract.

The work will be so prosecuted that a minimum of damage will result to utility services. In the event that utility services are damaged or interrupted, the Contractor shall immediately, at his/her own expense, restore such services in a manner satisfactory to the City Engineer. In the event that an interruption of utility services is sustained for a period of longer than one-half hour, it shall be the responsibility of the Contractor to notify the occupants of the premises to which said services are connected, so that no damage will accrue on or to said premises.

The Contractor shall perform all work in such manner as to prevent damage to utilities lying outside of or below a required excavation of trench area.

T. SOUND CONTROL REQUIREMENTS. Sound control shall conform to Section 4-10 of the Alameda Municipal Code, which prohibits weekday construction activities between 7:00 pm and 7:00 am.

U. CONSTRUCTION SITE CONTROLS. Within five (5) business days of the date the work is to commence pursuant to the NTP the Contractor shall submit an Erosion/Stormwater Pollution Control Plan (WPCP) to the City Engineer for review. The WPCP shall include appropriate erosion and sediment control measures to effectively prevent the entry of soil, dirt, debris and other pollutants to storm water runoff, the storm drain system, lagoons and the bay/estuary during construction. No work in the field under this Contract may begin until the City Engineer has approved the Contractor's WPCP.

Erosion and sediment control plans/sheets shall indicate the specifications and maintenance schedules for the installation and upkeep of the erosion control mechanisms. Specifications shall be provided for the erosion control practices, perimeter protection(s), any silt fencing and fiber rolls to be used, storm drain inlet protections, stabilized construction entrance(s) and exits, site and excavation dewatering activities, vehicle tire wash area(s), vehicle and equipment servicing area(s), and the materials handling and storage area(s). These specifications should meet the same level of erosion and sediment control effectiveness established by practices identified in the San Francisco Bay Regional Water Quality Control Board's Erosion and Sediment Control Field Manual (510-622-2465), the Association of Bay Area Government's Manual of Standards for Erosion and Sediment Control (510-464-7900) and/or the California Stormwater Quality Association's Stormwater Best Management Practice Handbook – Construction (2003) (www.cabmphandbooks.com). Contact City Public Works Department Clean Water Program Specialist Jim Barse (510-747-7930) for additional assistance in obtaining copies of these reference documents.

The Contractor is responsible for ensuring that all of his/her workers and subcontractors are aware of and implement the specific stormwater quality control measures under the approved WPCP. The Contractor(s) shall avoid creating excess dust when breaking asphalt/concrete and during excavation and grading. If water is to be used as a measure for dust control, use as little as possible. All wash water shall be kept out of streets, gutters and storm drains. Controls shall be implemented before construction begins and maintained until the end of construction at which time they shall be removed.

Failure to comply with the following approved construction Best Management Practices ("BMPs") shall result in the issuance of correction notices, citations and/or a project stop order:

1. Gather all construction debris on a regular basis and place it in a dumpster or other container which is emptied or removed on a weekly basis. When appropriate, use tarps on the ground to collect fallen debris or splatters that could contribute to stormwater pollution. After breaking old pavement, remove all pieces to avoid contact with rainfall or runoff.
2. Remove on-site piles from the site on a regular basis. Only temporary storage is allowed. All temporary soil or other stockpiles on site shall be securely covered with a tarp, plastic sheeting or similar material.
3. Remove all dirt/mud, gravel, rubbish, refuse and green waste from the sidewalk, street pavement, and storm drain system adjoining the project site daily and prior to rain. Clean up leaks, drips and spills immediately. Avoid unnecessary driving on unpaved areas during wet weather.
4. Install and maintain stabilized construction entrances to minimize the tracking of dirt, mud, dust and debris onto the public right-of-way.
5. Broom-sweep the sidewalk and public street pavement adjoining the project site daily and prior to rain. Caked-on mud or dirt shall be scraped from these areas before sweeping. At the completion of work the street shall be washed and the wash water collected and disposed offsite.
6. Install filter materials (such as block and gravel bags, sandbags, filter fabric) at the storm drain inlets surrounding the project site. Such inlet protections shall be installed before: the start of the rainy season (October 1st), site de-watering activities, saw-cutting

activities, or any other activity that may result in the discharge of material to the storm drain. Filter materials shall be maintained and/or replaced as necessary to minimize short-cutting and to remove sediment deposits and buildup. Accumulated sediment/debris shall be disposed of properly.

7. Vacuum saw-cutting slurry and remove from site. Do not allow saw-cut slurry to enter the storm water conveyance system.

8. Create a contained and covered area on the site for the storage of cement bags, paints, flammables, oils, fertilizers, pesticides, or any other materials used on the project site that have the potential for being discharged to the storm drain system by wind, exposure to rainfall or in the event of a material spill.

9. Never clean machinery, tools, brushes, etc. or rinse containers into a street, gutter, storm drain or stream. See the *Building Maintenance and Remodeling* BMP flyer and ACCWP BMP brochures for more information. Contact the Public Works Department at 747-7930 for assistance with obtaining these documents.

10. Ensure that concrete/gunite supply trucks or concrete/plaster finishing operations do not discharge wash water into street gutters or drains. Concrete trucks shall have a self-contained washout system or discharge to a dedicated, secure site washout in order to avoid the possibility of debris on city streets or discharge of wash water to the storm water conveyance system.

11. Minimize removal of natural vegetation or ground cover from the site in order to minimize the potential for erosion and sedimentation problems. Re-plant the area, and stabilize all cut and fill slopes as soon as possible after grading is completed. At a minimum, 4,000 pounds/acre of straw with tackifier should be placed on all exposed soils including those within active work areas and flat lots. **No site grading shall occur between October 1 and May 31 unless approved erosion and sedimentation control measures are in place.**

12. Provide erosion "prevention" and perimeter protection measures (soil stabilization) such as fiber rolls, silt fence, and/or sediment traps or basins. Ensure control measures are adequately maintained and in operable condition. Sediment controls, including inlet protection, are necessary but should be a secondary defense behind good erosion control and site perimeter measures.

13. Design site de-watering operations to prevent the discharge of any sediment, debris or other pollutants to the municipal storm water conveyance system.

14. Maintain and if necessary, repair, all erosion prevention and sediment control measures throughout the contract term. Replacement supplies should be kept on site. Site inspections shall be conducted before and after each storm event, and every 24 hours for extended storm events, to identify areas that contribute to erosion and sediment problems or any other pollutant discharges. If additional measures are needed, inform the City Engineer immediately and document all inspection findings and actions taken.

15. Conduct visual observations before, during, and after storm events. Any breach, malfunction, leakage, or spill observed that could result in the discharge of pollutants to surface waters that might not be visually detectable in stormwater shall trigger the collection of a sample of discharge. The following procedures shall be followed during sampling:

<u>Sampling Procedures</u>:

- For all construction activity, identify a sampling and analysis strategy and sampling schedule for potential discharges discovered through visual monitoring.

- Any breach, malfunction, leakage, or spill observed during visual monitoring which could result in the discharge of pollutants to surface waters that would not be visually detectable in stormwater shall trigger the collection of a sample of discharge.
- Samples shall be collected at all discharge locations which drain the areas identified by the visual observations and which can be safely accessed.
- Personnel trained in water quality sampling procedures shall collect stormwater samples.
- An uncontaminated sample shall be collected for comparison with the discharge sample.
- Sampling shall be conducted during the first two hours of discharge from rain events that occur during daylight hours and which generate runoff.
- The uncontaminated sample shall be compared to the samples of discharge using field analysis or through laboratory analysis. Analyses may include, but are not limited to indicator parameters such as: pH, specific conductance, dissolved oxygen, conductivity, salinity, and TDS
- All field and/or analytical data shall be kept in the WPCP document, which is to remain at the construction site at all times.

16. Contact the City of Alameda Public Works Department at 510-747-7930 in the event of any slope failure, sediment pond overflow, or any other malfunction resulting in sediment-laden runoff. The City shall, in turn, report such incidents to the Regional Water Quality Control Board.

17. Clearly mark with the words, "No Dumping! Drains to Bay" or the equivalent, using methods approved by the City of Alameda, onto the on-site storm drain inlets. All on-site storm drains must be inspected and, if necessary, cleaned, at least once a year immediately prior to the rainy season. Additional cleaning may be required by the City of Alameda.

18. Require all concrete trucks used in the performance of the work to have a self-contained washout system, rather than do washout on the site. The idea is to avoid:

a. An undesirable pile of concrete on the jobsite, and
b. The possibility of debris on city streets.

The objective of these Standard Conditions is to ensure that the City's municipal storm water Permit, the National Pollutant Discharge Elimination System (NPDES) Permit provisions and additional Regional Water Quality Control Board requirements are adequately enforced.

These recommendations are intended to be used in conjunction with the State's Best Management Practices Municipal and Construction Handbooks, local program guidance materials from municipalities, Section 7.1.01, of the Standard Specifications and any other appropriate documents on storm water quality controls for construction. If you need assistance in checking these documents, contact Clean Water Program Specialist at 510-747-7930.

Failure to comply with the above program will result in issuance of noncompliance notices, citations, project stop orders or fines. The fine for noncompliance of the above program is two hundred and fifty dollars ($250.00) per occurrence per day. The State under the Federal Clean Water Act can also impose a fine on the Contractor.

V. RECYCLING OF CONCRETE AND ASPHALT MATERIALS. Concrete and Asphalt are highly recyclable, and must be source separated as much as possible on the project site and delivered to a processor as separate materials to ensure a very high recycling rate, above 80%. Additionally, the Contractor shall prepare and submit to Alameda.WasteTracking.com a Waste Management Plan to recycle at least 80% of these two types of materials to an approved materials recycling location other than a landfill. The 80% shall be determined by weight of materials of the entire project.

The Contractor shall also submit to alameda.wastetracking.com a Summary Report, containing proof of actual recycling results of construction and/or demolition debris hauled from the project (ex. processing facility tonnage receipts verifying at least 80% recycling rate).

Proof of an approved Waste Management Plan must be provided to the City Engineer before construction starts and proof of an approved Summary Report must be provided before project acceptance. The Contractor shall submit a request, along with proof in writing, to the City Engineer of the Contractor's inability to comply with this requirement.

W. CLEAN AIR ACT OF 1970, ET SEQ. AND FEDERAL WATER POLLUTION CONTROL ACT AS AMENDED BY THE CLEAN WATER ACT OF 1977. The Contractor agrees to comply with federal clean air and water standards during the performance of this contract and specifically agrees to the following:

- The term "facility" means any building, plant, installation, structure, mine, vessel or other floating craft, location or site of operations owned, leased, or supervised by the Contractor and the subcontractors for the construction, supply and service contracts entered into by the Contractor;

- Any facility to be utilized in the accomplishment of this contract is not listed on the Environmental Protection Agency's List of Violating Facilities pursuant to 40 CFR, Part 15.20;

- In the event a facility utilized in the accomplishment of this contract becomes listed on the EPA list, this contract may be canceled, terminated, or suspended in whole or in part;

- It will comply with all the requirements of Section 114 of the Clean Air Act and Section 308 of the Water Pollution Control Act relating to inspection, monitoring, entry, reports, and information, as well as all other requirements specified in Section 114 and Section 308, respectively, and all regulations and guidelines issued thereunder;

- It will promptly notify the Government of the receipt of any notice from the Director, Office of Federal Activities, Environmental Protection Agency, indicating that any facility utilized or to be utilized in the accomplishment of this contract is under consideration for listing on the EPA List of Violating Facilities;

- It will include the provisions of Paragraph a. through g. in every subcontract or purchase order entered into for the purpose of accomplishing this contract, unless otherwise

exempted pursuant to the EPA regulations implementing the Air or Water Acts above (40 CFR, Part 15.5), so that such provisions will be binding on each subcontractor or vendor;

In the event that the Contractor or the subcontractor for the construction, supply and service contracts entered into for the purpose of accomplishing this contract were exempted from complying with the above requirements under the provisions of 40 CFR, Part 15.5 (a), the exemption shall be nullified should the facility give rise to a criminal conviction (see 40 CFR 15.20) during the accomplishment of this contract. Furthermore, with the nullification of the exemption, the above requirements shall be effective. The Contractor shall notify the Government, as soon as the Contractor's or the subcontractors' facility is listed for having given rise to a criminal conviction noted in 40 CFR, Part 15.20.

X. SUBMITTALS AND REQUEST FOR INFORMATION (RFI'S). The Contractor shall submit an RFI within five (5) business days of an event or question of fact arising under the Contract. The Engineer in charge of the project shall have ten (10) business days to respond to an RFI or any Submittal required to be made under the Contract.

Y. COMPLIANCE WITH THE CITY'S INTEGRATED PEST MANAGEMENT POLICY:

The Contractor shall follow the requirements of the City's Integrated Pest Management (IPM) Policy to ensure the City is in compliance with its Municipal Regional Stormwater NPDES Permit, Order No. R2-2009-0074, issued by the California Regional Water Quality Control Board. Contractor shall follow the City's IPM Policy and utilize generally accepted IPM Best Management Practices (BMPs) to the maximum extent practicable for the control or management of pests in and around City buildings and facilities, parks and golf courses, urban landscape areas, rights-of-way, and other City properties.

Contractor will ensure that applicators will use the most current IPM technologies available to ensure the long-term prevention or suppression of pest problems and to minimize negative impacts on the environment, non-target organisms, and human health. Contractor will consider the options or alternatives listed below in the following order, before recommending the use of or applying any pesticide on City property:

1. No controls (e.g., tolerating the pest infestation, use of resistant plant varieties or allowing normal life cycle of weeds)
2. Physical or mechanical controls (e.g., hand labor, mowing, exclusion)
3. Cultural controls (e.g., mulching, disking, alternative vegetation), good housekeeping (e.g. cleaning desk area)
4. Biological controls (e.g., natural enemies or predators)
5. Reduced-risk chemical controls (e.g., soaps or oils)
6. Other chemical controls

Contractor shall ensure that only appropriate licensed applicators who are authorized and trained in pesticide application and who shall implement the City department's IPM standard operating procedures may apply pesticides to or within City property.

Restricted Chemicals

The term pesticide applies to herbicides, insecticides, fungicides, rodenticides and other substances used to control pests. Antimicrobial agents are not included in this definition of pesticides.

Contractor shall avoid the use of pesticides that threaten water quality, human health and the environment. Thus, the Contractor shall not use or promote the use of the following chemicals:

1. Acute Toxicity Category I chemicals as identified by the Environmental Protection Agency (EPA),
2. Organophosphate pesticides (e.g., those containing Diazinon, chlorpyrifos or malathion)
3. Pyrethroids (bifenthrin, cyfluthrin, beta-cyfluthrin, cypermethrin, deltamethrin, esfenvalerate, lambda-cyhalothrin, permethrin, and tralomethrin),
4. Carbamates (e.g., carbaryl),
5. Fipronil,
6. Copper-based pesticides unless:
    a) Their use is judicious,
    b) Other approaches and techniques have been considered, and;
    c) Threat of impact to water-quality is prevented.

General Pesticide Usage Practices

Contractor shall ensure implementation of the following practices:

1. All pesticide applications shall be performed according to the manufacturer's instructions as detailed on the product label, and in accordance with all applicable state and local laws and regulations set forth to protect the environment, the public, and the applicator; and properly dispose of unused pesticides and their containers.

2. Pesticides that are not approved for aquatic use will not be applied to areas immediately adjacent to water bodies where through drift, drainage, or erosion, there is a reasonable possibility of a pesticide being transported into surface water.

3. Applicators will always avoid applications of pesticides that directly contact water, unless the pesticide is registered under Federal and California law for aquatic use.

4. Obtain coverage under the Statewide General NPDES Permit prior to discharging pollutants from the use of aquatic pesticides directly to the waters of the United States, or onto aquatic plants growing in waters of the United States (as required by the State Water Quality Resources Control Board).

Posting of Warning Notices Prior to Pesticide Application

1. If a pesticide with a "Warning" or "Danger" label indicator must be applied, the Contractor shall post sufficient copies of warning notices (Notice of Scheduled Chemical Application for Pest Management) and MSDS to effectively alert the public (i.e., at all

entrances to a building) no less than 48 hours in advance of the pesticide application. The warning notice must be completely filled out, including name of the pesticide (both chemical and brand name), time and date of application, and with a fully legible re-entry time.

Annual Pesticide Use Summary Report

Contractor shall track pesticide use on City properties and provide an annual pesticide use summary report of pesticide application on City properties. The annual pesticide use summary report shall be submitted to the City's Public Works Department Clean Water Program staff by a date to be determined in the scope of work and shall include the following information:

1. Product name and manufacturer
2. Active ingredient
3. The total quantity of each pesticide used during the prior fiscal year (from July 1 to June 30)
4. Target pest(s) for pesticide application(s).
5. Reasons for increases in use of pesticides that threaten water quality, specifically organophosphorous pesticides, pyrethroids, carbamatesl, fipronil, and copper-based pesticides.

Best Management Practices (BMPs)

To protect water quality, the Contractor shall implement the BMPs and control measures described below:

1. Follow all federal, state, and local laws and regulations governing the use, storage, and disposal of pesticides and training of pest control advisors and applicators.
2. Use the most effective, least toxic pesticides that will do the job, provided there is a choice. The agency will take into consideration the LD50, overall risk to the applicator, and impact to the environment (chronic and acute effects).
3. Apply pesticides at the appropriate time to maximize their effectiveness and minimize the likelihood of discharging pesticides in stormwater runoff. Avoid application of pesticides if rain is expected (this does not apply to the use of pre- emergent herbicide applications when required by the label for optimal results.)
4. Employ techniques to minimize off-target application (i.e. spray drift) of pesticides, including consideration of alternative application techniques. For example, when spraying is required, increase drop size, lower application pressure, use surfactants and adjuvants, use wick application, etc.
5. Apply pesticides only when wind speeds are low.
6. Mix and apply only as much material as is necessary for treatment. Calibrate application equipment prior to and during use to ensure desired application rate.
7. Do not mix or load pesticides in application equipment adjacent to a storm drain inlet, culvert, or watercourse.
8. Properly inspect applicator equipment to prevent accidental pesticide leaks, spills and hazards to applicators and the environment.
9. Meet local fire department and Alameda County Agricultural Commissioner storage requirements for pesticide products. Provide secondary containment for liquids if required.

10. Prepare spill kits, store the kits near pesticides, and train employees to use them.
11. Store pesticides and other chemicals indoors in a locked and posted storage unit, as per California Code of Regulations.
12. Store pesticides in labeled containers, as per California Code of Regulations.
13. Rinse empty pesticide/herbicide containers, and empty in the spray, as per California Code of Regulations.
14. Dispose of triple-rinsed empty pesticide containers according to recommendations of the Alameda County Agricultural Commissioner and the manufacturer.
15. Try to find a qualified user for any unwanted pesticides, or return to the manufacturer if unopened. If disposal is required, contact Alameda County's Household Hazard Waste Collection Program at (510) 670-6460 between 8:30 AM and 5:00 PM., Monday through Friday, to make appropriate disposal arrangements, or to recycle the material.
16. If changing pesticides or cleaning spray tanks, use tank rinse water as the product, over a targeted area within the application site.
17. Irrigate slowly to prevent runoff, and do not over-water.

SECTION III. SCOPE OF WORK

A. WORK TO BE DONE. The work to be done consists of furnishing all labor, tools, equipment, materials, except as herein specified, and doing all work associated removing and replacing equipment, rehabilitating existing wetwells, construction of new wetwells, construction of new manholes, construction of new valve vaults, installing new equipment, and replacing force and gravity mains at seven (7) sewage lift stations. Equipment to be replaced and installed includes pumps, piping, valves, electrical equipment, generators, and other items shown to be constructed on the contract drawings. Additional improvements may include but are not limited to curb, gutter, sidewalk, driveway, street patch, landscaping, irrigation, WPCP, traffic controls and all other associated work to complete the project at the locations designated in the plans.

The Notice to Proceed (NTP) for this project is tentatively scheduled to be issued in March, 2020.

The Initial Project Submittal Package shall address the entire project, and shall include the Traffic Control Plan (first 20 working days at minimum), WPCP, Waste Reduction and Recycling Plan, and the full project schedule. Contractor shall not commence work in the field until Engineer has approved the Initial Project Submittal Package.

The Contractor shall have two hundred eighty (280) consecutive working days from the date the work is to commence pursuant to the Notice to Proceed to complete the work.

Contractor is advised to remove all equipment from the streets identified as route, detour, and/or staging areas for the 4th of July Parade, during the period of Wednesday, July 1, 2 p.m. through 8 a.m. Monday, July 6. No removal of concrete, asphalt or pavement markings shall be allowed on these streets unless they are restored in full at least 24 hours prior to July 2.

Contractor shall not work during City holidays, 2019 and 2020 holidays include:

Christmas Day	Wednesday, December 25, 2019
New Year's Day	Wednesday, January 1, 2020
Martin Luther King, JR.	Monday, January 20, 2020
Presidents Day	Monday, February 17, 2020
Memorial Day	Monday, May 25, 2020
Day before Independence Day	Friday, July 3, 2020
Labor Day	Monday, September 7, 2020
Veteran's Day	Wednesday, November 11, 2020
Thanksgiving Day	Thursday, November 26, 2020
Day after Thanksgiving Day	Friday, November 27, 2020
Christmas Day	Friday, December 25, 2020
New Year's Day	Friday, January 1, 2021
Martin Luther King, JR.	Monday, January 18, 2021
Presidents Day	Monday, February 15, 2021

The following City events are planned for Calendar Year 2019 and 2020:

Event	**Date**
Farmer's Market (Webster Street at Haight Avenue) held every Tuesday and Saturday (year-round) from 9 a.m. to 1 p.m.	
Classic Car Show (Park Street)	TBD
Trick or Treat at Webster Street	TBD
Santa on Webster Street	TBD
Spring Festival (Park Street)	TBD
Alameda Island Jam (Webster Street)	TBD
July 4th Parade	July 4, 2020
Art and Wine Faire (Park Street)	TBD
Concerts at the Cove	TBD

B. ALTERATIONS. The City of Alameda reserves the right to increase or decrease the quantity of any item or portion of work, or to omit portions of the work as may be deemed necessary or expedient by the Engineer; also to make such alterations or deviations, increases or decreases, additions or omissions in the plans and specifications, as may be determined during the progress of the work to be necessary and advisable.

C. EXTRA AND FORCE ACCOUNT WORK. New and unforeseen work will be classed as extra work when such work cannot be covered by any of the various items or combination of items for which there is a bid price.

The Contractor shall do no extra work except upon written order from the Engineer. Extra work as herein before defined under Section 4-1.05, Extra Work, when ordered and accepted, shall be paid for under a written work order in accordance with the terms therein provided. Payment for extra work will be made as agreed upon in writing pursuant to an extra work order signed by both parties, or by force account.

Work performed on force account shall be paid on a time and materials basis plus ten percent (10%). For work done by a subcontractor, an additional five percent (5%) markup is allowed to reimburse the contractor for additional administration cost and no other additional payment will be made; provided, however, that the City reserves the right to furnish such materials required as it deems expedient, and the Contractor shall have no claim for profit on the cost of such materials. Payment for work performed on force account pursuant to this subsection shall include full compensation to the Contractor for contributions made to the State as required by the provisions of the Unemployment Reserve Act, Chapter 352, Statutes of 1935, as amended; for taxes paid to the Federal Government as required by the Social Securities Act, approved August 14, 1935, as amended; for premiums paid on any other insurance of any nature which the Contractor may be required to carry or which he may elect to carry, and for additional premiums paid on faithful performance and labor and materials bonds required by reason of increase in the amount of work to be performed over and above that called for in the original contract. The price paid for labor shall include any compensation insurance paid by the Contractor.

All force account work shall be recorded and tracked daily upon Time and Material Tentative Extra Work Order report sheets furnished by the Contractor to the Engineer and signed by both parties, which daily reports shall thereafter be considered the true record of force account work done. Verification of time and materials shall be made on a daily basis by the Inspector or by his/her designee.

D. REMOVAL OF OBSTRUCTIONS. The Contractor shall remove and dispose of all structures, debris, or other obstruction of any character to the construction of the project if and as required by the Engineer.

E. CLEAN UP. Contractor shall leave the work site in an acceptable clean manner at the end of each work day. Upon completion and before making application for acceptance of the work, the Contractor shall clean the street or road, borrow pits, and all ground occupied by the Contractor in connection with the work, of all rubbish, excess materials, temporary structures, and equipment; and all parts of the work shall be left in a neat and presentable condition.

SECTION IV. CONTROL

A. AUTHORITY OF THE ENGINEER. The Engineer shall decide all questions which may arise as to the quality or acceptability of materials furnished and work performed; the manner of performance and rate of progress of the work; the interpretation of the plans and specifications; the acceptable fulfillment of the contract on the part of Contractor; and all questions as to claims and compensation.

The Engineer's decision shall be final and he/she shall have executive authority to enforce and make effective such decisions and orders that the Contractor fails to carry out promptly.

B. PLANS. All authorized alterations affecting the requirements and information given on the approved plans shall be in writing. No changes shall be made to any plans or drawings after the same have been approved by the Engineer, except by direction of the Engineer.

Working drawings of plans for any structure not included in the plans furnished by the Engineer shall be approved by the Engineer before any work involving these plans shall be performed, unless approval is waived in writing by the Engineer.

Notwithstanding the foregoing, the Contractor agrees that approval by the Engineer of the Contractor's working plans does not relieve the Contractor of any responsibility for the accuracy of the dimensions and details thereof, and that the Contractor shall be responsible for agreement and conformity of his/her working plans with the approved plans and specifications.

The Contractor shall provide as-built drawings at the completion of the work. As-built drawings shall be prepared by a licensed engineer or surveyor and approved by the City Engineer.

As-built drawings must be in digital format. Any difficulty in providing the digital as-built drawings must be documented and presented to the City Engineer, who may permit manual as-built drawings on 24"x36" vellum. Release of retention is subject to the approval of the as-built drawings by the Engineer.

Full compensation for furnishing all working drawings and digital **as-built drawings** shall be considered as included in the prices paid for the various contract items of work, and no additional allowance will be made therefor.

C. CONFORMITY WITH PLANS AND ALLOWABLE DEVIATION. Finish surfaces in all cases shall conform with the lines, grades, cross sections, and dimensions shown on the approved plans. Deviations from the approved plans, as may be required by the exigencies of construction will be determined in all cases by the Engineer and authorized in writing.

D. COORDINATION OF PLANS, SPECIFICATIONS, AND SPECIAL PROVISIONS. These specifications, the plans, special provisions and all supplementary documents are essential parts of the contract, and a requirement occurring in one is as binding as though occurring in all. They are intended to be cooperative, to describe, and to provide for a complete work. Plans shall govern over specifications; special provisions shall govern over both specifications and plans.

E. INTERPRETATION OF PLANS AND SPECIFICATIONS AND ADDENDA THERETO. Should it appear that the work to be done, or any matter relative thereto, is not sufficiently detailed or explained in these specifications, plans, and the special provisions, the Contractor shall apply to the Engineer for such further explanation as may be necessary to carry out the work. Upon such application by the Contractor or prospective bidder, or in the event that it appears expedient to the Engineer to further explain, clarify, or amend these specifications, special provisions and plans, the Engineer shall issue addenda thereto and such addenda shall constitute a part hereof, and shall be binding on the Contractor. It is up to the Contractor to check before the bid date that Contractor has all paperwork to complete the bid.

It is the responsibility of each prospective bidder to check the website listed on page 1 of these specifications periodically for Addenda updates. If the addendum is issued after the non-mandatory pre-bid meeting is held, the addendum will be forwarded by email, to all attendees who have furnished contact information. Do not rely upon third party providers of the original plans and specs to issue all addenda. Contractor shall acknowledge receipt of all addenda on the Bid and those Bids that do not have acknowledgment of all addenda will be considered non-responsive.

In the event of any discrepancy between any drawing and the figures written thereon, the figures shall be taken as correct.

F. SUPERINTENDENCE. Whenever the Contractor is not present on any part of the work where it may be desired to give directions, orders will be given by the Engineer in writing and shall be received and obeyed by the superintendent or foreman in charge of the particular work in reference to which orders are given.

G. CONSTRUCTION STAKING & LAYOUT. Construction staking and layout shall be at the contractor's expense and performed by the contractor's surveyor or engineer qualified to do surveying work.

The Contractor shall preserve all stakes and points set for lines, grades, or measurements of the work in their proper places until authorized to remove them by the Engineer. All expenses incurred in replacing stakes that have been removed without proper authority shall be paid by the Contractor.

AND/OR

G. LINES AND GRADES. All distances and measurements are given and will be made in a horizontal plane. Grades are given from the top of stakes or nails, unless otherwise noted on the plans.

Three consecutive points shown on the same rate of slope must be used in common, in order to detect any variation from a straight grade, and in case any discrepancy exists, it must be reported to the Engineer. If such discrepancy is not reported to the Engineer, the Contractor shall be responsible for any error in the finished work.

The Contractor shall preserve all stakes and points set for lines, grades, or measurements of the work in their proper places until authorized to remove them by the Engineer. All expenses incurred in replacing stakes that have been removed without proper authority shall be paid by the Contractor.

H. INSPECTION. The Engineer shall at all times have access to the work during construction and shall be furnished with every reasonable facility for ascertaining full knowledge respecting the progress, workmanship, and character of materials used and employed in the work.

The Contractor shall give at least 48 hours notice in writing when he will require inspection on subgrade, formwork, concrete paving, etc. Inspection will routinely be carried out at pre-scheduled time established at the pre-construction meeting. Inspection will only be carried out for substantial quantities of work ready for inspection.

The Contractor shall contact the City's representative by 11:00 a.m. the day prior to any special inspections so the City can schedule the inspections. If the contractor does not perform work that requires the special inspection as previously communicated to City's representative then the contractor will be responsible for all costs associated with special inspection regardless of the fact that the special inspector did not perform any services.

Whenever the Contractor varies the period during which work is carried on each day, he shall give due notice to the Engineer, so that proper inspection may be provided. Any work done in the absence of the Engineer is subject to rejection.

The inspection of the work shall not relieve the Contractor of any of his/her obligations to fulfill the contract as prescribed. Defective work shall be made good and unsuitable materials may be rejected, notwithstanding the fact that such defective work and unsuitable materials have been previously overlooked by the Engineer and accepted or estimated for payment.

Working hours in the field are restricted to 8 AM through 5 PM, Monday through Friday, excluding City Holidays, and shall constitute “normal working hours.” The Public Works Department Inspectors work on Friday’s and can be reached at 510-747-7900. In some locations, as noted on the Plans, normal working hours may be further restricted to avoid traffic and/or school-related conflicts. Any work in the field performed outside of these hours, including but not limited to construction, clean up, placement of traffic control devices, and mobilization/demobilization, shall be subject to removal and the Contractor fined $5,000 per incident, unless such work has been previously authorized by the Engineer in writing.

Inspection hours for construction shall be from 8 AM through 5 PM, Monday through Friday, excluding City Holidays, and shall constitute “normal inspection hours.” The Public Works Department Inspectors work on Friday’s and can be reached at 510-747-7900. Unless

prior written authorization has been received from the Engineer, the Contractor shall not perform any work outside of these hours except for general clean up, demobilization, and placement of no-parking signs. The Contractor shall pay the salary and benefits, including overtime, of the City employee(s) for inspection of any work performed outside of the normal inspection hours. Projects financed in whole or in part with state funds shall be subject to inspection at all times by the Director of Public Works of the State of California, or his agents.

I. REMOVAL OF DEFECTIVE AND UNAUTHORIZED WORK. All work which is defective in its construction or deficient in any of the requirements of these specifications shall be remedied, or removed and replaced by the Contractor in an acceptable manner and no compensation will be allowed for such correction.

Any work done beyond the lines and grades shown on the plans or established by the Engineer, or any extra work done without written authority, shall be considered as unauthorized and will not be paid for.

Upon failure on the part of the Contractor to comply forthwith with any order of the Engineer made under the provisions of this article, the Engineer shall have the authority to cause defective work to be remedied, or removed and replaced, and unauthorized work to be removed, and to deduct the cost thereof from any monies due or to become due the Contractor.

The fact that the work and materials have been inspected from time to time, and payments on account have been made, does not relieve the Contractor from the responsibility of replacing and making good any defective work or materials that may be discovered within one year from the date of the completion of the work by the Contractor and its acceptance by the City.

J. FINAL INSPECTION. Whenever the work provided and contemplated by the contract shall have been satisfactorily completed, the Engineer will make the final inspection.

K. FINAL GUARANTEE. It is understood that the Contractor is skilled in the trade or calling necessary to perform the work set forth within the plans and specifications, and that the City of Alameda, not being skilled in such matters, relies upon the Contractor to do and perform all work, acts, and things necessary to carry out the contract in the most skilled and desirable manner, and the Contractor guarantees the workmanship and materials to be the best of their kind. The acceptance of any part or of the whole of the work by the City does not operate to release the Contractor or the Contractor's surety from said guarantee.

The Contractor shall be held responsible for and must make good any defects through faulty, improper or inferior workmanship or materials arising from or discovered in any part of the contract work within one year of the completion and acceptance of the same. The bond for faithful performance, furnished by the Contractor, shall cover such defects and protect the City of Alameda against any and all such defects.

Nothing in this section supersedes contractor obligations for repair and replacement of work pursuant to the Public Contract Code.

SECTION V. CONTROL OF MATERIAL

A. SAMPLES AND TESTS. At the option of the Engineer, the source of supply of each of the materials shall be approved by the Engineer before delivery is started and before such material is used in the work. Representative preliminary samples of the character and quality prescribed shall be submitted by the Contractor or producer of all materials to be used in the work for testing or examination as desired by the Engineer.

All tests of materials furnished by the Contractor shall be made in accordance with commonly recognized standards of national organizations and such special methods and tests as are prescribed in these specifications.

The Contractor shall furnish such samples of materials as are requested by the Engineer without charge. No material shall be used until it has been approved by the Engineer. Samples will be secured and tested whenever necessary to determine the quality of material.

B. DEFECTIVE MATERIALS. All materials not conforming to the requirements of these specifications shall be considered as defective, and all such materials, whether in place or not, shall be rejected. They shall be removed immediately from the site of the work unless otherwise permitted by the Engineer.

Upon failure on the part of the Contractor to comply with any order of the Engineer made under the provisions of this article, the Engineer shall have the authority to remove and replace defective material and to deduct the cost of removal and replacement from any monies due or to become due the Contractor.

SECTION VI. PROSECUTION AND PROGRESS

A. PROGRESS OF THE WORK AND TIME FOR COMPLETION. The Contractor shall submit the Initial Project Submittal Package to the City Engineer for review. The Initial Project Submittal Package shall address the entire project, and shall include the Traffic Control Plan (first 20 working days at minimum), WPCP, Waste Reduction and Recycling Plan, and the full project schedule. Contractor shall not commence work in the field until Engineer has approved the Initial Project Submittal Package.

The Contractor shall not commence construction on any section of the work until such time that he/she shall have on the ground, or can furnish definite assurance to the Engineer that there will be available when required, all the materials necessary to complete the section of the work upon which construction is to begin.

The Contractor shall submit a three week look-ahead work schedule every Monday and upon the issuance of any change order that alters the contract's schedule. Engineer shall have ten (10) working days to respond to the updated work schedule, and Contractor shall abide by most recently approved schedule until a new one has been approved in writing by the Engineer.

The Contractor shall submit additions to the Traffic Control Plan ten (10) working days in advance of any work that was not covered by the Traffic Control Plan submitted in the Initial Project Submittal Package.

In order to minimize disturbances to residents and public the Contractor shall:

1. Backfill and resurface failed area locations the same working day as the start of break out.
2. Resurface planed AC areas within three (3) working days from the day the areas were planed. The streets shall be swept, repeatedly if necessary, to minimize loose material.
3. Schedule removal and reconstruction of curb, gutter, and culverts so that only one side of the street is under construction on any one day, and parking and unimpeded pedestrian passage remains available on the opposite side of the street.

B. SUBLETTING AND ASSIGNMENT. The Contractor shall give his/her personal attention to the fulfillment of the contract and shall keep the work under his/her control.

Subcontractors will not be recognized as such, and all persons engaged in the work of construction will be considered as employees of the Contractor, and their work shall be subject to the provisions of the contract and specifications.

Where a portion of the work sublet by the Contractor is not being prosecuted in a manner satisfactory to the Public Works Director, the subcontractor shall be removed immediately on the requisition of the Engineer and shall not again be employed on the work.

This contract may be assigned only on written consent of the City Council.

C. CHARACTER OF WORKER. If any subcontractor or person employed by the Contractor shall fail or refuse to carry out the directions of the Engineer or shall appear to the Engineer to be incompetent or to act in a disorderly manner, said worker shall be discharged immediately on the requisition of the Engineer and such person shall not again be employed on the work.

D. TEMPORARY SUSPENSION OF WORK. The Engineer shall have the authority to suspend the work wholly or in part for such period as he/she may deem necessary, due to unsuitable weather, or to such other conditions as are considered unfavorable for the suitable prosecution of the work, or for such time as he/she may deem necessary, due to the failure on the part of the Contractor to carry out orders given or to perform any of the provisions of the work. The Contractor shall immediately obey such orders of the Engineer and shall not resume suspended work until ordered in writing by the Engineer.

E. TIME OF COMPLETION AND LIQUIDATED DAMAGES. It is agreed by the parties to the contract that in case all the work called for under the contract is not completed before or upon the expiration of the contract's term as set forth in these specifications, damage will be sustained by the City of Alameda, and that it is and will be impracticable to determine the actual damage which the City will sustain in the event of and by reason of such delay; and it is therefore agreed that the Contractor will pay to the City of Alameda the sum of two thousand five hundred dollars ($2,500.00) per day for each and every day's delay beyond the time prescribed to complete the work; and the Contractor agrees to pay such liquidated damages as herein provided, and in case the same are not paid, agrees that the City of Alameda may deduct the amount thereof from any money due or that may become due the Contractor under the contract.

It is further agreed that in case the work called for under the contract is not finished and completed in all parts and requirements within the time specified, the City Council shall have the right to extend the time for completion or not, as may seem best to serve the interest of the City; and if it decides to extend the time limit for the completion of the contract, it shall further have the right to charge the Contractor, his heirs, assigns, or sureties, and to deduct from the final payment for the work, all or any part, as it may deem proper, of the actual cost of engineering, inspection, superintendence, and other overhead expenses which are directly chargeable to the contract, and which accrue during the period of such extensions, except that the cost of final surveys and preparation of final estimate shall not be included in such charges.

The Contractor shall not be assessed with liquidated damages nor the cost of engineering and inspection during any delay in the completion of the work caused by acts of God or of the public enemy, acts of the City, fire, floods, epidemics, quarantine restrictions, strikes, freight embargoes, and unusually severe weather or delays of subcontractors due to such causes; provided that the Contractor shall within ten (10) days from the beginning of such delay notify the Engineer in writing of the causes of delay. The Engineer shall ascertain the facts and the extent of the delay and his findings of the facts thereon shall be final and conclusive.

F. SUSPENSION OF CONTRACT. If, at any time, in the opinion of the City Council, the Contractor has failed to supply an adequate working force, or material of proper quality, or has failed in any other respect to prosecute the work with the diligence and force specified and intended in and by the terms of the contract, notice thereof in writing will be served upon him; and shall he neglect or refuse to provide means for a satisfactory compliance with the contract, as directed by the Engineer, within the time specified in such notice, the City Council in any such case shall have the power to suspend the operation of the contract. Upon receiving notice of such suspension, the Contractor shall discontinue said work, or such parts of it as the City Council may designate. Upon such suspension, the Contractor's control shall terminate, and thereupon the City Council or its duly authorized representative may take possession of all or any part of the Contractor's materials, tools, equipment and appliances upon the premises, and use the same for the purpose of completing said contract, and hire such force and buy or rent such additional machinery, tools, appliances, and equipment, and buy such additional materials and supplies at the Contractor's expense as may be necessary for the proper conduct of the work and for the completion thereof; or may employ other parties to substitute other machinery or materials, and purchase the materials contracted for, in such manner as the City Council may deem proper; or the City Council may annul and cancel the contract and relet the work or any part thereof. Any excess of cost arising therefrom over and above the contract price will be charged against the Contractor and his sureties, who will be liable therefor. In the event of such suspension, all monies due the Contractor or retained under the terms of this contract shall be forfeited to the City; but such forfeiture shall not release the Contractor or his sureties from liability for failure to fulfill the contract. The Contractor and his sureties will be credited with the amount of money so forfeited toward any excess of cost over and above the contract price, arising from the suspension of the operations of the contract and the completion of the work by the City as above provided; the Contractor will be so credited with any surplus remaining after all just claims for such completion have been paid.

In the determination of the question whether there has been any such noncompliance with the contract as to warrant the suspension or annulment thereof, the decision of the City Council shall be binding on all parties to the contract.

G. RIGHT-OF-WAY. The right-of-way sufficient for the work to be constructed will be provided by the City. The Contractor shall make his own arrangements, and pay all expenses for additional area required by him outside of the limits of right-of-way, unless otherwise provided in the special provisions. Contractor’s staging area must be approved by the Engineer.

SECTION VII. MEASUREMENTS AND PAYMENT

A. MEASUREMENTS AND PAYMENT. Payment for work done under the contract shall be made on the basis of the sums as calculated from the finally measured quantities of work done and the agreed unit and lump sum prices. Payment shall be full compensation for furnishing all labor, materials, tools and equipment and doing all the work necessary to construct the items for which payment is being made, complete in place as shown on the plans and described in the specifications.

B. EXTRA AND FORCE ACCOUNT WORK. Extra work as hereinbefore defined (Section III, Paragraph C) when ordered and accepted, shall be paid for under a written work order in accordance with the terms therein provided. Payment for extra work will be made as agreed upon in writing pursuant to an extra work order signed by both parties, or by force account.

Work performed on force account shall be paid on a time and materials basis plus ten percent (10%). For work done by a subcontractor, an additional five percent (5%) markup is allowed to reimburse the contractor for additional administration cost and no other additional payment will be made; provided, however, that the City reserves the right to furnish such materials required as it deems expedient, and the Contractor shall have no claim for profit on the cost of such materials. Such payment shall include full compensation to the Contractor for contributions made to the State as required by the provisions of the Unemployment Reserve Act, Chapter 352, Statutes of 1935, as amended; for taxes paid to the Federal Government as required by the Social Securities Act, approved August 14, 1935, as amended; for premiums paid on any other insurance of any nature which the Contractor may be required to carry or which he may elect to carry, and for additional premiums paid on faithful performance and labor and materials bonds required by reason of increase in the amount of work to be performed over and above that called for in the original contract. The price paid for labor shall include any compensation insurance paid by the Contractor.

C. PROGRESS PAYMENTS. The City shall, once each month, cause an estimate in writing to be made by the City Engineer of the total amount of work done and the acceptable materials furnished and delivered by the Contractor on the ground and not used at the time of such estimate, and the value thereof. The City of Alameda shall retain five percent (5%) of such estimated value of the work done and fifty percent (50%) of the value of the materials so estimated to have been furnished and delivered and unused, as aforesaid, as part security for the fulfillment of the contract by the Contractor, and shall monthly pay to the Contractor, while carrying on the work, the balance not retained, as aforesaid, after deducting therefrom all previous payments and all sums to be kept or retained under the provisions of the contract. No such estimate or payment shall be required to be made, when, in the judgment of the City Engineer, the work is not proceeding in accordance with the provisions of the contract, or when in his judgment, the total value of the work done since the last estimate amounts to less than Three Hundred Dollars ($300.00). No such estimate or payment shall be construed to be an acceptance of any defective work or improper materials.

Partial Payments

Progress payments shall be in accordance with Section 9-1.16 of the Standard Specifications "Progress Payments", as currently amended, and these special provisions. The City, once in each month, shall cause an estimate in writing to be made by the Engineer. The estimate shall include the total amount of work done and acceptable materials furnished, provided the acceptable materials are listed as eligible for partial payment as materials in the special provisions and are furnished and delivered by the Contractor on the ground and not used or are furnished and stored for use on the Contract, if the storage is within the City and the Contractor furnishes evidence satisfactory to the Engineer that the materials are stored subject to or under the control of the City, to the time of the estimate, and the value thereof. The estimate shall also include any amounts payable for mobilization.

The amount of any material to be considered in making an estimate will in no case exceed the amount thereof which has been reported by the Contractor to the Engineer. Only materials to be incorporated in the work will be considered. The estimated value of the material established by the Engineer will in no case exceed the Contract price for the item of work for which the material is furnished.

Contractor warrants that upon signature of pay estimate, all work has been performed in strict compliance with the Contract Documents, and all work for which progress payments have been previously issued and payment has been received from City, shall be free and clear of all third-party claims, stop notices, security interests, and encumbrances.

Payment of all, or any part, of an estimate in writing may be withheld on account of any of the following:

1. Defective work not remedied;
2. Third-party claims against Contractor or City arising from the acts or omissions of Contractor or subcontractors;
3. Stop Notices;
4. Failure of Contractor to make timely payments due to subcontractors for material or labor;
5. Damage to the City or others for which Contractor is responsible;
6. Failure of Contractor to maintain, update, and submit record documents;
7. Failure of Contractor to submit schedules or their updates as required by the Contract Documents;
8. Performance of the work by Contractor without properly processed shop drawings;
9. Liquidated damages assessed;
10. Any other failure of Contractor to perform its obligations under the Contract Documents.

SUBSTITUTION OF SECURITIES FOR WITHHELD ACCOUNTS. Pursuant to Chapter 13 (commending with Section 4590), Division 5, Title 1 of the Government Code of the State of California, securities may be substituted for any monies withheld by a public agency to ensure performance under a contract. At the request and expense of the Contractor, securities equivalent to the amount withheld shall be deposited with the public agency, or with a state or

federally chartered bank as the escrow agent, who shall pay such monies to the Contractor upon satisfactory completion of the contract.

Securities eligible for substitution under this section shall include those listed in Section 22300 of the Public Contract Code of the State of California or bank or savings and loan certificates of deposit.

Contractor shall be the beneficial owner of any securities substituted for monies withheld and shall receive any interest thereon.

Any escrow agreement entered into pursuant to this section shall 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.
3. The termination of the escrow upon completion of the contract.

D. NOTICE OF COMPLETION. Whenever the work provided and contemplated by the contract shall have been satisfactorily completed, the Engineer will make the final inspection.

When such final inspection shows that the work has been completed in conformance with the plans, specifications and special provisions, the Engineer will recommend the formal acceptance of the work by the City Council; and upon such acceptance, Notice of Completion will be recorded. The said work shall not be deemed completed until the same is accepted by the City.

E. PAYMENT OF THE RETENTION. The City Engineer shall, after the completion of the contract, total all amounts retained under the provisions of the contract. Final payment of retention shall be in conformance with Public Contract Code Section 7107.

It is mutually agreed between the parties to the contract that no certificate given or payments made under the contract, except the final certificate of final payment, shall be conclusive evidence of the performance of the contract, either wholly or in part, against any claim of the Contractor; and no payment shall be construed to be an acceptance of any defective work or improper materials.

The Contractor further agrees that the payment of the final amount due under the contract, and the adjustment and payment for any work done in accordance with any alterations of the same, shall release the City of Alameda, its officers, employees and agents from any and all claims or liability on account of work performed under the contract or any alteration thereof.

SECTION VIII. SPECIAL PROVISIONS

STANDARD SPECIFICATIONS ADOPTION. The work embraced herein shall be done in accordance with the appropriate provisions of construction detail of the specifications entitled "State of California, Department of Transportation, Standard Specifications", latest revision, insofar as the same apply, which specifications are hereinafter referred to as the Standard Specifications, and in accordance with the following Special Provisions.

Whenever in the Standard Specifications the following terms are used, they shall be understood to mean and refer to the following:

Department of Public Works or Department of Transportation	To the Engineering Division
Director of Public Works	To the Public Works Director
Engineer	To the City Engineer, acting either directly or through properly authorized agents, such agents acting within the scope of the particular duties entrusted to them.
Laboratory	To the designated Laboratory authorized by the City of Alameda to test materials and Work involved in the contract.
State	To the City of Alameda

Other terms appearing in the Standard Specifications, and these specifications, shall have the intent and meaning specified in Section I, Definition of Terms, of the Standard Specifications.

In case of conflict between the Standard Specifications and these Special Provisions, the Special Provisions shall take precedence over and be used in lieu of such conflicting portions.

In case of conflict between the Standard Specifications or Special Provisions and the “East Bay Communities Regional Standards For Sanitary Sewer System Installation, Rehabilitation and Repair”, the “East Bay Communities Regional Standards For Sanitary Sewer System Installation, Rehabilitation And Repair” shall take precedence over and be used in lieu of such conflicting portions.

SECTION IX. QUANTITIES

The following preliminary estimate of the quantities of work to be done and materials to be furnished is approximate only, and the City of Alameda does not expressly or by implication agree that the actual amount of work will correspond therewith, but reserves the right to increase or decrease the amount of any class or portion of the work or to omit portions of the work that may be deemed necessary or expedient to the Engineer.

Quantities shall be determined by the Contractor from plans and specifications. Any discrepancy or conflict shall be reported to the Project Manager. Contractor shall be held responsible for any discrepancies or conflicts not reported to the Project Manager seventy-two (72) hours prior to the bid opening.

The basis of award of contract shall be by the City of Alameda for the lowest and best bid that will best serve the City's need. The contract shall be awarded with the entire project based bid.

The City reserves the right to reject any, any portion, or all bids.

The base bid consists of one hundred four (104) bid items, as outlined below and detailed in Section XII, M, Extent of Contract. The project also includes ZERO add alternates.

TABULATION OF PRELIMINARY ESTIMATE OF QUANTITIES

	Description	Est. Qty.	Unit	Unit Price	Total Price
1	Mobilization and Demobilization	1	LS		
2	Catalina Temporary Facilities and Bypass Pumping	1	LS		
3	Catalina Demolition & Abandonment	1	LS		
4	Catalina Convert Pumps to Rail-Mounted Submersible & Accessories	2	EA		
5	Catalina Discharge Piping, Fittings, and Valves	1	LS		
6	Catalina Shoring of Open Excavations	1	LS		
7	Catalina Valve Vault	1	LS		
8	Catalina New Wetwell	1	LS		
9	Catalina Existing Wetwell Modifications	1	LS		
10	Catalina Existing Wetwell Coating	1	LS		
11	Catalina Concrete Work	1	LS		
12	Catalina Electrical Modifications, Wiring and Sensors	1	LS		
13	Catalina Site Restoration and Cleanup	1	LS		
14	Cola Ballena Temporary Facilities and Bypass Pumping	1	LS		
15	Cola Ballena Demolition & Abandonment	1	LS		
16	Cola Ballena Shoring of Open Excavations	1	LS		

17	Cola Ballena Submersible Pumps & Accessories	2	EA		
18	Cola Ballena Discharge Piping, Fittings, and Valves	1	LS		
19	Cola Ballena Existing Wetwell Modifications	1	LS		
20	Cola Ballena Existing Wetwell Coating	1	LS		
21	Cola Ballena New Wetwell	1	LS		
22	Cola Ballena Generator	1	LS		
23	Cola Ballena Electrical Control Panel	1	LS		
24	Cola Ballena Service Pedestal	1	LS		
25	Cola Ballena SCADA Pole	1	LS		
26	Cola Ballena Site Light	1	LS		
27	Cola Ballena Maintenance Cabinet	1	LS		
28	Cola Ballena New 6-inch Force Main Aerial Bridge Crossing	142	LF		
29	Cola Ballena Force Main Bridge Pipe Support	17	EA		
30	Cola Ballena Force Main Flex-Tend Fittings	3	EA		
31	Cola Ballena New 6-inch Force Main	408	LF		
32	Cola Ballena Force Main Connection with Tideway Force Main	1	LS		
33	Cola Ballena Concrete Work	1	LS		
34	Cola Ballena Miscellaneous Electrical Work, Wiring and Sensors	1	LS		
35	Cola Ballena Site Restoration and Cleanup	1	LS		
36	Grand Otis Temporary Facilities and Bypass Pumping	1	LS		
37	Grand Otis Demolition & Abandonment	1	LS		
38	Grand Otis Shoring of Open Excavations	1	LS		
39	Grand Otis Convert Pumps to Rail-Mounted Submersible & Accessories	2	EA		
40	Grand Otis Discharge Piping, Fittings, and Valves	1	LS		
41	Grand Otis Existing Wetwell Modifications	1	LS		
42	Grand Otis Existing Wetwell Coating	1	LS		
43	Grand Otis Valve Vault	1	LS		
44	Grand Otis New Wetwell	1	LS		
45	Grand Otis 8-inch Force Main	531	LF		
46	Grand Otis Concrete Work	1	LS		
47	Grand Otis Electrical Modifications, Wiring and Sensors	1	LS		
48	Grand Otis Site Restoration and Cleanup	1	LS		
49	Harbor Bay Parkway 1 Temporary Facilities and Bypass Pumping	1	LS		
50	Harbor Bay Parkway 1 Demolition & Abandonment	1	LS		
51	Harbor Bay Parkway 1 Shoring of Open Excavations	1	LS		
52	Harbor Bay Parkway 1 Submersible Pumps & Accessories	2	EA		

53	Harbor Bay Parkway 1 Discharge Piping, Fittings, and Valves	1	LS		
54	Harbor Bay Parkway 1 Valve Vault	1	LS		
55	Harbor Bay Parkway 1 New Wetwell	1	LS		
56	Harbor Bay Parkway 1 Existing Wetwell Modifications	1	LS		
57	Harbor Bay Parkway 1 Existing Wetwell Coating	1	LS		
58	Harbor Bay Parkway 1 Concrete Work	1	LS		
59	Harbor Bay Parkway 1 Pathway Modifications	1	LS		
60	Harbor Bay Parkway 1 Removable Bollard	4	EA		
61	Harbor Bay Parkway 1 Generator	1	LS		
62	Harbor Bay Parkway 1 Electrical Control Panel	1	LS		
63	Harbor Bay Parkway 1 Service Pedestal	1	LS		
64	Harbor Bay Parkway 1 Fence and Gate	1	LS		
65	Harbor Bay Parkway 1 Utility Box Replacement	1	EA		
66	Harbor Bay Parkway 1 New 8-inch Force Main	135	LF		
67	Harbor Bay Parkway 1 Miscellaneous Electrical Work, Wiring and Sensors	1	LS		
68	Harbor Bay Parkway 1 Site Restoration and Cleanup	1	LS		
69	Marina Village Temporary Facilities and Bypass Pumping	1	LS		
70	Marina Village Demolition & Abandonment	1	LS		
71	Marina Village Submersible Pumps & Accessories	3	EA		
72	Marina Village Discharge Piping, Fittings, and Valves	1	LS		
73	Marina Village Wetwell Modifications	1	LS		
74	Marina Village Wetwell Coating	1	LS		
75	Marina Village Manhole Coating	1	LS		
76	Marina Village Wetwell Hatches	1	LS		
77	Marina Village Replace Top of Existing Manhole	1	LS		
78	Marina Village Concrete Work	1	LS		
79	Marina Village Generator	1	LS		
80	Marina Village Electrical Control Panel	1	LS		
81	Marina Village Service Pedestal	1	LS		
82	Marina Village Fence and Gates	1	LS		
83	Marina Village SCADA Pole	1	LS		
84	Marina Village Site Light	1	LS		
85	Marina Village Miscellaneous Electrical Work, Wiring and Sensors	1	LS		
86	Marina Village Site Restoration and Cleanup	1	LS		
87	Park Otis Temporary Facilities and Bypass Pumping	1	LS		
88	Park Otis Demolition & Abandonment	1	LS		
89	Park Otis Shoring of Open Excavations	1	LS		
90	Park Otis Convert Pumps to Rail-Mounted Submersible & Accessories	2	EA		

91	Park Otis Dicharge Piping, Fittings, and Valves	1	LS		
92	Park Otis Existing Wetwell Modifications	1	LS		
93	Park Otis Existing Wetwell Coating	1	LS		
94	Park Otis Valve Vault	1	LS		
95	Park Otis New Wetwell	1	LS		
96	Park Otis Concrete Work	1	LS		
97	Park Otis AC Driveway	1	LS		
98	Park Otis Service Pedestal	1	LS		
99	Park Otis Electrical Modifications, Wiring and Sensors	1	LS		
100	Park Otis Site Restoration, Landscaping, and Cleanup	1	LS		
101	Paru Generator, Automatic Transfer Switch, and Electrical Work	1	LS		
102	Paru Concrete Work	1	LS		
103	Paru Fence and Gate	1	LS		
104	Paru Miscellaneous Site Work, Site Restoration, and Cleanup	1	LS		
				Total Bid	

SECTION X. MATERIALS

The Contractor shall furnish for use under these special provisions all materials required to complete the contract, except as described under Section VII of the specifications.

SECTION XI. DESCRIPTION AND LOCATION OF WORK

A. DESCRIPTION OF WORK The work to be done consists of doing all work associated with the installation of sanitary sewer mains, sewer laterals, manholes, cleanouts, street patch, WPCP, traffic control, removal and disposal of manholes, sewer lines, and all other associated work to complete the project at the locations shown on the plans.

All work is to be in conformance with the plans and specifications as required by the Engineer. The contract shall include all work necessary to make the job complete as herein specified or as shown on the plans. The contract will be awarded with Base Bid only.

B. PLANS The following drawings dated are incorporated into these Specifications:

TITLE	DRAWING NO.	CASE
GROUP 4 – SEWERAGE PUMP STATION RENOVATIONS FOR RELIABILITY AND SAFETY IMPROVEMENTS	9425	35

CITY OF ALAMEDA STANDARD PLANS:

Survey Monuments	3174	54
Detail of Reinforcing Required in Sidewalk Around Utility Boxes	6080	22
Curb Gutter Sidewalk and Driveway	6297	24

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORATATION STANDARD PLANS 2018 EDITION AND CALIFORNIA MUTCD 2014 EDITION:

TITLE	DRAWING NO.
Curbs and Driveways	A87A
Traffic Control System for Lane Closure on Multilane Conventional Highways	T11
Traffic Control System for Half Road Closure on Multilane Conventional Highways and Expressway	T12
Traffic Control System for Lane Closure on Two Lane Conventional Highways	T13
Work in Center of Road with Low Traffic Volumes	TA-15
Closure in the Center of an Intersection	TA-26

TITLE	DRAWING NO.
Closure at the Side of an Intersection	TA-27
Sidewalk Detour or Diversion	TA-28
Crosswalk Closures and Pedestrian Detours	TA-29

SECTION XII. CONSTRUCTION DETAILS

The construction details covered under this Section XII shall be Special Provisions as set forth in Section VIII.

A. MAINTAINING TRAFFIC. Attention is directed to Section 7-1.03, "Public Convenience", 7-1.04, "Public Safety", of the State of California Standard Specifications, and to Section II, Article Q of these specifications.

The Contractor shall furnish, install and maintain such facilities as barricades, traffic signs, and flagmen, as may be necessary to advise the public of construction hazards and to control traffic.

The Contractor will not be permitted to detour traffic from the work area at any time. The Contractor will be required to maintain two-way traffic at all times. Any lane closure shall be subject to the prior approval of the City Engineer.

The full width of the traveled way shall be open for use by public traffic when construction operations are not actively in progress on working days.

Prior to commencement of work, the Contractor shall provide the Engineer with sketches for approval, indicating the method of signing and necessary delineators for proposed lane closures.

The Contractor shall cooperate with local authorities relative to handling traffic through the area and shall make his own arrangement relative to keeping the work area clear of parked vehicles.

The provisions of Section 7-1.04 of the Standard Specifications, regarding State-furnished signs, are hereby revised to provide that all signs and other warning devices shall be provided by the Contractor and shall become his/her property after the completion of the contract. The Contractor shall refer to the current "Manual of Warning Signs, Lights and Devices for Use in the Performance of Work Upon Highways" and the "Uniform Sign Chart" issued by the Department of Transportation, Division of Operations.

Flagmen, if necessary, shall be properly equipped and trained in accordance with "Instructions to Flagmen", published by the California Department of Transportation. Section 12-1.04 is revised to provide that all flagmen shall be furnished by the Contractor at his/her expense.

The provisions in this section may be modified or altered if, in the opinion of the Engineer, public traffic will be better served and work expedited. Said modifications or alterations shall not be adopted until approved in writing by the Engineer.

No additional compensation will be allowed the Contractor for providing for the free

passage of traffic through the work. Construction work hours are restricted between 8:00 AM to 5:00 PM, Monday through Friday.

Whenever vehicle or equipment is parked on the shoulder within 6 feet of a traffic lane, the shoulder area shall be closed with florescent traffic cones or portable delineators placed on a taper in advance of the parked vehicle or equipment and along the edge of the pavement at 25-foot intervals to a point no less that 25 feet past the last vehicle or piece of equipment. A minimum of nine (9) cones or portable delineators shall be used for the taper. A W20-1 (Road Work Ahead) or C24 (CA) (Shoulder Work Ahead) sign shall be mounted on a telescoping flag tree with flags. The flag tree shall be placed where directed by the Engineer.

Contractor shall be responsible for posting "No Parking-Tow Away" Signs for the seventy-two (72) hours prior to construction. Contractor must obtain these signs at his/her own expense from the City's Planning and Building Office or at the Department of Public Works. No parking signs shall be posted only when work is being performed by the Contractor at the posted locations. No Parking signs shall display a date range no longer than 2 weeks at any given time. A revision in date range requires re-posting.

All vehicular, bicycle, and pedestrian traffic shall be permitted to pass through the work, unless other existing streets stipulated in the special provisions**. Contractor must comply with ADA requirements, by providing pedestrian access on the sidewalk and crosswalk during construction.**

The Contractor shall furnish, install and maintain such facilities as barricades, traffic signs, and flagmen, as may be necessary to advise the public of construction hazards and to control traffic. A traffic control plan identifying the size and location of such facilities shall be submitted to the Engineer for approval a minimum of two weeks prior to beginning construction. Any work being performed without proper signing in place shall be stopped until the unsatisfactorily condition is corrected. **Contractor shall submit to the Engineer a traffic control plan signed and stamped by a Traffic Engineer registered in the state of California for any work that will impact vehicular, bicycle, and pedestrian traffic in the area and shall be developed to show the actual field conditions and not a typical plan. The contractor must have an approved plan prior to commencing of work. All Traffic Control Plans must be in conformance with the California Manual on Uniform Traffic Control Devices (CA MUTCD) regulations and guidelines. Contractor shall submit Traffic Control Plan for approval to the Engineer at the pre-construction. Any work being performed without proper signing in place shall be stopped until the unsatisfactory condition is corrected.**

The Contractor shall place barriers at each end of all excavations and at such places along excavations as may be necessary to warn all pedestrian and vehicular traffic of excavations. Lights shall also be placed along excavations (from sunset each day to sunrise of the next day) until excavation is entirely restored. Material for backfill or for protection of excavation in public roads from surface drainage shall be neatly placed and stored in containers so as to cause the least possible interference with public travel. Free access must be maintained to all fire hydrants, water valves and meters, and private driveways.

Storage of construction material and equipment on City streets will not be permitted.

No trench or excavation shall be left open at the end of any day's work. Daily traffic control measures shall continue until cleanup activities have been satisfactorily completed and all of the Contractor's equipment has been removed from the traveled way area.

The provision of this section will not relieve the Contractor from his/her responsibility to provide such additional devices or take such measures as may be necessary to comply with the provision in Section 7-1.04, "Public Safety," of the Standard Specifications.

Contractor shall not work on multiple streets at a time unless approved by the engineer.

See Section II, Q. for traffic control guidelines. This section also outlines times construction is allowed on certain streets in the City. (Night work, if requested by the Contractor, must be approved by the City Engineer.)

B. ORDER OF WORK. Order of work shall conform to provisions of Section 10-1.02, "Work Sequencing", of the Standard Specifications and these Special Provisions.

The Contractor shall coordinate his work with all other contractors or utility companies working in the construction area.

At least three (3) working days prior to the placement of any new traffic striping and pavement markings, the Contractor shall layout cat-tracks for the traffic striping and pavement marking and contact the City inspector for inspection and approval of the cat-tracking. The City shall review, modify as necessary, and approve the cat-tracking prior to the Contractor proceeding with the striping/marking. The Contractor may not proceed with the striping/marking work until the cat-tracks have been approved by the Engineer or approved designee. The Contractor shall post temporary "No Parking" signs in accordance with the provisions of Sections 7-1.03 and 7-1.04, "PUBLIC CONVENIENCE AND PUBLIC SAFETY" of these Specifications.

Any work done without proper inspection and approval will be subject to rejection. In the case of rejection, the Contractor shall remove the rejected work, and the striping/marking work shall be reinstalled in accordance with these requirements and based on the direction of the Engineer. The City will not compensate the Contractor for any work associated with replacing striping/marking to the satisfaction of the Engineer, including but not limited to: the full removal of the rejected traffic striping and pavement marking work; the installation of new striping/marking, including blacking out any of the removed and rejected striping/marking; and the re-posting of temporary "No Parking" signs in accordance with the provisions of Sections 7-1.03 and 7-1.04, "PUBLIC CONVENIENCE AND PUBLIC SAFETY" of these Specifications. All of these costs shall be borne by the Contractor.

C. PORTLAND CEMENT CONCRETE.

All concrete with exposed surfaces, such as sidewalk, curb, gutter, local depressions, driveway and catch basins tops shall be colored by adding to the mix a proportionate amount of the best quality lampblack, such proportion to be determined by the Engineer.

The name of the Contractor and the year the work is performed shall be stamped upon both ends of each single piece of any concrete work, as called for by Section No. 22-5.3 of the Municipal Code. Contractor shall obtain a load slip from each delivery and give one copy of said slip to the Engineer at the point of deliver of the material.

All exposed surfaces shall be cured by the impervious membrane method to the satisfaction of the Engineer.

Refer to TECHNICAL SPECIFICATIONS SECTION 03300 CAST-IN-PLACE CONCRETE.

D. EQUAL AND/OR APPROVED EQUAL

Wherever the term "or equal" and/or "approved equal" are used following a trade name or the mention of any patented product in the specifications, they shall be deemed to read "or their equals in quality and utility" where two or more such trade names or patented products are mentioned. If any trade name or patented product or process is mentioned in these specifications and is not followed by any such term as "or equal", such trade name or patented product or process shall be deemed to be followed by the words "or its equal in quality and utility" or "or their equals in quality and utility" if more than one is mentioned. Trade names, proprietary products and methods are used merely as standards of quality and utility and to designate the type of material and processes desired. Materials and processes of equal quality and utility may be furnished or used so long as such substitution causes no delay to product delivery and/or installation and the Contractor has received written approval therefor by the Engineer. The Contractor shall allow 30 days for the Engineer's review of the proposed substitution. Also see Exhibit P, "Statement of Standardized equipment" required for City pump stations that shall not be substituted equipment.

E. DISPOSAL OF EXCAVATED MATERIALS. Salvable materials will be disposed of as directed by the Engineer. The Contractor shall dispose of at least 80% of the removed concrete, rock, brick, asphalt or other similar materials to an approved materials recycling location other than a landfill. The 80% shall be determined by weight of materials. All disposal and recycling weight/receipt tags shall be submitted to the Engineer. In Exhibit C is a suggested list of facilities that will accept construction and demolition waste materials. The Contractor shall submit a request and proof in writing if unable to achieve this 80% goal. Other waste materials shall be disposed of in localities outside of the City of Alameda at the discretion of the Contractor.

F. EXISTING IMPROVEMENTS. Existing fence, lawn, or other improvements within the area of the work shall be carefully removed without damage and replaced in their present location and condition upon completion of the work, in a manner satisfactory to the Engineer and the owner.

Existing lawn shall be removed only where necessary and shall be replaced if considered by the Engineer to be in good condition. Otherwise, the Contractor shall furnish four inches (4") of new loam and plant new lawn, all as approved by the Engineer. All ground surface and replaced lawn shall be left smoothly graded to the original grade.

All existing irrigation system including electric wire, pipelines, sprinkler heads, damaged as a direct or indirect result of construction activity, shall be replaced by the Contractor at his/her expense at appropriate locations in a manner satisfactory to the Engineer and the owner. Any existing improvements that are damaged or disturbed due to carelessness by the Contractor shall be replaced or adjusted to the satisfaction of the Engineer.

Existing fence or other improvements within the area of the work shall be carefully removed without damage and replaced in their present location and condition upon completion of the work, in a manner satisfactory to the Engineer and the owner.

The Contractor shall not disturb or destroy any permanent survey points and/or monuments without the written consent of the City of Alameda. Any permanent survey points and/or monuments disturbed or destroyed, as a direct or indirect result of construction activity shall be replaced to the satisfaction of the Engineer by a licensed surveyor at the Contractor's expense.

All decorative landscaping (shrubs, plants, trees, lawn, etc.) and/or hardscaped ground surfaces (exposed aggregate, bricks and mortar, painted concrete, etc.) that are removed, damaged, or destroyed as a direct or indirect result of any work done for this project shall be replaced by the contractor at his expense and in the manner that is satisfactory to the engineer and the owner.

Unless specified separately by bid items, payment for existing improvements should be included in various bid items and no additional payment will be made.

G. TREE ROOTS. Where tree roots conflict with the grade for the placement or replacement of concrete work, the Contractor shall inform the City Maintenance Division immediately. When directed by the City Maintenance Division, the Contractor shall perform the necessary root removal and trimming to a minimum depth of ten inches (10") below the proposed concrete, to prepare the site for the concrete work. All cut roots shall be properly painted with an approved root-sealing compound. The Contractor shall then proceed with the work to completion. The cost of the Contractor cutting the tree roots involved shall be included in the cost of the work.

Prior to any lateral extension excavation, the area must be reviewed by the Engineer or his representative, and if required, the City Arborist shall supervise the excavation and any root cutting or shaving where tree conflicts exist.

If root trimming is not allowed by the City Maintenance Division, all trees that could be damaged from equipment will require protection from physical injury. Tree trunks are to be wrapped with orange plastic construction fencing from the base up to the first branch. The plastic fencing must be wrapped to a minimum thickness of 2 inches to protect from possible

injury. Additional protection from larger equipment can be provided by strapping 2x4 boards over the orange fencing on the side of the tree where there is a potential for injury. When trenching is undertaken, the size of the equipment may require that upper scaffold stems are also wrapped and protected. Hand digging is the only acceptable method for excavating the soil within five feet of the base of trees.

H. UTILITY RELOCATION. The known existing utilities and pipelines except building connections (laterals) are shown on the Drawings in their approximate location. The Contractor shall exercise care in avoiding damage to all utilities, as he/she will be held responsible for their repair if damaged. There is no guarantee that all utilities or obstructions are shown, or that locations indicated are accurate. Utilities are piping, conduits, wire, cable, poles, ducts, manholes, pull boxes and the like, located at the project site.

The Contractor shall be responsible for locating all utilities, and must protect and support all utilities, which are to remain whether shown or not shown on the plans. **Full compensation for this work shall be considered as included in the prices paid for the various contract items of work, and no additional allowance will be made.**

The Contractor shall contact all affected utility owners and request them to locate their respective utilities prior to the start of "potholing" procedures. The utility owner shall be given seven days written notice prior to commencing potholing. If a utility owner is not equipped to locate its utility, the Contractor shall locate it.

The location of all affected utility underground pipes; conduits and other utilities shall be clearly marked on the pavement or with suitable markers if not on pavement. In addition to the location of metallic pipes and conduits, non-metallic pipe, ducts and conduits shall also be similarly located using surface indicators and shall then be similarly marked.

After the utility survey is completed, potholing shall commence to determine the actual location of the utilities. Prior to excavating for any new pipelines or structures, the Contractor shall locate and uncover all existing utilities to a point one foot below the utility. Pothole for all utilities where crossings, interferences, or connections to the new pipelines are shown on the Drawings, marked by the utility companies, or indicated by surface signs. The Contractor shall submit a report identifying each underground utility and its depth and station. Any variation in the actual elevations and the indicated elevations shall be brought to the Engineer's attention.

Any necessary relocations of utilities, whether shown on the Drawings or not, shall be coordinated with the affected utility. The Contractor shall perform the relocation only if instructed to do so in writing from the utility and the Engineer. Payment for work not shown on the Drawings shall be in accordance with Section VII, Article B, of these specifications or for a price previously agreed upon in writing, by the Contractor and the Engineer. If the Contractor does not expose all required utilities, he shall not be entitled to additional compensation for work necessary to avoid interferences, nor for repair to damaged utilities.

Excavations around underground electrical ducts and conduits shall be performed using extreme caution to prevent injury to workmen or damage to electrical ducts or conduits. Similar precautions shall be exercised around gas lines, telephone and television cables.

Backfill and pave with one inch of cutback after completing potholing.

If interferences occur at locations other than shown on the Drawings, the Contractor shall notify the Engineer, and a method for correcting said interferences shall be supplied by the Engineer. Payment for interferences that are not shown on the plans, nor for which there are surface indications, shall be in accordance with the provisions of the General Conditions.

Planned utility service shutdowns shall be accomplished during periods of minimum use. In some cases this may require night or weekend work, at no additional cost to the City. The Contractor shall program his work so that service will be restored in the minimum possible time, and shall cooperate with the utility companies in reducing shutdowns of utility systems to a minimum.

No utility shall be disconnected without prior written approval from the utility owner. When it is necessary to disconnect a utility, the Contractor shall give the utility owner not less than 72 hours notice when requesting written approval. The Contractor shall program his work so that service will be restored in the minimum possible time.

There are existing overhead electric and telephone transmission lines along the pipeline routes. These overhead utilities are not shown on the Drawings. Extreme caution shall be used when working in the vicinity of overhead utilities so as to prevent injury to workmen or damage to the utilities. The Contractor shall be required to comply with the applicable provisions of the California Construction Safety Orders when working anywhere on this project.

Existing gas, water, sewer and telephone house laterals are not specifically shown on the Drawings but do exist along the pipeline routes. Protect all service laterals from damage due to construction operations. If any laterals are damaged, notify the Engineer and the affected utility immediately. The cost of repair shall be borne by the Contractor.

I. EXCAVATION AND BACKFILL Method of excavation, trench shoring and dewatering, if applicable, shall be the responsibility of the Contractor, subject to the approval of the Engineer. It should be presumed that the presence of high groundwater will require dewatering operations.

Contractor shall submit to the Engineer a submittal for the trenching plan, material data sheets of any shoring equipment to be used, and calculations signed, stamped and approved by a registered California Engineer. The Contractor must have an approved plan prior to commencing of any excavation and trenching work.

Refer to the attached Geotechnical report and technical specification sections 02300 Earthwork and 02318 for Trenching Guidelines.

The Contractor shall conform to the rules and regulations pertaining to safety established by the California Division of Occupational Safety and Health of the Industrial Relations Department.

Any excavation shall be supported so that it will be safe and the ground alongside the excavation will not slide or settle, and all existing improvements, either on public or private property, will be fully protected from damage.

Any damage or collapse of pavement or improvements beyond the trench shoring or excavation limits, due to sliding, caving, or settling of ground during excavation, construction, or backfilling, or from construction equipment, shall be repaired to the satisfaction of the Engineer at the Contractor's expense. All supports shall be removed after construction is completed, unless otherwise directed by the Engineer, and shall be withdrawn in a manner that will prevent the caving of the sides of the excavation. All openings caused by the removal of supports shall be filled with suitable material properly compacted.

Approved local or imported material shall be used for backfill. When the material from the excavation is unsuitable for backfill; it shall be disposed of and a suitable material (free from large stones) and approved by the Engineer, shall be furnished by the Contractor for the backfill. Backfilling shall be accomplished by tapping or ramming with proper tools for the full depth to sub-grade elevation in six inch (6") layers or less. Relative compaction shall be ninety-five percent (95%) or more as determined by the Impact or Field Method Compaction Test. Flooding or jetting of backfill shall not be allowed.

Backfilling of trenches in pipe areas shall be accomplished by backfilling on both sides of the pipe simultaneously so that injurious side pressures do not occur. Backfilling around the pipe by bulldozer or other mechanical equipment will not be allowed.

Guidelines for site preparation, suitable backfill material, material requirements, fill placement and compaction are outlined in the Geotechnical Report.

Payment for excavation and backfill shall be included in the various bid items of these specifications. The contractor shall provide the engineer daily load tags for backfill material used.

J. SEWAGE PUMPING The Contractor shall furnish, install, and operate pumps, conduits, and other equipment to divert the flow of sewage during the project construction as described in detail in technical specifications section 01500.

K. CONTROL OF WATER All excavations shall be kept free from water and all construction shall be in the dry. The presence of high groundwater will require dewatering operations. The contractor shall furnish, install, maintain and operate all necessary pumping and other equipment for dewatering all excavations. The contractor shall at all times have on the project sufficient pumping equipment for immediate use, including standby pumps for use in case other pumps become inoperable. A sufficient number of pumps shall be provided as to hold the groundwater level at an elevation not less than two feet below the lowest elevation of the concrete or other material to be placed. Water shall be disposed of in such a manner as to cause no injury or nuisance to public or private property, or be menace to the public health.

The Contractor may obtain a wastewater discharge permit from the East Bay Municipal Utility District (EBMUD) to discharge dewatering disposal water to the City’s sewer system.

The Contractor is responsible for applying for and meeting all of the EBMUD permit requirements.

The Contractor shall remove sediment from the disposal water prior to disposing into the sewer system. The sediment removal method shall meet the requirements of the EBMUD permit (filtered with Whatman 934 AH Glass Microfiber filter, or equivalent).

The dewatering operation shall be continuous, so that the excavated areas shall be kept free from water during construction, while concrete is setting and achieves full strength, and until backfill has been placed to a sufficient height to anchor the work against possible floatation.

Dewatering shall be continued during, backfilling operations such that the groundwater is at least one foot below the level of the compaction effort at all times. No compaction of saturated clay materials shall be allowed.

Dewatering devices must be adequately filtered to prevent the removal of fines from the soil.

The Contactor shall be responsible for any damage to foundations or any other parts of existing structures or the new work caused by failure of any part of the Contractor's protective works. After temporary protective works are no longer needed for dewatering purposes, they shall be removed by the Contractor.

If pumping is required on a 24- hour basis, requiring engine drives, then engines shall be equipped in a manner to keep noise to a minimum. Refer to Section II, Article T, of these specifications for noise control requirements.

The contractor shall be responsible for furnishing temporary drainage facilities to convey and dispose of surface water falling or passing over site.

No sediment shall be pumped from the excavation. Refer to Section II, Article U, of these specifications for construction site controls.

Reference technical specifications section 02300 for additional requirements.

Payment for dewatering whether on public right-of-way and private property shall be included in the various contract items of work**.**

L. EXCAVATION OF TRENCH The ground shall be excavated in open trenches, the sides of which shall be parallel to and at equal distances on each side of the sanitary sewer centerline. **Trench shall be saw cut along straight lines with no jagged edges**. At no time shall there be more than 200 lineal feet of the trench opened along any single sanitary sewer force main route, including the section opened ahead of the pipe laying and the section behind the pipe laying which has not been completely backfilled. Open trenches will be plated during non-working hours. This is to include asphalt concrete fillets around the perimeter of plates.

The Contractor shall conform to the rules and regulations pertaining to safety established by the California Division of Occupational Safety and health of the Industrial Relations Department. **See Attachment A, "TRENCH EXCAVATION CONSTRUCTION STANDARDS".**

Except where otherwise shown on the plans or otherwise approved by the Engineer, maximum trench width shall be as follows:

For pipe size 4" use maximum trench width 28"
For pipe size 8" use maximum trench width 36"
For pipe size 10" use maximum trench width 36"

In addition, all excavation shall conform to Section XII. I., "Excavation and Backfill." Additional requirements are also included in technical specification sections 02318 and 02300.

Due to nature of soil along alignment excavation should be shored using recommended methods in Section XII, I., "Excavation & Backfill", Subsection "Excavation Stabilization & Temporary Slopes." Contractor shall conform to the rules and regulations pertaining to safety established by the California Division of Occupational Safety and Health of the Industrial Relations Department.

Contractor shall submit proposal for review and approval to the Engineer for method of sheeting and shoring.

All storm drains, water pipes, gas pipes, EBMUD sewer pipes, and conduits or other structures must be properly supported where crossing or lying along the trench.

Contractor should expect to encounter 8" concrete patch over utility crossings. The 8" patch shall be saw cut, as necessary, when trenching for the new line.

a. Trench Backfill shall be in conformance with Section XII.I. of these specifications and this Section.

b. Location wires for non-trace-able pipes. All PVC, HPDE pipe and conduits for electrical wires shall be marked with a locatable wire prior to back filling the trenches during construction so as to be easily located from the ground surface by the typical Underground alert service**.**

c. Service shall be maintained at all times. No temporary connections shall be made which are health hazard. All connections shall be made in such a manner that no rock, soil, piece of pipe, or other debris is allowed to enter the sewerage system.

When trenching, the Contractor will not be permitted to tunnel under curb and/or gutter and or sidewalk for lower lateral installation. The curb, and/or gutter, and/or sidewalk will be saw cut at the nearest score marks and then removed and disposed of off-site. Upon completion of required work, the curb and/or gutter, and/or sidewalk will be replaced per Caltrans Standard Plan A87A.

Excavation shall be supported so that it will be safe and the ground alongside the excavation will not slide or settle. All existing improvements including structures, fences, walls, and foundations will be fully protected from damage.

Any damage to the existing improvements beyond the trench shoring or excavation limits due sliding, caving, or settling of ground or backfill, or from construction equipment shall be repaired to the satisfaction of the property owner and the City Engineer.

All existing improvements including irrigation system, brick walkways, brick walls, fences, electrical wires, driveways, pipelines, sprinkler heads, and landscaping damaged as a direct or indirect result of construction activity shall be replaced by the contractor at his expense at appropriate locations in a manner satisfactory to the property owner and the City Engineer. Continuous dewatering may be required due to high groundwater. Dewatering shall be in conformance with Section XII, K "Control of Water."

Contractor shall take extra care where trees are in conflict or in close proximity to laterals. See Section XII G. TREE ROOTS.

Payment shall be shall be included in the various bid items of these specifications.

M. EXTENT OF CONTRACT. The Contractor shall furnish all labor, material has herein specified, tools and equipment necessary and shall do all the work necessary to construct and put in complete order for use the construction project contemplated by these specifications, the various items, and in the approximate quantities tabulated in the Proposal, Section XIV and described in The technical Specifications - Division I to 16 and construction drawings. See Section 01125 "Measurement and Payment" in the Technical Specifications for additional descriptions of the Bid Items, sequence of work, required submittals and shop drawings etc.

N. SIGNAGE, STRIPING AND RESTORATION OF TRAFFIC LOOPS where applicable: Traffic stripes and marking removed shall be installed in accordance to the Standard Specifications Section 84. New striping must match the preexisting striping. Thermoplastic pavement striping and marking shall conform to Section 84-2.02 and 84-2.04 of the Standard Specifications. Painted striping and marking shall conform to Section 84-3 of the Standard Specifications. Pavement marking damage or destroyed as a result of the work shall be replaced in kind in conformance with Section 85 of the Standard Specifications. **Pavement markings shall be replaced in full, partial replacement of words, symbols, limit lines and crosswalk lines will not be allowed.** Whenever the Contractor's operations obliterate pavement delineation (striping - either painted or pavement markers or both, stop bars and crosswalks), pavement delineation shall be temporarily replaced before opening the traveled way to public traffic. For lane or center lines temporary delineation shall consist of reflective traffic line tape applied in pieces not less than 4" long nor less than 4" wide, spaced no more than 12' apart on curve, nor more than 24' apart on tangents, or as required by the Engineer.

Contractor to field verify loop location and type and contact Engineer if any loops are affected.

Striping & Signage

Reflective traffic line tape shall be applied in accordance with the manufacturer's instructions. Temporary delineation shall be the same color as permanent delineation. Full compensation for temporary delineation shall be considered as included in the prices paid for the contract items of work that obliterated the existing delineation and no separate payment will be made therefore. Traffic tape shall be removed when required and disposed of as specified under Section XII, E., Disposal of Excavated Materials. Striping for all other locations within the project boundaries shall be replaced in kind across full width of roadway, as directed by the Engineer.

Layout of traffic striping and pavement markings shall be subject to approval by the Engineer prior to placement of striping/marking, in accordance with Section 10-1.02 ORDER OF WORK.

SECTION XIII. MANDATORY PRE-CONSTRUCTION MEETING SUBMITTALS

A. REQUIRED REPORTS. Contractor shall submit the following mandatory reports to the City Engineer at the pre-construction meeting:

- Construction Schedule
- Schedule of Values
- Traffic Control Plan for each site
- Pothole Plan and Schedule

The Contractor shall not proceed with construction until these reports have been approved by the City Engineer and the Contractor has received such approval in writing (included in your Notice to Proceed letter). The potholing plan and schedule must be approved by the City Engineer at least two (2) weeks before construction may proceed.

Exhibit ‘A’

BIDDER’S PROPOSAL FORM

Bidder’s Proposal

Subcontractors to be used in the Performance of this Contract (Form)

Executed Agreement to be Bound to PSA

Security For Compensation Certificate

Important Instructions

EXHIBIT "A"

SECTION XIV. BIDDER'S PROPOSAL

Specifications and Special Provisions

No. P.W. 08-17-37

Filed:

Group 4 - Sewerage Pump Station Renovations for Reliability and Safety Improvements Alameda, California

Proposal to the COUNCIL of the CITY OF ALAMEDA:

The undersigned declares that he has carefully examined the location of the proposed work and the Plans, Specifications, and Special Provisions therefore, referred to herein, and hereby proposes to furnish all labor, materials, machinery, tools and equipment required to perform the work, and to do all the said work, in accordance with said Plans, Specifications and Special Provisions for the unit prices set forth in the following schedule:

	Description	Est. Qty.	Unit	Unit Price	Total Price
1	Mobilization and Demobilization	1	LS		
2	Catalina Temporary Facilities and Bypass Pumping	1	LS		
3	Catalina Demolition & Abandonment	1	LS		
4	Catalina Convert Pumps to Rail-Mounted Submersible & Accessories	2	EA		
5	Catalina Discharge Piping, Fittings, and Valves	1	LS		
6	Catalina Shoring of Open Excavations	1	LS		
7	Catalina Valve Vault	1	LS		
8	Catalina New Wetwell	1	LS		
9	Catalina Existing Wetwell Modifications	1	LS		
10	Catalina Existing Wetwell Coating	1	LS		
11	Catalina Concrete Work	1	LS		
12	Catalina Electrical Modifications, Wiring and Sensors	1	LS		
13	Catalina Site Restoration and Cleanup	1	LS		
14	Cola Ballena Temporary Facilities and Bypass Pumping	1	LS		
15	Cola Ballena Demolition & Abandonment	1	LS		
16	Cola Ballena Shoring of Open Excavations	1	LS		

17	Cola Ballena Submersible Pumps & Accessories	2	EA		
18	Cola Ballena Discharge Piping, Fittings, and Valves	1	LS		
19	Cola Ballena Existing Wetwell Modifications	1	LS		
20	Cola Ballena Existing Wetwell Coating	1	LS		
21	Cola Ballena New Wetwell	1	LS		
22	Cola Ballena Generator	1	LS		
23	Cola Ballena Electrical Control Panel	1	LS		
24	Cola Ballena Service Pedestal	1	LS		
25	Cola Ballena SCADA Pole	1	LS		
26	Cola Ballena Site Light	1	LS		
27	Cola Ballena Maintenance Cabinet	1	LS		
28	Cola Ballena New 6-inch Force Main Aerial Bridge Crossing	142	LF		
29	Cola Ballena Force Main Bridge Pipe Support	17	EA		
30	Cola Ballena Force Main Flex-Tend Fittings	3	EA		
31	Cola Ballena New 6-inch Force Main	408	LF		
32	Cola Ballena Force Main Connection with Tideway Force Main	1	LS		
33	Cola Ballena Concrete Work	1	LS		
34	Cola Ballena Miscellaneous Electrical Work, Wiring and Sensors	1	LS		
35	Cola Ballena Site Restoration and Cleanup	1	LS		
36	Grand Otis Temporary Facilities and Bypass Pumping	1	LS		
37	Grand Otis Demolition & Abandonment	1	LS		
38	Grand Otis Shoring of Open Excavations	1	LS		
39	Grand Otis Convert Pumps to Rail-Mounted Submersible & Accessories	2	EA		
40	Grand Otis Discharge Piping, Fittings, and Valves	1	LS		
41	Grand Otis Existing Wetwell Modifications	1	LS		
42	Grand Otis Existing Wetwell Coating	1	LS		
43	Grand Otis Valve Vault	1	LS		
44	Grand Otis New Wetwell	1	LS		
45	Grand Otis 8-inch Force Main	531	LF		
46	Grand Otis Concrete Work	1	LS		
47	Grand Otis Electrical Modifications, Wiring and Sensors	1	LS		
48	Grand Otis Site Restoration and Cleanup	1	LS		
49	Harbor Bay Parkway 1 Temporary Facilities and Bypass Pumping	1	LS		
50	Harbor Bay Parkway 1 Demolition & Abandonment	1	LS		
51	Harbor Bay Parkway 1 Shoring of Open Excavations	1	LS		
52	Harbor Bay Parkway 1 Submersible Pumps & Accessories	2	EA		
53	Harbor Bay Parkway 1 Discharge Piping, Fittings, and Valves	1	LS		
54	Harbor Bay Parkway 1 Valve Vault	1	LS		

55	Harbor Bay Parkway 1 New Wetwell	1	LS		
56	Harbor Bay Parkway 1 Existing Wetwell Modifications	1	LS		
57	Harbor Bay Parkway 1 Existing Wetwell Coating	1	LS		
58	Harbor Bay Parkway 1 Concrete Work	1	LS		
59	Harbor Bay Parkway 1 Pathway Modifications	1	LS		
60	Harbor Bay Parkway 1 Removable Bollard	4	EA		
61	Harbor Bay Parkway 1 Generator	1	LS		
62	Harbor Bay Parkway 1 Electrical Control Panel	1	LS		
63	Harbor Bay Parkway 1 Service Pedestal	1	LS		
64	Harbor Bay Parkway 1 Fence and Gate	1	LS		
65	Harbor Bay Parkway 1 Utility Box Replacement	1	EA		
66	Harbor Bay Parkway 1 New 8-inch Force Main	135	LF		
67	Harbor Bay Parkway 1 Miscellaneous Electrical Work, Wiring and Sensors	1	LS		
68	Harbor Bay Parkway 1 Site Restoration and Cleanup	1	LS		
69	Marina Village Temporary Facilities and Bypass Pumping	1	LS		
70	Marina Village Demolition & Abandonment	1	LS		
71	Marina Village Submersible Pumps & Accessories	3	EA		
72	Marina Village Discharge Piping, Fittings, and Valves	1	LS		
73	Marina Village Wetwell Modifications	1	LS		
74	Marina Village Wetwell Coating	1	LS		
75	Marina Village Manhole Coating	1	LS		
76	Marina Village Wetwell Hatches	1	LS		
77	Marina Village Replace Top of Existing Manhole	1	LS		
78	Marina Village Concrete Work	1	LS		
79	Marina Village Generator	1	LS		
80	Marina Village Electrical Control Panel	1	LS		
81	Marina Village Service Pedestal	1	LS		
82	Marina Village Fence and Gates	1	LS		
83	Marina Village SCADA Pole	1	LS		
84	Marina Village Site Light	1	LS		
85	Marina Village Miscellaneous Electrical Work, Wiring and Sensors	1	LS		
86	Marina Village Site Restoration and Cleanup	1	LS		
87	Park Otis Temporary Facilities and Bypass Pumping	1	LS		
88	Park Otis Demolition & Abandonment	1	LS		
89	Park Otis Shoring of Open Excavations	1	LS		
90	Park Otis Convert Pumps to Rail-Mounted Submersible & Accessories	2	EA		
91	Park Otis Dicharge Piping, Fittings, and Valves	1	LS		
92	Park Otis Existing Wetwell Modifications	1	LS		
93	Park Otis Existing Wetwell Coating	1	LS		
94	Park Otis Valve Vault	1	LS		
95	Park Otis New Wetwell	1	LS		

96	Park Otis Concrete Work	1	LS		
97	Park Otis AC Driveway	1	LS		
98	Park Otis Service Pedestal	1	LS		
99	Park Otis Electrical Modifications, Wiring and Sensors	1	LS		
100	Park Otis Site Restoration, Landscaping, and Cleanup	1	LS		
101	Paru Generator, Automatic Transfer Switch, and Electrical Work	1	LS		
102	Paru Concrete Work	1	LS		
103	Paru Fence and Gate	1	LS		
104	Paru Miscellaneous Site Work, Site Restoration, and Cleanup	1	LS		
				Total Bid	

Amount of Time Required to Commence
Work After Receipt of Work Order: **10** **Days**

The undersigned agrees to execute the contract required in said Specifications, to the satisfaction of the Council of the City of Alameda, with the necessary bonds, if any be required, within ten days, not including Sundays or legal holidays, after receiving notice that the contract has been awarded and is ready for signature; and further agrees that, in case of his default in any of the foregoing provisions, the proceeds of any check which may accompany his bid in lieu of a bid bond shall become the property of the City of Alameda as agreed and liquidated damages.

Firm Name (Please Print) _____

Signature of Person on Behalf of Firm _____

Business Address _____

_____

Dated: _____ Zip Code _____

Name Title Address

(Of Officers or Partners)

_____

_____

_____

_____

_____

_____

_____

_____

Incorporated under the laws of the State of _____

Contractor's License No. _____ Expiration Date: _____

Department of Industrial Relations (DIR) No.: _____

The signature above certifies that the foregoing information given on this document is true and correct under penalty of perjury. (Section 7028.15 California Business and Professionals Code.)

PROPOSED SUBCONTRACTOR FORM

The Bidder shall list the name, address, license number and Department of Industrial Relations number of each subcontractor to whom the Bidder proposes to subcontract portions of the work, as required by the provisions in Section 2-1.054, "Required Listing of Proposed Subcontractors," of the Standard Specifications and Section 2-1.01, "General," for the special provisions.

COMPANY NAME	CA LICENSE NO.	BUSINESS ADDRESS	DESCRIPTION OF WORK	DIR NO.

(This form may be duplicated if necessary to list additional subcontractors)

LIST OF PAST PROJECTS

The bidder must demonstrate a knowledge of public construction techniques and must possess a working ability to perform similarly-sized construction work for a public agency. The City expressly reserves the right to reject the bid of any bidder who has failed to complete three (3) **similar projects which included full rehabilitation or new construction of a sanitary sewer pump station with a capacity greater than 300 gallons/minute** in a timely fashion or in a satisfactory manner. The following are the names, addresses, phone numbers and contact person for three public agencies for which BIDDER has performed similar work within the past three (3) years: **FAILURE TO FURNISH SUCH INFORMATION (*IN THE COMPLETE FORMAT REQUIRED*) MAY CAUSE YOUR BID TO BE REJECTED AS NON-RESPONSIVE**.

PROJECT #1:

AGENCY: _____

ADDRESS: _____

CONTACT PERSON: _____

PHONE: _____ EMAIL: _____

SCOPE OF WORK, PUMP STATION CAPACITY, AND DOLLAR AMOUNT: _____

_____

PROJECT #2:

AGENCY: _____

ADDRESS: _____

CONTACT PERSON: _____

PHONE: _____ EMAIL: _____

SCOPE OF WORK, PUMP STATION CAPACITY, AND DOLLAR AMOUNT: _____

_____

PROJECT #3:

AGENCY: _____

ADDRESS: _____

CONTACT PERSON: _____

PHONE: _____ EMAIL: _____

SCOPE OF WORK, PUMP STATION CAPACITY, AND DOLLAR AMOUNT: _____

_____

The bidder's execution on the signature portion of this proposal shall also constitute an endorsement and execution of those certifications which are a part of this proposal)

EQUAL EMPLOYMENT OPPORTUNITY CERTIFICATION

The bidder _____, proposed subcontractor , hereby certified that he has ___, has not ___, participated in a previous contract or subcontract subject to the equal opportunity clauses, as required by Executive Orders 10925, 11114, or 11246, and that, where required, he has filed with the Joint Reporting Committee, the Director of the Office of Federal Contract Compliance, a Federal Government contracting or administering agency, or the former President's Committee on Equal Employment Opportunity, all report due under the applicable filling requirements.

NOTE: The above certification is required by the Equal Employment Opportunity Regulations of the Secretary of Labor (41 CFR 60-1.7(b)(1)), and must be submitted by bidders and proposed subcontractors only in connection with contracts and subcontracts which are subject to the equal opportunity clause. Contracts and subcontracts which are exempt from the equal opportunity clause are set forth in 41 CFR 60-1.5. (Generally only contracts or subcontracts of $10,000 or under are exempt.)

Currently, Standard Form 100 (EEO-1) is the only report required by the Executive Orders or their implementing regulations.

Proposed prime contractors and subcontractors who have participated in a previous contract or subcontract subject to the Executive Orders and have not filed the required reports should note that 41 CFR 60-1.7(b)(1) prevents the award of contracts and subcontracts unless such contractor submits a report covering the delinquent period or such other period specified by the Federal Highway Administration or by the Director, Office of Federal Contract Compliance, U.S. Department of Labor.

AGREEMENT TO BE BOUND TO PSA

PROJECT STABILIZATION AGREEMENT FOR THE CITY OF ALAMEDA AGREEMENT TO BE BOUND

The undersigned party confirms that it agrees and assents to comply with and to be bound by the City of Alameda

Project Stabilization Agreement as such Agreement may, from time to time, be amended by the parties or interpreted pursuant to its terms.

By executing this Agreement To Be Bound, the undersigned party subscribes to, adopts and agrees to be bound by the written terms of the legally established trust agreements, as set forth in section 17, specifying the detailed basis upon which contributions are to be made into, and benefits made out of, such Trust Fund(s) and ratifies and accepts the trustees appointed by the parties to such Trust Fund(s) and agrees to execute a separate Subscription Agreement(s) for Trust Funds when such Trust Fund(s) require(s) such document(s).

Such assent and obligation to comply with and to be bound by this Agreement shall extend to all work covered by said Agreement undertaken by the undersigned party. The undersigned party shall require all of its subcontractors, of whatever tier, to become similarly bound for all their work within the scope of this Agreement by signing an identical Agreement To Be Bound.

This letter shall constitute a subscription agreement, to the extent of the terms of the letter.

Dated: _____ Project: _____

Signature of Authorized Officer	Authorized Officer & Title
Name of Contractor/Employer(s)	Contractor/Employer(s) Address
CSLB #	Area Code Phone
E-mail and/or Fax	Motor Carrier (CA) Permit Number
DIR Prevailing Wage Registration #	

SECURITY FOR COMPENSATION CERTIFICATE

(Required by Paragraph 1861, California Labor Code)

To: _____

_____

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

_____

_____

_____

(Signature of Bidder)

_____

_____

Business Address

IMPORTANT INSTRUCTIONS

l. Any erasure or interlineation may invalidate bid.

2. If corporation is bidder, affix seal of corporation.

3. If bidder is:

(a) An individual doing business under his own name, sign his own name only.

(b) An individual using a firm name, sign: Example, "John Doe, an individual doing business as Blank Company."

(c) A co-partnership, sign: Example, "Blank Company, by John Doe, President" (or other title).

4. If a firm or co-partnership, give the names of all individual co-partners composing the firm. If a corporation, state legal name of corporation; also name of president, secretary and treasurer thereof.

5. If a bid is sent by mail, write the word "Proposal" plainly on the envelope.

Exhibit 'B'

CERTIFIED PAYROLL AND PREVAILING WAGES FORMS

Contractor's Certification Concerning Labor Standards and Prevailing Wage Requirements

Subcontractor's Certification Concerning Labor Standards and Prevailing Wage Requirements

Certification of Bidder Regarding Section 3 and Segregated Facilities

Certification of Proposed Subcontractor Regarding Section 3 and Segregated Facilities

Certification of Understanding and Authorization

Certification For Applicable Fringe Benefit Payments

Authorization For Deductions

Employee Questionnaire

EXHIBIT B: Certified Payroll Forms

CITY OF ALAMEDA PUBLIC WORKS DEPARTMENT CONTRACTOR'S CERTIFICATION CONCERNING LABOR STANDARDS AND PREVAILING WAGE REQUIREMENTS	
(Appropriate Recipient):	DATE
c/o	PROJECT NUMBER (if any)
	PROJECT NAME

1. The undersigned, having executed a contract with _____

_____ for the construction of the above-identified project acknowledges that:

(a) The Labor Standards provisions are included in the aforesaid contract;

(b) Correction of any infractions of the aforesaid conditions, including infractions any of his subcontractors and Any lower tier subcontractor, is his responsibility.

2. He certifies that:

(a) Neither he nor any firm, partnership or association in which he has substantial interest is designated as an ineligible contractor by the Comptroller General of the United States pursuant to Section 5.6(b) of the Regulations of the Secretary Labor, part 5 (29 CFR, Part 5) or pursuant to Section 3(a) of the Davis-Bacon Act as amended (40 U.S.C. 276u-2(a)).

(b) No part of the aforementioned contract has been or will be subcontracted to any subcontractor if such subcontractor or any firm, corporation, partnership or association in which such subcontractor has a substantial interest is designated an ineligible contractor pursuant to any of the aforementioned regulatory or statutory provisions.

He agrees to obtain and forward to the aforementioned recipient within ten days after the execution of any subcontract, including those executed by his subcontractors and any lower tier subcontractors, a Subcontractor's Certification Concerning Labor Standards at Prevailing Wage Requirements executed by the subcontractors.

He certified that:

(a) The legal name and the business address of the undersigned are:

(b) The undersigned is:

(1) A SINGLE PROPRIETORSHIP (3) A CORPORATION ORGANIZED IN THE STATE OF

(2) A PARTNERSHIP (4) OTHER ORGANIZATION (Describe)

(c) The name, title and address of the owner, partners or officers of the undersigned are:

NAME	TITLE	ADDRESS

EXHIBIT B: Certified Payroll Forms

(d) The names and address of all other persons, both natural and corporate, having a substantial interest in the undersigned, and the nature of the interest are (if none, so state):

NAME	TITLE	ADDRESS

(e) The names, address and trade classification of all other building construction contractors in which the undersigned, has a substantial interest are (if none, so state):

NAME	TITLE	ADDRESS

3. He certifies:

(a) The company's Federal Tax Identification Number is: _____

(b) The ethnicity of the company's owner(s) is/are: _____

(c) Is the company a female owned business: _____ Yes _____ No

Date _____ _____
(Contractor)

By _____
(Signature)

WARNING

U.S. Criminal Code, Section 1010, Title 18, U.S. C. Provides in part "Whoever .....makes, passes, utters, or publishes any statement, knowing the same to be false .....shall be fined not more than $5,000 or imprisoned not more than two years or both."

EXHIBIT B: Certified Payroll Forms

CITY OF ALAMEDA
PUBLIC WORKS DEPARTMENT
SUBCONTRACTOR'S CERTIFICATION
CONCERNING LABOR STANDARDS AND PREVAILING WAGE REQUIREMENTS

(Appropriate Recipient):	DATE
c/o	PROJECT NUMBER (if any)
	PROJECT NAME

1. The undersigned, having executed a contract with _____

_____ for _____

in the amount of $_____ In the construction of the above-identified project, certifies that:

(a) The Labor Standards provisions of the contract for construction are included in the aforesaid contract;

(b) Neither he nor any firm, partnership or association in which he has substantial interest is designated as an ineligible contractor by the Comptroller General of the United States pursuant to Section 5.6(b) of the Regulations of the Secretary Labor, part 5 (29 CFR, Part 5) or pursuant to Section 3(a) of the Davis-Bacon Act as amended (40 U.S.C.. 276u-2(a)).

(b) No part of the aforementioned contract has been or will be subcontracted to any subcontractor if such subcontractor or any firm, corporation, partnership or association in which such subcontractor has a substantial interest is designated an ineligible contractor pursuant to any of the aforementioned regulatory or statutory provisions.

2. He agrees to obtain and forward to the aforementioned recipient within ten days after the execution of any subcontract, including those executed by his subcontractors and any lower tier subcontractors, a Subcontractor's Certification Concerning Labor Standards at Prevailing Wage Requirements executed by the subcontractors.

(a) The workmen will report for duty on or about _____(date).

3. He certifies that:

(a) The legal name and the business address of the undersigned are:

(b) The undersigned is:

(1) A SINGLE PROPRIETORSHIP (3) A CORPORATION ORGANIZED IN THE STATE OF

(2) A PARTNERSHIP (4) OTHER ORGANIZATION (Describe)

(c) The name, title and address of the owner, partners or officers of the undersigned are:

NAME		ADDRESS

EXHIBIT B: Certified Payroll Forms

(d) The names and address of all other persons, both natural and corporate, having a substantial interest in the undersigned, and the nature of the interest are (if none, so state):		
NAME	TITLE	ADDRESS
(e) The names, address and trade classification of all other building construction contractors in which the undersigned, has a substantial interest are (if none, so state):		
NAME	TITLE	ADDRESS

3. He certifies:
(a) The company's Federal Tax Identification Number is: _____
(b) The ethnicity of the company's owner(s) is/are: _____
(c) Is the company a female owned business: _____ Yes _____ No

Date: _____ _____

(Contractor)

By _____

(Signature)

WARNING

U.S. Criminal Code, Section 1010, Title 18, U.S. C. Provides in part "Whoever .....makes, passes, utters, or publishes any statement, knowing the same to be false .....shall be fined not more than $5,000 or imprisoned not more than two years or both."

EXHIBIT B: Certified Payroll Forms

CERTIFICATION OF BIDDER REGARDING SECTION 3
AND SEGREGATED FACILITIES

Name of Prime Contractor | Project Name and Number

The undersigned hereby certified that:

(a) Section 3 provisions are included in the Contract.

(b) A written Section 3 plan was prepared and submitted as part of the bid proceedings (if bid equals or exceeds $10,000).

(c) No segregated facilities will be maintained.

Name
Name and Title of Signer (Print or Type)

Signature | Date

EXHIBIT B: Certified Payroll Forms

CERTIFICATION OF PROPOSED SUBCONTRACTOR REGARDING
SECTION 3 AND SEGREGATED FACILITIES

Name of Subcontractor	Project Name and Number

The undersigned hereby certified that:

(a) Section 3 provisions are included in the Contract.

(b) A written Section 3 plan was prepared and submitted as part of the bid proceedings (if bid equals or exceeds $10,000).

(c) No segregated facilities will be maintained, as required by Title VI of the Civil Right Act of 1964.

Name
Name and Title of Signer (Print or Type)

Signature	Date

EXHIBIT B: Certified Payroll Forms

CERTIFICATION OF UNDERSTANDING AND AUTHORIZATION

Project Name: _____

Project Number: _____

This is to certify that the principals, and the authorized payroll officer, below, have read and understand the Minutes of the Preconstruction Conference and the labor standards clauses pertaining to the subject project.

The following person(s) is designated as the payroll officer for the undersigned and is authorized to sign the Statement of Compliance which will accompany our weekly certified payroll reports for this project:

_____
Designated Payroll Officer (Name)

_____
Designated Payroll Officer (Signature)

_____
Authorized by (Contractor/Subcontractor)

_____
(Signature)

_____
(Title)

_____
(IRS) Employer Identification Number

_____
(Date)

EXHIBIT B: Certified Payroll Forms
CERTIFICATION FOR APPLICABLE FRINGE BENEFIT PAYMENTS

Project Name: _____
Project Number: _____

Classification/ Fringe Benefits Provided	Name, Address and Telephone Number of Plan/Fund/Program
1. _____ Health and Welfare	_____
_____ Pension	_____
_____ Vacation	_____
_____ Apprenticeship/Training	_____
2. _____ Health and Welfare	_____
_____ Pension	_____
_____ Vacation	_____
_____ Apprenticeship/Training	_____
3. _____ Health and Welfare	_____
_____ Pension	_____
_____ Vacation	_____
_____ Apprenticeship/Training	_____

OR: (Check if applicable)

_____ I certify that I do not make payments to approved fringe benefit plans, funds or programs.

_____ By _____
Contractor/Subcontractor Signature

_____ _____
Date Title

EXHIBIT B: Certified Payroll Forms

AUTHORIZATION FOR DEDUCTIONS

The undersigned authorized deductions, as noted, to be made from their wages. It is understood that these deductions: (a) are in the interest of the employee; (b) is not a condition of employment; (c) there is no direct or indirect financial benefit accruing to the employee; and; (d) it is not otherwise forbidden by law.

Employee's Name	Employee's Signature	Date	Deduction

_____

Signature of Authorized Representative of Employee

_____

Authorized Representative's Name and Title

_____

Date

EXHIBIT C

LIST OF PROCESSORS BY MATERIAL

List of Processors by Material

EXHIBIT "C"

LIST OF PROCESSORS BY MATERIAL

This guide is a listing of facilities/processors that accept construction and demolition waste materials. This is not a complete and comprehensive list; it is intended to be a quick reference guide to assist contractors and the general public recycle their construction and demolition debris.

Please call each facility for accepted materials, hours of operation, and the terms and conditions prior to delivering your materials.

ASPHALT & CONCRETE

AMAN ENVIRONMENTAL CONSTRUCTION (510) 553-0110
8300 Baldwin Street, Oakland
. Clean asphalt
. Clean concrete

CALMAT (925) 485-1279
501 El Charo Road, Pleasanton
. Clean asphalt
. Clean concrete

COUNTY QUARRY PRODUCTS, INC. (510) 682-0707
5501 Imhoff Drive, Martinez
. Clean asphalt
. Clean concrete
. Concrete with rebar
. Concrete roofing
. Tiles, gravel, porcelain

CURTNER QUARRY (510) 793-8861
2000 Scott Creek Road, Milpitas
. Clean concrete
. Clean asphalt (broken or grindings)
. Concrete roofing
. Tiles, gravel, porcelain

DAVIS STREET TRANSFER STATION (510) 638-2303
2615 Davis Street, San Leandro

DORN RECYCLERS (925) 449-9328
Livermore
(May pickup: large quantities)

DUTRA MATERIALS (510) 887-8070
4001 West Winton Avenue, Hayward
. Clean asphalt
. Clean concrete
. Concrete with rebar
. Concrete roofing
. Tiles, gravel, porcelain

LA VISTA QUARRY (510) 538-5085
28814 Mission Boulevard, Hayward
. Clean asphalt
. Clean concrete
. Concrete with rebar
. Concrete roofing
. Tiles, gravel, porcelain

RAISCH PRODUCTS (408) 227-9222
2122 Old Calaveras Road, Milpitas
. Clean asphalt
. Clean concrete
. Concrete with rebar
. Concrete roofing
. Tiles, gravel, porcelain

RAISCH PRODUCTS (408) 734-4245
1444 Borregas Avenue
. Clean asphalt
. Clean concrete
. Concrete with rebar
. Concrete roofing
. Tiles, gravel, porcelain

RAISCH PRODUCTS (510) 623-5870
7010 Auto Mall Parkway, Fremont
. Clean asphalt
. Clean concrete
. Concrete with rebar
. Concrete roofing
. Tiles, gravel, porcelain

RAISCH PRODUCTS (408) 227-9222
55 Hillsdale Avenue, San Jose
. Clean asphalt
. Clean concrete
. Concrete with rebar
. Concrete roofing
. Tiles, gravel, porcelain

RECYCLED BUILDING MATERIALS- WHOLE HOUSE SALVAGE (650) 856-0634
. Cinder blocks
. Roofing tiles

SPECIALTY CRUSHING (510) 986-0964
Oakland
. Clean asphalt
. Clean concrete
. Cinder blocks

SRDC, Inc. (415) 367-7324
195 Seaport Boulevard, Redwood City
. Clean asphalt
. Clean concrete

SYAR INDUSTRIES, INC. (510) 215-1114
Foot of Parr Boulevard, Richmond
. Clean asphalt
. Clean concrete

THE REUSE PEOPLE (510) 567-8525
2615 Davis Street, San Leandro
. Reuse/free drop-off;
. Useable, whole cinder blocks
. Roofing tile

VASCO ROAD LANDFILL & RECYCLING DROPOFF (925) 447-0491
4001 North Vasco Road, Livermore
. Clean asphalt
. Clean concrete

WRT WASTE MANAGEMENT (415) 822-2175
895 Egbert Avenue, San Francisco
. May pickup; asphalt, concrete

ZANKER RESOURCE MANAGEMENT (408) 263-2383

705 Los Esteros Way, San Jose

. Clean asphalt
. Clean concrete
. Concrete with rebar
. Concrete roofing
. Tiles, gravel, porcelain

Recycled materials, if deemed acceptable, by the Engineer, for the requirements of these specifications will be considered for building materials. Contractor shall submit a request in writing for the Engineer's use. The written request shall include all specification information required by the Engineer that provides him/her assurance that the proposed materials are an equal or better to those specified herein.

For further information regarding materials and vendors, Contractor may call Waste Management at (510) 747-7960.

Exhibit 'D'

SAMPLE CONTRACT AGREEMENT/ ADDITIONAL INSURED CERTIFICATE

Sample of Contract Agreement

Additional Insured Certificates

CONTRACTOR AGREEMENT

THIS AGREEMENT ("**Agreement**") is entered into this _____ day of _____ 2020, by and between the CITY OF ALAMEDA, a municipal corporation (the "**City**"), and COMPANY, a (California corporation, partnership, sole proprietor, individual) whose address is Address, **(**"**Contractor**"), in reference to the following:

RECITALS:

A. The City of Alameda is a municipal corporation duly organized and validly existing under the laws of the State of California with the power to carry on its business as it is now being conducted under the statutes of the State of California and the Charter of the City.

B. The City is in need of the following services: Group 4 – Sewerage Pump Station Renovations for Reliability and Safety Improvements. City staff issued Specifications and Plans on December 12, 2019, after a submittal period of twenty five days received _____ of timely submitted bids, and the bids were opened on January 16, 2020. Staff reviewed the bids and selected the lowest responsive and responsible bidder.

C. Contractor possesses the skill, experience, ability, background, certification and knowledge to provide the services described in this Agreement on the terms and conditions described herein.

D. City and Contractor desire to enter into an agreement for Group 4 – Sewerage Pump Station Renovations for Reliability and Safety Improvements, upon the terms and conditions herein.

NOW, THEREFORE, it is mutually agreed by and between the undersigned parties as follows:

1. TERM:

The Contractor shall have two hundred eighty (280) consecutive working days from the date the work is to commence pursuant to the Notice to Proceed to complete the work.

This Agreement may be mutually extended on a year-by-year basis, for up to four (4) additional years, at the sole discretion of the Public Works Director, based, at a minimum, upon satisfactory performance of all aspects of this Agreement. The Public Works Director may submit written notice that the Agreement is to be extended at the same terms and compensation as the existing Agreement and the compensation adjusted by the Construction Cost Index for the San Francisco Bay Area as reported in the Engineering News Record for the previous calendar year for the trade(s) associated with the services or tasks.

2. SERVICES TO BE PERFORMED:

Contractor agrees, at its own cost and expense, to furnish all labor, tools, equipment, materials, except as otherwise specified, and to do all work strictly in accordance with Specifications, Special Provisions and Plans, which Specifications, Special Provisions and Plans

are hereby referred to and expressly made a part hereof with the same force and effect as if the same were fully incorporated herein. The Contractor acknowledges that the work plan included in Exhibit "A" is tentative and does not commit the City to request Contractor to perform all tasks included therein.

3. COMPENSATION TO CONTRACTOR:

Contractor shall be compensated for services performed pursuant to this Agreement in the amount and manner set forth in Contractor's bid, which is attached hereto as Exhibit "A" and incorporated herein by this reference. Payment will be made in the same manner that claims of a like character are paid by the City, with checks drawn on the treasury of said City, with checks drawn on the treasury of said City, to be taken from CIP _____.

Payment will be made by the City in the following manner: On the first day of each month, Contractor shall submit a written estimate of the total amount of work done the previous month. However, the City reserves the right to adjust budget within and between tasks. Pricing and accounting of charges are to be according to the bid packet pricing, unless mutually agreed to in writing.

Payment shall be made for 95% of the value of the work completed as determined by the City. The City shall retain 5% of the value of the work as partial security for the completion of the work by Contractor. Retained amounts shall be paid to Contractor within sixty days of acceptance by the City of the project. Payment shall not be construed as acceptance of defective work. No interest will be paid to Contractor on retained funds.

Total compensation for work is $_____, with a _____ percent contingency in the amount of $_____ for a total not to exceed of $_____. Use of contingency shall be for items of work outside the original scope and requires prior written authorization by the City.

Prompt Payment Of Withheld Funds To Subcontractors: The City shall hold retainage from the prime contractor and shall make prompt and regular incremental acceptances of portions, as determined by the City of the contract work and pay retainage to the prime contractor based on these acceptances. The prime contractor or subcontractor shall return all monies withheld in retention from all subcontractors within 30 days after receiving payment for work satisfactorily completed and accepted including incremental acceptances of portions of the contract work by the City. Any delay or postponement of payment may take place only for good cause and with the City's prior written approval. Any violation of these provisions shall subject the violating prime contractor to the penalties, sanctions, and other remedies specified in Section 7108.5 of the California Business Professions Code. This requirement shall not be construed to limit or impair any contractual, administrative, or judicial remedies otherwise, available to the prime contractor or subcontractor in the event of a dispute involving late payment, or nonpayment by the contractor, or deficient subcontractor's performance, or noncompliance by a subcontractor, including but not limited to remedies under California Public Contract Code Section 9204. This clause applies to both DBE and non-DBE subcontractors.

4. TIME IS OF THE ESSENCE:

Contractor and the City agree that time is of the essence regarding the performance of this Agreement.

It is agreed by the parties to the Agreement that in case all the work called for under the Agreement is not completed before or upon the expiration of the time limit as set forth in paragraph 1 above, damage will be sustained by the City, and that it is and will be impracticable to determine the actual damage which the City will sustain in the event of and by reason of such delay. It is therefore agreed that the Contractor will pay to the City the sum of one thousand dollars ($1,000) per day for each and every day's delay beyond the time prescribed to complete the work; and the Contractor agrees to pay such liquidated damages as herein provided, and in case the same are not paid, agrees that the City may deduct the amount thereof from any money due or that may become due the Contractor under the Agreement.

It is further agreed that in case the work called for under the Agreement is not finished and completed in all parts and requirements within the time specified, the City shall have the right to extend the time for completion or not, as may seem best to serve the interest of the City; and if the City decides to extend the time limit for the completion of the Agreement, it shall further have the right to charge the Contractor, his or her heirs, assigns, or sureties, and to deduct from the final payment for the work, all or any part, as it may deem proper, of the actual costs and overhead expenses which are directly chargeable to the Agreement, and which accrue during the period of such extensions.

The Contractor shall not be assessed with liquidated damages during any delay in the completion of the work caused by an act of God or of the public enemy, acts of the City, fire, flood, epidemic, quarantine restriction, strikes, freight embargoes, and unusually severe weather or delays of subcontractors due to such causes; provided that the Contractor shall, within one (1) day from the beginning of such delay, notify the City in writing of the causes of delay. The City shall ascertain the facts in good faith and the extent of the delay, and its findings of the facts thereon shall be final and conclusive.

5. STANDARD OF CARE:

Contractor agrees to perform all services hereunder in a manner commensurate with the prevailing standards of like professionals in the San Francisco Bay Area and agrees that all services shall be performed by qualified and experienced personnel who are not employed by the City nor have any contractual relationship with City.

6. INDEPENDENT PARTIES:

Contractor hereby declares that it is engaged as an independent business and it agrees to perform its services as an independent contractor. The manner and means of conducting the work are under the control of Contractor, except to the extent they are limited by statute, rule or regulation and the express terms of this Agreement. No civil service status or other right of employment will be acquired by virtue of Contractor's services. None of the benefits provided by City to its employees, including but not limited to unemployment insurance, workers' compensation plans, vacation and sick leave are available from City to Contractor, its employees

or agents. Deductions shall not be made for any state or federal taxes, FICA payments, PERS payments, or other purposes normally associated with an employer-employee relationship from any fees due Contractor. Payments of the above items, if required, are the responsibility of Contractor.

7. IMMIGRATION REFORM AND CONTROL ACT (IRCA):

Contractor assumes any and all responsibility for verifying the identity and employment authorization of all of its employees performing work hereunder, pursuant to all applicable IRCA or other federal, or state rules and regulations. Contractor shall indemnify, defend, and hold City harmless from and against any loss, damage, liability, costs or expenses arising from any noncompliance of this provision by Contractor.

8. NON-DISCRIMINATION:

Consistent with City's policy that harassment and discrimination are unacceptable employer/employee conduct, Contractor agrees that harassment or discrimination directed toward a job applicant, a City employee, or a citizen by Contractor or Contractor's employee on the basis of race, religious creed, color, national origin, ancestry, handicap, disability, marital status, pregnancy, sex, age, or sexual orientation will not be tolerated. Contractor agrees that any and all violations of this provision shall constitute a material breach of this Agreement.

9. HOLD HARMLESS:

Contractor shall indemnify, defend, and hold harmless the City, its City Council, boards, commissions, officials, employees, and volunteers ("Indemnitees") from and against any and all loss, damages, liability, claims, suits, costs and expenses whatsoever, including reasonable attorneys' fees ("Claims"), arising from or in any manner connected to Contractor's negligent act or omission, whether alleged or actual, regarding performance of services or work conducted or performed pursuant to this Agreement. If Claims are filed against Indemnitees which allege negligence on behalf of the Contractor, Contractor shall have no right of reimbursement against Indemnitees for the costs of defense even if negligence is not found on the part of Contractor. However, Contractor shall not be obligated to indemnify Indemnitees from Claims arising from the sole negligence or willful misconduct of Indemnitees.

10. INSURANCE:

On or before the commencement of the terms of this Agreement, Contractor shall furnish the City’s Risk Manager with certificates showing the type, amount, class of operations covered, effective dates and dates of expiration of insurance coverage in compliance with paragraphs 10A, B, C and D. Such certificates, which do not limit Contractor's indemnification, shall also contain substantially the following statement: "Should any of the above insurance covered by this certificate be canceled or coverage reduced before the expiration date thereof, the insurer affording coverage shall provide fourteen (14) days' advance written notice to the City of Alameda, "Attention: Risk Manager."

It is agreed that Contractor shall maintain in force at all times during the performance of this Agreement all appropriate coverage of insurance required by this Agreement with an

insurance company that is acceptable to the City Risk Manager and licensed to do insurance business in the State of California. Endorsements naming the City, its City Council, boards, commissions, officials, employees, and volunteers as additional insured shall be submitted with the insurance certificates.

A. COVERAGE:

Contractor shall maintain the following insurance coverage:

(1) Workers' Compensation:
Statutory coverage as required by the State of California.

(2) Liability:
Commercial general liability coverage in the following minimum limits:

Bodily Injury:	$1,000,000 each occurrence $2,000,000 aggregate - all other
Property Damage:	$1,000,000 each occurrence $2,000,000 aggregate

If submitted, combined single limit policy with aggregate limits in the amounts of $2,000,000 will be considered equivalent to the required minimum limits shown above.

(3) Automotive:
Comprehensive automobile liability coverage (any auto) in the following minimum limits:

Bodily injury:	$1,000,000 each occurrence
Property Damage:	$1,000,000 each occurrence
or	
Combined Single Limit:	$2,000,000 each occurrence

(4) Pollution Prevention:
Legal liability required for hazardous materials excavation in the amount of $2,000,000 each occurrence.

(5) Builders Risk: $2,000,000.

B. SUBROGATION WAIVER:

Contractor agrees that in the event of loss due to any of the perils for which it has agreed to provide comprehensive general and automotive liability insurance, Contractor shall look solely to its insurance for recovery. Contractor hereby grants to the City, on behalf of any insurer providing comprehensive general and automotive liability insurance to either Contractor or City with respect to the services of Contractor herein, a waiver of any right to subrogation which any such insurer of said Contractor may acquire against City by virtue of the payment of any loss under such insurance.

C. FAILURE TO SECURE:

If Contractor at any time during the term hereof should fail to secure or maintain the foregoing insurance, the City shall be permitted to obtain such insurance in the Contractor's name or as an agent of the Contractor and shall be compensated by the Contractor for the costs of the insurance premiums at the maximum rate permitted by law and computed from the date written notice is received that the premiums have not been paid.

D. ADDITIONAL INSURED:

City, its City Council, boards, commissions, officials, employees, and volunteers shall be named as an additional insured under all insurance coverages, except worker's compensation insurance. The naming of an additional insured shall not affect any recovery to which such additional insured would be entitled under this policy if not named as such additional insured. An additional insured named herein shall not be held liable for any premium, deductible portion of any loss, or expense of any nature on this policy or any extension thereof. Any other insurance held by an additional insured shall not be required to contribute anything toward any loss or expense covered by the insurance provided by this policy.

E. SUFFICIENCY OF INSURANCE:

Contractor shall furnish the following bonds from a bonding company acceptable to the City Risk Manager. Faithful Performance Bond and Labor and Material Bond are only required for work over $25,000. Therefore, those estimates that are under $25,000 will not need to budget for the bond premiums and those estimates over $25,000 will need to be sure to budget for the bond premiums.

The insurance limits required by City are not represented as being sufficient to protect Contractor. Contractor is advised to consult Contractor's insurance broker to determine adequate coverage for Contractor.

11. BONDS:

Contractor shall furnish the following bonds from a bonding company acceptable to the City Risk Manager:

A. Faithful Performance:

A bond in the amount of 100% of the total contract price guaranteeing the faithful performance of this contract, and

B. Labor and Materials:

A bond for labor and materials in the amount of 100% of the total contract price.

12. PROHIBITION AGAINST TRANSFERS:

Contractor shall not assign, sublease, hypothecate, or transfer this Agreement, or any interest therein, directly or indirectly, by operation of law or otherwise, without prior written consent of the City Manager. Any attempt to do so without said consent shall be null and void, and any assignee, sublessee, hypothecate or transferee shall acquire no right or interest by reason

of such attempted assignment, hypothecation or transfer. However, Contractor's claims for money from the City under this Agreement may be assigned to a bank, trust company or other financial institution without prior written consent. Written notice of such assignment shall be promptly furnished to the City by Contractor.

The sale, assignment, transfer or other disposition of any of the issued and outstanding capital stock of Contractor, or of the interest of any general partner or joint venturer or syndicate member or cotenant, if Contractor is a partnership or joint venture or syndicate or cotenancy, which shall result in changing the control of Contractor, shall be construed as an assignment of this Agreement. Control means fifty percent (50%) or more of the voting power of the corporation.

13. SUBCONTRACTOR APPROVAL:

Unless prior written consent from the City is obtained, only those people and subcontractors whose names are listed in Contractor's bid shall be used in the performance of this Agreement.

Requests for additional subcontracting shall be submitted in writing, describing the scope of work to be subcontracted and the name of the proposed subcontractor. Such request shall set forth the total price or hourly rates used in preparing estimated costs for the subcontractor's services. Approval of the subcontractor may, at the option of the City, be issued in the form of a Work Order.

In the event that Contractor employs subcontractors, such subcontractors shall be required to furnish proof of workers' compensation insurance and shall also be required to carry general and automobile liability insurance in reasonable conformity to the insurance carried by Contractor. In addition, any work or services subcontracted hereunder shall be subject to each provision of this Agreement.

14. PERMITS AND LICENSES:

Contractor, at its sole expense, shall obtain and maintain during the term of this Agreement, all appropriate permits, certificates and licenses, including a City Business License that may be required in connection with the performance of services hereunder.

15. REPORTS:

Each and every report, draft, work product, map, record and other document reproduced, prepared or caused to be prepared by Contractor pursuant to or in connection with this Agreement shall be the exclusive property of the City.

No report, information nor other data given to or prepared or assembled by Contractor pursuant to this Agreement shall be made available to any individual or organization by Contractor without prior approval by the City.

Contractor shall, at such time and in such form as the City may require, furnish reports concerning the status of services required under this Agreement.

16. RECORDS:

Contractor shall maintain complete and accurate records with respect to sales, costs, expenses, receipts and other such information required by the City that relate to the performance of services under this Agreement.

Contractor shall maintain adequate records of services provided in sufficient detail to permit an evaluation of services. All such records shall be maintained in accordance with generally accepted accounting principles and shall be clearly identified and readily accessible. Contractor shall provide free access to such books and records to the representatives of the City or its designees at all proper times, and gives the City the right to examine and audit same, and to make transcripts therefrom as necessary, and to allow inspection of all work, data, documents, proceedings and activities related to this Agreement. Such records, together with supporting documents, shall be kept separate from other documents and records and shall be maintained for a period of three (3) years after receipt of final payment.

If supplemental examination or audit of the records is necessary due to concerns raised by the City's preliminary examination or audit of records, and the City's supplemental examination or audit of the records discloses a failure to adhere to appropriate internal financial controls, or other breach of contract or failure to act in good faith, then Contractor shall reimburse the City for all reasonable costs and expenses associated with the supplemental examination or audit.

17. NOTICES:

All notices, demands, requests or approvals to be given under this Agreement shall be given in writing and conclusively shall be deemed served when delivered personally or on the second business day after the deposit thereof in the United States Mail, postage prepaid, registered or certified, addressed as hereinafter provided.

All notices, demands, requests, or approvals from Contractor to the City shall be addressed to the City at:

City of Alameda
Public Works Department
950 West Mall Square, Room 110
Alameda, CA 94501
ATTENTION: Shilpa Patel, Assistant Engineer
Ph: (510) 747-7930 / Fax: (510) 769-6030
Email: spatel@alamedaca.gov

All notices, demands, requests, or approvals from the City to Contractor shall be addressed to Contractor at:

[Contractor Name]
[Department]
[Address]
Alameda, CA 94501

ATTENTION; [Title]
Ph: (510) xxx-xxxx / Fax: (510) xxx-xxxx
Email:

18. SAFETY:

The Contractor will be solely and completely responsible for conditions of all vehicles owned or operated by Contractor, including the safety of all persons and property during performance of the services and tasks under this Agreement. This requirement will apply continuously and not be limited to normal working hours. In addition, Contractor will comply with all safety provisions in conformance with U.S. Department of Labor Occupational Safety and Health Act, any equivalent state law, and all other applicable federal, state, county and local laws, ordinances, codes, and any regulations that may be detailed in other parts of the Agreement. Where any of these are in conflict, the more stringent requirements will be followed. The Contractor's failure to thoroughly familiarize itself with the aforementioned safety provisions will not relieve it from compliance with the obligations and penalties set forth herein.

The Contractor will immediately notify the City's Risk Manager within 24 hours of any incident of death, serious personal injury or substantial property damage that occurs in connection with the performance of this Agreement. The Contractor will promptly submit to the City a written report of all incidents that occur in connection with this Agreement. This report must include the following information: (i) name and address of injured or deceased person(s); (ii) name and address of Contractor's employee(s) involved in the incident; (iii) name and address of Contractor's liability insurance carrier; (iv) a detailed description of the incident; and (v) a police report.

19. LAWS TO BE OBSERVED:

Contractor shall comply with all applicable laws, state, federal, and all ordinances, rules and regulations enacted or issued by City. In addition, the Contractor shall keep himself fully informed of all existing and future state and federal laws and all municipal ordinances and regulations of the City of Alameda 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.

20. DEPARTMENT OF INDUSTRIAL RELATIONS COMPLIANCE AND PREVAILING WAGE REQUIREMENTS ON PUBLIC WORKS PROJECTS:

Effective January 1, 2015, no Contractor or Subcontractor may be listed on a bid proposal for a public works project (submitted after March 1, 2015) unless registered with the Department of Industrial Relations pursuant to Labor Code Section 1725.5 (with the limited exceptions from this requirement for bid purposed only under Labor code Section 1771.1(a)). Register at https://efiling.dir.ca.gov/PWCR

No Contractor or Subcontractor may be awarded a contract for public work on a public works project (awarded on or after April 1, 2015) unless registered with the Department of Industrial Relations pursuant to Labor Code Section 1725.5.

This project is subject to compliance monitoring and enforcement by the Department of Industrial Relations.

The Prime Contractor is required to post job site notices prescribed by regulations. See 8 Calif. Code Regulation §16451(d).

Effective April 1, 2015, All Contractors and Subcontractors must furnish electronic certified payroll records directly to the Labor Commissioner at: https://apps.dir.ca.gov/ecpr/das/altlogin

21. HOURS OF LABOR:

As provided in Article 3 (commencing at §1810), Chapter 1, Part 7, Division 2 of the Labor Code, eight (8) hours of labor shall constitute a legal day's work. The time of service of any worker employed at any time by the Contractor or by any Subcontractor on any subcontract under this Contract, upon the work or upon any part of the work contemplated by this Contract, is limited and restricted to eight (8) hours during any one calendar day and forty (40) hours during any one calendar week, except as hereinafter provided. Notwithstanding the provision hereinabove set forth, work performed by employees of Contractor in excess of eight (8) hours per day and forty (40) hours during any one week shall be permitted upon this public work provided that the employees' compensation for all hours worked in excess of eight (8) hours per day at not less than one and one-half (1-1/2) times the basic rate of pay.

The Contractor shall pay to the City a penalty of Twenty-five Dollars ($25.00) for each worker employed in the execution of this Contract by the Contractor, or by any Subcontractor, for each calendar day during which such worker is required or permitted to work more than eight (8) hours in any calendar day and forty (40) hours in any one (1) calendar week, in violation of the provisions of Article 3 (commencing at § 1810), Chapter 1, Part 7, Division 2 of the Labor Code, unless compensation for the workers so employed by Contractor is not less than one and one-half (1-1/2) times the basic rate of pay for all hours worked in excess of eight (8) hours per day.

Holiday and overtime work, when permitted by law, shall be paid for at a rate of at least one and one-half (1½) times the above specified rate of *per diem* wages, unless otherwise specified. Holidays shall be defined in the Collective Bargaining Contract applicable to each particular craft, classification, or type of worker employed.

22. APPRENTICES:

Attention is directed to the provisions in sections 1777.5 and 1777.6 of the Labor Code concerning the employment of apprentices by the Contractor or any subcontractor under him on contracts greater than $30,000 or 20 working days. The Contractor and any subcontractor under him shall comply with the requirements of Sections 1777.5 and 1777.6 in the employment of apprentices.

Section 1777.5 requires the Contractor or subcontractor employing workers 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, if they have not previously applied and are covered by the local apprenticeship standards.

The Contractor is required to make contributions to funds established for the administration of apprenticeship programs if: (1) the Contractor 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; or (2) if the Contractor is not a signatory to an apprenticeship fund and if the funds administrator is unable to accept Contractor' required contribution. The Contractor or subcontractor shall pay a like amount to the California Apprenticeship Council.

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.

23. LABOR DISCRIMINATION:

No discrimination shall be made in the employment of persons upon public works because of the race, color, sex, religion, age, national origin, sexual orientation, or physical disability of such persons and every Contractor for public works violating this section is subject to all the penalties imposed for a violation of the provisions of the Labor Code, and, in particular, Section 1735.

24. REGISTRATION OF CONTRACTORS:

Before submitting bids, contractors shall be licensed in accordance with the provisions of Chapter 9, Division 3, of the Business and Professional Code of the State of California.

25. URBAN RUNOFF MANAGEMENT:

The Contractor shall avoid creating excess dust when breaking asphalt or concrete and during excavation and grading. If water is used for dust control, contractor shall use as little as necessary. Contractor shall take all steps necessary to keep wash water out of the streets, gutters and storm drains.

The Contractor shall develop and implement erosion and sediment control to prevent pollution of storm drains. Such control includes but is not limited to:

a. Use storm drain inlet protection devices such as sand bag barriers, filter fabric fences, block and gravel filters. (Block storm drain inlets prior to the start of the rainy season (October 15), on site de-watering activities and saw-cutting activities; shovel or vacuum saw-cut slurry and remove from the site).

b. Cover exposed piles of soil or construction material with plastic sheeting. All construction materials must be stored in containers.

c. Sweep and remove all materials from paved surfaces that drain to streets, gutters and storm drains prior to rain as well as at the end of the each work day. At the completion of the project, the street shall be washed and the wash water shall be collected and disposed of offsite in an appropriate location.

d. After breaking old pavement, Contractor shall remove all debris to avoid contact with rainfall or runoff.

e. Contractor shall maintain a clean work area by removing trash, litter, and debris at the end of each workday. Contractor shall also clean up any leaks, drips, and other spills as they occur.

The objective is to ensure that the City and County of Alameda County-Wide Clean Water Program is adequately enforced. These controls should be implemented prior to the start of construction, up-graded as required, maintained during construction phases to provide adequate protection, and removed at the end of construction.

These recommendations are intended to be used in conjunction with the State's Best Management Practices Municipal and Construction Handbooks, local program guidance materials from municipalities, Section 7.1.01 of the Standard Specifications and any other appropriate documents on storm water quality controls for construction.

Failure to comply with this program will result in the issuance of noncompliance notices, citations, project stop orders or fines. The fine for noncompliance of the above program is two hundred and fifty dollars ($250.00) per occurrence per day. The State under the Federal Clean Water Act can also impose a fine on the contractor, pursuant to Cal. Water Code §13385.

26. COMPLIANCE WITH MARSH CRUST ORDINANCE:

Contractor shall perform all excavation work in compliance with the City's Marsh Crust Ordinance as set forth at Section 13-56 of the Municipal Code. Prior to performing any excavation work, Contractor shall verify with the Building Official whether the excavation work is subject to the Marsh Crust Ordinance. Contractor shall apply for and obtain permits from Building Services on projects deemed to be subject to the Marsh Crust Ordinance.

27. COMPLIANCE WITH THE CITY'S INTEGRATED PEST MANAGEMENT POLICY:

The Contractor shall follow the requirements of the City's Integrated Pest Management (IPM) Policy to ensure the City is in compliance with its Municipal Regional Stormwater NPDES Permit, Order No. R2-2009-0074, issued by the San Francisco Bay Regional Water Quality Control Board.

- ❑ Contractor shall use the most current IPM technologies available to ensure the long-term prevention or suppression of pest problems and to minimize negative impacts on the environment, non-target organisms, and human health for the control or management of

pests in and around City buildings and facilities, parks and golf courses, urban landscape areas, rights-of-way, and other City properties.

- ❑ Contractor will consider the City IPM Policy's hierarchy of options or alternatives listed below, in the following order before recommending the use of or applying any pesticide on City property: (1)

    a. No controls (e.g. tolerating the pest infestation, use of resistant plant varieties or allowing normal life cycle of weeds);

    b. Physical or mechanical controls (e.g. hand labor, mowing, exclusion);

    c. Cultural controls (e.g. mulching, disking, alternative vegetation) and good housekeeping (e.g. cleaning desk area);

    d. Biological controls (e.g., natural enemies or predators);

    e. Reduced-risk chemical controls (e.g., soaps or oils);

    f. Other chemical controls.

- ❑ Prior to applying chemical controls the contractor shall complete a checklist for the City's pre-approval that explains why a chemical control is necessary. For annual contracts that require regular application of chemical controls the contractor shall submit one checklist prior to the initiation of the project demonstrating that the hierarchy has been reviewed and no other options exist. (Attached as Exhibit C). Additionally, the Contractor shall provide documentation to the City's project manager of the implementation of the IPM techniques hierarchy described in the City's IPM Policy.

- ❑ Contractor shall avoid the use of the following pesticides that threaten water quality, human health and the environment:

    a. Acute Toxicity Category I chemicals as identified by the Environmental Protection Agency (EPA)

    b. Organophosphate pesticides (e.g., those containing Diazinon, chlorpyrifos or malathion)

    c. Pyrethroids (bifenthrin, cyfluthrin, beta-cyfluthrin, cypermethrin, deltamethrin, esfenvalerate, lambda-cyhalothrin, permethrin, and tralomethrin), carbamates (e.g., carbaryl), and fipronil

    d. Copper-based pesticides unless their use is judicious, other approaches and techniques have been considered, and the threat of impact to water quality is prevented.

- ❑ Contractor shall sign the Contractor Verification Form (attached as Exhibit B) indicating the intent to implement the City's IPM Policy, and return a signed copy to the City's project manager.

- ❑ Contractor shall provide to the City's project manager an annual Report of all pesticide usage in support of City operations including pesticide name, active ingredient(s), target pest(s), the total amounts used and the reasons for any increase in use of any pesticide.

- ❑ Contractor shall provide a copy of any current IPM certifications(s) to the City's project manager prior to initiation of the service work.

A copy of the City's IPM Policy may be obtained from the City's project manager and is also on file with the City Clerk.

If this agreement pertains to the use of any items listed above, the Contractor will need to fill out and send in the Contractor Verification Form and Contractor Check List. ADD EXHIBIT B IF PEST CONTROL.

28. PURCHASES OF MINED MATERIALS REQUIREMENT:

Contractor shall ensure that all purchases of mined materials such as construction aggregate, sand and gravel, crushed stone, road base, fill materials, and any other mineral materials must originate from a surface mining operation identified on the AB3098 List per the Surface Mining and Reclamation Act of 1975 (SMARA).

Within five days of award of contract, Contractor shall submit a report to City which lists the intended suppliers for the above materials and demonstrates that the suppliers are in compliance with the SMARA requirements. The AB3098 List is maintained by the Department of Conservation's Office of Mine Reclamation (OMR) and can be viewed at: www.conservation.ca.gov/OMR/ab_3098_list/index.htm. Note that the list changes periodically and should be reviewed accordingly.

29. TERMINATION:

In the event Contractor fails or refuses to perform any of the provisions hereof at the time and in the manner required hereunder, Contractor shall be deemed in default in the performance of this Agreement. If such default is not cured within a period of two (2) business days after receipt by Contractor from the City of written notice of default, specifying the nature of such default and the steps necessary to cure such default, the City may terminate the Agreement forthwith by giving to the Contractor written notice thereof.

The City shall have the option, at its sole discretion and without cause, of terminating this Agreement by giving seven (7) days' prior written notice to Contractor as provided herein. Upon termination of this Agreement, each party shall pay to the other party that portion of compensation specified in this Agreement that is earned and unpaid prior to the effective date of termination.

30. ATTORNEY'S FEES:

In the event of the bringing of any action or suit by a party hereto against the other party by reason of any breach of any covenants, conditions, obligation or provision arising out of this Agreement, the prevailing party shall be entitled to recover from the non-prevailing party all of

its costs and expenses of the action or suit, including reasonable attorneys' fees, experts' fees, all court costs and other costs of action incurred by the prevailing party in connection with the prosecution or defense of such action and enforcing or establishing its rights hereunder (whether or not such action is prosecuted to a judgment). For the purposes of this Agreement, reasonable fees of attorneys of the Alameda City Attorney shall be based on the fees regularly charged by private attorneys with the equivalent number of years of experience in the subject matter area of the law for which the Alameda City Attorney's services were rendered who practice in Alameda County in law firms with approximately the same number of attorneys as employed by the Alameda City Attorney's Office.

31. PCC SECTION 9204 SUMMARY - CLAIMS SUBMITTED BETWEEN 01-01-2017 AND 01-01-2020.:

Notwithstanding anything else to the contrary stated in the Information For Bidders (IFB) or the Contract Documents, all claims, regardless of dollar amount, submitted between January 1, 2017 and January 1, 2020 shall be governed by PCC Section 9204 and this section.

The following provisions and procedures shall apply:

A. For the purposes of this section, the term "Claim", "Contractor", "mediation", "Public Entity" "Public works project" and "Subcontractor" shall have the meaning provided for in PCC Section 9204.

B. Contractor shall submit each Claim (whether for a time extension, payment for money or damages) in writing and in compliance with PCC Section 9204. Contractor must include reasonable documentation to support each claim.

C. Upon receipt of a Claim, the City shall conduct a reasonable review and respond in writing within 45 days of receipt and shall identify in a written statement what portions of the claim are disputed and undisputed. Undisputed portions of the Claim shall be process and paid within 60 days of the written statement. Undisputed amounts not paid in a timely manner shall bear interest at 7% per annum. The City and Contractor may mutually agree to extend the 45 day response time.

D. If the City needs approval from the City Council to provide a written statement, the 45 days may be extended to 3 days following the next duly noticed public meeting pursuant to PCC Section 9204(d)(1)(C).

E. If the City fails to timely respond to a Claim or if Contractor disputes the City's response, Contractor may submit a written demand for an informal meet and confer conference with the City to settle the issues in dispute. The demand must be sent via registered or certified mail, return receipt requested. Upon receipt, the City shall schedule the conference within 30 days.

F. Within 10 business days following the informal meet and confer conference, the City shall submit to Contractor a written statement describing any issues remaining in dispute and that portion which is undisputed. Undisputed portions of the Claim shall be process and paid within 60 days of the written statement. Undisputed amounts not paid in a timely manner shall bear

interest at 7% per annum. The issues remaining in dispute shall be submitted to non-binding mediation. If the City and Contractor mutually agree on a mediator, each party shall pay equal portions of all associated costs. If within 10 business days, the City and Contractor cannot agree on a mediator, each party shall select a mediator (paying all costs associated with their selected mediator), and those mediators shall select a qualified neutral third party to mediate the disputed issues. The City and Contractor shall pay equal portions of all associated costs of such third party mediator.

G. Unless otherwise agreed by the City and Contractor, any mediation conducted hereunder shall excuse any further obligation under Public Contract Code Section 20104.4 to mediate after litigation has commenced.

H. The City reserves all rights and remedies that it has pursuant to the Construction Contract, plans and specification, at law or in equity which are not in conflict with PCC 9204.

I. This Section shall be automatically extended if legislation is lawfully passed which extends the terms of Public Contract Code Section 9204 beyond January 1, 2020.

32. CONFLICT OF LAW:

This Agreement shall be interpreted under, and enforced by the laws of the State of California excepting any choice of law rules which may direct the application of laws of another jurisdiction. The Agreement and obligations of the parties are subject to all valid laws, orders, rules, and regulations of the authorities having jurisdiction over this Agreement (or the successors of those authorities.) Any suits brought pursuant to this Agreement shall be filed with the courts of the County of Alameda, State of California.

33. ADVERTISEMENT:

Contractor shall not post, exhibit, display or allow to be posted, exhibited, displayed any signs, advertising, show bills, lithographs, posters or cards of any kind pertaining to the services performed under this Agreement unless prior written approval has been secured from the City to do otherwise.

34. WAIVER:

A waiver by City of any breach of any term, covenant, or condition contained herein, shall not be deemed to be a waiver of any subsequent breach of the same or any other term, covenant, or condition contained herein, whether of the same or a different character.

35. INTEGRATED CONTRACT:

This Agreement represents the full and complete understanding of every kind or nature whatsoever between the parties hereto, and all preliminary negotiations and agreements of whatsoever kind or nature are merged herein. No verbal agreement or implied covenant shall be held to vary the provisions hereof. Any modification of this Agreement will be effective only by written execution signed by both the City and Contractor.

36. INSERTED PROVISIONS:

Each provision and clause required by law to be inserted into the Agreement shall be deemed to be enacted herein, and the Agreement shall be read and enforced as though each were included herein. If through mistake or otherwise, any such provision is not inserted or is not correctly inserted, the Agreement shall be amended to make such insertion on application by either party.

37. CAPTIONS:

The captions in this Agreement are for convenience only, are not a part of the Agreement and in no way affect, limit or amplify the terms or provisions of this Agreement.

Signatures on next page

IN WITNESS WHEREOF, the parties have caused the Agreement to be executed on the day and year first above written.

COMPANY NAME
(A California Corporation, partnership, sole proprietor, individual)

_____
(Name)
(Title)

_____
(Name)
(Title)

Contractor License No. _____

DIR No. _____

CITY OF ALAMEDA,
a Municipal Corporation

_____
Eric J. Levitt
City Manager

RECOMMENDED FOR APPROVAL

_____
Liam Garland
Public Works Director

APPROVED AS TO FORM:
City Attorney

_____
Lisa N. Maxwell
Assistant City Attorney

Exhibit ‘E’

EMERGENCY FORM

EXHIBIT "E"

EMERGENCY FORM

During the course of the work and/or while the contractor has responsibility for the project, emergencies may arise where it is necessary to repair or replace safety devices, or install additional safety devices, or take preventative measures necessary for public safety. Such corrections as may be necessary are the contractor's responsibility and he, or his representative, will be called upon in such emergencies.

Please fill in the following information and submit it to the Deputy Public Works Director/City Engineer.

CONTRACTOR'S NAME_____

CONTRACTOR'S PHONE NUMBER_____

PROJECT SUPERINTENDENT_____

CONTACT IN THE EVENT OF EMERGENCY:

Name:_____

Phone Number:_____

In cases where the contractor, or his representative, cannot be contacted or will not take the necessary actions, the City Public Works Department will be notified and the necessary repairs, corrections, or changes will be made. The contractor will be billed for such remedial action. Charges will include the cost of labor at applicable rates, the City's normal overhead factor, the rental of any equipment or safety devices placed during the emergency that are damaged or stolen, or otherwise not returned to the City, will be billed to the contractor.

Scheduled starting date_____

Scheduled completion date_____

Job Name_____

EMERGENCY CONTACT INFORMATION – CITY OF ALAMEDA:

PROJECT MANAGER (NAME & PHONE NO.)_____

PROJECT INSPECTOR (NAME & PHONE NO.)_____

OTHER STAFF (NAME & PHONE NO.)_____

EXHIBIT “F”

PERFORMANCE BOND FORM

EXHIBIT "F"

Performance Bond Form

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS: that

_____
(Name of Contractor)

_____
(Address of Contractor)

a _____, hereinafter called Principal, and
(Corporation, Partnership, or Individual)

_____
(Name of Surety)

_____
(Address of Surety)

hereinafter called Surety, are held and firmly bound unto _____

_____
(Name of Owner)

_____
(Address of Owner)

hereinafter called OWNER, in the penal sum of _____
_____ Dollars. ($ _____)

in lawful money of the United States, f or the payment of which sum well and truly to be made, we bind ourselves, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas, the Principal entered into a certain contract with the OWNER, dated the _____ day of _____, 2020, a copy of which is hereto attached and made a part hereof for the construction of:

_____

_____

_____

_____

NOW, THEREFORE, if the Principal shall well, truly and faithfully perform its duties, all the undertakings, covenants, terms, conditions, and agreements of said contract during the original term thereof, and any extensions thereof which may be granted by the OWNER, with or without notice to the Surety and during the one year guaranty period, and if he shall satisfy all claims and demands incurred under such contract, and shall fully indemnify and save harmless the OWNER from all costs and damages which it may suffer by reason of failure to do so, and shall reimburse and repay the OWNER all outlay and expense which the OWNER may incur in making good any default, then this obligation shall be void; otherwise to remain in full force and effect.

EXHIBIT 'F'

PERFORMANCE BOND FORM

PROVIDED, FURTHER, that the said surety, for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract or to WORK to be performed thereunder or the SPECIFICATIONS accompanying the same shall in any wise affect its obligation on this BOND, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contract or to the WORK or to the SPECIFICATIONS.

PROVIDED, FURTHER, that no final settlement between the OWNER and the CONTRACTOR shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

IN WITNESS WHEREOF, this instrument is executed on _____ counterparts, each one

(Number)

of which shall be deemed an original, this the _____ day of _____, 2020.

ATTEST: _____

Principal

_____ By: _____

_____Principal Secretary

(SEAL)

_____

(Witness as to Principal) (Address)

_____

(Address)

_____

(Surety)

ATTEST:

_____

Surety Secretary

(SEAL)

_____ By: _____

(Witness as to Surety) Attorney-in-fact

_____

(Address) (Address)

_____

NOTE: Date of BOND must not be prior to date of Contract.
If the CONTRACTOR is Partnership, all partners should execute BOND.

IMPORTANT: Surety companies executing BONDS must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the state where the PROJECT is located.

Exhibit ‘G’

PAYMENT BOND FORM

EXHIBIT 'G'

PAYMENT BOND FORM

KNOW ALL MEN BY THESE PRESENTS: that

_____

_____

a _____, hereinafter called Principal, and

_____

hereinafter called Surety, are held and firmly bound unto _____

_____

_____

hereinafter called OWNER, in the penal sum of _____ Dollars. ($ _____)

in lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas, the Principal entered into a certain contract with the OWNER, dated the _____ day of _____, 2020, a copy of which is hereto attached and made a part hereof for the construction of:

_____

_____

_____

_____

NOW, THEREFORE, if the Principal shall promptly make payment to all persons, firms, SUBCONTRACTORS, and corporations furnishing materials for or performing labor in the prosecution of the WORK provided for in such contract, and any authorized extension or modification thereof, including all amounts due for materials, lubricants, oil, gasoline, coal and coke, repairs on machinery, equipment and tools, consumed or used in connection with the construction of such WORK, and all insurance premiums on said WORK, and for all labor, performed in such WORK whether by SUBCONTRACTOR or otherwise, then this obligation shall be void; otherwise to remain in full force and effect.

EXHIBIT 'G'

PAYMENT BOND FORM

PROVIDED, FURTHER, that the said surety, for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract or to WORK to be performed thereunder or the SPECIFICATIONS accompanying the same shall in any wise affect its obligation on this BOND, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contract or to the WORK or to the SPECIFICATIONS.

PROVIDED, FURTHER, that no final settlement between the OWNER and the CONTRACTOR shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

IN WITNESS WHEREOF, this instrument is executed on _____ counterparts, each one
(Number)
of which shall be deemed an original, this the _____ day of _____, 2020.

ATTEST: _____
Principal

_____ By: _____
Principal Secretary

(SEAL)

_____
(Witness as to Principal) (Address)

_____
(Address)

_____
(Surety)

ATTEST:

_____
Surety Secretary

(SEAL)

_____ By: _____
(Witness as to Surety) Attorney-in-fact

_____
(Address) (Address)

_____

NOTE: Date of BOND must not be prior to date of Contract.
If the CONTRACTOR is Partnership, all partners should execute BOND.

IMPORTANT: Surety companies executing BONDS must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the state where the PROJECT is located.

Exhibit ‘H’

BIDDER’S BOND FORM

EXHIBIT 'H'

Bidder's Proposal Form Contractor Name: _____

BIDDER'S BOND

We, _____
as Principal, and as Surety are bound unto the _____,
hereafter referred to as "oblige", in the penal sum of ten percent (10%) of the total amount of the bid of the Principal submitted to the Obligee for the work described below, for the payment of which sum we bind ourselves, jointly, and severally,

THE CONDITION OF THIS OBLIGATION IS SUCH, THAT:

WHEREAS, the Principal is submitted to the Obligee, for _____
(Copy here the exact description of

_____
work, including locations as it appears on the proposal)

_____

_____
for which bids are to be opened per Section 1 Proposal and Contract Requirements, Paragraph E, Presenting and Marking of Bid.

NOW, THEREFORE, if the Principal is awarded the contract and, within the time and manner required under the specifications, after the prescribed forms are presented to Contractor for signature, enters into a written contract, in the prescribed form, in accordance with the bid, and files two bonds with Obligee, one to guarantee faithful performance of the contract an the other to guarantee payment for labor and materials as provided by law, then this obligation shall be null and void; otherwise, it shall remain in full force.

In the event suit is brought upon this bond by the Obligee and judgement is recovered, the Surety shall pay all cost incurred by the Obligee in such suite, including a reasonable attorney's fee to be fixed by the court.

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

Dated: _____, 2020. _____

_____
Principal

_____
Surety

By: _____

EXHIBIT "H"

CERTIFICATE OF ACKNOWLEDGMENT

State of California
County of Alameda

On this _____ day of _____ in the year 2020 before me _____, a Notary Public, personally appeared _____
Attorney-in-fact
who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

Signature _____(Seal)
Notary Public

EXHIBIT "I"

LIST OF SUBMITTALS

EXHIBIT "I"

List of Submittals

GROUP 4 – SEWERAGE PUMP STATION RENOVATIONS FOR RELIABILITY AND SAFETY IMPROVEMENTS No. P.W. 08-17-37

Shall include but not limited to the following:

Item	Section Reference	Due Date/Frequency
1. Contract Bonds	Section I, Paragraph N	Within 5 days of award
2. Certified Payroll	Section II, Paragraph F	Submitted weekly
3. Emergency Form	Exhibit E	Preconstruction meeting
4. Insurance	Contract, Exhibit D	Within 5 days of award
5. Licenses/Permits	Section II, Paragraph J	Preconstruction meeting
6. Traffic Control Plan	Section XII, Paragraph A	Preconstruction meeting
7. Technical Submittals	Relevant Technical Specifications	Preconstruction meeting and updated at weekly meetings
8. Stormwater PPP	Section II, Paragraph U	Preconstruction meeting
9. Work Schedule	Section VI, Paragraph A	Preconstruction meeting and updated at weekly meetings

The above list is not exhaustive and the Contractor shall follow the requirements in the documents for submittals.

EXHIBIT "J"

INTEGRATED PEST MANAGEMENT POLICY WITH CONTRACTOR VERIFICATION FORM AND CONTRACTOR CHECK LIST

City of Alameda Contractor Verification Form
Implementation of City of Alameda Integrated Pest Management Policy

The City of Alameda (City) is mandated to:

(a) Minimize its reliance on pesticides that threaten water quality, and
(b) Require the effective use of Integrated Pest Management (IPM) in all municipal operations and on all municipal property.

To ensure compliance with this mandate, all City operations need to verifiably implement the practices and policies described in the City's IPM Policy adopted June 15, 2010. A copy of this IPM Policy is included with this form. The implementation of the IPM Policy is applicable to all municipal contractors that provide landscaping, structural pest control, or other pest management services in support of City operations and/or on municipal property.

The undersigning parties acknowledge that all elements of the City's IPM Policy will be implemented throughout the period of contractual services provided to City operations and on municipal property. Specific actions to document this performance shall include:

- ❑ Pest Management Contractor shall provide to City project manager for pre-approval the Pest Management Considerations Checklist.
- ❑ Pest Management Contractor shall avoid the use of the following pesticides that threaten water quality, human health and the environment:
  - o Acute Toxicity Category I chemicals as identified by the Environmental Protection Agency (EPA)
  - o Organophosphate pesticides (e.g., those containing Diazinon, chlorpyrifos or malathion)
  - o Pyrethroids (bifenthrin, cyfluthrin, beta-cyfluthrin, cypermethrin, deltamethrin, esfenvalerate, lambda-cyhalothrin, permethrin, and tralomethrin), carbamates (e.g., carbaryl), and fipronil
  - o Copper-based pesticides unless their use is judicious, other approaches and techniques have been considered and the threat of impact to water quality is prevented.
- ❑ Pest Management Contractor shall provide to the City's project manager an annual Report of all pesticide usage in support of City operations including product name and manufacturer, active ingredient(s), target pest(s), the total amounts used and reasons for any increase in use of any pesticide.
- ❑ If the Contractor's on-site personnel are currently IPM certified through either the EcoWise or GreenPro programs, or through another program, the contractor shall provide written evidence of any certifications to the City's project manager.

_____	_____
City Departmental Representative	Contractor Representative
_____	_____
Print Name	Print Name
_____	_____
Date	Date
_____	_____
City Department	City Contractor

City of Alameda Pest Management Contractor Checklist:
Pest Management Options Considerations

Contractor will consider the City IPM Policy's hierarchy of options or alternatives listed below, in the following order before recommending the use of or applying any pesticide on City property. Please provide a written explanation in each section below of why the specific pest management option is not appropriate:

(1) No controls (e.g. tolerating the pest infestation, use of resistant plant varieties or allowing normal life cycle of weeds)

Comment: _____

_____

_____

(2) Physical or mechanical controls (e.g. hand labor, mowing, exclusion)

Comment: _____

_____

_____

(3) Cultural controls (e.g. mulching, disking, alternative vegetation), good housekeeping (e.g. cleaning desk area)

Comment: _____

_____

_____

(4) Biological controls (e.g., natural enemies or predators)

Comment: _____

_____

_____

(5) Reduced-risk chemical controls (e.g., soaps or oils)

Comment: _____

_____

_____

(6) Other chemical controls

Comment: _____

_____

_____

Contractor Representative

_____
Print Name

_____
Date

_____
City Contractor

EXHIBIT "K"

PROJECT STABILIZATION AGREEMENT FOR THE CITY OF ALAMEDA

PROJECT STABILIZATION AGREEMENT

FOR THE

CITY OF ALAMEDA

PREAMBLE

This Agreement is made and entered into on this date, January 19, 2017, by and between the city of Alameda ("City" or "Owner") together with contractors and/or subcontractors who shall become signatory to this Agreement by signing the "Agreement To Be Bound" (Addendum "A"), ("Contractor/Employer(s)"), and the Building and Construction Trades Council of Alameda County, AFL-CIO ("Council") and its affiliated Local Unions signatory hereto ("Union(s)").

The purpose of this Agreement is to promote efficiency of construction operations during construction of the Project (as defined in Section 1.11 below) by providing for the orderly and peaceful settlement of labor disputes and grievances without strikes, work stoppages or lockouts, thereby promoting the public interest in assuring the timely and economical completion of the Project.

RECITALS

WHEREAS, the timely and successful completion of the Project is of the utmost importance to the city of Alameda; and

WHEREAS, large numbers of workers of various skills will be required in the performance of the construction work, including those to be represented by the Union(s) signatory to this Agreement employed by Contractor/Employer(s) and subcontractors who are also signatories to this Agreement; and

WHEREAS, it is recognized that on a project of this magnitude with multiple contractors and bargaining units on the job site at the same time over an extended period of time, the potential for work disruption is substantial without an overriding commitment to maintain continuity of work; and

WHEREAS, the interests of the general public, the city of Alameda, the Union(s) and Contractor/Employer(s) would be best served if the construction work proceeded in an orderly manner without disruption because of strikes, sympathy strikes, work stoppages, picketing, lockouts, slowdowns or other interferences with work; and

WHEREAS, the Contractor/Employer(s) and the Union(s) desire to mutually establish and stabilize wages, hours and working conditions for the workers employed on the Project by the Contractor/Employer(s), and further, to encourage close cooperation among the

Contractor/Employer(s) and the Union(s) so that a satisfactory, continuous and harmonious relationship will exist among the parties to this Agreement; and

WHEREAS, the parties agree that one of the primary purposes of this Agreement is to avoid the tensions that might arise on the Project if union and non-union workers of different employers were to work side by side on the Project thereby leading to labor disputes that could delay completion of the Project; and

WHEREAS, this Agreement is not intended to replace, interfere with, abrogate, diminish or modify existing local or national collective bargaining agreements in effect during the duration of the Project, insofar as a legally binding agreement exists between the Contractor/Employer(s) and the affected Union(s), except to the extent that the provisions of this Agreement are inconsistent with said collective bargaining agreements, in which event, the provisions of this Agreement shall prevail; and

WHEREAS, the contract(s) for construction work on the Project will be awarded in accordance with the applicable provisions of the California Public Contract Code; and

WHEREAS, the city of Alameda desires to provide construction training and employment opportunities for residents of the city of Alameda and Alameda County through apprentice and pre-apprentice programs; and

WHEREAS, the parties to this Agreement pledge their full good faith and trust to work towards a mutually satisfactory completion of the Project;

NOW, THEREFORE, IT IS AGREED BETWEEN AND AMONG THE PARTIES HERETO, AS FOLLOWS:

ARTICLE 1

DEFINITIONS

1.1 "City" means the city of Alameda.

1.2 "Agreement" means this Project Stabilization Agreement and all attached hereto Addenda.

1.3 "Agreement To Be Bound" means the document, as set forth in Addendum A hereto, that formally binds the Contractor/Employer(s) to comply with all the terms and conditions of this Agreement and that operates as a pre-condition to performing work on the Project.

1.4 "Apprentice" means an individual registered and participating as an apprentice in a Joint Labor/Management Apprenticeship Program approved by the State of California, Department of Industrial Relations, Division of Apprenticeship Standards.

1.5 "Completion" shall mean the date upon which the written notice of completion has been issued for a specific building, phase or project constructed under this Agreement.

1.6 "Construction Contract" means the public works or improvement contract(s) which will be awarded by the City and which are necessary to complete the Project, including subcontracts at any tier.

1.7 "Contractor/Employer(s)" means any individual, firm, partnership or corporation, or combination thereof, including joint ventures, and their successors and assigns that is an independent business enterprise and enters into a contract with the City or its Project Manager or any of its contractors or subcontractors at any tier, with respect to the construction of any part of the Project under contract terms and conditions approved by the City and which incorporate this Agreement.

1.8 "Coordinator" means that individual or entity designated and authorized by the City to provide those administrative services required by this Agreement.

1.9 "Council" means the Building and Construction Trades Council of Alameda County, AFL-CIO.

1.10 "Master Labor Agreement" ("MLA" or "Schedule A") means the Master Collective Bargaining Agreement of each craft Union(s) signatory to this Agreement listed in Exhibit A to this Agreement and incorporated herein by reference, a copy of which shall be made available to the City upon request.

1.11 "Project" means those Construction Contracts for individual public works, within the City of Alameda with a total value (as estimated by the City) of one million dollars ($1,000,000.00) or more. Specifically excluded from this definition of Project and, therefore, the scope of this Agreement are multi-year contracts that have already been let by the City. The City and the Council may mutually agree in writing to add additional components to the Project Scope of Work to be covered under this Agreement.

1.12 "Project Manager" means the person or persons or business entity designated by City or private developer having control over a public works project to oversee all phases of construction on the Project.

1.13 "Trust Fund(s)" means an agreement for an established vacation, pension or other form of deferred compensation plan, apprenticeship and health benefit funds established by an applicable Master Labor Agreement as set forth in Section 17.1.

1.14 "Union(s)" means the Building and Construction Trades Council of Alameda County, AFL-CIO and any affiliated Labor Organization signatory to this Agreement, acting on their own behalf and on behalf of their respective affiliates and member organizations whose names are subscribed hereto and who have through their officers executed this Agreement.

ARTICLE 2

SCOPE OF AGREEMENT

2.1 The City will apply this Agreement as a contract specification to the award of all public works construction contracts on the Project for Covered Work as specifically defined under Article 2 of this Agreement. This Agreement does not apply to any private development projects. In the event that the City is made aware that this Agreement or portions thereof are inconsistent with the terms and conditions of any grant, loan, or contract with any Federal or State agency or with the instructions or directions of an authorized representative of a Federal or State agency regarding the requirements of any such grant, loan, or contract, the City shall notify the Council. Within seven (7) days of notification, the parties shall meet and confer to attempt to modify the Agreement to avoid forfeiture of any funding or otherwise resolve the issue. Should the parties be unable to come to agreement, the Agreement or any inconsistent provision shall be subject to resolution by the grievance arbitration procedures set forth in Article 11. The foregoing notwithstanding, if the granting agency determines that the resolution of such grievance procedure will result in the forfeiture of material grant funds (meaning an amount that would threaten viability of the project), then the Agreement may be modified or terminated in order to avoid the forfeiture.

2.2 Parties: The Agreement shall apply and is limited to all Contractor/Employer(s) performing work for the Project (including subcontractors at any tier), the City, the Council and the Union(s) signatory to this Agreement, acting on their own behalf and on behalf of their respective affiliates and member organizations whose names are subscribed hereto and who have through their officers executed this Agreement.

2.3 Covered Work: This Agreement covers, without limitation, all site preparation, surveying, construction, alteration, demolition, installation, improvement painting or repair of buildings, structures and other works, and related activities for the Project, including geotechnical and exploratory drilling, temporary HVAC, and landscaping and temporary fencing that is within the craft jurisdiction of one of the Union(s) and which is directly or indirectly part of the Project, including, without limitation to the following examples, pipelines (including those in linear corridors built to serve the project), pumps, pump stations, start-up, and modular furniture installation. On-site work includes work done for the Project in temporary yards or areas adjacent to the Project, and at any on-site or off-site batch plant constructed solely to supply materials to the Project. This scope of work includes all on-site soils and materials testing and inspection where such testing and inspection is a classification in which a prevailing wage determination has been published.

2.4.1 This Agreement shall apply to any start-up, calibration, commissioning, performance testing, repair, operational revisions to systems and/or subsystems performed after Completion if it is within the scope of the contract for public work unless it is performed by City employees.

2.4.2 This Agreement covers all on-site fabrication work over which the City, Contractor/Employer(s) or subcontractor(s) possess the right of control (including work done for the Project in any temporary yard or area established for the Project). Additionally, it is agreed hereby that this Agreement covers any off-site work, including fabrication work necessary for the Project defined herein, that is covered by a current MLA or local addenda to a National Agreement of the applicable Union(s) that is in effect as of the execution date of this Agreement.

2.4.3 The furnishing of supplies, equipment or materials which are stockpiled for later use shall not be covered by this Agreement. However, construction trucking work, such as the delivery of ready-mix, asphalt, aggregate, sand or other fill material which are incorporated into the construction process as well as the off-hauling of debris and excess fill, material and/or mud, shall be covered by the terms and conditions of this Agreement, to the fullest extent provided by law and by prevailing wage determinations of the California Department of Industrial Relations. Contractor/Employer(s), including brokers, of persons providing construction trucking work shall provide certified payroll records to the City within ten (10) days of written request or as required by bid specifications.

2.4.4 It is agreed that the Contractor shall require all contractors of whatever tier who have been awarded contracts for work covered by this Agreement, to accept and be bound by the terms and conditions of this Project Agreement by executing the Agreement to be Bound (Attachment A) prior to commencing work. The Project Manager and/or Coordinator shall assure compliance with this Agreement by the Contractors. It is further agreed that, where there is a conflict, the terms and conditions of this Project Agreement shall supersede and override terms and conditions of any and all other national, area, or local collective bargaining agreements, except work covered by the Agreement within the following craft jurisdictions shall be performed under the terms of their National Agreements as follows: National Agreement of Elevator Constructors, National Transient Lodge (NTL) Articles of Agreement, the National Stack/Chimney Agreement, the National Cooling Tower Agreement, and all instrument calibration work and loop checking shall be performed under the terms of the UA/IBEW Joint National Agreement for Instrument and Control Systems Technicians, except that Articles 5, 6, and 11 of this Agreement shall prevail and be applied to such work. It is understood that this is a self-contained, stand alone, Agreement and that by virtue of having become bound to this Project Agreement, neither the Project Contractor/Manager nor the Contractors will be obligated to sign any other local, area, or national agreement.

2.5 The on-site installation or application of all items shall be performed by the craft having jurisdiction over such work as set forth under the provisions of this Agreement; provided, however, it is recognized that installation of specialty items which may be furnished by the owner of the Project or a contractor shall be performed by construction persons employed under this Agreement who may be directed by other personnel in a supervisory role.

2.6 After installation by the Contractor/Employer(s) and upon Completion, it is understood, the City reserves the right to perform start-up, operation, repair, maintenance or revision of equipment or systems with employees of the City. If required, the service representative may make a final check and may direct workmen on site to make any necessary repairs to protect the terms of a manufacturer's guarantee or warranty prior to start-up of a piece of equipment.

2.7 It is expressly agreed and understood by the parties hereto that the City shall have the right to purchase material and equipment from any source, except where limited by this Agreement, and the craftspersons will handle and install such material and equipment.

2.8 Exclusions. The following shall be excluded from the scope of this Agreement:

2.8.1 The Agreement is not intended to, and shall not affect or govern the award of public works contracts by the City which are not included in the Project.

2.8.2 The Agreement shall not apply to a Contractor/Employer(s)' non-construction craft employees, including, but not limited to, executives, managerial employees, engineering employees and supervisors above the level of General Foreman or Senior General Foreman (except those covered by existing MLAs), staff engineers or other professional engineers, administrative and management.

2.8.3 This Agreement shall not apply to any work performed on or near or leading to the site of work covered by this Agreement that is undertaken by state, county, city or other governmental bodies or their contractors; or by public or private utilities or their contractors.

2.8.4 Off-site maintenance of leased equipment and on-site supervision of such work;

2.8.5 The City shall not be required to comply with this Agreement for any work performed with its own forces as permitted by the City Charter, City Codes or Ordinances, the California Uniform Construction Cost Accounting Act, Public Contract Code and Education Code, as applicable.

2.9 Award of Contracts: It is understood and agreed that the City shall, for the award of contracts for public works, have the absolute right to select the bidder with the lowest responsive, responsible bid for the award of contracts under this Agreement. The bidder need only be willing, ready and able to execute and comply with this Agreement.

ARTICLE 3

EFFECT OF AGREEMENT

3.1 By executing the Agreement, the Union(s) and the City agree to be bound by each and all of the provisions of the Agreement.

3.2 By accepting the award of a construction contract for the Project, whether as contractor or subcontractor, the Contractor/Employer(s) agrees to be bound by each and every provision of the Agreement and agrees that it will evidence its acceptance prior to the commencement of work by executing the Agreement To Be Bound in the form attached hereto as Addendum A.

3.3 At the time that any Contractor/Employer(s) enters into a subcontract with any subcontractor providing for the performance of a construction contract, the Contractor/Employer(s) shall provide a copy of this Agreement to said subcontractor and shall require the subcontractor as a part of accepting an award of a construction subcontract to agree in writing to be bound by each and every provision of this Agreement prior to the commencement of work. The obligations of a Contractor/Employer(s) may not be evaded by subcontracting.

3.4 Each Contractor/Employer(s) shall give written notice to the Union(s) of any subcontract involving the performance of work covered by this Agreement within either seven (7) days of entering such subcontract or before such Contractor/Employer(s) commences work on the Project, whichever occurs first. Such notice shall specify the name, address, phone number, and the California Contractor State License Board (CSLB) license number and motor carrier permit number, and DIR registration number, of the Contractor/Employer(s). Written notice at a Pre-Job Conference shall be deemed written notice under this provision for those Contractor/Employer(s) listed at the Pre-Job only.

3.5 This Agreement shall only be binding on the signatory parties hereto and shall not apply to the parents, affiliates, subsidiaries, or other ventures of any such party. Each Contractor/Employer(s) shall alone be liable and responsible for its own individual acts and conduct and for any breach or alleged breach of this Agreement. Any dispute between the Union(s) and the Contractor/Employer(s) respecting compliance with the terms of the Agreement shall not affect the rights, liabilities, obligations and duties between the signatory Union(s) and other Contractor/Employer(s) party to this Agreement.

3.6 The provisions of this Agreement, including MLA's, shall apply to the work covered by this Agreement, notwithstanding the provisions of any other local, area and/or national agreements which may conflict with or differ from the terms of this Agreement. Where a subject covered by the provisions of this Agreement is also covered by a MLA, the provisions of this Agreement shall prevail. Where a subject is covered by the provisions of a MLA and is not covered by this Agreement, the provisions of the MLA shall prevail.

3.7 (a) With regard to any Contractor/Employer(s) that is independently signed to any MLA, this Project Stabilization Agreement shall in no way supersede or prevent the enforcement of any subcontracting clause contained in such MLA, except as specifically set forth in subsection (b) of this Section 3.7. Any such subcontracting clause in an MLA shall remain and be fully enforceable between each craft union and its signatory employers, and no provision of this Project Stabilization Agreement shall be interpreted and/or applied in any

manner that would give this Project Stabilization Agreement precedence over subcontracting obligations and restrictions that exist between craft unions and their respective signatory employers under an MLA, except as specifically set forth in subsection (b) of this Section 3.7.

(b) If a craft union (hereafter "Aggrieved Union") believes that an assignment of work on this Project has been made improperly by a contractor or subcontractor, even if that assignment was as a result of another craft union's successful enforcement of the subcontracting clause in its MLA, as permitted by subsection (a) of this Section 3.7, the Aggrieved Union may submit a claim under the jurisdictional resolution process contained in Article 6 of this PLA, and the decision rendered as part of that process shall be enforceable to require the contractor or subcontractor that made the work assignment to assign that work prospectively to the Aggrieved Union. An award made to a craft union under the subcontracting clause of its MLA, as permitted pursuant to Section 3.7 (a) of this Article, shall be valid and fully enforceable by that craft union unless it conflicts with a jurisdictional award made pursuant to this Agreement. If the award made under the MLA conflicts with the jurisdictional award, the award of any damages under the former shall be null and void ab initio.

ARTICLE 4

RELATIONSHIP BETWEEN PARTIES

4.1 This Agreement shall only be binding on the signatory parties hereto, and shall not apply to parents, affiliates, subsidiaries, or other ventures of any such party.

4.2 Each Contractor/Employer(s) shall alone be liable and responsible for its own individual acts and conduct and for any breach or alleged breach of this Agreement. Any alleged breach of this Agreement by a Contractor/Employer(s) or any dispute between the Union(s) and the Contractor/Employer(s) respecting compliance with the terms of this Agreement, shall not affect the rights, liabilities, obligations and duties between the signatory Union(s) and each of the other Contractor/Employer(s), party to this Agreement.

4.3 It is mutually agreed by the parties that any liability of a Union(s) shall be several and not joint. Any alleged breach of this Agreement by a signatory Union(s) shall not affect the rights, liabilities, obligations and duties between the Contractor/Employer(s) and the other Union(s) party to this Agreement.

4.4 It is recognized by the parties to this Agreement that the Contractor/Employer(s) are acting only on behalf of said Contractor/Employer(s), and said Contractor/Employer(s) have no authority, either expressed, implied, actual, apparent or ostensible, to speak for or bind the City.

ARTICLE 5

NO STRIKES - NO LOCKOUTS

5.1 The Union(s), the City and Contractor/Employer(s) covered by the Agreement agree that for the duration of the Project:

5.1.1 There shall be no strikes, sympathy strikes, work stoppages, picketing, hand billing or otherwise advising the public that a labor dispute exists, or slowdowns of any kind, for any reason, by the Union(s) or employees employed on the Project, at the job site of the Project or at any other facility of the City because of a dispute on the Project. Disputes arising between the Union(s) and Contractor/Employer(s) on other City projects are not governed by the terms of the Agreement or this Article.

5.1.2 As to employees employed on the Project, there shall be no lockout of any kind by a Contractor/Employer(s) covered by the Agreement.

5.1.3 If a master collective bargaining agreement expires before the Contractor/Employer(s) completes the performance of the Construction Contract and the Union(s) or Contractor/Employer(s) gives notice of demands for a new or modified master collective bargaining agreement, the Union(s) agrees that it will not strike on work covered under this Agreement and the Union(s) and the Contractor/Employer(s) agree that the expired master collective bargaining agreement shall continue in full force and effect for work covered under this Agreement until a new or modified master collective bargaining agreement is reached. If the new or modified master collective bargaining agreement provides that any terms of the master collective bargaining agreement shall be retroactive, the Contractor/Employer(s) agrees to comply with any retroactive terms of the new or modified master collective bargaining agreement which are applicable to employees who were employed on the projects during the interim with retroactive payment due within seven (7) days of the effective date of the modified Master Agreement.

5.1.4 Withholding employees for failure of a Contractor/Employer(s) to tender timely Trust Fund(s) contributions as required in accordance with Article 16 and/or for failure to timely meet its weekly payroll is not a violation of this Article 5; however, the Union(s) shall give the affected Contractor/Employer(s), the Coordinator and the City written notice seventy-two (72) hours prior to the withholding of employees when failure to tender Trust Fund(s) contributions has occurred. There shall be twenty-four (24) hours notice when failure to meet weekly payroll has occurred or when paychecks are determined to be nonnegotiable by a financial institution normally recognized to honor such paychecks.

Should a Contractor/Employer(s) performing work on this Project be delinquent in the payment of Trust Fund(s) contributions required under this Agreement, the

Union(s) may request that the general Contractor/Employer(s) issue joint checks payable to the Contractor/Employer(s) and the appropriate employee benefit Trust Fund(s), on behalf of the employee(s) until such delinquencies are satisfied. Any Trust Fund(s) claiming that a Contractor/Employer(s) is delinquent in its fringe benefit contributions to the Trust Fund(s) will provide written notice of the alleged delinquency to the affected Contractor/Employer(s), with copies to the General Contractor/Employer(s), the Coordinator and the City. The notice will indicate the amount of delinquency asserted and the period that the delinquency covers. It is agreed, however, with respect to Contractor/Employer(s) delinquent in trust or benefit contribution payments, that nothing in this Agreement shall affect normal contract remedies available under the MLAs. If the General Contractor/Employer(s) is delinquent in the payment of Trust Fund(s) contributions for covered work performed on this project, the General Contractor/Employer(s) agrees that the affected Trust Fund(s) may place the City on notice of such delinquencies and the General Contractor/Employer(s) further agrees that the City may issue joint checks to the General Contractor/Employer(s) and the Trust Fund(s), on behalf of the employee(s) until the delinquency is satisfied.

5.2 Expedited Arbitration: Any party to this Agreement shall institute the following procedure, prior to initiating any other action at law or equity, when a breach of this Article is alleged to have occurred:

5.2.1 A party invoking this procedure shall notify Bob Hirsch, as the permanent Arbitrator, or, Barry Winograd, as the alternate Arbitrator under this procedure. In the event that the permanent Arbitrator is unavailable at any time, the alternate will be contacted. If neither is available, then a selection shall be made from the list of Arbitrators in Article 11.2.2, Step 5. Should either the permanent or the alternate arbitrator listed above no longer work as a labor arbitrator, the City and the Council shall mutually agree to a replacement. Notice to the Arbitrator shall be by the most expeditious means available, with notices by facsimile, email or telephone to the Coordinator, the City and the party alleged to be in violation, and to the Council and involved local Union(s) if a Union(s) is alleged to be in violation.

5.2.2 Upon receipt of said notice, the Coordinator will contact the designated Arbitrator named above or his alternate who will attempt to convene a hearing within twenty-four (24) hours if it is contended that the violation still exists.

5.2.3 The Arbitrator shall notify the parties by facsimile, email or telephone of the place and time for the hearing. Said hearing shall be completed in one session, which, with appropriate recesses at the Arbitrator's discretion, shall not exceed twenty-four (24) hours unless otherwise agreed upon by all parties. A failure of any party to attend said hearings shall not delay the hearing of evidence or the issuance of an award by the Arbitrator.

5.2.4 The sole issue at the hearing shall be whether or not a violation of Article 5, Section 5.1.1 of the Agreement has occurred. The Arbitrator shall have no authority to consider any matter of justification, explanation or mitigation of such violation or to award damages, which issue is reserved for court proceedings, if any. The award shall be issued in writing within three (3) hours after the close of the hearing, and may be issued without a written opinion. If any party desires a written opinion, one shall be issued within fifteen (15) days, but its issuance shall not delay compliance with or enforcement of the award. The Arbitrator may order cessation of the violation of this Article and other appropriate relief and such award shall be served on all parties by hand or certified mail upon issuance.

5.2.5 Such award may be enforced by any Court of competent jurisdiction upon the filing of this Agreement and all other relevant documents referred to above in the following manner. Written notice of the filing of such enforcement proceedings shall be given to the other party. In the proceeding to obtain a temporary order enforcing the Arbitrator's award as issued under Section 5.2.4 of this Article, all parties waive the right to a hearing and agree that such proceedings may be ex parte. Such agreement does not waive any party's right to participate in a hearing for a final order or enforcement. The Court's order or orders enforcing the Arbitrator's award shall be served on all parties by hand or delivered by certified mail.

5.2.6 Any rights created by statute or law governing arbitration proceedings inconsistent with the above procedure, or which interfere with compliance, are waived by the parties.

5.2.7 The fees and expenses of the Arbitrator shall be divided equally between the party instituting the arbitration proceedings provided in this article and the party alleged to be in breach of its obligation under this article.

ARTICLE 6

WORK ASSIGNMENTS AND JURISDICTIONAL DISPUTES

6.1 The assignment of Covered Work will be solely the responsibility of the Contractor/Employer(s) performing the work involved and such work assignments will be in accordance with the Plan for the Settlement of Jurisdictional Disputes in the Construction Industry (the "Plan") or any successor Plan.

6.2 All jurisdictional disputes on this Project between or among the Union(s) and the Contractor/Employer(s), parties to this Agreement, shall be settled and adjusted according to the present Plan established by the Building and Construction Trades Department, or any other plan or method of procedure that may be adopted in the future by the Building

and Construction Trades Department. Decisions rendered shall be final, binding and conclusive on the Contractor/Employer(s) and Union(s) parties to this Agreement.

6.2.1 If a dispute arising under this Article involves the Northern California Carpenters Regional Council or any of its subordinate bodies, an Arbitrator shall be chosen by the procedures specified in Article V, Section 5, of the Plan from a list composed of John Kagel, Thomas Angelo, Robert Hirsch and Thomas Pagan and the Arbitrator's hearing on the dispute shall be held at the offices of the California State Building and Construction Trades Council in Sacramento, California, within fourteen (14) days of the selection of the Arbitrator. All other procedures shall be as specified in the Plan.

6.3 All jurisdictional disputes shall be resolved without the occurrence of any strike, work stoppage, or slow-down of any nature, and the Contractor/Employer(s)' assignment shall be adhered to until the dispute is resolved. Individuals violating this Section shall be subject to immediate discharge.

6.4 Each Contractor/Employer(s) shall conduct a Pre-Job Conference with the Council prior to commencing Covered Work. The Primary Employer, the Coordinator and the City will be advised in advance of all such conferences and may participate if they wish. Pre-job conferences for different Contractor/Employer(s) may be held together.

ARTICLE 7

COORDINATOR

7.1 The City will designate a Coordinator, who will be responsible for the administration and application of this Agreement.

7.2 The Coordinator shall endeavor to facilitate harmonious relations between the Contractors and Unions signatory hereto and will represent the City at the Pre-Job Conference(s) called for in Article 8 and the A Joint Administrative Committee called for in Article 20. The Coordinator shall not be responsible for the acts of the Contractor/Employer(s) or Unions signatory hereto, and will not be a party to any arbitration or litigation arising out of this Agreement.

ARTICLE 8

PRE-JOB CONFERENCES

8.1 Pre-Job Conference Timing and Attendees:

8.1.1 The Contractor shall hold and conduct a mandatory pre-job conference with representatives of all involved sub-contractors and the Unions at a location mutually agreeable to the Council at least twenty-one (21) calendar days prior to:

(a) The commencement of any Covered Work, as defined in section 2.3 above; and

(b) The commencement of Covered Work on each subsequently awarded Construction Contract.

8.1.2 The conference shall be attended by a representative of each participating Contractor, each affected Union, and the Council. The Owner may attend at its discretion.

8.2 Pre-Job Conference Information.

8.2.1 The information to be presented at the pre-job conference will consist of:

(a) A listing of each Contractor's scope of work;

(b) The Contractor's craft assignments;

(c) The estimated number of craft workers required to perform the work;

(d) Transportation and parking arrangements, if any;

(e) The estimated start and completion dates of the work;

(f) Identification of any pre-fabricated materials;

(g) All workforce projection information required under Article 14 of this Agreement; and

(h) A listing of all specialty work to be performed by the employees of an equipment vendor or manufacturer to protect the warranty on such equipment, and a demonstration by enumeration of specific tasks why such work cannot be performed by Covered Employees.

8.3 Work will not commence for any Contractor until an **Agreement to be Bound** has been signed and submitted by a duly authorized representative of the Contractor to the applicable Union(s) and the Council.

ARTICLE 9

MANAGEMENT RIGHTS

9.1 Consistent with the Schedule A Agreements, the Contractor/Employer(s) shall retain full and exclusive authority for the management of their operations, including the right to direct their work force in their sole discretion. No rules, customs or practices shall be permitted or observed which limit or restrict production, or limit or restrict the working efforts of employees except that lawful manning provisions in the MLA shall be recognized.

ARTICLE 10

WORK RULES

10.1 Work rules shall apply as set forth in the applicable MLA.

ARTICLE 11

GRIEVANCE PROCEDURE

11.1 All disputes concerning the interpretation and/or application of this Agreement which do not fall within the Article 5, No Strikes-No Lockouts procedure or Article 6, Work Assignments and Jurisdictional Disputes, shall be governed by the following grievance and arbitration procedure.

Employee Grievances: All disputes involving discipline and/or discharge of employees working on the Project shall be resolved through the grievance and arbitration provision contained in the MLA for the craft of the affected employee. No employee working on the Project shall be disciplined or dismissed without just cause.

11.2 Grievances between one or more Union(s) and one or more Contractor/Employer(s); or between the City and one or more Contractor/Employer(s) regarding interpretation and/or application of this Agreement shall be pursued according to the following provisions:

11.2.1 A grievance shall be considered null and void if not brought to the attention of the Contractor/Employer(s) or the Union(s) within fourteen (14) calendar days after the grievance is alleged to have occurred but in no event more than thirty (30) calendar days after the charging party became aware of the event giving rise to the dispute. The Coordinator shall be delivered a copy of all grievances.

11.2.2 Grievances between one or more Union(s) and one or more Contractor/Employer(s), or between the City and one or more Contractor/Employer(s) regarding provisions of this Agreement shall be settled or otherwise resolved according to the following Steps and provisions:

Step 1: A representative of the grievant and the party against whom the grievance is filed shall meet and attempt to resolve the grievance.

Step 2: In the event the matter remains unresolved in Step 1 above, within seven (7) calendar days, the grievance shall be reduced to writing and may then be referred by the Union(s), the City, or the Contractor/Employer(s) to the other party for discussion and resolution.

Step 3: In the event that the representatives are unable to resolve the dispute within the seven (7) calendar days after its referral to Step 2, either involved party may submit the dispute within seven (7) calendar days to the Joint Administrative Subcommittee established in Section 20.2. The Joint Administrative Subcommittee shall meet within seven (7) calendar days after such referral (or such longer time as is mutually agreed upon by the representatives on the Joint Administrative Subcommittee) to confer in an attempt to resolve the grievance. If a Union(s) is party to the grievance, regardless of which party has initiated the grievance proceeding, prior to the

meeting of the Joint Administrative Subcommittee, the Union(s) shall notify its International Union Representative(s), which shall advise both parties if it intends on participating in the meeting. The participation by the International Union Representative in this Step 3 meeting shall not delay the time set herein for the meeting, unless otherwise mutually agreed by the parties. If the dispute is not resolved by the Joint Administrative Subcommittee, it may be referred within seven (7) calendar days by either party to Step 4.

At the time a grievance is submitted under this Agreement or any MLA, the Union(s) may request that the City withhold and retain an amount from what is due and owing to the Contractor/Employer(s) against whom the grievance is filed, sufficient to cover the damages alleged in the grievance, should the Union(s) prevail.

The amount shall be retained by the City until such time as the underlying grievance giving rise to the retention is withdrawn, settled, or otherwise resolved, and the retained amount shall be paid to whomever the parties to the grievance shall decide, or to whomever an Arbitrator shall so order.

Step 4: In the event the matter remains unresolved in Step 3, either Party may request, within seven (7) calendar days, that the dispute be submitted to arbitration. The time limits set out in this procedure may, upon mutual agreement, be extended. Any request for arbitration, request for extension of time limits, and agreement to extend such time limits shall be in writing with a copy delivered to the Coordinator.

Step 5: The Parties agree that the Arbitrator who will hear the grievance shall be selected from the following: Barry Winograd, William Riker, and Robert Hirsch. The parties shall flip a coin to determine who shall strike the first name and shall then alternately strike names from the list and the last remaining name shall be the neutral third party Arbitrator who shall have the power to resolve the dispute in a final and binding manner. Should a Party to the procedure fail or refuse to participate in the hearing, if the Arbitrator determines that proper notice of the hearing has been given, said hearing shall proceed to a default award. The Arbitrator's award shall be final and binding on all Parties to the arbitration. The costs of the arbitration, excluding attorney fees, including the Arbitrator's fee and expenses, shall be borne by the losing party. The Arbitrator's decision shall be confined to the question(s) posed by the grievance and the Arbitrator shall not have authority to modify amend, alter, add to, or subtract from, any provisions of this Agreement.

11.3 Grievances raised by the City against one or more Union(s) and/or the Council, or against the City by one or more Union(s) and/or the Council, regarding provisions of this Agreement shall be settled or otherwise resolved according to the following Steps and provisions:

Step 1: The Joint Administrative Subcommittee shall attempt to resolve the grievance. The Joint Administrative Subcommittee shall meet within five (5) working days after receipt of the grievance (or such longer time as is mutually agreed upon by the representatives on this Joint Administrative Subcommittee) to confer with regard to the grievance. If the dispute is not resolved by the Joint Administrative Subcommittee, it may be referred within five (5) working days by either party to the Joint Administrative Committee.

Step 2: The Joint Administrative Committee shall attempt to resolve the grievance. The Joint Administrative Committee shall meet within five (5) working days after receipt of the grievance (or such longer time as is mutually agreed upon by the representatives on the Joint Administrative Committee) to confer with regard to the grievance. In the event that the Joint Administrative Committee is unable to resolve the dispute within the five (5) working days after receipt of the grievance, either involved party may proceed to Step 3.

Step 3: In the event the matter remains unresolved pursuant to Step 2, either Party may request that the dispute be submitted to arbitration in accordance with the process set forth in Paragraph 11.2.2. Step 5.

Step 4: Should a Party to the procedure fail or refuse to participate in the hearing, if the Arbitrator determines that proper notice of the hearing has been given, said hearing shall proceed to a default award. The Arbitrator's award shall be final and binding on all Parties to the arbitration. The costs of the arbitration, including the Arbitrator's fee and expenses, shall be borne by the losing Party. The Arbitrator's decision shall be confined to the question(s) posed by the grievance and the Arbitrator shall not have authority to modify amend, alter, add to, or subtract from, any provisions of this Agreement.

11.4 Grievances between a Union(s) and a Union(s)' signatory Contractor/Employer(s) involving interpretation or application of the MLA shall be governed by the grievance procedures contained in the MLA.

ARTICLE 12

UNION RECOGNITION AND REPRESENTATION

12.1 The Contractor/Employer(s) recognize the Union(s) signatory hereto as the sole and exclusive collective bargaining representatives for all craft employees on the Project.

12.2 The Contractor/Employer(s) shall require all employees who work on a Construction Contract on or before eight (8) days of consecutive or cumulative employment on the Project to comply with the applicable Union(s)' security provisions, and to maintain compliance for the period of time they are performing work on the Project, which requirement shall be satisfied by the tendering of periodic dues and fees uniformly required to the extent allowed by law. Further, there is nothing in this Agreement that would prevent non-union employees from joining the Union(s).

12.3 Authorized representatives of the Union(s) shall have access to the site at all times. Such representatives shall comply with reasonable visitor safety and security rules established for the Project at the pre-job meeting. Access for Union(s) representatives will not be unduly restricted.

ARTICLE 13

REFERRAL

13.1 Contractor/Employer(s) performing construction work on the Project described in the Agreement shall, in filling craft job requirements, utilize and be bound by the registration facilities and referral systems established or authorized by the Union(s) signatory hereto when such procedures are not in violation of Federal law. The Contractor/Employer(s) shall have the right to reject any applicant referred by the Union(s), in accordance with the applicable Master Agreement.

13.2 The Contractor/Employer(s) shall have the unqualified right to select and hire directly all supervisors above the level of general foreman or senior general foreman it considers necessary and desirable, without such persons being referred by the Union(s).

13.3 In the event that referral facilities maintained by the Union(s) are unable to fill the requisition of a Contractor/Employer(s) for employees within a forty-eight (48) hour period (Saturdays, Sundays and Holidays excluded) after such requisition is made by the Contractor/Employer(s), the Contractor/Employer(s) shall be free to obtain workers from any source. A Contractor/Employer(s) who hires any personnel to perform covered work on the Project pursuant to this Section shall immediately provide the appropriate Union(s) with the name and address of such employee(s) and shall immediately refer such employee(s) to the appropriate Union(s) to satisfy the requirements of Article 12 of this Agreement.

ARTICLE 14

LOCAL WORKFORCE DEVELOPMENT

14.1 The parties agree to a goal that residents of the city of Alameda, and Alameda County ("Local Residents"), in order of priority as here listed, will perform up to twenty-five

percent (25%) percent of all hours worked on the Project, on a craft-by-craft basis, if such workers are available, capable and willing to work. Contractors will first be required to request residents from the City of Alameda, and if those are not available, will then request residents from Alameda County. If the Local Resident is also a high school graduate of a high school located in Alameda or has received a General Educational Development diploma ("GED") while living in Alameda, those hours will count double. In addition, the parties agree that participants in the Alameda Point Collaborative Program will be referred to the apprentice programs of the Union(s) and establish a goal that such participants will perform fifteen percent (15%) of all apprentice hours worked on the Project. All participants that will be referred to the contractors to meet this requirement will have gone through a pre-apprenticeship program that meets the Multi-Craft Core Curriculum as established by the National Building Trades, or other union pre-apprenticeship programs.

14.2 The Contractor/Employer(s) shall make good faith efforts to reach these goals working through the hiring hall procedures of the applicable Schedule A Agreement and, when applicable, utilize their "rehire" and "name call" rights to employ such Local Residents. The Union(s) shall utilize their utmost efforts to recruit sufficient numbers of apprentice and journeymen craftspersons who are Local Residents to fulfill the requirements of the Contractor/Employer(s). The parties to this Agreement support the development and placement of increased numbers of skilled construction workers from Local Residents to meet the needs of the Project and the requirements of the industry generally.

14.3 To evaluate the performance of the Contractor/Employer(s) and Union(s) in achieving the employment of Local Residents goal on this Project, the Contractor/Employer(s) shall submit copies of their monthly certified payroll reporting forms to the Coordinator. The Contractor shall also submit a monthly report tabulating the ratio of Local Residents to total employees for each craft Union to the Coordinator. The performance of the Contractor/Employer(s) and Union(s) will be reviewed at the periodic Joint Administrative Committee meetings called for in Section 20 of this Agreement.

ARTICLE 15

NON-DISCRIMINATION

15.1 The Contractor/Employer(s) and Union(s) agree to comply with all anti-discrimination provisions of federal, state and local law, to protect employees and applicants for employment on the Project.

ARTICLE 16

APPRENTICES

16.1 Recognizing the need to maintain continuing support of programs designed to develop adequate numbers of competent workers in the construction industry, the Contractor/Employer(s) will employ apprentices in the respective Union(s) to perform such work as is within their capabilities and which is customarily performed by the Union(s) in which they are indentured. The apprentice ratios will be in compliance with the applicable provisions of the California Labor Code and Prevailing Wage Rate Determinations.

16.2 The parties only recognize the State-approved Apprenticeship training programs administered by Joint Labor/Management Apprenticeship Training Committees for the purposes of meeting the goals of this Article 16.

ARTICLE 17

WAGE SCALES AND FRINGE BENEFITS

17.1 All Contractor/Employer(s) agree to pay contributions to the established vacation, pension and other form of deferred compensation plan, apprenticeship, health benefit funds, and all other contributions established by the applicable MLA for each hour worked on the Project in the amounts designated in the MLAs of the appropriate Union(s) that are recognized by a prevailing wage determination and paid in accordance with the MLA. The Contractor/Employer(s) shall not be required to pay contributions to any other trust funds or other contributions that are not contained in the published prevailing wage determination to satisfy their obligation under this Article, except that those Contractor/Employer(s) who are signatory to the MLAs with the respective trades shall continue to pay all trust fund or other contributions as outlined in such MLAs.

17.2 By signing this Agreement, the Contractors/Employers adopt and agree to be bound by the written terms of the legally established Trust Agreements, as described in Section 17.1, which may from time to time be amended, specifying the detailed basis on which payments are to be made into, and benefits paid out of, such Trust Funds. The Contractors/Employers authorize the parties to such local trust agreements to appoint trustees and successor trustees to administer the Trust Funds and hereby ratify and accept the trustees so appointed as if made by the Contractors/Employers. The Contractors/Employers agree to execute a separate Subscription Agreement(s) for Trust Funds when such Trust Fund(s) requires such document(s).

17.3 Wages, Hours, Terms and Conditions of Employment: The wages, hours and other terms and conditions of employment on the Project shall be governed by the MLAs of the respective Union(s), copies of which shall be made available to the City upon request, to the extent such MLA is not inconsistent with this Agreement.

17.4 Holidays: Holidays shall be established as set forth in the applicable MLA.

ARTICLE 18

HEALTH AND SAFETY

18.1 The employees covered by the terms of this Agreement shall at all times, while in the employ of the Contractor/Employer(s), be bound by the reasonable safety rules and regulations as established by the City and Contractor/Employer(s) and in accordance with OSHA/Cal-OSHA. These rules and regulations will be published and posted at conspicuous places throughout the Project.

18.2 In accordance with the requirements of OSHA/Cal-OSHA, it shall be the exclusive responsibility of each Contractor/Employer(s) on the Project to assure safe working conditions for its employees and compliance by them with any safety rules contained herein or established by the Contractor/Employer(s).

18.3 A convenient supply of cold and potable drinking water shall be provided by the Contractor/Employer(s).

18.4 The Contractor/Employer(s) and Union(s) agree that the work site shall be a drug free workplace. Parties agree to recognize and use the Substance Abuse Prevention Program contained in each applicable Union(s)' MLA.

ARTICLE 19

HELMETS TO HARDHATS

19.1 The parties recognize a desire to facilitate the entry into the Building and Construction Trade Union(s) of veterans who are interested in careers in the building and construction industry. The parties agree to utilize the services of the Center for Military Recruitment, Assessment and Veteran's Employment (hereinafter "Center") and the Center's "Helmets to Hardhats" program to serve as a resource for preliminary orientation, assessment of construction aptitude, referral to apprenticeship programs or hiring halls, counseling and mentoring, support network, employment opportunities and other needs as identified by the parties.

19.2 The Union(s) and Contractor/Employer(s) agree to coordinate with the Center to assist in the creation and maintenance an integrated database of Veterans interested in working on this Project and of apprenticeship and employment opportunities for this Project. To the extent permitted by law, the Union(s) will give credit to such Veterans for bona fide, provable past experience.

19.3 To evaluate the performance of the Contractor/Employer(s) and Union(s) in achieving the employment of veterans on this Project, the Contractor/Employer(s) shall submit to the Coordinator information regarding veterans it has employed on a Project. The Contractor/Employer(s) shall submit a monthly report tabulating the number of veterans employed to the Coordinator. The performance of the Contractor/Employer(s) and Union(s) will be reviewed at the periodic Joint Administrative Committee meetings called for in Section 20 of this Agreement.

ARTICLE 20

JOINT ADMINISTRATIVE COMMITTEE

20.1 The Council and the City to this Agreement shall establish a six (6) person Joint Administrative Committee. This Committee shall be comprised of three (3) representatives selected by the City and three (3) representatives selected by the Council. The City and the Council shall designate alternates who shall serve in the absence of designated representatives for any purpose contemplated by this Agreement. The Joint Administrative Committee shall meet as required to review the implementation of the Agreement, the progress of the Projects and the employment of Local Residents and veterans on Projects covered by this Agreement.

20.2 The Joint Administrative Committee shall appoint a Joint Administrative Subcommittee consisting of one City representative and one Union(s) representative for the purpose of convening to confer in an attempt to resolve a grievance that has been filed consistent with Article 11. Any question regarding the meaning, interpretation, or application of the provisions of this Agreement shall be referred directly to the Joint Administrative Subcommittee for resolution. The Joint Administrative Subcommittee shall meet as required to resolve grievances by majority vote with such resolutions to be final and binding on all signatories of the Agreement. A failure of any party or parties to attend said hearing shall not delay the hearing of evidence or issuance of an award by the Joint Administrative Subcommittee, if such award is made by a majority vote, and the hearing shall proceed ex parte. If the subcommittee is unable to resolve the grievance, the grievance may be referred in accordance with Step 3 of Article 11.

ARTICLE 21

MISCELLANEOUS PROVISIONS

21.1 Counterparts. This Agreement may be executed in counterparts, such that original signatures may appear on separate pages, and when bound together all necessary signatures shall constitute an original. Faxed or e-mailed pdf signature pages transmitted separately to other parties to this Agreement shall be deemed equivalent to original signatures.

21.2 Warranty of Authority. Each of the persons signing this Agreement represents and warrants that such person has been duly authorized to sign this Agreement on behalf of the party indicated, and each of the parties by signing this Agreement warrants and represents that such party is legally authorized and entitled to enter into this Agreement.

ARTICLE 22

GENERAL SAVINGS CLAUSE

22.1 It is not the intention of either the City, Contractor/Employer(s) or the Union(s) parties to violate any laws governing the subject matter of this Agreement. If any Article or provision of this Agreement shall be declared invalid, inoperative, or unenforceable by any competent authority of the executive, legislative, judicial or administrative branch of the federal, state or local government, the parties shall suspend the operation of each such Article or provision during the period of invalidity. Such suspension shall not affect the operation of any other provision covered in this Agreement to which the law or regulation is not applicable. Further, the Contractor/Employer(s) and Union(s) agree that if and when any or all provisions of this Agreement are finally held or determined to be illegal or void by a Court of competent jurisdiction, the City and the Council will promptly enter into negotiations concerning the substance affected by such decision for the purpose of achieving conformity with the requirements of an applicable law and the intent of the parties hereto.

ARTICLE 23

DURATION OF AGREEMENT

23.1 This Agreement shall become effective on the day the city of Alameda ratifies this Agreement and shall continue in full force and effect for a period of three (3) years, at which time this Agreement will be reviewed and considered for extension or renewal with modifications if appropriate. Individual projects within the scope of this Agreement may be completed in phases and this Agreement shall be applied to such individual projects until Completion of such phase. After the expiration of this Agreement, the provisions of the Agreement shall continue to apply to those Projects subject to this Agreement until construction is completed. The parties may mutually agree in writing to amend, extend or terminate this Agreement at any time.

[THE REMAINDER OF THIS PAGE INTENTIONALLY LEFT BLANK]

ADDENDUM "A"

PROJECT STABILIZATION AGREEMENT FOR THE CITY OF ALAMEDA

AGREEMENT TO BE BOUND

The undersigned party confirms that it agrees and assents to comply with and to be bound by the City of Alameda Project Stabilization Agreement as such Agreement may, from time to time, be amended by the parties or interpreted pursuant to its terms.

By executing this Agreement To Be Bound, the undersigned party subscribes to, adopts and agrees to be bound by the written terms of the legally established trust agreements, as set forth in section 17, specifying the detailed basis upon which contributions are to be made into, and benefits made out of, such Trust Fund(s) and ratifies and accepts the trustees appointed by the parties to such Trust Fund(s) and agrees to execute a separate Subscription Agreement(s) for Trust Funds when such Trust Fund(s) require(s) such document(s).

Such assent and obligation to comply with and to be bound by this Agreement shall extend to all work covered by said Agreement undertaken by the undersigned party. The undersigned party shall require all of its subcontractors, of whatever tier, to become similarly bound for all their work within the scope of this Agreement by signing an identical Agreement To Be Bound.

This letter shall constitute a subscription agreement, to the extent of the terms of the letter.

Dated: _____ Project: _____

_____ _____

Signature of Authorized Officer Authorized Officer & Title

_____ _____

Name of Contractor/Employer(s) Contractor/Employer(s) Address

_____ _____

CSLB # Area Code Phone

_____ _____

E-mail and/or Fax Motor Carrier (CA) Permit Number

_____

DIR Prevailing Wage Registration #

EXHIBIT A
MASTER LABOR AGREEMENTS OF SIGNATORY AFFILIATED LOCAL UNIONS:

SIGNATURES

City of Alameda

Jill Keimach, City Manager

Approved as to Form:
Janet Kern, City Attorney

Building and Construction Trades Council
Of Alameda County, AFL-CIO

Andreas Cluver, Secretary-Treasurer

SIGNATORY UNION(S)

Asbestos Workers, Local 16 By:

Boilermakers, Local 549 By:

Bricklayers & Allied Craftsmen, Local 3 By:

Cement Masons, Local 300 By:

Electrical Workers, Local 595 By:

Elevator Constructors, Local 8 By:

Laborers, Local 886 By:

Iron Workers, Local 378 By: _____

Laborers, Local 67 By: _____

Laborers, Local 304 By: _____

Operating Engineers, Local 3 By: _____

Plasterers, Local 66 By: _____

Roofers, Local 81 By: _____

Sheet Metal Workers, Local 104 By: _____

Sign Display, Local 510 By: _____

Sprinkler Fitters, Local 483 By: _____

Teamsters, Local 853 By: _____

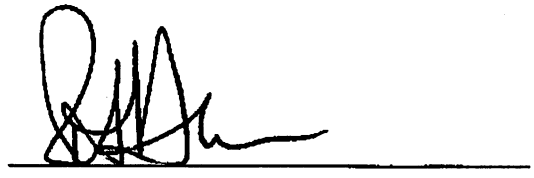
United Association of Journeymen and Apprentices Fitting Industry, Underground Utility & Landscape, Local 355

By: 

United Association of Steamfitters, Pipefitters, Plumbers, & Gas Fitters, Local 342

By: 

Northern California Carpenters Regional Council (on behalf of Carpenters, Local 713, Carpenters, Local 2236, Lathers, Local 68L, Millwrights, Local 102, Pile Drivers, Local 34)

By: 

District Council No. 16 Northern California International Union of Painters & Allied Trades (on behalf of Auto & Marine Painters, Local 1176, Carpet & Linoleum Layers, Local 12, Glaziers, Architectural Metal & Glassworkers, Local 169, Painters & Tapers, Local 3)

By: 

District Council of Iron Workers of the State of California & Vicinity Trades

By: _____

EXHIBIT "L"

STANDARDIZATION OF MAJOR EQUIPMENT COMPONENETS FOR SEWER PUMP STATIONS

EXHIBIT "L"

STANDARDIZATION OF MAJOR EQUIPMENT COMPONENETS FOR SEWER PUMP STATIONS

The Engineer hereby finds that it is necessary to specify standardized equipment for installation in all of the City's sewer pump stations in order to field test or experiment to determine the equipment's suitability for future use and in order to match existing equipment already in use in other sewer pump stations.

The Engineer further finds that standardizing the specific major components of the sewer pump stations would result in more efficient and reliable equipment operations, faster repair time on incidents that could result in sanitary sewer overflows (SSOs) through the use of common parts, and a reduction in on-going training costs. Standardization will also minimize spare and critical replacement parts inventory and costs.

Based on the foregoing criteria, the following specified standardized equipment shall be required for sewer pump stations.

- Flygt Submersible and Dry-Pit Submersible Pumps
- Cummins Power Generation (stationary standby emergency generators)
- Eaton Insight motor monitor
- Unitronics Pump Controller with pump vision and motor vision
- MOSCAD (Motorola SCADA)
- PMC, VL2000 Series Submersible Hydrostatic (Pressure) Level Transmitter
- MJK 7030 Float Type Level Switches Floats

The following standardized equipment items for sewer pump station are included in this project. They are described in detail in the Project Technical Specifications as listed below:

• Flygt Pumps	Section 11312 – Submersible Pumps
• Cummins Power Generation	Section 16630 - Engine-Generator Set
• Eaton Insight motor monitor	Section 16901 - Pump Control Panel
• Unitronics Pump Controller	Section 16901 - Pump Control Panel
• Hydrostatic (Pressure) Level Transmitter	Section 16901 - Pump Control Panel, and sheet notes
• Float Type Level Switches Floats	Section 16901 - Pump Control Panel

EXHIBIT “M”

Special Inspection and Testing Agreement Form

STATEMENT OF SPECIAL INSPECTION

Community Development • Planning & Building
2263 Santa Clara Ave., Rm. 190
Alameda, CA 94501-4477
alamedaca.gov
510.747.6800 • F: 510.865.4053 • TDD: 510.522.7538
Hours: 7:30 a.m.–3:30 p.m., M–Th

Project Title: Group 4-Sewerage Pump Station Renovations for Reliability and Safety Imp. Plan Check #: _____

Project Address: Varies

This Statement of Special Inspections is submitted in fulfillment of the requirements of California Building Code Sections 1704 and 1705.

Special Inspections and Testing will be performed in accordance with the approved plans and specifications, this statement and California Building Code Sections 1704, 1705, 1707, and 1708.

The attached Summary of Special Inspection lists the special inspections and tests required. Special inspectors will refer to the approved plans and specifications for detailed special inspection requirements.

Any additional tests and inspections required by the approved plans and specifications will also be performed.

Before a Permit Can be Issued

The owner or his representative, on the advice of the registered design professional in responsible charge, shall complete, sign by all parties, and submit two (2) copies of this package to this Division for review and approval.

CITY OF Alameda

1. The Owner recognizes his or her obligation to ensure that the construction complies with the approved permit documents and to implement this program of special inspections.
2. Contractor is responsible for proper notification to the Inspection or Testing agency for items listed.
3. Only the testing laboratory should take samples and transport them to their laboratory.
4. Copies of all laboratory reports and inspections are to be sent directly to this Division and to the registered design professional in responsible charge by the testing agency on a weekly basis.
5. Inspection agency to submit names and qualifications of on-site special inspectors to this Division for approval. Submission of qualifications is not required when the agency utilizes the inspectors who are pre-approved by the City. See Item #10 below.

   The agency must provide each special inspector with an identification badge that indicates the following:

   - Name of inspector
   - Photo of inspector
   - The specific areas in which the inspector is qualified to inspect
   - An authorization signature by the registered engineer who is a full-time employee of the agency
   - The authorization signature by the registered engineer who is a full-time employee of the inspector
6. The special inspector is responsible to the Chief Building Official for immediate notification of any concerns and/or problems encountered.
7. It is the responsibility of the contractor to review the Building Division approved plans for additional inspection or testing requirements that may be noted. A pre-construction conference at the job site is recommended to review special inspection procedures.
8. The special inspector shall use only Building Division approved drawings.
9. **Before an occupancy permit can be issued**: A final report of special inspections documenting required special inspections, tests and correction of any discrepancies noted in the inspections shall be submitted prior to issuance of a Certificate of Use and Occupancy (California Building Code Section 1704.1.2). The final report will document:

   - Required special inspections
   - Correction of discrepancies noted in inspection
10. Attach a City approved matrix list from the Special Inspection Agency for all special inspectors showing inspection areas for which they are qualified by experience and appropriate certifications (see enclosed). This will be cross checked with the list currently residing in our office, to make sure all special inspectors are approved by the City.

ACKNOWLEDGEMENT

Print: _____ Sign: _____ Date: _____
Registered Design Professional in Responsible Charge

Print: _____ Sign: _____ Date: _____
Owner's authorization

Print: _____ Sign: _____ Date: _____
Contractor

Print: _____ Sign: _____ Date: _____
Special Inspection Agency

Print: _____ Sign: _____ Date: _____
Building Official's Acceptance

CITY OF Alameda

SPECIAL INSPECTION AND TESTING AGENCIES

The following are the testing agencies and special inspectors that will be retained to conduct tests and inspection on this project.

RESPONSIBILITY	FIRM NAME	ADDRESS, TELEPHONE AND E-MAIL
Special Inspection		
Material Testing		

CITY OF Alameda

CONTRACTOR'S STATEMENT OF RESPONSIBILITY

Per Section 1706 of the California Building Code, the contractor responsible for the construction of a main wind or seismic force resisting system, designated seismic system or a wind or seismic resisting component listed in the statement of special inspections (structural tests and inspection schedule and as noted on the Building Division approved plans) shall submit a written statement of responsibility to the Building Official and the owner prior to the commencement of work on the system or component.

To comply with the requirements of California Building Code Section 1706 of the California Building Code, the contractor acknowledges that they are aware of the special requirements contained in the statements of special inspections (structural tests and inspection schedule and as noted on the Building Division approved plans) prepared by the engineer of record or the registered design professional per the requirements of California Building Code Section 1705.

ACKNOWLEDGEMENT

Print: _____ Sign: _____ Date: _____
Contractor

CITY OF Alameda

SEISMIC AND WIND RESISTANCE

Seismic Requirements (California Building Code Section 1705.3.1)

Description of seismic-force-resisting system and designated seismic systems subject to special inspections in accordance with California Building Code Section 1705.3:

The extent of the seismic-force-resisting system is defined in more detail in the construction documents.

Wind Requirements (California Building Code Section 1705.4.1)

Description of seismic-force-resisting system and designated seismic systems subject to special inspections in accordance with California Building Code Section 1705.3:

The extent of the main wind-force-resisting system and wind resisting components is defined in more detail in the construction documents.

CITY OF Alameda

SUMMARY OF SPECIAL INSPECTION

Complete the following form to indicate the types of special inspection required on this project. List the required inspections from the California Building Code Chapter 17; indicate Continuous or Periodic or both as required by code. **Reference California Building Code Chapter 17 for a complete list of inspections.**

Construction Type Requiring Inspection	List of Required Inspections	C	P
Steel – Table 1704.3	Embeds and Bolts Installed in Concrete	X	X
Concrete – Table 1704.4	Reinforcing Steel Placement	X	
	Concrete Placement	X	X
	Post Installed Concrete Bolts	X	X
Masonry			
Level 1 – Table 1704.5.1			
Level 2 – Table 1704.5.3			
Wood – Section 1704.6			
Soils – Table 1704.7	Geotechnical inspection of wetwells, manholes, and pipe excavations		X
Pile Foundations – Table 1704.8			
Pier Foundations – Table 1704.9			
Sprayed Fire-Resistant Materials – Section 1704.10			
Mastic and Intumescent Coatings – Section 1704.11			
Exterior Insulation and Finish Systems – Section 1704.12			
Alternate Materials and Systems – Section 1704.13			
Smoke Control System – Section 1704.14			
Wind Resistance – Section 1705.4			
Seismic Resistance – Section 1707			
Testing for Seismic Resistance – Section 1708			
Specify other tests, inspections, or special instructions as required:	Wetwell and manhole coating inspection and testing		X

CITY OF Alameda

RECOGNIZED SPECIAL INSPECTION AND TESTING AGENCIES

Updated: May 31, 2013

Key: RC = Reinforced Concrete; PC = Prestressed Concrete; SM = Structural Masonry; SW = Steel Welding; HSB = High-Strength Bolting; NDT = Non-destructive Testing; SWC = Structural Wood Construction; FP = Fireproofing

Agency Name	Address	Phone/Fax	RC	PC	SM	SW	HSB	NDT	SWC	FP	Expiration
A 1 Inspection Services	1754 Mission Street San Francisco, CA 94109	**(415) 621-8001** (415) 358-4409	X	X	X	X	X	X	X	X	8/7/2015
Achievement Engineering Corp.	434 Camille Circle #13 San Jose, CA 95134	**(800) 653-1397** (408) 852-0331	X	X	X		X		X	X	7/10/2015
Advanced Testing & Inspection, LLC	540 Brunken Avenue, Suite B Salinas, CA 93907	**(831) 422-2272** (831) 597-2004	X	X	X	X	X			X	2/5/2016
Apex Testing Laboratories, Inc.	3450 Third Street, Suite 3E San Francisco, CA 94124	**(415) 550-9800** (415) 550-9880	X	X	X	X	X			X	Exp. 3/3/2012
Applied Materials & Engineering, Inc.	980 41st Street Oakland, CA 94608	**(510) 420-8190** (510) 420-8186	X	X	X	X	X	X	X	X	4/11/2016
BAGG Engineers	847 West Maude Avenue Sunnyvale, CA 94085	**(650) 852-9133** (650) 852-9138	X	X	X	X	X	X		X	3/6/2015
Berlogar, Stevens and Associates	5587 Sunol Boulevard Pleasanton, CA 94566	**(925) 484-0220** (925) 846-9645	X	X	X	X	X				6/7/2014
Biggs Cardosa Associates, Inc.	1871 The Alameda, Suite 200 San Jose, CA 95126	**(408) 296-5515** (408) 296-8114	X	X	X	X	X				2/1/2014
B.S.K. Associates	324 Earhart Way Livermore, CA 94551	**(925) 315-3151** (925) 315-3152	X	X	X	X	X	X		X	10/2/2015
Capex Engineering Inc.	571 Seville Place Fremont, CA 94539	**(510) 668-1815** (510) 490-8690	X	X	X	X	X		X	X	4/3/2015
Consolidated Engineering Labs	2001 Crow Canyon Rd, Suite 100 San Ramon, CA 94583	**(925) 314-7100** (925) 855-7140	X	X	X	X	X	X	X	X	3/27/2015
Construction Materials Testing, Inc.	2278-F Pike Court Concord, CA 94520	**(925) 825-2840** (925) 682-7953	X	X	X	X	X			X	3/14/2016
Construction Testing Services	2174 Rheem Drive, Suite A Pleasanton, CA 94588	**(925) 462-5151** (925) 462-5183	X	X	X	X	X	X	X	X	4/25/2016
Construction Testing & Engineering, Inc.	242 West Larch Road, Suite F Tracy, CA 95304	**(209) 839-2890** (209) 839-2895	X	X	X	X	X			X	Exp. 2/2/2013
Earth System Pacific	780 Montague Expy, Suite 205 San Jose, CA 95131	**(408) 934-9302** (408) 946-4569	X	X	X	X	X			X	4/3/2015
EARTHTEC, Inc.	1830 Vernon Street, Suite 7 Roseville, CA 95678	**(916) 786-5262** **(916) 786-5263**	X	X	X	X	X			X	6/1/2013
ENGEO Incorporated	2010 Crow Canyon Pl., Suite 250 San Ramon, CA 94583-1545	**(925) 866-9000** (888) 279-2698	X	X	X	X	X	X	X	X	3/6/2015
Geocon Consultants, Inc.	6671 Brisa Street Livermore, CA 94550	**(925) 371-5900** (925) 371-5915	X	X	X		X			X	5/10/2015
Holdrege & Kull	792 Searls Ave Nevada City, CA 95959	**(530) 478-1305** (530) 478-1019	X	X	X	X	X	X		X	8/6/2015
HP Inspections	690 Sunol Street, Bldg. Hx San Jose, CA 95126	**(408) 288-8460** (408) 271-0902	X	X	X	X	X	X		X	3/1/2014
Inspection Consultants, Inc.	1515 North C Street Sacramento, CA 95814	**(916) 321-5580** (916) 321-5590	X	X	X	X	X			X	10/2/2015
Inspection Services Inc.	1798 University Avenue Berkeley, CA 94703	**(415) 243-3265** (415) 243-3266	X	X	X	X	X	X	X	X	10/2/2015
KC Engineering Co.	865 Cotting Lane, Suite A Vacaville, CA 95688	**(707) 447-4025** (707) 447-4143	X	X	X	X	X			X	12/6/2014
Agency Name	Address	Phone/Fax	RC	PC	SM	SW	HSB	NDT	SWC	FP	Expiration

CITY OF Alameda

Kleinfelder Inc.	21330 Broadway, Suite 1200 Oakland, CA 94612	**(510) 628-9000** (510) 628-9009	X	X	X	X	X	X	X	X	10/2/2015
Korbmacher Engineering Inc.	480 Preston Court, Suite B Livermore, CA 94551	**(925) 454-9033** (925) 454-9564	X	X	X	X	X		X	X	1/27/2015
Krazan and Associates Inc.	6711 Sierra Court, Suite B Dublin, CA	**(925) 307-1160** (925) 307-1161	X	X	X	X	X			X	Exp. 6/9/2012 Pending Review
MatriScope Engineering Laboratories, Inc.	436 14th Street, Suite 1429 Oakland, CA 94612	**(510) 763-3601** (510) 763-1388	X	X	X	X	X	X	X	X	9/24/2015
Moore Twining Associates, Inc.	2527 Fresno Street Fresno, CA 93721	**(559) 268-7021** (559) 268-0740	X	X	X	X	X			X	Exp. 8/11/2012 Pending Review
Neil O. Anderson and Associates	50 Goldenland Ct., #100 Sacramento, CA 95834	**(916) 928-4690** (916) 928-4697	X	X	X	X	X		X	X	4/17/2015
Nicholas Engineering Consultants	6743 Dublin Boulevard, #15 Dublin, CA 94568	**(925) 829-8090** (925) 829-0235	X	X	X	X	X		X	X	8/21/2015
Ninyo & Moore	1956 Webster Street, Suite 400 Oakland, CA 94612	**(510) 633-5640** (510) 633-5646	X	X	X	X	X			X	Exp. 12/11/2012 Pending Review
Purcell, Rhoades & Associates, Inc.	1041 Hook Avenue Pleasant Hill, CA 94523	**(925) 932-1177** (925) 932-2795	X		X						Expired 10/7/2011
Professional Service Industries, Inc.	365 Victor Street, Suite C Salinas, CA 93907	**(831) 757-3536** (831) 757-6265	X		X	X	X			X	3/1/2014
Raney Geotechnical, Inc.	3140 Beacon Blvd. West Sacramento, CA 95691	**(916) 371-0434** (916) 371-1809	X	X	X	X	X			X	5/14/2013
RES Engineers, Inc.	1250 Missouri Street, Suite 207 San Francisco, CA 94107	**(415) 822-4625** (415) 822-8925	X	X	X	X	X	X	X	X	8/7/2015
RMA Group	6293 San Ignacio Ave, Suite A San Jose, CA 95119	**(408) 362-4920** (408) 362-4926	X	X	X	X	X			X	10/4/2014
Salem Engineering Group, Inc.	4055 W. Shaw Ave, Suite 110 Fresno, CA 93722	**(559) 271-9700** (559) 275-0827	X	X	X	X	X	X			5/3/2014
Signet Testing Laboratories	3526 Breakwater Ct. Hayward, CA 94545	**(510) 887-8484** (510) 783-4295	X	X	X	X	X			X	Exp. 9/28/2012
Smith-Emery Company	Hunters Point Shipyard, Building 114 San Francisco, CA 94188	**(415) 642-7326** (415) 642-7055	X	X	X	X	X	X	X	X	1/9/2016
Stevens Ferrone & Bailey	1600 Willow Pass Court Concord, CA 94520	**(925) 688-1001** (925) 688-1005	X	X	X	X	X		X	X	7/5/2014
Summit Associates	2300 Clayton Road, Suite 1380 Concord, CA 94520	**(925) 363-5560** (925) 363-5511	X		X	X	X	X	X	X	3/6/2015
T. Makdissy Consulting, Inc.	23 Las Colinas Lane, Suite 106 San Jose, CA 95119	**(408) 227-8595** (408) 227-1672	X	X	X	X				X	1/29/2016
Testing Engineers Inc.	2811 Teagarden Street San Leandro, CA 94577	**(510) 835-3142** (510) 834-3777	X	X	X	X	X	X	X	X	5/3/2014
Twining	1572 Santa Ana Avenue Sacramento, CA 95838	**(916) 649-9000** (916) 921-8532	X	X	X	X	X			X	4/3/2015
Valley Inspection	326 Woodrow Avenue Vallejo, CA 94591	**(707) 552-7037** (707) 552-7022				X			X	X	2/7/2015
Wallace-Kuhl & Associates, Inc.	3050 Industrial Boulevard West Sacramento, CA 95691	**(916) 372-1434** (916) 372-2565	X	X	X	X	X	X		X	4/19/2016
Youngdahl Consulting Group, Inc.	1234 Glenhaven Court El Dorado Hills, CA 95762	**(916) 933-0633** (916) 933-6482	X	X	X	X	X	X	X	X	8/17/2015

Agencies may have offices in more than one location. Agencies with a "Pending Review" status are recognized. Other agencies may be approved by local jurisdictions.

ATTACHMENT “A”

TRENCH EXCAVATION AND CONSTRUCTION STANDARDS

SECTION CS-2.

TRENCH EXCAVATION CONSTRUCTION STANDARDS

CS-2-01. GENERAL: Trench excavation shall conform with the City Standard Specifications. In general a trench is defined as an excavation in which the depth is greater than the width of the bottom of the excavation. Additionally, for the purpose of the City Standard Specifications, a trench shall include excavation for appurtenant structures including but not limited to, manholes, transition structures, junction structures, vaults, valve boxes, catch basins, thrust blocks, and boring pits. The Contractor's attention is directed to the rules, orders, and regulations of the California Division of Occupational Safety and Health (CAL/OSHA) for a more specific definition.

A. The requirements specified in this section of the City Standard Specifications apply to all trench excavations. Nothing in these City Standard Specifications shall relieve the Contractor from conforming to the requirements of CAL/OSHA. If there is a conflict between the two aforementioned standards, the more stringent requirement shall apply.

B. Trench excavation shall include the removal of all water and materials of any nature which interfere with the construction work.

D. The method for installation of pipe or conduit (open trench, tunnel, or bore and jack) shall be shown on the Project Plans.

E. Open trenching shall be prohibited on paved streets for a period of not less than five (5) years from the date the asphalt concrete pavement was placed or one (1) year from the date any slurry seal was placed unless the Contractor receives written approval from the Director of Public Works.

F. Where pipe is to be installed in new embankment, the embankment shall be first constructed to the following dimensions and compacted prior to any excavation for placement of pipe:

1. a height of 12 inches above the top of pipe.

2. a width of not less than 5 times the diameter of the pipe on each side of the pipe, after which the trench shall be excavated.

G. Excavated material from trenches located within paved areas shall be immediately loaded into trucks and hauled off and disposed of outside the public right of way. No excavated material shall be placed or stored within the public right of way unless otherwise allowed by the Director of Public Works.

CS-2-02. EXISTING UNDERGROUND UTILITIES:

A. The Contractor shall contact Underground Services Alert (U.S.A.), at least 48 hours in advance of any excavation.

1. The Contractor shall not commence excavation in a location prior to U.S.A. members marking the location of their utilities or indicating that none exist within the excavation limits outlined by the Contractor.

2. The Contractor shall notify the Inspector of any conflict discovered as a result of the USA marking prior to commencing excavation at that location.

B. It is the Contractor's responsibility to verify the location and elevation of all existing utilities within the limits of excavation.

C. All existing pipes within the trench zone and any other facilities adjacent to the trench shall be carefully supported and protected from damage as a result of the Contractor's operations.

CS-2-03. EXCAVATION METHOD: Methods used in excavation shall be such as not to cause damage to surrounding property or to unnecessarily damage pavement. Street pads for backhoe outriggers and other equipment shall be utilized to prevent unnecessary damage.

CS-2-04. MINIMUM AND MAXIMUM TRENCH WIDTH: All trench widths shall be in compliance with the Standard Drawings. In the event that unsuitable materials or unstable trench walls are encountered, the trench width shall be modified in accordance with the applicable ASTM standard.

A. The pipe or conduit shall be positioned in the center of the trench.

B. The trench width for utility company owned facilities shall conform to the utility company standards.

C. The minimum trench width for City owned facilities shall conform to the requirements of Table CS-2-1, with the exception of Rock Wheel trench excavation specified elsewhere in the City Standard Specifications:

Table CS-2-1

Pipe Material	*Pipe Size (nominal diameter)*	*Minimum Trench Width*
All Pipes	6-Inches and less	O.D.[a] + 12-inches
Ductile Iron Pipe	Greater than 6-inches	O.D + 24-inches
Polyvinyl Chloride and High Density Polyethylene Pipes[b]	Greater than 6-inches	O.D. + 16 inches [c]
Cast-in-Place Concrete Pipe	Greater than 36-inches	O.D.
Reinforced Concrete and Vitrified Clay Pipes	Greater than 6-inches	O.D. + 16-inches

a. -O.D. – Outside Diameter

b. -High Density Polyethylene Pipe shall be used only when approved.

c. -Where trench walls can not sustain a vertical cut, trench width shall be three times O.D.

D. If the maximum trench width specified on the Project Plans is exceeded, the Contractor shall be required to provide a higher strength bedding class or a higher strength pipe as approved by the Director of Public Works.

E. The minimum trench width for installation of water service, street light, or traffic signal conduit of two inches in diameter or less, shall be in accordance with the manufacturer's recommendation for the conduit.

F. Rock Wheel trench excavation for trench depths up to twenty-four (24) inches for street light, traffic signal, or utility company conduit installations shall only be permitted when approved by the Director of Public Works. Where allowed, rock wheel excavation shall be performed in accordance with Section 86 of the Caltrans Standard Specifications. The minimum trench width shall be two (2) inches wider than the conduit being placed in the trench. The maximum rock wheel trench width shall be six (6) inches.

CS-2-05. SHORING, SHEETING, AND BRACING: The Contractor shall furnish and install sufficient shoring, sheeting, and bracing to insure the safety of workmen and the public, protect the work, and protect existing facilities.

A. Shoring, sheeting, and bracing shall comply with the rules, orders and regulations of CAL/OSHA.

B. Each Contractor shall submit to the Inspector a copy of its current Annual Excavation Permit issued by CAL/OSHA along with the Contractor's own Trench Safety Plan prior to the start of construction.

C. The Contractor shall be required to provide drawings and/or calculations by a registered engineer to the Director of Public Works a minimum of five (5) working days prior to beginning excavation for specially designed bracing and shoring of an excavation where required by CAL/OSHA or the Contractor's Trench Safety Plan.

D. Failure to comply with any of the rules, orders or regulations mentioned herein shall be sufficient cause for the Inspector to immediately suspend the work. The Contractor shall be responsible for the adequacy of all shoring and bracing and compliance with the law. Failure of the Inspector to suspend the work or notify the Contractor of any inadequacy of shoring and bracing or noncompliance with the law shall not relieve the Contractor of this responsibility.

E. The Contractor shall furnish and maintain shoring, sheeting and bracing until after the pipeline has been installed and sufficiently backfilled and the Inspector has approved the placement of backfill. The Contractor shall provide adequate safety measures to allow for access by the Inspector or testing personnel to perform compaction testing and inspection of the lifts of backfill placed.

CS-2-06. CONTROL OF WATER: When either ground water or surface run-off is encountered, the Contractor shall furnish, install, maintain, and operate all necessary pumps, materials and equipment to keep excavation reasonably free from water until the laying and jointing of the pipe, pouring of concrete and placing of bedding material has been completed, inspected and approved, and all danger of flotation and other damage is removed. Water pumped from the trench excavation shall be disposed of in a manner subject to the approval of the Director of Public Works.

CS-2-07. FOUNDATION:

A. All loose material shall be removed from the new trench bottom before placing the bedding material.

B. Special Foundation Treatment:

1. Whenever the bottom of the trench is soft or rocky, or, otherwise unsuitable as a foundation for the pipe in the opinion of the Director of the Public Works, the unsuitable material shall be removed as directed by the Director of Public Works to provide a stable and satisfactory foundation.

CS-2-08. MAXIMUM LENGTH OF OPEN TRENCH:

A. The maximum length of open trench where prefabricated pipe is to be laid shall be the distance necessary to accommodate that amount of pipe which can be installed and backfilled in that same day, but in no case shall exceed 400 feet except as allowed for with storm drain installation under Section CS-10B, CAST-IN-PLACE CONCRETE PIPE (CIPCP) of the Construction Standards.

B. At the end of each working day, there shall be no open trench in paved or improved areas unless it is plated in accordance with these City Standard Specifications. Improved areas are defined as any areas within 300' of any existing housing or commercial structure or paved area whether paved with asphalt concrete or Portland cement concrete.

The maximum length of trench in unimproved areas that may be left open for CIPCP is defined in Section CS-10B. A maximum of 300 feet of trench may be left open in unimproved areas if barricaded for all other piping material installations.

CS-2-09. TRENCH PLATES: Trench plates shall be used for temporary cover of trenches and other excavations**.**

A. When the backfilling of trenches and excavations can not be completed in the same day within a paved street section or within the concrete curb and gutter and sidewalk area, trench plates shall be required and the following conditions shall apply:

1. The plates shall be of steel construction capable of supporting H20 loading

2. The plates shall have a skid resistant surface.

3. The plates must extend beyond the edge of the trench wall to adequately support the traffic loads on it. In no case shall the plates extend less than twelve (12) inches beyond the trench wall.

4. Each plate must be fully supported around the perimeter to prevent wobbling or rocking.

5. The plates shall be secured to prevent any movement.

6. Trenches and excavations shall be adequately shored and braced to withstand highway traffic loads.

7. Temporary paving or cold-mix asphalt concrete (cutback) shall be placed and continuously maintained around all outside edges of the trench plates until removal of the plates.

ATTACHMENT "B"

GEOTECHNICAL INVESTIGATION,
ALAMEDA SEWER PUMP STATION UPGRADES – PHASE 4
CORNERSTONE EARTH GROUP, NOVEMBER 18, 2019

CORNERSTONE EARTH GROUP

TYPE OF SERVICES	Geotechnical Investigation
PROJECT NAME	Alameda Sewer Pump Station Upgrades – Phase 4
LOCATION	Marina Village Parkway, Ballena Boulevard, Grand Street, Park Street, Aughinbaugh Way, and Harbor Bay Parkway Alameda, California
CLIENT	SCHAAF AND WHEELER
PROJECT NUMBER	187-47-1
DATE	November 18, 2019

CORNERSTONE EARTH GROUP

Type of Services	**Geotechnical Investigation**
Project Name	**Alameda Sewer Pump Stations Upgrades – Phase 4**
Location	**Marina Village Parkway, Ballena Boulevard, Grand Street, Park Street, Aughinbaugh Way, and Harbor Bay Parkway** **Alameda, California**
Client	**Schaaf & Wheeler**
Client Address	**2200 Range Avenue, Suite 201** **Santa Rosa, California**
Project Number	**187-47-1**
Date	**November 18, 2019**

Prepared by **Nicholas S. Devlin, P.E.**
Senior Project Engineer
Geotechnical Project Manager

REGISTERED PROFESSIONAL ENGINEER
NICHOLAS S. DEVLIN
No. 75613
Exp. 6-30-20
CIVIL
STATE OF CALIFORNIA

Scott E. Fitinghoff, P.E., G.E.
Principal Engineer
Quality Assurance Reviewer

CORNERSTONE EARTH GROUP

TABLE OF CONTENTS

Type of Services	**Geotechnical Investigation**
Project Name	**Alameda Sewer Pump Stations Upgrades - Phase 4**
Location	**Marina Village Parkway, Ballena Boulevard, Grand Street, Park Street, Aughinbaugh Way, and Harbor Bay Parkway** **Alameda, California**

SECTION 1: INTRODUCTION

This geotechnical report was prepared for the sole use of Schaaf & Wheeler for the Alameda Sewer Pump Stations Upgrades - Phase 4 (No. P.W. 08-17-37) project located at Marina Village Parkway, Ballena Boulevard and Cola Ballena, Grand Street and Otis Drive, Park Street and Otis Drive, Aughinbaugh Way, and Harbor Bay Parkway in Alameda, California, and are referred to herein as Marina Village, Cola Bellena, Grand-Otis, Park-Otis, Catalina, and Harbor Bay pump stations, respectively. The locations of the sites are shown on the Vicinity Map, Figure 1. For our use, we were provided with the following documents:

- Project plans titled “City of Alameda, Group 4 – Sewerage Pump Station Renovations for Reliability and Safety Improvements”, prepared by Schaaf & Wheeler Consulting Civil Engineers, dated August 9, 2019.
- Project plans titled “Marina Village Site Plan, Cola Bellena Site Plan, Harbor Bay Parkway 1 Site Plan, Sheets 19, 31, and 39 of 49”, prepared by Schaaf & Wheeler Consulting Civil Engineers, dated April 16, 2013.
- Project plans titled “City of Alameda Sewer Pump Station Backup Generator Installation, Phase 1, Grand-Otis Site Plan & Demolition Sections, Park-Otis Site Plan & Demolition Sections, Catalina Site Plan, Sheets 3, 7, and 9 of 27”, prepared by Schaaf & Wheeler Consulting Civil Engineers, dated September 28, 2011.
- As-built plans titled “Improvement Plans, Marina Village – Sewer Lift Station and Collector Main, Alameda, California, Sheets 1 through 12 of 12”, prepared by Tillson, Bliss & Associates, dated January 1986.
- As-built plans titled “Improvement Plans, Catalina Ave. Pump Sta. Tract 3810, Alameda, California, Sheets C-1, C-2, E-1, and S-1 through S-4”, prepared by Jones-Tillson & Associates, Civil Engineers, dated March 11, 1980.

- As-built plans titled “Improvement Plans, Tract 3011, Ballena Bay Community, Alameda, Calif., Sheets 1 through 7 of 7”, prepared by Jones-Thenn-Tillson Civil Engineers, dated September 5, 1973.

- As-built plans titled “Park Street Pumping Station, Out of Tract & Thru Tract Sanitary, South Shore Development, Alameda, California, Sheets 1 through 11 of 21’, prepared by Utah Construction Company, dated March 30, 1959.

- As-built plans titled “Grand Street Pumping Station, Out of Tract & Thru Tract Sanitary, South Shore Development, Alameda, California, Sheets 12, 13A, 14A, 15A, 17 and 18 of 21’, prepared by Utah Construction Company, dated March 30, 1959.

- Site topographic surveys not titled, not dated.

1.1 PROJECT DESCRIPTION

The project will consist of improvements to the existing sanitary sewer pump stations including new wet wells, pumps, electrical controls, and security (e.g. fencing). Detailed descriptions of the proposed improvements at each of the existing pump stations are discussed in the following sections.

1.1.1 Marina Village Site

The proposed improvements generally include minor modifications to the existing wet well, new pump station equipment (e.g. pumps, generator, piping, and control panel). Improvements to the existing force mains is not anticipated.

We understand the existing wet well weighs approximately 229,600 pounds and has a footprint of about 219 square feet (sf), and the improvements to the existing wet well will likely result in a reduction in weight. Therefore, structural loads of the existing pump station structure are approximately 1,050 pounds per square foot (psf). Grading is anticipated to include minor cuts/fills for surface improvements (e.g. flatwork and pads).

1.1.2 Cola Ballena

The proposed improvements generally include backfilling of the existing dry well with lightweight fill, filling a portion of the existing wet well, installing a new wet well and valve vault adjacent to the existing wet well and all new pump station equipment (e.g. generator and control panel). The voids in the existing structure will be backfilled with engineered fill (possibly lightweight fill).

We understand the new wet well will be located adjacent to the existing pump station structure, and the new wet well is approximately 8 feet inside diameter and weighs approximately 93,500 pounds. The existing dry well will be backfilled which will increase the weight by about 45,000 pounds, and the existing wet well will be partially backfilled adding approximately 36,000 pounds to the weight of the structure for a combined additional weight of about 81,000 pounds.

Grading is anticipated to include minor cuts/fills for the proposed surface improvements and excavations up to 20 feet deep for installation of the new wet well and valve vault.

1.1.3 Grand-Otis

The proposed improvements generally include modifying the existing structure to install a new precast concrete wet well within the existing dry/wet well structure and a new valve vault outside the existing wet well. The voids in the existing structure will be backfilled with engineered fill (possibly lightweight fill). A new force main is also proposed for the renovation. The existing pumps, generator, and control panel will be reused.

We understand the existing pump station structure weighs approximately 435,000 pounds (including approximately 70,000 pounds of soil directly over the structure) and has a footprint of about 272 sf, and the new valve vault will weigh about 36,000 pounds. The new wet well and fill will increase the weight of the structure by about 58,000 pounds; therefore, structural loads of the existing pump station structure are anticipated to increase from the new wet well from approximately 1,600 psf to about 1,800 psf. The new valve vault will have a contact pressure of approximately 1,100 psf. Grading is anticipated to include minor cuts/fills for the proposed surface improvements and excavations up to 11 feet for the new valve vault.

1.1.4 Park-Otis

The proposed improvements generally include modifying the existing structure to install a new precast concrete wet well and a new valve vault within the existing dry/wet well structure. The voids in the existing structure will be backfilled with engineered fill (possibly lightweight fill).

We understand the existing pump station structure weighs approximately 435,000 pounds (including about 70,000 pounds of soil over the existing structure) and has a footprint of about 272 sf, and the new wet well and valve vault will weigh about 23,000 pounds. The new wet well and fill will increase the weight of the existing structure by about 58,000 pounds; therefore, structural loads are anticipated to increase from approximately 1,600 psf to about 1,800 psf. Grading is anticipated to include minor cuts/fills for the proposed surface improvements.

1.1.5 Catalina

The proposed improvements generally include installing a new 8-foot diameter precast concrete wet well and valve vault within the existing wet well structure. The voids in the existing structure will be backfilled with engineered fill (possibly lightweight fill). Additionally, approximately 20 lineal feet (LF) of force main will be replaced.

We understand the existing pump station structure weighs approximately 527,100 pounds and has a footprint of about 560 sf, and new wet well and valve vault modifications to the existing structure and fill will increase the weight of the structure by about 232,000 pounds; therefore, structural loads are anticipated to increase from approximately 950 psf to 1,360 psf. Grading is anticipated to include minor cuts/fills for surface improvements and trenches up to 6 feet deep for installation of the new force main.

1.1.6 Harbor Bay

The proposed improvements generally include installing a new precast concrete wet well and valve vault within the existing pump station structure. The voids in the existing structure will be backfilled with engineered fill (possibly lightweight fill). Additionally, a new force main is also planned for the site.

We understand the existing pump station structure weighs approximately 636,600 pounds and has a footprint of about 460 sf, and the new wet well, valve vault, and fill will weigh about 247,000 pounds. Therefore, structural loads are anticipated to increase from approximately 1,385 psf to about 1,920 psf. Grading is anticipated to include minor cuts/fills for the planned surface improvements and excavations up to 7 feet deep for installation of the new force main.

1.2 SCOPE OF SERVICES

Our scope of services was presented in our proposal dated November 15, 2017 and consisted of field and laboratory programs to evaluate physical and engineering properties of the subsurface soils, engineering analysis to prepare recommendations for site work and grading, foundations, temporary shoring, flatwork, retaining walls, and pavements, and preparation of this report. Brief descriptions of our exploration and laboratory programs are presented below.

1.3 EXPLORATION PROGRAM

Field exploration consisted of eight borings drilled on May 7 through 11, 2018 and May 29, 2018 with truck-mounted, hollow-stem auger drilling equipment. The borings were drilled to depths ranging from 30 to 65 feet. The borings were backfilled with cement grout in accordance with local requirements; exploration permits were obtained as required by local jurisdictions.

The approximate locations of our exploratory borings are shown on the Site Plan, Figures 2A through 2F. Details regarding our field program are included in Appendix A.

1.4 LABORATORY TESTING PROGRAM

In addition to visual classification of samples, the laboratory program focused on obtaining data for foundation design and seismic ground deformation estimates. Testing included moisture contents, dry densities, washed sieve analyses, Plasticity Index tests, and soil corrosion testing. Details regarding our laboratory program are included in Appendix B.

1.6 ENVIRONMENTAL SERVICES

Environmental services were not requested for this project. If environmental concerns are determined to be present during future evaluations, the project environmental consultant should review our geotechnical recommendations for compatibility with the environmental concerns.

SECTION 2: REGIONAL SETTING

2.1 GEOLOGICAL SETTING

The site vicinity is located on the eastern edge of the San Francisco Bay, which exists within a series of northwesterly-aligned mountains forming the Coast Ranges geomorphic province of California, which stretches from the Oregon border nearly to Point Conception. In the San Francisco Bay area, most of the Coast Ranges have developed on a basement of tectonically mixed Cretaceous- and Jurassic-age (70- to 200-million years old) rocks of the Franciscan Complex. Younger sedimentary and volcanic units locally cap these basement rocks. Still younger surficial deposits that reflect geologic conditions of the last million years or so cover most of the Coast Ranges.

Movement on the many splays of the San Andreas Fault system has produced the dominant northwest-oriented structural and topographic trend seen throughout the Coast Ranges today. This trend reflects the boundary between two of the Earth's major tectonic plates: the North American plate to the east and the Pacific plate to the west. The San Andreas Fault system is about 40 miles wide in the Bay area and extends from the San Gregorio Fault near the coastline to the Coast Ranges-Central Valley blind thrust at the western edge of the Great Central Valley as shown on the Regional Fault Map, Figure 3.

The San Andreas Fault is the dominant structure in the system, nearly spanning the length of California, and capable of producing the highest magnitude earthquakes. Many other subparallel or branch faults within the San Andreas system, such as the nearby Hayward Fault, are equally active and nearly as capable of generating large earthquakes. Right-lateral movement is dominant on these faults, but an increasingly large amount of thrust faulting resulting from compression across the system is now also being identified.

2.2 REGIONAL SEISMICITY

The San Francisco Bay area region is one of the most seismically active areas in the Country. While seismologists cannot predict earthquake events, the U.S. Geological Survey's Working Group on California Earthquake Probabilities 2015 revises earlier estimates from their 2008 (2008, UCERF2) publication. Compared to the previous assessment issued in 2008, the estimated rate of earthquakes around magnitude 6.7 (the size of the destructive 1994 Northridge earthquake) has gone down by about 30 percent. The expected frequency of such events statewide has dropped from an average of one per 4.8 years to about one per 6.3 years. However, in the new study, the estimate for the likelihood that California will experience a magnitude 8 or larger earthquake in the next 30 years has increased from about 4.7 percent for UCERF2 to about 7.0 percent for UCERF3.

UCERF3 estimates that each region of California will experience a magnitude 6.7 or larger earthquake in the next 30 years. Additionally, there is a 63 percent chance of at least one magnitude 6.7 or greater earthquake occurring in the Bay Area region between 2007 and 2036.

The faults considered capable of generating significant earthquakes are generally associated with the well-defined areas of crustal movement, which trend northwesterly. The table below presents the State-considered active faults within 25 kilometers of the sites. The fault distances presented in Tables 1A and 1B were determined from EZ Frisk (Version 7.65.04) and represent the rupture distance and may not be the distance to the surface expression of the fault that is shown on published geological maps and on-line resources such as Google Earth, etc. The seismic characteristics of some faults vary along its length so different segments of the same fault could be listed separately in the table.

Table 1A: Approximate Fault Distances

Fault Name	Marina Village		Cola Ballena		Grand-Otis	
	miles	kilometers	miles	kilometers	miles	kilometers
Hayward-Rodgers Creek	4.5	7.3	5.7	9.1	4.8	7.7
Northern San Andreas	13.5	21.8	12.5	20.1	13.3	21.4
Calaveras	14.7	23.7	15.5	24.9	14.4	23.1
Mount Diablo Thrust	15.2	24.5	-	>25	15.3	24.7

Table 1B: Approximate Fault Distances

Fault Name	Park-Otis		Catalina		Harbor Bay	
	miles	kilometers	miles	kilometers	Miles	kilometers
Hayward-Rodgers Creek	4.5	7.2	5.3	8.5	5.0	8.1
Northern San Andreas	13.7	22.0	12.9	20.7	13.2	21.2
Calaveras	13.7	22.1	14.3	23.1	13.9	22.3
Mount Diablo Thrust	15.0	24.2	-	>25	-	>25

A regional fault map is presented as Figure 3, illustrating the relative distances of the site to significant fault zones.

SECTION 3: SITE CONDITIONS

3.1 SITE BACKGROUND

3.1.1 Marina Village

Based on aerial images provided by Historic Aerials website (NETROnline, 2019), the site was occupied by an industrial development consisting of buildings, yard areas, rail spurs, and roadways in images dated 1956 to 1980. The site is occupied by a commercial development in an image dated 1988. Significant changes to the site were not observed in images dated after 1988.

3.1.2 Cola Ballena

Based on aerial images provided on Historic Aerials (NETROnline, 2019) website, the site consisted of the San Francisco Bay in images dated 1956 and 1959. The surrounding island (Ballena Isle), Ballena Boulevard, and Ballena Isle Marina are visible in an image dated 1968. Development of the island is visible in an image dated 1980. Significant changes to the site were not observed in images dated after 1980.

3.1.3 Grand-Otis

Based on aerial images provided on Historic Aerials (NETROnline, 2019) website, the site consisted of the San Francisco Bay in an image dated 1946. The site was filled in and being graded in an image dated 1956. Grand Street and Otis Drive, the school and park, and the surrounding residential developments were observed in an image dated 1968. Significant changes to the site were not observed in images dated after 1968.

3.1.4 Park-Otis

Based on aerial images provided on Historic Aerials (NETROnline, 2019) website, the site consisted of the San Francisco Bay in an image dated 1946. The site is filled in, Park Street and Otis Drive are under construction, and the adjacent retail development is visible in an image dated 1958. Park Street and Otis Drive and the surrounding developments are visible in an image dated 1968. Significant changes to the site were not observed in images dated after 1968.

3.1.5 Catalina

Based on aerial images provided on Historic Aerials (NETROnline, 2019) website, the site consisted of the eastern shore of the San Francisco Bay in images dated 1946 and 1958. The site was filled in in an image dated 1968. The pump station, Aughinbaugh Way, and the adjacent lagoon are visible in an image dated 1980. Residential developments are visible north of the lagoon and south of the pump station in images dated 1987 and 1988. The existing surrounding developments are visible in an image dated 1993. Significant changes, other than the removal of a large tree from the site after 2002, were not observed in images dated after 1993.

3.1.6 Harbor Bay

Based on aerial images provided on Historic Aerials (NETROnline, 2019) website, the site consisted of the San Francisco Bay in images dated 1946, 1958, and 1959. The site consisted of a salt marsh in an image dated 1968. The site was filled in and canals are visible in images dated 1980 and 1981. The surrounding developments along Harbor Bay Parkway and Penumbra Place are visible in images dated 1987, 1988, and 1993. Additional development south, east, and west of the site is visible in an image dated 2002, 2005, 2009, and 2010. Significant changes to the site were not observed in images dated after 1987.

3.2 SURFACE DESCRIPTION

3.2.1 Marina Village

The site is currently occupied by an existing sanitary sewer lift station located within a commercial development consisting of retail buildings and paved parking areas and drive aisles. The site is relatively level and near the elevations of the adjacent properties and roadways. Based on the referenced topographic survey, the site ranges from Elevations 3 to 4 feet City of Alameda Datum (CAD); however, the railroad property west of the site is approximately 2 feet below the site elevation (corresponding to Elevations 1 to 2 feet CAD).

Surface pavements generally consisted of 1½ inches of asphalt concrete over 5 inches of aggregate base. Based on our observations, the existing pavements are in poor condition with trench patches and cracking.

3.2.2 Cola Ballena

The site is currently occupied by an existing sanitary sewer lift station, a paved driveway, several large trees and landscape areas. The site is relatively level and near the elevation of the adjacent properties and roadways; however, the site is adjacent to a channel that connects to the Bay. Based on the referenced topographic survey, the site is at about Elevation 7 feet CAD. The site slopes down to the channel to the north and west.

Surface pavements generally consisted of 6 inches of asphalt concrete over subgrade soil. Based on our observations, the existing pavements are in fair condition.

3.2.3 Grand-Otis

The site is currently occupied by an existing sanitary sewer lift station and a few trees and bushes. The site is adjacent to Grand Street and Otis Drive, and a City park consisting of turf play fields, several large trees and landscape areas. The site is relatively level and near the elevation of the adjacent properties and roadways. Based on the referenced topographic survey, the site is at about Elevation 2.8 to 3.8 feet CAD.

Surface pavements of the adjacent Grand Street generally consisted of 6 inches of asphalt concrete over subgrade soil. Based on our observations, the existing pavements are in poor condition with significant linear and alligator cracking.

3.2.4 Park-Otis

The site is currently occupied by an existing sanitary sewer lift station, a paved driveway, hedges and bushes, and landscape areas. The site is located within a retail development and is relatively level and near the elevation of the adjacent properties and roadways. Based on the referenced topographic survey, the site is at about Elevation 4.5 feet CAD.

Surface pavements of the adjacent Park Street generally consisted of 4 to 5 inches of asphalt concrete over 6 inches of aggregate base. Based on our observations, the existing driveway pavement is in fair condition; however, the pavement of the adjacent Park Street is in poor condition with significant linear and alligator cracking and trench patches.

3.2.5 Catalina

The site is currently occupied by an existing sanitary sewer lift station, a paved driveway, several medium size trees and landscape areas. The site is relatively level and near the elevation of the adjacent properties and roadways; however, the site is adjacent to a lagoon that connects to the Bay. Based on the referenced topographic survey, the site is at about Elevation 3.5 feet CAD. The site slopes down to the channel to the west.

Surface pavements of the driveway generally consisted of 5 inches of asphalt concrete over subgrade soil. Based on our observations, the existing driveway pavement is in fair condition.

3.2.6 Harbor Bay

The site is currently occupied by an existing sanitary sewer lift station, a paved bicycle path, a concrete sidewalk, and natural turf and landscape areas. The site is relatively level and near the elevation of the adjacent properties and roadways. Based on the referenced topographic survey, the site is at about Elevation 5.5 feet CAD.

Our borings were performed within the landscape areas adjacent to Harbor Bay Parkway; therefore, surface pavements were not encountered within our borings. However, based on our observations, the existing pavements are in poor condition with significant alligator cracking.

3.3 SUBSURFACE CONDITIONS

Below the surface pavements (when encountered), our borings generally encountered undocumented fill, over Bay Mud (when encountered) over alluvial soil.

3.3.1 Marina Village

Our Exploratory Boring EB-1 generally encountered undocumented fill overlying Bay Mud, overlying alluvial soil. Undocumented fill was encountered to a depth of 11 feet (corresponding to Elevation -7 feet CAD) and consisted of very stiff, sandy lean clay and lean clay with sand and medium dense clayey sand and clayey sand with gravel. Bay Mud was encountered below the undocumented fill to a depth of 25 feet (corresponding to Elevation -21 feet CAD). Alluvium consisting of very stiff, lean clay with sand and sandy lean clay was encountered to a depth of 46 feet (corresponding to Elevation -42 feet CAD) and very dense, poorly graded sand with silt to a depth of 65 feet (corresponding to Elevation -60¾ feet CAD), the maximum depth explored.

3.3.2 Cola Ballena

Our Boring EB-2 generally encountered undocumented fill over alluvial soil. Undocumented fill was encountered to a depth of 12 feet (corresponding to Elevation -5 feet CAD) and consisted of medium dense, poorly graded sand with silt. The undocumented fill was underlain by alluvial soil consisting of medium dense, clayey sand, dense to very dense, poorly graded sand with silt, and dense to very dense, silty sand to a depth of 49.5 feet (corresponding to Elevation -42.5 feet CAD).

3.3.3 Grand-Otis

Our Boring EB-3 generally encountered undocumented fill over Bay Mud, over alluvial soil. Undocumented fill was encountered to a depth of 11 feet (corresponding to Elevation -8.3 feet CAD) and consisted of medium dense, poorly graded sand with silt and medium dense, silty sand. Bay Mud was encountered at depths of 11 to 12.5 feet (corresponding to Elevations -8.3 and -9.8 feet CAD, respectively). The alluvial soil was encountered below the Bay Mud to a depth of 41.5 feet (corresponding to Elevation -38.8 feet CAD), the terminal depth of the boring, and consisted of medium dense, silty sand and medium dense to dense, poorly graded sand with silt.

3.3.4 Park-Otis

Our Borings EB-4 and EB-8 generally encountered undocumented fill over alluvial soil. Undocumented fill was encountered to depths of 8 to 12 feet (corresponding to Elevations -3.5 and -7.5 feet CAD, respectively) and consisted of medium dense to dense, poorly graded sand with silt and loose to medium dense, silty sand. The underlying alluvial soil consisted of dense, silty sand and medium dense to dense, poorly graded sand with silt to a depth of 40 feet within EB-8 (corresponding to Elevation -35.5 feet CAD).

3.3.5 Catalina

Our Boring EB-5 generally encountered undocumented fill over Bay Mud over alluvial soil. Undocumented fill was encountered to a depth of 7.5 feet (corresponding to Elevation -4 feet CAD) and consisted of very dense to dense, poorly graded sand with silt and medium dense, silty sand. Bay Mud was encountered at depths of 7.5 to 13 feet (corresponding to Elevations -4 and -95 feet CAD, respectively). The alluvial soil was encountered to a depth of 49.4 feet (corresponding to Elevation -45.9 feet CAD), the terminal depth of the boring, and consisted of loose to dense, silty sand, medium dense to very dense, clayey sand, very stiff, sandy lean clay, and dense, poorly graded sand with silt.

3.3.6 Harbor Bay

Our Borings EB-6 and EB-7 generally encountered undocumented fill over Bay Mud (EB-6 only) over alluvial soil. Undocumented fill was encountered to depths of 12.5 to 13 feet (corresponding to Elevations -7 and -7.5 feet CAD, respectively) and consisted of very dense to dense, poorly graded sand with silt and medium dense, silty sand. Bay Mud was encountered

in EB-6 at depths of 12.5 to 13.5 feet (corresponding to Elevations -7 and -8 feet CAD, respectively). The alluvial soil was encountered to depths of 30 and 39.5 feet (corresponding to Elevations -24.5 and -34 feet CAD, respectively), the terminal depths of the borings and consisted of medium dense, silty sand, loose to very dense, poorly graded sand with silt, medium dense, clayey sand, and stiff, sandy lean clay.

3.3.7 Plasticity/Expansion Potential

We performed three Plasticity Index (PI) tests on representative samples. Test results were used to evaluate expansion potential of soils at the depth of the proposed improvements. The PI tests resulted in PIs ranging from 13 to 83, indicating low to very high expansion potential to wetting and drying cycles.

3.3.8 In-Situ Moisture Contents

3.3.8.1 Marina Village

Laboratory testing indicated that the in-situ moisture contents within the undocumented fill range from 0 to 10 percent over the estimated laboratory optimum moisture. The in-situ moisture contents of the Bay Mud range from 30 to 65 percent over the estimated laboratory optimum moisture.

3.3.8.2 Cola Ballena

Laboratory testing indicated that the in-situ moisture contents within the upper 15 feet range from 0 to 15 percent over the estimated laboratory optimum moisture.

3.3.8.3 Grand-Otis and Park-Otis

Laboratory testing indicated that the in-situ moisture contents within the upper 10 feet range from 5 to 10 percent over the estimated laboratory optimum moisture.

3.3.8.4 Catalina

Laboratory testing indicated that the in-situ moisture contents within the upper 10 feet range from 5 percent below to 10 over the estimated laboratory optimum moisture for the fill and 80 percent over for the Bay Mud.

3.3.8.5 Harbor Bay

Laboratory testing indicated that the in-situ moisture contents within the upper 10 feet range from 5 percent below to 10 percent over the estimated laboratory optimum moisture.

3.4 GROUNDWATER

Groundwater was encountered in our explorations at the depths and elevations indicated in Table 2 below. All measurements were taken at the time of drilling and may not represent the stabilized levels that can be higher than the initial levels encountered.

Table 2: Depth to Groundwater

Boring Number / Site	Date Drilled	Depth to Groundwater (feet)	Groundwater Elevation* (feet)	Depth of Boring
EB-1 / Marina Village	05/07/18	19.0	-15.0	64.9
EB-2 / Cola Ballena	05/08/18	5.0	2.0	49.5
EB-3 / Grand-Otis	05/09/18	7.0	-5.3	41.5
EB-4 / Park-Otis	05/10/18	10.0	-5.5	26.5
EB-5 / Catalina	05/09/10	10.0	-6.5	49.4
EB-6 / Harbor Bay	05/10/18	10.0	-4.5	39.5
EB-7 / Harbor Bay	05/11/18	8.0	-2.5	30.0
EB-8 / Park-Otis	05/29/18	7.0	-2.5	40.0

*Elevation datum (City of Alameda datum)

3.4.1 Marina Village Site

Historic high groundwater levels for the site are mapped at a depth of 5 feet below the existing grades (Oakland West 7.5-Minute Quadrangle, CGS, 2003).

3.4.2 Cola Ballena, Grand-Otis, Park-Otis, Catalina, and Harbor Way Sites

Historic high groundwater levels for the sites are mapped at depths of less than 5 feet below the existing grades and may be perched on top of the Bay Mud underlying the granular fills (Oakland East and San Leandro 7.5-Minute Quadrangles, CGS, 2003).

Fluctuations in groundwater levels occur due to many factors including seasonal and tidal fluctuations, underground drainage patterns, regional fluctuations, and other factors.

3.5 CORROSION SCREENING

We tested six samples collected at depths of 14 to 24 feet for resistivity, pH, soluble sulfates, and chlorides. The laboratory test results are summarized in Table 3A.

Table 3A: Summary of Corrosion Test Results

Sample Location / Boring Number	Depth (feet)	Soil pH[1]	Resistivity[2] (ohm-cm)	Chloride[3] (mg/kg)	Sulfate[4,5] (mg/kg)
Marina Village / EB-1	14.0	8.5	123	8,158	0.0611
Cola Ballena / EB-2	15.0	8.6	3,397	13	0.0474
Grand-Otis / EB-3	14.5	8.0	576	522	0.0716
Park-Otis / EB-4	15.5	8.9	3,193	12	0.0174
Catalina / EB-5	24.0	8.1	164	3,753	0.1793
Harbor Bay / EB-6	20.5	8.6	522	678	0.0483

Notes: [1]ASTM G51
[2]ASTM G57 - 100% saturation
[3]ASTM D3427/Cal 422 Modified
[4]ASTM D3427/Cal 417 Modified
[5]1 mg/kg = 0.0001 % by dry weight

Many factors can affect the corrosion potential of soil including moisture content, resistivity, permeability, and pH, as well as chloride and sulfate concentration. Typically, soil resistivity, which is a measurement of how easily electrical current flows through a medium (soil and/or water), is the most influential factor. In addition to soil resistivity, chloride and sulfate ion concentrations, and pH also contribute in affecting corrosion potential.

3.5.1 Preliminary Soil Corrosion Screening

Based on the laboratory test results summarized in Table 3A and published correlations between resistivity and corrosion potential, the soils may be considered moderately to very severely corrosive to buried metallic improvements (Chaker and Palmer, 1989).

In accordance with the 2016 CBC Section 1904A.1, alternative cementitious materials for different exposure categories and classes shall be determined in accordance with ACI 318-14 Table 19.3.1.1, Table R19.3.1, and Table 19.3.2.1. Based on the laboratory sulfate test results, no cement type restriction is required for Marina Village, Cola Ballena, Grand-Otis, Park-Otis, and Harbor Bay Sites, although, in our opinion, it is generally a good idea to include some sulfate resistance and to maintain a relatively low water-cement ratio. Additionally, cement type restriction is recommended for the Catalina site. We have summarized applicable exposure categories and classes from ACI 318-14, Table 19.3.1.1 below in Table 3B.

Table 3B: ACI 318-14 Table 19.3.1.1 Exposure Categories and Classes

Site / Boring No.	Freezing and Thawing (F)	Sulfate (S, soil)	In Contact with Water (W)	Corrosion Protection of Reinforcement (C)
Marina Village / EB-1	F0[1]	S0[2]	W1[4]	C2[6]
Cola Ballena / EB-2	F0[1]	S0[2]	W1[4]	C1[5]
Grand-Otis / EB-3	F0[1]	S0[2]	W1[4]	C1[5]
Park-Otis / EB-4	F0[1]	S0[2]	W1[4]	C1[5]
Catalina / EB-5	F0[1]	S1[3]	W1[4]	C2[6]
Harbor Bay / EB-6	F0[1]	S0[2]	W1[4]	C1[5]

1 (F0) "Concrete not exposed to freezing-and-thawing cycles" (ACI 318-14)
2 (S0) "Water soluble sulfate in soil, percent by mass" is less than 0.10 (ACI 318-14)
3 (S1) "Water soluble sulfate in soil, percent by mass" is 0.10 to 0.20 (ACI 318-14)
4 (W1) "Concrete in contact with water and low permeability is required" (ACI 318-14)
5 (C1) "Concrete exposed to moisture but not to an external source of chlorides" (ACI 318-14)
6 (C2) "Concrete exposed to moisture and an external source of chlorides from deicing chemicals, salt, brackish water, seawater, or spray from these sources" (ACI 318-14)

In addition, ACI 318-14, Table 19.3.2.1 provides requirements for concrete by exposure class. Table 3C below indicates different requirements that we recommend be followed for the concrete design.

Table 3C: ACI 318-14 Table 19.3.2.1 Requirements for Concrete by Exposure Class

Exposure Class	Maximum water:cement ratio	Minimum Compressive Strength (psi)	Cementitious materials – Types (ASTM C150)	Maximum Water-Soluble Chloride Ion Content (% wt)
F0	N/A	2,500	N/A	N/A
S0 (soil)	N/A	2,500	No type restriction	N/A
S1 (soil)	0.50	4,000	II	N/A
W1	0.50	4,000	N/A	N/A
C1	N/A	2,500	N/A	0.30 (0.06)[1]
C2	0.40	5,000	N/A	0.15 (0.06)[1]

1 Maximum water-soluble chloride ion content for non-pre-stressed concrete, (value for pre-stressed concrete).

Additional provisions for Exposure Class C2 include concrete cover for reinforcement. Table 20.6.1.3.1 of ACI 310-14 indicates a minimum concrete cover of 3 inches for "All" reinforcement.

If detailed corrosion design is required, we recommend a corrosion engineer be retained to confirm the information provided and for additional recommendations, as required.

SECTION 4: GEOLOGIC HAZARDS

4.1 FAULT RUPTURE

As discussed above several significant faults are located within 25 kilometers of the site. The site is not located within a State-designated Alquist Priolo Earthquake Fault Zone. As shown in Figure 3, no known surface expression of fault traces is thought to cross the site; therefore, fault rupture hazard is not a significant geologic hazard at the site.

4.2 ESTIMATED GROUND SHAKING

Moderate to severe (design-level) earthquakes can cause strong ground shaking, which is the case for most sites within the Bay Area.

4.2.1 Marina Village

Peak ground accelerations (PGA) of 0.591g was estimated for analysis using a value equal to $PGA_M = F_{PGA} \times PGA_G$ (Equation 11.8-1) as allowed in the 2016 California Building Code (CBC).

4.2.2 Cola Ballena

Peak ground accelerations (PGA) of 0.531g was estimated for analysis using a value equal to $PGA_M = F_{PGA} \times PGA_G$ (Equation 11.8-1) as allowed in the 2016 California Building Code (CBC).

4.2.3 Grand-Otis

Peak ground accelerations (PGA) of 0.576g was estimated for analysis using a value equal to $PGA_M = F_{PGA} \times PGA_G$ (Equation 11.8-1) as allowed in the 2016 California Building Code (CBC).

4.2.4 Park-Otis

Peak ground accelerations (PGA) of 0.597g was estimated for analysis using a value equal to $PGA_M = F_{PGA} \times PGA_G$ (Equation 11.8-1) as allowed in the 2016 California Building Code (CBC).

4.2.5 Catalina

Peak ground accelerations (PGA) of 0.549g was estimated for analysis using a value equal to $PGA_M = F_{PGA} \times PGA_G$ (Equation 11.8-1) as allowed in the 2016 California Building Code (CBC).

4.2.6 Harbor Bay

Peak ground accelerations (PGA) of 0.564g was estimated for analysis using a value equal to $PGA_M = F_{PGA} \times PGA_G$ (Equation 11.8-1) as allowed in the 2016 California Building Code (CBC).

4.3 LIQUEFACTION POTENTIAL

The sites are within a State-designated Liquefaction Hazard Zones (CGS, Oakland West, Oakland East, Hunters Point, and San Leandro Quadrangles, 2003). Our field and laboratory programs addressed this issue by testing and sampling potentially liquefiable layers, performing visual classification on sampled materials, and performing various tests to further classify soil properties.

4.3.1 Background

During strong seismic shaking, cyclically induced stresses can cause increased pore pressures within the soil matrix that can result in liquefaction triggering, soil softening due to shear stress loss, potentially significant ground deformation due to settlement within sandy liquefiable layers as pore pressures dissipate, and/or flow failures in sloping ground or where open faces are present (lateral spreading) (NCEER 1998). Limited field and laboratory data is available regarding ground deformation due to settlement; however, in clean sand layers settlement on the order of 2 to 4 percent of the liquefied layer thickness can occur. Soils most susceptible to liquefaction are loose, non-cohesive soils that are saturated and are bedded with poor drainage, such as sand and silt layers bedded with a cohesive cap.

4.3.2 Analysis

As discussed in the "Subsurface" section above, several loose to medium dense sand layers were encountered below the design groundwater depths. Following the procedures in the 2008 monograph, *Soil Liquefaction During Earthquakes* (Idriss and Boulanger, 2008) and in accordance with CDMG Special Publication 117A guidelines (CDMG, 2008) for quantitative analysis, this layer was analyzed for liquefaction triggering and potential post-liquefaction settlement. These methods compare the ratio of the estimated cyclic shaking (Cyclic Stress Ratio - CSR) to the soil's estimated resistance to cyclic shaking (Cyclic Resistance Ratio - CRR), providing a factor of safety against liquefaction triggering. Factors of safety less than or equal to 1.3 are considered to be potentially liquefiable and capable of post-liquefaction re-consolidation.

The CSR for each layer quantifies the stresses anticipated to be generated due to a design-level seismic event, is based on the peak horizontal acceleration generated at the ground surface discussed in the "Estimated Ground Shaking" section above, and is corrected for overburden and stress reduction factors as discussed in the procedure developed by Seed and Idriss (1971) and updated in the 2008 Idriss and Boulanger monograph.

The soil's CRR is estimated from the in-situ density and strength obtained from field SPT blow counts ("N" value). The "N" values are corrected for effective overburden stresses, taking into consideration both the groundwater level at the time of exploration and the design groundwater level, and stress reduction versus depth factors. The "N" values are also corrected for fines content, hammer efficiency, boring diameter, rod length, and sampler type (with or without liners).

4.3.3 Summary of Liquefaction Potential

4.3.3.1 Marina Village

Our analyses indicate that sandy layers encountered in EB-1 could potentially experience liquefaction triggering that could result in post-liquefaction total settlement at the ground surface of less than ¼ inch based on the Yoshimine (2006) method. As discussed in SP 117A, differential movement for level ground sites over deep soil sites will be up to about two-thirds of

the total settlement between independent foundation elements. In our opinion, differential settlement is anticipated to be less than ¼ inch at the ground surface; therefore, it is our opinion the impacts of liquefaction settlement on the existing and planned improvements will be negligible.

4.3.3.2 Cola Ballena

Our analyses indicate the sandy layer encountered in EB-2 could potentially experience liquefaction triggering that could result in post-liquefaction total settlement at the ground surface of about ½ inch based on the Yoshimine (2006) method. As discussed in SP 117A, differential movement for level ground sites over deep soil sites will be up to about two-thirds of the total settlement between independent foundation elements. In our opinion, differential settlement is anticipated to be about ⅓ inch at the ground surface; however, based on the depths of the existing and proposed below-grade improvements (i.e. about 14 feet), it is our opinion that the impacts of liquefaction settlement on the below-grade improvements will be negligible.

4.3.3.3 Grand-Otis

Our analyses indicate the sandy layers encountered in EB-3 could potentially experience liquefaction triggering that could result in post-liquefaction total settlement at the ground surface of about 2 inches based on the Yoshimine (2006) method. As discussed in SP 117A, differential movement for level ground sites over deep soil sites will be up to about two-thirds of the total settlement between independent foundation elements. In our opinion, differential settlement is anticipated to be about 1⅓ inches at the ground surface; however, based on the depths of the existing and proposed below-grade improvements (i.e. about 23 feet), we estimate a total and differential settlement of about ⅔ and about ½ inch, respectively, for below-grade improvements.

4.3.3.4 Park-Otis

Our analyses indicate the sandy layers encountered in EB-4 (across the street from the existing pump station) and EB-8 (closest to the existing pump station) could potentially experience liquefaction triggering that could result in post-liquefaction total settlement at the ground surface of about 1 inch to 4¼ inches based on the Yoshimine (2006) method. As discussed in SP 117A, differential movement for level ground sites over deep soil sites will be up to about two-thirds of the total settlement between independent foundation elements. In our opinion, differential settlement is anticipated to be about to ⅔ inch to 2¾ inches for at-grade improvements; however, based on the depth of the proposed and existing below-grade improvements (i.e. about 17 feet), we estimate a total and differential settlement of about 1¼ inches and ¾ inch, respectively, for below-grade improvements.

4.3.3.5 Catalina

Our analyses indicate the sandy layers encountered in EB-5 could potentially experience liquefaction triggering that could result in post-liquefaction total settlement at the ground surface of about 1½ inches based on the Yoshimine (2006) method. As discussed in SP 117A,

differential movement for level ground sites over deep soil sites will be up to about two-thirds of the total settlement between independent foundation elements. In our opinion, differential settlement is anticipated to be about 1 inch; however, based on the depths of the proposed and existing below-grade improvements (i.e. about 17 feet), it is our opinion that the impacts of liquefaction settlement below 17 feet will be negligible.

4.3.3.6 Harbor Bay

Our analyses indicate the sandy layers encountered in EB-6 and EB-7 could potentially experience liquefaction triggering that could result in post-liquefaction total settlement at the ground surface of about 1½ and 3¾ inches, respectively, based on the Yoshimine (2006) method. As discussed in SP 117A, differential movement for level ground sites over deep soil sites will be up to about two-thirds of the total settlement between independent foundation elements. In our opinion, differential settlement is anticipated to be about 1 inch to 2½ inches; however, based on the depths of the proposed and existing below-grade improvements (i.e. about 22 feet), we estimate a total and differential settlement of up to ¾ and ½ inch, respectively, for below-grade improvements.

4.3.4 Ground Rupture Potential

The methods used to estimate liquefaction settlement assume there is a sufficient cap of non-liquefiable material to prevent ground rupture or sand boils. For ground rupture to occur, the pore water pressure within the liquefiable soil layer will need to be great enough to break through the overlying non-liquefiable layer, which could cause significant ground deformation and settlement. Based on the existing and proposed improvements being uninhabitable and mostly below the shallow liquefiable layers encountered in our borings, our analysis of ground rupture potential is preliminary and not intended to be used to develop mitigation recommendations and/or methods.

4.3.4.1 Marina Village

As discussed, the potential for liquefaction to occur at the site is low; therefore, it is our opinion that the potential for ground rupture to occur at the site is also low, and that the above total settlement estimates are reasonable.

4.3.4.2 Cola Ballena

The work of Youd and Garris (1995) indicates the 9-foot thick layer of non-liquefiable cap is sufficient to prevent ground rupture; therefore, the above total settlement estimates are reasonable.

4.3.4.3 Grand-Otis

The work of Youd and Garris (1995) indicates the 9-foot thick layer of non-liquefiable cap is sufficient to prevent ground rupture; therefore, the above total settlement estimates are reasonable.

4.3.4.4 Park-Otis

The work of Youd and Garris (1995) indicates the 5-foot thick layer of non-liquefiable cap may not be sufficient to prevent ground rupture; therefore, there is a potential for additional ground deformation and increased total settlement than those estimated above. However, there is a lower potential for increased settlement due to ground rupture to impact the existing and proposed below-grade improvements.

4.3.4.5 Catalina

The work of Youd and Garris (1995) indicates the 4½-foot thick layer of non-liquefiable cap may not be sufficient to prevent ground rupture; therefore, there is a potential for additional ground deformation and increased total settlement than those estimated above. However, there is a lower potential for increased settlement due to ground rupture to impact the existing and proposed below-grade improvements.

4.3.4.6 Harbor Bay

The work of Youd and Garris (1995) indicates the 5-foot thick layer of non-liquefiable cap may not be sufficient to prevent ground rupture; therefore, there is a potential for additional ground deformation and increased total settlement than those estimated above. However, there is a lower potential for increased settlement due to ground rupture to impact the existing and proposed below-grade improvements.

4.4 LATERAL SPREADING

Lateral spreading is horizontal/lateral ground movement of relatively flat-lying soil deposits towards a free face such as an excavation, channel, or open body of water; typically, lateral spreading is associated with liquefaction of one or more subsurface layers near the bottom of the exposed slope. Generally, lateral spreading is considered when an open face (i.e. slope) is within 40D (D = height of free face) of a site; however, as lateral spreading tends to propagate as block failures, it is difficult to analyze and estimate where the first tension crack will form. The deeper below-grade improvements will likely be less impacted by lateral spreading than surface/near surface improvements. Additionally, the proposed and existing improvements are not habitable; therefore, the estimates of lateral spreading displacement discussed below are preliminary and not intended for developing mitigation recommendations and/or methods. If the impacts of lateral spreading are not tolerable, supplemental explorations and analysis should be performed to provide detailed analysis and mitigation recommendations and/or methods.

4.4.1 Marina Village

There are no open faces located near the site, and the potential for liquefaction at the site is low. Additionally, the proposed improvements are not intended to be habitable; therefore, the potential for lateral spreading is considered to be low.

4.4.2 Cola Ballena

The closest open face is the bay channel located approximately 40 feet from the site. Our analysis indicates there is a potential for up to 0.7 feet of lateral displacement of the ground surface at the site due to lateral spreading propagating from the nearby open face.

4.4.3 Grand-Otis

The closest open face is the bay channel located approximately 270 feet from the site. Our analysis indicates there is a potential for up to 0.8 feet of lateral displacement of the ground surface at the site due to lateral spreading propagating from the nearby open face; however, there is an existing residential development and surface improvements (e.g. roadways) between the open face and the site that will likely reduce the potential for lateral spreading to impact the existing and planned improvements at the site.

4.4.4 Park-Otis

The closest open face is the lagoon located approximately 200 feet from the site. Our analysis indicates there is a potential for up to 4.2 feet of lateral displacement of the ground surface at the site due to lateral spreading propagating from the nearby open face; however, there are existing residences, storm drain and outfall structure, and surface improvements (e.g. paved roadways) between the open face and the site that will likely reduce the potential for lateral spreading to impact the existing and planned improvements at the site.

4.4.5 Catalina

The closest open face is the lagoon located adjacent to the site. Our analysis indicates there is a potential for up to 3.4 feet of lateral displacement of the ground surface at the site due to lateral spreading propagating from the nearby open face.

4.4.6 Harbor Bay

There are no open faces located near the site, and the potential for liquefaction at the site is low. Additionally, the proposed improvements are not intended to be habitable; therefore, the potential for lateral spreading at the site is considered to be low.

4.5 SEISMIC SETTLEMENT/UNSATURATED SAND SHAKING

Loose unsaturated sandy soils can settle during strong seismic shaking. As discussed, the soil encountered above the design groundwater depths was predominantly medium dense to dense silty and clayey sand; therefore, our analysis indicated a low potential for seismic settlement of this material. Additionally, based on the anticipated depths of the proposed improvements, this material may likely be removed during excavations for the improvements. Therefore, in our opinion, the potential for significant seismic settlement impacting the proposed improvements is low.

4.7 TSUNAMI/SEICHE

The terms tsunami or seiche are described as ocean waves or similar waves usually created by undersea fault movement or by a coastal or submerged landslide. Tsunamis may be generated at great distance from shore (far field events) or nearby (near field events). Waves are formed, as the displaced water moves to regain equilibrium, and radiates across the open water, similar to ripples from a rock being thrown into a pond. When the waveform reaches the coastline, it quickly raises the water level, with water velocities as high as 15 to 20 knots. The water mass, as well as vessels, vehicles, or other objects in its path create tremendous forces as they impact coastal structures.

Tsunamis have affected the coastline along the Pacific Northwest during historic times. The Fort Point tide gauge in San Francisco recorded approximately 21 tsunamis between 1854 and 1964. The 1964 Alaska earthquake generated a recorded wave height of 7.4 feet and drowned eleven people in Crescent City, California. For the case of a far-field event, the Bay area would have hours of warning; for a near field event, there may be only a few minutes of warning, if any.

A tsunami or seiche originating in the Pacific Ocean would lose much of its energy passing through San Francisco Bay. Based on the study of tsunami inundation potential for the San Francisco Bay Area (Ritter and Dupre, 1972), areas most likely to be inundated are marshlands, tidal flats, and former bay margin lands that are now artificially filled, but are still at or below sea level, and are generally within 1½ miles of the shoreline. The sites are located ½ to ¾ mile inland from the San Francisco Bay shoreline and are less than 10 feet above mean sea level. Tsunami Inundation maps provided by CGS (2009) indicate the sites are located within tsunami and/or seiche inundation zones. Therefore, the potential for impacts to the proposed improvements from tsunami and/or seiche is considered high.

4.8 FLOODING

4.8.1 Marina Village

Based on our internet search of the Federal Emergency Management Agency (FEMA, 2018) flood map public database, the site is located within Zone X, described as “0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas less than one square mile”; however, the site is located adjacent to Zone AE with a Base Flood Elevation (BFE) of 10 feet.

4.8.2 Cola Ballena and Harbor Bay

Based on our internet search of the Federal Emergency Management Agency (FEMA, 2018) flood map public database, the site is located within Zone X, described as “Area of minimal flood hazard”.

4.8.3 Grand-Otis, Park-Otis, and Catalina

Based on our internet search of the Federal Emergency Management Agency (FEMA, 2018) flood map public database, the site is located within Zone X, described as “0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas less than one square mile”.

We recommend the project civil engineer be retained to confirm this information and verify the base flood elevations, if appropriate.

SECTION 5: CONCLUSIONS

5.1 SUMMARY

From a geotechnical viewpoint, the project is feasible provided the concerns listed below are addressed in the project design. Descriptions of each concern with brief outlines of our recommendations follow the listed concerns.

- Shallow groundwater – All sites
- Presence of sand layers – Cola Ballena
- Presence of existing utilities and residential/commercial construction areas – All sites
- Soil corrosion potential – All sites
- Potential for liquefaction-induced settlement – All sites
- Potential for ground rupture and lateral spreading – All sites except Marina Village

5.1.1 Shallow Groundwater (All Sites)

Shallow groundwater was measured at a depth as shallow as 5 feet below the existing ground surface; however, our experience is that groundwater may be encountered at the top of the Bay Mud and within the undocumented fill above the Bay Mud. The groundwater may be either a static level, perched, or tidally influenced levels or combinations thereof. Our experience with similar sites in the vicinity indicates that shallow groundwater could significantly impact grading and underground construction. Additionally, sites underlain by Bay Mud may have perched water levels that are shallower than those encountered within our borings. Therefore, a design groundwater depth of 1 foot above the fill/Bay Mud interface is recommended. These impacts typically consist of potentially wet and unstable excavation subgrade, difficulty achieving compaction, and difficult underground utility installation. Dewatering and shoring of utility trenches, wet wells, and valve vault excavations will be required. Detailed recommendations addressing this concern are presented in the “Earthwork” section of this report.

5.1.2 Presence of Sand Layers (Cola Ballena)

As discussed in the "Subsurface" section of this report, medium dense to dense, silty sand and poorly graded sand with silt were encountered within EB-2 from the ground surface to 49.5 feet below the existing grades (corresponding to Elevation -42.5 feet CAD). We understand the new wet well for the Cola Ballena lift station will be about 20 feet deep. It is noted the proposed wet well will be located within the dense, poorly graded sand with silt layer encountered. Poorly graded sand and silty sand could potentially result in some instability at the cut face and shoring systems, and ground loss that could result in surface settlement. The presence of sand should be considered when choosing excavation methods.

5.1.3 Presence of Existing Utilities and Residential/Commercial Construction Areas (All Sites)

The planned excavation and trenching associated with construction of the sewer improvements could potentially cause displacements of the adjacent soils, utilities and ground surface. Displacement of adjacent soils could damage existing utilities and pavements. An effective shoring design and construction sequencing should be implemented to address these potential risks. The pipes should be relocated as determined by the Project Civil Engineer.

Additionally, the proposed sewer improvements will be installed adjacent to and near single-family residences and businesses where there will be concerns about construction noise and vibrations. Additionally, construction activities should be performed in accordance with the City's noise ordinance requirements.

5.1.4 Soil Corrosion Potential (All Sites)

Our testing indicates sulfate exposures at the Marina Village, Cola Ballena, Grand-Otis, Park-Otis, and Harbor Bay sites are low and no cement-type restrictions to buried concrete are required; however, it is generally a good idea to include some sulfate resistance and to maintain a relatively low water-cement ratio. The corrosion potential for buried metallic structures, such as metal pipes, is considered moderately to very severely corrosive at the sites. Additionally, the sulfate exposure at the Catalina site is high and sulfate resistant concrete designs (cement type restrictions) are recommended. Based on the results of the preliminary soil corrosion screening, special requirements for corrosion control will likely be required to protect metal pipes and fittings. Additionally, our preliminary corrosion screening of Bay Mud encountered within our borings indicated chloride levels that might be corrosive to concrete. Refer to the "Corrosion Screening" section of this report.

5.1.5 Potential for Liquefaction-Induced Settlement (All Sites)

As discussed, our liquefaction analysis indicates that there is a potential for liquefaction of localized sand layers during a significant seismic event.

5.1.6.1 Cola Ballena

The potential for liquefied sand to vent to the ground surface through cracks in the surficial soils is low. Additionally, our analysis indicates the potential for liquefaction-induced settlement to impact the existing and planned improvements at the site is low.

5.1.5.2 Grand-Otis

Although the potential for liquefied sand to vent to the ground surface through cracks in the surficial soils is low, our analysis indicates that liquefaction-induced settlement of about 2 inches could occur, resulting in differential settlement of 1⅓ inches for at-grade improvements and the new valve vault. As discussed, the existing wet well structure is approximately 23 feet below the existing grade. Based on our analysis, the total liquefaction settlement below a depth of 23 feet is about ⅔ with about ½ inch of differential settlement.

5.1.5.3 Park-Otis

Although there is a potential for liquefied sand to vent to the ground surface through cracks in the surficial soils, our analysis indicates that liquefaction-induced settlement of about 1 to 4¼ inches could occur at the ground surface, resulting in differential settlement of ⅔ inch to 2¾ inches for at-grade improvements. As discussed, the existing wet well structure is approximately 17 feet below the existing grade. Based on our analysis, the total liquefaction settlement below a depth of 17 feet is approximately 1¼ inches with about ¾ inch of differential settlement.

5.1.5.4 Catalina

Although the potential for liquefied sand to vent to the ground surface through cracks in the surficial soils is low, our analysis indicates that liquefaction-induced settlement of about 1½ inches could occur at the ground surface, resulting in differential settlement of about 1 inch. As discussed, the existing wet well is approximately 17 feet below the existing grade. Based on our analysis, the liquefaction settlement below a depth of 17 feet is negligible.

5.1.5.5 Harbor Bay

Although the potential for liquefied sand to vent to the ground surface through cracks in the surficial soils is low, our analysis indicates that liquefaction-induced settlement of about 1½ to 3¾ inches could occur at the ground surface, resulting in differential settlement of 1 inch to 2½ inches. As discussed, the existing wet well structure is approximately 22 feet below the existing grade. Based on our analysis, a total liquefaction settlement below a depth of 22 feet of about ¾ inch with about ½ inch of differential settlement.

In our experience, this magnitude of estimated settlement is very typical for this area and design of the sewer lift stations, valve vaults, and mains for this estimated movement is not the standard of practice. Accordingly, some repair of the improvements should be expected following a large magnitude earthquake.

5.1.6 Potential for Ground Rupture and Lateral Spreading

As discussed, the sites in close proximity to open faces (e.g. lagoons and canals) are estimated to be impacted by ground rupture and lateral spreading. Ground rupture generally results in increased liquefaction settlement than that estimated by standard analysis methods. Additionally, lateral spreading generally impacts surface and near surface improvements. Deeper improvements (i.e. wet wells) can also be impacted by lateral spreading. In our experience, these hazards are very typical for this area and design of the sewer lift stations, valve vaults, and mains for these estimated movements is not the standard of practice. Accordingly, some repair and/or replacement of the improvements should be expected following a large magnitude earthquake.

5.2 PLANS AND SPECIFICATIONS REVIEW

We recommend that we be retained to review the geotechnical aspects of the project structural, civil, and landscape plans and specifications, allowing sufficient time to provide the design team with any comments prior to issuing the plans for construction.

5.3 CONSTRUCTION OBSERVATION AND TESTING

As site conditions may vary significantly between the small-diameter borings performed during this investigation, we also recommend that a Cornerstone representative be present to provide geotechnical observation and testing during earthwork and foundation construction. This will allow us to form an opinion and prepare a letter at the end of construction regarding contractor compliance with project plans and specifications, and with the recommendations in our report. We will also be allowed to evaluate any conditions differing from those encountered during our investigation and provide supplemental recommendations as necessary. For these reasons, the recommendations in this report are contingent of Cornerstone providing observation and testing during construction. Contractors should provide at least a 48-hour notice when scheduling our field personnel.

SECTION 6: EARTHWORK

6.1 SITE DEMOLITION AND PREPARATION

6.1.1 Site Clearing

The sites should be cleared of all surface and subsurface improvements designated for removal within the proposed construction areas.

6.1.2 Abandonment of Existing/Abandonment Utilities

All utilities designated for removal should be handled as shown in the project specifications and plans.

6.2 REMOVAL OF EXISTING FILLS AND BAY MUD

As discussed, undocumented fill was encountered within our borings up to 12 feet below the existing grades; however, deeper fills should be anticipated and planned for by the contractor. The fill will likely be removed during excavation for the new wet well at the Cola Ballena site; however, the fill below the new valve vault at the Grand-Otis site is deeper than the planned excavation. Therefore, the excavation should be over-excavated at least 12 inches and backfilled with crushed rock wrapped in geofabric. Partial over-excavation of deeper fills at the other sites that include at-grade improvements may be considered. Additionally, Bay Mud up to 25 feet deep was encountered within EB-1 at the Marina Village site. Although, deep excavations are not anticipated at this site, Bay Mud was encountered at some of the other sites and should be removed during excavation for the new improvements. We recommend that all Bay Mud, if encountered, be removed from within the alignment of the new sewer force main and the footprint of the new valve vault to reduce the potential for settlement (Grand-Otis and Catalina). Provided the material meets the "Materials for Fill" requirements below, trenches and/or excavations may be backfilled with materials that were removed. Reuse of Bay Mud as trench and/or excavation backfill is not recommended and should be off-hauled for disposal at an appropriate disposal facility. In order to reduce the increased loads from the proposed improvements on the existing wet well structures, light-weight engineered fill or grout may be used to fill the voids around the new wet wells and valve vaults that will be constructed within existing wet well structures. Refer to Appendix C of this report for detailed backfilling recommendations in Bay Mud. If other materials are encountered that do not meet the requirements, such as debris, wood, trash, those materials should be screened out of the remaining material and be removed from the site. Backfill of excavations should be placed in lifts and compacted in accordance with the "Compaction" section below.

6.3 TEMPORARY CUT AND FILL SLOPES

The contractor is responsible for maintaining all temporary slopes and providing temporary shoring where required. Temporary shoring, bracing, and cuts/fills should be performed in accordance with the strictest government safety standards. On a preliminary basis, the Bay Mud encountered at the sites may be classified as OSHA Soil Type C materials. A Cornerstone representative should be retained to confirm the preliminary site classifications. Open cuts and trench shields and boxes, hydraulic shores, and soldier pile and lagging shoring are not recommended for excavations in Bay Mud as the ground is very soft and weak; however, these methods (excluding open cuts and trench shields and boxes) may be used for excavations within the fill and alluvium encountered at the sites. Recommended soil parameters for temporary shoring consisting of sheet piles and slide rails are provided in the "Temporary Shoring" section of this report. Additionally, recommendations for performing excavations in Bay Mud are provided in Appendix C.

6.4 BELOW-GRADE EXCAVATIONS

Below-grade excavations may be constructed with temporary slopes in accordance with the "Temporary Cut and Fill Slopes" section above if space allows. Alternatively, temporary shoring may support the planned cuts up to 20 feet. We have provided geotechnical parameters for

shoring design in the section below. The choice of shoring method should be left to the contractor's judgment based on experience, economic considerations and adjacent improvements such as utilities, pavements, and foundation loads. Temporary shoring should support adjacent improvements without distress and should be the contractor's responsibility. A pre-condition survey including photographs and installation of monitoring points for existing site improvements should be included in the contractor's scope. We should be provided the opportunity to review the geotechnical parameters of the shoring design prior to implementation; the project structural engineer should be consulted regarding support of adjacent structures.

6.4.1 Temporary Shoring

Based on the site conditions encountered during our investigation, the cuts may be supported by braced excavations such as sheet pile and slide rail shoring systems or potentially other methods that provide support from the top down while being installed. Utility crossings will likely be problematic when using slide rail systems and should be anticipated and planned for by the contractor. Trench boxes, trench shields, and hydraulic shores with plates should not be used for excavations within Bay Mud. Restrained shoring will most likely be required to limit detrimental lateral deflections and settlement behind the shoring. In addition to soil earth pressures, the shoring system will need to support adjacent loads such as construction vehicles and incidental loading, existing structure foundation loads, and street loading. We recommend that heavy construction loads (cranes, etc.) and material stockpiles be kept at least 15 feet behind the shoring. Adjacent traffic and equipment loads should also be limited and/or set back from open excavations. Where this loading cannot be set back, the shoring will need to be designed to support the loading. Anticipated lateral at-rest earth pressures on shoring and/or existing wet well walls due to excavator loads (Kobelco SK210) are presented on the "Lateral Pressure" diagrams, Figures 4A through 4D. Excavations within Bay Mud should not be left open for extended periods of time including even overnight. Excavations should be backfilled simultaneously with the shoring removal. The shoring designer should provide for timely and uniform mobilization of soil pressures that will not result in excessive lateral deflections. Minimum suggested geotechnical parameters for shoring design are provided in the following tables.

Table 4: Suggested Temporary Shoring Design Parameters

Design Parameter	Design Value
Minimum Lateral Wall Surcharge (upper 5 feet)	120 psf
Cantilever Wall – Triangular Earth Pressure**	40 pcf
Restrained Wall – Uniform Earth Pressure**	Refer to FHWA Circular No.4 Sections 5.2.3 and 5.2.4*
Passive Pressure – Starting at 2 feet below the bottom of the excavation or the bottom of the adjacent Bay Mud, whichever is deeper.	400 pcf up to 2,000 psf maximum uniform pressure*

* Passive pressures are assumed to act over twice the soldier pile diameter.
** The cantilever and restrained pressures are for drained designs with dewatering. If undrained shoring is designed, an additional 62.4 pcf should be added for hydrostatic pressures.

The restrained earth pressure for the sandy soil may also be distributed as described in Figure 23(a) of the *FHWA Circular No. 4 – Ground Anchors and Anchored Systems* (with the hinge point at ¼H) provided the total pressure is established from the uniform pressure above.

Table 5: Suggested Lateral Earth Pressure Parameters

Site / Boring No.	Soil Unit Weight (pcf)[1]	Effective Angle of Internal Friction – Sand / Clay (°)	Active Earth Pressure Coefficient – Ka (clay)	Passive Earth Pressure Coefficient – Kp (clay)	At-Rest Earth Pressure Coefficient – Ko (clay)	Stockpile Surcharge (psf)[3]
Grand-Otis / EB-3	125 (75)	34	0.28	3.5	0.44	140
Park-Otis / EB-4 & 8	120	33 / 28	0.29 (0.36)	3.4 (2.8)	0.46 (0.53)	140
Catalina / EB-5	120 (75)	32 / 31[2]	0.31 (0.32)	3.3 (3.1)	0.47 (0.48)	140
Harbor Bay / EB-6 & 7	120	33 / 28	0.29 (0.36)	3.4 (2.8)	0.46 (0.53)	140

1. Unit weight of soil (Unit weight of Bay Mud).
2. Angle of internal friction for Bay Mud, long-term condition and where cohesion (c) = 0. t the elevation indicated.
3. Lateral surcharge pressure below a depth of 5 feet. Assumes soil stockpile up to 6' high and 5' behind excavation.

We performed our borings with hollow-stem auger drilling equipment and as such were not able to evaluate the potential for caving soils, which can create difficult conditions during soldier beam, tie-back, or soil nail installation; caving soils can also be problematic during excavation and lagging placement. The contractor is responsible for evaluating excavation difficulties prior to construction.

In addition to anticipated deflection of the shoring system, other factors such as voids created by soil sloughing, and erosion of granular layers due to perched water conditions can create adverse ground subsidence and deflections. Voids created during extraction of sheet piles should be grouted during removal and should be anticipated and planned for by the contractor. Additionally, sheet pile shoring should be interlocked and continuous. The contractor should attempt to cut the excavation as close to neat lines as possible; where voids are created, they should be backfilled as soon as possible with sand, gravel, or grout.

As discussed, shallow groundwater is anticipated to be encountered during excavation. Localized dewatering will likely be needed in order to construct/install the proposed improvements. Dewatering can result in settlement of the adjacent soil and improvements and the potential for damage. Shoring should extend below the bottom of the excavations or below the bottom of the Bay Mud, whichever is deeper. Additionally, due to the presence of weak and soft Bay Mud, heave of the excavation bottoms may occur and should be anticipated and planned for by the contractor and shoring designer.

As previously mentioned, we recommend that a monitoring program be developed and implemented to evaluate the effects of the shoring on adjacent improvements. All sensitive improvements should be located and monitored for horizontal and vertical deflections and distress cracking based on a pre-construction survey. For multi-level excavations, the installation of inclinometers at critical areas may be desired for more detailed deflection monitoring. The monitoring frequency should be established and agree to by the project team

prior to start of shoring construction. If sheet piles are used within 50 feet of buildings and and/or residences, vibration monitoring should be performed to ensure that Peak Particle Velocity (PPV) does not exceed 0.5 inch per second (in/sec). If the PPV exceeds 0.5 in/sec, the contractor should change their procedures to reduce the vibration to within this limit.

The above recommendations are for the use of the design team; the contractor in conjunction with input from the shoring designer should perform additional subsurface exploration they deem necessary to design the chosen shoring system. A California-licensed civil or structural engineer must design and be in responsible charge of the temporary shoring design. The contractor is responsible for means and methods of construction, as well as site safety. Refer to Appendix C of this report for additional recommendations for construction at sites underlain by Bay Mud.

6.4.2 Construction Dewatering

Groundwater levels are expected to be near or above the planned excavation (new wet well, force mains, and valve vaults) bottoms at the sites; therefore, temporary dewatering or water-tight shoring methods will be necessary during construction. The design, selection of the equipment and dewatering method, and construction of temporary dewatering should be the responsibility of the contractor. Modifications to the dewatering system are often required in layered alluvial soils and should be anticipated by the contractor. Temporary draw down of the groundwater table can also cause the subsidence outside the excavation area, causing settlement of adjacent improvements. The dewatering plan should consider settlement of the existing sandy soil and surface improvements adjacent to the excavations. Settlement monitoring should be performed. The dewatering plan, including planned dewatering well filter pack materials, should be forwarded to our office for review prior to implementation.

Dewatering in the Bay Mud and clay deposits using well points or dewatering wells is not anticipated to be effective because the water will seep very slowly from the clay. Additionally, care should be taken in lowering the water table around the excavations because that may induce undesirable settlement of the surrounding site improvements. Dewatering will most likely consist of sumps from within the sheet piles.

Depending on the groundwater quality and previous environmental impacts to the site and surrounding area, settlement and storage tanks, particulate filtration, and environmental testing may be required prior to discharge, either into storm or sanitary, or trucked to an off-site facility.

6.5 SUBGRADE PREPARATION

Due to the sandy soils likely to be encountered at the subgrade elevations, we recommend that placement of the capillary break layer or slab-on-grade construction be performed within 24 hours after subgrade compaction and proof rolling are performed.

6.6 MATERIAL FOR FILL

From a geotechnical viewpoint, all on-site soils below the pavement surface having an organic content of less than 3 percent by weight are suitable for use as fill at the sites. The weight of the backfill should not exceed the in-situ condition; however, Bay Mud is not recommended for use as backfill. Additionally, all utility trenches and excavations should be backfilled according to the City of Alameda and/or Caltrans standards and requirements. Light-weight fill may be considered as an alternative to balance backfill pressures and reduce the potential for future settlement of the proposed improvements. From a practical standpoint, the material is anticipated to be over-optimum and difficult to compact because of the over optimum moisture conditions. Additionally, there is no room to stockpile materials at the sites and process them for drying. Based on these anticipated difficulties, we would recommend that import material be considered for backfill such as Class II aggregate base (if the backfill weight is balanced) or light weight aggregates as needed to balance the existing backfill weight. In general, imported fill material should not contain rocks or lumps larger than 6 inches in greatest dimension, with no more than 1.5 percent larger than 2½ inches. Imported fill material should be predominantly granular with a Plasticity Index of 15 or less. To prevent significant caving during future trenching or excavations, imported material should have sufficient fines. Samples of potential import sources should be delivered to our office at least 10 days prior to the desired import start date. Information regarding the import source should be provided, such as any site geotechnical and environmental reports. Alternatively, a CLSM and light-weight fill flowable material could be considered.

Environmental and soil corrosion characterization should also be considered by the project team prior to acceptance. Suitable environmental laboratory data to the planned import quantity should be provided to the project environmental consultant; additional laboratory testing may be required based on the project environmental consultant's review. The potential import source should also not be more corrosive than the on-site soils, based on pH, saturated resistivity, and soluble sulfate and chloride testing.

6.7 COMPACTION REQUIREMENTS

All fills, and subgrade areas where fill, slabs-on-grade, and pavements are planned, should be placed in loose lifts 8 inches thick or less and compacted in accordance with ASTM D1557 (latest version) requirements as shown in the table below. In general, clayey soils should be compacted with sheepsfoot equipment and sandy/gravelly soils with vibratory equipment; open-graded materials such as crushed rock should be placed in lifts no thicker than 18 inches consolidated in place with vibratory equipment. Each lift of fill and all subgrade should be firm and unyielding under construction equipment loading in addition to meeting the compaction requirements to be approved. The contractor (with input from a Cornerstone representative) should evaluate the in-situ moisture conditions, as the use of vibratory equipment on soils with high moistures can cause unstable conditions. General recommendations for soil stabilization are provided in the "Subgrade Stabilization Measures" section of this report.

Table 6: Compaction Requirements

Description	Material Description	Minimum Relative[1] Compaction (percent)	Moisture[2] Content (percent)
Trench Structural Backfill	Class 2 Aggregate Base[3]	95	Optimum
Crushed Rock Fill	¾-inch Clean Crushed Rock	Consolidate In-Place	NA
Pavement Aggregate Base	Class 2 Aggregate Base[3]	95	Optimum
Asphalt Concrete	Asphalt Concrete	95[4]	NA
Light-Weight Fill	Imported Aggregate	90 to 95	Optimum

1 – Relative compaction based on maximum density determined by ASTM D1557 (latest version)
2 – Moisture content based on optimum moisture content determined by ASTM D1557 (latest version)
3 – Class 2 aggregate base shall conform to Caltrans Standard Specifications, latest edition, except that the relative compaction should be determined by ASTM D1557 (latest version)
4 – Relative Compaction of Asphalt should be performed in accordance with the City of Alameda standard specifications.

6.8 TRENCH BACKFILL

Pipeline lines constructed within public right-of-way should be trenched, bedded and shaded, and backfilled in accordance with local or governing jurisdictional requirements (City of Alameda Sewer Standards for Sanitary Sewer System Installation Rehabilitation Repair and/or Caltrans Standards); however, due the presence of highly compressible Bay Mud and the potential for significant settlement to occur due to increased foundation loads and backfill placement, light-weight fill may be considered in order to balance the backfill pressures and reduce the potential for future settlement of the proposed improvements.

All utility lines should be bedded and shaded to at least 6 inches over the top of the lines with crushed rock (⅜-inch-diameter or greater), vibrated concrete, or well-graded sand and gravel materials conforming to the pipe manufacturer's requirements. Open-graded shading materials should be consolidated in place with vibratory equipment and well-graded materials should be compacted to at least 90 percent relative compaction with vibratory equipment prior to placing subsequent backfill materials.

We recommend the trench be excavated a minimum 6 inches beyond the outside of the pipe including bells and 4 inches below the bottom of the invert. The bedding material should be consolidated on the outside of the pipe in lifts with vibration equipment to enable the material to be compacted under the pipe haunches. Recommendations for over-excavation of the bottom of trenches are provided in Section 7.

General backfill over shading materials may consist of on-site native materials provided they meet the requirements in the "Material for Fill" section, and are moisture conditioned and compacted in accordance with the requirements in the "Compaction" section. As discussed, some of the sites are underlain by Bay Mud and reuse of Bay Mud as trench and/or excavation backfill is not recommended; however, consideration should be given to backfilling trenches and excavations with light weight material (of similar weight as Bay Mud) so as to limit the potential

for settlement of the backfilled improvements. Refer to Appendix C of this report for further trench and excavation backfill recommendations.

SECTION 7: FOUNDATIONS

7.1 SUMMARY OF RECOMMENDATIONS

As discussed, new wet wells, valve vaults, and sewer mains are planned for the project. We understand the new wet wells and valve vaults will be placed within the existing wet well structures; however, the new wet well for the Cola Ballena site and the new valve vault at the Grand-Otis site will be constructed outside of the existing structures. Recommendations for foundations for the new wet wells and valve vaults constructed outside of the existing structures and existing wet wells supported on Bay Mud are discussed in the following sections.

7.2 SEISMIC DESIGN CRITERIA

We understand that the project structural design will be based on the 2016 California Building Code (CBC), which provides criteria for the seismic design of buildings in Chapter 16. The "Seismic Coefficients" used to design buildings are established based on a series of tables and figures addressing different site factors, including the soil profile in the upper 100 feet below grade and mapped spectral acceleration parameters based on distance to the controlling seismic source/fault system. Based on our borings and review of local geology, the site is underlain by deep alluvial soils with typical SPT "N" values between 15 and 50 blows per foot. Therefore, we have classified the site as Soil Classification D; however, the Marina Village site is underlain by more than 10 feet of soil (Bay Mud) with a PI greater than 20, SPT "N" values less than 15 blows per foot, and/or soil with undrained shear strength of less than 500 pounds per square foot. Therefore, we have classified this site as Soil Classification E. The mapped spectral acceleration parameters S_S and S_1 were calculated using the USGS web-based program *U.S. Seismic Design Maps* (http://geohazards.usgs.gov/designmaps/us/application.php), Version 3.1.0, revision date July 11, 2013, based on the site coordinates presented below and the site classification. The table below lists the various factors used to determine the seismic coefficients and other parameters.

Table 7A: 2016 CBC Site Categorization and Site Coefficients – Marina Village

Classification/Coefficient	Design Value
Site Class	E
Site Latitude	37.783898°
Site Longitude	-122.275132°
0.2-second Period Mapped Spectral Acceleration[1], S_S	1.534g
1-second Period Mapped Spectral Acceleration[1], S_1	0.605g
Short-Period Site Coefficient – Fa	0.9
Long-Period Site Coefficient – Fv	2.4
0.2-second Period, Maximum Considered Earthquake Spectral Response Acceleration Adjusted for Site Effects - S_{MS}	1.381g
1-second Period, Maximum Considered Earthquake Spectral Response Acceleration Adjusted for Site Effects – S_{M1}	1.453g
0.2-second Period, Design Earthquake Spectral Response Acceleration – S_{DS}	0.921g
1-second Period, Design Earthquake Spectral Response Acceleration – S_{D1}	0.968g

[1]For Site Class B, 5 percent damped.

Table 7B: 2016 CBC Site Categorization and Site Coefficients – Cola Ballena

Classification/Coefficient	Design Value
Site Class	D
Site Latitude	37.769407°
Site Longitude	-122.286363°
0.2-second Period Mapped Spectral Acceleration[1], S_S	1.500g
1-second Period Mapped Spectral Acceleration[1], S_1	0.600g
Short-Period Site Coefficient – Fa	1.0
Long-Period Site Coefficient – Fv	1.5
0.2-second Period, Maximum Considered Earthquake Spectral Response Acceleration Adjusted for Site Effects - S_{MS}	1.500g
1-second Period, Maximum Considered Earthquake Spectral Response Acceleration Adjusted for Site Effects – S_{M1}	0.900g
0.2-second Period, Design Earthquake Spectral Response Acceleration – S_{DS}	1.000g
1-second Period, Design Earthquake Spectral Response Acceleration – S_{D1}	0.600g

[1]For Site Class B, 5 percent damped.

Table 7C: 2016 CBC Site Categorization and Site Coefficients – Grand-Otis

Classification/Coefficient	Design Value
Site Class	D
Site Latitude	37.762792°
Site Longitude	-122.262075°
0.2-second Period Mapped Spectral Acceleration[1], S_S	1.510g
1-second Period Mapped Spectral Acceleration[1], S_1	0.601g
Short-Period Site Coefficient – Fa	1.0
Long-Period Site Coefficient – Fv	1.5
0.2-second Period, Maximum Considered Earthquake Spectral Response Acceleration Adjusted for Site Effects - S_{MS}	1.510g
1-second Period, Maximum Considered Earthquake Spectral Response Acceleration Adjusted for Site Effects – S_{M1}	0.901g
0.2-second Period, Design Earthquake Spectral Response Acceleration – S_{DS}	1.007g
1-second Period, Design Earthquake Spectral Response Acceleration – S_{D1}	0.601g

[1]For Site Class B, 5 percent damped.

Table 7D: 2016 CBC Site Categorization and Site Coefficients – Park-Otis

Classification/Coefficient	Design Value
Site Class	D
Site Latitude	37.756679°
Site Longitude	-122.249045°
0.2-second Period Mapped Spectral Acceleration[1], S_S	1.543g
1-second Period Mapped Spectral Acceleration[1], S_1	0.607g
Short-Period Site Coefficient – Fa	1.0
Long-Period Site Coefficient – Fv	1.5
0.2-second Period, Maximum Considered Earthquake Spectral Response Acceleration Adjusted for Site Effects - S_{MS}	1.543g
1-second Period, Maximum Considered Earthquake Spectral Response Acceleration Adjusted for Site Effects – S_{M1}	0.911g
0.2-second Period, Design Earthquake Spectral Response Acceleration – S_{DS}	1.029g
1-second Period, Design Earthquake Spectral Response Acceleration – S_{D1}	0.607g

[1]For Site Class B, 5 percent damped.

Table 7E: 2016 CBC Site Categorization and Site Coefficients – Catalina

Classification/Coefficient	Design Value
Site Class	D
Site Latitude	37.739182°
Site Longitude	-122.252125°
0.2-second Period Mapped Spectral Acceleration[1], S_S	1.500g
1-second Period Mapped Spectral Acceleration[1], S_1	0.600g
Short-Period Site Coefficient – Fa	1.0
Long-Period Site Coefficient – Fv	1.5
0.2-second Period, Maximum Considered Earthquake Spectral Response Acceleration Adjusted for Site Effects - S_{MS}	1.500g
1-second Period, Maximum Considered Earthquake Spectral Response Acceleration Adjusted for Site Effects – S_{M1}	0.900g
0.2-second Period, Design Earthquake Spectral Response Acceleration – S_{DS}	1.000g
1-second Period, Design Earthquake Spectral Response Acceleration – S_{D1}	0.600g

[1]For Site Class B, 5 percent damped.

Table 7F: 2016 CBC Site Categorization and Site Coefficients – Harbor Bay

Classification/Coefficient	Design Value
Site Class	D
Site Latitude	37.725799°
Site Longitude	-122.234617°
0.2-second Period Mapped Spectral Acceleration[1], S_S	1.503g
1-second Period Mapped Spectral Acceleration[1], S_1	0.600g
Short-Period Site Coefficient – Fa	1.0
Long-Period Site Coefficient – Fv	1.5
0.2-second Period, Maximum Considered Earthquake Spectral Response Acceleration Adjusted for Site Effects - S_{MS}	1.503g
1-second Period, Maximum Considered Earthquake Spectral Response Acceleration Adjusted for Site Effects – S_{M1}	0.900g
0.2-second Period, Design Earthquake Spectral Response Acceleration – S_{DS}	1.002g
1-second Period, Design Earthquake Spectral Response Acceleration – S_{D1}	0.600g

[1]For Site Class B, 5 percent damped.

Because the potential for liquefaction and the potential for affects to the structures at Park-Otis, Catalina, and Harbor Bay sites appear high, based on Table 1613.5.2, Site Class Definitions, of the 2016 California Building Code (CBC), the site should be classified as Site Class F. Site Coefficients F_a and F_v are determined using Tables 1613.5.3(1) and 1613.5.3(2). Site Class F

of those tables refers the determination of Site Coefficients F_a and F_v to Section 11.4.7 of ASCE 7-16. ASCE 7-16 generally indicates that sites classified as Site Class F shall have a site response analysis performed in accordance with Section 21.1 of ASCE 7-16, unless the proposed structure meets the following exception.

> **EXCEPTION:** For structures having fundamental periods of vibration equal to or less than 0.5s, site-response analysis is not required to determine spectral accelerations for liquefiable soils. Rather, a site class is permitted to be determined in accordance with Section 20.3 and the corresponding values of F_a and F_v determined from Tables 11.4-1 and 11.4-2.

For these reasons, in our opinion, the above Site Classification of D in Tables 7D, 7E, and 7F of this report, and the presented seismic coefficients, appear valid due to the above exception, as the structure likely has a fundamental period equal to or less than 0.5 seconds. The Project Structural Engineer should verify this assumption. If the structure will have a fundamental period of greater than 0.5 seconds and meets the requirements for a Site Class designation of F, the requirement for a site response analysis will be triggered, and additional geotechnical analysis will need to be approved.

7.3 WET WELL AND VALVE VAULT FOUNDATIONS – SUPPORTED ON ALLUVIUM

The planned improvements for the Cola Ballena (wet well and valve vault) and Grand-Otis (valve vault only) sites may be supported on at least 6 inches of clean crushed rock, prepared in accordance with the “Earthwork” section of this report provided the improvements are supported on the underlying alluvial soil. Prior to placement of crushed rock, the subgrade should be visually observed by a Cornerstone representative to confirm stable subgrade conditions prior to the installation of the crushed rock base. Light-weight fill may also be considered as an alternative to crushed rock in order to balance the backfill pressures and reduce the potential for future settlement of the proposed improvements.

7.3.1 Bearing Pressures (Alluvium) and Crushed Rock on Alluvium

Undocumented fill remaining below the excavations at the Cola Ballena and Grand-Otis sites should be removed below the planned structures down to the alluvium soil and replaced with compacted crushed rock on alluvium. Subgrade (alluvium) prepared in accordance with the “Earthwork” recommendations of this report is capable of supporting maximum allowable bearing pressures of 2,000 psf for dead loads, 3,000 psf for combined dead plus live loads, and 4,000 psf for all loads including wind and seismic. These pressures are based on factors of safety of 3.0, 2.0, and 1.5 applied to the ultimate bearing pressure for dead, dead plus live, and all loads, respectively. These pressures are net values.

7.3.2 Settlement

As discussed, the proposed new wet well for the Cola Ballena and valve vault for the Grand-Otis sites are estimated to weigh about 93,500 and 36,000 pounds, respectively, and have footprints of about 293 and 35 square feet each.

Based on the above loading and the allowable bearing pressures presented above for the alluvial soil, we estimate the total static settlement for the proposed wet well (Cola Ballena) and valve vault (Grand-Otis) is estimated to be about ½ inch. In addition to the estimated total static settlement for the valve vault (Grand-Otis), a total seismic settlement of 1⅓ inches is estimated. Resulting in a total settlement of about 1¾ inches for the valve vault (Grand-Otis).

SECTION 8: LIMITATIONS

This report, an instrument of professional service, has been prepared for the sole use of Schaaf & Wheeler specifically to support the design of the City of Alameda Sewer Pump Stations Upgrades - Phase 4 project in Alameda, California. The opinions, conclusions, and recommendations presented in this report have been formulated in accordance with accepted geotechnical engineering practices that exist in Northern California at the time this report was prepared. No warranty, expressed or implied, is made or should be inferred.

Recommendations in this report are based upon the soil and groundwater conditions encountered during our subsurface exploration. If variations or unsuitable conditions are encountered during construction, Cornerstone must be contacted to provide supplemental recommendations, as needed.

Schaaf & Wheeler may have provided Cornerstone with plans, reports and other documents prepared by others. Schaaf & Wheeler understands that Cornerstone reviewed and relied on the information presented in these documents and cannot be responsible for their accuracy.

Cornerstone prepared this report with the understanding that it is the responsibility of the owner or his representatives to see that the recommendations contained in this report are presented to other members of the design team and incorporated into the project plans and specifications, and that appropriate actions are taken to implement the geotechnical recommendations during construction.

Conclusions and recommendations presented in this report are valid as of the present time for the development as currently planned. Changes in the condition of the property or adjacent properties may occur with the passage of time, whether by natural processes or the acts of other persons. In addition, changes in applicable or appropriate standards may occur through legislation or the broadening of knowledge. Therefore, the conclusions and recommendations presented in this report may be invalidated, wholly or in part, by changes beyond Cornerstone's control. This report should be reviewed by Cornerstone after a period of three (3) years has elapsed from the date of this report. In addition, if the current project design is changed, then Cornerstone must review the proposed changes and provide supplemental recommendations, as needed.

An electronic transmission of this report may also have been issued. While Cornerstone has taken precautions to produce a complete and secure electronic transmission, please check the electronic transmission against the hard copy version for conformity.

Recommendations provided in this report are based on the assumption that Cornerstone will be retained to provide observation and testing services during construction to confirm that conditions are similar to that assumed for design, and to form an opinion as to whether the work has been performed in accordance with the project plans and specifications. If we are not retained for these services, Cornerstone cannot assume any responsibility for any potential claims that may arise during or after construction as a result of misuse or misinterpretation of Cornerstone's report by others. Furthermore, Cornerstone will cease to be the Geotechnical-Engineer-of-Record if we are not retained for these services.

SECTION 9: REFERENCES

Boulanger, R.W. and Idriss, I.M., 2004, Evaluating the Potential for Liquefaction or Cyclic Failure of Silts and Clays, Department of Civil & Environmental Engineering, College of Engineering, University of California at Davis.

Boulanger, R.W. and Idriss, I.M., 2014, CPT and SPT Based Liquefaction Triggering Procedures, Department of Civil & Environmental Engineering, College of Engineering, University of California at Davis, Report No. UCD/GCM-14/01, April 2014

California Building Code, 2016, Structural Engineering Design Provisions, Vol. 2.

California Department of Conservation Division of Mines and Geology, 1998, Maps of Known Active Fault Near-Source Zones in California and Adjacent Portions of Nevada, International Conference of Building Officials, February, 1998.

California Division of Mines and Geology (2008), "Guidelines for Evaluating and Mitigating Seismic Hazards in California, Special Publication 117A, September.

California Geological Survey, 2003, State of California Seismic Hazard Zones, Oakland West 7.5-Minute Quadrangle, California: Seismic Hazard Zone Report 081.

California Geological Survey, 2003, State of California Seismic Hazard Zones, Oakland East 7.5-Minute Quadrangle, California: Seismic Hazard Zone Report 080.

California Geological Survey, 2003, State of California Seismic Hazard Zones, San Leandro 7.5-Minute Quadrangle, California: Seismic Hazard Zone Report 078.

California Geological Survey, 2003, State of California Seismic Hazard Zones, Hunters Point 7.5-Minute Quadrangle, California.

Cetin, K.O., Bilge, H.T., Wu, J., Kammerer, A.M., and Seed, R.B., Probablilistic Model for the Assessment of Cyclically Induced Reconsolidation (Volumetric) Settlements, ASCE Journal of Geotechnical and Geoenvironmental Engineering, Vo. 135, No. 3, March 1, 2009.

Federal Emergency Management Administration (FEMA), 2018, FIRM City of Alameda, California, Community Panel #06000C0067H, 068H, 069H, 088H, 232H, and 251H, December 21.

Idriss, I.M., and Boulanger, R.W., 2008, Soil Liquefaction During Earthquakes, Earthquake Engineering Research Institute, Oakland, CA, 237 p.

Ishihara, K., 1985, Stability of Natural Deposits During Earthquakes: Proceedings Eleventh International Conference on Soil Mechanics and Foundation Engineering, San Francisco.

Ishihara, K. and Yoshimine, M., 1992, Evaluation of Settlements in Sand Deposits Following Liquefaction During Earthquakes, Soils and Foundations, 32 (1): 173-188.

Pradell, D., 1988, Procedure to Evaluate Earthquake-Induced Settlements in Dry Sandy Soils, Journal of Geotechnical and Environmental Engineering, April 1998, p. 364 – 368 and Errata October 1998 p. 1048.

Ritter, J.R., and Dupre, W.R., 1972, Map Showing Areas of Potential Inundation by Tsunamis in the San Francisco Bay Region, California: San Francisco Bay Region Environment and Resources Planning Study, USGS Basic Data Contribution 52, Misc. Field Studies Map MF-480.

Seed, H.B. and I.M. Idriss, 1971, A Simplified Procedure for Evaluation soil Liquefaction Potential: JSMFC, ASCE, Vol. 97, No. SM 9, pp. 1249 – 1274.

Seed, H.B. and I.M. Idriss, 1982, Ground Motions and Soil Liquefaction During Earthquakes: Earthquake Engineering Research Institute.

Seed, Raymond B., Cetin, K.O., Moss, R.E.S., Kammerer, Ann Marie, Wu, J., Pestana, J.M., Riemer, M.F., Sancio, R.B., Bray, Jonathan D., Kayen, Robert E., and Faris, A., 2003, Recent Advances in Soil Liquefaction Engineering: A Unified and Consistent Framework., University of California, Earthquake Engineering Research Center Report 2003-06.

Southern California Earthquake Center (SCEC), 1999, Recommended Procedures for Implementation of DMG Special Publication 117, Guidelines for Analyzing and Mitigating Liquefaction Hazards in California, March.

State of California Department of Transportation, 2016, Highway Design Manual, Sixth Edition, December 15.

Tokimatsu, K., and Seed, H. Bolton, 1987, Evaluation of Settlements in Sands due to Earthquake Shaking, ASCE Journal of Geotechnical Engineering, Vol. 113, August 1987, pp. 861-878.

USGS, 2011, Earthquake Ground Motion Parameters, Version 5.1.0, revision date February 10, 2011 - A Computer Program for determining mapped ground motion parameters for use with IBC 2006 available at http://earthquake.usgs.gov/research/hazmaps/design/index.php.

Working Group on California Earthquake Probabilities, 2007, The Uniform Earthquake Rupture Forecast, Version 2 (UCRF 2), U.S.G.S. Open File Report 2007-1437.

Yoshimine, M., Nishizaki, H., Amano, KI, and Hosono, Y., 2006, Flow Deformation of Liquefied Sand Under Constant Shear Load and Its Application to Analysis of Flow Slide in Infinite Slope, Soil Dynamics and Earthquake Eng. 26, 253-264.

Youd, T.L. and C.T. Garris, 1995, Liquefaction-Induced Ground-Surface Disruption: Journal of Geotechnical Engineering, Vol. 121, No. 11, pp. 805 - 809.

Youd, T.L. and Idriss, I.M., et al, 1997, Proceedings of the NCEER Workshop on Evaluation of Liquefaction Resistance of Soils: National Center for Earthquake Engineering Research, Technical Report NCEER - 97-0022, January 5, 6, 1996.

Youd et al., 2001, “Liquefaction Resistance of Soils: Summary Report from the 1996 NCEER and 1998 NCEER/NSF Workshops on Evaluation of Liquefaction Resistance of Soils,” ASCE Journal of Geotechnical and Geoenvironmental Engineering, Vo. 127, No. 10, October, 2001.

Youd, T. Leslie, Hansen, Corbett M., and Bartlett, Steven F., 2002, Revised Multilinear Regression Equations for Prediction of Lateral Spread Displacement: ASCE Journal of Geotechnical and Geoenvironmental Engineering, Vol. 128, December 2002, p 1007-1017.

Youd, T.L. and Hoose, S.N., 1978, Historic Ground Failures in Northern California Triggered by Earthquakes, United States Geologic Survey Professional Paper 993.

CORNERSTONE EARTH GROUP

Vicinity Map

Alameda Sewer Pump Station Upgrades - Phase 4 Alameda, CA

Project Number	187-47-1
Figure Number	Figure 1
Date	January 2018
Drawn By	RRN

Legend

Approximate location of exploratory boring (EB)

Base by Google Earth, dated 8/31/2017
Overlay by Schaaf & Wheeler,. Marina Village Site Plan - Sheet 17 - C7, dated 8/9/2019

N

0 10 20

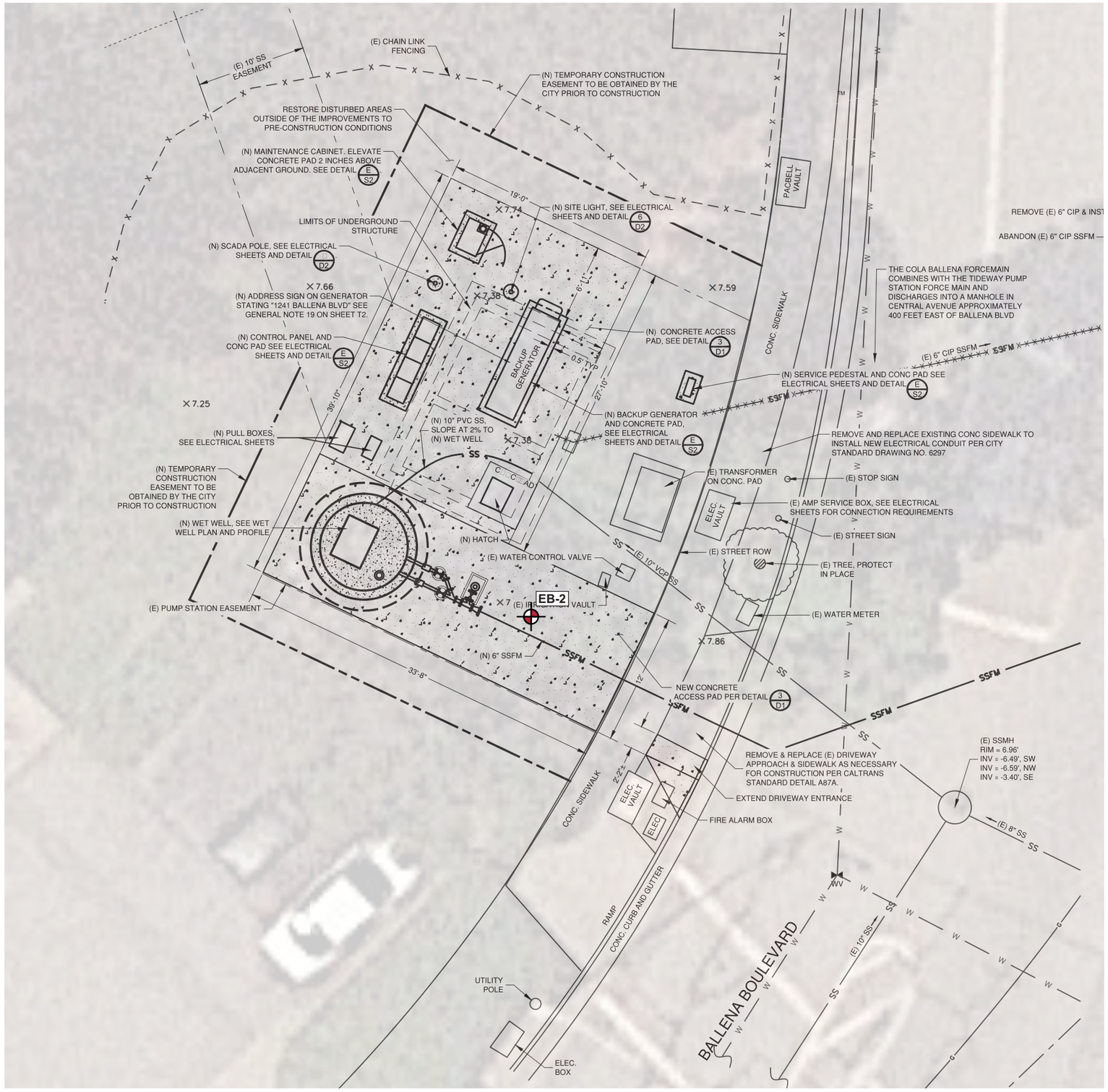
APPROXIMATE SCALE (FEET)

Project Number	187-47-1
Figure Number	Figure 2A
Date	August 2019
Drawn By	RRN

Site Plan

Marina Village Pump Station
Alameda Sewer Pump Station Upgrades - Phase 4
Alameda, CA

CORNERSTONE EARTH GROUP



Legend

⊕ **Approximate location of exploratory boring (EB)**

Base by Google Earth, dated 8/31/2017
Overlay by Schaaf & Wheeler, Cola Ballena Site Plan - Sheet 5 - C2, dated 8/9/2019

N

0 10 20

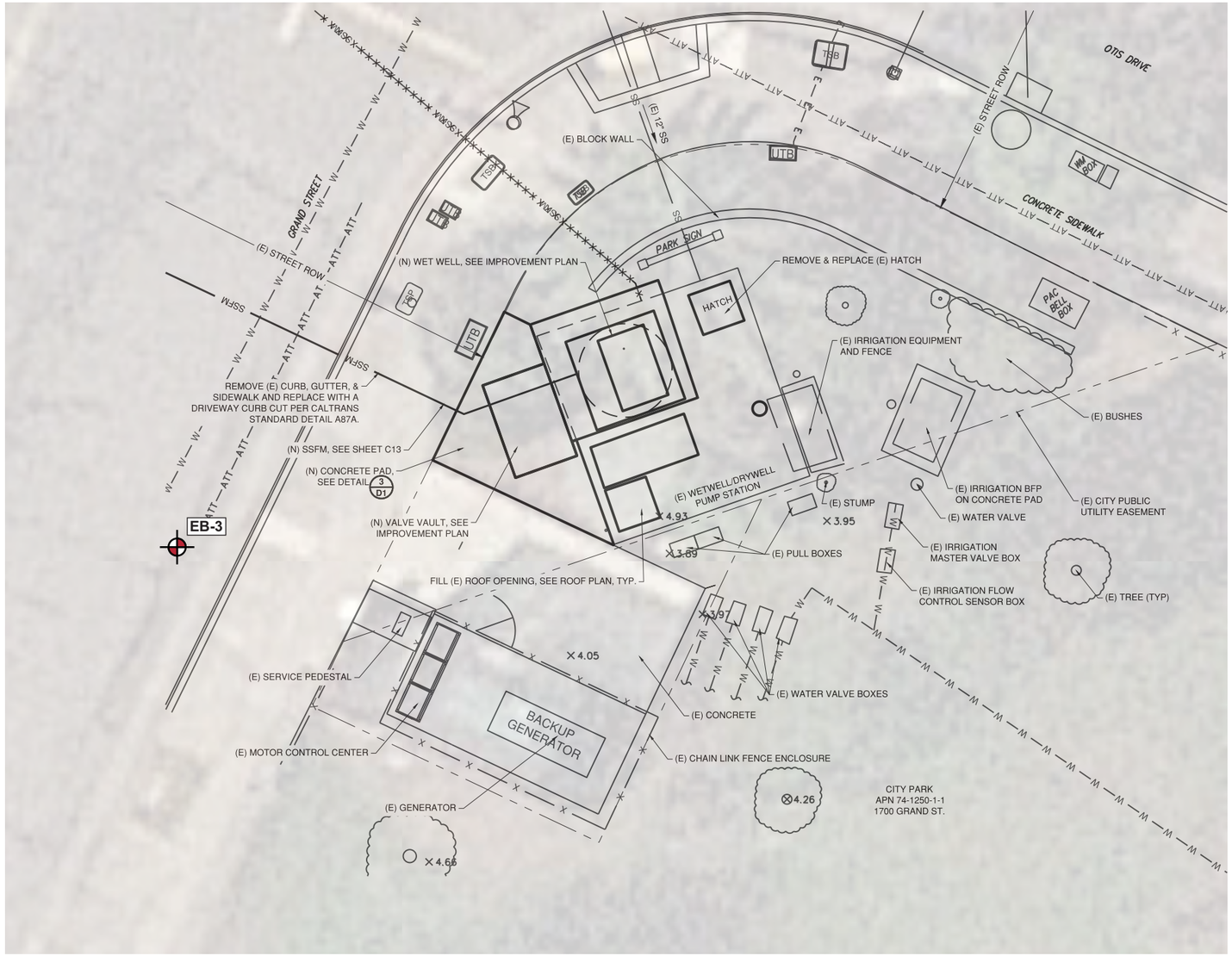
APPROXIMATE SCALE (FEET)

Project Number	187-47-1
Figure Number	Figure 2B
Drawn By	RRN
Date	August 2019

Site Plan

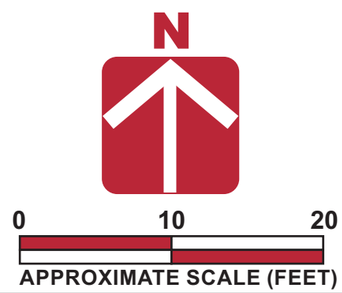
Cola Ballena Pump Station and Sewer Pump Station Upgrades - Phase 4
Alameda, CA

CORNERSTONE EARTH GROUP



Legend

⊕ Approximate location of exploratory boring (EB)



Base by Google Earth, dated 8/31/2017
Overlay by Schaaf & Wheeler, Grand-Otis Site Plan - Sheet 32 - C12, dated 8/9/2019

Project Number	Figure Number	Drawn By
187-47-1	Figure 2C	RRN
	Date	
	August 2019	

Site Plan

Grand-Otis Pump Station
Alameda Sewer Pump Station Upgrades - Phase 4
Alameda, CA

CORNERSTONE EARTH GROUP

Legend

Approximate location of exploratory boring (EB)

0 20 40

APPROXIMATE SCALE (FEET)

Base by Google Earth, dated 8/31/2017
Overlay by Schaaf & Wheeler, Park-Otis Site Plan - Sheet 39 - C16, dated 8/9/2019

Site Plan

Park-Otis Pump Station
Alameda Sewer Pump Station Upgrades - Phase 4
Alameda, CA

Project Number	Figure Number	Date	Drawn By
187-47-1	Figure 2D	August 2019	RRN

CORNERSTONE EARTH GROUP

(E) MOTOR CONTROL CENTER, SEE ELECTRICAL SHEETS
CONC. WALK
(E) IRRIGATION BFP
ASPHALT WALK
102.00
102.80
(N) 15" PVC SEWER, SEE IMPROVEMENT SECTION FOR ADDITIONAL INFORMATION
PROTECT (E) REDWOOD TREE IN PLACE, SEE TREE PROTECTION NOTES ON SHEET 2
FILL ROOF PENETRATION W/ CONCRETE PER 6 C20
REMOVE (E) HATCH & INSTALL (N) HATCH PER DETAIL 5 C20
PROTECT (E) TREE IN PLACE
(E) SD MANHOLE
FACE OF CURB
(E) IRRIGATION BOX
ACCESS HATCH
(N) DISCHARGE PIPING SEE IMPROVEMENT SECTION A C19
(N) WET WELL, SEE IMPROVEMENT PLAN
SS
(E) 15" SS
(E) 10" SS
(E) ELECTRICAL SERVICE PEDESTAL
WV BOX
102.13
102.97
SSFM
(E) STREET LIGHT CONDUIT
BM "X" 102.81
(E) 10" SSFM
REMOVE & REPLACE (E) TREE
(E) STORM DRAIN MANHOLE
(E) STREET ROW
(E) TRANSFORMER
CONC. SLAB
TOP OF TRANS-FORMER
ELECT. BOX
(N) HOSE BID, PER DETAIL 8 D3
CONCRETE SIDEWALK
BACKFILL W/ CDF AND INSTALL (N) CONCRETE PAD, SEE SECTION FOR ADDITIONAL INFORMATION
102.43
(E) ELECTRIC VAULT
102.38
(N) VALVE VAULT, SEE IMPROVEMENT PLAN ON SHEET C19
(E) EDGE PAVEMENT
PROTECT (E) REDWOOD TREE IN PLACE
(E) CITY PUBLIC UTILITY EASEMENT
AUGHINBAUGH WAY
102.68
102.95
103.34
BACKUP GENERATOR
(E) GENERATOR IN FENCED ENCLOSURE
104.22
103.90
EB-5
(E) AC PAVEMENT DRIVEWAY
104.32
(E) FENCE
(E) EDGE PAVEMENT
APN 74-1346-19
13 ANDERSON RD
104.57
(E) HOUSE

Legend

Approximate location of exploratory boring (EB)

0 10 20

APPROXIMATE SCALE (FEET)

Base by Google Earth, dated 8/31/2017
Overlay by Schaaf & Wheeler, Catalina Site Plan - Sheet 44 - C18, dated 8/9/2019

Project Number 187-47-1

Figure Number Figure 2E

Date August 2019

Drawn By RRN

Site Plan

Catalina Pump Station
Alameda Sewer Pump Station Upgrades - Phase 4
Alameda, CA

CORNERSTONE EARTH GROUP

Legend

Approximate location of exploratory boring (EB)

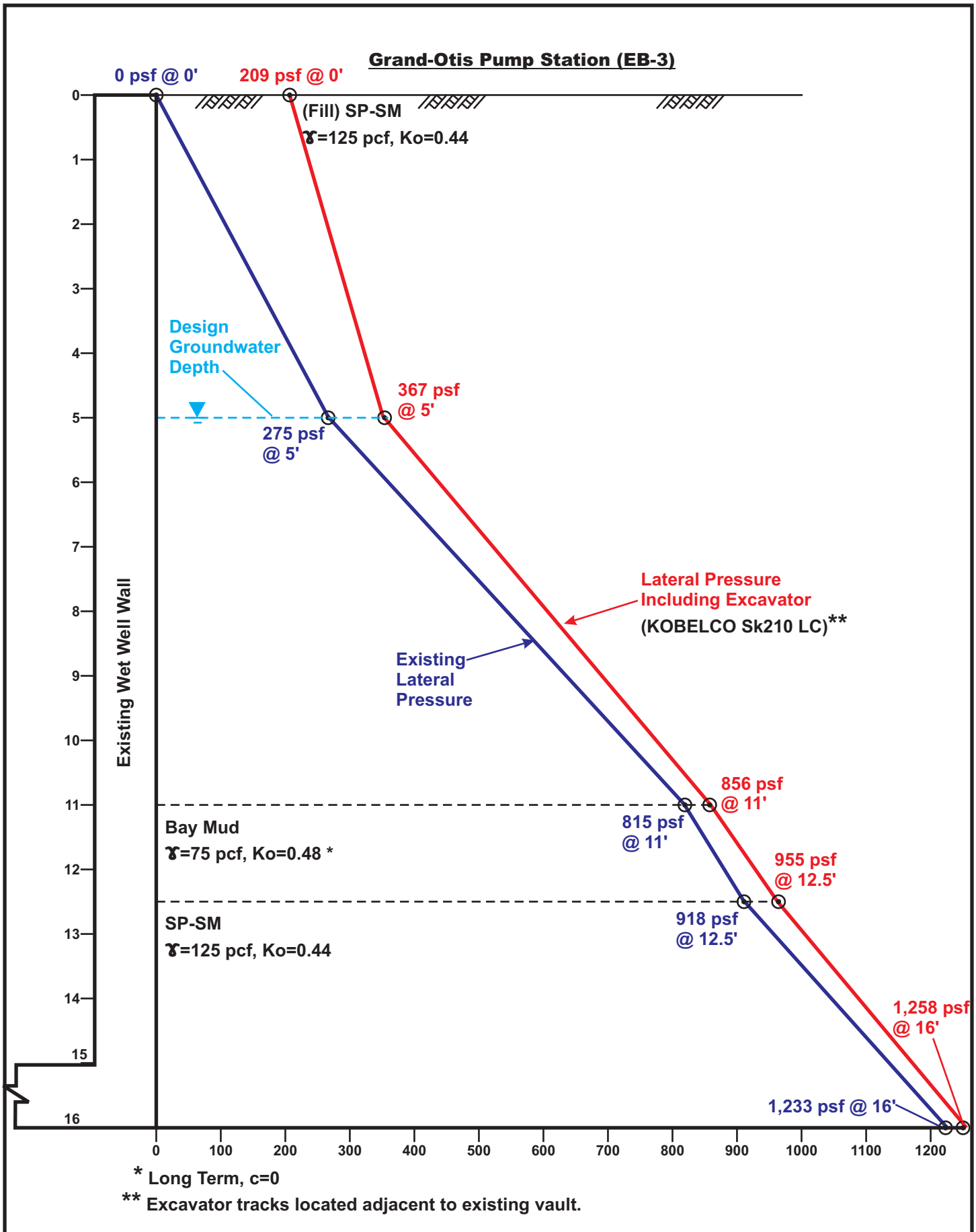
Base by Google Earth, dated 8/31/2017
Overlay by Schaaf & Wheeler, Harbor Bay Site Plan - Sheet 52 - C23, dated 8/9/2019

Project Number	187-47-1
Figure Number	Figure 2F
Date	August 2019
Drawn By	RRN

Site Plan

Harbor Bay Pump Station
Alameda Sewer Pump Station Upgrades - Phase 4
Alameda, CA

CORNERSTONE EARTH GROUP



* Long Term, c=0

** Excavator tracks located adjacent to existing vault.

CORNERSTONE EARTH GROUP

Lateral At-Rest Earth Pressure Diagram

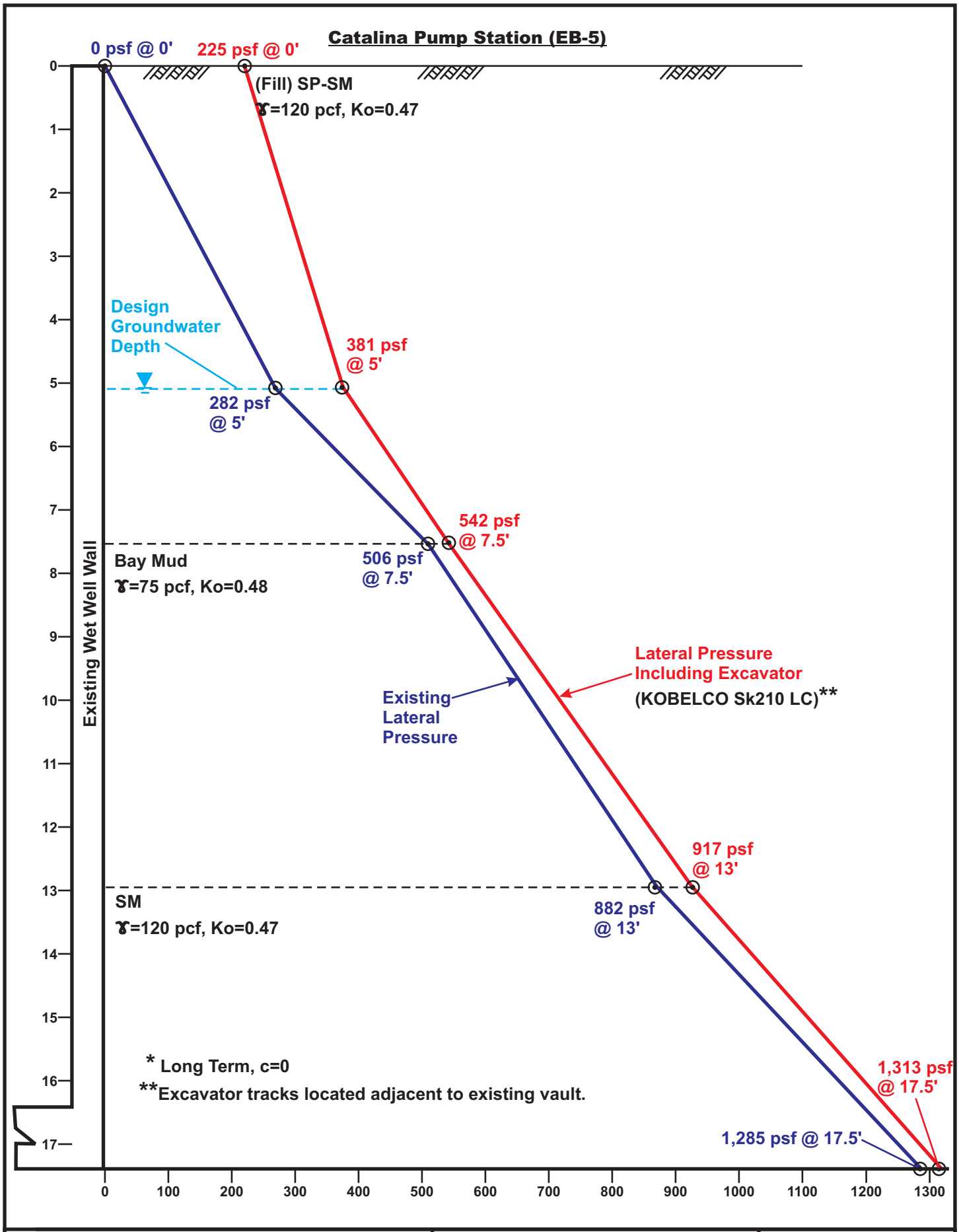
Grand-Otis Pump Station
Alameda Sewer Pump Station
Upgrades - Phase 4
Alameda, CA

Project Number: 187-47-1

Figure Number: Figure 4A

Date: October 2019

Drawn By: RRN

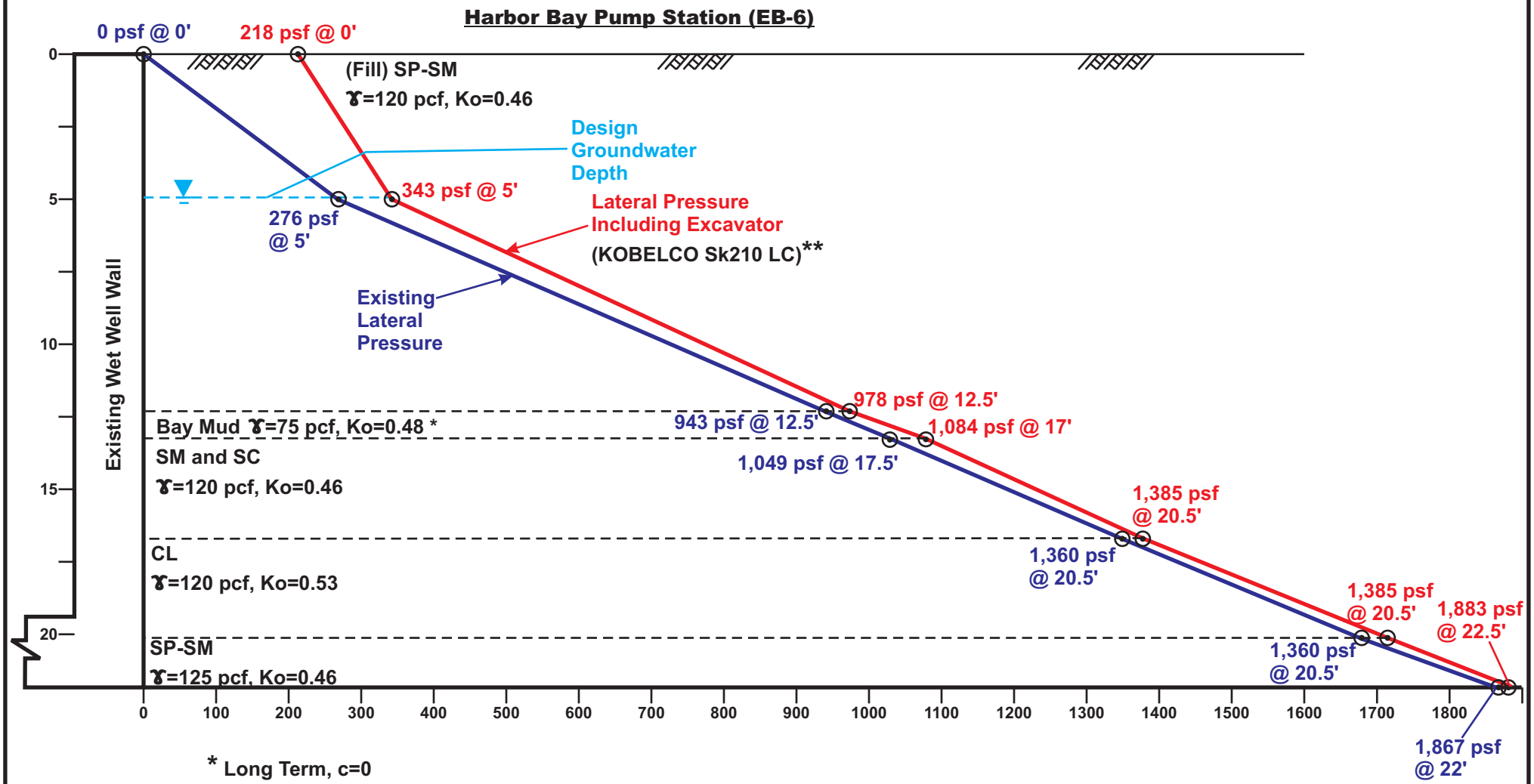


CORNERSTONE EARTH GROUP

Lateral At-Rest Earth Pressure Diagram

Catalina Pump Station
Alameda Sewer Pump Station
Upgrades - Phase 4
Alameda, CA

Project Number	187-47-1
Figure Number	Figure 4B
Date	October 2019
Drawn By	RRN



* Long Term, c=0

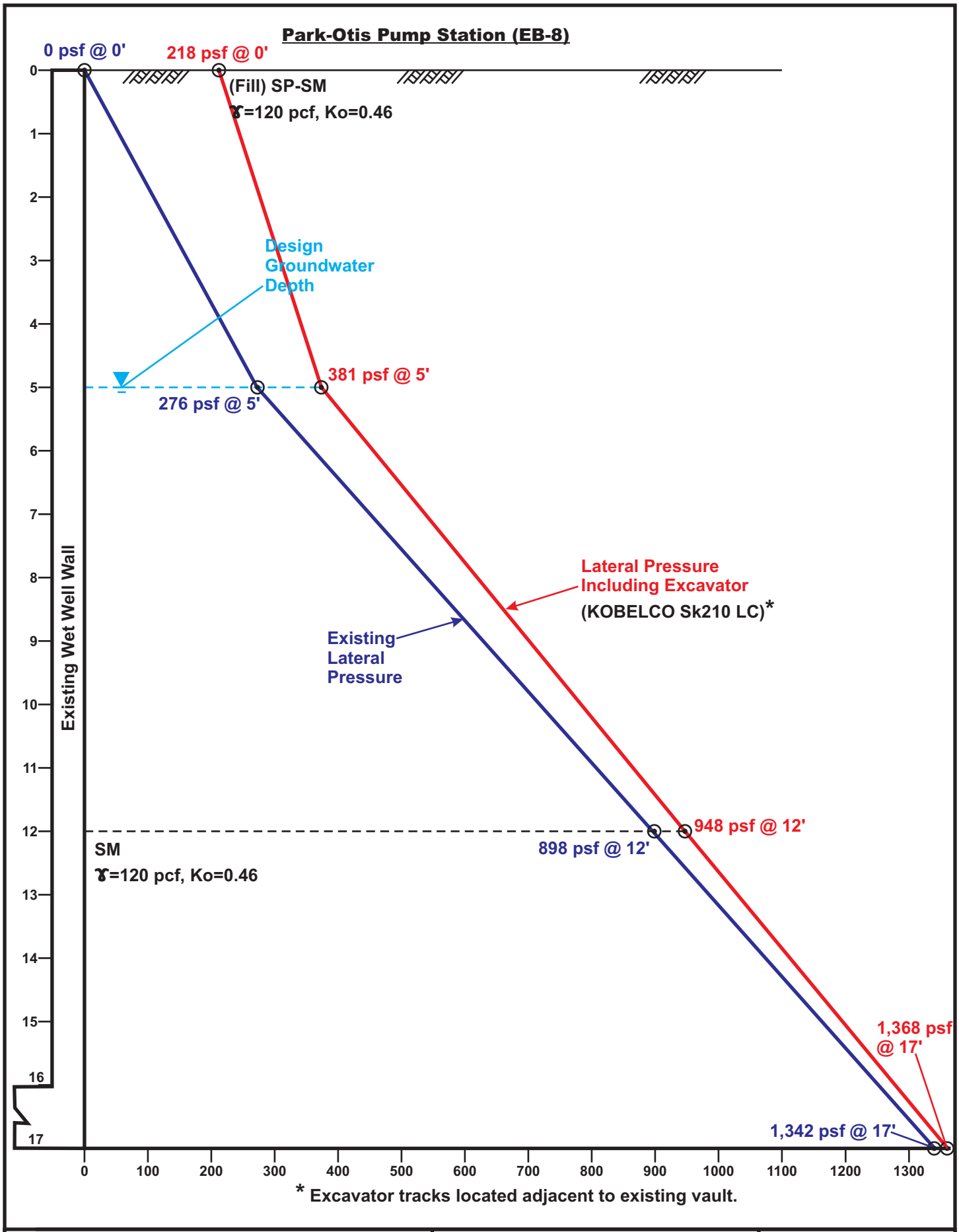
** Excavator tracks located adjacent to existing vault.

CORNERSTONE EARTH GROUP

Lateral At-Rest Earth Pressure Diagram

Harbor Bay Pump Station
Alameda Sewer Pump Station
Upgrades - Phase 4
Alameda, CA

Project Number	187-47-1
Figure Number	Figure 4C
Date	October 2019
Drawn By	RRN



CORNERSTONE EARTH GROUP

Lateral At-Rest Earth Pressure Diagram

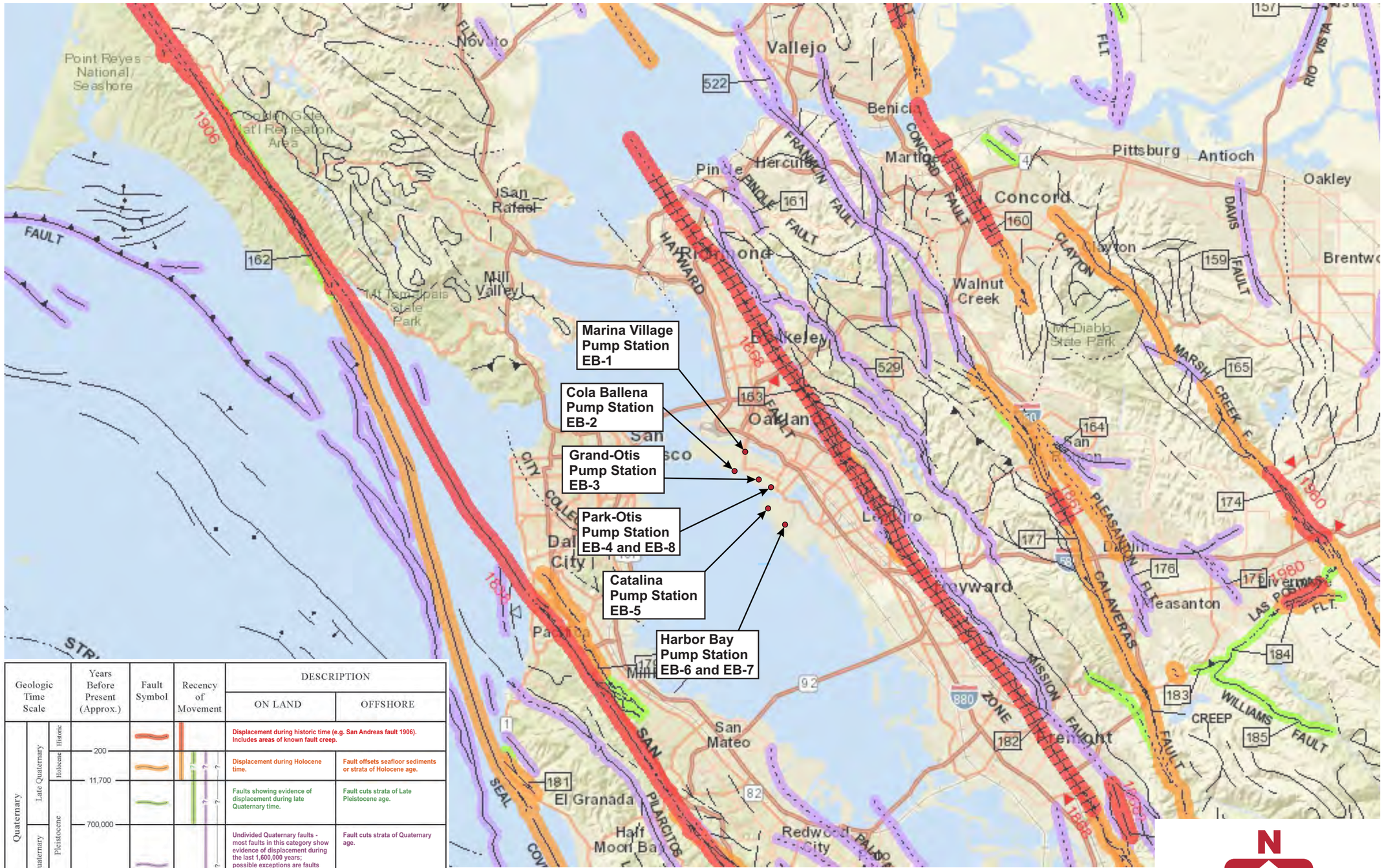
Park-Otis Pump Station
Alameda Sewer Pump Station
Upgrades - Phase 4
Alameda, CA

Project Number: 187-47-1

Figure Number: Figure 4D

Date: October 2019

Drawn By: RRN



Geologic Time Scale			Years Before Present (Approx.)	Fault Symbol	Recency of Movement	DESCRIPTION: ON LAND	DESCRIPTION: OFFSHORE
Quaternary	Late Quaternary	Historic	200			Displacement during historic time (e.g. San Andreas fault 1906). Includes areas of known fault creep.	
		Holocene	11,700		? ?	Displacement during Holocene time.	Fault offsets seafloor sediments or strata of Holocene age.
	Early Quaternary	Pleistocene	700,000		? ?	Faults showing evidence of displacement during late Quaternary time.	Fault cuts strata of Late Pleistocene age.
			1,600,000		?	Undivided Quaternary faults - most faults in this category show evidence of displacement during the last 1,600,000 years; possible exceptions are faults which displace rocks of undifferentiated Pilo-Pleistocene age.	Fault cuts strata of Quaternary age.
Pre-Quaternary			4.5 billion (Age of Earth)			Faults without recognized Quaternary displacement or showing evidence of no displacement during Quaternary time. Not necessarily inactive.	Fault cuts strata of Pliocene or older age.

Base by California Geological Survey - 2010 Fault Activity Map of California (Jennings and Bryant, 2010)

Project Number: 187-47-1

Figure Number: Figure 3

Date: August 2019

Drawn By: RRN

Regional Fault Map

Alameda Sewer Pump Station Upgrades - Phase 4 Alameda, CA

CORNERSTONE EARTH GROUP

APPENDIX A: FIELD INVESTIGATION

The field investigation consisted of a surface reconnaissance and a subsurface exploration program using truck-mounted, hollow-stem auger drilling equipment. Eight 8-inch-diameter exploratory borings were drilled on May 7 through May 11, and May 29, 2018 to depths of 30 to 65 feet. The approximate locations of exploratory borings are shown on the Site Plans, Figures 2A through 2F. The soils encountered were continuously logged in the field by our representative and described in accordance with the Unified Soil Classification System (ASTM D2488). Boring logs, as well as a key to the classification of the soil, are included as part of this appendix.

Boring locations were approximated using existing site boundaries and other site features as references. Boring elevations were based on interpolation of plan contours. The locations and elevations of the borings should be considered accurate only to the degree implied by the method used.

Representative soil samples were obtained from the borings at selected depths. All samples were returned to our laboratory for evaluation and appropriate testing. The standard penetration resistance blow counts were obtained by dropping a 140-pound hammer through a 30-inch free fall. The 2-inch O.D. split-spoon sampler was driven 18 inches and the number of blows was recorded for each 6 inches of penetration (ASTM D1586). 2.5-inch I.D. samples were obtained using a Modified California Sampler driven into the soil with the 140-pound hammer previously described. Unless otherwise indicated, the blows per foot recorded on the boring log represent the accumulated number of blows required to drive the last 12 inches. The various samplers are denoted at the appropriate depth on the boring logs.

Field tests included an evaluation of the unconfined compressive strength of the soil samples using a pocket penetrometer device. The results of these tests are presented on the individual boring logs at the appropriate sample depths.

Attached boring logs and related information depict subsurface conditions at the locations indicated and on the date designated on the logs. Subsurface conditions at other locations may differ from conditions occurring at these boring locations. The passage of time may result in altered subsurface conditions due to environmental changes. In addition, any stratification lines on the logs represent the approximate boundary between soil types and the transition may be gradual.

UNIFIED SOIL CLASSIFICATION (ASTM D-2487-10)

MATERIAL TYPES	CRITERIA FOR ASSIGNING SOIL GROUP NAMES			GROUP SYMBOL	SOIL GROUP NAMES & LEGEND
COARSE-GRAINED SOILS >50% RETAINED ON NO. 200 SIEVE	GRAVELS >50% OF COARSE FRACTION RETAINED ON NO 4. SIEVE	CLEAN GRAVELS <5% FINES	Cu>4 AND 1<Cc<3	GW	WELL-GRADED GRAVEL
			Cu>4 AND 1>Cc>3	GP	POORLY-GRADED GRAVEL
		GRAVELS WITH FINES >12% FINES	FINES CLASSIFY AS ML OR CL	GM	SILTY GRAVEL
			FINES CLASSIFY AS CL OR CH	GC	CLAYEY GRAVEL
	SANDS >50% OF COARSE FRACTION PASSES ON NO 4. SIEVE	CLEAN SANDS <5% FINES	Cu>6 AND 1<Cc<3	SW	WELL-GRADED SAND
			Cu>6 AND 1>Cc>3	SP	POORLY-GRADED SAND
		SANDS AND FINES >12% FINES	FINES CLASSIFY AS ML OR CL	SM	SILTY SAND
			FINES CLASSIFY AS CL OR CH	SC	CLAYEY SAND
FINE-GRAINED SOILS >50% PASSES NO. 200 SIEVE	SILTS AND CLAYS LIQUID LIMIT<50	INORGANIC	PI>7 AND PLOTS>"A" LINE	CL	LEAN CLAY
			PI>4 AND PLOTS<"A" LINE	ML	SILT
		ORGANIC	LL (oven dried)/LL (not dried)<0.75	OL	ORGANIC CLAY OR SILT
	SILTS AND CLAYS LIQUID LIMIT>50	INORGANIC	PI PLOTS >"A" LINE	CH	FAT CLAY
			PI PLOTS <"A" LINE	MH	ELASTIC SILT
		ORGANIC	LL (oven dried)/LL (not dried)<0.75	OH	ORGANIC CLAY OR SILT
HIGHLY ORGANIC SOILS		PRIMARILY ORGANIC MATTER, DARK IN COLOR, AND ORGANIC ODOR		PT	PEAT

OTHER MATERIAL SYMBOLS

- Poorly-Graded Sand with Clay
- Clayey Sand
- Sandy Silt
- Artificial/Undocumented Fill
- Poorly-Graded Gravelly Sand
- Topsoil
- Well-Graded Gravel with Clay
- Well-Graded Gravel with Silt
- Sand
- Silt
- Well Graded Gravelly Sand
- Gravelly Silt
- Asphalt
- Boulders and Cobble

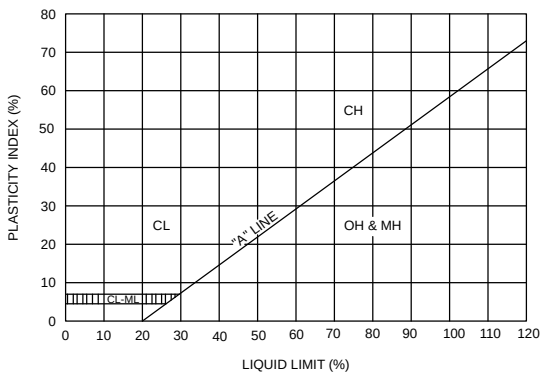
SAMPLER TYPES

- SPT
- Modified California (2.5" I.D.)
- Rock Core
- Shelby Tube
- No Recovery
- Grab Sample

ADDITIONAL TESTS

CA	-	CHEMICAL ANALYSIS (CORROSIVITY)	PI	-	PLASTICITY INDEX
CD	-	CONSOLIDATED DRAINED TRIAXIAL	SW		SWELL TEST
CN	-	CONSOLIDATION	TC	-	CYCLIC TRIAXIAL
CU	-	CONSOLIDATED UNDRAINED TRIAXIAL	TV	-	TORVANE SHEAR
DS	-	DIRECT SHEAR	UC	-	UNCONFINED COMPRESSION
PP	-	POCKET PENETROMETER (TSF)	(1.5)	-	(WITH SHEAR STRENGTH IN KSF)
(3.0)	-	(WITH SHEAR STRENGTH IN KSF)		-	
RV	-	R-VALUE	UU		UNCONSOLIDATED UNDRAINED TRIAXIAL
SA	-	SIEVE ANALYSIS: % PASSING #200 SIEVE		-	
▼	-	WATER LEVEL			

PLASTICITY CHART



PENETRATION RESISTANCE
(RECORDED AS BLOWS / FOOT)

SAND & GRAVEL		SILT & CLAY		
RELATIVE DENSITY	BLOWS/FOOT*	CONSISTENCY	BLOWS/FOOT*	STRENGTH** (KSF)
VERY LOOSE	0 - 4	VERY SOFT	0 - 2	0 - 0.25
LOOSE	4 - 10	SOFT	2 - 4	0.25 - 0.5
MEDIUM DENSE	10 - 30	MEDIUM STIFF	4 - 8	0.5-1.0
DENSE	30 - 50	STIFF	8 - 15	1.0 - 2.0
VERY DENSE	OVER 50	VERY STIFF	15 - 30	2.0 - 4.0
		HARD	OVER 30	OVER 4.0

* NUMBER OF BLOWS OF 140 LB HAMMER FALLING 30 INCHES TO DRIVE A 2 INCH O.D. (1-3/8 INCH I.D.) SPLIT-BARREL SAMPLER THE LAST 12 INCHES OF AN 18-INCH DRIVE (ASTM-1586 STANDARD PENETRATION TEST).

** UNDRAINED SHEAR STRENGTH IN KIPS/SQ. FT. AS DETERMINED BY LABORATORY TESTING OR APPROXIMATED BY THE STANDARD PENETRATION TEST, POCKET PENETROMETER, TORVANE, OR VISUAL OBSERVATION.

CORNERSTONE EARTH GROUP

LEGEND TO SOIL DESCRIPTIONS

Figure Number A-1

BORING NUMBER EB-1

CORNERSTONE EARTH GROUP

PROJECT NAME Alameda Sewer Pump Station Upgrades - Phase 4
PROJECT NUMBER 187-47-1
PROJECT LOCATION Alameda, CA

DATE STARTED 5/7/18 **DATE COMPLETED** 5/7/18
GROUND ELEVATION 4 FT +/- **BORING DEPTH** 64.9 ft.
DRILLING CONTRACTOR Exploration Geoservices, Inc. **LATITUDE** 37.783898° **LONGITUDE** -122.275132°
DRILLING METHOD Mobile B-61, 8 inch Hollow-Stem Auger **GROUNDWATER LEVELS:**
LOGGED BY OL ▽ **AT TIME OF DRILLING** 19 ft.
NOTES Marina Village ▼ **AT END OF DRILLING** 19 ft.

This log is a part of a report by Cornerstone Earth Group, and should not be used as a stand-alone document. This description applies only to the location of the exploration at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with time. The description presented is a simplification of actual conditions encountered. Transitions between soil types may be gradual.

ELEVATION (ft)	DEPTH (ft)	DESCRIPTION	N-Value (uncorrected) blows per foot	SAMPLES TYPE AND NUMBER	DRY UNIT WEIGHT PCF	NATURAL MOISTURE CONTENT	PLASTICITY INDEX, %	PERCENT PASSING No. 200 SIEVE
4.0	0	1½ inches asphalt concrete over 5 inches aggregate base						
3.5		**Sandy Lean Clay (CL) [Fill]** very stiff, moist, brown and gray brown mottled, fine to coarse sand, some fine to coarse subangular to subrounded gravel, low plasticity	67	MC-1B	110	20		
1.0		**Clayey Sand with Gravel (SC) [Fill]** medium dense, moist, brown and gray brown mottled, fine to coarse sand, fine to coarse subangular to subrounded gravel	31	MC-2	100	11		
-1.5	5	**Lean Clay with Sand (CL) [Fill]** very stiff, moist, gray with brown mottles, fine to coarse sand, moderate plasticity	29	MC-3B	88	33		
-4.0		**Clayey Sand (SC) [Fill]** medium dense, moist, gray, fine to medium sand, some fine subrounded gravel	46	MC-4B	120	13		
-7.0	10	**Fat Clay (CH) [Bay Mud]** soft, moist, gray, trace fine sand, high plasticity						
		Liquid Limit = 109, Plastic Limit = 43	6	MC-5B	49	86	66	
	15			ST				
			7	MC-7B	49	87		
	20							
			7	MC-8B	72	50		
-21.0	25	**Clayey Sand (SC)**						
-21.5		dense, moist, gray, fine to medium sand,	36	SPT-9B		17		
-22.0		*Continued Next Page*						

UNDRAINED SHEAR STRENGTH, ksf
○ HAND PENETROMETER
△ TORVANE
● UNCONFINED COMPRESSION
▲ UNCONSOLIDATED-UNDRAINED TRIAXIAL
1.0 2.0 3.0 4.0

BORING NUMBER EB-1

CORNERSTONE EARTH GROUP

PROJECT NAME Alameda Sewer Pump Station Upgrades - Phase 4

PROJECT NUMBER 187-47-1

PROJECT LOCATION Alameda, CA

This log is a part of a report by Cornerstone Earth Group, and should not be used as a stand-alone document. This description applies only to the location of the exploration at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with time. The description presented is a simplification of actual conditions encountered. Transitions between soil types may be gradual.

ELEVATION (ft)	DEPTH (ft)	SYMBOL	DESCRIPTION	N-Value (uncorrected) blows per foot	SAMPLES TYPE AND NUMBER	DRY UNIT WEIGHT PCF	NATURAL MOISTURE CONTENT	PLASTICITY INDEX, %	PERCENT PASSING No. 200 SIEVE	UNDRAINED SHEAR STRENGTH, ksf
-22.0			some shell fragments							
			Lean Clay with Sand (CL) very stiff, moist, gray, fine to medium sand, moderate plasticity							
				40	MC-10B	114	17			2.0
	30									
-26.5			**Sandy Lean Clay (CL)** very stiff, moist, brown with gray mottles, fine to medium sand, moderate plasticity							
				68	MC-11B	110	15			2.0
	35									
			becomes hard	50/6"	MC-12B	118	16			>4.5
	40									
				50/6"	MC-13B	118	16			>4.5
	45									
-42.0			**Poorly Graded Sand with Silt (SP-SM)** very dense, moist, brown, fine to medium sand							
				50/3"	SPT-14		19			
	50									
				50/6"	SPT-15		19			
	55									
-52.0										

UNDRAINED SHEAR STRENGTH, ksf
○ HAND PENETROMETER
△ TORVANE
● UNCONFINED COMPRESSION
▲ UNCONSOLIDATED-UNDRAINED TRIAXIAL
1.0 2.0 3.0 4.0

Continued Next Page

BORING NUMBER EB-1

CORNERSTONE EARTH GROUP

PROJECT NAME Alameda Sewer Pump Station Upgrades - Phase 4

PROJECT NUMBER 187-47-1

PROJECT LOCATION Alameda, CA

This log is a part of a report by Cornerstone Earth Group, and should not be used as a stand-alone document. This description applies only to the location of the exploration at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with time. The description presented is a simplification of actual conditions encountered. Transitions between soil types may be gradual.

ELEVATION (ft)	DEPTH (ft)	SYMBOL	DESCRIPTION	N-Value (uncorrected) blows per foot	SAMPLES TYPE AND NUMBER	DRY UNIT WEIGHT PCF	NATURAL MOISTURE CONTENT	PLASTICITY INDEX, %	PERCENT PASSING No. 200 SIEVE
-52.0			**Poorly Graded Sand with Silt (SP-SM)** very dense, moist, brown, fine to medium sand						
	60			50/6"	SPT-16		18		
				50/4"	SPT-17		18		
-60.8	65		Bottom of Boring at 64.9 feet.						
	70								
	75								
	80								
	85								

UNDRAINED SHEAR STRENGTH, ksf

○ HAND PENETROMETER

△ TORVANE

● UNCONFINED COMPRESSION

▲ UNCONSOLIDATED-UNDRAINED TRIAXIAL

1.0 2.0 3.0 4.0

BORING NUMBER EB-2

CORNERSTONE EARTH GROUP

PROJECT NAME Alameda Sewer Pump Station Upgrades - Phase 4
PROJECT NUMBER 187-47-1
PROJECT LOCATION Alameda, CA

DATE STARTED 5/8/18 **DATE COMPLETED** 5/8/18
GROUND ELEVATION 7 FT +/- **BORING DEPTH** 49.5 ft.
DRILLING CONTRACTOR Exploration Geoservices, Inc. **LATITUDE** 37.769407° **LONGITUDE** -122.286363°
DRILLING METHOD Mobile B-61, 8 inch Hollow-Stem Auger **GROUNDWATER LEVELS:**
LOGGED BY OL **AT TIME OF DRILLING** 5 ft.
NOTES Cola Ballena **AT END OF DRILLING** 5 ft.

This log is a part of a report by Cornerstone Earth Group, and should not be used as a stand-alone document. This description applies only to the location of the exploration at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with time. The description presented is a simplification of actual conditions encountered. Transitions between soil types may be gradual.

ELEVATION (ft)	DEPTH (ft)	DESCRIPTION	N-Value (uncorrected) blows per foot	SAMPLES TYPE AND NUMBER	DRY UNIT WEIGHT PCF	NATURAL MOISTURE CONTENT	PLASTICITY INDEX, %	PERCENT PASSING No. 200 SIEVE
7.0	0	6 inches asphalt concrete						
6.5		**Poorly Graded Sand with Silt (SP-SM) [Fill]** medium dense, moist, gray brown, fine to medium sand	52	MC-1B	107	6		
			62	MC-2B	101	10		
	5		60	MC-3B	107	9		7
		some Fat Clay nodules	40	MC-4B	104	22		
	10							
-5.0		**Clayey Sand (SC)** medium dense, wet, gray, fine to medium sand						
-7.5			28	MC-5B	99	27		
	15	**Poorly Graded Sand with Silt (SP-SM)** dense, moist, gray brown, fine to medium sand	47	SPT				
			38	SPT-7		19		11
	20							
-15.5		**Silty Sand (SM)** dense, moist, brown, fine to medium sand						
			40	SPT-8		22		
	25							
-19.0								

UNDRAINED SHEAR STRENGTH, ksf
○ HAND PENETROMETER
△ TORVANE
● UNCONFINED COMPRESSION
▲ UNCONSOLIDATED-UNDRAINED TRIAXIAL
1.0 2.0 3.0 4.0

Continued Next Page

BORING NUMBER EB-2

CORNERSTONE EARTH GROUP

PROJECT NAME Alameda Sewer Pump Station Upgrades - Phase 4

PROJECT NUMBER 187-47-1

PROJECT LOCATION Alameda, CA

This log is a part of a report by Cornerstone Earth Group, and should not be used as a stand-alone document. This description applies only to the location of the exploration at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with time. The description presented is a simplification of actual conditions encountered. Transitions between soil types may be gradual.

ELEVATION (ft)	DEPTH (ft)	DESCRIPTION	N-Value (uncorrected) blows per foot	SAMPLES TYPE AND NUMBER	DRY UNIT WEIGHT PCF	NATURAL MOISTURE CONTENT	PLASTICITY INDEX, %	PERCENT PASSING No. 200 SIEVE
-19.0		**Silty Sand (SM)** dense, moist, brown, fine to medium sand						
		becomes very dense	58	SPT-9		23		
	30							
-25.0		**Poorly Graded Sand with Silt (SP-SM)** very dense, moist, gray, fine to medium sand	50/6"	SPT-10		18		
	35							
			50/6"	SPT-11		21		
	40							
-35.0		**Silty Sand (SM)** very dense, moist, gray, fine to medium sand						
			50/6"	SPT-12		18		
	45							
			50/6"	SPT-13		17		
-42.5	50	Bottom of Boring at 49.5 feet.						
	55							

UNDRAINED SHEAR STRENGTH, ksf
- ○ HAND PENETROMETER
- △ TORVANE
- ● UNCONFINED COMPRESSION
- ▲ UNCONSOLIDATED-UNDRAINED TRIAXIAL

1.0 2.0 3.0 4.0

BORING NUMBER EB-3

CORNERSTONE EARTH GROUP

PROJECT NAME Alameda Sewer Pump Station Upgrades - Phase 4
PROJECT NUMBER 187-47-1
PROJECT LOCATION Alameda, CA

DATE STARTED 5/9/18 **DATE COMPLETED** 5/9/18
GROUND ELEVATION 2.75 FT +/- **BORING DEPTH** 41.5 ft.
DRILLING CONTRACTOR Exploration Geoservices, Inc. **LATITUDE** 37.762792° **LONGITUDE** -122.262075°
DRILLING METHOD Mobile B-61, 8 inch Hollow-Stem Auger **GROUNDWATER LEVELS:**
LOGGED BY RPM ▽ **AT TIME OF DRILLING** 7 ft.
NOTES Grand - Otis ▼ **AT END OF DRILLING** 7 ft.

ELEVATION (ft)	DEPTH (ft)	DESCRIPTION	N-Value (uncorrected) blows per foot	SAMPLES TYPE AND NUMBER	DRY UNIT WEIGHT PCF	NATURAL MOISTURE CONTENT	PLASTICITY INDEX, %	PERCENT PASSING No. 200 SIEVE
2.8	0	6 inches asphalt concrete						
2.3		**Poorly Graded Sand with Silt (SP-SM) [Fill]** medium dense, moist, gray brown, fine to medium sand	22	MC-1B	101	15		
			50/6"	MC				
	5		50/6"	MC-2B	113	14		
-6.3		**Silty Sand (SM) [Fill]** medium dense, wet, gray, fine to medium sand, some fat clay nodules	30	MC-3B	100	25		
	10		4	SPT				
-8.3		**Fat Clay (CH) [Bay Mud]** soft, moist, gray, trace fine sand, high plasticity		ST				
-9.8		**Silty Sand (SM)** medium dense, moist, gray, fine to medium sand, some shell fragments	27	SPT-6		19		
	15							
-13.3		**Poorly Graded Sand with Silt (SP-SM)** medium dense to dense, moist, brown, fine to medium sand	55	NR				
	20		40	MC-8B	107	20		
			30	SPT				
	25							
-23.3								

Continued Next Page

UNDRAINED SHEAR STRENGTH, ksf
○ HAND PENETROMETER
△ TORVANE
● UNCONFINED COMPRESSION
▲ UNCONSOLIDATED-UNDRAINED TRIAXIAL
1.0 2.0 3.0 4.0

BORING NUMBER EB-3

CORNERSTONE EARTH GROUP

PROJECT NAME Alameda Sewer Pump Station Upgrades - Phase 4

PROJECT NUMBER 187-47-1

PROJECT LOCATION Alameda, CA

This log is a part of a report by Cornerstone Earth Group, and should not be used as a stand-alone document. This description applies only to the location of the exploration at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with time. The description presented is a simplification of actual conditions encountered. Transitions between soil types may be gradual.

ELEVATION (ft)	DEPTH (ft)	SYMBOL	DESCRIPTION	N-Value (uncorrected) blows per foot	SAMPLES TYPE AND NUMBER	DRY UNIT WEIGHT PCF	NATURAL MOISTURE CONTENT	PLASTICITY INDEX, %	PERCENT PASSING No. 200 SIEVE
-23.3			**Poorly Graded Sand with Silt (SP-SM)** medium dense to dense, moist, brown, fine to medium sand						
				29	MC-10		21		
	30								
-29.3			**Poorly Graded Sand with Silt (SP-SM)** very dense, moist, gray, fine to medium sand						
				50/6"	MC-11B	110	19		
	35								
			medium dense	48	MC-12B	114	16		
	40			54	SPT				
-38.8			Bottom of Boring at 41.5 feet.						
	45								
	50								
	55								

UNDRAINED SHEAR STRENGTH, ksf

○ HAND PENETROMETER

△ TORVANE

● UNCONFINED COMPRESSION

▲ UNCONSOLIDATED-UNDRAINED TRIAXIAL

1.0 2.0 3.0 4.0

BORING NUMBER EB-4

CORNERSTONE EARTH GROUP

PROJECT NAME Alameda Sewer Pump Station Upgrades - Phase 4
PROJECT NUMBER 187-47-1
PROJECT LOCATION Alameda, CA

DATE STARTED 5/9/18 **DATE COMPLETED** 5/9/18
GROUND ELEVATION 4.5 FT +/- **BORING DEPTH** 26.5 ft.
DRILLING CONTRACTOR Exploration Geoservices, Inc. **LATITUDE** 37.756679° **LONGITUDE** -122.249045°
DRILLING METHOD Mobile B-61, 8 inch Hollow-Stem Auger **GROUNDWATER LEVELS:**
LOGGED BY RPM ▽ **AT TIME OF DRILLING** 10 ft.
NOTES Park - Otis ▼ **AT END OF DRILLING** 10 ft.

This log is a part of a report by Cornerstone Earth Group, and should not be used as a stand-alone document. This description applies only to the location of the exploration at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with time. The description presented is a simplification of actual conditions encountered. Transitions between soil types may be gradual.

ELEVATION (ft)	DEPTH (ft)	DESCRIPTION	N-Value (uncorrected) blows per foot	SAMPLES TYPE AND NUMBER	DRY UNIT WEIGHT PCF	NATURAL MOISTURE CONTENT	PLASTICITY INDEX, %	PERCENT PASSING No. 200 SIEVE
4.5	0	5 inches asphalt concrete						
4.1		**Poorly Graded Sand with Silt (SP-SM) [Fill]** dense, moist, gray brown, fine to medium sand	60	MC-1B	111	12		
1.5		**Silty Sand (SM) [Fill]** medium dense, moist, gray and brown, fine to medium sand	40	MC-2A	107	13		15
	5		29	MC-3B	110	17		
-3.5		**Sandy Lean Clay (CL)** very stiff, moist, gray, fine to medium sand, moderate plasticity	31	MC-4B	107	20		
	10		22	SPT-5B		22		
-6.0		**Silty Sand (SM)** dense, moist, gray, fine to medium sand, some shell fragments						
-8.5		**Poorly Graded Sand with Silt (SP-SM)** medium dense, moist, gray, fine to medium sand	40	MC-6B	107	20		
	15		25	SPT				
		becomes very dense	50/5"	SPT-8B	112	17		
	20							
			50/6"	MC-9B	110	18		
	25		60	SPT				
-22.0		Bottom of Boring at 26.5 feet.						

UNDRAINED SHEAR STRENGTH, ksf
○ HAND PENETROMETER
△ TORVANE
● UNCONFINED COMPRESSION
▲ UNCONSOLIDATED-UNDRAINED TRIAXIAL
1.0 2.0 3.0 4.0

BORING NUMBER EB-5

CORNERSTONE EARTH GROUP

PROJECT NAME Alameda Sewer Pump Station Upgrades - Phase 4
PROJECT NUMBER 187-47-1
PROJECT LOCATION Alameda, CA

DATE STARTED 5/9/18 **DATE COMPLETED** 5/9/18
GROUND ELEVATION 3.5 FT +/- **BORING DEPTH** 49.4 ft.
DRILLING CONTRACTOR Exploration Geoservices, Inc.
LATITUDE 37.739182° **LONGITUDE** -122.252125°
DRILLING METHOD Mobile B-61, 8 inch Hollow-Stem Auger
GROUNDWATER LEVELS:
LOGGED BY RPM
▽ **AT TIME OF DRILLING** 10 ft.
NOTES Catalina
▼ **AT END OF DRILLING** 10 ft.

This log is a part of a report by Cornerstone Earth Group, and should not be used as a stand-alone document. This description applies only to the location of the exploration at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with time. The description presented is a simplification of actual conditions encountered. Transitions between soil types may be gradual.

ELEVATION (ft)	DEPTH (ft)	DESCRIPTION	N-Value (uncorrected) blows per foot	SAMPLES TYPE AND NUMBER	DRY UNIT WEIGHT PCF	NATURAL MOISTURE CONTENT	PLASTICITY INDEX, %	PERCENT PASSING No. 200 SIEVE
3.5	0	5 inches asphalt concrete						
3.1		**Poorly Graded Sand with Silt (SP-SM) [Fill]** very dense to dense, moist, brown, fine to medium sand	50/6"	MC-1B	98	3		
			63	MC-2B	97	7		
-1.0	5	**Silty Sand (SM) [Fill]** medium dense, moist, gray and brown, fine to medium sand	28	MC-3B	105	19		
-4.0		**Fat Clay (CH) [Bay Mud]** soft, moist, gray, trace fine sand, high plasticity Liquid Limit = 117, Plastic Limit = 34	7	MC-4B	47	98	83	
	10	becomes stiff		ST				
-9.5		**Silty Sand (SM)** loose, moist, gray, fine to medium sand	12	NR				
	15		15	SPT-6		17		
-13.0		**Clayey Sand (SC)** very dense, moist grayish brown, fine to medium sand	52	SPT				
-15.0		**Sandy Lean Clay (CL)** very stiff, moist, gray, fine to medium sand, moderate plasticity	69	MC-8B	111	17		
	20							
-19.0		**Clayey Sand (SC)** very dense, moist grayish brown, fine to medium sand	50/5"	MC-9B	112	18		
	25							
-22.5		*Continued Next Page*						

UNDRAINED SHEAR STRENGTH, ksf
○ HAND PENETROMETER
△ TORVANE
● UNCONFINED COMPRESSION
▲ UNCONSOLIDATED-UNDRAINED TRIAXIAL
1.0 2.0 3.0 4.0

BORING NUMBER EB-5

CORNERSTONE EARTH GROUP

PROJECT NAME Alameda Sewer Pump Station Upgrades - Phase 4

PROJECT NUMBER 187-47-1

PROJECT LOCATION Alameda, CA

This log is a part of a report by Cornerstone Earth Group, and should not be used as a stand-alone document. This description applies only to the location of the exploration at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with time. The description presented is a simplification of actual conditions encountered. Transitions between soil types may be gradual.

ELEVATION (ft)	DEPTH (ft)	DESCRIPTION	N-Value (uncorrected) blows per foot	SAMPLES TYPE AND NUMBER	DRY UNIT WEIGHT PCF	NATURAL MOISTURE CONTENT	PLASTICITY INDEX, %	PERCENT PASSING No. 200 SIEVE
-22.5		**Poorly Graded Sand with Silt (SP-SM)** dense, moist, gray and brown, fine to medium sand						
			61	MC-10B	107	21		
	30							
-28.5		**Clayey Sand (SC)** medium dense, moist gray with brown mottles, fine to medium sand						
			38	MC-11B	112	17		
	35	becomes very dense	66	SPT				
			50/4"	MC-13B	111	18		
	40							
-38.5		**Silty Sand (SM)** very dense, moist grayish brown, fine to medium sand						
			50/5"	MC-14	109	19		
	45		50/6"	SPT				
			50/4"	MC-16A	108	20		
-45.9		Bottom of Boring at 49.4 feet.						
	50							
	55							

UNDRAINED SHEAR STRENGTH, ksf

- ○ HAND PENETROMETER
- △ TORVANE
- ● UNCONFINED COMPRESSION
- ▲ UNCONSOLIDATED-UNDRAINED TRIAXIAL

1.0 2.0 3.0 4.0

BORING NUMBER EB-6

CORNERSTONE EARTH GROUP

PROJECT NAME Alameda Sewer Pump Station Upgrades - Phase 4
PROJECT NUMBER 187-47-1
PROJECT LOCATION Alameda, CA

DATE STARTED 5/10/18 **DATE COMPLETED** 5/10/18
GROUND ELEVATION 5.5 FT +/- **BORING DEPTH** 39.5 ft.
DRILLING CONTRACTOR Exploration Geoservices, Inc.
LATITUDE 37.725799° **LONGITUDE** -122.234617°
DRILLING METHOD Mobile B-61, 8 inch Hollow-Stem Auger
GROUNDWATER LEVELS:
LOGGED BY RPM
AT TIME OF DRILLING 10 ft.
NOTES Harbor Bay
AT END OF DRILLING 10 ft.

This log is a part of a report by Cornerstone Earth Group, and should not be used as a stand-alone document. This description applies only to the location of the exploration at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with time. The description presented is a simplification of actual conditions encountered. Transitions between soil types may be gradual.

ELEVATION (ft)	DEPTH (ft)	DESCRIPTION	N-Value (uncorrected) blows per foot	SAMPLES TYPE AND NUMBER	DRY UNIT WEIGHT PCF	NATURAL MOISTURE CONTENT	PLASTICITY INDEX, %	PERCENT PASSING No. 200 SIEVE
5.5	0	**Poorly Graded Sand with Silt (SP-SM) [Fill]** very dense to dense, moist, brown, fine to medium sand	36	MC-1B	81	3		
			72	MC-2B	101	4		
	5		43	MC-3B	94	13		
-2.0		**Silty Sand (SM) [Fill]** medium dense, moist, gray, fine to medium sand	18	MC-4B	106	20		
	10		24	SPT				
-7.0		**Fat Clay (CH) [Bay Mud]** soft, moist, gray, trace fine sand, high plasticity	12	MC-6B	117	14		
-8.0		**Silty Sand (SM)** medium dense, moist, gray, fine to medium sand	18	SPT				
-9.5	15	**Clayey Sand (SC)** medium dense, moist, gray, fine to medium sand	24	SPT-8		18		
-11.5		**Sandy lean Clay (CL)** stiff, moist, gray with brown mottles, fine sand, low plasticity Liquid Limit = 27, Plastic Limit = 14	28	MC-9B	108	19	13	
	20		11	SPT-10		23		
-15.0		**Poorly Graded Sand with Silt (SP-SM)** dense to medium dense, moist, gray, fine to medium sand	66	MC-11B	111	18		
	25							
-20.5		*Continued Next Page*						

UNDRAINED SHEAR STRENGTH, ksf
○ HAND PENETROMETER
△ TORVANE
● UNCONFINED COMPRESSION
▲ UNCONSOLIDATED-UNDRAINED TRIAXIAL
1.0 2.0 3.0 4.0

BORING NUMBER EB-6

CORNERSTONE EARTH GROUP

PROJECT NAME Alameda Sewer Pump Station Upgrades - Phase 4

PROJECT NUMBER 187-47-1

PROJECT LOCATION Alameda, CA

This log is a part of a report by Cornerstone Earth Group, and should not be used as a stand-alone document. This description applies only to the location of the exploration at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with time. The description presented is a simplification of actual conditions encountered. Transitions between soil types may be gradual.

ELEVATION (ft)	DEPTH (ft)	SYMBOL	DESCRIPTION	N-Value (uncorrected) blows per foot	SAMPLES TYPE AND NUMBER	DRY UNIT WEIGHT PCF	NATURAL MOISTURE CONTENT	PLASTICITY INDEX, %	PERCENT PASSING No. 200 SIEVE
-20.5			**Poorly Graded Sand with Silt (SP-SM)** dense to medium dense, moist, gray, fine to medium sand						
	30			47	MC-12B	111	17		
				43	SPT-13		20		
	35			64	MC-14B	108	20		
-34.0			becomes very dense	50/6"	MC-15B	111	17		
	40		Bottom of Boring at 39.5 feet.						
	45								
	50								
	55								

UNDRAINED SHEAR STRENGTH, ksf

- ○ HAND PENETROMETER
- △ TORVANE
- ● UNCONFINED COMPRESSION
- ▲ UNCONSOLIDATED-UNDRAINED TRIAXIAL

1.0 2.0 3.0 4.0

BORING NUMBER EB-7

CORNERSTONE EARTH GROUP

PROJECT NAME Alameda Sewer Pump Station Upgrades - Phase 4
PROJECT NUMBER 187-47-1
PROJECT LOCATION Alameda, CA

DATE STARTED 5/11/18 **DATE COMPLETED** 5/11/18
GROUND ELEVATION 5.5 FT +/- **BORING DEPTH** 30 ft.
DRILLING CONTRACTOR Exploration Geoservices, Inc. **LATITUDE** 37.725927° **LONGITUDE** -122.234829°
DRILLING METHOD Mobile B-61, 8 inch Hollow-Stem Auger **GROUNDWATER LEVELS:**
LOGGED BY OL ▽ **AT TIME OF DRILLING** 8 ft.
NOTES Harbor Bay ▼ **AT END OF DRILLING** 8 ft.

This log is a part of a report by Cornerstone Earth Group, and should not be used as a stand-alone document. This description applies only to the location of the exploration at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with time. The description presented is a simplification of actual conditions encountered. Transitions between soil types may be gradual.

ELEVATION (ft)	DEPTH (ft)	DESCRIPTION	N-Value (uncorrected) blows per foot	SAMPLES TYPE AND NUMBER	DRY UNIT WEIGHT PCF	NATURAL MOISTURE CONTENT	PLASTICITY INDEX, %	PERCENT PASSING No. 200 SIEVE
5.5	0	**Poorly Graded Sand with Silt (SP-SM) [Fill]** dense, moist, brown, fine to medium sand	70	MC-1B	104	15		
			56	MC-2B	98	5		
1.0	5	**Silty Sand (SM) [Fill]** medium dense, moist, grayish brown, fine to medium sand	38	MC				
			13	SPT-4		21		
	10		19	SPT-5		20		
-7.5		**Poorly Graded Sand with Silt (SP-SM)** loose to medium dense, moist, gray, fine to medium sand	7	SPT-6		20		9
	15							
			18	SPT-7		19		
-14.5	20	**Silty Sand (SM)** medium dense, moist, gray, fine to medium sand, some shell fragments	18	SPT-8B		17		
-17.0		**Clayey Sand (SC)** medium dense, moist grayish brown, fine to medium sand						
-18.5		**Poorly Graded Sand with Silt (SP-SM)** very dense, moist, gray, fine to medium sand						
	25							
-20.5		*Continued Next Page*						

UNDRAINED SHEAR STRENGTH, ksf
○ HAND PENETROMETER
△ TORVANE
● UNCONFINED COMPRESSION
▲ UNCONSOLIDATED-UNDRAINED TRIAXIAL
1.0 2.0 3.0 4.0

BORING NUMBER EB-7

CORNERSTONE EARTH GROUP

PROJECT NAME Alameda Sewer Pump Station Upgrades - Phase 4

PROJECT NUMBER 187-47-1

PROJECT LOCATION Alameda, CA

This log is a part of a report by Cornerstone Earth Group, and should not be used as a stand-alone document. This description applies only to the location of the exploration at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with time. The description presented is a simplification of actual conditions encountered. Transitions between soil types may be gradual.

ELEVATION (ft)	DEPTH (ft)	SYMBOL	DESCRIPTION	N-Value (uncorrected) blows per foot	SAMPLES TYPE AND NUMBER	DRY UNIT WEIGHT PCF	NATURAL MOISTURE CONTENT	PLASTICITY INDEX, %	PERCENT PASSING No. 200 SIEVE
-20.5			**Poorly Graded Sand with Silt (SP-SM)** very dense, moist, gray, fine to medium sand	50	SPT-9		18		
-24.5	30		Bottom of Boring at 30.0 feet.						
	35								
	40								
	45								
	50								
	55								

UNDRAINED SHEAR STRENGTH, ksf

- ○ HAND PENETROMETER
- △ TORVANE
- ● UNCONFINED COMPRESSION
- ▲ UNCONSOLIDATED-UNDRAINED TRIAXIAL

1.0 2.0 3.0 4.0

BORING NUMBER EB-8

CORNERSTONE EARTH GROUP

PROJECT NAME Alameda Sewer Pump Station Upgrades - Phase 4
PROJECT NUMBER 187-47-1
PROJECT LOCATION Alameda, CA

DATE STARTED 5/29/18 **DATE COMPLETED** 5/29/18
GROUND ELEVATION 4.5 FT +/- **BORING DEPTH** 40 ft.
DRILLING CONTRACTOR Exploration Geoservices, Inc.
LATITUDE 37.756622° **LONGITUDE** -122.249154°
DRILLING METHOD Mobile B-61, 8 inch Hollow-Stem Auger
GROUNDWATER LEVELS:
LOGGED BY OL
▽ **AT TIME OF DRILLING** 7 ft.
NOTES Park - Otis
▼ **AT END OF DRILLING** 7 ft.

This log is a part of a report by Cornerstone Earth Group, and should not be used as a stand-alone document. This description applies only to the location of the exploration at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with time. The description presented is a simplification of actual conditions encountered. Transitions between soil types may be gradual.

ELEVATION (ft)	DEPTH (ft)	DESCRIPTION	N-Value (uncorrected) blows per foot	SAMPLES TYPE AND NUMBER	DRY UNIT WEIGHT PCF	NATURAL MOISTURE CONTENT	PLASTICITY INDEX, %	PERCENT PASSING No. 200 SIEVE
4.5	0	4 inches asphalt concrete over 6 inches aggregate base						
4.2								
3.7		**Poorly Graded Sand with Silt (SP-SM) [Fill]** medium dense, moist, gray brown, fine to medium sand	50	MC-1B	108	11		
			31	MC-2B	105	12		
-0.5	5	**Silty Sand (SM) [Fill]** loose, moist, gray, fine to medium sand	16	MC-3B	107	16		
			4	MC				
	10		6	SPT-4		19		
-7.5		**Silty Sand (SM)** medium dense, moist, gray, fine to medium sand	22	SPT-5		22		
	15		14	SPT-6		20		
			20	SPT-7		21		
	20							
-16.5		**Poorly Graded Sand with Silt (SP-SM)** medium dense, moist, gray, fine to medium sand	18	SPT-8		21		11
			37	SPT-9		20		
	25							
-21.5								

UNDRAINED SHEAR STRENGTH, ksf
○ HAND PENETROMETER
△ TORVANE
● UNCONFINED COMPRESSION
▲ UNCONSOLIDATED-UNDRAINED TRIAXIAL
1.0 2.0 3.0 4.0

Continued Next Page

BORING NUMBER EB-8

CORNERSTONE EARTH GROUP

PROJECT NAME Alameda Sewer Pump Station Upgrades - Phase 4

PROJECT NUMBER 187-47-1

PROJECT LOCATION Alameda, CA

This log is a part of a report by Cornerstone Earth Group, and should not be used as a stand-alone document. This description applies only to the location of the exploration at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with time. The description presented is a simplification of actual conditions encountered. Transitions between soil types may be gradual.

ELEVATION (ft)	DEPTH (ft)	SYMBOL	DESCRIPTION	N-Value (uncorrected) blows per foot	SAMPLES TYPE AND NUMBER	DRY UNIT WEIGHT PCF	NATURAL MOISTURE CONTENT	PLASTICITY INDEX, %	PERCENT PASSING No. 200 SIEVE
-21.5			**Poorly Graded Sand with Silt (SP-SM)** dense, moist, gray, fine to medium sand						
				35	SPT-10		19		
	30								
				43	SPT-11		16		
	35								
				35	SPT-12		17		
-35.5	40		Bottom of Boring at 40.0 feet.						
	45								
	50								
	55								

UNDRAINED SHEAR STRENGTH, ksf

○ HAND PENETROMETER

△ TORVANE

● UNCONFINED COMPRESSION

▲ UNCONSOLIDATED-UNDRAINED TRIAXIAL

1.0 2.0 3.0 4.0

CORNERSTONE EARTH GROUP2 - CORNERSTONE 0812.GDT - 8/22/19 06:54 - P:\DRAFTING\GINT FILES\187-47-1 MARINA VILLAGE.GPJ

APPENDIX B: LABORATORY TEST PROGRAM

The laboratory testing program was performed to evaluate the physical and mechanical properties of the soils retrieved from the site to aid in verifying soil classification.

Moisture Content: The natural water content was determined (ASTM D2216) on 89 samples of the materials recovered from the borings. These water contents are recorded on the boring logs at the appropriate sample depths.

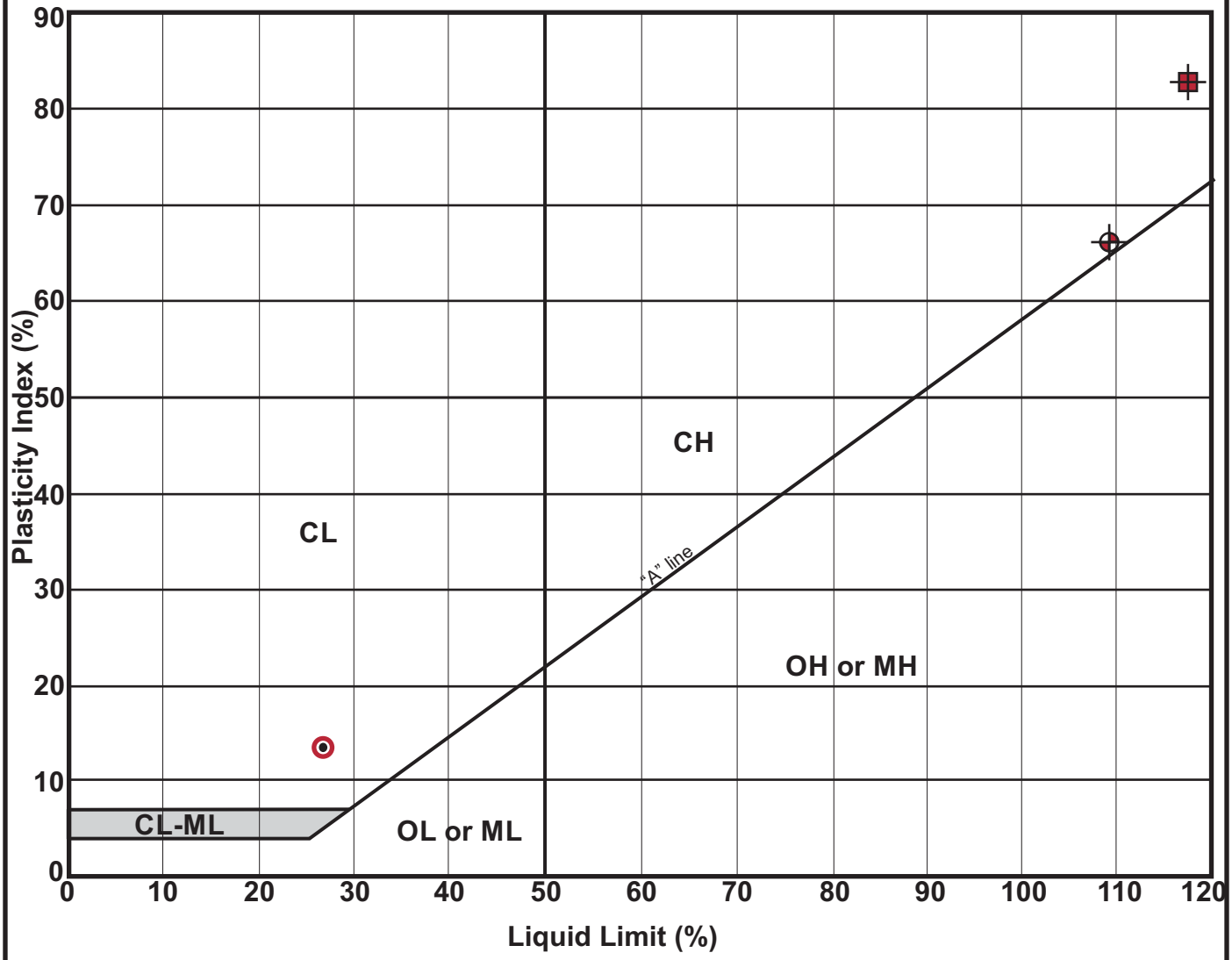
Dry Densities: In place dry density determinations (ASTM D2937) were performed on 55 samples to measure the unit weight of the subsurface soils. Results of these tests are shown on the boring logs at the appropriate sample depths.

Washed Sieve Analyses: The percent soil fraction passing the No. 200 sieve (ASTM D1140) was determined on five samples of the subsurface soils to aid in the classification of these soils. Results of these tests are shown on the boring logs at the appropriate sample depths.

Plasticity Index: Three Plasticity Index determinations (ASTM D4318) were performed on samples of the subsurface soils to measure the range of water contents over which this material exhibits plasticity. The Plasticity Index was used to classify the soil in accordance with the Unified Soil Classification System and to evaluate the soil expansion potential. Results of these tests are shown on the boring logs at the appropriate sample depths.

Corrosion: Six soluble sulfate determinations (ASTM D4327), six resistivity tests (ASTM G57), six chloride determinations (ASTM D4327), and six pH determinations (ASTM G51) were performed on samples of the subsurface soil. Results of these tests are attached in this appendix.

Plasticity Index (ASTM D4318) Testing Summary



Symbol	Boring No.	Depth (ft)	Natural Water Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index	Passing No. 200 (%)	Group Name (USCS - ASTM D2487)
⊕	EB-1	14.5	86	109	43	66	—	Fat Clay (CH) [Bay Mud]
■	EB-5	9.5	98	117	34	83	—	Fat Clay (CH) [Bay Mud]
◎	EB-6	19.5	19	27	14	13	—	Sandy Lean Clay (CL)

CORNERSTONE EARTH GROUP

Plasticity Index Testing Summary

Alameda Sewer Pump Station Upgrades - Phase 4 Alameda, CA

Project Number: 187-47-1

Figure Number: Figure B1

Date: June 2018

Drawn By: FLL

Corrosivity Tests Summary

CTL # 640-1223 **Date:** 5/22/2018 **Tested By:** PJ **Checked:** PJ
Client: Cornerstone Earth Group **Project:** Alameda SS Upgrades **Proj. No:** 187-47-1
Remarks:

Sample Location or ID			Resistivity @ 15.5 °C (Ohm-cm)			Chloride	Sulfate		pH	ORP (Redox)		Sulfide	Moisture	Soil Visual Description
			As Rec.	Min	Sat.	mg/kg	mg/kg	%		E_H (mv)	At Test	Qualitative by Lead	At Test %	
						Dry Wt.	Dry Wt.	Dry Wt.						
Boring	Sample, No.	Depth, ft.	ASTM G57	Cal 643	ASTM G57	ASTM D4327	ASTM D4327	ASTM D4327	ASTM G51	ASTM G200	Temp °C	Acetate Paper	ASTM D2216	
EB-1	5A	14	-	-	123	8,158	611	0.0611	8.5	-	-	-	118.4	Olive Gray CLAY w/ organics
EB-2	6	15	-	-	3,397	13	474	0.0474	8.6	-	-	-	22.5	Dark Gray Silty SAND
EB-3	6	14.5	-	-	576	522	716	0.0716	8.0	-	-	-	19.1	Dark Gray Silty SAND
EB-4	7	15.5	-	-	3,193	12	174	0.0174	8.9	-	-	-	20.5	Dark Gray Silty SAND
EB-5	9A	24	-	-	164	3,753	1,793	0.1793	8.1	-	-	-	18.2	Olive Gray Silty SAND
EB-6	10	20.5	-	-	522	678	483	0.0483	8.6	-	-	-	22.5	Gray Silty SAND

APPENDIX C: CONSTRUCTION GUIDELINES ON BAY MUD

Constructing improvements on Bay Mud presents difficulties throughout the Bay Area. These general guidelines are meant to provide a general understanding of some difficulties working in such an environment, where conditions likely include fill material; soft and compressible, saturated, weak clays; and shallow groundwater. These general guidelines should be used as a supplement to the construction plans and specifications for the project.

GENERAL SOIL AND GROUNDWATER CONDITIONS

Soft, marine clays, known locally as Bay Mud, was encountered up to depths of 11 to 25 feet at the sites. It is noted the thickness of the Bay Mud may vary and be greater than 14 feet. In general, the clay is saturated, soft, weak, and highly compressible. Moisture contents of the Bay Mud material at the sites generally range from 50 to 98 percent.

The soft, compressible Bay Mud is underlain by alluvium that is generally medium to very stiff and of low compressibility.

Groundwater is generally assumed to be near the top of the Bay Mud; however, groundwater does not typically appear quickly as free water, but does seep out of the mud slowly – often from more highly permeable seams of silts or fine sand. Since Bay Mud was deposited in a marine environment, the groundwater will often be brackish. Groundwater is also found to perch in the upper fill materials above the top of the Bay Mud.

UNSTABLE SOIL CONDITIONS

During construction on Bay Mud sites, often due to regular construction traffic or compaction during grading, the surface soils or exposed subgrade become unstable. Bay Mud sites are particularly susceptible to instability because of the perched water frequently encountered at these sites, and the soft underlying clays. Instability is typically observed as significant deflection under loading or rutting due to wheel or track loading. Often unstable soil conditions can be avoided by properly preparing the site for construction activities and/or winter conditions. These preparations often include the following items.

1. The site should be rough graded prior to inclement weather to drain surface water to retention or detention areas, or approved storm water treatment facilities. These approved areas for storm water disposal should be constructed in accordance with the project Storm Water Pollution Prevention Plan (SWPPP), if applicable to the project.

2. If heavy cranes are used, the contractor should perform a settlement and stability analysis to confirm that the proposed cribbing support and shoring can handle the crane loading.

3. Positive surface grades should direct water to these facilities, and ponding on the site should be avoided.

4. Construction entrances and construction traffic areas should be prepared for the expected traffic with a sufficient construction roadway or aggregate base section to support the traffic without instability. Chemical treatment, stabilization fabric and rock, and temporary paving could potentially be used in these areas.

5. Unstable areas can be difficult to stabilize on Bay Mud sites, and likely required crushed rock and stabilization fabric or geogrid, or other approved methods.

HEAVY EQUIPMENT LIMITATIONS

As discussed, soft clays generally underlie the entire site. For this reason, construction equipment should be limited to medium to lightweight equipment to reduce the potential for instability, damage to shallow utilities, or slope failures. Instability is a significant issue on Bay Mud sites, and often leads to extra efforts to stabilize materials, dry out wet materials, and achieve compaction. The use of heavy equipment will greatly exacerbate this issue. We have the following general guidelines to aid in choosing the appropriate equipment for the site. Where lighter equipment cannot be used, such as during pile installation, then extra care and support efforts will be required to traffic the heavy equipment across the site.

1. Avoid the use of heavy equipment on the site. This includes heavy vehicles – we generally recommend vehicles less than 15 tons – and vehicles with heavy point loads, such as forklifts or other types of lifts.

2. Where fill materials have been partially removed, the exposed soils will be even more susceptible to instability, and we recommend that lighter weight equipment be used in these situations. We do not recommend direct vehicles loads of any kind on exposed Bay Mud.

3. Moderate to heavy equipment should not come close to any excavation in Bay Mud and should generally stay at least 3 to 4 times the height of the excavation from the edge of the excavation unless the shoring system is designed for the heavy equipment.

4. Traffic routes should be well-prepared and smooth to avoid bouncing of vehicles. Traffic speed should be kept low.

5. Shallow utilities should be located and protected from vehicle loading.

UTILITY CONSIDERATIONS

Bay Mud site present several significant risks to shallow utilities. The most significant risk to shallow utilities on Bay Mud sites is typically damage due to vehicle loading. Traffic loading can cause deflections and rutting and can also significantly load a utility where shallow cover exists, damaging the utility. In addition, construction means, methods and materials that are not appropriate for Bay Mud sites, and do not take into account the site conditions, can also distress utilities. We suggest the following guidelines be considered:

1. Shallow utilities should be protected from traffic loading and properly marked during construction. Protection might include slurry or lean concrete cover, trench plates, soil mounding, or other approved methods.

2. Construction equipment should not be allowed to traverse utilities where deflections or rutting is occurring, or subgrade soils are unstable. Properly designed access roads and utility protection should be implemented.

3. Distress to utilities can often not be discovered until much later; therefore, precautionary steps should be taken prior to allowing traffic to cross shallow utilities.

4. The backfill of utilities extending into Bay Mud may need to include lightweight backfill materials to limit backfill weights relative to the weight of the material removed. Otherwise, settlement of the underlying Bay Mud may be induced causing sags in the utility.

5. Excavations in Bay Mud for utilities require shoring. We recommend against the use of trench shields or trench boxes. For example, dragging a trench shield along the trench would not be allowed. In addition, voids between excavation sidewalls and trench shields could allow lateral creep or sloughing of native soils. The shoring system design needs to evaluate bottom heave and put in-place a shoring plan that will control it.

OPEN EXCAVATIONS AND TRENCHES

Open excavations and trenches in Bay Mud require special precautions to prevent failures and potentially distress other improvements or cause significant delays and cost to the project. In general, open excavations and trenches are not recommended on this project without shoring. Contractors should carefully review the site conditions and preferably have experience in working on Bay Mud. We suggest the following guidelines be considered:

1. Trench excavations in Bay Mud or in fills overlying Bay Mud may be subject to failure and/or collapse due to the weak strength of the Bay Mud. Equipment or stockpiles near excavations can also cause failures. All excavations and trenches should be properly shored. The work is in the City right-of-way therefore, sloping the excavations is assumed to be unfeasible.

2. Even shored excavations should be checked for potential failure mechanisms such as bottom heave prior to excavation and installation of shoring. The stability of all excavations and shoring should be the contractor's responsibility.

3. Glory hole excavations and large v-trenching should not be backfilled with heavy import materials as detrimental settlement is likely to occur. Backfill materials should be similar in weight to the weight of materials removed.

4. Excavations extending into Bay Mud should have fill materials and Bay Mud segregated during excavation. Most contractors accomplish this by putting fill material on one side

of the trench and Bay Mud on the other. Bay Mud is typically removed from the site because re-use would require a considerable amount of processing and drying to reach optimum moisture content for re-use as engineered fill. We do not recommend the use of reconditioned Bay Mud for reuse as backfill.

5. Shallow trenches that extend into undocumented fill and Bay Mud crust may remain open temporarily during utility installation – at the contractor's risk. We recommend that all excavations on this project be shored. Trenches that extend into Bay Mud should be backfilled as soon as possible to prevent failures or instability of the sidewalls.

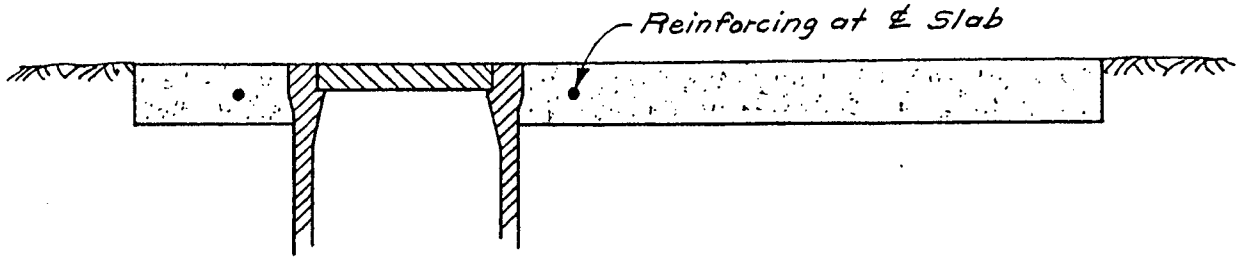
6. The contractor should completely review the geotechnical report and these guidelines in addition to the project plans and specifications to understand the difficulties of working on a Bay Mud site.

SOIL AND AGGREGATE STOCKPILES

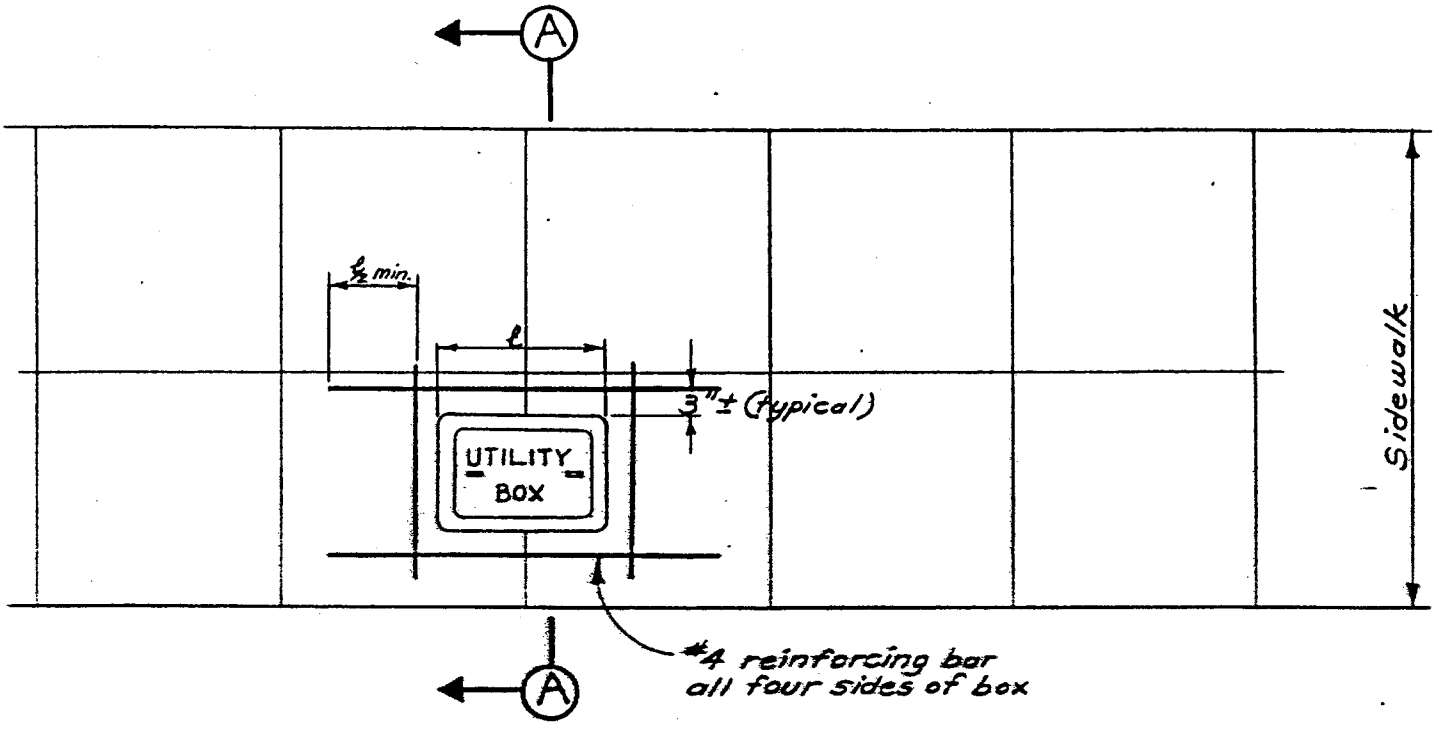
Stockpiling soil and crushed concrete and asphalt can cause non-uniform compression or bearing failure of the underlying Bay Mud. Stockpiles should be 5 feet or less in height. In addition, stockpiles should not be left in place for long periods (weeks) at a time. The Geotechnical Engineer should review and approve the proposed location and lateral extent of soil stockpiles greater than 5 feet high prior to construction.

ATTACHMENT "C"

APPLICABLE CITY OF ALAMEDA STANDARD PLANS AND DETAILS



SECTION (A)



NO.	REVISED	BY	APVD.
⚠	Feb. 13, 1970	A.T.	MH

COMPILED P.H. Long
DRAWN A. Tang
CHECKED P.H. Long
DATE April 1967 | SCALE No Scale

CITY OF ALAMEDA
CALIFORNIA
ENGINEERING DEPARTMENT

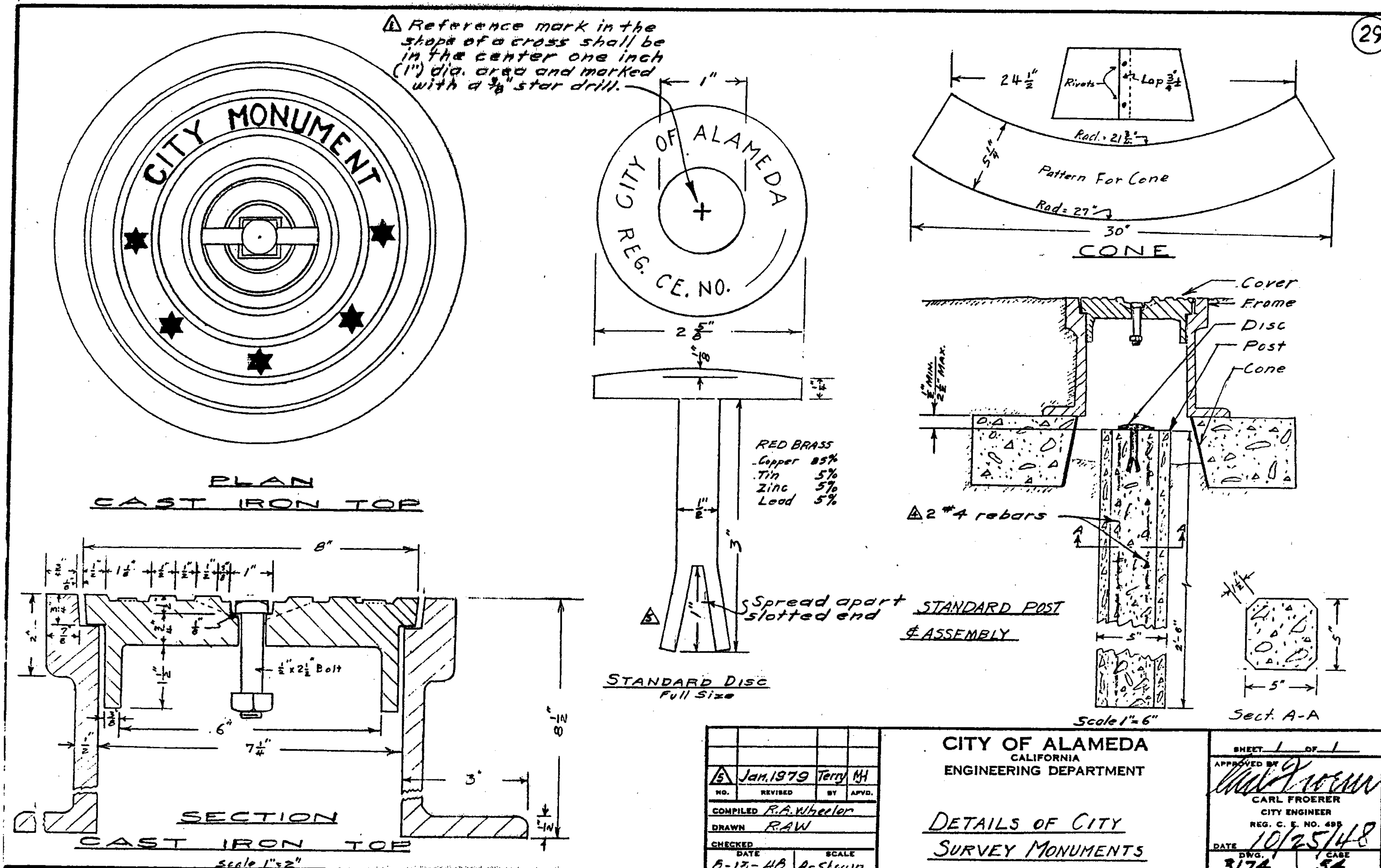
DETAIL OF REINFORCING REQUIRED IN SIDEWALK AROUND UTILITY BOXES

SHEET 1 OF 1
APPROVED BY

CITY ENGINEER
REG. C. E. NO. 7061

DATE
DWG. 6080 | CASE 22

9578-10-48-250



5	Jan. 1979	Terry	MH
NO.	REVISED	BY	APVD.

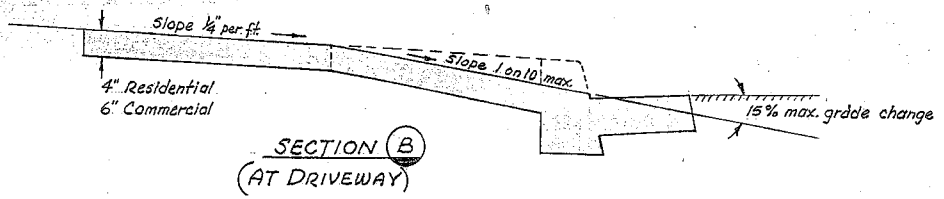
COMPILED R.A. Wheeler
DRAWN RAW
CHECKED

DATE	SCALE
6-13-48	As Shown

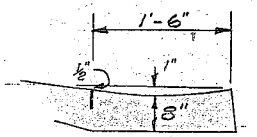
CITY OF ALAMEDA
CALIFORNIA
ENGINEERING DEPARTMENT

DETAILS OF CITY SURVEY MONUMENTS

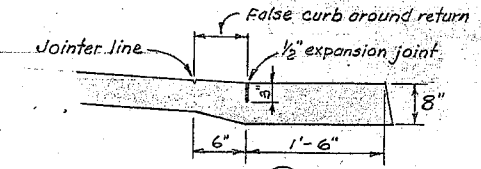
SHEET 1 OF 1
APPROVED BY
CARL FROERER
CITY ENGINEER
REG. C. E. NO. 495
DATE 10/25/48
DWG. 3174 CASE 54



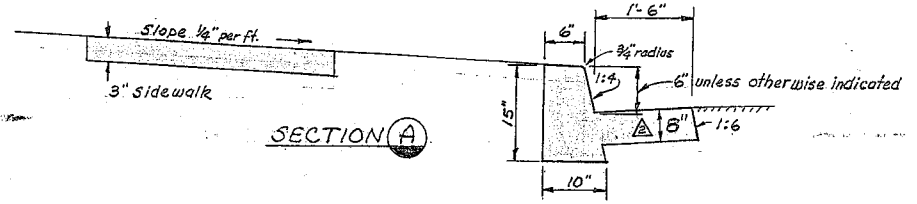
SECTION (B)
(AT DRIVEWAY)



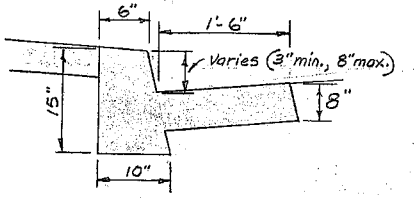
SECTION (D)
AT FLUSH RETURN



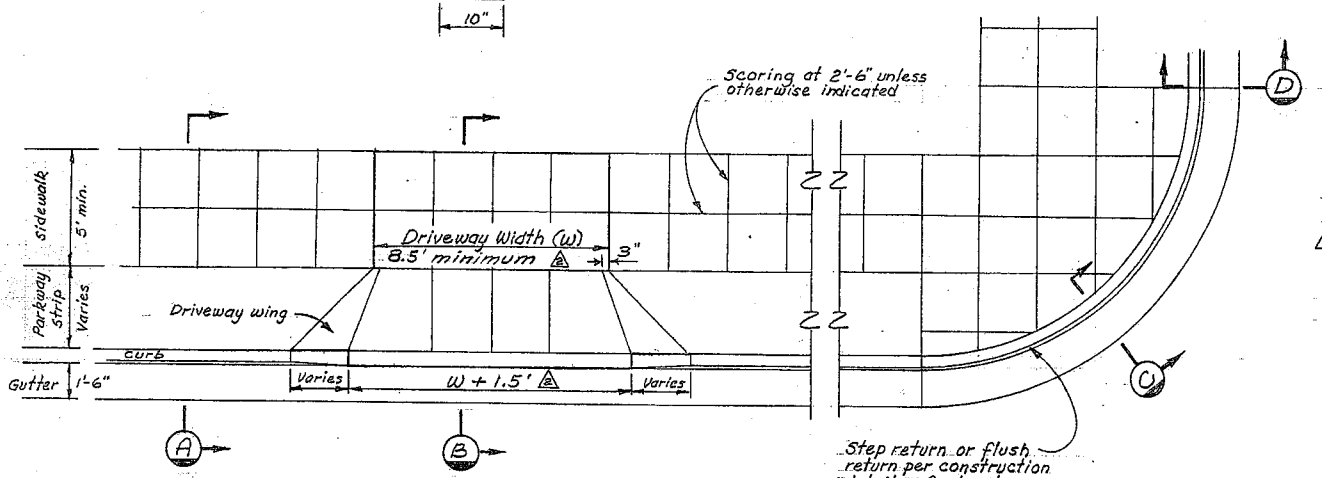
SECTION (C)
AT FLUSH RETURN

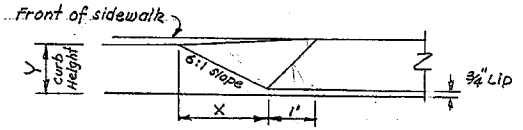


SECTION (A)



SECTIONS (C) & (D)
AT STEP RETURN





FRONT VIEW AT DRIVEWAY WING

Y	4"	5"	6"	8"
X	19½"	25½"	31½"	43½"

DRIVEWAY WING LENGTHS
FOR VARIOUS CURB HEIGHTS

NOTES:

(3) Required mix design is 5 sack, ¾" aggregate, 2500 psi with 1½ lb. lamp black per cu. yd.

CURB AND GUTTER
½" expansion joints at 15'.
Jointer line at 5'.
Finish as specified.
Transition to existing wider gutter shall be 5' long.

SIDEWALK AND DRIVEWAY
½" expansion joints at 15'.
Finish as specified.

See dwg. 6270-22 where driveway slopes exceed limits shown.

NO.	REVISED	BY	APP.
(3)	April 1998	JF	
(2)	Jan. 1974	Terry	MH
(1)	Jan. 1972	Terry	MH

COMPILED LONG & WONG
DRAWN H.J. WONG
CHECKED J. PAU
DATE OCT. 1968
SCALE NONE

CITY OF ALAMEDA
CALIFORNIA
ENGINEERING DEPARTMENT

STANDARD PLAN
CURB GUTTER
SIDEWALK AND
DRIVEWAY

SHEET 1 OF 1
APPROVED BY
M J Hanna
CITY ENGINEER
REG. C. E. NO. 7061
DATE 10-28-68

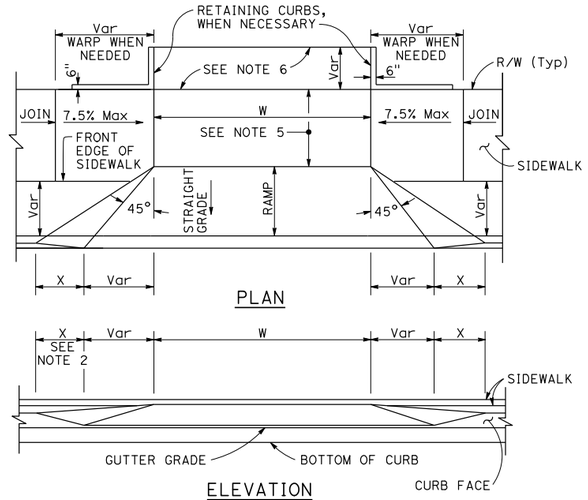
DWG. 6297
CASE 24

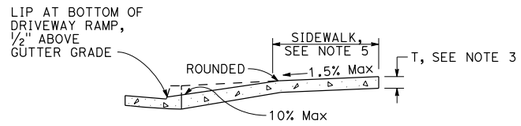
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

H. David Cordova
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

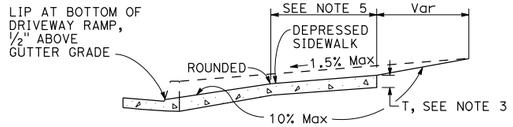
REGISTERED PROFESSIONAL ENGINEER — Hector David Cordova — No. C41957 — Exp. 3-31-20 — CIVIL — STATE OF CALIFORNIA





CASE A

Typical driveway, sidewalk not depressed



CASE B

Driveway with depressed sidewalk

SECTIONS

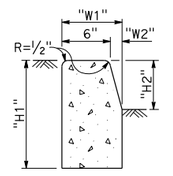
TABLE A

CURB TYPE	DIMENSIONS			
	"H1"	"H2"	"W1"	"W2"
A1-6	1'-2"	6"	7½"	1½"
A1-8	1'-4"	8"	8"	2"
A2-6	1'-0"	6"	2'-7½"	1½"
A2-8	1'-2"	8"	2'-8"	2"
A3-6	6"	5"	7¼"	1¼"
A3-8	8"	7"	7¾"	1¾"
B1-4	1'-0"	4"	7½"	2½"
B1-6	1'-2"	6"	9"	4"
B2-4	10"	4"	2'-7½"	2½"
B2-6	1'-0"	6"	2'-9"	4"
B3-4	4"	3"	7"	2"
B3-6	6"	5"	8½"	3½"
D-4	10"	4"	1'-6"	1'-1"
D-6	1'-0"	6"	2'-2"	1'-9"

CURB QUANTITIES

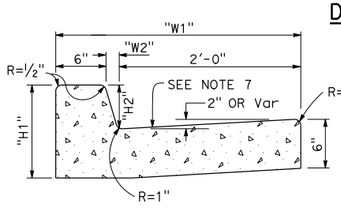
TYPE	CUBIC YARDS PER LINEAR FOOT
A1-6	0.02585
A1-8	0.03084
A2-6	0.05903
A2-8	0.06379
A3-6	0.01036
A3-8	0.01435
B1-4	0.02185
B1-6	0.02930
B2-4	0.05515
B2-6	0.06171
B3-4	0.00641
B3-6	0.01074
B4	0.05709
D-4	0.04083
D-6	0.06804
E	0.06661

DRIVEWAYS



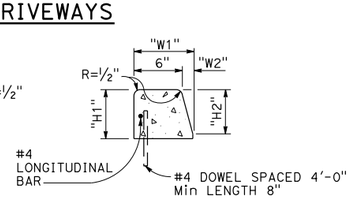
TYPE A1 CURBS

See Table A



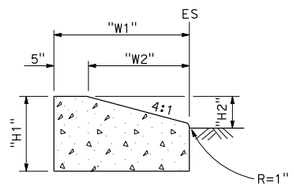
TYPE A2 CURBS

See Table A



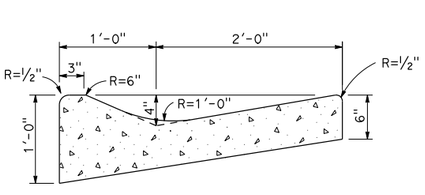
TYPE A3 CURBS

Superimposed on existing pavement
See Table A

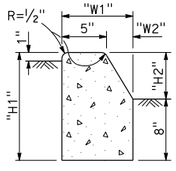


TYPE D CURBS

See Table A

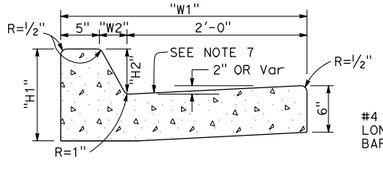


TYPE E CURB



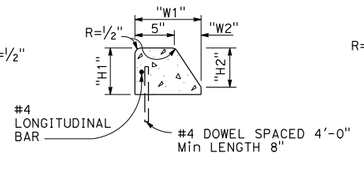
TYPE B1 CURBS

See Table A



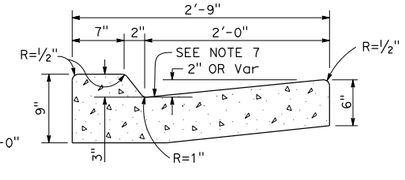
TYPE B2 CURBS

See Table A

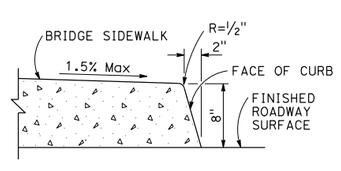


TYPE B3 CURBS

Superimposed on existing pavement
See Table A



TYPE B4 CURBS



TYPE H CURB

On Bridges

CURBS

NOTES:

1. Case A driveway section typically applies.
2. X=3'-0" except for curb heights over 10" where 4:1 slopes shall be used on curb slope.
3. Sidewalk and ramp thickness "T" at driveway shall be 4" for residental and 6" for commercial.
4. Difference in slope of the driveway ramp and the slope of a line between the gutter and a point on the roadway 5'-0" from gutter line shall not exceed 15%. Reduce driveway ramp slope, not gutter slope, where required.
5. Minimum width of clear passageway for sidewalk shall be 4'-2".
6. Retaining curbs and acquisition of construction easement may be necessary for narrow sidewalks or curb heights in excess of 6".
7. Across the pedestrian route at curb ramp locations, the gutter pan slope shall not exceed 1" of depth for each 2'-0" of width.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CURBS AND DRIVEWAYS

NO SCALE

A87A

1-29-18

Return to Table of Contents

ATTACHMENT "D"

BCDC REGIONWIDE PERMIT NO. RWP-2
FOR THE COLA BALLENA PUMP STATION

San Francisco Bay Conservation and Development Commission
375 Beale Street, Suite 510, San Francisco, California 94105 tel 415 352 3600 fax 888 348 5190
State of California | Gavin Newsom – Governor | info@bcdc.ca.gov | www.bcdc.ca.gov

November 1, 2019

Flavio Barrantes
City of Alameda
950 W. Mall Square
Alameda, California 94501

AND

Jeff Frankel
Ballena Bay Townhouse Association #1
315 Diablo Road, Suite 221
Danville, California 94526

SUBJECT: BCDC Regionwide Permit No. RWP-2
(Notice of Intent to Proceed No. NOI2019.036.00)

Dear Flavio Barrantes and Jeff Frankel:

Enclosed please find an original of Regionwide Permit No. RWP-2, stamped "BCDC Original," and a copy, stamped "Permittee's Copy," both executed by the Executive Director. I am issuing this regionwide permit to replace a sanitary sewer pump station, as requested by your Notice of Intent to Proceed under a regionwide permit dated September 8, 2019, including its accompanying exhibits, any subsequent additions or changes, and as modified by the conditions of this regionwide permit.

You must (1) **complete** the acknowledgment section of the regionwide permit stamped "BCDC Original," which indicates that you have read and that you agree to all of the terms and conditions of the regionwide permit, (2) **forward** the executed original stamped "BCDC Original," along with one copy stamped "Permittee's Copy" to co-permittee Ballena Bay Townhouse Association #1, for their acknowledgement and signature; and (3) **return** that entire "BCDC Original" regionwide permit to the Commission's offices within 14 days. You should retain the copy stamped "Permittee's Copy" for your records.

Please understand that this permit authorizes you to perform only the work described in your Notice of Intent to Proceed under a regionwide permit, and no more. In addition, **no** work may commence on the project until the regionwide permit stamped "BCDC Original" is executed and returned to the Commission. Until the Commission receives the executed regionwide permit, you do not have the necessary authorization for the work authorized under the permit. The commencement of any work within the Commission's jurisdiction without the necessary authorization from the Commission is a violation of the McAteer-Petris Act and could subject you to substantial fines.

If you have any questions concerning the regionwide permit or the procedure outlined above, please contact me at 415/352-3618 or ethan.lavine@bcdc.ca.gov.

Very truly yours,

ETHAN LAVINE
Chief of Permits, Shoreline Development

EL/ra
Enc.
cc: U. S. Army Corps of Engineers, Attn: Regulatory Functions Branch
San Francisco Bay Regional Water Quality Control Board,
Attn: Certification Section
Environmental Protection Agency
City of Alameda Planning Department

San Francisco Bay Conservation and Development Commission
375 Beale Street, Suite 510, San Francisco, California 94105 tel 415 352 3600 fax 888 348 5190
State of California | Gavin Newsom – Governor | info@bcdc.ca.gov | www.bcdc.ca.gov

BCDC Original

REGIONWIDE PERMIT NO. RWP-2
NOTICE OF INTENT TO PROCEED
NO. NOI2019.036.00
(As Amended Through January 7, 2010)
(Reconstruction, replacement, incidental additions, and maintenance of service lines, utilities, utility cables, pipelines, and outfalls; installation of new pipelines where the majority of work would occur below the ground surface and Bay bottom; and backfilling of geotechnical or monitoring wells in the Bay, certain waterways, managed wetlands, and shoreline band)

November 1, 2019

City of Alameda
950 W. Mall Square
Alameda, California 94501

Ballena Bay Townhouse Association #1
315 Diablo Road, Suite 221
Danville, California 94526

On March 19, 1992, the San Francisco Bay Conservation and Development Commission, by a vote of 17 affirmative, 0 negative, and 0 abstentions, approved the issuance of the original of this Regionwide Permit. On April 18, 1996, the Commission, by a vote of 17 affirmative, 0 negative, and 0 abstentions, approved Amendment No. One of this Regionwide Permit. On December 18, 2008, the Commission by a vote of 18 affirmative, 0 negative, and 0 abstentions, approved Amendment No. Two of this Regionwide Permit. On January 7, 2010, the Commission by a vote of 19 affirmative, 0 negative, and 0 abstentions, approved Amendment No. Three of this Regionwide Permit upon which your authorization is based:

I. Authorization

A. Subject to the conditions stated below, the permittee(s) is hereby authorized to do the following:

Location: Within the 100-foot shoreline band, at 1241 Ballena Boulevard, in the City of Alameda, Alameda County.

Description: Rehabilitate and replace a sanitary sewer pump station.

B. This authority is limited to activities undertaken at a site where activities are not already authorized by another BCDC permit and to projects that would not adversely impact: (1) the Bay; (2) Bay resources such as those that are scarce, easily disturbed or have an abundance and diversity of fish, other aquatic organisms or wildlife (such as tidal marshes or eelgrass beds); and (3) existing or possible future visual or physical public access to and along the Bay from public access areas, public roads and pathways. This authority is generally pursuant to and limited by your notice of intent to proceed under a Regionwide Permit dated September 18, 2019, including its accompanying exhibits, any subsequent additions or modifications, and all conditions of this Regionwide Permit.

C. Work authorized herein must commence within two years of the date of the transmittal of this Regionwide Permit by the Executive Director to you or the authorization of your work will lapse and become null and void. Such work must also be diligently pursued to completion and must be completed within two years of commencement, or within three years of the date of transmittal of this Regionwide Permit to you, whichever is earlier, unless an extension of time is granted by the Executive Director.

II. Special Conditions

The authorization made herein shall be subject to the following special conditions, in addition to the standard conditions in Part IV:

A. **Limit of Work.** Authorized work shall be built in general conformance with the plans entitled "#28 Cola Ballena Pump Station Improvement Plan," prepared by Schaaf and Wheeler and dated June 8, 2018, submitted as part of the application.

B. **Construction Operations and Debris Removal**. All construction operations shall be performed so as to minimize turbidity and the roiling of waters, to prevent construction materials from falling, washing, or blowing into any tidal areas of the Bay or drifting and presenting a navigation or pollution hazard. In the event that any such material is placed or escapes into any area subject to tidal action of the Bay, the permittee(s), its assigns or successors in interest, or the owner of the improvements shall immediately retrieve and remove such material at its expense. All construction debris shall be removed to an authorized location outside the Commission's jurisdiction and the site left in the same condition and grade as existed prior to project implementation. Any material used to backfill excavated holes and trenches shall be free of contaminants and approved for such use by the Regional Water Quality Control Board.

C. **Habitat Protection**. The work authorized by this Regionwide Permit shall be performed so as to prevent any significant adverse impact on any tidal marsh, tidal flat, eelgrass habitat or other sensitive Bay resources. If any unforeseen adverse impacts occur to any such area as a result of the activities authorized herein, the permittee(s) shall restore the area to or improve

the area above its previous condition, which may include returning the disturbed area to its original elevation and soil composition and, if the area does not revegetate to its former condition within one year, seeding all disturbed areas with appropriate vegetation.

D. **Creosote Treated Wood**. No pilings or other wood structures that have been pressure treated with creosote shall be used in any area subject to tidal action in the Bay or any certain waterway, in any salt pond, or in any managed wetland within the Commission's jurisdiction as part of the project authorized herein.

E. **Maintenance and Replacement of Authorized Facilities.** Any in-kind repairs and maintenance of an authorized structure or improvement shall only use construction material that is approved by the Commission in consultation with the Regional Water Quality Control Board and the California Department of Fish and Game for use in San Francisco Bay. Construction shall only occur during those months of the year, as approved by the Commission in consultation with resource agencies such as U.S. Fish and Wildlife Service, Department of Fish and Game and National Marine Fisheries Service, that avoid or minimize potential impacts to fish and wildlife. BCDC staff should be contacted to confirm current restrictions.

F. **Water Quality**. Prior to undertaking any work authorized herein on any outfall pipe or similar facility, the permittee(s) shall receive all necessary approvals from the California Regional Water Quality Control Board, San Francisco Bay Region, for any discharge or emission from such structure.

G. **Diked Wetlands Protection**. No work authorized herein on culverts, outfalls, tide gates, or similar facilities shall significantly alter water management, circulation or drainage patterns or otherwise adversely affect any salt pond or other sensitive diked wetland resources.

H. **Abandonment**. If, at any time, the Commission determines that the improvements authorized herein have been abandoned for a period of two years or more, or have deteriorated to the point that public health, safety or welfare is adversely affected, the Commission may require that the improvements be removed by the permittee(s), its assigns or successors in interest, or by the owner of the improvements within 60 days or such other reasonable time as the Commission may direct.

I. **Notice to Contractor**. The permittee(s) shall provide a copy of this Regionwide Permit to any contractor or person working in concert with the permittee(s) to carry out the activities authorized herein and shall point out the special conditions contained herein.

III. Findings and Declarations

The Commission hereby finds, declares, and certifies that:

A. **Consistency with Commission Regulations**. The projects authorized by this Regionwide Permit include installation, reconstruction, replacement and maintenance of, and incidental additions to, existing currently-used outfall pipes, service lines, utility cables, pipelines, and similar facilities that do not involve any substantial enlargement or any substantial extension

into the Bay, into certain waterways, managed wetlands or the 100-foot shoreline band and the installation of new pipelines where the majority of work would occur below the ground surface or Bay bottom. Such projects have been authorized by the Commission as qualifying for a Regionwide Permit because they involve repairs to outfall pipes approved by the California Regional Water Quality Control Board, San Francisco Bay Region, utility cables on or under the bottom of the Bay, and similar facilities, as defined in Regulation Sections 10601(a)(4), 10601(a)(5), 10601(a)(6), 10601(b)(1) and 10601(b)(5), or activities similar to those described above, as defined in Regulation Section 10601(e)(3), and thus are equivalent to a "minor repair and improvement" and qualify for authorization under a Regionwide Permit that may be issued by the Commission and approved by the Executive Director, pursuant to Government Code Section 66632(f) and Regulation Sections 11700 and 11713.

B. **Consistency with McAteer-Petris Act and San Francisco Bay Plan.** The project authorized by this permit is consistent with the McAteer-Petris Act and with the *San Francisco Bay Plan* in that it will not adversely affect the Bay nor public access to and enjoyment of the Bay. Special conditions have been included to assure that project construction, materials and the improvements themselves will not adversely affect the Bay's natural resources, water quality or navigation and that any deteriorated improvements will be removed if they adversely impact the Bay's natural resources, water quality, or pose a navigation hazard, as required by the *San Francisco Bay Plan* policies on fish, other aquatic organisms, and wildlife, tidal marshes and tidal flats, water quality, and navigational safety.

C. **Consistency with Coastal Zone Management Act.** The activities authorized herein are consistent with the Commission's Amended Management Program for San Francisco Bay, as approved by the Department of Commerce under the Federal Coastal Zone Management Act of 1972, as amended.

D. **Consistency with California Environmental Quality Act.** California Public Resources Code Section 21084 provides that the California Environmental Quality Act (CEQA) guidelines shall include a list of classes of projects that have been determined not to have a substantial adverse impact on the environment and are therefore exempt from the requirements of CEQA. This list of "categorical exemptions" is located at 14 Cal. Admin. Code Sections 15300 through 15329. Section 15301 (Class 1) exempts the operation, repair, maintenance or minor alteration of existing public or private structures or facilities that involve negligible or no expansion of previous use. Section 15302 (Class 2) exempts the replacement or reconstruction of existing structures or facilities where the new structure will be located on the same site as the structure being replaced and will have substantially the same purpose and capacity as the replaced structure. Section 15303 (Class 3) exempts the construction of limited numbers of new, small facilities or structures, and subsection (e) specifically exempts accessory structures. The Commission's own regulations provide that the Commission need not prepare an environmental assessment before it issues a permit for a project that falls within the list of categorically exempt activities (14 Cal. Admin. Code Section 10910). This Regionwide Permit is

therefore categorically exempt because it authorizes only reconstruction and replacement of, and incidental additions to, existing, currently used outfall pipes, service lines, utility cables, pipelines, and similar facilities that do not involve any substantial enlargement or any substantial extension into the Bay.

E. **Listing with the Commission.** The Commission staff will prepare a description and indicate the location of any project authorized under this Regionwide Permit, along with the name and address of the permittee(s), and attach such information to the listing of administrative permits, marsh development permits, and federal consistency actions that is sent to the Commission, following the Executive Director's approval of the project under this Regionwide Permit.

F. **Enforcement Program and Civil Penalties**. The Commission has an enforcement program that reviews its permits for compliance. The Commission may issue cease and desist and civil penalty orders if violations are discovered. The McAteer-Petris Act provides for the imposition of administrative civil penalties ranging from $10 to $2,000 per day up to a maximum of $30,000 per violation. The Act also provides for the imposition of court-imposed civil penalties of up to $30,000 in addition to any other penalties, penalties for negligent violations of between $50 and $5,000 per day, knowing and intentional penalties of between $100 and $10,000 per day, and exemplary penalties, which are supplemental penalties, in an amount necessary to deter future violations. In addition, anyone who places fill, extracts materials, or makes any substantial change in use of any water, land or structure within the area of the Commission's jurisdiction without securing a permit from the Commission is guilty of a misdemeanor.

IV. Standard Conditions

A. **Permit Execution**. This Regionwide Permit shall not take effect unless the permittee(s) executes the original of this Regionwide Permit and returns it to the Commission within 14 days after the date of the issuance of the Regionwide Permit. No work shall be done until the acknowledgment is duly executed and returned to the Commission.

B. **Permit Assignment**. The rights, duties, and obligations contained in this Regionwide Permit are assignable. When the permittee(s) transfers any interest in any property either on which the activity is authorized to occur or which is necessary to achieve full compliance of one or more conditions to this Regionwide Permit, the permittee(s)/transferor and the transferee shall execute and submit to the Commission a permit assignment form acceptable to the Executive Director. An assignment shall not be effective until the assignee executes and the Executive Director receives an acknowledgment that the assignee has read and understands the Regionwide Permit and agrees to be bound by the terms and conditions of the Regionwide Permit, and the assignee is accepted by the Executive Director as being reasonably capable of complying with the terms and conditions of the Regionwide Permit.

C. **Permit Runs With the Land**. Unless otherwise provided in this Regionwide Permit, the terms and conditions of this Regionwide Permit shall bind all future owners and future possessors of any legal interest in the land and shall run with the land.

D. **Other Government Approvals**. All required permissions from governmental bodies must be obtained before the commencement of work; these bodies include, but are not limited to, the U. S. Army Corps of Engineers, the State Lands Commission, the Regional Water Quality Control Board, and the city or county in which the work is to be performed, whenever any of these may be required. This Regionwide Permit does not relieve the permittee(s) of any obligations imposed by State or Federal law, either statutory or otherwise.

E. **Built Project must be Consistent with Application**. Work must be performed in the precise manner and at the precise locations indicated in your application, as such may have been modified by the terms of the Regionwide Permit and any plans approved in writing by or on behalf of the Commission.

F. **Life of Authorization**. Unless otherwise provided in this Regionwide Permit, all the terms and conditions of this Regionwide Permit shall remain effective for so long as the Regionwide Permit remains in effect or for so long as any use or construction authorized by this Regionwide Permit exists, whichever is longer.

G. **Commission Jurisdiction**. Any area subject to the jurisdiction of the San Francisco Bay Conservation and Development Commission under either the McAteer-Petris Act or the Suisun Marsh Preservation Act at the time the Regionwide Permit is granted or thereafter shall remain subject to that jurisdiction notwithstanding the placement of any fill or the implementation of any substantial change in use authorized by this Regionwide Permit. Any area not subject to the jurisdiction of the San Francisco Bay Conservation and Development Commission that becomes, as a result of any work or project authorized in this Regionwide Permit, subject to tidal action shall become subject to the Commission's "bay" jurisdiction.

H. **Changes to the Commission's Jurisdiction as a Result of Natural Processes**. This Regionwide Permit reflects the location of the shoreline of San Francisco Bay when the Regionwide Permit was issued. Over time, erosion, avulsion, accretion, subsidence, relative sea level change, and other factors may change the location of the shoreline, which may, in turn, change the extent of the Commission's regulatory jurisdiction. Therefore, the issuance of this Regionwide Permit does not guarantee that the Commission's jurisdiction will not change in the future.

I. **Violation of Permit May Lead to Permit Revocation**. Except as otherwise noted, violation of any of the terms of this Regionwide Permit shall be grounds for revocation. The Commission may revoke any permit for such violation after a public hearing held on reasonable notice to the permittee(s) or its assignee if the permit has been effectively assigned. If the

Regionwide Permit is revoked, the Commission may determine, if it deems appropriate, that all or part of any fill or structure placed pursuant to this Regionwide Permit shall be removed by the permittee(s) or its assignee if the Regionwide Permit has been assigned.

J. **Should Permit Conditions Be Found to be Illegal or Unenforceable**. Unless the Commission directs otherwise, this Regionwide Permit shall become null and void if any term, standard condition, or special condition of this Regionwide Permit shall be found illegal or unenforceable through the application of statute, administrative ruling, or court determination. If this Regionwide Permit becomes null and void, any fill or structures placed in reliance on this Regionwide Permit shall be subject to removal by the permittee(s) or its assignee if the Regionwide Permit has been assigned to the extent that the Commission determines that such removal is appropriate. Any uses authorized shall be terminated to the extent that the Commission determines that such uses should be terminated.

K. **Permission to Conduct Site Visit**. The permittee(s) shall grant permission to any member of the Commission's staff to conduct a site visit at the subject property during and after construction to verify that the project is being and has been constructed in compliance with the authorization and conditions contained herein. Site visits may occur during business hours without prior notice and after business hours with 24-hour notice.

Executed at San Francisco, California, on behalf of the San Francisco Bay Conservation and Development Commission on the date first above written.

LAWRENCE J. GOLDZBAND
Executive Director
San Francisco Bay Conservation and
Development Commission

By: _____
ETHAN LAVINE
Chief of Permits, Shoreline Development

EL/ra

cc: U. S. Army Corps of Engineers, Attn: Regulatory Functions Branch
San Francisco Bay Regional Water Quality Control Board,
Attn: Certification Section
Environmental Protection Agency
City of Alameda Planning Department

* *

Receipt acknowledged, contents understood and agreed to:

Executed at Alameda, CA

City of Alameda
Permittee

On 11-5-19

By: [signature]

Flavio D. Barrientos
Print Name and Title

* *

Receipt acknowledged, contents understood and agreed to:

Executed at ALAMEDA, CA

Ballena Bay Townhouse Association #1
Permittee

On 11-5-19

By: [signature]

Jeff Frankel
Print Name and Title

ATTACHMENT "E"

ARBORIST TREE REPORTS
FOR THE FOLLOWING PUMP STATIONS

- **COLA BALLENA**
- **MARINA VILLAGE**

SBCA TREE CONSULTING
Steve Batchelder, Consulting Arborist
1534 Rose Street, Crockett, CA 94525
WC ISA Certified Arborist #228
CUFC Certified Urban Forester #134
Calif. Contractor Lic. (C-27) 533675
Phone (510) 787-3075, Fax (510) 787-3065
E-mail: steve@sbcatree.com

Date: September 25, 2013

To: Carol Clark
950 West Mall Square, Room 110
Alameda, CA 94501-7575

Subject: Survey of Vegetation at Cola Ballena Pump Station

Location: 1241 Ballena Blvd.

Assignment: *Arborist was requested provide information on the vegetation surrounding the pump station including species, condition and future viability.*

Introduction

A tree and plant survey has been undertaken as part of the pump station upgrades. This report provides a listing of the plant materials located around the pump station. The Site Plan (*Appendix 1*) provides preliminary routs for the trenching and excavation activities, as well as the locations of the vegetation. *Appendix 2* provides the Tree Protection Guidelines.

Summary

Ten trees were surveyed in the area surrounding the Cola Ballena Pump station. Seven of the trees are recommended for removal to accommodate the upgrade. Trees to be removed include: four Strawberry Trees that are in conflict with the proposed improvements; one Monterey Pine and two Myoporum, both of which are seriously stressed. The Home Owners Association will remove the pine. If excavation and root cutting occurs during summer months, supplemental moisture will be required to mitigate root disturbance.

Other vegetation in the area of activity includes three flax plants and Canary Island Ivy. The ivy is of little concern as it is difficult to kill.

Tree Replacement Suggestions include Coast Live Oak *(Quercus agrifolia)* and Hybrid Strawberry Tree *(Arbutus marina)* are both good candidates. Additional suggestions can be provided if requested.

Trees Surrounding Pump Station

Trees highlighted in grey are those which will be removed or are expected to be seriously impacted and therefore may require removal.

No.	Species	Common Name	DBH(s)[1]	Height	Health*	Structure*	Distance to Pump Structures	Notes	Action
1	*Metrosideros excelsa*	New Zealand Christmas Tree	34.5"	45'	G	F	8' to transformer	Codominant with Included Bark, Previous tag #36	Protect
2	*Arbutus unedo*	Strawberry Tree	7	20'	G	F		Lean	Remove
3	*Arbutus unedo*	Strawberry Tree	5,7, 3.5, 2, 2, 1.5	25'	G	F	40" to Drywell hatch	In conflict	Remove
4	*Arbutus unedo*	Strawberry Tree	9, 5.5, 6.5, 4.5, 4.5, 3, 2.5	30'	G	F	"30 to Drywell hatch	Poor pruning	Protect At high risk.
5	*Arbutus unedo*	Strawberry Tree	7, 7.5, 4.5, 7, 4.5, 7.5, 5, 7	25'	G	F		In conflict	Remove
6	*Arbutus unedo*	Strawberry Tree	3.5, 3.5,	10'	F	P		Lean, large dead limb, In conflict	Remove
7	*Eucalyptus polyanthemos*	Silver Dollar Gum	17	45'	F-P	F	4' to slab	Codominant, Minimal foliage	Protect
8	*Myoporum laetum*	Myoporum	5.5, 5, 7, 6.5, 5, 7, 9, 7, 4.5	25'	P	F	2' to slab	Pavement displacement, Thrips	Remove
9	*Myoporum laetum*	Myoporum	7.5, 7	25'	P	F	2' to slab	Pavement displacement, Thrips	Remove
10	*Pinus radiata*	Monterey Pine	39.5	60'	P-D	F		Almost dead,	HOA to Remove

***G is Good, F is Fair, P is Poor & D is Dying or dead**

Shrubs and Ground Cover

Flax *(Phormium spp.)* – Three flax plants are growing in the area of possible impact. The plants are equivalent to a 15 gallon size flax plant.

Canary Island Ivy *(Hedera canariensis)* – The ivy is covering much of the area. If damaged, the ivy will grow back quite readily.

[1] DBH is tree diameter at breast height, 54 inches above average soil grade.

Discussion of Trees at Risk

Strawberry Trees – Five strawberry trees are located in the area of the pump station. Though none have particularly good structural qualities, they are all fairly healthy. Strawberry trees #s 2, 3, 5 and 6 will be removed as they are in conflict with proposed upgrades. Tree #6 is not a tree of high value due to its condition and past pruning.

Monterey Pine – This tree will be impacted by the Backup Generator Slab. This tree is near dead and heavily infected with the Red Turpentine Beetle. This tree is recommended for removal and therefore will not be of concern.

Myoporum – The improvements are likely to cause root loss to the Myoporum. The trees are infested with the Myoporum Thrips. The infestation is expected to worsen in the future. Removal is recommended for both Myoporum.

Photo 1. *Photo above shows Tree #5 (right) and #6 (left), which will be removed to accommodate construction.*

Photo 2. *Photo to the left shows Tree #4 in the foreground. The placement of a backup generator within the tree's Primary Root Protection Zone (RPZ) is of concern and the tree will require protection and health mitigation measures.*

Photo 3. *Photo to the left shows the Monterey Pine tree #10 which is recommended for removal. The placement of the backup generator will encroach into the root zone of this already senescent tree. Signs of the opportunistic Red Turpentine Beetle were observed, an indication that the tree is dying.*

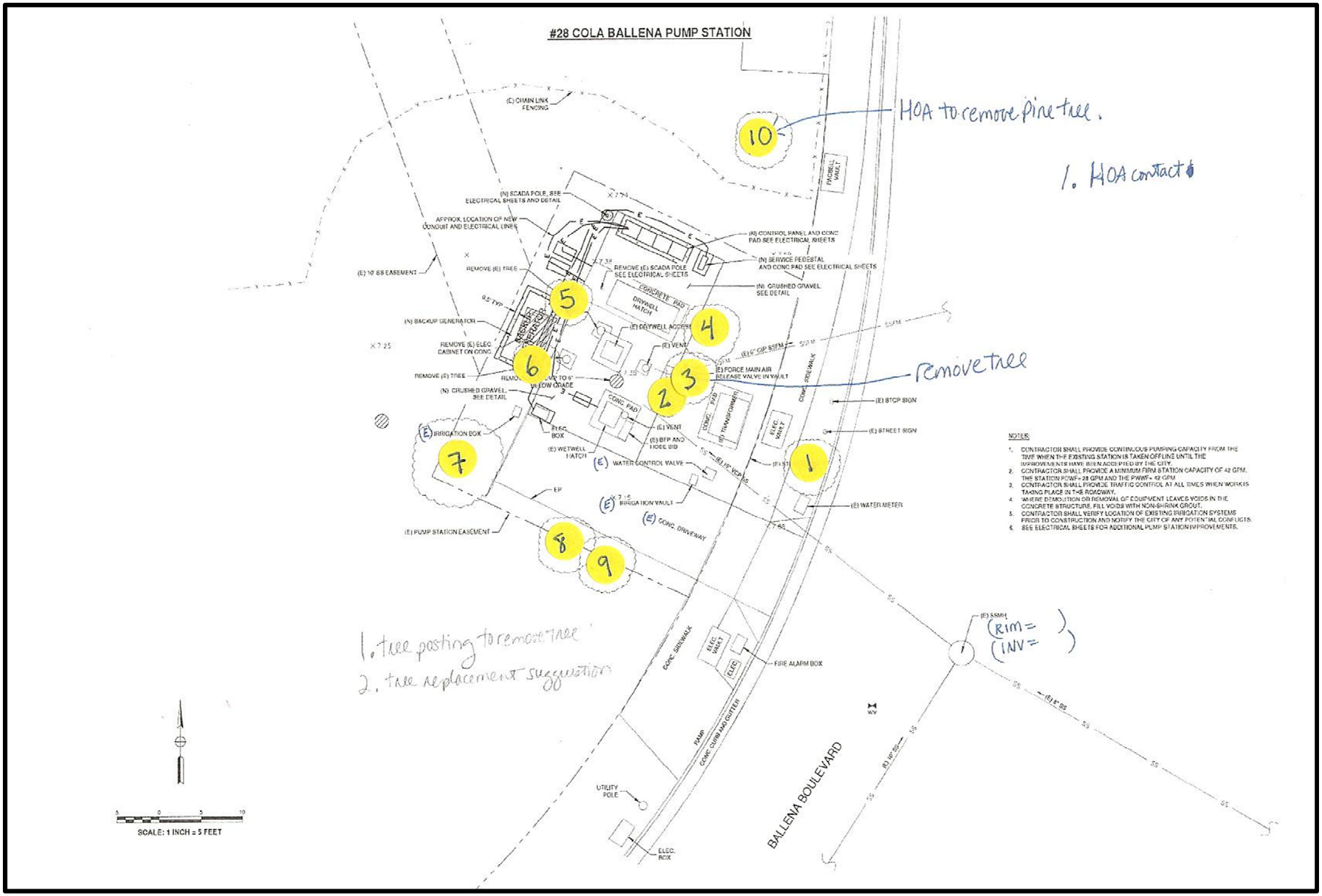
Photo 4. *Photo to the left shows the bases of Myoporum trees #8 and 9, and the adjacent root related hardscape displacement. The trees are infested with Myoporum Thrip. The trees are expected to decline at an increasing rate if root loss occurs.*

.

End Report

Appendix Material

Appendix 1 – Tree and Plant Location Map
Appendix 2 – Tree Protection Guidelines



SBCA Tree Consulting
1534 Rose St. Crockett, CA 94525

Phone (510) 787-3075
Fax (510) 787-3065

SBCA TREE CONSULTING
Steve Batchelder, Consulting Arborist
1534 Rose Street, Crockett, CA 94525
WC ISA Certified Arborist #228
CUFC Certified Urban Forester #134
Calif. Contractor Lic. (C-27) 533675
Phone (510) 787-3075, Fax (510) 787-3065
E-mail: steve@sbcatree.com

Date: September 25, 2013

To: Carol Clark
950 West Mall Square, Room 110
Alameda, CA 94501-7575

Subject: Survey of Vegetation at Marina Village Pump station

Location: Behind Marina Village Shopping Center, 713 Marina Village Parkway

Assignment: *Arborist was requested provide information on the vegetation surrounding the pump station including species, condition and future viability.*

Introduction

The tree and plant survey has been undertaken as part of pump station upgrades. This report provides a listing of the plant materials located around the pump station. The site plan, *Appendix 1*, provides preliminary locations where trenching and excavation activities will occur and the locations of the adjacent vegetation. This report provides Tree Protection guidelines for specific trees. *Appendix 2* provides overall guidelines for tree protection activities.

Summary

All seven trees surrounding the pump station are Lombardy Poplar *(Populus nigra* 'Italica'*)*. Most trees are in fair to good health. Trees #'s 3, 4 will be removed to accommodate the project.

Trees #2 & 5 appear to be at minor risk from the construction project and will likely require Tree Protection Measures. Both trees are currently in fair to good health.

The only other plant material is English Ivy *(Hedera helix).* The ivy is not a serious concern due to its ability for vigorous regeneration when damaged. No attempt needs to be made to replace the ivy with other than organic mulch.

Table 1 Tree Survey Data

Trees highlighted in grey will be impacted or removed due to the project.

No.	Species	Common Name	DBH	Height	Health*	Structure*	Distance to Pump Structures	Notes	Action
1	*Populus nigra 'Italica'*	Lombardy Poplar	6.5”	35’	F	F	20’ to pad	Poor Pruning	Protect
2	*Populus nigra ‘Italica’*	Lombardy Poplar	12.5”	60’	F-G	F	3’ to pad	Codominant top	Protect
3	*Populus nigra ‘Italica’*	Lombardy Poplar	9”	50’	F-G	F	12.5’ to pad	In conflict with plans	Remove
4	*Populus nigra ‘Italica’*	Lombardy Poplar	9”, 9”	13’	F	P	3’ to pad	Codominant with Included Bark, Decay at base, Deadwood, In conflict with plans	Remove
5	*Populus nigra ‘Italica’*	Lombardy Poplar	10”	60’	F-G	F	12.5’ to pad		Protect
6	*Populus nigra ‘Italica’*	Lombardy Poplar	6.5”	50’	F	G	13’ to Tree #5		Protect
7	*Populus nigra ‘Italica’*	Lombardy Poplar	7”	50’	F	F		Codominant	Protect

***G is Good, F is Fair, P is Poor**

Shrubs and Ground Cover

Vines – English Ivy *(Hedera helix). The ivy does not appear to be thriving.*

Discussion of Tree Protection

The poplar trees will require trunk and root-soil protection during construction activities. Supplemental irrigation may be required if any significant root loss occurs. Refer to Tree Protection Guidelines contained in Appendix 2.

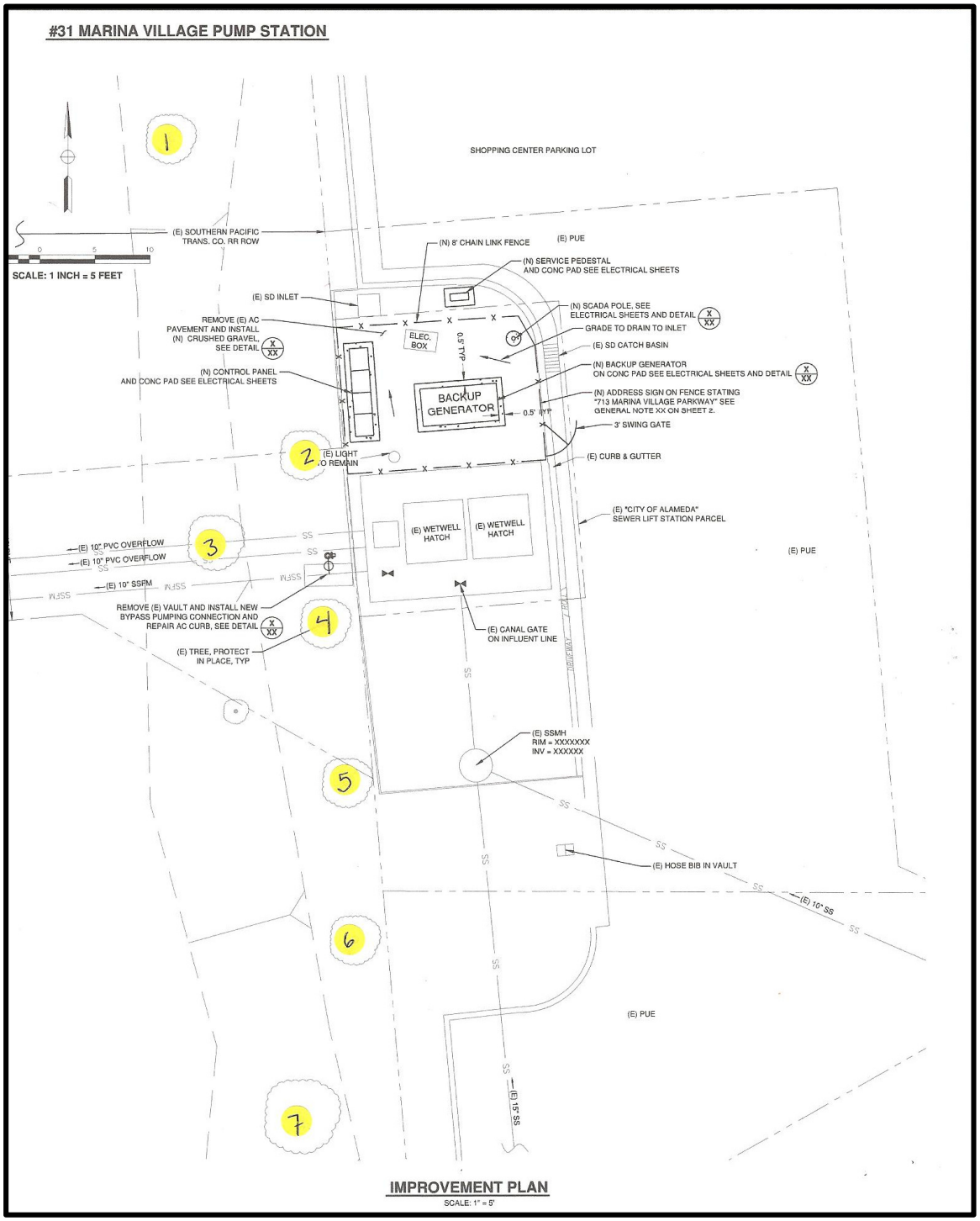
It may be best to not replace any of the ivy that is removed but to use organic mulch on the soil surface to help retain soil moisture for the trees.

Photo 1. *Photo above shows Trees #2 thru 5, from right to left. Trees #3 and 4 will be removed to accommodate pump station improvement. Trees #2 and 5 will require Tree Protection measures during construction activities.*

End Report

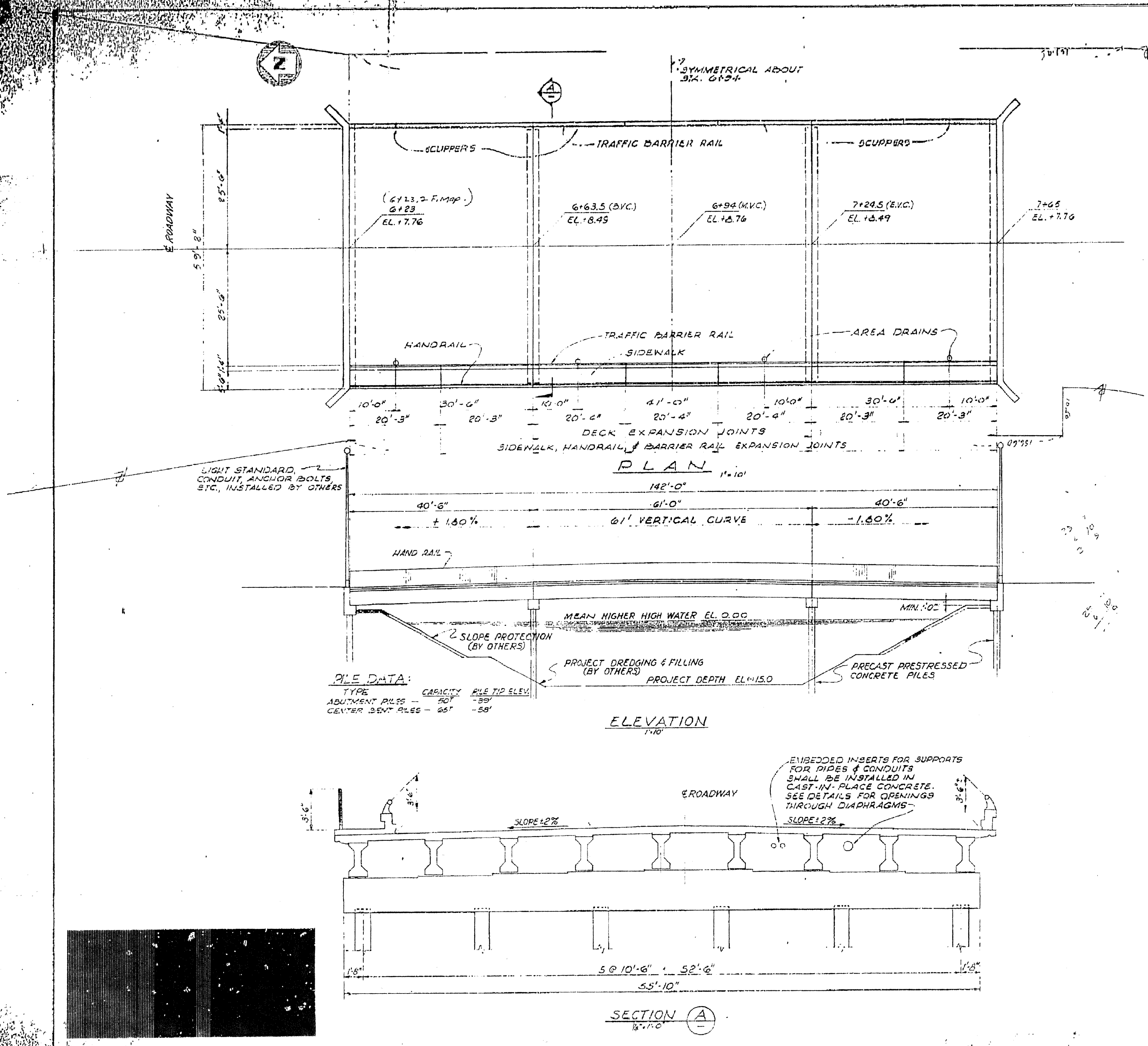
Appendix Material

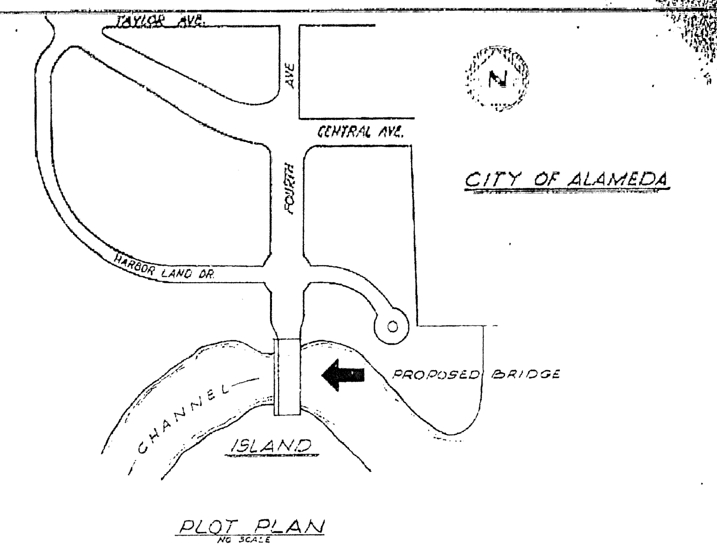
Appendix 1 – Tree and Plant Location Map
Appendix 2 – Tree Protection Guidelines


#31 MARINA VILLAGE PUMP STATION
SHOPPING CENTER PARKING LOT
(E) SOUTHERN PACIFIC TRANS. CO. RR ROW
SCALE: 1 INCH = 5 FEET
(N) 8' CHAIN LINK FENCE
(E) PUE
(N) SERVICE PEDESTAL AND CONC PAD SEE ELECTRICAL SHEETS
(E) SD INLET
REMOVE (E) AC PAVEMENT AND INSTALL (N) CRUSHED GRAVEL, SEE DETAIL X/XX
ELEC. BOX
0.5' TYP
(N) SCADA POLE, SEE ELECTRICAL SHEETS AND DETAIL X/XX
GRADE TO DRAIN TO INLET
(E) SD CATCH BASIN
(N) CONTROL PANEL AND CONC PAD SEE ELECTRICAL SHEETS
BACKUP GENERATOR
(N) BACKUP GENERATOR ON CONC PAD SEE ELECTRICAL SHEETS AND DETAIL X/XX
(N) ADDRESS SIGN ON FENCE STATING "713 MARINA VILLAGE PARKWAY" SEE GENERAL NOTE XX ON SHEET 2.
0.5' TYP
3' SWING GATE
(E) LIGHT TO REMAIN
(E) CURB & GUTTER
(E) WETWELL HATCH
(E) WETWELL HATCH
(E) "CITY OF ALAMEDA" SEWER LIFT STATION PARCEL
(E) PUE
(E) 10" PVC OVERFLOW
(E) 10" PVC OVERFLOW
(E) 10" SSFM
REMOVE (E) VAULT AND INSTALL NEW BYPASS PUMPING CONNECTION AND REPAIR AC CURB, SEE DETAIL X/XX
(E) TREE, PROTECT IN PLACE, TYP
(E) CANAL GATE ON INFLUENT LINE
(E) SSMH RIM = XXXXXXX INV = XXXXXX
(E) HOSE BIB IN VAULT
(E) 10" SS
(E) PUE
(E) 15" SS
1
2
3
4
5
6
7
IMPROVEMENT PLAN
SCALE: 1" = 5'

ATTACHMENT "F"

COLA BALLENA BRIDGE AS-BUILT PLANS, 1965
COLA BALLENA BRIDGE REPAIR PLANS, 2008
COLA BALLENA BRIDGE PHOTOGRAPHS





GENERAL NOTES

1. ALL WORK SHALL BE IN CONFORMANCE WITH THE STATE OF CALIFORNIA, DEPARTMENT OF PUBLIC WORKS, DIVISION OF HIGHWAYS, STANDARD SPECIFICATIONS, 1964 EDITION, EXCEPT AS NOTED BELOW.

2. REFERENCE DATUM: CITY OF ALAMEDA DATUM
   M.H.H.W. = ELEV. 0.00

3. DESIGN LOADS: THE DESIGN PROCEDURES SHALL BE IN ACCORDANCE WITH THE AASHO SPECIFICATIONS, 1964 EDITION, EXCEPT THAT THE BPR INTERSTATE TRUCK LOADING SHALL NOT BE CONSIDERED. THE DESIGN LOADS SHALL BE AS FOLLOWS:
   a. VEHICLE ROADWAY: STANDARD AASHO H-20-S16-44 TRUCK
   b. SIDEWALK: 60 p.s.f.
   c. HANDRAIL: 20 p.l.f. APPLIED TO THE TOP RAIL
   d. BARRIER RAIL: 500 p.l.f. APPLIED 10" ABOVE THE ROADWAY SURFACE
   e. WIND: 50 p.s.f. WITH A MINIMUM OF 300 p.l.f.
   f. SEISMIC COEFFICIENT: 6% OF DEAD LOAD
   g. LATERAL EARTH PRESSURE: EQUIVALENT FLUID PRESSURE = 120 p.c.f.

4. MATERIAL:
   a. CONCRETE:
      1.) PRECAST, PRESTRESSED CONCRETE:
         28 DAY STRENGTH = f'c = 5000 p.s.i.
         TRANSFER STRENGTH = SEE DWG. #2, NOTE 3
         DESIGN STRENGTH = fc = 2000 p.s.i.
      2.) CAST-IN-PLACE CONCRETE: (CLASS A)
         28 DAY STRENGTH = f'c = 3000 p.s.i.
         DESIGN STRENGTH = fc = 1200 p.s.i.
      3.) CONCRETE PROTECTIVE COVER OVER MAIN REINFORCEMENT (SEE DRAWINGS FOR LOCATIONS NOT NOTED BELOW):
         PRESTRESSED PILES: 2½" CLEAR TO STRANDS
         PRESTRESSED I-GIRDERS: REFER TO I-GIRDER DETAILS
         PILE CAPS & ABUTMENTS: 2½" CLEAR
         DECK SLAB - 1½" CLEAR TOP & BOTTOM
         CONCRETE DEPOSITED AGAINST EARTH: 3" CLEAR
      4.) PRESTRESSED CONCRETE AGGREGATE SHALL BE ¾" MAXIMUM
      5.) MAX. SIZE AGGREGATE FOR C.I.P. CONCRETE 1½" FOR PILE BENTS & ABUTMENTS 1" FOR ALL OTHERS
   b. REINFORCING STEEL:
      1.) MILD STEEL REBAR: INTERMEDIATE GRADE DEFORMED BARS, fs = 20,000 p.s.i. EXCEPT AS NOTED
      2.) PRESTRESSING TENDONS SHALL BE 7 WIRE HIGH TENSILE, H.T.S.R., UNCOATED STRANDS
         OPTIONS: f_{su} = 250,000 p.s.i., f_{si} = 175,000 p.s.i., f_{se} = 140,000 p.s.i. OR f_{su} = 270,000 p.s.i., f_{si} = 189,000 p.s.i., f_{se} = 154,000 p.s.i.
   c. STRUCTURAL STEEL: ASTM A36
   d. STEEL HANDRAIL BALUSTERS & POSTS: STANDARD STEEL PIPE, COMMERCIAL QUALITY
   e. TRAFFIC BARRIER SAFETY RAILING SHALL BE STATE DIVISION OF HIGHWAY STANDARD, SINGLE RAIL TYPE, AND MAY BE CONSTRUCTED OF STEEL OR ALUMINUM
   f. ALL EXPOSED STEEL NOTED ABOVE SHALL BE HOT-DIP GALVANIZED AFTER FABRICATION

5. PILING: THE PILES SHALL BE DRIVEN TO THE CAPACITIES AND MINIMUM TIP ELEVATIONS AS SHOWN. JETTING WILL BE PERMITTED TO A DEPTH SEVEN FEET ABOVE THE TIP ELEVATIONS SHOWN. THE FINAL SEVEN FEET MUST BE DRIVEN. JETTING MAY BE INTERNAL OR EXTERNAL AT THE OPTION OF THE CONTRACTOR. DEVIATIONS FROM THE ABOVE JETTING PROCEDURE SHALL RECEIVE PRIOR WRITTEN APPROVAL FROM HARDING ASSOCIATES, SOIL MECHANICS ENGINEERS, SAN RAFAEL CALIFORNIA.
   THE PILE TOLERANCES AT CUT OFF ELEVATION SHALL BE AS FOLLOWS:
      PARALLEL TO PILE CAP: 6"
      TRANSVERSE TO PILE CAP: 4"
   THE PILE TIP ELEVATIONS, CAPACITIES AND JETTING PROCEDURE ARE BASED UPON THE RECOMMENDATIONS SPECIFIED IN LETTER Nº 2464.1 HARDING ASSOCIATES, SOIL MECHANICS ENGINEERS, DATED MAR. 15, 1965.
   PILES SHALL BE DRIVEN WITH A STEAM OR AIR HAMMER WITH AN ENERGY OF NOT LESS THAN 30,000 FT. LBS.

6. INSERTS, MECHANICAL PIPING SUPPORTS, ELECTRICAL CONDUIT DETAILS ETC. WHICH ARE TO BE PROVIDED BY OTHERS SHALL RECEIVE WRITTEN APPROVAL BY BEN C GERWICK, INC. PRIOR TO INSTALLATION INTO THE STRUCTURE.

(2)

NO.	DATE	REVISIONS & ISSUES	BY	APP.
1	9-16-65	ISSUED FOR CONSTRUCTION	WI	
0	3-26-65	ISSUED FOR APPROVAL	WI	

BEN C. GERWICK INC.
PRECAST — PRESTRESSED CONCRETE DIVISION
755 SANSOME ST. SAN FRANCISCO 11, CALIFORNIA

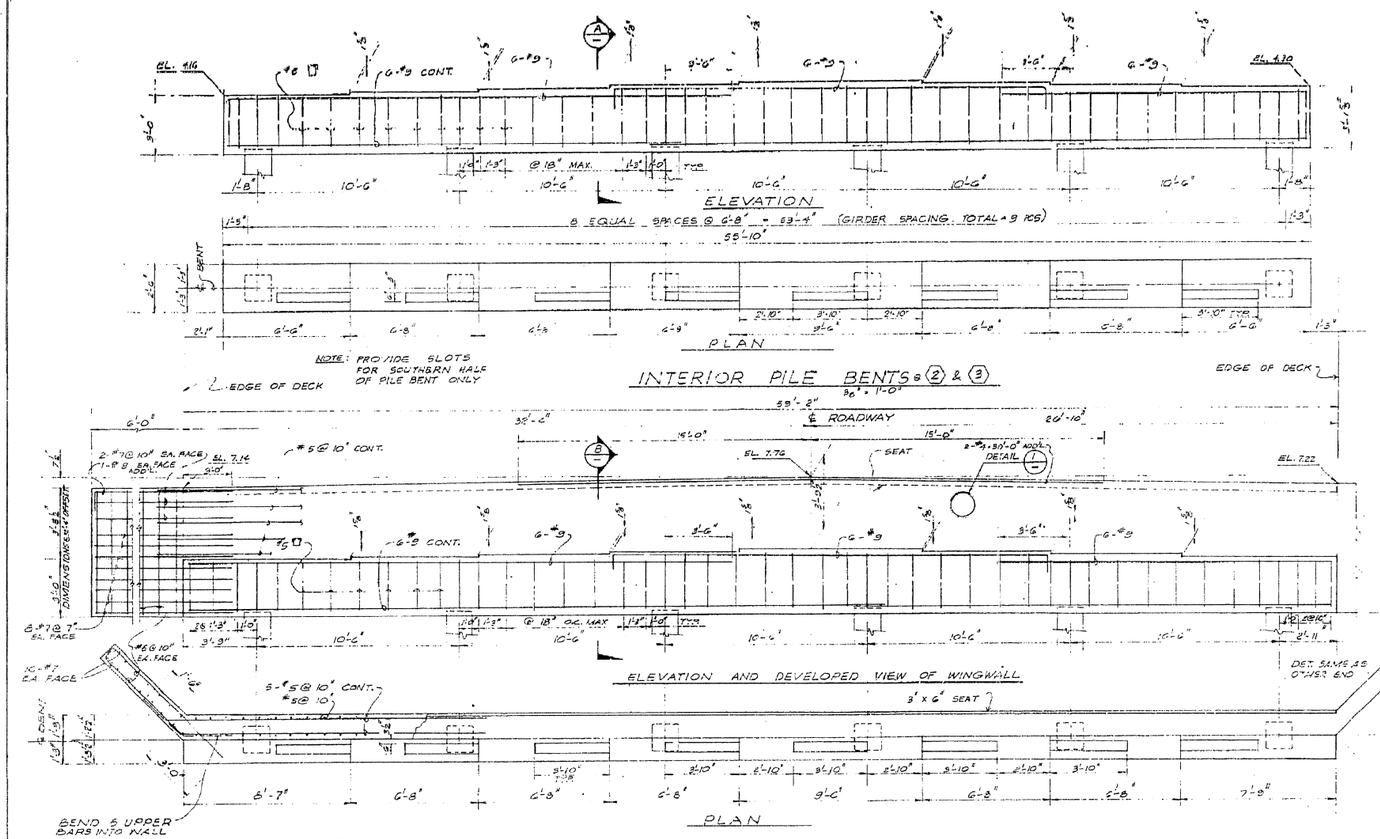
HARBOR-LAND COMMUNITY DEV.
ALAMEDA CALIFORNIA

HARBOR-LAND BRIDGE

GENERAL PLAN

DESIGNED ... CHECKED ... DRAWN ... APPROVED ... DATE 3-26-65

33C-230 BALLENA BAY BR.



NOTES

1. CHAMFER ALL CORNERS 1" UNLESS NOTED OTHERWISE.
2. CONSTRUCTION JOINTS WILL NOT BE PERMITTED EXCEPT AT RECOMMENDED LOCATIONS SHOWN IN THE PLANS. THE CONSTRUCTION JOINTS SHALL BE SUFFICIENTLY CLEANED TO EXPOSE THE AGGREGATE AND WETTED PRIOR TO DEPOSITING NEW CONCRETE.
3. OPENINGS THROUGH ABUTMENTS SHALL BE SEALED PROPERLY SO THAT RETAINED MATERIAL SHALL NOT PASS THROUGH.

1	4/16/65	ISSUED FOR CONSTRUCTION	WH / APD
0	3/24/65	ISSUED FOR APPROVAL	WH
NO.	DATE	REVISIONS & ISSUES	BY / APP.

BEN C. GERWICK INC.
PRECAST — PRESTRESSED CONCRETE DIVISION
755 SANSOME ST. SAN FRANCISCO 11, CALIFORNIA

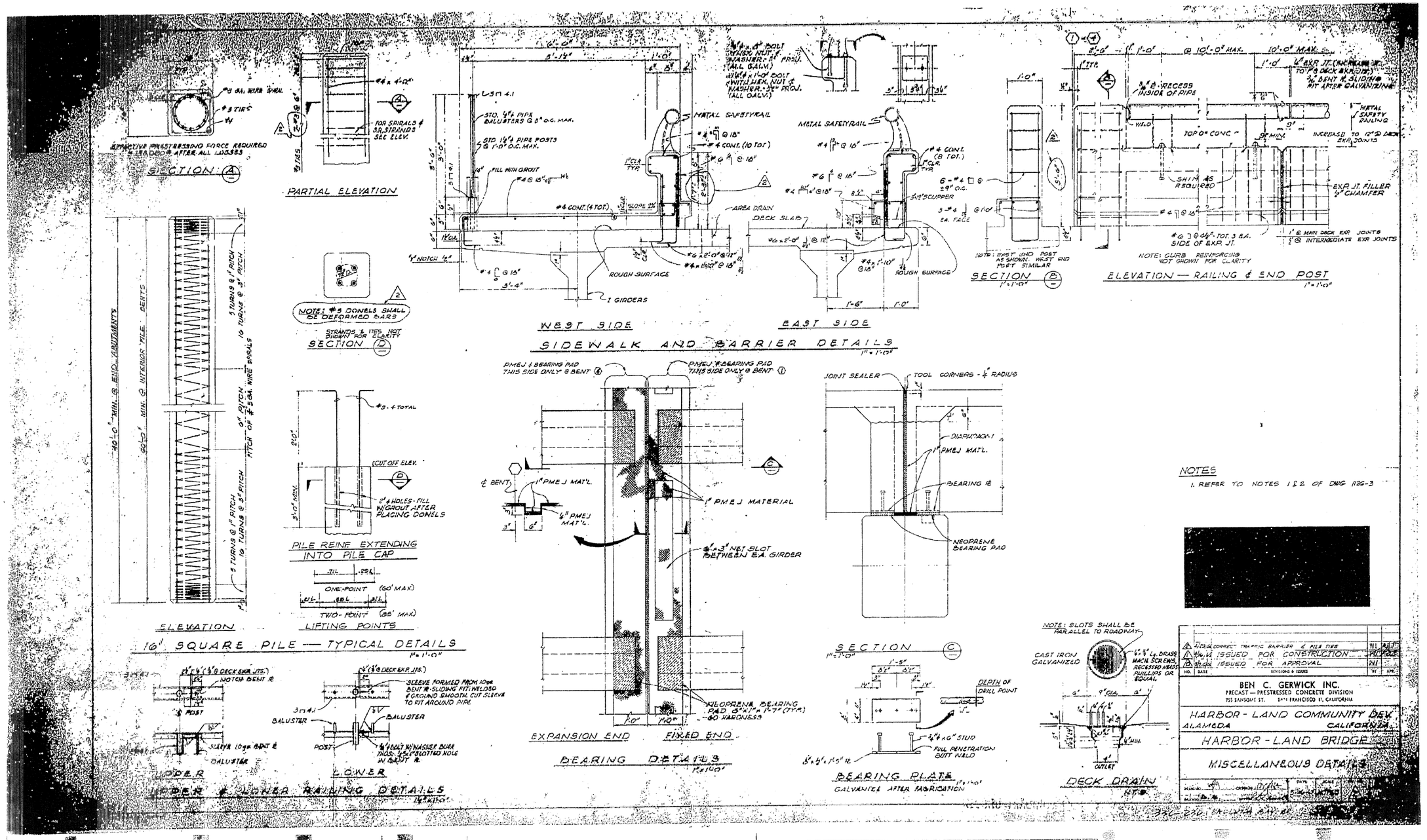
HARBOR-LAND COMMUNITY DEV.
ALAMEDA CALIFORNIA

HARBOR-LAND BRIDGE

PILE BENTS & END ABUTMENTS

DESIGNED	DRAWN	CHECKED	DATE	SCALE	CONT. NO.	DRAWING NO.
WH	WH	DK/LOT	3-24-65	AS NOTED	4	

230-230 BALLENA BAY RE 5675P-113



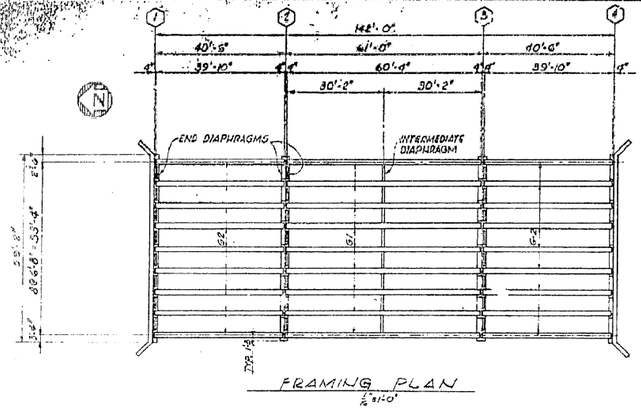
NO.	DATE	REVISIONS & ISSUES	BY	APP'D
2	12-30-48	CORRECT TRAFFIC BARRIER & PILE TIES	WI	A.J.C.
1	9-14-48	ISSUED FOR CONSTRUCTION	WI	A.J.C.
0	8-24-48	ISSUED FOR APPROVAL	WI	

BEN C. GERWICK INC.
PRECAST — PRESTRESSED CONCRETE DIVISION
155 SANSOME ST. SAN FRANCISCO 11, CALIFORNIA

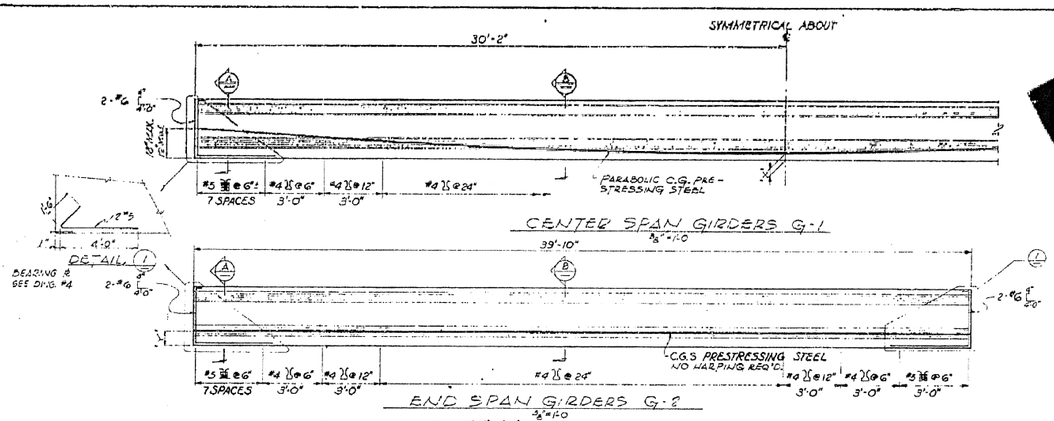
HARBOR - LAND COMMUNITY DEV.
ALAMEDA CALIFORNIA

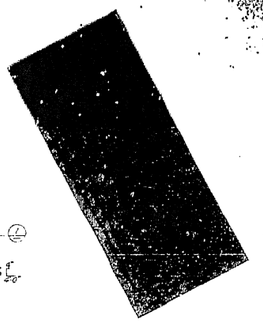
HARBOR - LAND BRIDGE

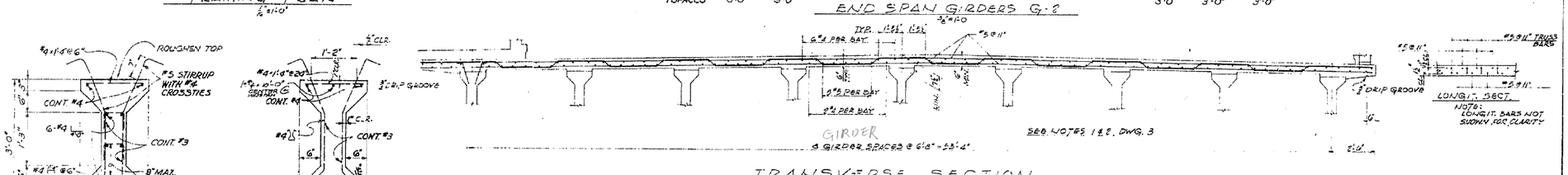
MISCELLANEOUS DETAILS



FRAMING PLAN
1/8"=1'-0"



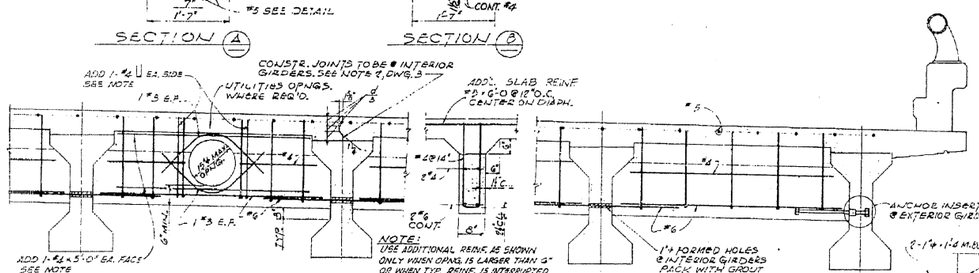




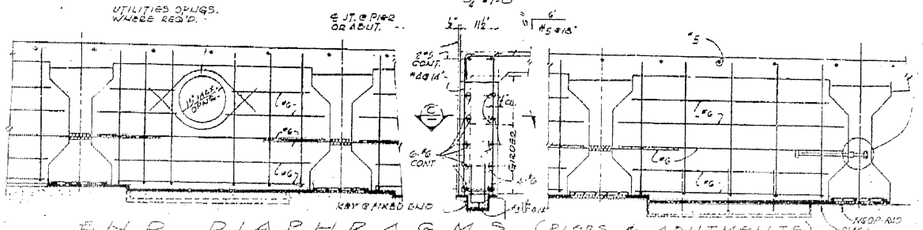
SECTION A

SECTION B

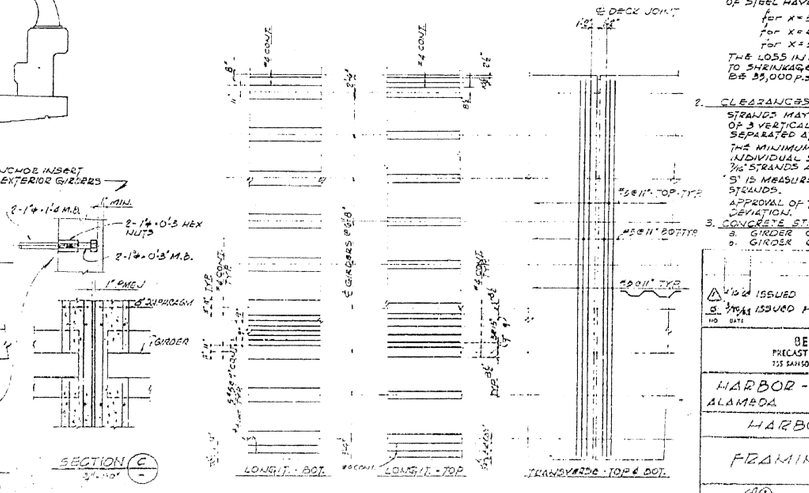
TRANSVERSE SECTION
(SLAB REINF.)
3/8"=1'-0"



INTERMEDIATE DIAPHRAGM
1/2"=1'-0"



END DIAPHRAGMS (PIERS & ABUTMENTS)
3/4"=1'-0"



PLAN - DECK SLAB REINFORCEMENT

PRESTRESSING NOTES:

1. WORKING FORCE (THE FORCE PER GIRDER REMAINING AFTER ALL LOSSES, INCLUDING THOSE DUE TO CREEP AND SHRINKAGE OF CONCRETE AND CREEP OF STEEL HAVE OCCURRED) IS AS FOLLOWS:
   for X = 3' P_E = 455,000 for Y = 7' P_E = 270,000
   for X = 2' P_E = 470,000 for Y = 8' P_E = 266,000
   for X = 5 P_E = 499,000
   THE LOSS IN STRESS IN PRETENSIONING STEEL DUE TO SHRINKAGE AND CREEP SHALL BE ASSUMED TO BE 33,000 P.S.I.
2. CLEARANCES FOR STRANDS
   STRANDS MAY BE BUNDLED IN GROUPS CONSISTING OF 3 VERTICALLY AND 2 HORIZONTALLY, AND SEPARATED AT THE ENDS.
   THE MINIMUM DISTANCE 'S' BETWEEN GROUPS OR INDIVIDUAL STRANDS IS 1¼" FOR ½" STRANDS, 1⅛" FOR ⅜" STRANDS AND 2" FOR ⅝" STRANDS.
   'S' IS MEASURED BETWEEN CENTERS OF ADJACENT STRANDS.
   APPROVAL OF THE ENGINEER IS REQ'D. FOR DEVIATION.
3. CONCRETE STRESSES @ TRANSFER
   a. GIRDER G-1 f'_{ci} = 6,500 psi.
   b. GIRDER G-2 f'_{ci} = 4,000 psi.

NO	DATE	REVISIONS & ISSUES	BY	APP.
1	10/24	ISSUED FOR CONSTRUCTION	FVI	
0	7/7/61	ISSUED FOR APPROVAL	FVI	

BEN C. GERWICK INC.
PRECAST — PRESTRESSED CONCRETE DIVISION
735 SANSOME ST. SAN FRANCISCO 11, CALIFORNIA

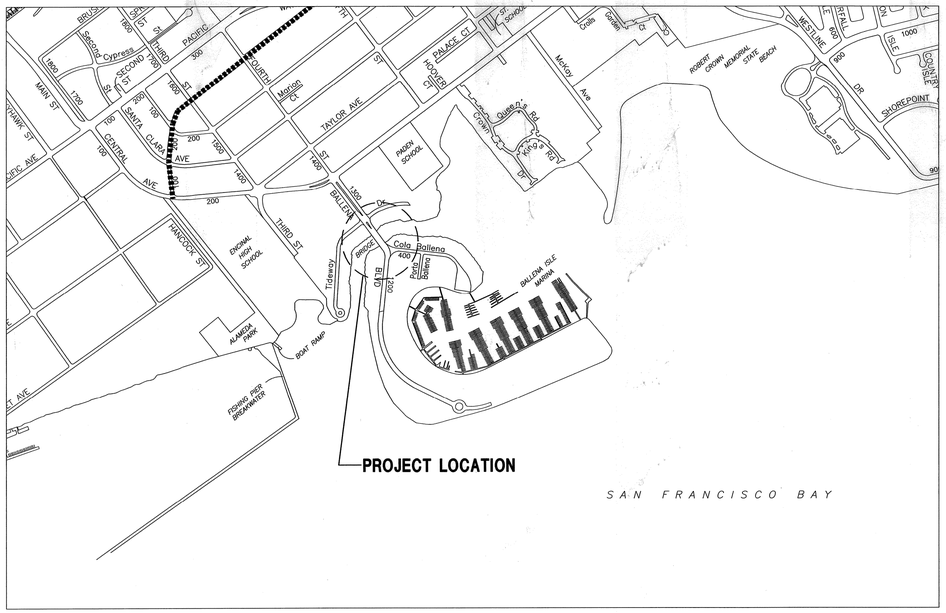
HARBOR - LAND COMMUNITY DEV.
ALAMEDA CALIFORNIA

HARBOR-LAND BRIDGE

FRAMING PLAN & DETAILS

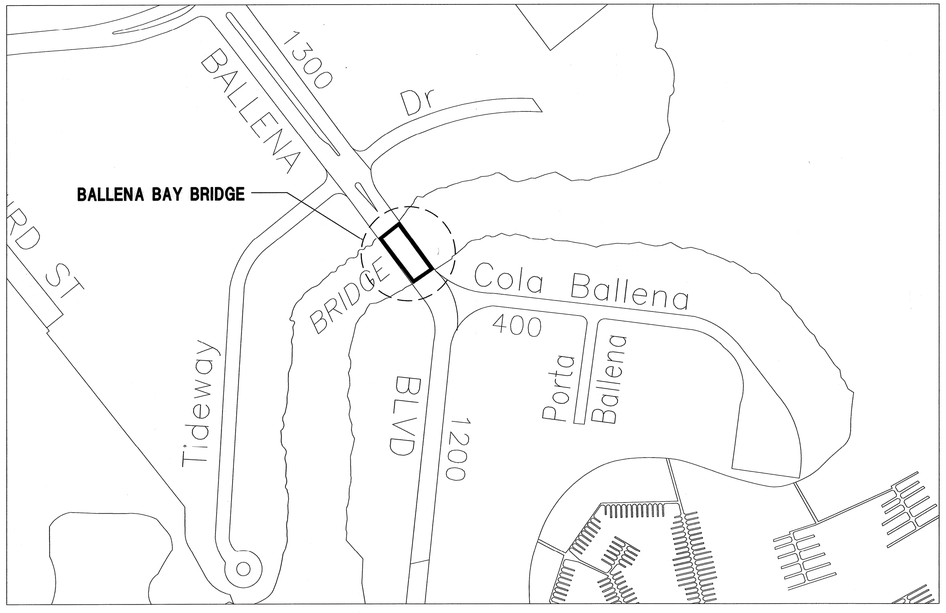
DESIGNED	DRAWN	DATE	SCALE	SHT. NO.
FVI & M	MSP	6/61	AS NOTED	4

336-230 BALLENA BAY DR. 46781



VICINITY MAP

NOT TO SCALE



LOCATION MAP

NOT TO SCALE

GENERAL NOTES

I. GENERAL

A. All material, workmanship and construction shall conform to the following standard specifications and drawings:
   - Current Caltrans standard plans & specifications.

B. Contractor shall verify all dimensions and existing field conditions. Discrepancies between drawings and field conditions, and/or omissions on the drawings requiring clarification or revision, shall promptly brought to the attention of the Engineer before proceeding with work. Not all site utilities & structures are shown on the drawings. Verify conditions in field prior to construction.

C. Do not scale drawings. All dimensions related to existing conditions shall be verified by the Contractor. Details not specifically shown shall be of same nature as other similar conditions.

D. It is contractor's responsibility to provide adequately shoring system per applicable codes and ordinance as required and as appropriate during the construction period.

E. The contractor shall notify the Engineer at least two days prior to each of the following events so that the Engineer may make the appropriate job site inspection:
   a. Prior to placement of concrete for reinforcing steel or strips review.
   b. Prior to setting embedded anchors or epoxy dowels.
   c. Prior to placement of shotcrete, concrete or mortar.

F. The contractor shall prepare traffic control plan submitting to the city for review and approval prior to beginning work.

G. The contractor shall prepare fall protection plan and erosion plan submitting to the city for review and approval prior to beginning work.

II. MATERIAL TESTING

A. All material testing including testing requirements and procedures shall be in accordance with Standard Specifications. Also see testing & Inspection Schedule.

III. MATERIALS AND SURFACE PREPARATION:

A. Concrete bridge deck surface crack healer coating (Methacrylate Sealer):
   1. Coating shall be a 2-component, rapid-curing solvent-free, high molecular weight methacrylate, crack healer/penetrating sealer ~~by SIKA PRONTO 19 TF, or approved equivalent.~~ - KRP 204 SEALER BY KWIK BOND POLYMERS, LLC
   2. Application finish: prepare existing concrete surface by steel shot blasting. Apply coating in accordance with manufacture written recommendation. Clean sand shall be broad casted and adhered to coating to ensure a coefficient of friction of the deck of 0.35 or better when tested in conformance with calif-test 342.

B. Patching mortar:
   1. Use Sikacrete 211, one-component, cementitions pumpable and pourable concrete mix or equivalent as approved by the engineer.
   2. Mixing: Mechanically mix with a low-speed drill (400-600rpm) and mixing paddle. Manual mixing in less than full unit quantities is acceptable. However, if complete, thorough mixing and proper proportioning of the two components is not maintained, the resulting mortar will show cracking. Do not manually mix full units.
   3. Mixing procedure: In accordance with manufacture's written recommendation.
   4. Concrete Surface Preparation: The surface must be mechanically prepared. Areas to be repaired must be clean, sound and free of contaminants. All loose and deteriorated concrete shall be removed by mechanical means approved by the Engineer. Saw cut perimeter 1/2" maximum. Chip concrete substrate to obtain a surface profile 1/16" to 1/8" in depth with a new fractured aggregate surface as per the product manufacturer's recommendation. Where reinforcing steel with active corrosion is encountered the following procedures will be used: sandblast reinforcing steel to remove all contaminants and rust. Determine section loss, splice where more than 10-15% loss as directed by the Engineer. Spacing of steel must be 3 times the largest aggregate size. If half of the diameter of the rebar is exposed, chip out behind the reinforcing steel, 1/2" minimum for mortar only and 3 times the largest aggregate size for extended mixes. Saturate exposed surfaces with clean water prior to applying patching mortar. Exposed substrate should be saturated surface dry (ssd) with no standing water during mortar application. Product manufacturer's recommendations and procedures shall be strictly followed in surface preparation.
   5. Application & finish: At the time of application surfaces must be saturated surface dry (SSD) with no standing water. Mortar must be scrubbed into the substrate, filling all pores and voids. Force material against edge of repair, working toward center. After filling repair, consolidate, then screed.
   6. Set, place and anchor reinforcing steel required as designated on the drawings.
   7. Reinforcing steel for concrete shall conform to ASTM A615, 60ksi steel free of dust and rust. Apply two coats of 20 mil each of Sika Armtec 110 Epocem on new rebars and existing rebars to remain prior to apply mortar.

C. Epoxy Injection Grouting (for cracks in slab/wall/beam/pile cap):
   1. Epoxy grout shall be Sikadur 35, Hi Mod, LV epoxy adhesive with Sikadur 31, Hi Mod Gel sealant or approved equivalent by pressure injection method.
   2. Installation and application of the products shall be in accordance with the manufacturer's printed instruction and recommendation.

D. Corrosion, inhibiting, impregnation coating for hardened concrete (Underside of deck & beams):
   1. Coating for hardened concrete shall be SIKA FERROGARD 903 coating or approved equivalent.
   2. Surface preparation and application: Existing concrete surface shall be pressure cleaned and free of dust, grease, efflorescence etc. Coating may be applied by rolled, brush or spray in accordance with manufacture written recommendation. A minimum of 2 coats must be applied.

E. Corrosion Control System for Concrete Pile Caps:
   1. Corrosion control system shall be Sika Galvashield CC100 Embedded Galanic Anode System by Sika Corp.
   2. Coring and placement of the anode system shall be in accordance with the manufacturer's printed instructions.
   3. Qualified installer of the system shall be manufacturer certified and has successfully completed at least three projects using this system in the last two years.

F. Concrete and Reinforcing Steel
   1. Concrete work shall conform to ACI 318, latest edition.
   2. Reinforcing steel shall conform to ASTM A615, Grade 60. Steel shall be kept clean and free of rust scales.
   3. Reinforcing steel, anchors, inserts and embdded items shall be rigidly held in place prior to placing concrete.
   4. All exposed concrete edges shall have 1/2" radius rounded edges.
   5. Non-shrink grout shall be non-ferrous, non-shrink grout by Burke or approved equivalent.

SPECIAL INSPECTION AND TESTING SCHEDULE

Embedded Dowels, Anchors, Threaded Rods and Misc. Items:

- ✓ Placement inspection for dowels, rebars, threaded rods set in epoxy.
- ___ Pull test for embedded anchors to _____#.
- ✓ Placement of proprietary structural items: as recommended by manufacturer for Methacrylate sealer & Embbed Galvanic Anode System.
- ✓ Core tes on epoxy injection grouting cracks (Three 2" diameter by 6" cores per members or as directed by the project engineer).

LEGEND

- X / SX — DETAIL # / SHEET #
- X / SX — SECTION OR ELEVATION CALLOUT
- ℄ — CENTER LINE

STANDARD PLANS
DATA JULY 2002

A-10A, B — ABBREVIATIONS AND ACRYONYMS
O.C. — ON CENTER

DRAWING LIST

DRAWING #	DESCRIPTION
S1	DRAWING LIST & VICINITY MAP
S2	BRIDGE DECK PLAN
S3	EXTERIOR ELEVATIONS
S4	INTERIOR ELEVATIONS
S5	SECTIONS
S6	REPAIR DETAILS

REGISTERED PROFESSIONAL ENGINEER
VINCENT T. WU
NO. 43749
Exp. 03/31/2009
CIVIL
STATE OF CALIFORNIA

BENCH MARK	REFERENCE

NO.	REVISED	BY	APP.
–	Issued 8/10/12	VT.J	

DESIGNED W. X.
DRAWN S. W.
CHECKED V.T.W.
DATE 07-27-07
SCALE AS NOTED

BASELINE ENGINEERING
CIVIL & STRUCTURAL ENGINEERING
1504 Park Street, Suite 8
Alameda, CA 94501

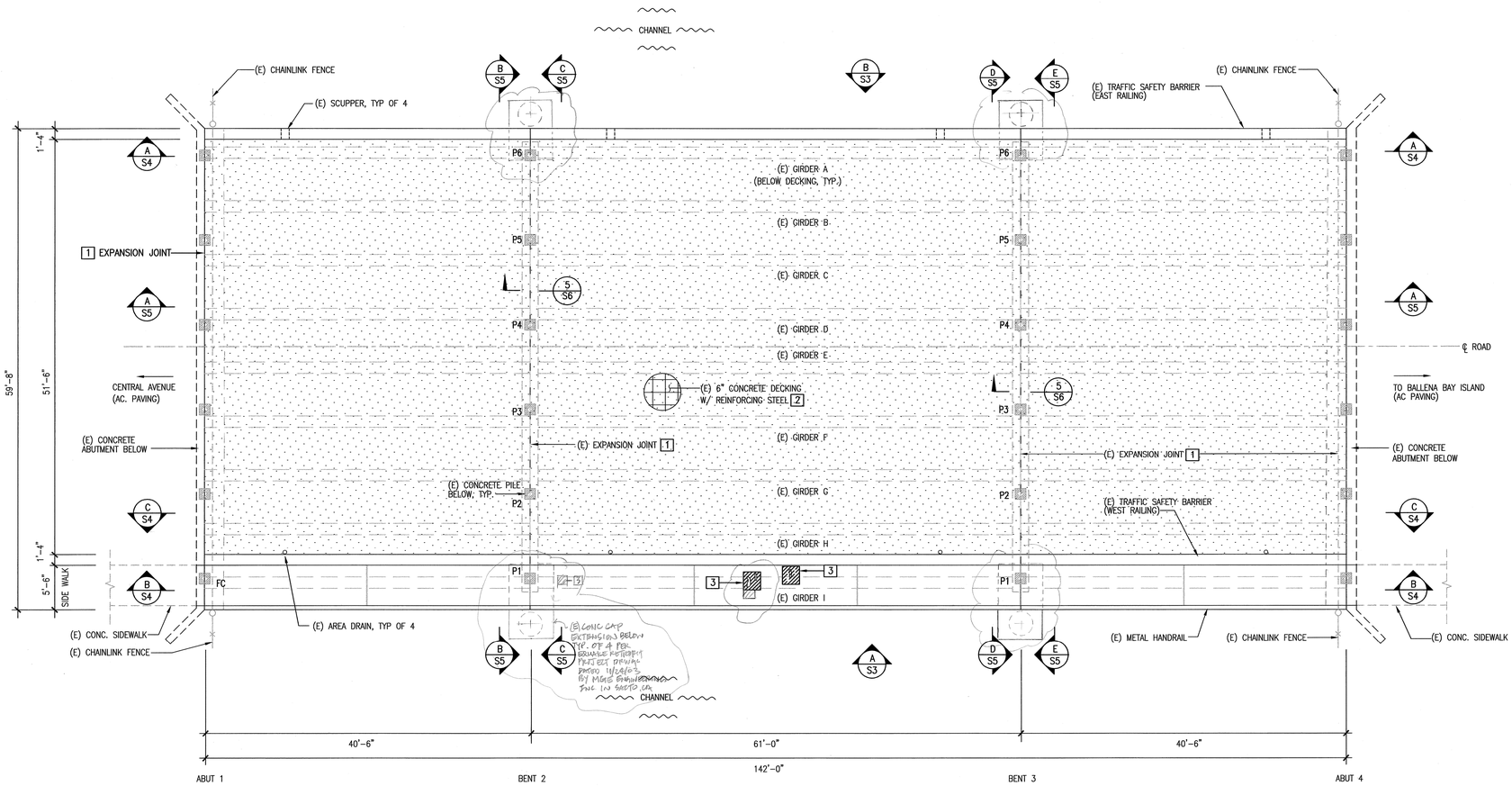
CITY OF ALAMEDA
CALIFORNIA
ENGINEERING DEPARTMENT

REPAIR & RESURFACING
BALLENA BOULEVARD
BRIDGE

APPROVED BY
CITY ENGINEER
DATE

SHEET 1 OF 6
DWG. S1
CASE –

PP 07/05/12



BRIDGE DECK PLAN

0' 8' 16' 24'

SCALE: 1/8"=1'-0"

REPAIR NOTES:

1. REMOVE (E) JOINT SEALANT, CLEAN JOINT. & INSTALL EXP. JOINT FILLER MATERIAL WITH BACKER ROD, TYPICAL. SEE DET. 5/S6
2. CLEAN (E) CONC. BRIDGE DECK AND APPLY METHACRYLATE RESIN TREATMENT. SEE DET. 1/S6
3. CHIP OUT RUTTED AREA & REPAIR WITH PATCHING MORTAR.

REGISTERED PROFESSIONAL ENGINEER
VINCENT T. WU
NO. 43749
Exp. 03/31/2009
CIVIL
STATE OF CALIFORNIA

BENCH MARK	REFERENCE

BASELINE ENGINEERING
CIVIL & STRUCTURAL ENGINEERING
1504 Park Street, Suite 8
Alameda, CA 94501

NO.	REVISED	BY	APP.
–	Robert Taylor	VTW	

DESIGNED WEI B. XIE
DRAWN STEVE WU
CHECKED VINCENT WU
DATE 07-27-07
SCALE 1/8"=1'-0"

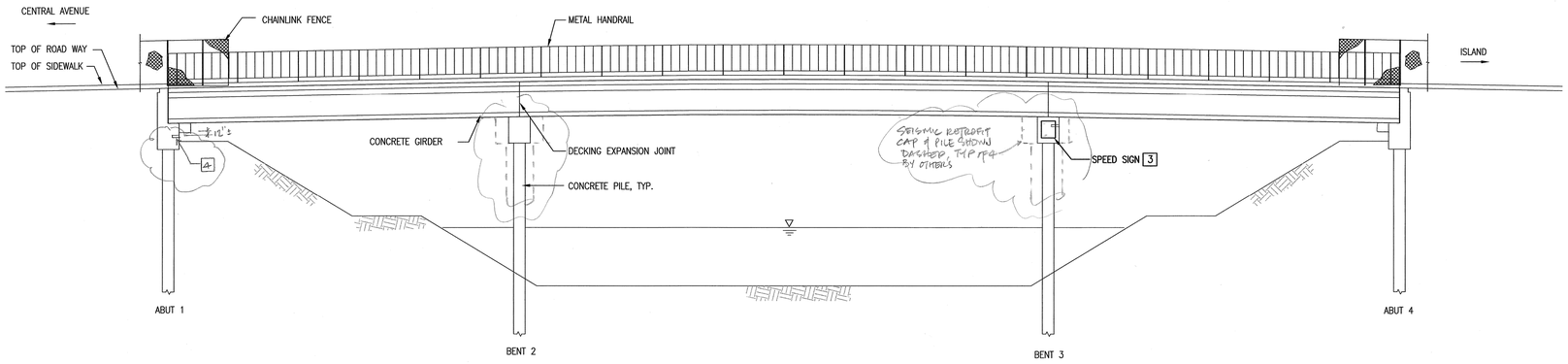
CITY OF ALAMEDA
CALIFORNIA
ENGINEERING DEPARTMENT

REPAIR & RESURFACING
BALLENA BOULEVARD
BRIDGE

APPROVED BY
CITY ENGINEER
DATE

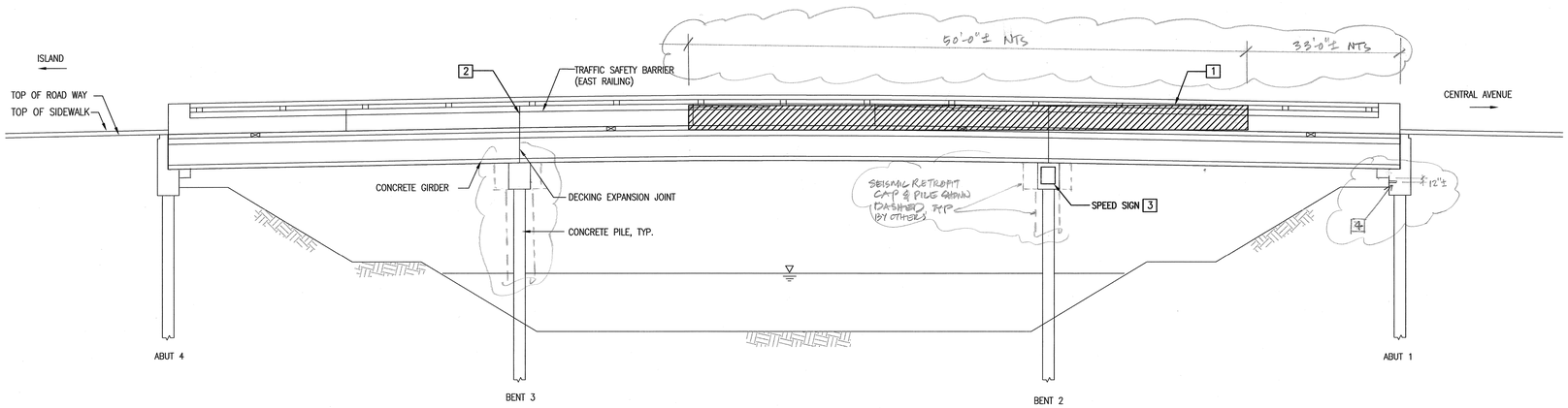
SHEET 2 OF 6
DWG. S2
CASE

P# 070312



A WEST EXTERIOR ELEVATION

SCALE: 1/8"=1'-0"



B EAST EXTERIOR ELEVATION

SCALE: 1/8"=1'-0"

REPAIR NOTES:

1. REPAIR THE TOP & EXTERIOR SIDE OF SAFETY BARRIER.
2. REMOVE (E) JOINT SEALANT, CLEAN JOINT. & INSTALL EXP. JOINT FILLER MATERIAL WITH BACKER ROD, TYP OF 6 LOCATION. SEE DET. 5/S6
3. REMOVE (E) SIGN FOR CONC. REPAIR WORK. REINSTALL SIGN AT PILE CAP AT LOCATION AS DIRECTED BY CITY.
4. INSTALL SIKA GALVAGHIELD CC 100 @ P.6'Ø.C SEE. DETAIL 6/S6 FOR CORING & PLACING INFO.

REGISTERED PROFESSIONAL ENGINEER
VINCENT T. WU
NO. 43749
Exp. 03/31/2009
CIVIL
STATE OF CALIFORNIA

BASELINE ENGINEERING
CIVIL & STRUCTURAL ENGINEERING
1504 Park Street, Suite 8
Alameda, CA 94501

BENCH MARK	REFERENCE

NO.	REVISED	BY	APP.
–	AS BUILT 8/7/08		

DESIGNED WEI B. XIE
DRAWN STEVE WU
CHECKED VINCENT WU
DATE 07-27-07
SCALE 1/8"=1'-0"

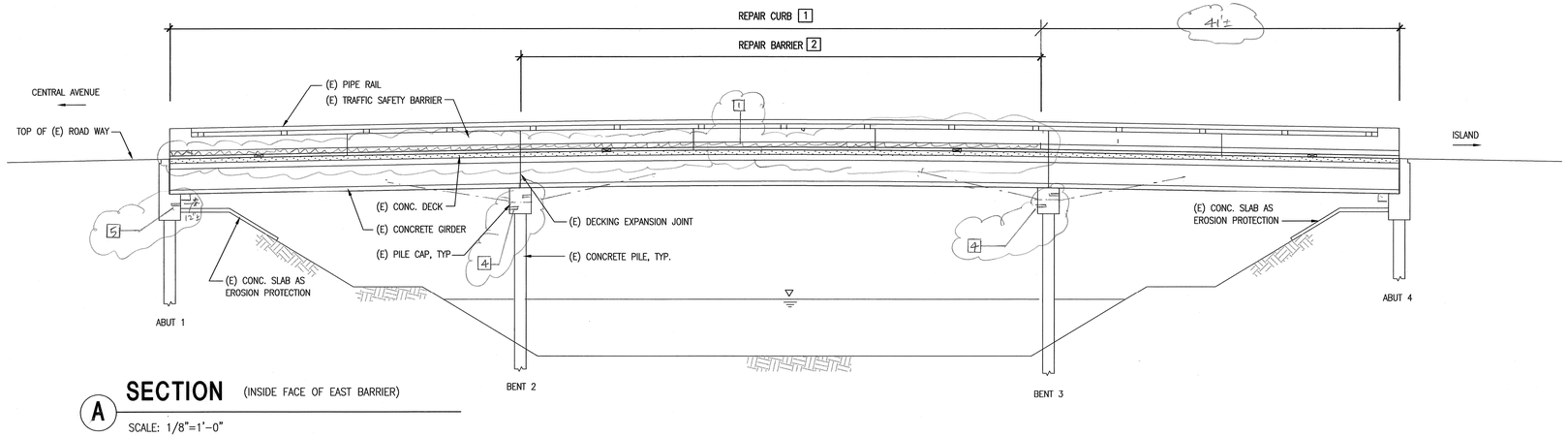
CITY OF ALAMEDA
CALIFORNIA
ENGINEERING DEPARTMENT

REPAIR & RESURFACING BALLENA BOULEVARD BRIDGE

APPROVED BY
CITY ENGINEER
DATE

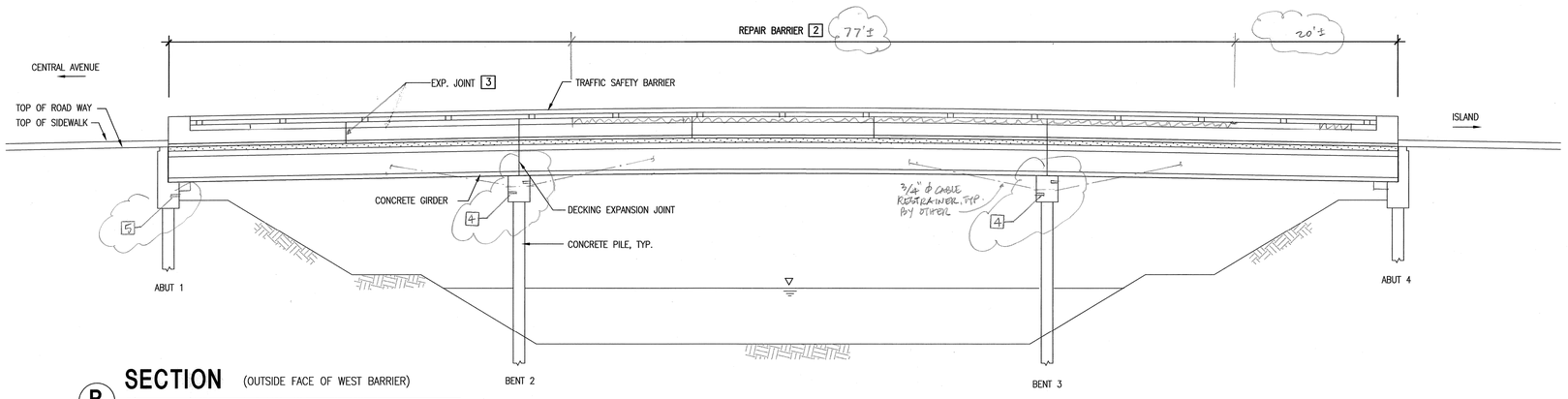
SHEET 3 OF 6
DWG. S3
CASE

PW 070512



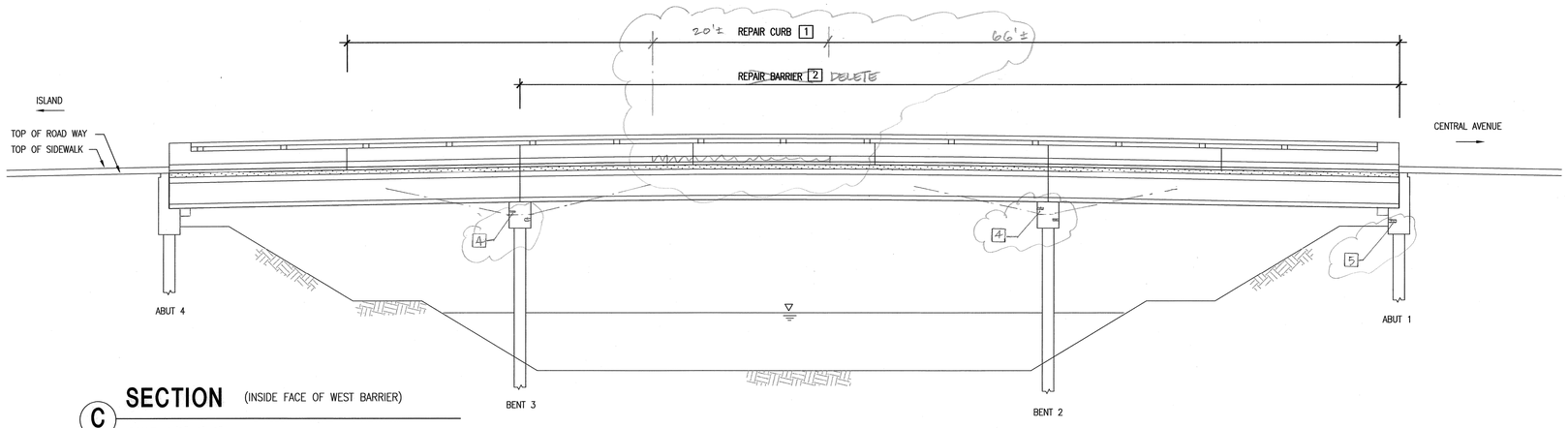
A SECTION (INSIDE FACE OF EAST BARRIER)

SCALE: 1/8"=1'-0"



B SECTION (OUTSIDE FACE OF WEST BARRIER)

SCALE: 1/8"=1'-0"



C SECTION (INSIDE FACE OF WEST BARRIER)

SCALE: 1/8"=1'-0"

REPAIR NOTES:

1. REPAIR ENTIRE INTERIOR CURB & INTERIOR OF SAFETY BARRIER. SEE DET. 2/S6
2. REPAIR ENTIRE EXTERIOR FACES OF SAFETY BARRIER. SEE DET. 2/S6
3. REMOVE (E) EXP. JOINT. CLEAN SPALL & PROVIDE (N) EXP. JOINT WITH BACKER ROD TYPICAL OF 6 LOCATIONS.
4. INSTALL GALVASHIELD CC100 ANODES PER DETAIL 4/S6.
5. PROVIDE EPOXY INJECTION SEALING CRACK APPROXIMATELY 6 LINEAL FEET @ THE WEST END OF NORTH CONCRETE ABUTMENT (ABUT 1). THEN INSTALL GALVASHIELD CC100 ANODES @ 18"OC AS CORROSION CONTROL ALONG ENTIRE NORTH CONC. ABUTMENT.

REGISTERED PROFESSIONAL ENGINEER
VINCENT T. WU
NO. 43749
Exp. 03/31/2009
CIVIL
STATE OF CALIFORNIA

BENCH MARK	REFERENCE

BASELINE ENGINEERING
CIVIL & STRUCTURAL ENGINEERING
1504 Park Street, Suite 8
Alameda, CA 94501

NO.	REVISED	BY	APP.
–	Per Bulletin #1 7/18	JTW	

DESIGNED WEI B. XIE
DRAWN STEVE WU
CHECKED VINCENT WU
DATE 07-27-07
SCALE 1/8"=1'-0"

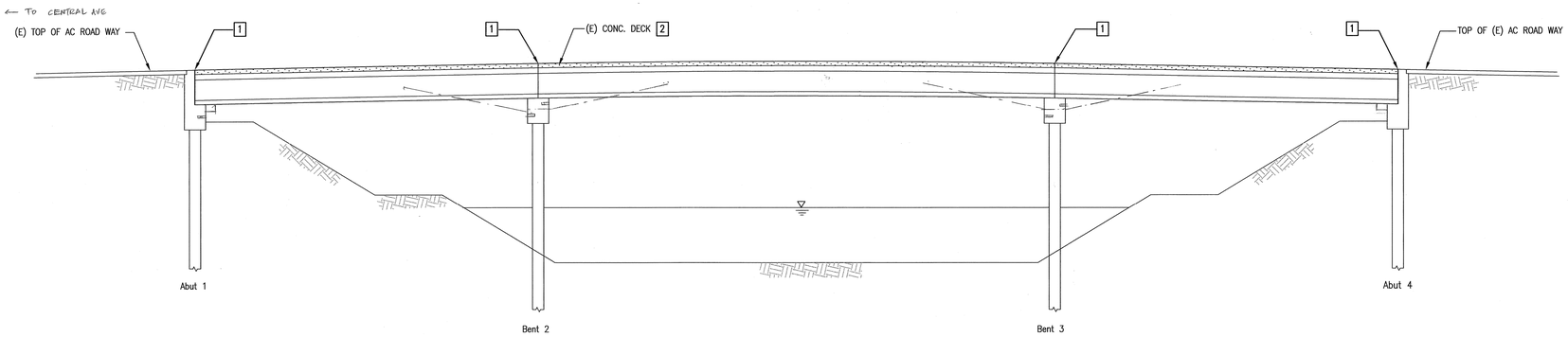
CITY OF ALAMEDA
CALIFORNIA
ENGINEERING DEPARTMENT

REPAIR & RESURFACING
BALLENA BOULEVARD
BRIDGE

APPROVED BY
CITY ENGINEER
DATE

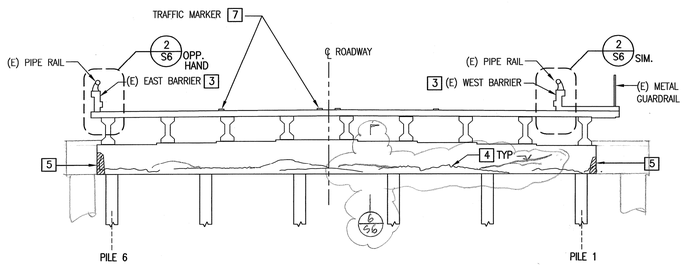
SHEET 4 OF 6
DWG. S4
CASE

P# 070312



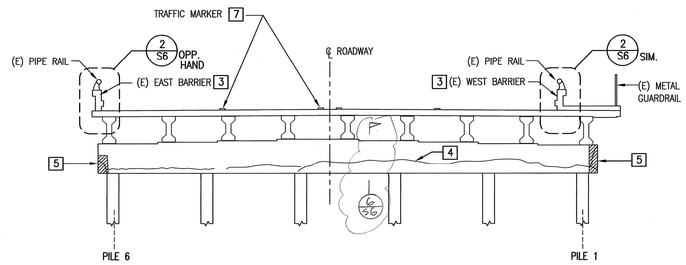
A SECTION

SCALE: 1/8"=1'-0"



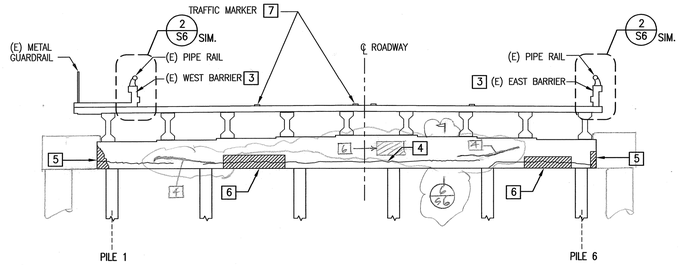
B SECTION - BENT #2 (LOOKING SOUTH)

SCALE: 1/8"=1'-0"



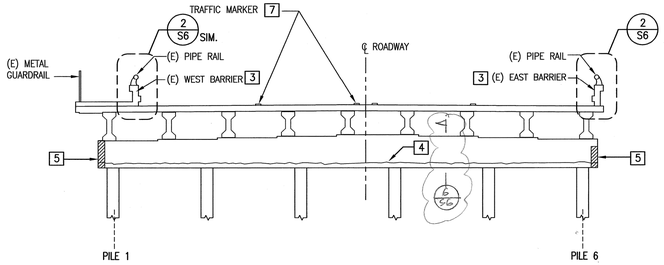
D SECTION - BENT #3 (LOOKING SOUTH)

SCALE: 1/8"=1'-0"



C SECTION - BENT #2 (LOOKING NORTH)

SCALE: 1/8"=1'-0"



E SECTION - BENT #3 (LOOKING NORTH)

SCALE: 1/8"=1'-0"

REPAIR NOTES:

1. REMOVE (E) EXP. JOINT & CLEAN JOINT. INSTALL (N) EXP. JOINT W/ BACKER ROD TYPICAL. SEE DET. 2/S6
2. CLEAN (E) CONC. BRIDGE DECK AND APPLY METHACRYLATE RESIN TREATMENT. SEE DET. 1/S6
3. REPAIR CURB & BARRIER SEE DET. 2/S6
4. REPAIR CRACKS BY EPOXY INJECTION GROUTING IN ENTIRE (E) PILE CAP SEE DET. 3/S6 & INSTALL 6"ø GALVASHIELD CCLOP. SEE DETAIL 6/S6
5. REPAIR CRACKED CONC. CAP @ END OF PILE CAP. SEE DET. 4/S6
6. CHIP OUT CRACKED & LOOSE CONCRETE FOR REPAIR. SEE DET. 3/S6
7. INSTALL (N) TRAFFIC MARKERS & STRIPING TO MATCH (E).

REGISTERED PROFESSIONAL ENGINEER
VINCENT T. WU
NO. 43749
Exp. 03/31/2009
CIVIL
STATE OF CALIFORNIA

BASELINE ENGINEERING
CIVIL & STRUCTURAL ENGINEERING
1504 Park Street, Suite 8
Alameda, CA 94501

BENCH MARK	REFERENCE

NO.	REVISED	BY	APP.
–	AS-BUILT 8/7/08	VTW	

DESIGNED WEI B. XIE
DRAWN STEVE WU
CHECKED VINCENT WU
DATE 07-27-07
SCALE 1/8"=1'-0"

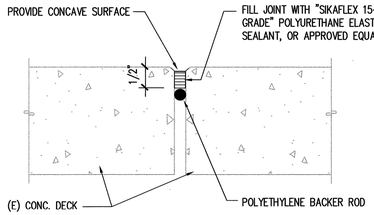
CITY OF ALAMEDA
CALIFORNIA
ENGINEERING DEPARTMENT

REPAIR & RESURFACING BALLENA BOULEVARD BRIDGE

APPROVED BY
CITY ENGINEER
DATE

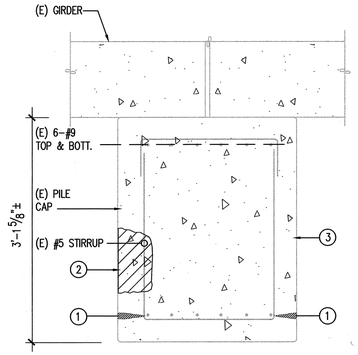
SHEET 5 OF 6
DWG. S5
CASE

FY 07/08 12



5 DETAIL JOINT REPAIR

1"=1'-0"

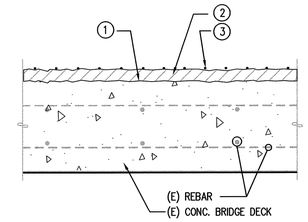


REPAIR ITEMS:

1. REMOVE LOOSE CONCRETE, CLEAN CRACK LINE & REPAIR CRACKS WITH WIDTH EXCEEDING 0.015" WITH EPOXY INJECTION. ALL GROUT PORTS TO BE REMOVED & SEALED FLUSH WITH CONC. SURFACE. INSPECTION HOLES SHALL BE PLUGGED W/ NON-SHRINK GROUT.
2. CHIP TO REMOVE (E) LOOSE & DETERIORATING CONCRETE BEYOND CRACK LINE TO EXPOSE SOUND CONCRETE
   BRUSH CLEAN (E) REBARS AND APPLY BONDING AGENT & REINFORCEMENT PROTECTION COATING.
   FORM & REPAIR AREA WITH PATCHING REPAIR MORTAR.
3. (BID ADDITION #1): PRESSURE WASH & CLEAN SURFACE AND APPLY CORROSION INHIBITING IMPREGNATION COATING AT ENTIRE UNDERSIDE OF BRIDGE DECK & PILE CAPS. INCLUDED

3 DETAIL PILE CAP CRACK REPAIR

1"=1'-0"

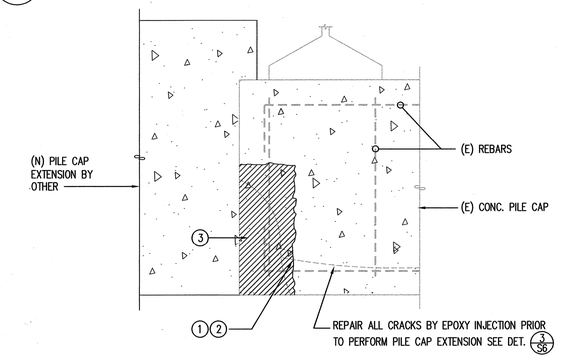


REPAIR ITEM:

1. STEEL SHOT BLAST & CLEAN (E) CONC. SURFACE.
2. APPLY METHACRYLATE RESIN TREATMENT
3. BROADCAST SAND TO ACHIEVE A COEFFICIENT OF FRICTION OF 0.35 AT THE BRIDGE DECK.

1 DETAIL DECK TREATMENT

1"=1'-0"

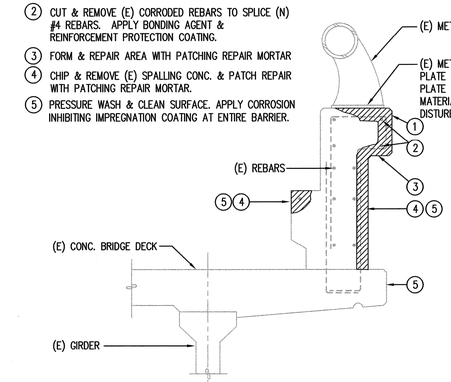


REPAIR ITEMS:

1. CHIP TO REMOVE (E) LOOSE & DETERIORATING CONCRETE BEYOND CRACK LINE TO EXPOSE SOUND CONCRETE
2. BRUSH CLEAN (E) REBARS AND APPLY BONDING AGENT & REINFORCEMENT PROTECTION COATING.
3. FORM & REPAIR AREA WITH PATCHING REPAIR MORTAR.

4 DETAIL NOT IN CONTRACT

1"=1'-0"

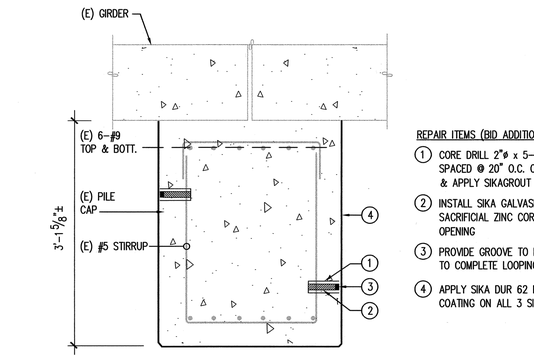


REPAIR ITEMS:

1. CHIP & REMOVE (E) SPALLING & LOOSE CONC. TO EXPOSE SOUND CONC.
2. CUT & REMOVE (E) CORRODED REBARS TO SPLICE (N) #4 REBARS. APPLY BONDING AGENT & REINFORCEMENT PROTECTION COATING.
3. FORM & REPAIR AREA WITH PATCHING REPAIR MORTAR
4. CHIP & REMOVE (E) SPALLING CONC. & PATCH REPAIR WITH PATCHING REPAIR MORTAR.
5. PRESSURE WASH & CLEAN SURFACE. APPLY CORROSION INHIBITING IMPREGNATION COATING AT ENTIRE BARRIER.

2 DETAIL SAFETY BERRIER REPAIR

1"=1'-0"

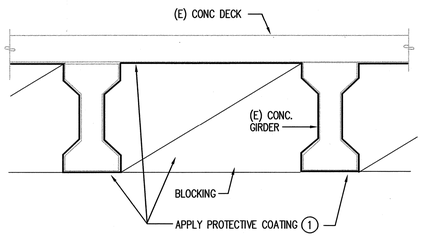


REPAIR ITEMS (BID ADDITION #2): INCLUDED

1. CORE DRILL 2"ø x 5-1/8" HOLES SPACED @ 20" O.C. CLEAN SURFACE & APPLY SIKAGROUT 212
2. INSTALL SIKA GALVASHIELD CC 100 SACRIFICIAL ZINC CORE & SEAL OPENING
3. PROVIDE GROOVE TO EMBED CABLE TO COMPLETE LOOPING OF SYSTEM
4. APPLY SIKA DUR 62 LO MOD PROTECTIVE COATING ON ALL 3 SIDES

6 DETAIL PILE CAP - EMBEDDED GALVANIC ANODE FOR CORROSION CONTROL

1"=1'-0"



REPAIR ITEMS (BID ADDITION #1): INCLUDED

1. PRESSURE CLEAN SURFACE OF (E) CONC. AND APPLY PENETRATING CORROSION INHIBITING IMPREGNATIONG COATING ON THE UNDERSIDE OF CONC. BRIDGE DECK, GIRDERS, BLOCKING AND PILE CAPS.

7 DETAIL GIRDER TREATMENT

NOT TO SCALE

REGISTERED PROFESSIONAL ENGINEER
VINCENT T. WU
NO. 43749
Exp. 03/31/2009
CIVIL
STATE OF CALIFORNIA

BASELINE ENGINEERING
CIVIL & STRUCTURAL ENGINEERING
1504 Park Street, Suite 8
Alameda, CA 94501

BENCH MARK	REFERENCE

NO.	REVISED	BY	APP.
-	AS-built 8/7/08		

DESIGNED WEI B. XIE
DRAWN STEVE WU
CHECKED VINCENT WU
DATE 07-27-07
SCALE AS SHOWN

CITY OF ALAMEDA
CALIFORNIA
ENGINEERING DEPARTMENT

REPAIR & RESURFACING BALLENA BOULEVARD BRIDGE

APPROVED BY
CITY ENGINEER
DATE

SHEET 6 OF 6
DWG. S6
CASE

P# 07031/2

Photos 1 & 2: Cola Ballena Bridge Abutment Penetration (south side)

Photo 3: Cola Ballena Bridge – Force Main Under Bridge

Photo 4: Cola Ballena Bridge – Force Main Under Bridge

Photo 5: Cola Ballena Bridge – Access, Southeast side of Bridge

Photo 6: Cola Ballena Bridge – Access, Southeast side of Bridge

CITY OF ALAMEDA
ALAMEDA COUNTY, CALIFORNIA

TECHNICAL PROVISIONS
FOR THE
CONSTRUCTION OF

CITY OF ALAMEDA
GROUP 4 – SEWERAGE PUMP STATION RENOVATIONS FOR RELIABILITY AND SAFETY IMPROVEMENTS

PROJECT NO. P.W. 08-17-37

NOVEMBER 27, 2019

SECTION 01005
CERTIFICATION

THE FOLLOWING SECTIONS:

Division 16

OF THESE TECHNICAL PROVISIONS WERE PREPARED UNDER THE SUPERVISION OF:

Julio C. Herdocia, P.E.
California Registered Electrical Engineer No. E9580
Expiration 9/30/20

MTH Engineers, Inc.
3350 Scott Boulevard # 11
Santa Clara, CA 95054
(408) 986-8558

11/25/19

THE FOLLOWING SECTIONS:

Divisions 1, 2, 3, 5, 8, 9, 11, and 15.

OF THESE TECHNICAL PROVISIONS WERE PREPARED UNDER THE SUPERVISION OF:

Benjamin L. Shick, P.E.
California Registered Civil Engineer No. 68813
Expiration 9/30/21

Schaaf & Wheeler, Consulting Civil Engineers
1171 Homestead Rd, Suite 255
Santa Clara, CA 95050
(408) 246-4848

DIVISION 1 - GENERAL REQUIREMENTS

DIVISION 2 - SITE CONSTRUCTION

DIVISION 3 - CONCRETE

DIVISION 5 - METALS

DIVISION 8 - OPENINGS

DIVISION 9 - FINISHES

DIVISION 11 - EQUIPMENT

DIVISION 15 – MECHANICAL SYSTEMS

DIVISION 16 - ELECTRICAL

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 01110
SUMMARY OF WORK

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: Identification and summary description of the Project, the Work, location, City furnished products, activities by others and coordination.

1.02 THE PROJECT

A. The project consists of removing and replacing equipment, rehabilitating existing wetwells, construction of new wetwells, construction of new manholes, construction of new valve vaults, installing new equipment, and replacing force and gravity mains at seven (7) sewage lift stations. Equipment to be replaced and installed includes pumps, piping, valves, electrical equipment, generators, and other items shown to be constructed on the contract drawings or specifications, including repair, and reconstruction of existing improvements affected by the Work, and incidentals for complete and usable facility.

B. The work to be done under this Contract includes the furnishing of all project management, labor, materials, tools, equipment and services necessary for and incidental to the construction of the Project as noted on the Plans and in the Specifications and all other Contract Documents including the General Conditions and General Requirements.

1.03 LOCATION OF PROJECT

A. The Work is located at various locations in Alameda, California.

1.04 CITY FURNISHED EQUIPMENT

A. City will not furnish any specific equipment.

1.05 ACTIVITIES BY OTHERS

A. City, utilities, and others may perform activities within Project area while the Work is in progress.

1. Schedule the Work with City, utilities, and others to minimize mutual interference.

1.06 COORDINATION OF WORK

A. Maintain overall coordination of the Work.

B. Obtain construction schedules from each subcontractor, and require each subcontractor to maintain schedules and coordinate modifications.

1.07 PROJECT IDENTIFICATION

A. General:

1. The Project Name is “City of Alameda Group 4 Sewerage Pump Station Renovations for Reliability and Safety Improvements, PW 08-17-37.”
2. Contract Documents have been prepared by the City of Alameda Public Works Department.
3. The extent of Contracted Work is indicated on the Plans and Specifications.

1.08 SUMMARY OF REFERENCES

A. Contracted Work can be summarized by references to the Proposal and Contract Requirements, General Conditions, Special Provisions, sections in the Technical Specifications, Plans, Addenda, Notice to Bidders and Modifications to the Contract Documents.

B. It is recognized that the Contracted Work may also be unavoidably affected or influenced by other governing codes and regulations, natural phenomenon, including weather conditions and other forces outside the Contract Documents.

1.09 PLANS AND SPECIFICATIONS

A. As shown on the Plans and/or described in the Specifications, each element of the Work must be furnished complete, finished and functional. Whether shown or not, include all materials and ancillary equipment necessary to provide a complete installation. The Plans, Specifications and other Contract Documents are intended to be complementary and cooperative to describe and provide for a complete project. Anything in the Specifications and not on the Plans, or on the Plans and not in the Specifications, shall be as though shown or mentioned in both. Details shown for an item of Work are typical and shall apply to similar items of Work.

B. Do not deviate from the Plans and Specifications without written authorization from the Engineer.

C. The Engineer does not warrant the accuracy of scaled dimensions. Dimensions indicated by figures or numerals shall govern. Larger scale drawings shall take precedence over smaller scale drawings.

D. References made to other specifications and codes refer to the edition including amendments in effect and published at the time of advertising the project, unless specifically referred to by edition, volume, or date as noted in the Contract Documents.

1.10 PRECEDENCE OF CONTRACT DOCUMENTS

A. Supplemental Agreements, Change Orders, Engineer's written interpretations and clarifications, and Addenda, will take precedence over all other components of the Contract Documents. Shown dimensions take precedence over scaled dimensions. Detailed drawings will take precedence over general drawings.

1.11 GROUND BREAKING CEREMONY

A. Not required.

1.12 OCCUPANCY OF PORTIONS OF WORK

A. Through City contacts, Contractor shall coordinate work with the neighboring property owners to minimize disruption to their operations.

B. Certificates of Substantial Completion will be executed for each designated portion of Work prior to City occupancy including specified testing, training of City's personnel, and other preparations necessary for City's occupancy or use of the facility.

C. Certificates of Substantial Completion will be executed for each designated portion of Work completed prior to City occupancy.

1. Such certificate of Substantial Completion will describe the portion of the Work to be occupied by City, items that may be incomplete or defective, date of occupancy by City, and other information required by City and Contractor.

D. After City occupancy, allow access for City's personnel, access for others authorized by City, and City operation of equipment and systems.

E. Following Occupancy, City will:

1. Provide power to operate equipment and systems.

2. Repair damage caused by City's occupancy.

F. Prior to such occupancy or use, enter into agreement with City indicating work that remains to be performed in occupied areas.

G. When City's use of occupied facilities reveal defective work, correct defects.

H. No partial acceptance of the Work will be made and no acceptance other than the final acceptance of the completed Work will be made except for those portions of Work designated for early occupancy by City.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01125
MEASUREMENT AND PAYMENT

PART 1 GENERAL

1.01 MEASUREMENT OF QUANTITIES

A. Measurements of the completed work shall be in accordance with, and by instruments and devices calibrated to United States Standard Measures and the units of measurement for payment, and the limits thereof, shall be made as shown on the Plans, Specifications, General Requirements, and Supplementary Conditions.

B. Payment for the various items of the Bid Schedule, as further described herein, shall include all compensation to be received by the Contractor for furnishing all tools, equipment, supplies and manufactured items and for all operations, and incidental appurtenances to the items of work being described, as necessary to complete the various items of work all in accordance with the requirements of the Contract Documents. Payment for the various items of the Bid Schedule shall include all costs of permits, business licenses, and the cost of compliance with the regulations of public agencies having jurisdiction, including the Department of Public Health, Safety and Health Requirements of the California Division of Industrial Safety and the Occupational Safety and Health Administration of the U.S. Department of Labor (OSHA). The City of Alameda Building Permit has been applied for and paid for, the Contractor is responsible for obtaining the permit and adhering to all requirements. No separate payment will be made for any item that is not specifically set forth in the Bid Schedule, and all costs therefore shall be included in the prices named in the Bid Schedule for various appurtenant items of work.

1.02 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.

B. 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 City's Representative, on a completely automated weighing and recording system. The Contractor shall furnish the City's Representative with duplicate licensed weighmaster's certificates showing the actual net weights. The City will accept the certificates as evidence of the weights delivered.

1.03 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 City's Representative 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 City's Representative; 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.

1.04 DESCRIPTION OF BID ITEMS

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. Each bid item shall include all work necessary to prepare, implement, and maintain a traffic control plan for that portion of work. Each bid item shall also include all work to prepare and implement a Storm Water Pollution Control Plan

(WPCP) and the requisite construction Best Management Practices (BMPs) to prevent the illegal discharge of pollutants to San Francisco Bay.

D. Bid Item Descriptions

1. Mobilization and Demobilization

The lump sum bid price for this item shall constitute full compensation for preparatory work and operations, including but not limited to, those necessary for the movement of personnel, equipment, supplies, and incidentals to the project sites; for the establishment of all temporary fencing and other facilities necessary for work on the Project; and for all other work and operations which must be performed or costs incurred prior to beginning work on the various contract items.

This bid item also includes demobilization at the completion of work. The City will reserve ten percent of this bid item for payment upon the completion of the work and full demobilization from the site.

2. Catalina Temporary Facilities and Bypass Pumping

The lump sum price bid for this item shall constitute full compensation for all temporary facilities during the construction of the Catalina Pump Station improvements. Temporary facilities include, but are not limited to; power supply and energy costs during construction, water/sanitary facilities, construction fencing, WPCP and BMPs, implement and maintain a pedestrian and traffic control plan, and other items as necessary to complete the project as identified within these specifications and on the Contract Drawings.

This bid item includes all work, equipment, and materials necessary for installing, operating, and maintaining a bypass pumping system for the Catalina Pump Station as required by these Specifications and the Contract Drawings.

3. Catalina Demolition and Abandonment

The lump sum price bid for this item shall constitute full compensation for all work, equipment, and materials necessary for abandoning, demolishing, removing, and disposing of equipment and materials at the Catalina Pump Station. Items include, but are not limited to; access hatches, vents, hose bib, electric pull box, pump station equipment, stairs, ladders, plugging openings, removing portions of the existing concrete structure, vegetation, tree removal, and all other items as identified in the Contract Drawings and these Specifications.

This bid item includes backfilling the existing structures with lightweight engineered fill as shown on the plans and specified herein. This bid item also includes all necessary work, equipment, and materials necessary for abandoning, demolishing, removing, and disposing of the existing force main as shown on the plans and specified herein.

4. Catalina Convert Pumps to Rail-Mounted Submersible and Accessories

This bid item includes all work, materials, and equipment required to convert the existing pumps to rail-mounted submersible sewage pumps. This includes, but is not limited to; pump discharge elbows, lifting chains,

guide rails and mounts, power cables and other items necessary to provide a functioning pump installation. Payment for this bid item shall be on a per pump basis.

5. Catalina Discharge Piping, Fittings, and Valves

   This bid item includes all material, labor, and equipment required to furnish and install all elbows, pipe spools, fittings, valves, couplings, bypass pumping connection, and accessories necessary to provide a complete and functional pump discharge in conformance with the requirements of these Specifications and the Contract Drawings. This bid item includes all work necessary to construct the piping system from the pumps to the connection with the existing force main. This bid item includes all necessary clearing, grubbing, excavation, bedding, backfill, pipe penetrations, manhole/vault connections, surface replacement, and other items necessary for the construction of the discharge piping system. Payment for this bid item shall be on a lump sum basis.

6. Catalina Shoring of Open Excavation

   The lump sum bid price for this item shall constitute full compensation for the cost of furnishing, installing, maintaining, protecting, and removing shoring for the protection of life and limb in trenches and open excavations at the Catalina Pump Station, which shall conform to applicable safety orders.

7. Catalina Valve Vault

   This bid item includes all necessary labor, materials, and equipment to furnish and install a precast concrete valve vault, access hatch, and pipe penetrations conforming to the requirements of these Specifications and the Contract Drawings. This bid item includes all necessary clearing, grubbing, excavation, bedding, backfill, drain system, and other items necessary for the construction of the valve vault. Payment for this bid item shall be on a lump sum basis.

8. Catalina New Wetwell

   This bid item includes all necessary materials, equipment, and labor necessary to furnish and install a precast concrete wetwell, top slab, access hatch, concrete pump pad, chamfers, and accessories as indicated on the Contract drawings. This bid item includes preparation of the existing structure. Payment for this item shall be paid on a lump sum basis.

9. Catalina Existing Wetwell Modifications

   The lump sum price bid for this item shall constitute full compensation for modifying the existing wetwell at the Catalina Pump Station to convert it to a flow through structure as identified in the Contract Drawings and these Specifications. This Bid item includes modifying the invert of the existing wetwell structure, new concrete walls, new pipe penetrations, new access hatch, new piping to connect the existing wetwell to the new wetwell as identified on the Drawings.

10. Catalina Existing Wetwell Coating

This bid item includes all work necessary to install a coating system on the interior surfaces of the existing wetwell in accordance with these specifications. This bid item includes all necessary surface cleaning, blasting, preparation, coating, and testing measures as necessary to install a complete coating system. Payment for this bid item will be on a lump sum basis.

11. Catalina Concrete Work

This bid item includes all necessary labor, materials, and equipment to furnish and install cast-in-place concrete pads surrounding the new wetwell and valve vault conforming to the requirements of these Specifications and the Contract Drawings. This bid item includes all necessary clearing, grubbing, excavation, bedding, backfill, and other items necessary for construction of cast-in-place concrete. Payment for this bid item shall be on a lump sum basis.

12. Catalina Electrical Modifications, Wiring, and Sensors

This bid item includes all materials, equipment, and labor necessary to modify and replace existing electrical wiring and sensors as required to provide a fully functioning electrical system conforming to the Contract Documents. Work includes, but is not limited to, supply and installation of conduits and conductors; supply, installation and calibration of sensors and electrical devices; wiring, stilling well and mounting of level sensors; pull boxes; and any additional work required to provide a fully functional system. This bid item also includes all necessary excavation, bedding, backfill, AC pavement replacement, and other items as necessary to construct the improvements. Payment for this bid item shall be on a lump sum basis.

13. Catalina Site Restoration and Cleanup

The lump sum bid price for this item constitutes full payment for all materials, equipment, and labor necessary for the reconstruction of curbs, gutters, sidewalks, irrigation, landscaping, and other improvements damaged or modified during construction and to leave the project site in a clean and fully usable condition upon job acceptance by the City. This bid item includes all other items as indicated on the Contract Drawings and as necessary for construction of the improvements.

14. Cola Ballena Temporary Facilities and Bypass Pumping

The lump sum price bid for this item shall constitute full compensation for all temporary facilities during the construction of the Cola Ballena Pump Station, gravity sewer main, and discharge. Temporary facilities include, but are not limited to; power supply and energy costs during construction, water/sanitary facilities, construction fencing, WPCP and BMPs, implement and maintain a pedestrian and traffic control plan, and other items as necessary to complete the project as identified within these specifications and on the Contract Drawings.

This bid item also includes vibration and settlement monitoring during construction activities that produce significant vibration.

This bid item includes all work, equipment, and materials necessary for installing, operating, and maintaining a bypass pumping system for the Cola Ballena Pump Station and force main as required by these Specifications and the Contract Drawings.

15. Cola Ballena Demolition and Abandonment

The lump sum price bid for this item shall constitute full compensation for all work, equipment, and materials necessary for abandoning, demolishing, removing, and disposing of equipment and materials from the Cola Ballena Pump Station. These items include, but are not limited to; access hatches, irrigation box and lines, vents, hose bib, electrical cabinets, concrete pads, concrete driveway, sidewalks, curbs & gutters, pump station equipment, removal of portions of the existing concrete pump station structure, pipe supports under the existing bridge, tree removal, vegetation, SCADA pole and all other items as identified in the Contract Drawings and these Specifications.

This bid item includes all necessary materials, equipment, and labor to remove or abandon the existing sanitary force main. This price includes removal or abandonment of existing pipe as necessary for construction. Abandonment includes plugging pipe ends concrete, and filling pipe with Controlled Low Strength Material or sand.

This bid item includes backfilling the existing structures with lightweight engineered fill as shown on the plans and specified herein. This bid item also includes all necessary work, equipment, and materials necessary for abandoning, demolishing, removing, and disposing of the existing force main as shown on the plans and specified herein.

16. Cola Ballena Shoring of Open Excavation

The lump sum bid price for this item shall constitute full compensation for the cost of furnishing, installing, maintaining, protecting, and removing shoring for the protection of life and limb in trenches and open excavations at the Cola Ballena Pump Station, which shall conform to applicable safety orders. See Section 02260 for Shoring requirements and restrictions.

17. Cola Ballena Submersible Pump and Accessories

This bid item includes all work, materials, and equipment required to furnish and install rail-mounted submersible sewage pumps, pump discharge elbows, lifting chains, guide rails and mounts, power cables and other items necessary to provide a functioning pump installation. Payment for this bid item shall be on a per pump basis.

18. Cola Ballena Discharge Piping, Fittings, and Valves

This bid item includes all material, labor, and equipment required to furnish and install all elbows, bypass pumping connections, pipe spools, fittings, valves, valve cans, couplings, and accessories necessary to provide a complete and functional pump discharge in conformance with the requirements of these Specifications and the Contract Drawings. This bid item includes all necessary clearing, grubbing, excavation, bedding, backfill, pipe penetrations, wetwell connections, and other items necessary

for the construction of the discharge piping system. Payment for this bid item shall be on a lump sum basis.

19. Cola Ballena Existing Wetwell Modifications

    The lump sum price bid for this item shall constitute full compensation for all work, equipment, and materials necessary for modifying the existing wetwell structure as identified on the Plans and specified herein. This bid item includes, but is not limited to, filling existing wetwell, forming a new flow through channel, access hatch, pipe penetrations, and new piping to connect the existing wetwell to the new wetwell. This Bid item includes necessary excavation, backfill, and compaction in accordance with these Specifications.

20. Cola Ballena Existing Wetwell Coating

    This bid item includes all work necessary to install a coating system on the interior surfaces of the existing wetwell in accordance with these specifications. This bid item includes all necessary surface cleaning, blasting, preparation, coating, and testing measures as necessary to install a complete coating system. Payment for this bid item will be on a lump sum basis.

21. Cola Ballena New Wetwell

    This bid item includes all necessary materials, equipment, and labor necessary to furnish and install a precast concrete wetwell, top slab, access hatch, chamfers, and accessories as indicated on the Contract drawings. This bid item includes excavation, dewatering, subgrade preparation, backfill, compaction, and other items as necessary to construct the new wetwell. This bid item also includes all work necessary to install a coating system on the interior surfaces of the new wetwell in accordance with these specifications. This bid item includes all necessary surface cleaning, blasting, preparation, coating, and testing measures as necessary to install a complete coating system. Payment for this item shall be paid on a lump sum basis.

22. Cola Ballena Generator

    The lump sum price bid for this item shall constitute full compensation for all labor, materials, and equipment necessary to furnish and install a fully functional emergency generator set and fuel tank. Work includes, but is not limited to; fuel tank, fuel, generator, and associated wiring, incidentals, anchorage, anchorage design, and accessories. Payment for this item shall also include.

23. Cola Ballena Electrical Control Panel

    This bid item includes all labor, materials, and equipment necessary to furnish and install a fully functional electrical control panel at the Cola Ballena Pump Station conforming to the requirements of these specifications and the Contract Drawings. Payment for this bid item shall be on a lump sum basis.

24. Cola Ballena Service Pedestal

    This bid item includes all labor, materials, and equipment necessary to furnish and install a fully functional electrical service and pedestal at the Cola Ballena Pump Station conforming to the requirements of these specifications and the Contract Drawings. This bid item includes all labor, materials, and equipment necessary to coordinate with the electrical utility and construct the improvements from the point of service connection to the service pedestal. This bid item also includes all necessary excavation, bedding, backfill, surface restoration, and sidewalk replacement as necessary to construct the electrical service and pedestal. Payment for this bid item shall be on a lump sum basis.

25. Cola Ballena SCADA Pole

    This bid item includes all labor, materials, and equipment necessary to furnish and install a SCADA pole, concrete foundation, cables, conduits, grounding equipment, connection of existing antenna, and miscellaneous accessories conforming to the requirements of these specifications and the Contract Drawings. Payment for this bid item shall be on a lump sum basis.

26. Cola Ballena Site Light

    This bid item includes all labor, materials, and equipment necessary to furnish and install a light pole, concrete foundation, fixture, wires, conduits, and miscellaneous accessories conforming to the requirements of these specifications and the Contract Drawings. Payment for this bid item shall be on a lump sum basis.

27. Cola Ballena Maintenance Cabinet

    This bid item includes all labor, materials, and equipment necessary to furnish and install a maintenance cabinet conforming to the requirements of these specifications and the Contract Drawings. This bid item also includes a fire extinguisher and associated mounting as indicated on the Contract Drawings. Payment for this bid item shall be on a lump sum basis.

28. Cola Ballena New 6-inch Force Main Aerial Bridge Crossing

    The unit price bid per linear foot for this bid item shall constitute full compensation for all material, labor, equipment, tools, and services necessary to install the Cola Ballena force main below the existing bridge as indicated on the Contract drawings and specified herein. This bid item includes all necessary temporary facilities for accessing and installing the new force main.

29. Cola Ballena Force Main Bridge Pipe Support

    This bid item includes all necessary materials, equipment, and labor necessary to furnish and install bridge pipe supports for the force main as indicated on the Contract drawings and specified herein. This bid item includes all necessary temporary facilities for accessing and installing the new force main pipe supports. Payment for this bid item shall be on a per support basis.

30. Cola Ballena Force Main Flex-Tend Fittings

    This bid item includes all necessary materials, equipment, and labor necessary to furnish and install Forced Balanced Flex-Tend fittings for the force main as indicated on the Contract drawings and specified herein. This bid item includes fittings, connections, excavation, subgrade preparation, backfill, compaction, and other items as necessary to construct the Flex-Tend fitting. Payment for this bid item shall be on a per fitting basis.

31. Cola Ballena New 6-inch Force Main

    The unit price bid per linear foot for this bid item shall constitute full compensation for all material, labor, equipment, tools, and services necessary to install the Cola Ballena force main from the bypass pumping connection to the connection at the aerial bridge, and from the aerial bridge to the connection of the existing Tideway force main as indicated on the Contract drawings and specified herein. This bid item includes excavation, subgrade preparation, backfill, compaction, AC pavement replacement, tracer wire, warning tape, tracer wire boxes, curb & gutter replacement, survey monument replacement, and other items as necessary to construct the force main. This bid item also includes potholing of the existing utilities prior to construction as indicated on the plans.

32. Cola Ballena Force Main Connection with Tideway Force Main

    This bid item includes all labor, materials, and equipment necessary to furnish and install a gate valve and flange coupling to connect the new force main to the existing Tideway force main in conformance with the requirements of these specifications and the Contract Drawings. This bid item also includes coordination and temporary facilities necessary for temporarily shutting down the Tideway pump station as necessary to complete the work. Payment for this bid item shall be on a lump sum basis.

33. Cola Ballena Concrete Work

    This bid item includes all necessary labor, materials, and equipment to furnish and install cast-in-place concrete access pads and equipment pads conforming to the requirements of these Specifications and the Contract Drawings. This bid item also includes all necessary labor, materials, and equipment to furnish and install a concrete driveway approach, sidewalk, driveway, generator pad, control panel pad, service pedestal pad, maintenance cabinet pad, and all other concrete work necessary to complete the work. This bid item includes all necessary clearing, grubbing, excavation, bedding, backfill, and other items necessary for construction of cast-in-place concrete. Payment for this bid item shall be on a lump sum basis.

34. Cola Ballena Miscellaneous Electrical Work, Wiring, and Sensors

    This bid item includes all materials, equipment, and labor necessary to furnish and install all miscellaneous items required to provide a fully functioning electrical system conforming to the Contract Documents. Work includes, but is not limited to, supply and installation of conduits and

conductors, pull boxes, supply, installation and calibration of sensors and electrical devices, wiring, stilling well and mounting of level sensors, and any additional work required to provide a fully functional system. This bid item also includes all necessary excavation, bedding, backfill, and other items as necessary to construct the improvements. Payment for this bid item shall be on a lump sum basis.

35. Cola Ballena Site Restoration and Cleanup

The lump sum bid price for this item constitutes full payment for all materials, equipment, and labor necessary for the reconstruction of landscaping, irrigation, and other improvements damaged or modified during construction and to leave the project site in a clean and fully usable condition upon job acceptance by the City. This bid item includes all other items as indicated on the Contract Drawings and as necessary for construction of the improvements.

36. Grand Otis Temporary Facilities and Bypass Pumping

The lump sum price bid for this item shall constitute full compensation for all temporary facilities during the construction of the Grand Otis Pump Station, gravity sewer main, and discharge. Temporary facilities include, but are not limited to; power supply and energy costs during construction, water/sanitary facilities, construction fencing, WPCP and BMPs, implement and maintain a pedestrian and traffic control plan, and other items as necessary to complete the project as identified within these specifications and on the Contract Drawings.

This bid item includes all work, equipment, and materials necessary for installing, operating, and maintaining a bypass pumping system for the Grand Otis Pump Station as required by these Specifications and the Contract Drawings.

37. Grand Otis Demolition and Abandonment

The lump sum price bid for this item shall constitute full compensation for all work, equipment, and materials necessary for abandoning, demolishing, removing, and disposing of equipment and materials from the Grand Otis Pump Station. These items include, but are not limited to; access hatches, vents, hose bib, pull boxes, brick wall, post, sidewalks, curbs & gutters, pump station equipment, removal of portions of the existing concrete pump station structure, vegetation, and all other items as identified in the Contract Drawings and these Specifications.

This bid item includes all necessary materials, equipment, and labor to remove and/or abandon the existing sanitary force main. This price includes removal or abandonment of existing pipe as necessary for construction. Abandonment includes plugging pipe ends concrete, and filling pipe with Controlled Low Strength Material or sand.

This bid item includes backfilling the existing structures with lightweight engineered fill as shown on the plans and specified herein. This bid item also includes all necessary work, equipment, and materials necessary for abandoning, demolishing, removing, and disposing of the existing force main as shown on the plans and specified herein.

38. Grand Otis Shoring of Open Excavation

The lump sum bid price for this item shall constitute full compensation for the cost of furnishing, installing, maintaining, protecting, and removing shoring for the protection of life and limb in trenches and open excavations at the Grand Otis Pump Station, which shall conform to applicable safety orders.

39. Grand Otis Convert Pumps to Rail-Mounted Submersible and Accessories

This bid item includes all work, materials, and equipment required to convert the existing pumps to rail-mounted submersible sewage pumps. This includes, but is not limited to; pump discharge elbows, lifting chains, guide rails and mounts, power cables and other items necessary to provide a functioning pump installation. Payment for this bid item shall be on a per pump basis.

40. Grand Otis Discharge Piping, Fittings, and Valves

This bid item includes all material, labor, and equipment required to furnish and install all elbows, bypass pumping connection, pipe spools, fittings, valves, couplings, and accessories necessary to provide a complete and functional pump discharge in conformance with the requirements of these Specifications and the Contract Drawings. This bid item includes all necessary clearing, grubbing, excavation, bedding, backfill, pipe penetrations, wetwell connections, and other items necessary for the construction of the discharge piping system. Payment for this bid item shall be on a lump sum basis.

41. Grand Otis Existing Wetwell Modifications

The lump sum price bid for this item shall constitute full compensation for all work, equipment, and materials necessary for modifying the existing wetwell structure as identified on the Plans and specified herein. This bid item includes, but is not limited to, filling existing wetwell, forming a new flow through channel, concrete work, access hatch, pipe penetrations, and new piping to connect the existing wetwell to the new wetwell.

42. Grand Otis Existing Wetwell Coating

This bid item includes all work necessary to install a coating system on the interior surfaces of the existing wetwell in accordance with these specifications. This bid item includes all necessary surface cleaning, blasting, preparation, coating, and testing measures as necessary to install a complete coating system. Payment for this bid item will be on a lump sum basis.

43. Grand Otis Valve Vault

This bid item includes all necessary labor, materials, and equipment to furnish and install a precast concrete valve vault, access hatch, and pipe penetrations conforming to the requirements of these Specifications and the Contract Drawings. This bid item includes all necessary clearing, grubbing, excavation, bedding, backfill, drain system, and other items necessary for the construction of the valve vault. Payment for this bid item shall be on a per vault basis.

44. Grand Otis New Wetwell

This bid item includes all necessary materials, equipment, and labor necessary to furnish and install a precast concrete wetwell, top slab, access hatch, chamfers, and accessories as indicated on the Contract drawings. This bid item includes preparation of existing structure for the installation of the new wetwell. This bid item includes all work necessary to install a coating system on the interior surfaces of the new wetwell in accordance with these specifications. This bid item includes all necessary surface cleaning, blasting, preparation, coating, and testing measures as necessary to install a complete coating system. Payment for this item shall be paid on a lump sum basis.

45. Grand Otis 8-inch Force Main

The unit price bid per linear foot for this bid item shall constitute full compensation for all material, labor, equipment, tools, and services necessary to install the Grand Otis force main from the valve vault to the discharge manhole as indicated on the Contract drawings and specified herein. This bid item includes excavation, subgrade preparation, backfill, compaction, tracer wire, warning tape, tracer wire boxes, AC pavement replacement, connection to the existing manhole, and other items as necessary to construct the force main. This bid item also includes potholing of the existing utilities prior to construction as indicated on the plans.

46. Grand Otis Concrete Work

This bid item includes all necessary labor, materials, and equipment to furnish and install concrete sidewalks, curb & gutter, and a concrete slab around the wetwell and valve vault, and other items as necessary to conform to the requirements of these Specifications and the Contract Drawings. This bid item includes all necessary clearing, grubbing, excavation, bedding, backfill, and other items necessary for construction of cast-in-place concrete. Payment for this bid item shall be on a lump sum basis.

47. Grand Otis Electrical Modifications, Wiring, and Sensors

This bid item includes all materials, equipment, and labor necessary to modify and replace existing electrical wiring and sensors as required to provide a fully functioning electrical system conforming to the Contract Documents. Work includes, but is not limited to, supply and installation of conduits and conductors; supply, installation and calibration of sensors and electrical devices; wiring, stilling well and mounting of level sensors; pull boxes; and any additional work required to provide a fully functional system. This bid item also includes all necessary excavation, bedding, backfill, AC pavement replacement, and other items as necessary to construct the improvements. Payment for this bid item shall be on a lump sum basis.

48. Grand Otis Site Restoration and Cleanup

The lump sum bid price for this item constitutes full payment for all materials, equipment, and labor necessary for the reconstruction of landscaping, irrigation, and other improvements damaged or modified

during construction and to leave the project site in a clean and fully usable condition upon job acceptance by the City. This bid item includes all other items as indicated on the Contract Drawings and as necessary for construction of the improvements.

49. Harbor Bay Parkway 1 Temporary Facilities and Bypass Pumping

The lump sum price bid for this item shall constitute full compensation for all temporary facilities during the construction of the Harbor Bay Parkway 1 Pump Station, gravity sewer main, and discharge. Temporary facilities include, but are not limited to; power supply and energy costs during construction, water/sanitary facilities, construction fencing, WPCP and BMPs, implement and maintain a pedestrian and traffic control plan, and other items as necessary to complete the project as identified within these specifications and on the Contract Drawings.

This bid item includes all work, equipment, and materials necessary for installing, operating, and maintaining a bypass pumping system for the Harbor Bay Parkway 1 Pump Station as required by these Specifications and the Contract Drawings.

50. Harbor Bay Parkway 1 Demolition and Abandonment

The lump sum price bid for this item shall constitute full compensation for all work, equipment, and materials necessary for abandoning, demolishing, removing, and disposing of equipment and materials from the Harbor Bay Parkway 1 Pump Station. These items include, but are not limited to; curb, gutter, service pedestal, electrical junction box, communication box, access hatches, vents, hose bib, landscaping, AC pathway, pull boxes, pump station equipment, removal of portions of the existing concrete pump station structure, and all other items as identified in the Contract Drawings and these Specifications.

This bid item includes all necessary materials, equipment, and labor to remove and/or abandon the existing sanitary force main. This price includes removal or abandonment of existing pipe as necessary for construction. Abandonment includes plugging pipe ends concrete, and filling pipe with Controlled Low Strength Material or sand.

This bid item includes backfilling the existing structures with lightweight engineered fill as shown on the plans and specified herein. This bid item also includes all necessary work, equipment, and materials necessary for abandoning, demolishing, removing, and disposing of the existing force main as shown on the plans and specified herein.

51. Harbor Bay Parkway 1 Shoring of Open Excavation

The lump sum bid price for this item shall constitute full compensation for the cost of furnishing, installing, maintaining, protecting, and removing shoring for the protection of life and limb in trenches and open excavations at the Harbor Bay Parkway Pump Station, which shall conform to applicable safety orders.

52. Harbor Bay Parkway 1 Submersible Pump and Accessories

This bid item includes all work, materials, and equipment required to furnish and install rail-mounted submersible sewage pumps, pump

discharge elbows, lifting chains, guide rails and mounts, power cables and other items necessary to provide a functioning pump installation. Payment for this bid item shall be on a per pump basis.

53. Harbor Bay Parkway 1 Discharge Piping, Fittings, and Valves

This bid item includes all material, labor, and equipment required to furnish and install all elbows, bypass pumping connections, pipe spools, fittings, valves, couplings and accessories necessary to provide a complete and functional pump discharge in conformance with the requirements of these Specifications and the Contract Drawings. This bid item includes all necessary clearing, grubbing, excavation, bedding, backfill, pipe penetrations, wetwell connections, and other items necessary for the construction of the discharge piping system. Payment for this bid item shall be on a lump sum basis.

54. Harbor Bay Parkway 1 Valve Vault

This bid item includes all necessary labor, materials, and equipment to furnish and install a precast concrete valve vault, access hatch, and pipe penetrations conforming to the requirements of these Specifications and the Contract Drawings. This bid item includes all necessary clearing, grubbing, excavation, bedding, backfill, drain system, and other items necessary for the construction of the valve vault. Payment for this bid item shall be on a lump sum basis.

55. Harbor Bay Parkway 1 New Wetwell

This bid item includes all necessary materials, equipment, and labor necessary to furnish and install a precast concrete wetwell, top slab, access hatch, chamfers, and accessories as indicated on the Contract drawings. This bid item includes preparation of existing structure as necessary to construct the wetwell. This bid item includes all work necessary to install a coating system on the interior surfaces of the new wetwell in accordance with these specifications. This bid item includes all necessary surface cleaning, blasting, preparation, coating, and testing measures as necessary to install a complete coating system. Payment for this item shall be paid on a lump sum basis.

56. Harbor Bay Parkway 1 Existing Wetwell Modifications

The lump sum price bid for this item shall constitute full compensation for all work, equipment, and materials necessary for modifying the existing wetwell structure as identified on the Plans and specified herein. This bid item includes, but is not limited to, filling existing wetwell, forming a new flow through channel, access hatch, pipe penetrations, and new piping to connect the existing wetwell to the new wetwell. This Bid item includes necessary excavation, backfill, and compaction in accordance with these Specifications.

57. Harbor Bay Parkway 1 Existing Wetwell Coating

This bid item includes all work necessary to install a coating system on the interior surfaces of the existing wetwell in accordance with these specifications. This bid item includes all necessary surface cleaning, blasting, preparation, coating, and testing measures as necessary to install

a complete coating system. Payment for this bid item will be on a lump sum basis.

58. Harbor Bay Parkway 1 Concrete Work

This bid item includes all necessary labor, materials, and equipment to furnish and install cast-in-place concrete access pads and equipment pads conforming to the requirements of these Specifications and the Contract Drawings. This bid item also includes all necessary labor, materials, and equipment to furnish and install a concrete driveway approach, access pads, generator pad, control panel pad, service pedestal pad, and all other concrete work necessary to complete the work. This bid item includes all necessary clearing, grubbing, excavation, bedding, backfill, and other items necessary for construction of cast-in-place concrete. Payment for this bid item shall be on a lump sum basis.

59. Harbor Bay Parkway 1 Pathway Modifications

This bid item includes all necessary labor, materials, and equipment to modify the existing AC pathway and install new AC pavement and concrete pathway conforming to the requirements of these Specifications and the Contract Drawings. This bid item includes all necessary clearing, grubbing, excavation, bedding, backfill, saw-cutting, AC paving, concrete, and other items necessary for construction. Payment for this bid item shall be on a lump sum basis.

60. Harbor Bay Parkway 1 Removable Bollard

This bid item includes all necessary labor, materials, and equipment to furnish and install removable bollards conforming to the requirements of these Specifications and the Contract Drawings. This bid item includes all necessary clearing, grubbing, excavation, bedding, backfill, concrete, paint, and other items necessary. Payment for this bid item shall be on a per bollard basis.

61. Harbor Bay Parkway 1 Generator

The lump sum price bid for this item shall constitute full compensation for all labor, materials, and equipment necessary to furnish and install a fully functional emergency generator set and fuel tank. Work includes, but is not limited to; fuel tank, fuel, generator, and associated wiring, incidentals, anchorage, anchorage design, and accessories.

62. Harbor Bay Parkway 1 Electrical Control Panel

This bid item includes all labor, materials, and equipment necessary to furnish and install a fully functional electrical control panel at the Harbor Bay Parkway 1 Pump Station conforming to the requirements of these specifications and the Contract Drawings. Payment for this bid item shall be on a lump sum basis.

63. Harbor Bay Parkway 1 Service Pedestal

This bid item includes all labor, materials, and equipment necessary to furnish and install a fully functional electrical service and pedestal at the Harbor Bay Parkway 1 Pump Station conforming to the requirements of these specifications and the Contract Drawings. This bid item includes all

labor, materials, and equipment necessary to coordinate with the electrical utility and construct the improvements from the point of service connection to the service pedestal. This bid item also includes all necessary excavation, bedding, backfill, AC pavement replacement, and sidewalk replacement, necessary to construct the electrical service and pedestal. Payment for this bid item shall be on a lump sum basis.

64. Harbor Bay Parkway 1 Fence and Gate

This bid item includes all labor, materials, and equipment necessary to furnish and install the fencing and gates at the Harbor Bay Parkway 1 Pump Station conforming to the requirements of these specifications and the Contract Drawings. Payment for this bid item shall be on a lump sum basis.

65. Harbor Bay Parkway 1 Utility Box Replacement

This bid item includes all labor, materials, and equipment necessary to furnish and install a fully functional utility box at the Harbor Bay Parkway 1 pump station conforming to the requirements of these specifications and the Contract Drawings. This bid item also includes all necessary coordination with the utility company, excavation, bedding, and backfill necessary to construct the utility box. Payment for this bid item shall be on a per utility box basis.

66. Harbor Bay Parkway 1 New 8-inch Force Main

The unit price bid per linear foot for this bid item shall constitute full compensation for all material, labor, equipment, tools, and services necessary to install the Harbor Bay Parkway 1 force main from the valve vault to the discharge manhole as indicated on the Contract drawings and specified herein. This bid item includes excavation, subgrade preparation, backfill, compaction, tracer wire, warning tape, tracer wire boxes, and AC pavement replacement, connection to the existing manhole, and other items as necessary to construct the force main. This bid item also includes potholing of the existing utilities prior to construction as indicated on the plans. Payment for this item shall be paid per linear foot.

67. Harbor Bay Parkway 1 Miscellaneous Electrical Work, Wiring, and Sensors

This bid item includes all materials, equipment, and labor necessary to furnish and install all miscellaneous items required to provide a fully functioning electrical system conforming to the Contract Documents. Work includes, but is not limited to, supply and installation of conduits and conductors, supply, installation and calibration of sensors and electrical devices, wiring, stilling well and mounting of level sensors, pull boxes, and any additional work required to provide a fully functional system. This bid item also includes all necessary excavation, bedding, backfill, and other items as necessary to construct the improvements. Payment for this bid item shall be on a lump sum basis.

68. Harbor Bay Parkway 1 Site Restoration and Cleanup

The lump sum bid price for this item constitutes full payment for all materials, equipment, and labor necessary for the reconstruction of

landscaping, irrigation, and other improvements damaged or modified during construction and to leave the project site in a clean and fully usable condition upon job acceptance by the City. This bid item includes all other items as indicated on the Contract Drawings and as necessary for construction of the improvements.

69. Marina Village Temporary Facilities and Bypass Pumping

The lump sum price bid for this item shall constitute full compensation for all temporary facilities during the construction of the Marina Village Pump Station, gravity sewer main, and discharge. Temporary facilities include, but are not limited to; power supply and energy costs during construction, water/sanitary facilities, construction fencing, WPCP and BMPs, implement and maintain a pedestrian and traffic control plan, and other items as necessary to complete the project as identified within these specifications and on the Contract Drawings.

This bid item includes all work, equipment, and materials necessary for installing, operating, and maintaining a bypass pumping system for the Marina Village Pump Station as required by these Specifications and the Contract Drawings.

70. Marina Village Demolition and Abandonment

The lump sum price bid for this item shall constitute full compensation for all work, equipment, and materials necessary for abandoning, demolishing, removing, and disposing of equipment and materials from the Marina Village Pump Station and including service pedestal, electrical pull boxes, SCADA pole, access hatches, AC pavement, concrete pads, curb, gutter, storm drains, top of manhole structure, vents, canal gate valve, trees, vault and flow meter, control panel, portions of the existing concrete structure, piping, valves, fittings, and all other items as identified in the Contract Drawings and these Specifications.

71. Marina Village Submersible Pump and Accessories

This bid item includes all work, materials, and equipment required to furnish and install rail-mounted submersible sewage pumps, pump discharge elbows, lifting chains, guide rails and mounts, power cables and other items necessary to provide a functioning pump installation. Payment for this bid item shall be on a per pump basis.

72. Marina Village Discharge Piping, Fittings, and Valves

This bid item includes all material, labor, and equipment required to furnish and install all elbows, pipe penetrations, pipe supports, bypass pumping connection, pipe spools, fittings, couplings, valves, air valves, and accessories necessary to provide a complete and functional pump discharge in conformance with the requirements of these Specifications and the Contract Drawings. This bid item includes all necessary clearing, grubbing, excavation, bedding, backfill, pipe penetrations, wetwell connections, and other items necessary for the construction of the discharge piping system. Payment for this bid item shall be on a lump sum basis.

73. Marina Village Wetwell Modifications

The lump sum price bid for this item shall constitute full compensation for all work, equipment, and materials necessary for modifying the existing wetwell structure as identified on the Plans and specified herein. This bid item includes, but is not limited to, constructing new chamfers, grouting bottom of wetwell, and repairing wetwell voids from demolition.

74. Marina Village Wetwell Coating

This bid item includes all work necessary to install a coating system on the interior surfaces of the new wetwell in accordance with these specifications. This bid item includes all necessary surface cleaning, blasting, preparation, coating, and testing measures as necessary to install a complete coating system. Payment for this bid item will be on a lump sum basis.

75. Marina Village Manhole Coating

This bid item includes all work necessary to install a coating system on the interior surfaces of the manhole in accordance with these specifications. This bid item includes all necessary surface cleaning, blasting, preparation, coating, and testing measures as necessary to install a complete coating system. Payment for this bid item will be on a lump sum basis.

76. Marina Village Wetwell Hatches

This bid item includes all necessary labor, materials, and equipment to furnish and install three top mounted access hatches conforming to the requirements of these Specifications and the Contract Drawings. Payment for this bid item will be on a lump sum basis.

77. Marina Village Replace Top of Existing Manhole

The lump sum price bid for this bid item includes all necessary labor, materials, and equipment necessary to modify the existing manhole upstream of the pump station. The item includes replacement of the manhole frame and cover, manhole riser, manhole top section, concrete collar, frame and cover, and asphalt replacement as necessary as shown on the Contract Documents.

78. Marina Village Concrete Work

This bid item includes all necessary labor, materials, and equipment to furnish and install cast-in-place concrete access pads and equipment pads conforming to the requirements of these Specifications and the Contract Drawings. This bid item also includes all necessary labor, materials, and equipment to furnish and install a concrete access pad, generator pad, control panel pad, service pedestal pad, pad for discharge piping, and all other concrete work necessary to complete the work. This bid item includes all necessary clearing, grubbing, excavation, bedding, backfill, and other items necessary for construction of cast-in-place concrete. Payment for this bid item shall be on a lump sum basis.

79. Marina Village Generator

The lump sum price bid for this item shall constitute full compensation for all labor, materials, and equipment necessary to furnish and install a fully

functional emergency generator set and fuel tank. Work includes, but is not limited to; fuel tank, fuel, generator, and associated wiring, incidentals, anchorage, anchorage design, and accessories.

80. Marina Village Electrical Control Panel

This bid item includes all labor, materials, and equipment necessary to furnish and install a fully functional electrical control panel at the Marina Village pump station conforming to the requirements of these specifications and the Contract Drawings. This bid item also includes a fire extinguisher and associated mounting. Payment for this bid item shall be on a lump sum basis.

81. Marina Village Service Pedestal

This bid item includes all labor, materials, and equipment necessary to furnish and install a fully functional electrical service and pedestal at the Marina Village Pump Station conforming to the requirements of these specifications and the Contract Drawings. This bid item includes all labor, materials, and equipment necessary to coordinate with the electrical utility and construct the improvements from the point of service connection to the service pedestal. This bid item also includes all necessary excavation, bedding, backfill, and AC pavement replacement necessary to construct the electrical service and pedestal. Payment for this bid item shall be on a lump sum basis.

82. Marina Village Fence and Gates

This bid item includes all labor, materials, and equipment necessary to furnish and install the fencing and gates at the Marina Village Pump Station conforming to the requirements of these specifications and the Contract Drawings. Payment for this bid item shall be on a lump sum basis.

83. Marina Village SCADA Pole

This bid item includes all labor, materials, and equipment necessary to furnish and install a SCADA pole, concrete foundation, cables, conduits, grounding equipment, connection of existing antenna, and miscellaneous accessories conforming to the requirements of these specifications and the Contract Drawings. Payment for this bid item shall be on a lump sum basis.

84. Marina Village Site Light

This bid item includes all labor, materials, and equipment necessary to furnish and install a light pole, concrete foundation, fixture, wires, conduits, and miscellaneous accessories conforming to the requirements of these specifications and the Contract Drawings. Payment for this bid item shall be on a lump sum basis.

85. Marina Village Miscellaneous Electrical Work, Wiring, and Sensors

This bid item includes all materials, equipment, and labor necessary to furnish and install all miscellaneous items required to provide a fully functioning electrical system conforming to the Contract Documents. Work includes, but is not limited to, supply and installation of conduits and conductors, pull boxes, supply, installation and calibration of sensors and electrical devices, wiring, stilling well and mounting of level sensors, and

any additional work required to provide a fully functional system. This bid item also includes all necessary excavation, bedding, backfill, and other items as necessary to construct the improvements. Payment for this bid item shall be on a lump sum basis.

86. Marina Village Site Restoration and Cleanup

The lump sum bid price for this item constitutes full payment for all materials, equipment, and labor necessary for the reconstruction of landscaping, irrigation, and other improvements damaged or modified during construction and to leave the project site in a clean and fully usable condition upon job acceptance by the City. This bid item includes all other items as indicated on the Contract Drawings and as necessary for construction of the improvements.

87. Park Otis Temporary Facilities and Bypass Pumping

The lump sum price bid for this item shall constitute full compensation for all temporary facilities during the construction of the Park Otis Pump Station, gravity sewer main, and discharge. Temporary facilities include, but are not limited to; power supply and energy costs during construction, water/sanitary facilities, construction fencing, WPCP and BMPs, implement and maintain a pedestrian and traffic control plan, and other items as necessary to complete the project as identified within these specifications and on the Contract Drawings.

This bid item includes all work, equipment, and materials necessary for installing, operating, and maintaining a bypass pumping system for the Park Otis Pump Station as required by these Specifications and the Contract Drawings.

88. Park Otis Demolition and Abandonment

The lump sum price bid for this item shall constitute full compensation for all work, equipment, and materials necessary for abandoning, demolishing, removing, and disposing of equipment and materials from the Park Otis Pump Station. These items include, but are not limited to; access hatches, vents, hose bib, pull boxes, access hatches, sidewalks, curbs & gutters, pump station equipment, removal of portions of the existing concrete pump station structure, vegetation, and all other items as identified in the Contract Drawings and these Specifications.

This bid item includes backfilling the existing structures with lightweight engineered fill as shown on the plans and specified herein. This bid item also includes all necessary work, equipment, and materials necessary for abandoning, demolishing, removing, and disposing of the existing force main as shown on the plans and specified herein.

89. Park Otis Shoring of Open Excavation

The lump sum bid price for this item shall constitute full compensation for the cost of furnishing, installing, maintaining, protecting, and removing shoring for the protection of life and limb in trenches and open excavations at the Park Otis Pump Station, which shall conform to applicable safety orders.

90. Park Otis Convert Pumps to Rail-Mounted Submersible and Accessories

This bid item includes all work, materials, and equipment required to convert the existing pumps to rail-mounted submersible sewage pumps. This includes, but is not limited to; pump discharge elbows, lifting chains, guide rails and mounts, power cables and other items necessary to provide a functioning pump installation. Payment for this bid item shall be on a per pump basis.

91. Park Otis Discharge Piping, Fittings, and Valves

This bid item includes all material, labor, and equipment required to furnish and install all elbows, bypass pumping connection, pipe spools, fittings, valves, couplings, and accessories necessary to provide a complete and functional pump discharge in conformance with the requirements of these Specifications and the Contract Drawings. This bid item includes all necessary clearing, grubbing, excavation, bedding, backfill, pipe penetrations, wetwell connections, and other items necessary for the construction of the discharge piping system. Payment for this bid item shall be on a lump sum basis.

92. Park Otis Existing Wetwell Modifications

The lump sum price bid for this item shall constitute full compensation for all work, equipment, and materials necessary for modifying the existing wetwell structure as identified on the Plans and specified herein. This bid item includes, but is not limited to, filling existing wetwell, forming a new flow through channel, concrete work, access hatch, pipe penetrations, and new piping to connect the existing wetwell to the new wetwell. This Bid item includes necessary excavation, backfill, and compaction in accordance with these Specifications.

93. Park Otis Existing Wetwell Coating

This bid item includes all work necessary to install a coating system on the interior surfaces of the existing wetwell in accordance with these specifications. This bid item includes all necessary surface cleaning, blasting, preparation, coating, and testing measures as necessary to install a complete coating system. Payment for this bid item will be on a lump sum basis.

94. Park Otis Valve Vault

This bid item includes all necessary labor, materials, and equipment to furnish and install a precast concrete valve vault, access hatch, and pipe penetrations conforming to the requirements of these Specifications and the Contract Drawings. This bid item includes all necessary clearing, grubbing, excavation, bedding, backfill, drain system, and other items necessary for the construction of the valve vault. Payment for this bid item shall be on a per vault basis.

95. Park Otis New Wetwell

This bid item includes all necessary materials, equipment, and labor necessary to furnish and install a precast concrete wetwell, top slab, access hatch, chamfers, and accessories as indicated on the Contract drawings. This bid item includes preparation of existing structure for the

installation of the new wetwell. This bid item includes all work necessary to install a coating system on the interior surfaces of the new wetwell in accordance with these specifications. This bid item includes all necessary surface cleaning, blasting, preparation, coating, and testing measures as necessary to install a complete coating system. Payment for this item shall be paid on a lump sum basis.

96. Park Otis Concrete Work

This bid item includes all necessary labor, materials, and equipment to furnish and install concrete slab around the wetwell and valve vault, and other items as necessary to conform to the requirements of these Specifications and the Contract Drawings. This bid item includes all necessary clearing, grubbing, excavation, bedding, backfill, and other items necessary for construction of cast-in-place concrete. Payment for this bid item shall be on a lump sum basis.

97. Park Otis AC Driveway

This bid item includes all necessary labor, materials, and equipment to modify existing asphalt driveway and install new asphalt driveway conforming to the requirements of these Specifications and the Contract Drawings. This bid item includes all necessary clearing, grubbing, excavation, bedding, backfill, AC pavement, and other items necessary for construction of asphalt driveway. Payment for this bid item shall be on a lump sum basis.

98. Park Otis Service Pedestal

This bid item includes all labor, materials, and equipment necessary to furnish and install a fully functional electrical service and pedestal at the Park Otis Pump Station conforming to the requirements of these specifications and the Contract Drawings. This bid item includes all labor, materials, and equipment necessary to coordinate with the electrical utility and construct the improvements from the point of service connection to the service pedestal. This bid item also includes all necessary excavation, bedding, backfill, surface restoration, and sidewalk replacement as necessary to construct the electrical service and pedestal. Payment for this bid item shall be on a lump sum basis.

99. Park Otis Electrical Modifications, Wiring, and Sensors

This bid item includes all materials, equipment, and labor necessary to modify and replace existing electrical wiring and sensors as required to provide a fully functioning electrical system conforming to the Contract Documents. Work includes, but is not limited to, supply and installation of conduits and conductors; supply, installation and calibration of sensors and electrical devices; wiring, stilling well and mounting of level sensors; pull boxes; and any additional work required to provide a fully functional system. This bid item also includes all necessary excavation, bedding, backfill, AC pavement replacement, and other items as necessary to construct the improvements. Payment for this bid item shall be on a lump sum basis.

100. Park Otis Site Restoration, Landscaping, and Cleanup

The lump sum bid price for this item constitutes full payment for all materials, equipment, and labor necessary for the site restoration, irrigation, and other improvements damaged or modified during construction and to leave the project site in a clean and fully usable condition upon job acceptance by the City. This bid item includes all other items as indicated on the Contract Drawings and as necessary for construction of the improvements.

101. Paru Generator, Automatic Transfer Switch, and Electrical Work

This bid item includes all labor, materials, and equipment necessary to furnish and install a fully functional emergency generator set, fuel tank, and automatic transfer switch (ATS). Work includes, but is not limited to; fuel tank, fuel, generator, reinforced concrete equipment pad, electrical wiring and sensors, conduits and conductors, installation and calibration of sensors and electrical devices, incidentals, anchorage, anchorage design, and accessories. This bid item also includes all necessary demolition, disposal, excavation, bedding, backfill, and other items as necessary to construct the improvements. Payment for this item shall be on a lump sum basis.

102. Paru Concrete Work

This bid item includes all necessary labor, materials, and equipment to furnish and install cast-in-place concrete equipment pad for the generator and concrete surface improvement as shown on the plans and specified herein. This bid item includes all necessary clearing, grubbing, excavation, bedding, backfill, and other items necessary for construction of cast-in-place concrete. Payment for this bid item shall be on a lump sum basis.

103. Paru Fence and Gate

This bid item includes all labor, materials, and equipment necessary to furnish and install the fence and gate at the Paru Pump Station conforming to the requirements of these specifications and the Contract Drawings. Payment for this bid item shall be on a lump sum basis.

104. Paru Miscellaneous Site Work, Site Restoration, and Cleanup

The lump sum bid price for this item constitutes full payment for all materials, equipment, and labor necessary for the reconstruction of site improvements damaged or modified during construction and to leave the project site in a clean and fully usable condition upon job acceptance by the City. This bid item includes all other items as indicated on the Contract Drawings and as necessary for construction of the improvements.

1.05 CONTRACTOR'S COST BREAKDOWN

A. The Contractor shall submit a Schedule of Values to the City's Representative at the preconstruction conference. The price breakdown, as agreed upon by the Contractor and the City's Representative, shall be used for preparing future estimates for partial payments of lump sum items to the Contractor.

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, electrical, 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 City, 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 City, 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 City as one of the bases for evaluating requests for payments. The City 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 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01140
WORK RESTRICTIONS

PART 1 GENERAL

1.01 SUMMARY

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

1. Access to site.
2. Use of site.
3. Use of premises.

B. Related Sections:

1. Section 01110 - Summary of Work.
2. Section 01145 - Contractor's Use of the Premises.
3. Section 01330 - Submittal Procedures.
4. Section 01500 - Temporary Facilities and Controls.

1.02 HOURS OF WORK

A. Refer to the Special Provisions for restrictions on hours of work.

1.03 SPECIFIC CONSTRAINTS ON SEQUENCE AND SCHEDULING OF WORK

A. Wastewater Projects:

1. The existing pump stations and their force mains are integral and important components of the wastewater collection system for the City of Alameda.
2. Conduct work in a manner that will not impair the safe discharge of wastewater influent at each station to the downstream wastewater collection system. Impairing the discharge of wastewater in such a manner that results in the spill of that wastewater will result in serious environmental damage and monetary fines. Influent wastewater must be pumped at all times, using temporary bypass facilities as required and as specified herein.
3. Include costs in bid price for compliance with the specific limitations and constraints and the related general factors pertaining to maintaining the discharge of all influent wastewater.

B. Improvements Must be Protected During and After Installation

1. Equipment installed as part of the Work shall be permanently secured against theft and vandalism and protected from the elements.

C. Contractor Shall Secure Permit to Install and Operate Standby Generator

1. Within ten (10) working days after receiving a favorable review of each generator submittal, Contractor shall apply for a Bay Area Air Quality Management District (BAAQMD) permit to install and operate the standby diesel engine-generator set specified in Division 16 and Section 01410 of these Specifications.

2. Contractor shall work with generator manufacturer to submit all relevant material in conformance with Division 16 and Section 01410, to obtain the BAAQMD Permit. Engineer will assist Contractor as required.

D. Work within Easements on Private Property

1. Approximate City easement locations are shown on the Drawings.

2. Contractor shall confine his non-transient operations to the existing easements. Contractor is responsible for obtaining permission from property owners for the use of any properties outside of the existing sewer easements and street right of ways.

E. Work Sequence and Constraints:

1. Utilize description of critical events in work sequence in this Section as a guideline for scheduling and undertaking the Work.

2. Work sequence and constraints presented do not include all items affecting completion of the Work, but are intended to describe critical events necessary to minimize disruption of the existing facilities.

3. Indicate required closures of existing facilities or interruptions of existing operations on progress schedules submitted to the Engineer. Closures will be permitted to the extent that existing operation of the facilities will not be jeopardized and identified constraints are satisfied. All shutdowns and disruptions to operation of facilities shall be coordinated with the Engineer.

4. Submit written notification of required closures or disruptions to existing facilities at least 7 days prior to planned date of shutdown or disruption.

5. Do not begin alterations until Engineer's written permission has been received.

6. Minimize closures through advanced planning. Have required equipment, materials and labor on hand at time of closure.

F. Sequence of Pump Station Construction

1. As described in Section 01500 only one pump station shall be out of service at any given time.

2. Work at the Harbor Bay Parkway 1 Pump Station shall not proceed until the City has obtained the new sanitary sewer easement as shown on the plans. The Contractor shall sequence the work as necessary to accommodate the easement acquisition process. For bidding purposes the Contractor shall assume that the Harbor Bay Parkway 1 Pump Station may need to be the last pump station constructed as part of this project.

1.04 ACCESS BY OTHER PARTIES

A. Provide access to the City and its representatives immediately upon request.

B. Provide safe and continuous access to all adjacent public and private properties at all times, unless specific written approval as been obtained to temporarily discontinue said access.

1.05 UTILITIES

A. Maintain electrical, telephone, water and other utilities within existing facilities in service. Provide temporary utilities when necessary.

B. Provide advance notice to and utilize services of Underground Services Alert (USA) for location and marking of underground utilities a minimum of five (5) days in advance of any activities that have the potential to encounter such utilities.

1.06 WORK BY OTHERS

A. Where proper execution of the Work depends upon work by others, inspect and promptly report discrepancies and defects.

1.07 WORK SEQUENCE AND CONSTRAINTS

A. The following sequencing of work and/or constraints shall be adhered to by the contractor and shown in the progress schedule in accordance with the special provisions.

1. All existing gravity pipe lines and sewer force mains shall remain operational at all times, except as noted otherwise on the Drawings or in the specifications.
2. The CONTRACTOR shall be responsible for maintaining flow at all times. This requires temporary bypasses to be constructed by the CONTRACTOR, as specified in Section 01500.
3. Upstream gravity lines shall not be allowed to surcharge at any time during construction.
4. At least one lane of traffic shall be maintained on all streets where construction or construction traffic is occurring unless otherwise approved in writing by the City.
5. All work within the public right of way shall comply with the approved traffic control plan as specified in Section II.P of the Contract General Provisions.
6. Indicate required shutdowns of existing facilities on Progress Schedule. All shutdowns and disruptions to operation of facilities shall be coordinated with City operating personnel.
7. Submit written notification of required shutdowns or disruptions to existing facilities at least 7 days prior to planned date of shutdown or disruption.

8. Do not begin alterations or demolition until City's written permission has been received.
9. Minimize shutdown duration through advanced planning. Have required equipment, materials and labor on hand at time of shutdown.
10. Coordinate between trades for proper installation/sequencing during pump station installation.

1.08 TEMPORARY SERVICES, MATERIALS, AND EQUIPMENT

A. Locate temporary facilities in a manner that minimizes interference to City's operation and maintenance personnel.

B. Unless otherwise specified, install temporary pipelines of the same size as its connection to the existing facility at the downstream end of the pipeline.

C. Provide submittals on proposed temporary electrical and instrumentation components necessary to maintain existing facilities.

D. Dimensions for all existing structures, piping, paving, and other nonstructural items are approximate. The CONTRACTOR shall field verify all dimensions and conditions and report any discrepancies to the City a minimum of 14 days in advance of any construction in the area.

E. Discrepancies between coordinates, bearings and lengths, and stationing shall be resolved in the following order of precedence:

1. Coordinates.
2. Bearings and lengths.
3. Stationing.

1.09 UTILITIES

A. All work on this project shall be so conducted as to permit utility companies to maintain their services or install additional facilities without interruption.

B. Contractor shall, at his sole expense, make provisions for temporary pumping to the sanitary sewer force main or downstream gravity sewer system whenever the pump station is inoperable, as shown on the plans and specified in Section 01500.

C. Work requires the installation of secondary electrical services from existing transformers. Contractor shall submit, in writing, notice to the City at least 48 hours in advance of his readiness for this necessary operation. Contractor shall cooperate fully with each of the affected utilities including Alameda Municipal Power (AMP).

D. Access to AMP secondary boxes is not allowed unless AMP personnel are present. Contact AMP Operation Center at 510-748-3964 during work hours, 8 AM – 4:30 PM Monday through Friday, to arrange access to AMP secondary boxes. Contractor shall notify AMP a minimum of 48 hours prior to access.

E. AMP inspectors are available from the hours of 8 AM to 4:30 PM Monday through Friday.

F. AMP will inspect electrical installations from the point of service to the meter, and City inspectors will perform inspections beyond the meter. Contractor shall schedule inspections accordingly.

1.10 INSPECTIONS

A. The Contractor shall schedule their work in a manner that allows inspections to be performed in accordance with the following inspection schedules.

B. AMP inspections shall be scheduled as described in the previous section.

C. City building department inspections shall be scheduled as follows:

1. Contractor shall call (510) 747-6800 between 7:30 AM and 8:30 AM, Monday to Thursday to schedule inspection.

2. The City's Building Dept. only performs scheduled inspections in "AM appointment" = 9 AM to 11:30 AM or PM appointment = between 1:00 PM to 3:30 PM. The building Department is closed on Fridays. Contractor shall schedule work and inspections accordingly.

D. Reference Section IV, H of the special provisions for the City's Public Works Inspection hours and requirements.

1.11 CONSTRUCTION SCHEDULE

A. The Contractor shall review the plans and specifications and submit a project schedule using the critical path method (CPM). The schedule shall be submitted for review at the preconstruction meeting. The schedule shall show the various activities of work in sufficient detail to demonstrate a reasonable and workable plan to complete the work in the specified contract time.

B. The CPM schedule shall include activities for all work to be performed by the Contractor and subcontractors. The schedule shall also include activities specific to the project to be performed by other parties, such as utility companies.

C. Construction shall not be started until the schedule is approved by the Engineer.

D. The Contractor shall not commence construction on any section of the work until such time that he shall have on the ground, or can furnish definite assurance to the Engineer that there will be available when required, all the materials necessary to complete the section of the work upon which construction is to begin.

E. The Contractor shall submit an updated work schedule at each progress meeting and upon the issuance of any change order that alters the contract's schedule.

1.12 BAY CONSERVATION AND DEVELOPMENT COMMISSION (BCDC) PERMIT

A. The City has applied for and obtained a BCDC Regionwide Permit No. RWP-2 for the work at the Cola Ballena Pump Station and Force Main. A copy of the permit is included as Attachment D to these specifications. The Contractor is responsible for adhering to all requirements and restrictions identified in the BCDC permit.

B. The Contractor shall not proceed with any work at the Cola Ballena Pump Station or Force Main until all permit requirements are met.

1.13 NESTING BIRD SURVEYS – COLA BALLENA

A. Nesting bird surveys are required at the Cola Ballena Pump Station and Force Main Site if project activities are initiated within the bird nesting season (February 1 - August 15). Pre-construction nesting bird surveys are required within 14 days prior to the beginning of Project-related activities. The City's biologist will perform the required nesting bird surveys. The Contractor shall notify the City in writing at minimum of 21 days prior to planned construction activities for the Cola Ballena Pump Station and/or Force Main.

B. No construction activities shall occur at projects sites that have been found to contain nests. For bidding purposes the Contractor shall assume that the commencement of work at the Cola Ballena Pump Station and Force Main may preclude between February 1st and August 15th.

C. The Contractor shall notify the City if there is a lapse in project related work of 15 days or longer during bird nesting season. If this occurs, another focused nest survey shall be conducted by the City's qualified biologist before project work is reinitiated.

1.14 WORK UNDER COLA BALLENA BRIDGE

A. Access under the existing Cola Ballena Bridge is limited to foot traffic and hand held equipment. Record drawings and photographs of the existing bridge are provided as an appendix to these specifications for informational purposes.

B. Contractor shall not access or disturb the area below the mean high water line.

C. Means for accessing the existing pipe alignment under the bridge do not exist. Construction of temporary platforms, falsework, and/or the use of a barge placed under the bridge will be required for construction of the improvements. Contractor is responsible for all temporary facilities and structures as necessary to construct the improvements.

1. Contractor shall prepare and submit a detailed plan for accessing, demolishing, and constructing the improvements under the Cola Ballena Bridge. The plan shall be submitted to the City for review and approval prior to construction. The plan shall include, but is not limited to, the following:

a. Means for isolating and draining the existing sewer force main prior to demolition.

b. Means for collecting, removing, and properly disposing of all debris, sewage, concrete dust, and any other material disturbed and/or removed from the existing infrastructure during construction. Contractor shall provide all means necessary to ensure that material and debris does not enter the San Francisco Bay.

c. Site plan, details, material cut sheets, shop drawings, and other items necessary to provide detailed information regarding the temporary structures, falsework, barge, etc. necessary to access the force main alignment.

1) Design Calculations, details, and drawings stamped and signed by a California licensed Civil or Structural Engineer shall be provided for all temporary structures.

2) Drilling and connections to the existing bridge structure may be limited based on the presence and location of existing reinforcement.

d. Calculations, drawings, and details shall be All temporary structures

D. All temporary structures and falsework shall be removed upon completion of the work.

1.15 WETWELL DIMENSIONS

A. New wetwell structures are proposed to be placed within existing concrete structures. Contractor shall confirm the required wetwell dimensions and wall thicknesses based on existing field conditions prior to ordering and casting precast structures.

B. In the event that the wall thickness of standard precast concrete structures is too thick, then alternative materials may be required such as high strength concrete or polymer concrete structures. If deemed necessary this will be coordinated and handled under a contract change order.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 01145
CONTRACTOR'S USE OF THE PREMISES

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: Requirements for working in and around Project site, and protection of existing improvements, including:

1. Access to site.
2. Use of site.
3. Use of premises.
4. Protection of existing improvements to remain.
5. Public Safety.

B. Related Sections:

1. Section 01110 - Summary of Work.
2. Section 01140 - Work Restrictions.
3. Section 01500 - Temporary Facilities and Controls.

C. This Section applies to all situations in which the Contractor or his representatives, including but not necessarily limited to, suppliers, Subcontractors, employees and field engineers, enter upon the City's property, adjacent private properties, or utilize the public right-of-way for purposes other than conveyance.

D. Contractor shall commence the Contract Work and provide security and protection to the existing facility and job site within 5 days from the issuance of the "Notice to Proceed".

1.02 ACCESS TO THE JOB SITE

A. Restrict Contractor's employees to the immediate work areas on the job site and in no way go beyond the Work limits noted on the Drawings or as otherwise directed by the Engineer.

1.03 CITY OCCUPATION OF THE PREMISES

A. The City will not occupy the existing premises during construction operations.

1.04 CONTRACTOR'S USE OF THE PREMISES

A. Do not interfere with Lift Station operations of the City during Contracted Work operations.

B. All items, materials and equipment remaining in the existing structures and on the premises (job site), which are not specified to be salvaged or incorporated into the Contracted Work, shall become the property of the Contractor and shall be removed from the job site. The City makes no claims or assumes any value in any of these items, materials and/or equipment if they are removed from the structures or the job site or vandalized prior to and/or during the Contract period. The City assumes no responsibility for any additional operation or works as a result of the conditions described herein.

1.05 RIGHTS OF WAY

A. Outside of the work areas identified on the Drawings, the Contractor shall not allow its employees to use private property for any reason, or to use water or electricity from such property without written permission from each affected property owner. The Contractor shall provide evidence of such permission, in writing, to the Engineer, before entering upon such lands.

B. The Contractor shall be fully responsible for locating and obtaining permission to use layout and staging sites beyond those shown on the Drawings. Where the Contractor may find it advantageous to use private property, it shall arrange for such use and assume full responsibility for its rental, preparation, maintenance and cleanup in a manner satisfactory to the City and property owner.

1.06 PARKING

A. No parking of Contractor's vehicles will be allowed on the job-site except for the purposes of active unloading and/or loading. Contractor shall not use new paved areas for loading or unloading. All traffic controls in the Work area shall conform to Section II.P of the Contract General Provisions.

B. Contractor's employees are advised to park within the adjacent private parking lot or city streets and shall observe all posted parking restrictions.

1.07 SECURITY

A. The Contractor shall be responsible for the security of all its construction equipment, materials, tools, facilities, and vehicles (personal, private, or contractual) while performing the work of this Contract. This requirement shall be effective twenty-four (24) hours per day for the entire duration of the Contract.

B. Contractor shall furnish and maintain approved type site security protection between the Work areas and other areas. All such site security protection shall remain for the duration of this Contract.

1.08 PROTECTIONS

A. Where necessary for the safety of the public and the protection of the adjacent street improvements and adjacent properties, provide and maintain adequate protections, fences and gates and barricades to separate Work areas from areas outside the job site limits. Such protections shall comply with provisions

of Section 01500 "Temporary Facilities and Controls", and shall remain in place during extent of this Contract or as otherwise directed by the Engineer.

B. Provide protections, barricades, signs, etc., as necessary so that persons will be protected from the Work areas where trenching and excavations occur on the job site. Upon completion of such work operations, such protections shall be removed. Such protections shall not unnecessarily disrupt the public right-of-way at the job site.

C. All equipment, material, soil, debris and any heavy loaded object that will not become part of the permanent Work shall only be temporarily stock piled within the work area, and shall be removed from the site as quickly as feasible.

D. Protection of Existing Structures and Site Conditions:

1. Protect existing surfaces in areas where work of this Contract is being performed or passed through for access to the Work areas from damage in a manner approved by the Engineer. Take all necessary precautions to protect and preserve the integrity of all existing work. Submit protection plans or details as required by the Engineer.

2. Provide adequate protection for existing wall, fencing, post or sign, lighting, plant, traffic signal equipment including loop detectors, paving, etc. indicated to remain within the Work area. Contractor shall make necessary repair to damages that occurred under Contractor's responsibility or jurisdiction.

1.09 REPAIR OF DAMAGES

A. Repair or replace any damage to existing structures or equipment under Contractor's protection.

B. Repair or replace damaged work with new materials as necessary to restore the damaged areas or surfaces to a condition equal to and matching such conditions existing prior to damage or start of Work at no added cost to the City.

C. Submit repair method for approval as required by the Engineer.

1.10 INTERRUPTION OF SERVICES

A. Contractor shall make all provisions to accomplish all Work without undue interference with the City's operations of the existing facilities or utilities on the job site premises. Any necessary interruptions to existing facilities shall be done only after 48 hours advance consultations with the Engineer and at such time and duration as instructed by the Engineer.

1.11 NON-INTERFERENCE WITH OTHERS

A. Confine Work operations to the immediate boundaries of the job site and execute Work operations in a manner to minimize interference with City operations and/or work operations of other contractors.

B. Provide and maintain adjacent pedestrian and vehicular accesses in accordance with the Contract General Provisions.

C. Obtain approval of the Engineer prior to any street or parking lot closure.

1.12 UNDERGROUND SERVICE ALERT

A. Before commencing any excavation, the Contractor shall obtain an underground service alert inquiry I.D. Number by calling (800) 227-2600. Five (5) working days shall be allowed after the I.D. Number is obtained and before the excavation work is started so that utility owners can be notified.

1.13 JOB SAFETY

A. Observe all safety rules and regulations of the applicable Building Code and CAL/OSHA as applicable to the safety of the Contractor, Contractor's personnel and City employees during Work operations.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01150
STORAGE OF MATERIALS AND EQUIPMENT

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: Requirements for storing materials and equipment on and off-site as necessary for the prosecution of the Work.

B. Related Sections:

1. Section 01145 - Contractor's Use of Premises.
2. Section 01330 - Submittal Procedures.
3. Section 01500 - Temporary Facilities and Controls.

1.02 REQUIREMENTS

A. Protection of Work and Materials

1. Provide and maintain storage facilities and employ such measures as will preserve the specified quality and fitness of materials to be used in the Work. Stored materials shall be reasonably accessible for inspection. Adequately protect new and existing work and all items of equipment for the duration of the Contract.
2. The Contractor shall not, without the City's consent, assign, sell, mortgage, hypothecate or remove equipment or materials which have been installed or delivered and which may be necessary for the completion of the Contract.

B. Material Delivery

1. The Contractor, subcontractors, and suppliers shall at all times comply with the requirements of the City of Alameda Truck Route Ordinance and the City of Oakland Truck Route Ordinance.
2. As much as possible, material delivery should be completed before 10 am.
3. Contractor shall submit the following for review in advance of the first scheduled material delivery:
    a. Vicinity maps showing the project location and proposed truck access routes.
    b. An estimation of the frequency of delivery trucks during each phase of construction.
    c. Traffic control plans for truck delivery operations in conformance with Section II.P of the Contract General Provisions.

C. Storage of Equipment and Materials on Site

1. To the maximum extent possible, construction materials and equipment shall be stored on site within an area secured by the Contractor inside the limits of site occupation indicated on the Drawings.
2. On-site equipment and material storage shall occur within the areas designated as exclusive and non-exclusive easements on the Drawings, unless written arrangements are made with the City.

D. Storage of Equipment and Materials in Public Streets

1. No storage of materials, facilities or equipment is permitted in City sidewalks, streets or parking lots, unless approved by the City. This includes sanitation facilities, office trailers, dumpsters and storage containers.
2. If City parking lot use is approved, costs for parking space rentals will be assessed and additional bonding required.
3. Notwithstanding the above criteria, construction materials shall not be stored in streets, roads, or highways for more than five (5) calendar days after unloading. All materials or equipment not installed or used in construction within five (5) calendar days after unloading shall be stored elsewhere by the Contractor at its expense unless authorized additional storage time. Equipment and materials shall not obstruct pedestrian or vehicular traffic, traffic lines of sight, or drainage paths.
4. Construction equipment shall not be stored at the Worksite before its actual use on the Work nor for more than five (5) calendar days after it is no longer needed. Time necessary for repair or assembly of equipment may be authorized by the Engineer.
5. Excavated material, except that which is to be used as backfill in the adjacent trench, shall not be stored in public streets unless otherwise permitted. After placing backfill, all excess material shall be removed immediately from the site.
6. The Contractor shall be fully responsible for locating and obtaining permission to use stockpile sites.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01330
SUBMITTAL PROCEDURES

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: Requirements and procedures for submitting Shop Drawings, Product Data, Samples, other submittals relating to products, and as specified in individual sections.

1.02 DEFINITIONS

A. Manufacturer's Instructions: Instructions, stipulations, directions, and recommendations issued in printed form by the manufacturer of a product addressing handling, installation, erection, and application of the product; Manufacturers Instructions are not prepared especially for the Work.

B. Shop or Fabrication Drawings: Drawings, diagrams, schedules, and other data specially prepared for the Work to illustrate some portion of the Work in detail sufficient for actual fabrication.

C. Design Calculations: Detailed calculations relating to structural, mechanical or electrical design as called for in the relevant technical specification section, or as necessary for the preparation of detailed fabrication drawings.

D. Product Data: Illustrations, standard schedules, performance charts, brochures, diagrams and other information to illustrate materials or equipment for some portion of the Work.

E. Samples: Physical examples which illustrate materials, equipment, or workmanship and establish standards by which the Work will be judged.

F. Special Samples: Physical examples which illustrate materials, equipment, or workmanship and establish standards by which the Work will be judged, and will be incorporated in the Work.

1.03 SUBMITTAL PROCEDURES

A. Deliver submittals to the City’s representative via email. Contractor shall provide a file share site for transferring all submittals larger than 5MB.

1. Final hard copies of Operation and Maintenance manuals are required as specified in each individual specification section. Contractor shall also provide electronic submittal of all operation and maintenance manuals.

B. Submit submittals in ample time to serve submittals' intended purpose.

C. Submit submittals which are specified or reasonably required for construction, operation, and maintenance of the Work.

D. All submittals shall be accompanied by the standard “CONTRACTOR’S SUBMITTAL TRANSMITTAL” form (Section 1.04). Any submittal not accompanied by such a form, or where all applicable items on the form are not completed, or are incorrectly completed, may be returned at the Engineer’s discretion for resubmittal

E. Provide or furnish products and execute the Work in accordance with accepted submittals, unless in conflict with Contract Documents.

F. When minor deviations from Contract Documents are accepted, modify Contract Documents in accordance with the Conditions of the Contract.

1.04 SUBMITTAL FORM

A. Each submittal transmittal form shall identify:

1. Submittal date.
2. Project and Contractor.
3. Subcontractor and major supplier, when appropriate.
4. Reference submittal to Contract Documents by Drawing, detail, and/or Specification section numbers, as appropriate.
5. Variations from Contract Documents when variations are included in submittal.

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 a 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. All submittal forms and submittals shall be in English.

1.05 SUBMITTAL LIST

A. Furnish a schedule and list of all required submittals to the Engineer at the Preconstruction Conference, including required submittals by all subcontractors.

B. Regardless of the Engineer’s acceptance of such a submittal list, Contractor shall furnish all submittals required in the Technical Specifications.

1.06 SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES

A. Submit Shop Drawings, Product Data, Samples, and other pertinent information in sufficient detail to show compliance with specified requirements.

B. Shop Drawings shall show in detail the size, sections, and dimensions of all the member(s); the arrangement and construction of all connections and joints; all holes, straps, and other fittings required for attaching work and other pertinent

details. When required, engineering computations shall be submitted. The Contractor shall be responsible for delivering reviewed copies of Shop Drawings to all others whose work is dependent thereon.

C. The Contractor shall maintain at the site of the Project, at all times, a complete file of approved Shop Drawings and manufacturers' data for this Project.

D. Check, verify, and revise submittals as necessary to bring them into conformance with Contract Documents and actual field conditions.

1. Determine and verify quantities, dimensions, specified design and performance criteria, materials, catalog numbers, and similar data.

2. Coordinate submittal with other submittals and with the requirements of the Contract Documents.

E. After completion of checking, verification, and revising; stamp, sign and date submittals indicating review and approval; and submit to Engineer.

1. Stamp and signature indicates Contractor has satisfied shop drawing review responsibilities and constitutes Contractor's written approval of shop drawing.

2. Shop drawings without Contractor's written approval will be returned for resubmission.

F. Product Data and Manufacturer's Instructions: Submit electronic copies of review submittals, and four (4) hard copies of final approved submittals if requested by the City. Excise or cross out non-applicable information and clearly mark applicable information with citations to and terminology consistent with Contract Documents.

G. Samples: Submit two (2) samples labeled with reference to applicable Contract Documents. Label will be returned with reviewer's selection when appropriate, comments and stamp. Samples will not be returned unless return is requested in writing and additional sample is submitted.

H. Special Samples: Submit one (1) sample labeled with reference to applicable Contract Documents. Sample and one label will be returned for installation in the Work.

I. Assume risk of expense and delays when proceeding with work related to required submittals without review and acceptance.

1.07 MANUFACTURER'S INSTRUCTIONS

A. Submit manufacturer's instructions whenever made available by manufacturers and when installation, erection, or application in accordance with manufacturer’s instructions is required by the Specifications.

B. Submit manufacturer's instructions prior to installation, erection, or application of equipment and other project components. Submit manufacturer's instructions in accordance with requirements for Product Data.

1.08 CERTIFICATES OF COMPLIANCE

A. Certificates of Compliance should provide the following information:

1. Name of supplier;
2. Type of material being supplied and quantity of material available;
3. A statement that material being supplied complies in all respects with the requirements of the specifications;
4. Copies of test results from a qualified testing laboratory which supports the statement provided above.

B. All materials used on the basis of a Certificate of Compliance may be sampled and tested at any time by the Engineer. The fact that material is used on the basis of a Certificate of Compliance shall not relieve the Contractor of responsibility for incorporating material in the Work which conforms to the requirements of the Drawings and Specifications and any such material not conforming to such requirements will be subject to rejection whether in place or not.

1.09 ENGINEER'S REVIEW

A. Engineer's review of submittals shall not release Contractor from Contractor's responsibility for performance of requirements of Contract Documents. Neither shall Engineer's review release Contractor from fulfilling purpose of installation nor from Contractor's liability to replace defective work.

B. Do not consider submittals as Contract Documents. Purpose of submittals is to demonstrate how Contractor intends to conform to the design concepts.

C. Engineer's review of shop drawings, samples, or test procedures will be only for conformance with design concepts and for compliance with information given in Contract Documents.

1. Engineer's review does not extend to:
    a. Accuracy of dimensions, quantities, or performance of equipment and systems designed by Contractor.
    b. Contractor's means, methods, techniques, sequences, or procedures except when specified, indicated on the Drawings, or required by Contract Documents.
    c. Safety precautions or programs related to safety which shall remain the sole responsibility of the Contractor.

D. Except as may be provided in subsequent specifications, a submittal will be returned within 30 days with appropriate comments if required.

1. When a submittal cannot be returned within that period, Engineer will, within a reasonable time after receipt of the submittal, give notice of the date by which that submittal will be returned.

E. Engineer will be entitled to rely upon the accuracy or completeness of designs, calculations, or certifications made by licensed professionals accompanying a particular submittal whether or not a stamp or seal is required by Contract Documents or Laws and Regulations.

F. Costs incurred by City as a result of additional reviews of a particular submittal after the second time it has been reviewed shall be borne by Contractor. Reimbursement to City will be made by deducting such costs from Contractor's subsequent partial payments.

1.10 SUBMITTAL REVIEW PROCEDURES

A. 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 City reserves the right to withhold moneys due the Contractor to cover additional costs of the Engineer's review beyond the second submittal. Submittal will be returned to the Contractor with one of three (3) markings:

1. If submittal is returned to the Contractor marked "NO EXCEPTIONS TAKEN/PROCEED," formal revision and resubmission of said submittal will not be required.

2. If submittal is returned to the Contractor marked "MAKE CORRECTIONS NOTED/PROCEED CONDITIONALLY" formal revision and resubmission of said submittal will not be required.

3. If submittal is returned to the Contractor marked "REJECTED-RESUBMIT/DO NOT PROCEED," the Contractor shall revise said submittal and shall resubmit to the Engineer.

B. All Work for which Shop Drawings are required shall be performed in accordance with the reviewed and approved copies. Fabrication of an item shall not commence before the Engineer has reviewed the pertinent submittal and returned the copies to the Contractor marked either "NO EXCEPTIONS TAKEN/PROCEED," or "MAKE CORRECTIONS NOTED/PROCEED CONDITIONALLY." Revisions 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 claims for extra work.

C. All Contractor submittals shall be carefully reviewed by an authorized representative of the Contractor prior to submission 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. No consideration for review by the Engineer of any Contractor's submittal will be made for any items which have not been so certified by the Contractor. All noncertified 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.

D. Should the Shop Drawings or manufacturers data (for submittals required by the Standard Specifications or the specifications) show variations from the Contract requirements, the Contractor shall make specific mention of such variations in the letter of transmittal, in order that, if acceptable, suitable action may be taken

for proper adjustment of the Contract; otherwise the Contractor will not be relieved of the responsibility for executing the work in accordance with the Contract Documents, and the approved submittals.

1.11 MINOR OR INCIDENTAL PRODUCTS AND EQUIPMENT SCHEDULES

A. Shop Drawings of minor or incidental fabricated products will not be required, unless requested.

B. Submit tabulated lists of minor or incidental products showing the names of the manufacturers and catalog numbers, with Product Data and Samples as required to determine acceptability.

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.

1.03 EXISTING SITE CONDITIONS

A. The work sites are operating sewage lift stations located within an urban area. It is unknown but possible that hazardous materials beyond what is identified herein may be found or have been used within the Work site.

B. 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 project includes working around existing asbestos cement (AC) pipe and removing and disposing of existing AC pipe as shown on the plans and specified herein. See specification Section 02170 Asbestos Cement Pipe Removal and Disposal.

3. Other than AC pipe, the City is not aware of substantial contamination at these Work sites, but given the historic use of the facilities, contaminated material could include additional asbestos cement (AC) pipes, lead-based paint, residual solvents, and petroleum hydrocarbons from maintenance activities.

1.04 GENERAL REQUIREMENTS

A. Do not disturb existing structures, soil, or groundwater suspected to contain hazardous materials.

B. Maintain copies on-site of any 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.

E. Use equipment, in addition to the minimum outlined herein, if required as part of the Contractor's job safety responsibility.

F. 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 these requirements.

1.05 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

Not Used.

PART 3 EXECUTION

3.01 HAZARDOUS MATERIAL AND WASTE MANAGEMENT

A. Storage: The Contractor shall label and store all hazardous materials used during construction, such as pesticides, paints, thinners, solvents, and fuels; and all hazardous wastes, such as waste oil and antifreeze; in accordance with the applicable City of Alameda hazardous materials ordinances and all applicable State and Federal regulations.

B. 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.

C. 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.

D. 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 chemicals and shall follow material manufacturer's instructions regarding uses, protective equipment, ventilation, flammability, and mixing of chemicals.

E. 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 01410
REGULATORY REQUIREMENTS

PART 1 GENERAL

1.01 SUMMARY OF WORK

A. Building Codes and Regulations:

1. The Contractor shall perform the Contracted Work in accordance with the requirements of the California Building Codes and Amendments and all other regulations, laws, and ordinances, even though such requirements are not specifically mentioned in the Specifications or shown on the Contract Plans.

2. When the Work required by the Plans and Specifications are in conflict with any such law or ordinance, the Contractor shall notify the Engineer. The Contractor shall comply with the more stringent requirements, unless notified by the Engineer and the Contractor shall not proceed with the Work until the Engineer has so ordered.

3. This Section specifies procedural and administrative requirements for compliance with governing regulations, codes, and standards imposed upon the Contracted Work. These requirements include obtaining permits, licenses, inspections, releases, and similar documentation, as well as payments, statements, and similar requirements associated with the regulations, codes, and standards.

1.02 CODES AND REGULATIONS

A. The design and construction of this Project have been selected and depicted on the Contract Documents in compliance with all applicable codes, which govern the various work, materials, devices, equipment, systems, and procedures in effect at the time the Project is issued to bid by the City. These include, but are not limited to, the following:

1. City of Alameda "Standard Specifications for Public Works Construction".
2. City of Alameda “Standard Plans”
3. Alameda Municipal Power, Material and Installation Criteria for Underground Electrical Systems.
4. Alameda City Municipal Code, latest edition.
5. California Building Code (CBC).
6. CAL-OSHA (Occupational and Safety Code).
7. California State Fire Marshall requirements.
8. California Electrical, Plumbing and Mechanical Codes.
9. State Energy Standards Title 24.
10. Americans with Disabilities Act (ADA).

11. Bay Area Air Quality Management District (BAAQMD).
12. East Bay Municipal Utility District (EBMUD) Ordinances and Wastewater Discharge Permit Requirements
13. All other Codes and Regulations that may be noted in the Technical Sections of the Specifications.

B. Contractor shall be familiar with all codes, regulations and all necessary procedures to obtain and pay for all permits, arrange all inspections, and secure necessary releases or sign-offs, which are prerequisite to any utility service connection work.

C. When conflict or violation of law or codes are found during any inspection by the governing agencies, the Contractor shall request such allegation of code conflict or violation, or Request of Correction to be on a written form from the governing agencies. The Contractor shall furnish the Engineer and the Inspector each a duplicate copy of such written notice for review.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.01 BAAQMD REQUIREMENTS AND PERMITS

A. Contractor shall apply for and obtain all required permits from the Bay Area Air Quality Management District to install and operate the standby engine-generator sets. Contractor shall include all permit and application fees with the bid items associated with each standby engine-generator set.

B. Engine generators less than 50 horsepower: The contractor shall submit an application in order to obtain a letter of exemption for all generators less than 50 horsepower. The BAAQMD does not charge permit fees for letters of exemption.

C. The generator at the Cola Ballena pump station is within 1,000 feet of a school; however, it is less than 50 horsepower. Therefore, additional BAAQMD permitting and notification procedures are not anticipated.

D. See Section 16263 Diesel Generator Set and Section 01140 Work Restrictions of these technical specifications for additional requirements.

3.02 BAY CONSERVATION AND DEVELOPMENT COMMISSION (BCDC) PERMIT AND NESTING BIRD SURVEYS

A. See Sections 01140-1.12 and 01140-1.13.

END OF SECTION

SECTION 01500

TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: Furnishing, maintaining, and removing construction facilities and temporary controls, including temporary utilities, construction aids, barriers and enclosures, security, access roads, temporary controls, project signs, field offices and sheds, and removal after construction.

1.02 TEMPORARY UTILITIES

A. Temporary Electrical Power:

1. Arrange with Alameda Municipal Power (AMP) to provide adequate temporary electrical services or provide backup generators as required to complete the work.
2. Provide and maintain adequate jobsite power distribution facilities conforming to applicable Laws and Regulations.
3. Provide, maintain, and pay for electric power for performance of the Work.
    a. When using permanent facilities, provide separate meter and reimburse City for power used in connection with performance of the Work.

B. Temporary Electrical Lighting:

1. In work areas, provide temporary lighting sufficient to maintain lighting levels during working hours not less than lighting levels required by OSHA and state agency which administers OSHA regulations where Project is located.
2. When available, permanent lighting facilities may be used in lieu of temporary facilities.
    a. Prior to Substantial Completion of the Work, replace bulbs, lamps, or tubes used by Contractor for lighting.

C. Temporary Heating, Cooling, and Ventilating:

1. Heat and ventilate work areas to protect the Work from damage by freezing, high temperatures, weather, and to provide a safe environment for workers.

D. Temporary Water:

1. Pay for and provide facilities necessary to furnish potable water for human consumption and use during construction.
2. Pay for water used for construction prior to Completion.

3. The Contractor shall provide and maintain adequate drinking water facilities at locations easily accessible to workers during working hours.
4. The Contractor shall provide the necessary water for this project. The contractor may contact EBMUD to procure a hydrant meter. Contact Julie Sturgeon (510) 287-0357.
5. The Contractor shall not use residential or business water services for any purpose.

E. Temporary Sanitary Facilities:

1. Provide suitable and adequate sanitary facilities that are in compliance with applicable Laws and Regulations.
2. Fixed or potable chemical toilets shall be provided for the use of the Contractor's employees. These accommodations shall be maintained in a neat and sanitary condition. Toilets at construction sites shall conform to the requirements of Title 8, California Code of Regulations.
3. Wastewater conveyance and disposal shall not be interrupted. Should the Contractor disrupt existing sewer facilities, sewage shall be conveyed in closed conduits and disposed of in a sanitary sewer system. Sewage shall not be permitted to flow in trenches or be covered by backfill.
4. The Contractor shall establish a regular schedule for collection of all sanitary and organic waste. All wastes and refuse from sanitary facilities provided by the Contractor or organic material wastes from any other source related to the Contractor's operations shall be disposed of away from the site in a manner satisfactory to the Inspector and in accordance with all laws and regulations pertaining thereto. Disposal of all such wastes shall be at the Contractor's expense.
5. At completion of the Work, remove sanitary facilities and leave site in neat and sanitary condition.

F. Temporary Fire Protection: Provide sufficient number of fire extinguishers of type and capacity required to protect the Work and ancillary facilities.

G. First Aid: Post first aid facilities and information posters conforming to requirements of OSHA and other applicable Laws and Regulations in readily accessible locations.

H. Utilities in Existing Facilities: See Section 01140- Work Restrictions

1.03 CONSTRUCTION AIDS

A. Provide railings, kick plates, enclosures, safety devices, and controls required by Law and Regulations and as required for adequate protection of life and property.

B. Use construction hoists, elevators, scaffolds, stages, shoring, and similar temporary facilities or ample size and capacity to adequately support and move loads.

C. Design temporary supports with adequate safety factor to assure adequate load bearing capability.

1. When requested, submit design calculations by professional registered engineer prior to application of loads.

2. Submitted design calculations are for information and record purposes only.

D. Accident prevention:

1. Exercise precautions throughout construction for protection of persons and property.

2. Observe safety provisions of applicable Laws and Regulations

3. Guard machinery and equipment, and eliminate other hazards.

4. Make reports required by authorities having jurisdiction, and permit safety inspections of the Work.

5. Before commencing construction Work, take necessary action to comply with provision for safety and accident prevention.

E. Barricades:

1. Place barriers at ends of excavations and along excavations to warn pedestrian and vehicular traffic of excavations.

2. Provide barriers with flashing lights after dark.

3. Keep barriers in place until excavations are entirely backfilled and compacted.

4. Barricade excavations to prevent persons from entering excavated areas in streets, roadways, parking lots, treatment plants, or other public or private areas.

F. Warning Devices and Barricades: Adequately identify and guard hazardous areas and conditions by visual warning devices and, where necessary, physical barriers.

1. Devices shall conform to minimum requirements of OSHA and State agency which administers OSHA regulations where Project is located.

G. Hazards in Public or Private Right-of-Way:

1. Mark at reasonable intervals, trenches, and other continuous excavations in public or private right-of-way, running parallel to general flow of traffic, with traffic cones, barricades, or other suitable visual markers during daylight hours.

a. During hours of darkness, provide markers with torches, flashers, or other adequate lights.

2. At intersections or for pits and similar excavations, where traffic may reasonably be expected to approach head on, protect excavations by continuous barricades.

    a. During hours of darkness, provide warning lights at close intervals.

H. Hazards in Protected Areas: Mark or guard excavations in areas from which public is excluded, in manner appropriate for hazard.

I. Protect existing structures, trees, shrubs, and other items to be preserved on Project site from injury, damage or destruction by vehicles, equipment, worker or other agents with substantial barricades or other devices commensurate with hazards.

J. Fences:

1. Enclose site of the Work with fence adequate to protect the Work against acts of theft, violence, and vandalism.

2. Enclose temporary offices and storage areas with fence adequate to protect temporary facilities against acts of theft, violence, and vandalism.

3. When entire or part of site is to be permanently fenced, permanent fence may be built to serve for both permanent and temporary protection of the Work site, provided that damaged or defaced fencing is replaced prior to Substantial Completion.

4. Protect temporary and permanent openings and close openings in existing fences to prevent intrusion by unauthorized persons. Bear responsibility for protection of completed work and material when openings in existing fences are not closed.

5. During night hours, weekends, holidays, and other times when no work is performed at site, provide temporary closures or enlist services of security guards to protect temporary openings.

6. Fence temporary openings when openings are no longer necessary.

1.04 SECURITY

A. The Contractor shall make adequate provision for the protection of the Work area against fire, theft, and vandalism, and for the protection of the public against exposure to injury.

1.05 TEMPORARY CONTROLS

A. Dust Control:

1. Prevent dust nuisance caused by operations, excavation, backfilling, demolition, or other activities.

2. Control dust by sprinkling with water, use of dust palliatives, modification or operations, or other means acceptable to agencies having jurisdiction.

B. Noise Control:

1. Perform operations in manner to minimize noise and remain in conformance with City of Alameda ordinances.

2. Take special measures to suppress noise during night hours.

C. Mud Control:

1. Prevent mud nuisance caused by construction operations, excavation, backfilling, demolition, or other activities.

1.06 PROJECT SIGNS

A. Provide and maintain project identification sign, securely affixed as directed in the field, with clearly legible lettering equivalent to that of a professional sign painter using no more than 5 sign colors.

1. List at least the title of the Project, and names of the City, Design Engineer and Contractor and approximate duration of construction.

2. List normal construction hours and provide a contact telephone number as directed by the City during the preconstruction conference.

1.07 OFFICES

A. Maintain on Project site weather-tight space in which to keep copies of Contract Documents, progress schedule, shop drawings, and other relevant documents.

B. The City will provide meeting space within Alameda containing a conference table and chairs for at least eight persons as required and requested.

1.08 REMOVAL

A. Remove temporary facilities before inspection for Substantial Completion or when directed.

B. Clean and repair damage caused by installation or use of temporary facilities.

C. Remove underground installations to minimum depth of 24 inches and grade to match surrounding conditions.

D. Restore existing facilities used during construction to specified or original condition.

1.09 MAINTENANCE OF SANITARY SEWAGE PUMPING

A. Throughout the duration of pump station rehabilitation and testing, the Contractor shall maintain sanitary sewer service at levels indicated on the plans and specified herein. Contractor is liable for any damage to property, cleanup costs, and regulatory fines associated with pumping failure.

PART 2 PRODUCTS

2.01 TEMPORARY BYPASS PUMPS

A. Contractor shall provide temporary pumps, motors, level controls, alarms, all appurtenances and power necessary to pump raw sewage as required during the course of construction and testing.

B. Temporary pumping equipment and appurtenances shall remain the property of the Contractor and be sufficient to convey the peak wet weather flow rate as identified below at all times **with one full-capacity pump available in reserve**.

C. Pumps shall be driven by electric motors except when the replacement of the primary transformer makes this impossible. The use of engines or engine-generators shall be kept to an absolute minimum.

D. Contractor shall furnish submersible pumps and motors, automatic motor starters and controls, high level alarms, discharge hoses and/or piping and automatic standby power necessary to convey the flows during the construction of the proposed improvements. The estimated peak wet weather flow rates and total dynamic head (with existing force mains) for each pump station where bypass pumping is required are provide below:

1. Harbor Bay Parkway 1
   a. Peak Wet Weather Flow = 910 gpm
   b. Total Dynamic Head at PWWF = 26 feet
2. Cola Ballena
   a. Peak Wet Weather Flow = 75 gpm
   b. Total Dynamic Head at PWWF = 18 feet
3. Marina Village
   a. Peak Wet Weather Flow = 368 gpm
   b. Total Dynamic Head at PWWF = 15 feet
4. Catalina
   a. Peak Wet Weather Flow = 757 gpm
   b. Total Dynamic Head at PWWF = 50 feet
5. Park Otis
   a. Peak Wet Weather Flow = 889 gpm
   b. Total Dynamic Head at PWWF = 40 feet
6. Grand Otis
   a. Peak Wet Weather Flow = 619 gpm
   b. Total Dynamic Head at PWWF = 20 feet
7. Paru

a. The Paru pump station shall remain in service at all times during construction.

E. Prior to equipment demolition, Contractor may use the Owner's existing pumping equipment to meet this requirement. However, Owner does not warrant the condition of existing equipment.

F. The temporary pumping equipment shall not be oversized so as to damage the force main or surcharge the downstream gravity sewer system.

G. Contractor is responsible for damage to property or existing facilities, or wastewater spills to the street or Storm Drain resulting from inadequate temporary pump capacity, mechanical failure, or loss of Contractor supplied power. The temporary pumping equipment shall not be oversized, as it may damage the force main.

2.02 FIRE EXTINGUISHERS

A. A sufficient number of fire extinguishers of the type and capacity required to protect the Work and ancillary facilities, shall be provided and maintained in readily accessible locations.

2.03 TEMPORARY SITE FENCES

A. Except as otherwise provided, the Contractor shall enclose the site of the Work with a fence adequate to protect the Work and temporary facilities against acts of theft, violence, or vandalism.

PART 3 EXECUTION

3.01 BYPASS PUMPING

A. The Contractor shall be responsible for maintaining sewer flow at all times. This may require construction of temporary bypass pipes and manholes and the use of temporary pumps.

B. Bypass pumping operations shall not occur at more than one (1) pump station at a time without approval from the City.

C. The Contractor shall develop and submit a detailed written plan for bypass pumping for each pump station to the City for approval at least 14 days prior to commencing bypass of the flow. The plan shall include but may not be limited to; schematic showing all elements and location of proposed conveyance system, pump curves, bypass piping materials and location, pump control methods, pump power supply, duration of construction activity, temporary alarm and notification system, modification to existing alarm system, bypass monitoring plan, and detailed schedule for operation of bypass pumping.

D. Contractor shall make provisions for temporary pumping to the sanitary sewer force mains or downstream gravity sewer systems whenever the pump stations

are inoperable. Contractor must provide the minimum pump capacity identified herein with complete mechanical redundancy. Contractor is responsible for damage to property or existing facilities, or wastewater spills to the street or storm drain system resulting from inadequate temporary pump capacity, mechanical failure, or loss of power from power sources other than Alameda Municipal Power (AMP). The temporary pumping equipment shall not be oversized so as to damage the force main.

E. Contractor shall have a portable backup power supply available at all times during construction. Backup power supply shall be capable of fully operating the Contractor's temporary bypass pumps, the existing pumps, or the new pumps depending on what method of sewer conveyance is being used at the time. The generator shall be capable of starting and running all bypass pumps, including redundant pumps.

1. Backup power supply shall be connected with an automatic transfer switch (ATS) that will be automatically implemented immediately upon primary power failure.

F. Bypass pumping may only be feasible through existing force mains or directly to the downstream gravity sewer system. Upstream gravity lines shall not be allowed to surcharge at any time during construction.

G. All existing gravity pipe lines and sewer force mains shall remain operational at all times, except as noted otherwise on the Drawings or in the specifications.

H. At a minimum, the Contractor shall maintain high level and power failure alarms at all times during construction. The existing pump station alarm system can be used during construction if desired by the Contractor. Contractor shall coordinate with the City to have the alarm system notify the Contractor.

I. Above ground bypass piping is not allowed within the travel lanes of any roadway during non construction hours.

J. All elements of the bypass pumping system (pumps, pipes, controls, alarms, etc.) shall be tested prior to pump station demolition to verify that it works correctly.

1. Hydrostatic Pressure Test for Pump Bypass Systems:

a. Prior to operation, test each section of discharge piping with maximum pressure equal to 1.5 times maximum operating pressure of system.

b. Notify City 24 hours prior to testing.

2. Full Scale Test:

a. At least 14 days prior to test, notify Engineer of date and time of test.

b. Do not begin temporary flow control activities until successful test has been completed.

c. Conduct test on proposed temporary flow control at least 14 days before scheduled date of actual proposed temporary flow control.

d. Purpose of test is to demonstrate capability, function, and reliability of Contractor's proposed method of temporary flow control.

e. Duration: Minimum of 4 hours.

f. Conduct between 8:00 a.m. and 4:00 p.m. Do not conduct test on Saturday, Sunday, or holiday.

g. If electric pumps are being used, provide standby generators to ensure continuity of pumping operation in event of power failure.

h. Demonstrate system controls and operation, reliability, and transfer to standby equipment during test.

i. Conduct until flow is accommodated for minimum specified test duration.

j. Failure:

1) Test shall be deemed to have failed if during test flows are not accommodated for whatever reason and for whatever length of time.

2) If test fails, determine and correct deficiencies that caused test to fail and conduct another Full Scale Test.

k. 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.

K. Bypass pumping equipment shall remain in place until the new pump station is fully functional and has passed all testing and startup requirements.

L. Contractor shall coordinate pumping with any Alameda Municipal Power service interruptions.

M. 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 telephone numbers for this purpose. All persons listed shall be able to respond to any pump station 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.

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.

3.02 CONTROL POINTS

A. The Contractor shall establish control points to monitor the ground level and settlement surrounding the work. The control points shall be established prior to performing construction operations that affect the groundwater level (dewatering wells or other) or that create significant ground movement or vibrations such as installation or removal of shoring systems. Measurement shall be taken to document vertical movement.

1. The control points shall be set on surrounding utilities, hardscape, and building foundations. Set at least six additional control points surrounding each location that requires monitoring.

B. Perform vertical survey and measurement of control points at least twice before and after construction, and at least once every week throughout the duration of activities that reduce groundwater levels or produce ground vibrations.

C. Provide the City with documentation showing the location of the control points along with weekly measurement data.

3.03 CONSTRUCTION CLEANING

A. The Contractor shall, at all times, keep property on which work is in progress and the adjacent properties 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.

3.04 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 Owner from any and all responsibility in connection with the disposal of material on said property. When material is disposed of as above provided, the Contractor shall conform to all required codes pertaining to grading, hauling, and filling of earth.

3.05 PARKING AND STORAGE AREAS

A. All stockpiled materials and parked equipment at the job site shall be located to avoid interference with private property and to prevent hazards to the public. Locations of stockpiles, parking areas, and equipment storage must be approved by the Owner's Representative.

END OF SECTION

SECTION 01610
SEISMIC DESIGN CRITERIA

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Seismic design criteria for the anchorage of equipment and other items as specified or indicated on the Contract Drawings.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 01330 – Submittal Procedures

B. Section 05501 – Anchor Bolts

1.03 REFERENCES

A. 2016 California Building Code (CBC)

B. American Society of Civil Engineers (ASCE) 7-10 “Minimum Design Loads for Buildings and Other Structures”

1.04 SYSTEM DESCRIPTION

A. Design requirements: Design in accordance with the requirements of the 2016 CBC and ASCE 7-10 for equipment components.

1. Site Class: D
2. Risk Category: III
3. Mapped MCE_R Spectral Response Acceleration Parameter, S_S: To be determined for each specific pump station site.
4. Mapped MCE_R Spectral Response Acceleration Parameter, S_1: To be determined for each specific pump station site.
5. Component Amplification Factor, a_p: In accordance with ASCE 7-10, Table 13.6-1.
6. Component Response Modification Factor, R_p: In accordance with ASCE 7-10, Table 13.6-1.
7. Component Importance Factor, I_p: 1.50
8. Do not use friction to resist sliding due to seismic forces.
9. Do not use more than 60 percent of the weight of the equipment for designing anchors for resisting overturning due to seismic forces.
10. Use cast-in-place anchor bolts or post-installed anchors for resisting seismic forces.

a. Cast-in-place anchor bolts shall have a standard hex bolt head. Do not use anchor bolts fabricated from rod stock with an L or J shape. See Section 05501 – Anchor Bolts.

b. Post-installed anchors shall be either adhesive anchor bolts or expansion anchors. See Section 05501 – Anchor Bolts.

c. Seismic forces must be resisted by direct bearing on the fasteners used to resist seismic forces. Do not use connections which use friction to resist seismic forces.

1.05 SUBMITTALS

A. Shop Drawings and Calculations: Submit shop drawings and seismic calculations in accordance with Section 01330 – Submittal Procedures.

B. Calculations shall be stamped and signed by a civil or structural Professional Engineer licensed in California.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01710
SITE MAINTENANCE AND CLEANUP

PART 1 GENERAL

1.01 DESCRIPTION

A. Work included:

1. Throughout the construction period, maintain the site in a standard of cleanliness as described in this Section.
2. Tie-out and Underground Service Alert (USA) marking removal.

B. Related Work:

1. In addition to standards described in this Section comply with requirements for cleaning as described in Section 01500 “Temporary Facilities”.

1.02 QUALITY ASSURANCE

A. A daily inspection, and more often if necessary, shall be conducted by the Engineer to verify that requirements for cleanliness are being met.

B. In addition to the standards described in this Section, the Contractor shall comply with pertinent requirements of other governmental agencies having jurisdiction over this Work.

PART 2 PRODUCTS

2.01 CLEANING MATERIALS AND EQUIPMENT

A. The Contractor shall provide required personnel, equipment, and materials needed to maintain the specified standard of cleanliness.

PART 3 EXECUTION

3.01 SITE MAINTENANCE

A. General

1. Any stored items shall be placed in an orderly arrangement allowing maximum access, not impeding traffic or drainage, and providing required protection of materials.
2. The accumulation of scrap, debris, waste material and other items not required for construction of the Work shall not be allowed to occur.

B. Site

1. The Contractor shall inspect the site on a daily, and more often if necessary, basis and insure that all scrap, debris, and waste material is removed.

2. The Contractor shall maintain the site in a neat and orderly condition at all times. Both public and private areas shall be cleaned of all materials attributed to or involved in the Work on a daily basis. It is especially important to ensure that the site is left in a safe condition everyday, especially from loose lumber and nails.

C. Material that is stockpiled in the street shall be located no closer than ten feet from a catch basin and, during rainy weather, shall be covered with a waterproof covering. All loose material shall be swept up and removed from gutters at the end of each workday.

D. The Contractor shall collect and remove all saw cut slurry from the work area by the use of a wet vacuum or other method approved by the Engineer. The Contractor shall be responsible for the proper disposal of the collected slurry material.

E. The Contractor shall remove all utility, striping tie-out and USA paint markings upon completion of the work.

1. The method of tie-out and USA marking removal shall be approved by the Engineer prior to commencement of the work. Solvents may not be used.

3.02 FINAL CLEANING

A. The Contractor shall insure that all tools, surplus materials and soil, equipment, scrap, debris, and waste are removed from the project sites and storage area prior to the final inspection. Progress payments and / or retention payments may be held until work has been satisfactorily completed. Final cleaning constitutes part of the base contract.

B. Site:

1. Unless otherwise directed by the Engineer, clean all areas on the site with as specified herein.

2. Completely remove all debris and foreign matter.

C. Schedule final cleaning prior to final acceptance by City.

END OF SECTION

SECTION 01756
TESTING, TRAINING, AND FACILITY START-UP

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: Requirements for equipment and system testing and facility start-up, including the following:

1. Start-up Plan.
2. Performance Testing.
3. General Start-up and Testing Procedures.
4. Functional Testing.
5. Operational Testing.
6. Certificate of Proper Installation.
7. Services of manufacturer's representatives.
8. Training of City's personnel.
9. Final testing requirements for the complete facility.

1.02 GENERAL TESTING, TRAINING, AND START-UP REQUIREMENTS

A. Contract Requirements: Testing, training, and start-up are requisite to the satisfactory completion of the Contract.

B. Complete testing, training, and start-up within the Contract Times.

C. Allow realistic durations in the schedule for testing, training, and start-up activities.

D. Furnish labor, power, tools, equipment, instruments, and services required for and incidental to completing functional testing, performance testing, and operational testing.

E. Provide competent, experienced technical representatives of equipment manufacturers for assembly, installation and testing guidance, and operator training.

1.03 START-UP PLAN

A. Submit start-up plan for each piece of equipment and each system not less than 2 weeks prior to planned initial start-up of equipment or system.

B. Provide a detailed startup schedule with the following activities identified:

1. Manufacturer's services.

2. Installation certifications.
3. Operator training.
4. Submission of Operation and Maintenance Manuals.
5. Functional testing.
6. Performance testing.
7. Operational testing.

C. Provide testing plan with test logs for each item of equipment and each system when specified. Include testing of alarms, control circuits, SCADA RTU status and alarms inputs, capacities, speeds, flows, pressures, vibrations, and other parameters.

D. Provide summary of shutdown requirements for existing systems which are necessary to complete start-up of new equipment and systems.

E. Revise and update start-up plan based upon review comments, actual progress, or to accommodate changes in the sequence of activities.

1.04 PERFORMANCE TESTING

A. Test equipment for proper performance at point of manufacture or assembly when specified.

B. When source quality control testing is specified:

1. Demonstrate equipment meets specified performance requirements.
2. Provide certified copies of test results.
3. Do not ship equipment until certified copies have received written acceptance from Engineer. Written acceptance does not constitute final acceptance.
4. Perform testing as specified in the equipment specification sections.

1.05 GENERAL START-UP AND TESTING PROCEDURES

A. Mechanical Systems: As specified in the individual equipment specification sections and Section 15050:

1. Remove rust preventatives and oils applied to protect equipment during construction.
2. Install and adjust packing, mechanical seals, O-rings, and other seals. Replace defective seals.
3. Remove temporary supports, bracing, or other foreign objects installed to prevent damage during shipment, storage, and erection.
4. Check rotating machinery for correct direction of rotation and for freedom of moving parts before connecting driver.
5. Perform equipment alignment to manufacturer's tolerances.

B. Electrical Systems: As specified in the individual equipment specification sections.

1. Perform insulation resistance tests on wiring except 120 volt wiring, and control wiring inside electrical panels.

2. Perform continuity tests on grounding systems.

3. Test and set switchgear and circuit breaker for proper operation.

4. Check motors for actual full load amperage draw. Compare to nameplate value.

1.06 FUNCTIONAL TESTING

A. Perform checkout and performance testing as specified in the individual equipment specification sections.

B. Functionally test mechanical and electrical equipment, and instrumentation and controls systems for proper operation after general start-up and testing tasks have been completed.

C. Demonstrate proper rotation, alignment, speed, flow, pressure, vibration, sound level, adjustments, and calibration. Perform initial checks in the presence of and with the assistance of the manufacturer's representative.

D. Demonstrate proper operation of each instrument loop function including alarms, local and remote controls, SCADA RTU inputs, instrumentation and other equipment functions.

E. Conduct continuous 8 hour test under normal operating conditions. Replace parts which operate improperly.

1.07 OPERATIONAL TESTING

A. After completion of operator training, conduct operational test of the entire facility. Demonstrate satisfactory operation of equipment and systems in actual operation as field conditions allow.

B. City will provide operations personnel; however, contractor shall provide power, fuel, and other consumables for duration of test.

C. Immediately correct defects in material, workmanship, or equipment which became evident during operational test.

D. Repeat operational test when malfunctions or deficiencies cause shutdown or partial operation of the facility or results in performance that is less than specified.

1.08 CERTIFICATE OF PROPER INSTALLATION

A. At completion of Functional Testing, furnish written report prepared and signed by manufacturer's authorized representative, certifying equipment:

1. Has been properly installed, adjusted, aligned, and lubricated.

2. Is free of any stresses imposed by connecting members or anchor bolts.
3. Is suitable for satisfactory full-time operation under full load conditions.
4. Operates within the allowable limits for vibration.
5. Controls, protective devices, instrumentation, and control panels furnished as part of the equipment package are properly installed, calibrated, and functioning.
6. Control logic for start-up, shutdown, sequencing, interlocks, and emergency shutdown have been tested and are properly functioning.
7. SCADA RTU inputs have been properly transmitted and received at the City's SCADA System Central Monitoring Station. This part of the report is also to be signed by the City's SCADA Consultant.

1.09 TRAINING OF CITY'S PERSONNEL

A. Manufacturers shall provide training for operations, maintenance and troubleshooting of all mechanical and electrical equipment and systems at each Lift Station.

B. Provide all necessary training materials in addition to operating manuals specified elsewhere.

C. Training shall be up to two 8 hour days for up to six people.

1.10 RECORD KEEPING

A. Maintain and submit following records generated during start-up and testing phase of Project:

1. Daily logs of equipment testing identifying all tests conducted and outcome.
2. Logs of time spent by manufacturer's representatives performing services on the job site.
3. Equipment lubrication records.
4. Electrical phase, voltage, and amperage measurements.
5. Insulation resistance measurements.
6. Records of testing and calibration of instrumentation devices and setpoints.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01782
OPERATING AND MAINTENANCE DATA

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: Preparation and submittal of Operation and Maintenance Manuals.

1.02 SUBMITTALS

A. Submit Operation and Maintenance Manuals as part of the shop drawing approval process.

B. Make additions and revisions to the Manuals in accordance with Engineer's review comments.

C. Submit four (4) complete Manuals for each piece of equipment or system after shop drawing approval.

1.03 OPERATION AND MAINTENANCE MANUALS

A. Preparation:

1. Provide first submittal in electronic (PDF) format for review and approval prior to submitting final hard copies.
2. Provide 4 copies of approved Operations and Maintenance Manuals in 3-ring binders with rigid covers. Utilize tab sheets to organize information.
3. Provide electronic PDF copies of all final approved Operation and Maintenance Manuals.

B. Contents of Operation And Maintenance Manuals:

1. Cover Page: Equipment name, equipment tag number, project name, City's name, appropriate date.
2. Table of Contents: General description of information provided within each tab section.
3. Lubrication Information: Required lubricants and lubrication schedules.
4. Control Diagrams:
    a. Internal and connection wiring, wiring diagrams for control panels and connections between existing systems and new additions, and adjustments such as calibrations and set points for relays, and control or alarm contact settings.
5. Start-up Procedures: Recommendations for installation, adjustment, calibration, and troubleshooting.

6. Operating Procedures:
    a. Step-by-step procedures for starting, operating, and stopping equipment under specified modes of operation.
    b. Include safety precautions and emergency operating shutdown instructions.
7. Preventative Maintenance Procedures: Recommended steps and schedules for maintaining equipment.
8. Overhaul Instructions: Directions for disassembly, inspection, repair and reassembly of the equipment; safety precautions; and recommended tolerances, critical bolt torques, and special tools that are required.
9. Parts List: Generic title and identification number of each component part of equipment; include bearing manufacturer, model and ball or roller pass frequencies for every bearing.
10. Spare Parts List: Recommended number of parts to be stored at the site and special storage precautions.
11. Drawings: Exploded view or plan and section views with detailed callouts.
12. Provide electrical and instrumentation schematic record drawings.
13. Provide approved shop and fabrication drawings.
14. Source (Factory) Quality Control Test Results: Provide copies of factory test reports.
15. Field Quality Control Test Results: After field testing is completed, insert field test reports.
16. Equipment Summary Form: Completed form in the format attached at the end of this Section. Insert Equipment Summary Form after the tab sheet of each equipment section. The manufacturer's standard form will not be acceptable.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

EQUIPMENT SUMMARY FORM

1. EQUIPMENT ITEM _____

2. MANUFACTURER _____

3. EQUIPMENT IDENTIFICATION NUMBER(S) _____
(maps equipment number)

4. LOCATION OF EQUIPMENT _____

5. WEIGHT OF INDIVIDUAL COMPONENTS (OVER 100 POUNDS) _____

_____

_____

_____

NAMEPLATE DATA -

Horsepower _____
Amperage _____
Voltage _____
Service Factor (S.F.) _____
Speed _____
ENC Type _____
Capacity _____
Other _____

7. MANUFACTURER'S LOCAL REPRESENTATIVE

Name _____

Address _____

Telephone Number _____

8. MAINTENANCE REQUIREMENTS _____

_____

_____

9. LUBRICANT LIST _____

_____

10. SPARE PARTS (recommendations) _____

_____

11. COMMENTS _____

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 02170
ASBESTOS CEMENT PIPE REMOVAL AND DISPOSAL

PART 1 GENERAL

1.01 DESCRIPTION

A. The project requires cutting, removing, and disposing of existing asbestos cement pipe (ACP) during the prosecution of this work. The Contractor shall remove and dispose of ACP in accordance with State of California requirements, and the Contract Documents. Removal of ACP shall be performed by a Contractor

B. The Contractor shall follow the AWWA guidelines for handling, removing and disposing of ACP as stated in the applicable sections of AWWA Standards C400, C401, C402, and C403 covering Asbestos-Cement Transmission and Distribution Pipe.

1.02 EXISTING SITE CONDITIONS

A. Existing force mains to be abandoned and/or removed consist of asbestos cement (AC) pipe as shown on the plans. The project requires cutting, removing, and disposing of ACP. ACP may also be encountered during trenching activities.

1.03 SUBMITTALS

A. **Asbestos Cement Pipe Removal and Disposal Plan:** The Contractor shall complete and submit an Asbestos Cement Pipe Removal and Disposal Plan for review and approval prior to construction. The Contractor shall clearly describe his proposed methods for the removal and disposal of ACP that ensures no exposure to airborne asbestos by the Contractor's personnel or by the public.

B. The Contractor shall submit documentation certifying that all ACP was transported to, accepted, and properly disposed of, at a legal disposal facility.

PART 2 PRODUCTS

2.01 EQUIPMENT

A. Snap cutting tools shall be used for the removal of asbestos cement pipe whenever the removal of intact pipe sections is not possible. Power "Cut-Off" saws, hand-saws, and other devices and methods that result in the release of asbestos fibers into the air shall not be used for the removal of ACP.

2.02 ENCAPSULANT

A. If during the removal of ACP broken edges occur, the broken edges shall be encapsulated with Certane 1000 Post Removal Encapsulant, or approved equal.

PART 3 EXECUTION

3.01 GENERAL

A. The Contractor shall perform all cutting and handling of asbestos cement pipe in accordance with State of California requirements. The Contractor shall provide sufficient supervision and perform monitoring to assure conformance with State requirements. Under no circumstances shall the Contractor utilize methods of removal that result in the release of asbestos fibers into the air.

3.02 REMOVAL

A. The Contractor shall, whenever possible, accomplish the removal of ACP by removing intact pipe sections.

B. Snap cutting tools shall be used for the removal of ACP whenever the removal of intact pipe sections is not possible. The pipe shall be wetted prior to the snapping operation being performed. Use of a hammer and chisel to gradually split an ACP coupling lengthwise may only be performed if the “Asbestos Cement Pipe Removal and Disposal Plan” developed by the Contractor incorporates measures to prevent the release of asbestos fibers into the air, and is approved by the City. Power “Cut-Off” saws, hand-saws, and other devices and methods that result in the release of asbestos fibers into the air shall not be used for the removal of ACP.

C. The Contractor shall continuously wet the ACP around the snap cutting tool during the removal operation. All personnel handling the ACP shall wear properly fitted respirators during the removal and bagging operation, and shall be trained in the use of the respirator equipment. All pedestrian traffic shall be rerouted to maintain 30 feet clear of the ACP work area.

D. All removed sections or pieces of ACP shall be bagged and prepared for disposal immediately after removal as described below. If during the removal of ACP broken edges occur, the broken edges shall be encapsulated with Certane 1000 Post Removal Encapsulant, prior to bagging, in accordance with the manufacturers recommendations.

3.03 DISPOSAL

A. The Contractor shall transport and dispose of all sections and pieces of ACP in accordance with State requirements at a legally operating landfill that accepts ACP. All sections or pieces of ACP shall be wetted and double wrapped or bagged with polyethylene wrap immediately after removal. The minimum thickness of polyethylene wrap shall be 6 mils. The outer wrap shall be securely

held in place with tape in a manner to prevent the release of airborne asbestos fibers.

B. The Contractor shall submit documentation certifying that all ACP was transported to, accepted, and properly disposed of, at a legal disposal facility.

END OF SECTION

THIS PAGE IS INTENTIONALLY BLANK

SECTION 02200
SITE PREPARATION

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: Clearing and preparing project site for work activities.

B. Related Sections:

1. Section 01145 - Contractor's Use of the Premises.
2. Section 01354 - Hazardous Materials Procedures.
3. Section 01500 - Temporary Facilities and Controls.

1.02 DEFINITIONS

A. Clearing: Consists of removal of natural obstructions and existing foundations, buildings, fences, lumber, walls, rubbish, pavement, landscaping, and any other items which shall interfere with construction operations or are designated for removal.

1.03 QUALITY ASSURANCE

A. Regulatory Requirements: Verify and comply with applicable regulations governing noise, dust, nuisance, drainage and runoff, fire protection, and disposal.

B. Pre-construction Conference: Discuss order and method of work.

1.04 PROJECT CONDITIONS

A. Environmental Requirements:

1. For suspected hazardous materials found, comply with Section 01354 - Hazardous Materials Procedures.

B. Existing Conditions:

1. Verify character and amount of material and rubbish involved and work to be performed.

C. The Contractor shall adhere to appropriate methods recommended by the Bay Area Air Quality Management District to minimize airborne pollution, including but not limited to frequent watering of open trenches, covering of excavated dirt and related actions.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verification of Conditions: Examine site and verify existing conditions for beginning work.

3.02 PREPARATION

A. Protect existing improvements from damage by site preparation work. Install fence at drip line of trees to remain as necessary to prevent damage from operations.

3.03 INSTALLATION

A. Clearing:

1. Clear areas where construction is to be performed and other areas as indicated on the Drawings or specified in this Section of pavement, fences, lumber, walls, concrete, rubbish, and other objectionable material of any kind which, if left in place, would interfere with proper performance or completion of the work, would impair its subsequent use, or form obstructions therein.

2. Do not incorporate material from clearing operations in fills and backfills.

3. Contractor's Temporary Construction Facilities: Fill or remove pits, fill, and other earthwork required for erection of facilities, upon completion of the work, and level to meet existing contours of adjacent ground.

3.04 PRESERVATION OF PROPERTY

A. The project area shall be cleared **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 Engineer, 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 and pavement if necessary shall be in accordance with the provisions of Section 15-3 of the State 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 construction under existing asphalt pavement or the replacement of existing asphalt pavement, the existing pavement shall be removed and disposed of off-site.

3.06 REMOVAL OF DEBRIS

A. All demolished and cleared material and equipment shall become the property of the Contractor and shall be legally disposed of by the Contractor.

B. Demolished concrete shall not be buried in structure backfill areas.

3.07 CLEANING WETWELL

A. Contractor is responsible for cleaning and removing solids within existing wetwells and manholes (where work is proposed) prior to construction and for maintaining a clean wetwell as necessary during construction. This may include removal of debris and solids within the wetwell.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 02222
SELECTIVE DEMOLITION

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: Demolition of buildings and appurtenant structures.

B. Related Sections:

1. Section 01140 - Work Restrictions.
2. Section 01710 - Site Maintenance and Cleanup.
3. Section 02532 – Manhole and Pipe Abandonment and Demolition
4. Section 03300 – Cast-in-Place Concrete.

1.02 SUBMITTALS

A. Demolition plan and schedule.

B. Disposal means and locations.

1.03 PROJECT CONDITIONS

A. Environmental Requirements:

1. Conform to existing environmental requirements and regulations regarding noise, dust, and vibration.

B. Existing Conditions:

1. Verify that utility services are disconnected.

1.04 SEQUENCING AND SCHEDULING

A. Sequencing

1. See Section 01140 for sequencing and scheduling requirements.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions pertaining to demolition work.

3.02 PREPARATION

A. Utilities:

1. Disconnect any remaining utility services that will no longer be active, or will not be used during construction to maintain an operating facility.
2. Remove all disconnected utilities within the site.
3. Repair utility mains as necessary in conformance with City of Alameda Standard Specifications and Details.

B. Protection:

1. Use saw cutting and other methods acceptable to Engineer to protect adjacent facilities.
2. Provide berms and other means acceptable to Engineer to keep drainage from demolition areas.

3.03 DEMOLITION

A. Completely remove from project site structures specified or indicated on the Drawings to be demolished.

B. Unless otherwise specified or indicated on the Drawings, demolition includes removal of slabs, footings, foundations, piping, conduits, and appurtenances and backfilling of any resulting voids in the subgrade with suitable excavated or imported material, compacted to 95 percent relative density.

C. The City maintains the right of refusal to retain any and all materials and equipment identified to be removed from the site. The contractor shall coordinate with the City prior to demolition to identify the items that the City would like to retain. The Contractor shall remove the items to be retained from the pump station, set them aside, and notify the City. The City will pick up the items up from the site.

D. Demolition debris shall be handled in conformance with Section 01710, “Site Maintenance and Cleanup.”

E. See Section 02532 for manhole and pipe abandonment and demolition requirements.

3.04 TREE REMOVAL

A. All trees shown on the plans to be removed shall be safely removed and properly disposed of off-site. Removal shall include tree stumps and roots two inches or larger in diameter to a minimum depth of twelve inches below grade. Portions of tree stumps and roots located within the excavation for improvements shall be removed. Removed trees, stumps and roots shall become the property of the Contractor and shall be removed from the project site.

B. All debris resulting from tree removal work, including broken branches, fallen leaves, wood chips, and sawdust produced from stump and root removal work, shall be promptly removed from the work site. If the tree to be removed is within the drip line of any other tree that is to remain, the tree removal work shall be done under the direction of a Certified Arborist. The holes resulting from tree stump and tree root removal activities shall be backfilled as provided in Section 02300, “Earthwork”, of these Specifications.

C. The Contractor shall receive written authorization from the City prior to removing any tree, even those indicated for removal on the Plans.

D. Prior to construction the Contractor shall review and clearly mark all trees to be removed with a representative of the City.

E. Burning of trees and debris on-site is not permitted.

END OF SECTION

THIS PAGE IS INTENTIONALLY BLANK

SECTION 02223
LIGHTWEIGHT ENGINEERED FILL

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: Light weight engineered fill material.

B. Related Sections:

1. Section 02100 - Clearing and Demolition
2. Section 02300 - Earthwork.
3. Section 03300 - Cast in Place Concrete.

1.02 REFERENCE STANDARDS

A. American Society for Testing and Materials (ASTM):

1. C 94 - Ready Mix Concrete
2. C 150 - Portland Cement
3. C 796 - Foaming Agents for Use in Producing Cellular Concrete Using Preformed Foam

1.03 QUALITY ASSURANCE

A. Skilled workmen who are trained, experienced and familiar with the specified requirements and methods for proper performance of this work shall be used.

B. Specialized batching, mixing, and placing equipment shall be automated.

1.04 SUBMITTALS

A. Mix Design: Mix design shall be submitted and shall show names and brands of all materials, proportions, slump, strength, gradation, and location to be used on job.

B. Product Data: Manufacturer's catalog sheets including instructions for use and description of application shall be provided for all materials.

C. Weight and Batch Tags: Weight and batch tags will be supplied to the engineer upon request.

PART 2 PRODUCTS

2.01 MATERIALS

A. Lightweight Engineered Fill shall be hand excavatable mixture of cement, foam, and water that has been mixed, in accordance with ASTM C94.

B. Lightweight Engineered Fill Materials:

1. Portland cement shall comply with ASTM C150 (Type II).
2. Fly ash shall be Class C or Class F and compatible with foaming agent.
3. Water shall be free from deleterious substances.
4. Foam shall be Geofill Concentrate conforming to ASTM C796; or equal.
5. Admixtures for water reducing, retarding, accelerating, anti-washout and other specific properties may be used when specifically approved by the manufacturer of the preformed foam.

C. Lightweight Engineered Fill shall meet the following requirements, unless otherwise specified:

1.	Cast Density, Per ASTM D2922:	26-30 PCF
2.	Minimum Compressive Strength:	50 PSI
3.	Min 12 hr Compressive Strength:	20 PSI
4.	Maximum Compressive Strength:	150 PSI
5.	Freeze-Thaw Resistance:	330 Cycles
6.	Min Modified Shear Modulus (G) per ASTM D4015at confining stress of 3 PSI:	27,000 PSI
7.	Young's Modulus (E) based on Poisson's Ratio u=0.22 and E=2G(1+u):	67,000 PSI
8.	Min Relative E percent at cast:	70%
9.	Max Water Absorption after 120 days:	20%
10.	Coefficient of Permeability (k) per ASTM D2434:	
	a. Confining Stress, 2.5 PSI	4.7x10-5 cm/sec
	b. Confining Stress, 18 PSI	1.9x10-5 cm/sec

PART 3 EXECUTION

3.01 INSTALLATION

A. Production:

1. Foam generating equipment shall be used to produce a predetermined quantity of pre-formed foam which shall be mixed and blended with cementitious slurry. Equipment shall be calibrated to produce consistent foam with stable, uniform cellular structure.
2. When producing neat cellular concrete (no sand or other aggregates), pre-formed foam under no circumstances shall be added or blended with cementitious slurry in a transit mixer.

3. Lightweight Engineered Fill shall be produced utilizing specialized automated proportioning, mixing, and foam producing equipment, which is capable of meeting the specified properties.

4. Avoid excessive handling of the material. After sufficient mixing of the foam with slurry, Lightweight Engineered Fill shall be conveyed promptly in its final location.

5. All equipment used must be approved by foam manufacturer.

B. Placement

1. Prior to placement of Lightweight Engineered Fill, the ground surface shall be excavated to the lines and grades shown on the plans.

2. There shall be no standing water in the area to be filled. If necessary, dewatering shall be continuous during placement of materials.

3. Any items to be encased in Lightweight Engineered Fill shall be set in place and secured prior to installation of material.

4. Placement shall not be allowed on frozen ground.

5. Place Lightweight Engineered Fill in such a manner so that minimal consolidation of material occurs during or after placement. Placement of Lightweight Engineered Fill shall not exceed depths as recommended by the manufacturer.

6. Final surface of Lightweight Engineered Fill shall be within +/- 0.2 feet of the plan elevations.

7. Lightweight Engineered Fill shall not be disturbed or loaded until the material has attained an adequate compressive strength

3.02 TESTING

A. During placement of the initial batches, check the density and adjust the mix as required to obtain the specified cast density at the point of placement.

B. Sampling and Testing: The City's agent will perform sampling and testing of materials during placement. Contractor shall accommodate for the testing procedures and supply materials as requested.

3.03 COMPLETION

A. Vehicle loads shall not be placed on areas supported by lightweight engineered fill until that fill has reached its 28-day compressive strength.

B. At the completion of fill placement, the site shall be left in a clean and finished condition.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 02260
EXCAVATION SUPPORT AND PROTECTION

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: Requirements for designing, furnishing and installing, maintaining, and removing excavation support and protection.

B. Related Sections:

1. Section 02318 - Trenching.
2. Section 02300 – Earthwork.

1.02 REFERENCES

A. American Institute of Steel Construction, Inc. (AISC):

1. Manual of Steel Construction Allowable Stress Design.

B. American Society of Civil Engineers:

1. Guidelines of Engineering Practice for Braced and Tied-Back Excavations.

C. California Code of Regulations (CCR):

1. Title 8 - Construction Safety Orders.

D. California Labor Code Sections 6705 to 6707 (CLC).

E. Department of the Navy Naval Facilities Engineering Command (NAVFAC):

1. NAVFAC Design Manual 7.2 - Foundations and Earth Structures.
2. NAVFAC Design Manual 7.3 - Soil Dynamics Deep Stabilization and Special Geotechnical Construction.

F. International Code Council (ICC):

1. California Building Code (CBC).

G. State of California Department of Transportation (Caltrans):

1. Caltrans California Trenching and Shoring Manual.

H. United States Steel Corporation (USS):

1. USS Steel Sheet Piling Design Manual.

1.03 DEFINITIONS

A. General Engineering Design Practice: General engineering design practice in area of the Project, performed in accordance with recent engineering literature on subject of shoring and stability of excavations.

B. Shoring: A temporary structural system designed to support vertical faces, or nearly vertical faces, of soil or rock for purposes of excavation. Shoring includes internally braced sheet piling, slurry walls, soldier piles and lagging, and other similar shoring systems. Sloping of the soil is not shoring.

1.04 CONTRACTOR'S RESPONSIBILITIES

A. CONTRACTOR assumes full and complete responsibility for excavation support and protection, including shoring design and installation.

B. The review of CONTRACTOR's shoring system design, submittals and/or installations by the ENGINEER does not relieve CONTRACTOR of his responsibility for excavation safety. This requirement shall apply continuously and is not limited to normal working hours.

C. CONTRACTOR's reliance upon documents furnished by City does not provide relief from these requirements.

1.05 SYSTEM DESCRIPTION

A. **Contractor shall note the presence of bay mud material and shallow groundwater as discussed and identified in the project geotechnical report. In order to effectively shore the excavations and protect the adjacent infrastructure and utilities, slide rail shoring systems and/or interlocking sheet piles may be required.** The shoring systems shall be installed such that the intrusion of groundwater is kept to an absolute minimum.

B. Acceptable means for shoring the wetwell excavation for the Cola Ballena Pump Station shall include one of the following methods. **No other shoring methods will be acceptable for the wetwell excavation**. The shoring systems shall be installed such that the intrusion of groundwater is kept to an absolute minimum.

1. Interlocking sheet piles
2. Drilling and installation of a large diameter casing.
3. Slide-rail shoring system with methods for minimizing water intrusion into excavation.

C. **Shoring drawings and calculations for all shoring systems for excavations deeper than 5 feet shall be prepared and signed by a civil or structural engineer registered in California.**

1. Provide design calculations that clearly disclose assumptions made, criteria followed, and stress values used for the materials being used.

2. Furnish references acceptable to ENGINEER substantiating appropriateness of design assumptions, criteria, and stress values.

D. Design Loads:

1. Contractor shall design all shoring elements using the soil unit weights and parameters identified in the Geotechnical Investigation Report included as an attachment to these specifications.

E. Design Requirements:

1. General:

a. Design means for safe and stable excavations in accordance with general engineering design practice.

1) The preceding requirement shall not apply to trench excavation support conforming to standards set forth in CCR Title 8 - Construction Safety Orders.

b. Design steel members in accordance with the California Building Code and the AISC Manual of Steel Design.

c. Design shoring involving materials other than steel in accordance with California Building Code.

d. When electing to design with material stresses for temporary construction higher than allowable stresses prescribed in the Manual of Steel Construction and the California Building Code, increase in such stresses shall not exceed 10 percent of value of prescribed stresses.

e. Minimum safety factor used for design shall not be less than 1.3.

f. The calculated minimum depth of penetration of shoring below the bottom of the excavation shall be increased not less than 30 percent if the full value of passive pressure is used in the design.

g. The maximum height of cantilever shoring above the bottom of excavation shall not exceed 15 feet. Use braced shoring when the height of shoring above the bottom of excavation exceeds 15 feet.

h. The location of the point of fixity for shoring shall not be less than half the calculated minimum embedment depth below the bottom of the excavation.

i. Generally acceptable references for the design of shoring and excavations are as follows:

1) Caltrans California Trenching and Shoring Manual.

2) NAVFAC Design Manual 7.2 - Foundations and Earth Design.

3) NAVFAC Design Manual 7.3 - Soil Dynamics Deep Stabilization and Special Geotechnical Construction.

4) USS Steel Sheet Piling Design Manual.

5) Guidelines of Engineering Practice for Braced and Tied-Back Excavations published by American Society of Civil Engineers.

j. Shoring design shall be performed by a Civil or Structural Engineer licensed to practice in California. Include costs for this shoring design in the bid.

2. Soldier Piles and Lagging:

a. Soldier pile and lagging systems shall not be used in areas where bay mud soils are present.

b. Provide lagging over the full face of the excavation. Joints between pieces of lagging shall be tight to prevent loss of soil.

c. Provide full face lagging all around penetrations through the lagging.

d. If the soldier piles are installed in predrilled holes, the predrilled holes shall be filled with control density backfill after the soldiers piles are installed.

e. The effective width of driven soldier piles for passive soil resistance shall not exceed 2 times the width of the pile. The effective width of concrete encased soldier piles for passive soil resistance shall not exceed 2 times the width of the concrete encasement.

f. Fill voids behind lagging with gravel or other material acceptable to the ENGINEER.

g. Apply loads from tie back soil, rock, or deadman anchors concentrically to soldier piles or wales spanning between soldier piles. Wales shall be back-to-back double channels or other members acceptable to the ENGINEER. Eccentrically loaded with section soldier piles or wales are not acceptable.

h. Tie backs shall not be used in bay mud soils.

3. Soil Anchors, Rock Anchors, and Deadmen Anchors:

a. Design tie back anchors for a safety factor of not less than 2 times the calculated load from the shoring.

b. Proof load all production anchors to not less than 125 percent of the calculated load from the shoring. Lock off anchors at the calculated anchor load.

c. The length of soil anchors used to calculate resistance to load from the shoring, shall not include any length within the potential active pressure soil failure zone behind the face of shoring.

d. Apply load from anchors concentrically to wales and other shoring members.

e. Design tie rods for anchors for 130 percent of the calculated load from the shoring.

f. Design tie rods for anchors for 150 percent of the calculated load from the shoring when tie rod couplers are used and for other conditions where stress concentrations can develop.

F. Performance Requirements:

1. General:

a. Support faces of excavations and protect structures and improvements in vicinity of excavations from damage and loss of function due to settlement or movement of soils, alterations in ground water level caused by such excavations, vibration associated with installation and removal of excavation support structures, and related operations.

b. Herein Specified Provisions:

1) Complement, but do not substitute or diminish, obligations of CONTRACTOR for the furnishing of a safe place of work pursuant to provisions of the Occupational Safety and Health Act of 1970 and its subsequent amendments and regulations and for protection of the Work, structures, and other improvements.

2) Represent minimum requirement for:

a) Number and types of means needed to maintain soil stability.

b) Strength of such required means.

c) Methods and frequency of maintenance and observation of means used for maintaining soil stability.

2. Provide safe and stable excavations by means of sheeting, shoring, bracing, sloping, and other means and procedures, such as draining and recharging groundwater and routing and disposing of surface runoff, required to maintain the stability of soils and rock.

3. Provide support for trench excavations for protection of workers from hazard of caving ground.

4. Provide Shoring:

a. Where, as result of excavation work and analysis performed pursuant to general engineering design practice, as defined in this Section:

1) Excavated face or surrounding soil mass may be subject to slides, caving, or other types of failures.

2) Stability and integrity of structures and other improvements may be compromised by settlement or movement of soils, or changes in soil load on structures and other improvements.

b. For trenches 3 feet and deeper.

c. For trenches less than 3 feet in depth, when there is a potential for cave-in.

d. Where indicated on the Drawings.

5. For safe and stable excavations, use appropriate design and procedures for construction and maintenance to minimize settlement of supported ground and to prevent damage to structures and other improvements, including:

a. Using stiff support systems.

b. Following appropriate construction sequence.

c. Preventing soil loss through or under support system.

1) Provide support system that is tight enough to prevent loss of soil and extend deep enough to prevent heave or flow of soils from supported soil mass into the excavation.

d. Providing surface runoff routing and discharge away from excavations.

e. Where dewatering is necessary, recharge groundwater as necessary to prevent settlement in area surrounding excavation.

f. Where sheet piling is used, use interlocking type sheets including interlocking corners. The sheet piles shall be continuous and driven in interlock. If the bottom of the excavation is located below the water table, use "thumb and finger" type interlock.

g. Not applying shoring loads to existing structures and other improvements.

h. Not changing existing soil loading on existing structures and other improvements.

i. Provide welded steel packing between soil retaining members such as sheet piles and wales and similar members when the gap exceeds 1/2 inch before the wales are loaded.

6. Do not use cantilever sheet pile shoring. When sheet piling is used, provide a braced system with a minimum of 2 levels of wales and braces. Locate top level of wales and bracing within 5 feet of the top of the sheets.

7. Use template for driving sheet piles to minimize need for pulling and redriving sheet piles in the attempt to drive them plumb in areas where bay mud is present.

1.06 SUBMITTALS

A. Shop Drawings and Calculations:

1. In accordance with requirements in California Labor Code for trench excavations 5 feet or more in depth and for trenches less than 5 feet in depth when there is potential for cave-in. Submit in advance of excavation work, detailed drawings showing means for safe and stable excavations.

a. Where such drawings vary from excavation support standards set forth in California Code of Regulations Title 8 - Construction Safety Orders, submit design calculations pursuant to general engineering design practice.

b. Provide means for safe and stable excavations that are not less effective than required in CCR Title 8 - Construction Safety Orders.

2. For excavations other than trenches, submit, in advance of excavation work, design calculations as performed pursuant to general engineering design practice, as specified in this Section, and detail drawing showing

means for safe and stable excavations. In design calculations and detail drawing, cover, as a minimum:

a. Excavations adjacent to structures and other improvements, and

b. Excavations 5 feet or more in depth, or less than 5 feet in depth when there is potential for cave-in, at other locations.

3. Submit Following:

a. Provide calculations for the different load, support, and other conditions that occur during the sequence of installation of shoring, construction of facilities protected by the shoring, and sequence of removal of shoring.

b. Provide sketches showing the condition at various stages of installation and removal of shoring.

c. Show structures, pipelines, and other improvements located near the shoring, and the shoring on a plan.

d. When utilities penetrate the shoring, submit an elevation of all sides of the shoring showing the locations of the penetrations. Submit details on ground support and sealing around utility penetrations.

B. Control Points and Schedule of Measurements:

1. Control points shall be established and monitored for all activities that affect the groundwater level (dewatering wells or other) or that create significant ground movement or vibrations as specified in Section 01500-3.02.

2. Contractor shall establish control points on shoring systems to monitor movement during construction.

3. Submit location and details of control points and method and schedule of measurements in accordance with requirements of this Section.

4. Promptly upon constructing control points and making measurements at such control points, as specified in this Section, submit copy of field notes with such measurements. The field notes shall show the current measurement and the change in measurement from the first measurement taken.

C. Detailed Sequence of Installation and Removal of Shoring:

1. Consider effects of ground settlement in the sequence of installation and removal of shoring.

2. Provide sketches showing the conditions at various stages in the sequence of installation and removal of shoring.

3. Contractor shall consider leaving sheet piles and/or excavation casings in place after construction to minimize ground movement and settlement.

4. Removal of sheet piles is only acceptable if it can be done in a manner that does not produce excessive ground movement and vibrations. If sheet pile

removal causes excessive vibration the Contractor will be required to alter the sheet pile removal methods or abandon the sheet piles in place at no additional cost to the City.

5. Clay and silt may stick to sheet piles when sheet piles are removed.

D. Submit submittals for stability of excavations as a complete package and include all items required in this section. Incomplete submittals will not be reviewed and will be returned for resubmittal as a complete package. Complete submittal shall include all necessary information regarding the dewatering system as specified in Section 02300.

1.07 SEQUENCING AND SCHEDULING

A. Do not begin work on excavations, trenches, and means for providing stability of excavation and trenches until submittals have been accepted by ENGINEER and until materials necessary for installation are on site.

B. Submit submittals a minimum of 30 days prior to the scheduled date to begin excavation work.

C. Do not begin construction of any shoring or excavation operations until:

1. Control points as specified in this Section and as indicated on the Drawings on existing structures and other improvements have been established and surveyed to document initial elevations and locations.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.01 INSTALLATION AND REMOVAL

A. Install means for providing safe and stable excavations as indicated in the submittals section above.

B. Except for concrete encased soldier piles, slurry walls, sheet piles, and similar shoring systems, remove shoring by completion of the Work. Select shoring system and method of removal, which will minimize soil that sticks to shoring from creating large voids and causing settlement. To prevent settlement caused by pulling shoring, fill voids with sand, pea gravel, or pressure injected grout. The methods used shall prevent settlement.

C. Contractor shall consider Contractor shall consider leaving sheet piles and/or excavation casings in place after construction to minimize ground movement and settlement.

3.02 MAINTENANCE

A. Where loss of soil occurs, plug gap in shoring and replace lost soil with fill material acceptable to ENGINEER.

B. Where measurements and observations indicate possibility of failure or excessive movement of excavation support, determined in accordance with general engineering design practice, take appropriate action immediately.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 02300
EARTHWORK

PART 1 GENERAL

1.01 SUMMARY

A. The general extent of all excavation, fill and grading is shown on the Plans.

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 fill.
6. Finish grading.

C. Related Sections:

1. Section 01140 – Work Restrictions.
2. Section 02223 – Lightweight Engineered Fill
3. Section 02260 - Excavation Support and Protection.
4. Section 02318 - Trenching.
5. Section 02722 - Aggregate Base Course.
6. Section 03300 - Cast-In-Place Concrete.

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 3017 - Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).
9. D 4318 - Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

C. Division of Industrial Safety (DIS).

D. Institute of Makers of Explosives (IOMOE).

E. Occupational Safety and Health Act (OSHA).

F. State of California Department of Transportation (Caltrans).

1.03 DEFINITIONS

A. Excavation: Consists of satisfactory loosening, removing, loading, transporting, depositing, and compacting in final location, wet and dry materials, necessary to be removed for purposes of construction, or as required for ditches, grading, roads, and such other purposes as are indicated on the Plans.

B. Backfill Adjacent to Structure: Is backfill around the exterior surfaces of a structure from the bottom of the excavation to finish grade.

C. In-Place Density of Compacted Backfill: Is density determined in accordance with ASTM D 1556, or with ASTM D 2922 and ASTM D 3017.

D. Maximum Density: Is maximum density obtained in laboratory when tested in accordance with ASTM D 1557 and ASTM D4253 for levee toe drain aggregate.

E. Definitions Related to Compaction of Coarse Fill:

1. One Pass: Defined as one movement of roller over area being compacted.
2. Measurement Of Pass Width: Measure width of pass between centers of outside tires or outside edge of roller wheel.

F. Optimum Moisture Content: Is the optimum content at the maximum density when tested in accordance with ASTM D 1557.

1.04 SYSTEM DESCRIPTION

A. Performance Requirements:

1. General:

a. Obtain acceptable material from other sources if surplus or borrow materials obtained within project site do not conform to specified requirements or are not sufficient in quantity for structural backfill.

b. No extra compensation will be made for hauling fill materials or for water required to compact fills.

2. Subgrade Preparation:

a. Where mud or other soft or unstable material is encountered, 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 crushed rock. The stabilization fabric (Mirafi 140N or approved equal) should be wrapped around the backfill up to the bottom of the excavation.

3. Structural Backfill:

a. Material for Backfill: As specified in these specifications

4. Compacted Fills:

a. Provide specified compaction for backfill, fill, and other earthwork.

b. The City will perform confirmation tests to verify and confirm that work has complied, and is complying at all times, with requirements specified in this Section concerning field quality control testing.

5. Borrow Area:

a. Where borrow material is required, provide such material from source selected by the Contractor, subject to acceptance by the Engineer, but not necessarily from within project site.

b. Use of imported borrow shall not cause additional cost to the Contract.

B. Environmental Requirements:

1. Keep excavations reasonably free from water.

2. Provide standby power to ensure continuous dewatering in case of power failure.

1.05 SUBMITTALS

A. Product Data: Submit material source, gradation, and testing data for all materials, including imported and on-site materials.

B. Test Reports: Submit certified test reports of all tests specified to be performed by the Contractor. Test reports shall be signed and sealed by a registered geotechnical engineer in the state of California.

C. Excavation Plan: Submit proposed excavation plan which shall include a detailed description of materials and equipment to be used, limits of excavation, material stockpile locations, and a shoring plan in accordance with Section 02260.

D. Dewatering Plan: Proposed dewatering plan including arrangement, location, and depths of system components, type, and sizes of filters, water sample, and required permits.

1.06 QUALITY ASSURANCE

1. Compaction Sequence Requirements: Until specified degree of compaction on previously specified amounts of earthwork is achieved, do not perform additional earthwork of the same kind.
2. After satisfactory conclusion of initial compaction demonstration and at any time during construction, provide confirmation tests as directed by the Engineer.
3. Dewatering: Dispose of water from dewatering in accordance with Section 3.08

1.07 SEQUENCING AND SCHEDULING

A. Schedule earthwork operations to meet requirements as provided in this Section for excavation and uses of excavated material.

B. Excavation and Filling: Perform excavation and filling, during construction, in manner and sequence that provides drainage at all times.

PART 2 PRODUCTS

2.01 MATERIALS

A. Water for Compacting Fills: Use water from source acceptable to Engineer.

B. Fill Materials:

1. General:
    a. Provide aggregate base course, select material, bedding, engineered fill and native material, where required for fill and backfill.
    b. Obtain material for fills from cut sections or from borrow sources.
    c. Provide material having maximum particle size not exceeding 1 inch and that is free of trash, lumber, debris, leaves, grass, roots, stumps, and other vegetable matter.
    d. Fill materials provided shall be free of environmental contaminates.
    e. Materials derived from processing demolished or removed asphalt concrete are not acceptable.
    f. Proposed imported fill shall be approved by the Engineer at least five working days prior to site delivery. Compliance testing for aggregate base may require up to ten days.
2. Crushed Rock: Crushed rock for mat foundation underlayment and where necessary to stabilize excavation bottom shall be a clean, durable, open graded rock meeting the requirements of ASTM No. 57 Stone with the following gradation:

Sieve Size	Percent Passing
1 1/2-inch	100
1-inch	95-100
1/2-inch	25-60
No. 4	0-10
No. 8	0-5

3. Aggregate Base Course: As specified in Section 02722.
4. Controlled Density Fill (CDF) or Controlled Low Strength Material (CLSM):
   a. Controlled Density Fill (CDF) or Controlled Low Strength Material (CLSM): CDF/CLSM shall be self-compacting upon backfilling placement and shall be composed of cementitious materials, aggregates, water, and an air-entraining admixture, as follows:
      1) Cementitious materials shall be Portland cement in combination with fly ash.
      2) Admixture shall be an air-entraining agent.
      3) CDF admixture shall contain no aggregate larger than 3/8 inch. Amount passing a No. 200 sieve shall not exceed 12 percent. No plastic fines shall be present.
      4) Total calculated air content shall not exceed 30 percent, as tested in accordance with ASTM C231.
      5) CDF shall have an unconfined compressive strength at 28 days from a minimum of 50 psi to a maximum of 150 psi
5. Pipe Bedding and Pipe Zone Material:
   a. As shown on the plans and specified herein, the pipe bedding and pipe zone material shall be drain rock (3/4" crushed rock). Drain rock shall consist of clean, durable, crushed, uniformly graded angular drain rock conforming to Caltrans Standard Specifications. It shall be composed of hard durable, sound pieces free from slaking or decomposition under action of alternate wetting and drying.
   b. Drain rock shall conform to the following requirements:

Property		**Test Procedure**
Sieve Size	**Percent Passing**	
3/4-inch	100	ASTM D422
No. 200	Less than 3	ASTM D422
Durability Index:		
40 minimum		CTM D229
Percent Crushed Particles:		
95% minimum		CTM 205

6. General Fill:

   a. Material for general site filling should be obtained from suitable native or import material as described herein.

7. Native Material:

   a. Sound, earthen material passing 1 inch sieve.

   b. Free from sod, large lumps, boulders, rocks, roots, brush, or other objectionable material, and free of hazardous materials as defined by Section 25117 of the State Health and Safety Code.

   c. Percent of material by weight passing Number 200 sieve shall not exceed 30 when tested in accordance with ASTM C 136.

   d. Expansion index less than 35.

   e. The use of Bay Mud as a fill material is unacceptable.

8. Lightweight Backfill:

   a. Lightweight backfill shall conform to ASTM C330 Standard Specifications for lightweight Aggregates for Structural Concrete.

   b. Lightweight backfill shall meet the following gradation:

Sieve Size	Percent Passing
1-inch	100
3/4-inch	80-100
3/8-inch	10-50
No. 4	0-15
No. 100	0-5

   c. The dry loose unit weight of lightweight backfill shall be less than 75 pcf. The compacted in-place density shall be less than 80 pcf as measured in accordance with ASTM D-698.

   d. Lightweight backfill shall be placed in layers not to exceed 12-inches, measured prior to compaction.

   e. Each layer shall be compacted using a vibratory compactor.

   f. Lightweight aggregate shall have a proven record of durability and be non-corrosive.

9. Lightweight Engineered Fill: As specified in Section 02223.

10. Imported Materials:

    a. Imported materials shall be in conformance with Section 19 of the State Standard Specifications, these Special Provisions for their intended use, and approved by the Engineer prior to use. The Contractor shall submit for review information on all backfill materials to be used on the project giving a description of the source of the material, environmental history and past uses of the property at the source location, quantity of material and the purpose for which it is

intended.

b. Import material shall have a plasticity index of less than 15 and a liquid limit of less than 40 as tested in accordance with ASTM D4318.

c. Import material shall have a sand equivalent greater than 10 as tested in accordance with California Test 217.

d. Imported materials shall conform to the following gradation as tested in accordance with ASTM D422:

Sieve	Percentage of Dry Material Passing by Weight
3”	100
3/4”	80 - 100
No. 4	40 – 70
No. 40	20 – 50
No. 200	Greater than 15

11. Sand Bedding:

a. As shown on the plans and specified herein, bedding material for conduits and irrigation lines shall be clean and graded, washed sand, all passing No. 4 U.S. Standard sieve, and conforming generally to ASTM C33 for fine aggregate. Finer sand may be used (quarry fines), if convenient, provided the sand is clean and does not contain deleterious substances in excess of the amounts specified in ASTM C33, Table 3.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verification of Conditions:

1. Character and Quantity of Material:

a. Verify character and quantity of rock, gravel, sand, silt, water, and other inorganic or organic materials to be encountered in work to be performed.

b. Determine gradation and shrinkage of excavation and fill material, and suitability of material for use intended in work to be performed.

c. Determine quantity of material, and cost thereof, required for construction of excavations and fills, whether from on-site excavations, borrow areas, or imported materials. Include in cost of work to be performed.

d. Include wasting of excess material, if required, in cost of work to be performed.

e. All excavated soils will need to be segregated, cleaned, and/or screened prior to re-use (Native Material).

f. The Contractor shall, prior to submitting his bid, visit the site 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 site, and working conditions.

B. Verification of Prepared Subgrade prior to Constructing Improvements:

1. The Contractor shall request the Engineer 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 Engineer.

b. The Engineer will perform this inspection no later than two working days after the Contractor makes his request.

2. Contractor shall protect excavation prior to and during the inspection.

a. The Contractor remains solely responsible for excavation safety. This responsibility is not waived when the Engineer agrees to enter the work site for inspection.

3.02 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. Record unmarked utility locations on record drawings and notify the Engineer.

C. Open excavations, trenches, and the like are to be protected with fences, barricades, covers and railings as required.

D. 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.

3.03 SAFETY

A. In conformance with Section 02260, the Contractor is solely responsible for excavation safety, including support to all adjacent improvements at all times.

3.04 PREPARATION

A. Surface Preparation:

1. Preparing Ground Surfaces for Fill or Concrete:

a. After clearing, grubbing and stripping is completed, scarify entire areas which underlie fill sections or structures to a depth of 6 inches and until surface is free of ruts, hummocks, and other features which would prevent uniform compaction by equipment to be used.

b. Moisture condition and recompact areas to density specified in "Compacted Fills" before placing of fill material or concrete.

c. Where cemented rock, cobbles, or boulders compose a large portion of foundation material underlying structures, slabs, or paved areas, it may not be advisable to scarify the top 6 inches prior to compaction. If the ENGINEER deems it advisable not to scarify existing natural ground, then moisten the native soil and compact it as specified in "Compaction of Coarse Fill."

d. Where subgrade stabilization is required, scarification and compaction of native soils is not practical. In these instances stabilize the subgrade by placing geotextile and crushed rock as shown on the plans and/or specified herein.

e. Finished compacted subgrade shall be firm and non-yielding under the weight of compaction equipment. If the relative compaction of the subgrade is less than specified, or the surface of the subgrade exhibits significant yielding, over-excavate the area and rebuild or rework the area until the subgrade compaction conforms to this specification.

2. Preparing for Backfill:

a. After completion of foundation footings and walls and other construction below the elevation of the final grades and prior to backfilling, all forms shall be removed and excavation shall be cleaned of all trash and debris.

b. After inspection of foundation, walls, and pipes, backfill shall be placed symmetrically to prevent eccentric loading upon or against structures.

c. All backfill shall be compacted per Compaction of this specification.

3.05 APPLICATION

A. General:

1. Dispose of excavated materials which are not required or unsuitable for fill and backfill in lawful manner.

2. Dispose of surplus material on private property only when written permission agreement is furnished by owner of property. Submit copies of such agreements.

3. Obtain material required for fills in excess of that produced by excavation from borrow areas subject to the fill material requirements specified herein.

4. Rocks, broken concrete, or other solid materials larger than 4 inches in greatest dimension shall not be placed in fill areas, but removed from project site at no additional cost to the Contract.

5. Stabilization of Subgrade: Provide materials used or perform work to stabilize subgrade so it can withstand loads which may be placed upon it by CONTRACTOR's equipment.

6. No material larger than 1” shall be placed in the first two feet below subgrade.

B. Excavation:

1. Excavations for Structures:

a. All excavations shall comply with Section 02260, Excavation Support and Protection.

b. Dimensions and Elevations of Excavations: Provide excavations conforming to dimensions and elevations indicated on the Drawings for each structure, including trenching for adjacent piping and all work incidental thereto.

c. Soil of Unsuitable Bearing Value: Where soil is encountered having unsuitable bearing value, ENGINEER may direct in writing that excavation be carried to elevations above or below those indicated on the Drawings.

d. Unless directed by the ENGINEER, excavations shall not be carried below elevations indicated on the Drawings.

e. Bottom of Excavations for Structures: Consist of native material with top 6 inches compacted to 95 percent of maximum density and graded to conform to outside limits of structures as indicated on the Drawings, except where otherwise indicated on the Drawings or specified.

2. Necessary Over Excavation:

a. General:
1) Where it becomes necessary to excavate beyond normal lines of excavation in order to remove boulders or other interfering objects, backfill voids remaining after removal as specified in Backfilling of Voids, or as acceptable to the Engineer.
2) Perform necessary excavation beyond normal lines as specified above and backfill such voids.

b. Backfilling of Voids:
1) Fill voids with suitable material acceptable to the Engineer, placed in manner and to same uniform density as surrounding material.
2) With acceptance of the Engineer, concrete may be used.

C. Compaction:

1. Compacted Fills:

a. Lines and Grades:
1) Construct fills, and backfills, designated herein as fills, at locations and to lines and grades indicated on the Plans.

2. Where required, Contractor shall provide necessary imported fill material from outside sources.

a. Compacted Fill Shape and Sections: Provide completed fill that corresponds to shape of typical sections indicated on the Plans or that meets requirements for particular case.

b. Preparation of Areas Designated to Receive Fill Material: Scarify to minimum depth of 6 inches, unless otherwise indicated on the Drawings, and recompact to density of fill material as specified in following Article.

c. Fills and Backfills and Upper 6 Inches in Cuts: Compact to percentage of maximum density as follows and as determined by ASTM D1557:

1) Backfill adjacent to structures: 95 percent.
2) Under present and future structures: 95 percent.
3) Under paved areas not subject to traffic loading, curbs, and sidewalks: 90 percent.
4) Under paved areas subject to traffic loading: 95 percent.
5) Other areas: 85 percent.
6) Demolition areas: 95 percent.

d. Placing Compacted Fills:
1) Placement: Place loose material in successive layers that do not exceed 8 inches in thickness after compaction.
2) Moisture Content: Bring each layer to specified moisture content for maximum density before compaction by rolling.
3) Each successive lift shall be firm and non-yielding under the weight of construction equipment.
4) Defective Compacted Fills: Remove and recompact.

3. Crushed rock shall be compacted by means of vibratory compaction equipment. At least three (3) pass from a flat plate vibratory compactor, number of passes shall be made as required until a firm unyielding state is achieved.

3.06 FIELD QUALITY CONTROL

A. Tests:

1. Confirmation Tests:

a. CONTRACTOR shall accomplish specified compaction for backfill, fill, and other earthwork.

b. CONTRACTOR may, at his option, arrange for conformation testing through his own forces or a testing laboratory.

c. Confirmation testing is only for the Contractor's benefit and shall not substitute for Compliance Tests as specified herein.

d. Control operations in response to confirmation tests and City Compliance Testing to verify that compaction work complies, and is complying at all times, with requirements specified in this Section concerning compaction, control, and testing.

e. Cost of Confirmation Tests: Paid for by the CONTRACTOR.

f. Confirmation Test submittals are not required.

2. Compliance Tests:

a. Compliance tests will be made by the ENGINEER to verify that compaction is meeting requirements specified herein.

b. City's Testing Laboratory will perform confirmation testing as acceptable to the ENGINEER.

c. CONTRACTOR shall coordinate with ENGINEER regarding the frequency of Compliance Testing and testing results.

d. Copies of Compliance Test Reports will be submitted promptly to the

ENGINEER for disbursement to CONTRACTOR.

e. Coordination with ENGINEER Testing: Remove overburden above level at which the ENGINEER wishes to test and backfill and recompact excavation after testing is completed.

f. If compaction fails to meet specified requirements, perform remedial work by one of the following methods:
   1) Remove and replace backfill at proper density.
   2) Bring density up to specified level by other means acceptable to the ENGINEER.

g. Retesting:
   1) Costs of Retesting: Costs of retesting required to confirm and verify that remedial work has brought compaction within specified requirements shall be borne by the CONTRACTOR.
   2) City's Compliance Tests During Performance of Remedial Work will be performed as follows:
      a) Tests will be performed in a manner acceptable to the ENGINEER.
      b) Frequency: Double amount specified for initial confirmation tests.

B. Tolerances:

1. Finish Grading of Excavations, Backfill and Fills:

   a. Perform fine grading under concrete structures such that finished surfaces are never above established grade or approved cross section and are never more than 0.10 feet below.

   b. Provide finish surface areas outside of structures that are not more than 0.10 feet above or below established grade or accepted cross section.

2. Of Areas Which Are Not under Structures, Concrete, Asphalt, Roads, Pavements, Walks, Dikes and Similar Type Items:

   a. Provide finish graded surfaces of either undisturbed natural soil, or cohesive material not less than 6 inches deep.

   b. Intent of preceding is to avoid sandy or gravelly areas.

3. Finished Grading Surfaces:

   a. Reasonably smooth, compacted, and free from irregular surface changes.

   b. Provide degree of finish that is ordinarily obtainable from blade grader operations, except as otherwise specified.

   c. Uniformly grade areas which are not under concrete.

   d. Finish gutters and ditches so that they drain readily.

3.07 WET WEATHER AND WET SOIL CONDITIONS

A. To the maximum extent possible within schedule constraints, major excavation

should take place during periods of suitable weather conditions.

B. The continuous presence of groundwater at the project sites is expected.

C. Shallow ground water could significantly impact underground construction. Impacts may include potentially wet and unstable pavement subgrade, difficulty achieving compaction, and difficult underground utility installation. Contractor shall make provisions to meet the specifications herein given the site conditions.

D. Surficial soils are anticipated to be loose sands, and with the presence of ground water, vertical excavations below the upper 3 feet may not stand vertical without shoring. The Contractor should anticipate shoring for excavations deeper than 3 feet. The Contractor should also anticipate raveling of excavations shallower than 3 feet.

E. When the moisture content of fill materials is significantly above optimum:

1. Scarify and air dry until fill materials have a suitable moisture content for compaction; or
2. Over-excavate the fill and replace with suitable on-site or import materials with an appropriate moisture content; and/or
3. Install a geotextile or geogrid to reinforce soft fill.
4. Chemically treat with lime, kiln-dust, or cement to reduce the moisture content and increase the strength of the fill.

3.08 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 and rapidly flowing. Ground water levels are expected to be less than 5 feet below the existing ground surface and may be encountered in excavations deeper than 3 feet. 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. Contractor shall assume extensive dewatering (such as dewatering wells and/or additional sumps) will be required for controlling groundwater flow into excavations.

C. Contractor shall develop and submit a dewatering plan for review and approval. The dewatering design should maintain ground water at least 2 feet below the bottom of the mass excavation, and at least to the bottom of localized excavation such as for manholes and utilities. Contractor shall have a backup power source available for the dewatering system at all times during the dewatering operation.

D. The Contractor may obtain a wastewater discharge permit from the East Bay Municipal Utility District (EBMUD) to discharge dewatering disposal water to the City's sewer system. The Contractor is responsible for applying for, paying for, and meeting all of the EBMUD permit requirements.

1. The Contractor shall remove sediment from the disposal water prior to disposing into the sewer system. The sediment removal method shall meet

the requirements of the EBMUD permit (filtered with Whatman 934 AH Glass Microfiber filter, or equivalent).

E. If the Contractor chooses to discharge any water the storm drain system, the Contractor shall adhere to the requirements within the State Water Resources Control Board NPDES General Permit Requirements (Order No. 2009-0009-DWQ) for Risk Level 1 sites. The Contractor shall also obtain a waste discharge permit from the Regional Water Quality Control Board (RWQCB). Permit requirements (Order No. 2009-0009-DWQ) are available for download on the State Water Resource Control Board's website (http://www.waterboards.ca.gov).

F. During excavation operations, if the Contractor encounters suspected contaminated water, the Contractor shall immediately implement the CSEDWP and stop the disposal of excavated groundwater. 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 negotiated contaminated price, if it is mixed with contaminated water.

G. If contaminated water is discovered, 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.

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.

I. 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.

J. 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.

K. 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.

L. 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.

M. 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.

N. Dewatering devices shall be adequately filtered to prevent the removal of fines

from the soil.

O. 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.

P. 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.

Q. After dewatering is no longer necessary, all dewatering pumps and appurtenances shall be removed by the Contractor.

3.09 ADJUSTING

A. Finish Grades of Excavations, Backfilling and Fill:

1. Repair and reestablish grades to required elevations and slopes due to any settlement or washing way that may occur from action of the elements or any other cause prior to final acceptance.

2. Protect newly graded areas from action of the elements.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 02318
TRENCHING

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: Trench excavation, fine grading, pipe bedding, backfilling, and compaction, tracer wire, and warning tape for the construction of new pipe.

1. Sewage Piping.
2. Electrical conduits.
3. Pull boxes and other accessories.

B. Related Sections:

1. Section 02260 - Excavation Support and Protection.
2. Section 02300 - Earthwork.
3. Section 15100 – Piping and Fittings

1.02 REFERENCES

A. 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 1556 - Test Method for Density and Unit Weight of Soil in Place by the Sand Cone Method.
4. D 1557 - Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft.lbf/ft^3 (2,700 kN.m/m^3)).
5. D 2922 - Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
6. D 4318 - Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

1.03 SUBMITTALS

A. Products Data: For all proposed bedding and backfill materials.

1. Material source.
2. Gradation.
3. Testing data and testing laboratory qualifications including lab certification.

B. Trench excavation plan, drawings, and calculations as specified in Section 02260.

C. Product data for tracer wire, tracer wire connection boxes, and warning tape.

PART 2 PRODUCTS

2.01 MATERIALS

A. General:

1. Provide bedding and backfill material per Section 02300.

B. Tracer Wire: Shall be No. 8 AWG, standard copper THW or THHN, 600 volt with solid green insulation.

C. Warning Tape: Shall be metallic foil bonded to plastic film 2-inches or greater wide. The warning tape shall identify the appropriate utility with letter such as "Caution Force Main Buried Below" with 3/4-inch tall minimum lettering and colored per the appropriate AWWA utility color designation.

PART 3 EXECUTION

3.01 PREPARATION

A. General:

1. Trench Condition:

a. Install pipe and materials as specified herein and detailed on the Drawings.

2. Embankment Condition:

a. Exists where width of pipe trench exceeds limits specified herein.

b. Before laying pipes or electrical conduits in fill, place fill and compact it to not less than 2 feet above top of pipe or conduit.

c. After placing and compacting fill, excavate through fill and fine grade as required in this Section.

B. Protection: Stabilize excavation as specified in Section 02260.

C. Control of Water: See Section 02300-3.08

3.02 INSTALLATION

A. Trench Excavation:

1. General Requirements:

a. If because of soil conditions, safety requirements or other reasons, trench width at top of pipe is increased beyond width specified in this Section and shown on the plans, upgrade laying conditions or install stronger pipe designed in conformance with Specifications for increased trench width, without additional cost.

b. Pipe and Electrical Conduits:

1) Lay pipe and electrical conduits in open trench; install pipe bedding as shown on the Plans.

2) If bottom of excavation is found to consist of rock or any material that by reason of its hardness cannot be excavated to provide uniform bearing surface, remove such rock or other material to a depth of not less than 4 inches below bottom of pipe and refill to grade with bedding material placed at uniform density, with minimum possible compaction, at no additional cost.

3) If bottom of excavation is found to consist of soft or unstable material which is incapable of properly supporting pipe, remove such material to a depth and for the length required, as determined by the ENGINEER, and then refill trench to grade with crushed rock and compacted to 90 percent maximum density.

4) In all locations where Bay Mud is encountered Geotextile filter fabric (Mirafi 600X or approved equal) shall be placed at the bottom of the final excavation, on the sides, and on top of the bedding material. Minimum overlap of the filter fabric shall be 12 inches.

c. Trench Widths: as shown on drawings

d. For Manholes, Valves, or Other Accessories:

1) Provide excavations sufficient to leave at least 12 inches clear between their outer surfaces and embankment or shoring which may be used to hold banks and protect them.

2) Do not backfill with earth under manholes, vaults, tanks, or valves.

3) Fill any unauthorized excess excavation below elevation indicated on the Drawings for foundation of any structure with crushed rock at no additional cost. Backfill material may be substituted for crushed rock in areas where foundation material is not required and when approved by the ENGINEER.

4) Backfilling of Manhole Excavation: Conform to backfilling requirements as specified for trenches in this Section.

e. At Road Crossings or Existing Driveways:

1) Make provision for trench crossings at these points, either by means of backfills, tunnels, or temporary bridges.

B. Pipe Bedding:

1. Bedding material shall be as scheduled herein unless otherwise specified or shown on the drawings.

2. General:

a. Over excavate bottom of trench to allow installation of at least 6 inches, or 1/12 outside diameter of pipe, whichever is greater.

b. Place bedding material at uniform density, with minimum possible compaction.

3. Bell or Coupling Holes:

a. Dig holes after trench fine grading has been placed.

b. Provide holes of sufficient width to provide ample room for grouting, banding, or welding.

c. Excavate holes only as necessary in making joints and to ensure that pipe rests upon prepared trench bottom and not supported by any portion of the joint.

4. Depressions for Joints, Other than Bell-and-spigot:

a. Make in accordance with recommendations of joint manufacturer for particular joint used.

5. Bedding material shall be as scheduled herein unless otherwise specified.

6. After Pipe Laid:

a. Place bedding material under, around, and above pipe to 12 inches above top of pipe in maximum 6-inch lifts and compact to 90 percent of maximum density.

7. Pipe Displacement:

a. Take necessary precautions in placement and compaction of bedding material to prevent displacement of piping.

b. In event there is movement or floating, re-excavate, re-lay, and backfill the pipe.

8. Consolidation:

a. Bedding shall be mechanically compacted at optimum moisture content or above according to ASTM D1557 with vibratory or other compaction equipment. Water settling methods such as flooding and poling or jetting are prohibited.

C. Trench Backfill:

1. Backfill material shall be as specified in Section 02300.

2. Place and compact backfill in accordance with following requirements:

a. From 6 inches above top of pipe to natural surface level. Match finish grade as indicated on the Drawings.

b. Trench Backfill from 6 inches above top of pipe to finish grade with backfill material compacted to 95 percent of maximum density.

c. Existing Conditions: Where existing underground pipes or conduits larger than 3 inches in diameter cross trenches above new work:

1) Backfill from bottom of intersecting trench to spring line of intersecting pipe or conduit with backfill material compacted to 90 percent of maximum density when tested in accordance with ASTM D 1556 or ASTM D 2922.

a) Provide controlled density fill material below existing pipe or conduit where backfill cannot be placed and compacted as specified. Controlled density fill shall have a minimum thickness of 12 inches beneath the existing pipe or conduit

and shall extend up to the springline of the pipe or conduit. Controlled density fill shall extend a minimum of 12 inches beyond the outside of the pipe or conduit in either direction and as a minimum shall extend to the edge of the trench crossing the pipe or conduit.

2) Extend backfill material 2 feet on either side of intersecting pipe or conduit to ensure that material remains in place while other backfill is placed.

d. Backfill shall be mechanically compacted at optimum moisture content or above according to ASTM D1557 with vibratory equipment weighing no more than 12 tons static weight. All backfill shall be placed in maximum 8-inch lifts. Water settling methods such as flooding and poling or jetting are prohibited.

D. Native or Import Material:

1. Native or Import material meeting the requirements within Section 02300 shall be used as backfill.

E. Excess Material:

1. Remove excess excavated material and any excavated Bay Mud from the project site and dispose of legally off-site.

F. Warning Tape and Tracer Wire

1. Place warning tape and tracer wire above the pipe as indicated on the Drawings. Tracer wire shall be terminated at tracer wire connection boxes.

3.03 FIELD QUALITY CONTROL

A. Shall meet the compaction and testing requirements in Section 02300-3.06

END OF SECTION

THIS PAGE IS INTENTIONALLY BLANK

SECTION 02532
MANHOLE AND PIPE ABANDONMENT AND DEMOLITION

PART 1 GENERAL

1.01 SUMMARY

A. Section includes the abandonment of existing sewer mains and manholes as indicated on the contract drawings.

B. Related Sections:
   1. Section 02100 – Clearing and Demolition
   2. Section 02300 – Earthwork
   3. Section 02223 – Lightweight Engineered Fill
   4. Section 03300 – Cast in Place Concrete

1.02 REFERENCES

1. Not Used.

1.03 SUBMITTALS

A. Products Data: For all proposed fill materials.
   1. Material source.
   2. Gradation.
   3. Testing data and testing laboratory qualifications including lab certification.

B. Plans:
   1. For abandonment, describing proposed sequence and methods of plugging and filling mains and manholes to be abandoned.

PART 2 PRODUCTS

2.01 MATERIALS

A. Controlled Low Strength Material (CLSM): As specified in Section 02300.

B. Concrete: As specified in Section 03300.

C. Lightweight Engineered Fill: As specified in Section 02223

D. Sand:
   1. Free from clay and organics
   2. Sand Equivalent: 35 minimum
   3. Percent composition by weight determined by laboratory sieves:

Sieve Size	Percent Passing
No. 4	100
No. 10	95 - 100
No. 40	20 - 65
No. 100	5 - 30
No. 200	0

PART 3 EXECUTION

3.01 PREPARATION

A. General:
   1. Contractor shall submit abandonment plan detailing approximate volume of fill required to abandon each pipe segment and each manhole.

3.02 INSTALLATION

A. Pipe Abandonment: Fill pipe with CLSM or sand. When filling with Sand, contactor shall plug pipe at each end with 6” minimum thick concrete plug. Material placed within pipe shall be placed by the use of a horizontal tremie to fill the entire pipe volume. Contractor shall calculate the volume of material required to fill the pipe and document the volume of material placed to ensure all voids are filled.

B. Wetwell & Drywell Abandonment and Modifications:
   1. Contractor shall puncture structures as identified on the plans.
   2. Fill structure as identified on the plans.
   3. Where applicable, restore site to preconstruction condition with no visible surface indications of the structure below. Restoration within paved areas shall confirm to the City’s Standards.

C. Water Service Abandonment
   1. Contractor shall coordinate water service abandonment with East Bay Mud (EBMUD) and City as shown on the plans and as specified herein.
   2. Contractor shall notify the City 30 days prior to construction so the City can make a request to EBMUD to have service abandoned.
   3. Contractor is responsible for removing hose bib, back flow device, and service pipe within the limits of work. EBMUD will abandon the service and meter. The meter box will remain unless the adjacent sidewalk is being replaced as part of the work, then the meter box shall be removed and replaced with sidewalk.

END OF SECTION

SECTION 02722
AGGREGATE BASE COURSE

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: Aggregate base course.

1.02 REFERENCES

A. American Society of Testing and Materials (ASTM):

1. C 117 - Test Method for Material Finer than 75 ΦM (Number 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.
2. 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.

B. Shall meet the requirements within Section 01140.

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 02300, "Earthwork."

3.03 INSTALLATION

A. Furnish, spread, and compact aggregate base course material to the lines, grades, and dimensions indicated on the Drawings.

1. Aggregate bases, after compaction, shall be watered in conformance with the provisions in Section 17, “Watering”, of the Caltrans Standard Specifications.
2. The relative compaction of each layer of compacted base material shall be not less than 95 percent.
3. The surface of the finished aggregate base at any point shall not vary more than 0.05 foot above or below the grade established by the Engineer.
4. Spreading: Spread in accordance with sections of Caltrans Standard Specifications.
5. Compacting: Compact in accordance with sections of Caltrans Standard Specifications.

3.04 FIELD QUALITY CONTROL

A. Tests: Perform tests and meet the requirements within Section 02300-3.06.

END OF SECTION

THIS PAGE IS INTENTIONALLY BLANK

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 02318 – Trenching.
   2. Section 03300 – Cast in Place Concrete
   3. Section 03400 – Precast Concrete
   4. Section 15100 – Pipe and Fittings

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. Mandrels, 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 PIPE SHAPE AND DEFLECTION TESTING FOR GRAVITY SEWER

A. Deflection testing shall be performed after the trench has been completely backfilled and compacted.

B. Newly installed pipe (8) inches in diameter or larger gravity sewer pipe shall be tested for deflection, joint displacement, or other obstruction by passing a rigid mandrel through the pipe.

C. The mandrel shall be a full circle, rigid, non-adjustable, an odd-numbered leg (9 leg minimum), approved by the Engineer as to design and manufacturer. Mandrel size shall meet the minimum requirements set forth in ASTM D 3034 and ASTM F 679. The circular cross section of the mandrel shall have a diameter of at least ninety five percent (95%) of the specified average inside diameter of the pipe and the minimum length of the circular portion of the mandrel shall be equal to the nominal diameter of the pipe.

D. Where obstructions and excessive deflection are encountered by the mandrel, the Contractor shall remove, replace, and retest the deficient section. Re-rounding will not be allowed.

3.02 LEAKAGE TESTING FOR GRAVITY SEWER

A. Gravity sewer work for this project is minimal; therefore, leakage testing is not required. Gravity sewer connections shall be connected with continuous sections of pipe where feasible.

3.03 WET WELL TESTING

A. New precast concrete wet well shall be hydrostatically leak tested prior to acceptance and prior to coating as specified below:

1. Test Procedure:

a. Plug all inlets and outlets with temporary plugs

b. Fill structure with potable water

c. Let stand for 24 hours

d. Fill to rim of structure

e. Let stand for 2 hours

f. Calculate water loss. Leakage shall not exceed 0.1 gallon per hour per foot of water depth during the test.

2. Repair all structures which do not meet the test requirement. Re-test structure until it passes.

3.04 FORCE MAIN TESTING

A. Testing of new force main pipe 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. Newly installed sanitary sewer force main pipe shall be tested with potable water unless otherwise approved by the City.

C. Testing shall be done after the pipe has been fully installed and backfilled. Ensure thrust restraints have been installed and allow sufficient time for any required concrete thrust blocks to achieve required sufficient strength.

D. Testing shall not be done only when the temperature of pipe is 80 degree Fahrenheit or less.

E. Testing against closed valves is not recommended. Contractor shall blind flange before the closed valve.

F. 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.

G. All plugs shall be adequately braced and restrained to support the full load developed. No workers shall be allowed in the excavation, vault, or manhole while the line is under pressure. The Contractor shall make provisions for reading the pressure at the ground surface and for safely releasing the pressure without entering the manhole or excavation.

H. 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.

I. **TEST REPORT:** Contractor shall prepare and submit a report detailing all pipes tested. The report shall include the pipe location, pipe size, upstream and downstream testing locations, testing date, testing pressure, recorded leakage, test time, and test date. The report shall be submitted to the City within one

week of performing the test. The City will review the report and if acceptable the City will sign the report for acceptance of the test.

*****END OF SECTION*****

SECTION 02772
CONCRETE CURBS, GUTTERS, AND SIDEWALKS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: Concrete curbs, gutters, sidewalks, driveways and access ramps to replace those demolished or damaged during construction.

B. Related Sections:

1. Section 02990 - Pavement Restoration and Rehabilitation.
2. Section 03300 – Cast-in-Place Concrete.

C. Concrete work to replace structures demolished as necessary to accomplish the Work as described in the Plans and Specifications shall be paid for in the item of work that necessitates the demolition. Replacing existing concrete work intentionally or unintentionally damaged during the course of construction operations, which is not shown as needing to be demolished on the Plans, shall be the responsibility of the Contractor and no additional compensation will be made thereto.

1.02 SYSTEM DESCRIPTION

A. Performance Requirements: Construct various types of concrete curb, gutter, sidewalk, driveways, and ramps to dimensions and details indicated on the Drawings or to replace the damaged facility in kind, as directed by the Engineer.

1.03 SUBMITTALS

A. Product Data: Submit data completely describing products.

B. Samples: Submit samples when requested.

1.04 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. Concrete: Shall conform to the applicable requirements of Section 03300.

B. Curb Finishing Mortar: 1 part portland cement to 2 parts sand.

C. Form Release Material: Light oil or other releasing agent of concrete type that does not discolor concrete or interfere with the application of finishing mortar to curb tops and faces.

D. Joint Materials:

1. Expansion: Comply with requirements as specified in Section 03300.

2. Construction: Steel dividers or plastic inserts.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verification of Conditions:

1. Verify field conditions, including subgrade condition and interferences, before beginning construction.

3.02 PREPARATION

A. Removal of Existing Concrete

1. All damaged concrete shall be removed and replaced by the Contractor at the Contractor's expense.

2. All concrete curbs, gutters, and sidewalks to be removed shall be removed and replaced to the nearest existing cold joint.

B. Surface Preparation:

1. Subgrade:

a. Construct and compact true to grades and lines indicated on the Drawings and requirements as specified in this section.

b. Remove soft or unsuitable material to depth of not less than 6 inches below subgrade elevation and replace with satisfactory material.

2. Forms And Subgrade: Water immediately in advance of placing concrete.

3.03 PROJECT CONDITIONS

A. Environmental Requirements:

1. Hot Weather Concreting:

a. When Ambient Air Temperature Is above 90 Degrees Fahrenheit: Prior to placing concrete, cool forms and reinforcing steel to by water cooling to below 90 degrees Fahrenheit.

b. Temperature of Concrete Mix at Time of Placement: Keep temperature below 90 degrees Fahrenheit by methods which do not impair quality of concrete.

2. Cold Weather Concreting:

a. Concrete placed below ambient air temperature of 45 degrees Fahrenheit and falling or below 40 degrees Fahrenheit: Make provision for heating water.

b. If materials have been exposed to freezing temperatures to degree that any material is below 35 degrees Fahrenheit: Heat such materials.

c. Heating Water, Cement, or Aggregate Materials:
   1) Do not heat in excess of 160 degrees Fahrenheit.

d. Protection of Concrete in Forms:
   1) Protect by means of covering with tarpaulins, or other acceptable covering.
   2) Provide means for circulating warm moist air around forms in manner to maintain temperature of 50 degrees Fahrenheit for at least 5 days.

B. For conditions that promote rapid drying of freshly placed concrete such as low humidity, high temperature, and wind: Take corrective measures to minimize rapid water loss from concrete.

a. Furnish and use sufficient number of maximum and minimum self-recording thermometers to adequately measure temperature around concrete.

3.04 INSTALLATION

A. Special Techniques:

1. Contractor's Option:

a. Construct concrete curbs and gutters by conventional use of forms, or by means of curb and gutter machine when acceptable to the Engineer.

b. When use of machines designed specifically for work of this Section are accepted by the Engineer, results must be equal to or better than those produced by use of forms.

c. Applicable requirements of construction that apply to use of forms also apply to use of machines.

d. Discontinue use of machines when results are not satisfactory to the Engineer.

B. Forms:

1. Carefully set to line and grade and securely stake in position forms conforming to dimensions of items to be constructed.

2. Thoroughly clean prior to each use and coat with form releasing material.

C. Expansion and Contraction Joints:

1. Expansion Joints:

a. Construct vertically, and at right angles to centerline of street and match joints in adjacent pavement or sidewalks.

b. Constructed at radius points, driveways, alley entrances, and at adjoining structures.

c. Fill joints with expansion joint filler material.

2. Contraction Joints:

a. Constructed not more than 15 feet apart.

b. Make joints of construction joint material, scoring or saw cutting to depth of not less than 1-1/2 inches and matching joints in adjacent pavement or sidewalk.

D. Concrete:

1. Placing:

a. Thoroughly spade concrete away from forms so that no rock pockets exist next to forms and so that no coarse aggregate will show when forms are removed.

2. Compacting:

a. Compact by mechanical vibrators accepted by the Engineer.

b. Continue tamping or vibrating until mortar flushes to surface and coarse aggregate is below concrete surface.

3. Form Removal:

a. Front Form Faces: Do not remove before concrete has taken initial set and has sufficient strength to carry its own weight.

b. Gutter and Rear Forms: Do not remove until concrete has hardened sufficiently to prevent damage to edges. Take special care to prevent damage.

4. Finishing and Curing:

a. As soon as curb face forms are stripped, apply finishing mortar to the top and face of curb and trowel to a smooth, even finish. Finish with fine haired broom in direction of work.

b. Where curb is installed without integral gutter, extend finish 2 inches below grade.

c. Edge concrete at expansion joints to 1/4-inch radius.

d. Flow lines of gutters shall be troweled smooth 4 inches out from curb face for integral curb and gutter and 4 inches on both sides of flowline 4 gutters without curbs.

E. Backfilling:

1. Unless otherwise specified, backfill behind curbs, gutters, or sidewalks with soil native to area and to lines and grades indicated on the Drawings.

3.05 FIELD QUALITY CONTROL

A. Tests:

1. Curbs and Gutters:

a. Test face, top, back, and flow line with 10-foot straightedge or curve template longitudinally along surface.

b. Correct deviations in excess of 1/4 inch.

2. Gutters:

a. Frequency of Testing: When required by the Engineer, where gutters have slope of 0.8 foot per hundred feet or less, or where unusual or special conditions cast doubt on capability of gutters to drain.

b. Test Method: Establish flow in length of gutter to be tested by supplying water from hydrant, tank truck, or other source.

c. Required Results:

1) 1 hour after supply of water is shut off, inspect gutter for evidence of ponding or improper shape.

2) In event water is found ponded in gutter to depth greater than ½-inch, or on adjacent asphalt pavement, correct defect or defects in manner acceptable to the Engineer without additional cost to the Contract.

3.06 ADJUSTING

A. Repair portions of concrete damaged while stripping forms or, when damage is severe, replace such work at no additional cost to the Contract. Evidence of repairs shall not be noticeable in the finished product.

B. Remove and replace sections of work deficient in depth or not conforming to requirements indicated on the Drawings and specified in the Specifications at no additional cost to the Contract. Removal and replacement shall be the complete section between two joints.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 02810
IRRIGATION

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: Irrigation materials and equipment needed to replace those demolished or damaged during construction.

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM):

1. D 1784 – Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds
2. D 1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) plastic pipe, Schedules 40, 80, and 120.
3. D 2466 - Standard Specification for Poly(Vinyl Chloride) (PVC) plastic pipe fittings, Schedule 40.

B. National Sanitation Foundation (NSF)

1.03 SUBMITTALS

A. Product Data: Submit data completely describing products.

B. Record Drawings:

1. Provide Record Drawings with the location and relevant information on what was installed in the field including:
    a. Connection to the existing water/irrigation lines.
    b. Connection to existing electrical power
    c. Routing of the pressure lines with relevant dimensions
    d. Electrical control valves
    e. Routing of control wiring
    f. Valves
    g. Other related equipment installed as part of this project.

1.04 PRODUCT DELEIVERY, STORAGE, AND HANDLING

A. Handling of pipe and fittings:

1. The Contractor is cautioned to exercise care in handling, loading, unloading, and storing of pipe and fittings. All pipe shall be transported in vehicle which allows the length of pipe to lie flat so as not to subject it to undue bending or concentrated external load at any point. Any section of

pipe that has been dented or damaged shall be removed from the site and, if installed, shall be replaced with new undamaged piping.

B. During the Guarantee Period the Owner reserves the right to make necessary repairs to prevent damage to property. The exercise of this right shall not relieve the Contractor of the obligations of the Guarantee as specified.

PART 2 PRODUCTS

2.01 MATERIALS

A. PVC pressure mainline pipe, laterals and fittings:

1. Pressure mainline and lateral piping: PVC Schedule 40
2. Pipe shall be made from an NSF approved Type I PVC compound conforming to ASTM D1785.
3. All PVC shall bear the following markings:
   a. Manufacturer's name
   b. Nominal pipe size
   c. Schedule or class
   d. Pressure rating in PSI
   e. NSF
   f. Date of extrusion
4. All fittings shall bear the manufacturer's name or trademark, material designation, size, applicable I.P.S. schedule and NSF seal of approval.

B. Sleeving:

1. Material shall be PVC schedule 40 with solvent weld connections.

C. Pipe Fittings:

1. Steel fittings shall be galvanized, Schedule 40, double headed, standard thread type.
2. Plastic fittings, shall be Schedule 40 PVC solvent weld type, Type I and in full compliance with ASTM D1784 and D2466. Fittings shall be consistently white in color and of one manufacture only.

D. Lubricants, Solvents and Joint Compounds:

1. All mainline pipe and fittings shall be connected using the pipe lubricant recommended and/or supplied by the pipe manufacturer.
2. Joint compound for all threaded connections shall be 3/4" wide Teflon tape, or equal, UL-listed.
3. Primer and solvent for all solvent weld connections shall be as recommended by the pipe and hose manufacturers.

4. All cans shall have labels intact and stamped with the date of manufacture. No cans dated over two years old will be permitted.
5. No solvent or primer shall be thinned in any manner.

E. Wire Connectors:

1. Connector sealing packs: Scotchlock, Pentite Wire Connections, Bell System, or approved equal.

F. Control Wiring:

1. Direct burial copper wire: AWG-U.F. 600-volt, 14- gauge minimum. Size in accordance with manufacturer's recommendations.

G. Backflow Prevention Devices: As Shown on Drawings.

H. Gate Valve

1. Valve shall be rated 150 PSI working pressure. Construction shall be all brass or bronze with non-rising stem, round operating handle and standard female threaded connection. Valve shall be line size, unless otherwise noted. Gate Valve shall be Champion or approved equal.

I. Sprinkler heads:

1. Provide spray heads with a screw adjustment.
2. Fabricate riser units to match existing units.
3. Riser nipples for all sprinkler heads shall be the same size as the riser opening in the sprinkler body.
4. All sprinkler heads of the same type shall be of the same manufacturer.
5. Shrub spray: Pop-up type; plastic construction with fixed spindle feature.

J. Miscellaneous Equipment: See Plans for additional required materials equipment and accessories.

PART 3 EXECUTION

3.01 GENERAL

A. Irrigation system shall be installed in accordance with all applicable local and state codes and ordinances by a licensed Landscape Contractor.

B. Follow manufacturer's directions except as shown or specified.

3.02 INSPECTION

A. Verification of Conditions:

1. Contractor is responsible for locating all existing irrigation equipment, re-routing irrigation equipment around proposed improvements, and

placement of new equipment to provide water for all existing and proposed landscaping.

2. Coordinate installation of irrigation materials, including pipe, so there shall be no interference with utilities or other construction or difficulty in planting trees, shrubs, and groundcovers

3.03 PREPARATION

A. Physical layout:

1. Prior to installation, stake out all pressure supply lines, routing and location of sprinkler heads.

2. All layouts shall be reviewed and approved by the City prior to installation.

3.04 INSTALLATION

A. Trenching:

1. Dig trenches straight and support pipe continuously on bottom of trench. Lay pipe to an even grade.

2. Provide for a minimum of 24 inches cover for all pressure supply lines. (Schedule 40 PVC).

3. Provide for a minimum cover of 18 inches for all control wiring.

4. Avoid trenching in drip lines of existing large trees. When unavoidable, hand trench and tunnel under roots over 2 inches in diameter. Piping to clear roots by a minimum of 2 inches.

B. Backfilling:

1. Do not backfill trenches until all required tests are performed. Carefully backfill trenches with acceptable materials as specified in Section 02300. Backfill shall be mechanically compacted in landscaped areas to a dry density equal to adjacent undisturbed soil in planting areas. Backfill shall conform to adjacent grades without dips, sunken areas, humps or other surface irregularities

2. If settlement occurs and subsequent adjustments in pipe, valves, sprinkler heads, lawn or planting, or other construction is necessary, the Contractor shall make all required adjustments at no increase in Contract Sum.

C. Pipe and fitting connections:

1. Install no multiple assemblies on plastic lines. Provide each assembly with its own outlet.

2. Install all assemblies specified herein in accordance with details shown on Drawings.

3. Thoroughly clean PVC pipe and fittings of dirt, dust and moisture before installation. Installation and solvent welding methods shall be as recommended by the pipe and fitting manufacturer.

4. On PVC to metal connections, the Contractor shall work the metal connections first. Use Teflon tape, or equal, on all threaded PVC to PVC, and on all threaded PVC to metal joints. Do not over-tighten. Where threaded PVC connections are required, use threaded PVC adapters into which the pipe may be welded.

D. Line Clearance

1. All lines shall have a minimum clearance of 6 inches from each other and from lines of other trades. Parallel lines shall not be installed directly over one another.

E. Control Wiring:

1. Make connections between existing automatic controls and electrical control valves with direct burial copper wire. Common wires shall be white. Install in accordance with valve manufacturer's specifications and wire chart.
2. Wiring shall occupy the same trench and shall be installed along the same route as pressure supply or lateral lines wherever possible.
3. Where more than one wire is placed in a trench the wiring shall be taped together at intervals of 10 feet.
4. Provide expansion curl within 3 feet of each wire connection and at least every 100 feet of wire length on runs more than 100 feet in length. Form expansion curls by wrapping at least five turns of wire around a 1-inch diameter pipe, then withdrawing the pipe.
5. Make all splices with connector sealing packs. Use one splice per connector sealing pack.

F. Sleeving:

1. Install sleeves and electrical conduit under all paving and for all planting locations where existing sleeves are not indicated or do not exist. Install new sleeves prior to paving installation.
2. Contractor may, with prior approval from City, install pipe sleeves under existing concrete or asphalt surface by jacking, boring, or hydraulic driving of the sleeve. Remove and replace existing concrete and asphalt surfaces where cutting is necessary. Obtain Engineer’s permission before cutting existing concrete and asphalt surfaces. Where piping is shown under paved areas which are adjacent to planting areas, install the piping in the planting areas.
3. Control wiring passing under proposed concrete and paving shall pass through schedule 40 PVC conduit, size as required.
4. Conduit shall extend at least six inches (6") beyond edge of pavement or curb.
5. Provide removable non-decaying plug at ends of sleeves to prevent entrance of earth. Ends of sleeve shall extend at least six inches (6") beyond edge of paving or curb.

G. Flushing of System:

1. After all new pipe lines and risers are in place and connected, all necessary diversion work has been completed, and prior to installation of sprinkler heads, open control valves and use a full head of water to flush out the system.

2. Install sprinkler head only after flushing of system has been accomplished and accepted.

H. Sprinkler Heads:

1. Install sprinkler heads as necessary to provide water to all existing and new landscaping surrounding the improvements.

2. Spacing of heads shall not exceed maximum 50% of diameter of throw. In no case shall spacing exceed maximum recommended by the manufacturer.

3.05 FIELD QUALITY CONTROL

A. Adjustment of the system:

1. Flush and adjust all sprinkler heads for optimum performance and to prevent overspray onto walks, roadways and buildings.

2. If it is determined that adjustment in the irrigation equipment will provide proper and more adequate coverage, the Contractor shall make such adjustments prior to planting. Adjustments may also include changes in nozzle sizes and degrees of arc as required.

3. Lowering raised sprinkler heads by the Contractor shall be accomplished within ten days after notification by Engineer.

4. Set all sprinkler heads perpendicular to finished grades.

B. Testing of Irrigation System:

1. The Contractor shall request the presence of the Engineer as specified in Testing Schedule.

2. Test all pressure lines under hydrostatic pressure of 125 pounds per square inch and prove watertight.

3. Sustain pressure in lines for not less than 2 hours. If leaks develop, replace joints and repeat test until entire system is proven watertight.

4. All hydrostatic tests shall be made only in the presence of the Engineer or their designated representative. No trench shall be backfilled until piping has been reviewed, tested and accepted.

5. Furnish necessary force pump and all other test equipment.

6. When the irrigation system is completed, perform a coverage test in the presence of the Engineer or their designated representative to determine if the water coverage for planting areas is complete and adequate. Furnish all materials and perform all work required to correct any inadequacies of

coverage. This test shall be accomplished before any groundcover or lawn is planted.

7. Upon completion of each phase of work, test and adjust entire system to meet site requirements.

3.06 CLEAN UP

A. Clean up shall be made as each portion of work progresses. Refuse and excess dirt shall be removed from the site, all walks and paving shall be broomed or washed down, and any damage sustained on the work of others shall be repaired to original conditions

3.07 TESTING

A. Notify the City 48 hour prior to system inspection. Any items deemed not acceptable shall be reworked.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 02850
REDWOOD FENCE AND GATE

PART 1 GENERAL

1.01 SCOPE OF WORK

A. New redwood fencing, posts, gates and, and associated hardware as shown on the drawings and specified herein.

B. The intent of this specification is to provide for a complete installation in a workmanlike and professional manner. Not all required materials, installation procedures or hardware may be specifically referred to.

C. Related Work Specified Elsewhere:

1. Section 01330 - Submittal Procedures.
2. Section 02200 - Site Preparation.
3. Section 03300 – Cast-in-Place Concrete.

1.02 REFERENCE STANDARDS

A. American Society for Testing and Materials (ASTM):

1. A36 - Structural Steel.
2. A123 - Zinc (Hot-Dipped Galvanized) Coatings on Iron and Steel Products.
3. A153 - Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

1.03 MANUFACTURER'S QUALIFICATIONS

A. Fence, gates, and accessories shall be products of manufacturers' regularly engaged in manufacturing items of type specified.

1.04 SUBMITTALS

A. In accordance with Section 01330, furnish the following:

1. Manufacturer's Literature and Data: wood materials, post materials, gate hardware, and accessories.

B. Fence and gate layouts shall be submitted and approved by the engineer showing post and gate locations.

PART 2 PRODUCTS

2.01 REDWOOD FENCING

A. Redwood for fencing shall be construction grade heart wood, suitable for use as fencing.

B. Redwood shall be surfaced and seasoned.

2.02 POSTS

A. ASTM A53 steel hot-dipped galvanized after fabrication, coated with a polyurethane top coat.

1. Dimensions and weights of posts shall conform to the tables in the ASTM Specification.

B. Provide post braces and truss rods for each gate, corner, pull or end post.

1. Provide truss rods with turnbuckles or other equivalent provisions for adjustment.

2. Fit with suitable expansion sleeves and means for securing rail to each gate, corner, and end posts.

2.03 GATE HARDWARE

A. Hinges: Provide three (3) heavy duty gate hinges per gate panel.

1. National Hardware Model V287 or approved equal.

B. Locks: Provide two (2) lockable gate latches per gate. Locate as indicated on the plans. Re-key locks to work with City standard lock.

1. Stanley Hardware Model CD6201 or approved equal.

C. Bolt: Provide cane bolt where located on plans.

1. National Hardware Model 810 or approved equal.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install fence with a properly trained crew, on previously prepared surfaces, to lines and grades as shown.

B. Supply accessories as required and recommended by the manufacturer, to accommodate the installation of a complete fence, with fabric that is taut and attached properly to posts, rails, and tension wire.

3.02 EXCAVATION

A. Provide post holes to the depth and diameter shown on the Contract Drawings.

B. Clear loose material from post holes.

3.03 POST SETTING

A. Install posts plumb and in alignment.

B. Set post in concrete footings of dimensions shown on the Contract Drawings.

1. Thoroughly compact concrete so as it to be free of voids and finished in a slope or dome to divert water running down the post away from the footing.

2. Cure concrete a minimum of 72 hours before any further work is done on the posts.

C. Where removable posts are specified, ensure that post is plumb prior to attaching fencing.

3.04 GATES

A. Install gates plumb, level, and secure for full opening without interference.

B. Adjust hardware for smooth operation and lubricate where necessary.

3.05 REPAIR OF GALVANIZED SURFACES

A. Use galvanized repair compound, stick form, or other method, where galvanized surfaces need field or shop repair. Repair surfaces in accordance with the manufacturer's printed directions.

3.06 FINAL CLEAN-UP

A. Remove all debris, rubbish and excess material from the station site.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 02860
PICKET FENCE AND GATE

PART 1 GENERAL

1.01 SCOPE OF WORK

A. New picket fencing, posts, gates and, and associated hardware as shown on the drawings and specified herein.

B. The intent of this specification is to provide for a complete installation in a workmanlike and professional manner. Not all required materials, installation procedures or hardware may be specifically referred to.

C. Related Work Specified Elsewhere:

1. Section 01330 - Submittal Procedures.
2. Section 02200 - Site Preparation.
3. Section 03300 – Cast-in-Place Concrete.

1.02 REFERENCE STANDARDS

A. American Society for Testing and Materials (ASTM):

1. ASTM A653/A653M – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.
2. ASTM B221 – Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles and Tubes.
3. ASTM D1654 – Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments.
4. ASTM D2794 – Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact).
5. ASTM D3359 – Test Method for Measuring Adhesion by Tape Test.
6. ASTM F1184 – Industrial & Commercial Horizontal Slide Gates.
7. ASTM F2408 – Ornamental Fences Employing Galvanized Steel Tubular Pickets.

1.03 MANUFACTURER'S QUALIFICATIONS

A. Fence, gates, and accessories shall be products of manufacturers' regularly engaged in manufacturing items of type specified.

1.04 SUBMITTALS

A. In accordance with Section 01330.

B. Shop Drawings:

1. Detailed information and specifications for materials and finishes.
2. Layout of fence and gates with dimensions, details, and finishes of component accessories and post foundations.
3. Gate elevations, hardware details, and complete installation details.

C. Product Data:

1. Manufacturer's catalog cuts indicating material compliance, specified options, and installation instructions.
2. Provide 4 copies of operation and maintenance data covering the installed products, to the City. Including name, address and telephone number of the nearest fully equipped service center.

D. Samples: Approximately 6-inch lengths of posts, rails, pickets, and fittings.

E. Quality Control Submittals:

1. Installer Qualifications:
   a. Engage a single installer regularly engaged in fence installation and with successful experience in the installation of the types of materials required, and who agrees to employ only tradesmen with specific skill and successful experience in this type of Work.
   b. Submit name and qualifications to the City for review and approval.
2. Manufacturer's supervision: Manufacturer authorized representative must supervise installation of the gates and submit a written report at completion of installation stating that installations were made in compliance with the equipment Manufacturer's instructions.
3. Warranty: Provide a 1-yr warranty on all equipment from date of start-up. Warranty shall cover defects in workmanship, design, and materials. If any component should fail during the warranty period, it shall be corrected and the unit restored to service at no expense to the City.

PART 2 PRODUCTS

2.01 PRODUCT AND MANUFACTURER

A. The fence and gate system shall consist of a welded steel picket fence and matching aluminum and steel cantilever slide gate. The fence and gate system shall be the product of a single manufacturer.

B. Manufacturer and Model.

1. Ameristar Fence Products, Inc.
   a. Fence: Montage II fence in the Majestic style with 3-rail design and flush bottom rail
   b. Gate: Transport II gate, style and rail design to match the fence

2. Or approved equal.

2.02 FABRICATION

A. Fence Height: As shown on the plans.

B. Fence Color: Black, provide color sample to the City for review and approval prior to fabrication.

C. Pickets, rails, uprights, diagonal bracing and posts shall be cut to lengths necessary to achieve the required height. Rails shall be punched to accept pickets. Cutting and punching shall be done prior to coating to facilitate assembly without compromising the integrity of the finish.

D. Fence:

1. The fence shall be furnished in factory-assembled standard panels. The panels shall be attached the posts with brackets supplied by the fence system Manufacturer.
2. Pickets shall be inserted into the punched holes in the rails and shall be aligned to standard spacing.
3. The aligned pickets and rails shall be welded at each picket-to-rail intersection, providing a rigid panel assembly.

E. Rolling Gates:

1. Pickets, enclosed track, uprights, and diagonal bracing shall be pre-drilled and labeled for easy assembly.
2. Top and bottom rail extrusions shall be mechanically fastened to vertical uprights and reinforced with diagonal braces.
3. Gates shall be capable of being opened and closed easily by one person.
4. Internal roller truck assembly shall be self-aligning swivel ball-and-socket type running on four bearing wheels.
    a. Internal roller truck assembly shall be affixed to the hanger bracket by means of a 5/8-in. diameter industrial-grade rod end/center bolt, with a minimum static load rating of 10,000 pounds.
    b. Attachment of the center bolt to the truck body shall be by means of a swivel joint to ensure equivalent and consistent loading on all bearing wheels and internal track surfaces throughout the travel of the gate.
5. Each gate shall be provided with two upper suspension rollers and two lower guide rollers.

F. Pedestrian swing gates:

1. Shall be self-closing, having a gate leaf size as shown on the plans.

2. Integrated hinge-closer set (2 qty) shall be ADA compliant that shall include a variable speed and final snap adjustment with compact design (no greater than 5” x 6” footprint).
3. Hinge-closer set (2 qty) shall be tested to a minimum of 500,000 cycles and capable of self-closing gates up to a maximum gate weight of 260 lbs. and maximum weight load capacity of 1,500 lbs.
4. Hinge-closer device shall be externally mounted with tamper-resistant security fasteners, with full range of adjustability, horizontal (.5” - 1.375”) and vertical (0 - .5”).
5. Maintenance free hinge-closer set shall be tested to operate in temperatures of negative 20 F to 200 F degrees, and swings to negative 2 degrees to ensure reliable final lock engagement.

G. The manufactured fence system shall be capable of meeting the vertical load, horizontal load, and infill performance requirements for industrial weight fences under ASTM F2408.

H. Posts shall have a square cap firmly affixed to the extending end.

2.03 MATERIALS

A. Fence

1. Steel used for pickets, rails, and posts shall conform to the requirements of ASTM A653/A653M.
   a. Steel components shall have a minimum yield strength of 45,000 psi.
   b. Steel shall be hot-dip galvanized with a minimum zinc coating weight of 0.90 oz/sq. ft.
2. Pickets:
   a. 1-inch square tubular members
   b. Minimum thickness: 14 gauge
   c. Maximum face to face picket spacing: 4-¾ in. on center
3. Rails:
   a. 1-¾ in. x 1-¾ in. steel channel
   b. Minimum steel thickness of 0.105 in.
4. Posts:
   a. 2-½ in. square tubular members
   b. Minimum thickness: 12 gauge
5. Coating:
   a. Galvanized steel fence components shall be subjected to a wash and pretreatment process that includes a zinc phosphatizer and a non-chromate sealer, followed by an epoxy primer and an acrylic topcoat.

b. The minimum cumulative coating thickness of epoxy and acrylic shall be 2 mils.

c. The color shall match the fence components used at the adjacent Alameda Municipal Golf Course.

d. The coated panels and posts shall be capable of meeting the following performance requirements:

1) Adhesion per ASTM D3359 Method B: Over 90% of test area

2) Corrosion resistance per ASTM D1654: Over 1,500 hours

3) Impact resistance per ASTM D2794: over 60 in.-lb. from forward impact using 5/8-inch ball

B. Gates

1. Gate opening dimensions shall be as shown on the Drawings.

2. Aluminum used for uprights, diagonal braces, pickets and rails shall conform to the requirements of ASTM B221, designation 6063-T-6.

a. Aluminum components shall have a minimum yield strength of 25,000 psi and a minimum tensile strength of 30,000 psi.

b. Aluminum shall have a standard mill finish.

3. Diagonal Bracing and Uprights:

a. 2-inch square aluminum

b. Minimum thickness of 1/4 in.

c. Uprights shall be equally spaced at no more than 8 ft on center.

4. Pickets:

a. 1-inch square aluminum

b. Minimum thickness of 1/8 in.

5. Rails:

a. 5 in. x 2 in. aluminum

b. Minimum thickness of 1/4 in.

6. Posts:

a. 4 in. square tubular steel members conforming to the requirements of ASTM A653/A653M.

b. Steel posts shall have a minimum yield strength of 45,000 psi.

c. Steel shall be hot-dip galvanized with a minimum zinc coating weight of 0.90 oz/sq. ft.

d. Minimum steel thickness: 5/16 in.

e. Post spacing shall be as shown on the Drawings

7. Gate Rollers (for rolling gates):

a. Gate rollers shall have a hot-dipped galvanized steel chassis and graphite impregnated nylon wheels.

b. Each roller shall have a minimum load rating of 2,200 lbs.

8. Accessories:

a. Gate hangers, latches, brackets, guide assemblies, and stops shall be aluminum, malleable iron, or steel, galvanized after fabrication.

b. Each gate shall be provided with a positive latch device for padlocking and a key safe for fire department access.

c. The key safe shall be a black surface mount model provided without a tamper switch, Knox-Box Model 3201.

9. Coating:

a. Gate components shall be subjected to a thermal stratification coating process. The coating process shall include, at a minimum, a wash and pre-treatment process followed by an electrostatic spray application of a polyester finish.

b. The topcoat shall be a “no-mar” TGIC polyester powder coat finish with a minimum thickness of 2 mils.

c. The color shall match the fence.

d. The gate components and posts shall be capable of meeting the following performance requirements:

1) Adhesion per ASTM D3359 Method B: Over 90% of test area

2) Corrosion resistance per ASTM D1654: Over 3,500 hours

3) Impact resistance per ASTM D2794: over 60 in.-lb. from forward impact using 5/8-inch ball.

2.04 CONCRETE

A. As specified in Section 03300.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install fence with a properly trained crew, on previously prepared surfaces, to lines and grades as shown.

B. Supply accessories and hardware as required and recommended by the manufacturer, to accommodate the installation of a complete fence and gate system.

C. Install fences and gates in accordance with fence Manufacturer's recommendations, as approved by ENGINEER. Erect fencing in straight lines between angle points.

3.02 PREPARATION

A. Establish locations of fence lines, gates, and terminal posts.

B. Contractor is responsible for documenting and measuring the existing site conditions prior to ordering fencing and fencing material. Contractor shall confirm that the existing sites are conducive to the proposed fence and gate materials.

C. Embedment Coating: Coat portion of galvanized or aluminum-coated steel posts that will be embedded in concrete per Section 09960, Coatings.

3.03 FENCE INSTALLATION

A. Fence Post Setting:

1. Driven posts are not acceptable.
2. Concrete Set Posts:
    a. Drill hole in firm, undisturbed or compacted soil.
    b. Post Hole Depth:
        1) Minimum 3 feet below finished grade.
        2) 2 inches deeper than post embedment depth below finish grade.
    c. Space posts as shown on the Drawings. For installations that must be raked to follow sloping grades, the post spacing dimension must be measured along the grade.
    d. Backfill post holes with concrete to 2 inches above finished grade. Minimum concrete footing diameter is 12 in. Before concrete sets, crown and finish top of concrete to readily shed water.
3. Check each post for vertical and top alignment. Maintain position during placement and finishing.

B. Fence Panel Installation:

1. Panels shall not be attached to posts until concrete post footing has cured to sufficient strength.
2. Panels shall be attached to posts with brackets supplied by the Manufacturer.
3. When cutting/drilling rails or posts adhere to the following steps to seal the exposed steel surfaces:
    a. Remove all metal shavings from cut area.
    b. Apply zinc-rich primer to thoroughly cover cut edge and/or drilled hole and allow primer to dry.
    c. Apply 2 coats of custom finish paint matching fence color.
    d. Primer and finish paint shall be Manufacturer-approved products.

C. Gate Installation:

1. Install gates plumb, level, and secure for full opening without interference. Hang gates and adjust hardware so gates operate satisfactorily and smoothly from open or closed position.
2. Install gates according to manufacturer's instructions.
3. Install gates according to Manufacturer's instructions.
4. Gate stops shall be installed on each track in a way that conforms to current ASTM F1184 standards.
5. Attach hardware by means which will prevent unauthorized removal.

3.04 FIELD QUALITY CONTROL

A. Gate Tests: Prior to acceptance of installed gates and gate operator systems, demonstrate proper operation of gates under each possible open and closed condition.

3.05 FINAL CLEAN-UP

A. Remove all debris, rubbish and excess material from the station site.

END OF SECTION

SECTION 02990
PAVEMENT RESTORATION AND REHABILITATION

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Resurfacing roads and paved surfaces in which surface is removed or damaged by installation of new work.

B. Related Sections:

1. Section 02772 - Concrete Curbs, Gutters, and Sidewalks.
2. Section 03300 – Cast-in-Place Concrete.

C. Restoration work to replace or rehabilitate pavement demolished as necessary to accomplish the Work as described in the Plans and Specifications shall be paid for in the item of work that necessitates the demolition. Replacing existing pavements intentionally or unintentionally damaged during the course of construction operations, which is not shown as needing to be demolished on the Plans, shall be the responsibility of the Contractor and no additional compensation will be made thereto.

1.02 SYSTEM DESCRIPTION

A. Performance Requirements:

1. Limiting Dimensions:

a. Determine the exact lengths and dimensions of such roads, pavements, parking areas, and walks that will require removal and replacement for restoration.

b. Join existing surfaces to terminals of new surfacing in smooth juncture.

1.03 SUBMITTALS

A. Mix Designs:

1. Prior to placement of asphalt concrete, submit full details, including design and calculations for the asphalt concrete mix proposed.
2. Submit gradation of aggregate base.
3. Submit proposed mix design of portland cement concrete.

PART 2 PRODUCTS

2.01 AGGREGATE BASE COURSE

A. Aggregate base course shall meet the requirements of specification Section 02722 Aggregate Base Course.

2.02 ASPHALT PAVEMENT MATERIALS

A. Asphalts:

1. Asphalt Binder: Steam-refined paving asphalt, Performance Grade 64-10, conforming to Section 92-1.02 “Grades” of the Caltrans Standard Specifications.
2. Prime Coat and Tack Coat: Grade SC-70, conforming to Section 93-1.01 of the Caltrans Standard Specifications.
3. Fog Seal: Asphaltic Emulsion, Grade SS-1h, conforming to Section 94-1.02 of the Caltrans Standard Specifications.

B. Asphalt Aggregate:

1. Aggregate for asphalt concrete shall conform to Section 39 of the Caltrans Standard Specifications for Type A, 1/2-inch maximum grading.

C. Asphalt pavement shall be produced in a batch mixing plant, a continuous pugmill mixing plant, or drier-drum mixing plant.

1. Storage shall conform to section 39-3.01 and Section 39-3.05 of the Caltrans Standard Specifications.
2. Drying shall conform to Section 39-3.02 of the Caltrans Standard Specifications.
3. Proportioning shall conform to Section 39-3.03 of the Caltrans Standard Specifications.
4. Mixing shall conform to Section 39-3.04 of the Caltrans Standard Specifications.

2.03 PORTLAND CEMENT PAVEMENT

A. Conform to the requirements of Section 03300.

2.04 SOURCE QUALITY CONTROL

A. The Engineer will perform sampling and tests of materials in accordance with California Test Method Number 304 and California Test Method Number 362 or 379, as applicable. Samples will be taken from materials as delivered to the site.

2.05 EQUIPMENT

A. Roads, Pavements, Parking Areas, and Walks:

1. Equipment Requirements: Good condition, capable of performing work intended in satisfactory manner.

PART 3 EXECUTION

3.01 INSTALLATION

A. Aggregate Surface Removal Replacement:

1. When trench cut is in aggregate surfaced areas, replace aggregate base course material with material matching existing material compacted to 95 percent of its maximum density. Depth of aggregate base course shall match depth of existing aggregate base course or shall be a minimum of 6 inches, whichever is greater, unless otherwise indicated on the Drawings.

B. Pavement Removal and Temporary Asphalt Replacement:

1. Install temporary asphalt pavement or first course of permanent pavement replacement immediately following backfilling and compaction of trenches that have been cut through existing pavement.
2. Except as otherwise provided, maintain this temporary pavement in a safe and reasonably smooth condition until required permanent pavement is installed.
3. Remove and dispose of temporary paving from project site.
4. Where longitudinal trench is partly in pavement, replace pavement to original pavement edge, on a straight line, parallel to centerline of roadway.
5. Where no part of longitudinal trench is in pavement, surfacing replacement shall only be required where existing surfacing materials have been removed.

3.02 AGGREGATE BASE INSTALLATION

A. Furnish, spread, and compact aggregate base course material to the lines, grades, and dimensions indicated on the Plans.

1. Spreading: Spread in accordance with sections of Caltrans Standard Specifications.
2. Compacting: Compact in accordance with sections of Caltrans Standard Specifications to the relative compactions specified in relevant sections of these specifications**.**

3.03 ASPHALT PAVEMENT REPLACEMENT

1. Replace asphalt pavement to same thickness as adjacent pavement and match as nearly as possible adjacent pavement in texture.

2. Cut existing asphalt pavements to be removed for trenches or other underground construction by wheel cutter, clay spade, or other device capable of making neat, reasonably straight, and smooth cut without damaging adjacent pavement. Cutting device operation shall be subject to acceptance of Engineer.

3. Cut and trim existing pavement after placement of required aggregate base course and just prior to placement of asphalt concrete for pavement replacement, and paint trimmed edges with material for painting asphalt concrete pavement immediately prior to constructing new abutting asphalt pavements. No extra payment will be made for these items, and all costs incurred in performing this work shall be incidental to pipe laying or pavement replacement.

4. Conform replacement of asphalt pavement to contour of original pavement.

B. Portland Cement Concrete Pavement Replacement:

1. Where trenches lie within Portland cement concrete section of streets, alleys, sidewalks, and similar concrete construction, saw cut such concrete (to a depth of not less than 1-1/2 inches) to neat, vertical, true lines in such manner adjoining surfaces are not damaged.

2. Place portland cement concrete replacement material to dimension as indicated on the Drawings.

3. Provide expansion joints that match existing.

4. Before placing replacement concrete, thoroughly clean edges of existing pavement and wash with neat cement and water.

5. Surface Finish: Wood float finish.

C. Pavement Matching

1. Trim existing asphalt pavements which are to be matched by pavement widening or pavement extension to neat true line with straight vertical edges free from irregularities with saw specifically designed for this purpose. Minimum allowable depth of cut shall be 1-1/2 inches.

2. Cut and trim existing pavement after placement of required aggregate base course and just prior to placement of asphalt concrete for pavement widening or extension, and paint trimmed edges with material for painting asphalt concrete pavement immediately prior to constructing new abutting asphalt concrete pavements. No extra payment will be made for these items and all costs incurred in performing this work shall be incidental to widening or pavement extension.

3.04 FIELD QUALITY CONTROL

A. Inspection:

1. Asphalt Concrete:

a. Lay 10-foot straightedge parallel to centerline of trench when the trenches run parallel to street and across pavement replacement when trench crosses street at angle.

b. Remove and correct any deviation in cut pavement replacement greater than 1/4 inch in 10 feet.

2. Portland Cement Concrete Replacement Pavement:

a. Lay 10 foot straightedge either across pavement replacement or longitudinal with centerline of gutter or ditch.

b. Remove and correct any deviation in cut pavement replacement greater than 1/4 inch in 10 feet.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

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 01330 - 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 must 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 must submit shop drawings and calculations of any required falsework, shoring. Shop drawings and calculations must 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 must 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 03 30 00 - Cast-in-Place Concrete Part 3.05.
2. Unless otherwise specified or permitted, locate and detail formed construction joints to the following requirements:
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, must 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 must meet the requirements of "Concrete Finishing" Section 03 30 00 - 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 must 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 must 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 must conform to ASTM D994 or ASTM D1751.

2.06 FABRICATION AND MANUFACTURE

A. Formwork must 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. Fabricate form ties so ends or end fasteners can be removed with minimum spalling at the faces of concrete.

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 must 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 must 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 must be taped and must align so joints will not be apparent on the concrete surfaces.

H. Any movement or bellying of forms during construction must be considered just cause for

their removal and, in addition, the concrete work so affected.

I. Bolts, rods, or other approved devices must be used for internal form ties and must be of sufficient quantities to prevent spreading of the forms. The ties must be placed at least 1 inch away from the finished surface of the concrete. Bolts and rods that are to be completely withdrawn must be coated with grease.

J. Boards or other form materials that have been damaged or checked or warped prior to placing of concrete must 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 workers 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 must be moved or altered except as may be specifically directed.

L. Wall forms must 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 must 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 must 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 Engineer responsible for design of formwork over 12' in height, falsework or shoring must write a letter to the Engineer of Record/City certifying construction is in accordance with the reviewed shop drawings and meets his/her approval prior to the Contractor placing any concrete.

C. The Contractor must 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 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. Contractor must 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.

E. In removing plywood forms, no metal pinch bars must 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 must be done gradually and must 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.

F. Nothing herein must be construed as relieving the contractor of any responsibility of the safety of the structure.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

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 A185 - Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.

G. ASTM A615 - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.

H. ASTM A706 - Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement.

I. ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection and/or Testing.

J. AWS D1.4 - Structural Welding Code - Reinforcing Steel; American Welding Society.

K. CRSI (DA4) - Manual of Standard Practice; Concrete Reinforcing Steel Institute.

1.04 SUBMITTALS

A. See Section 01330 - Submittal Procedures.

B. Shop Drawings (Placing drawings)
   1. Comply with requirements of ACI SP-66. Shop drawings must 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 must 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 must 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 must include name of mill, date of rolling, date of shipping to fabricator and must be signed by fabricator certifying that each material complies with or exceeds the specified requirements. A Mill Certificate must be furnished with each lot of material delivered to the project and the lot must be clearly identified in the Certificate.
   3. When Mill Certificates cannot be provided, the Contractor must hire a professional testing laboratory to verify compliance and provide laboratory test reports. The Contractor must pay for the cost of testing.

E. Laboratory Test Reports
   1. Laboratory test reports must 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 must 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 must meet the requirements of ASTM E329. Testing agencies must 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 must 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 must 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 must not be dropped or dragged. Reinforcing steel must 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 must conform to the requirements of ASTM A706, deformed low-alloy steel bars for these applications:
      a. Horizontal Bars.
      b. Vertical Bars.
      c. All Reinforcing Bars to be Welded.

      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 must 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 must be deformed grade steel conforming to the requirements of ASTM A706 or A615, Grade 60.
   3. Uncoated steel unless noted otherwise.

2.02 WIRE

A. All wire for concrete reinforcement must conform to ASTM A1064.

2.03 WELDED WIRE REINFORCEMENT

A. All wire fabric mesh must 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.

2.04 WELDING ELECTRODES

A. Welding electrodes must be per Table 5-1 of AWS D1.4.

2.05 MECHANICAL COUPLING DEVICES

A. Mechanical coupling devices must 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 must 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 must 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 must 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 must be placed in strict conformance with the requirements of the Contract Drawings, both as to location, position and spacing of members. It must 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 must not reduce cover requirements except as specified in ACI 117.

C. Minimum concrete cover for reinforcement and couplers must 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 must 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 must have a minimum spacing equal to 12 bar diameters and the remaining curtain must 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 must be lapped and tied around the perimeter of each sheet in order to maintain the proper positioning of the reinforcement. Lap splices must 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 must be contact lap splices in accordance with ACI 318 unless noted otherwise on the Contract Drawings. Bars must 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 must be non-contact with at least 2 inches clearance between bars.

H. Butt splices must be accomplished by mechanical anchorage devices. Stagger these devices 2 feet, unless noted otherwise on the Contract Documents.

I. Bars must 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

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 03300
CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: Cast-in-Place Concrete.

1.02 RELATED REQUIREMENTS

A. Section 03100 – Concrete Forming and Accessories

B. Section 03200 – Concrete Reinforcing

C. Section 05120 – Structural Steel Framing

1.03 REFERENCE STANDARDS

A. ACI 117 - Standard Specifications for Tolerances for Concrete Construction and Materials; American Concrete Institute International.

B. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete; American Concrete Institute International.

C. ACI 301 - Specifications for Structural Concrete for Buildings; American Concrete Institute International.

D. ACI 302.1R - Guide for Concrete Floor and Slab Construction; American Concrete Institute International.

E. ACI 306.1 - Cold Weather Concreting; American Concrete Institute International.

F. ACI 308R - Guide to Curing Concrete; American Concrete Institute International.

G. ACI 318 - Building Code Requirements for Structural Concrete and Commentary; American Concrete Institute International.

H. ASTM C31 - Standard Practice for Making and Curing Concrete Test Specimens in the Field

I. ASTM C33 - Standard Specification for Concrete Aggregates.

J. ASTM C39 - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.

K. ASTM C42 - Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.

L. ASTM C94 - Standard Specification for Ready-Mixed Concrete.

M. ASTM C143 - Standard Test Method for Slump of Hydraulic-Cement Concrete.

N. ASTM C150 - Standard Specification for Portland Cement.

O. ASTM C157 - Standard Test Method for Length Change of Hardened Hydraulic-Cement Mortar and Concrete.

P. ASTM C171 - Standard Specification for Sheet Materials for Curing Concrete.

Q. ASTM C173 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.

R. ASTM C260 - Standard Specification for Air-Entraining Admixtures for Concrete.

S. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.

T. ASTM C494 - Standard Specification for Chemical Admixtures for Concrete.

U. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.

V. ASTM C 979 - Standard Specification for Pigments for Integrally Colored Concrete.

W. ASTM C1077 - Standard Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation.

X. ASTM C1107 - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).

Y. ASTM C1218 - Standard Test Method for Water-Soluble Chloride in Mortar and Concrete.

Z. ASTM C1602 - Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete.

AA. 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 01330 - Submittal Procedures.

B. Product Data

1. Manufacturer's catalog sheets including instructions for use and description of application must be provided on each of the following materials:
    a. Epoxies
    b. Grout
    c. Admixtures
    d. Curing Compounds
    e. Chemical Hardener
    f. Waterstops
    g. Adhesive Anchoring System

C. Mix Designs

1. Mix designs must be submitted for each class of concrete on the job and must show names and brands of all materials, proportions, slump, strength, gradation of coarse and fine aggregates, and location to be used on job. Field test records or test data that is used to establish the average compressive strength of the mixture must be submitted.

D. Concrete Placement Schedule: The Contractor must submit a concrete placement schedule which must show all proposed construction joint locations, limits of each placement sequence, order of placement and type of joint proposed at each joint location.

E. Samples: Submit to testing agency of City's choice sample of materials as specified and as otherwise required by Engineer, including names, sources and descriptions. Select samples to fairly represent average quality and grading of aggregates proposed for the work.

F. Certificates of Compliance

1. The Contractor must provide Certificate of Compliance for each type of aggregate, cementitious material and admixture to be used in each class of concrete or a Certificate of Compliance for each class of concrete.

2. Certificates of Compliance for cementitious materials must include type, manufacturing location, shipping location; for aggregates: type, pit or quarry location, producers' name, grading, specific gravities and certification evidence not more than 90 days old; for admixtures: type, brand name, producer, manufacturer's technical data sheet, and certification data; and for water: source of supply that are used in each class of concrete and must be signed by the concrete supplier certifying that each material item complies with, or exceeds the specified requirements. Certificates of Compliance must be furnished 60 days in advance of any concrete pours.

3. When Certificates of Compliance cannot be provided, the Contractor must hire a professional testing laboratory to verify compliance of each type of material to be used in each Class of Concrete. The cost of testing must be paid for by the Contractor.

4. The Contractor must provide a certificate of compliance for the vapor retarder/barrier material. When a Certificate of Compliance cannot be provided, laboratory test reports must be provided. The cost of testing must be paid for by the Contractor.

5. Certificates of Compliance for vapor retarder/barrier must include the name, and description of the product and must state that the product complies with ASTM E1745 and ASTM E154.

G. Weight and Batch Tags:

1. The special inspector must be provided with a weight and batch tag upon delivery of each load of concrete. The batch tag must show weight of all materials.

1.05 QUALITY ASSURANCE

A. Comply with the provisions of the current governing CBC, ACI 301, and ASTM C94 except where more stringent requirements are shown or specified.

B. Sampling, Testing and Inspection:

1. General:

a. If the City'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 must meet the requirements of ASTM C1077. Testing agencies must be accepted by the Engineer before performing any work.

2. Contractor:

a. The Contractor must cooperate with and notify City’s agent at least 24 hours in advance of inspection required and must provide samples and facilities for inspection without extra charge.

b. The Contractor must provide and maintain adequate facilities on the project site for safe storage and initial curing of concrete test specimens as required by ASTM C31 for the sole use of the testing agency.

c. Each mix design must be verified by trial batch tests or field test records and certified to by a principal of a testing agency who is a registered Civil Engineer in the State of California and submitted to the Engineer for review. Agency field test records, in order to be acceptable, must satisfy the requirement of ACI 318 section 5.3 otherwise trial mixture meeting the requirements of ACI 318 section 5.3 must be made. The Contractor must submit data on qualifications of proposed testing agency for acceptance and hire the accepted testing agency to provide trial mixture test data for each type of concrete on the job.

1.06 SEQUENCING AND SCHEDULING

A. Obtain information and instructions from other trades and suppliers in ample time to schedule and coordinate the installation of items furnished by them to be embedded in concrete so provision for their work can be made without delaying the project.

B. Perform any coring and infill of cored holes that were required by failed test results from test panels, failure or delay in complying with these requirements, at no cost to City.

PART 2 PRODUCTS

2.01 FORMWORK

A. Comply with requirements of Section 03100.

2.02 REINFORCEMENT

A. Comply with requirements of Section 03200.

2.03 CEMENTITIOUS MATERIALS

A. Portland Cement: ASTM C150, Type II.

B. Fly Ash: ASTM C618, Class F.

1. Fly ash may substitute for portland cement up to a maximum of 25% of total cementitious materials by weight (fly ash, if used, must substitute for 15% of the total cementitious materials by weight, minimum).

    a. Substitutions that combine fly ash and ground granulated blast-furnace slag are limited to a combined total of 50% of the total cementitious material by weight with fly ash no more than 25% of the total cementitious materials by weight.

    b. Reduce slag and fly ash substitution rates by at least 50% for cold weather concreting as defined in ACI 306.1.

C. Ground-granulated Blast-furnace Slag: ASTM C989 grades 100 or 120

1. Ground-granulated Blast-furnace Slag may substitute for portland cement up to a maximum of 50% of the total cementitious material by weight.

D. Use cementitious materials that are of the same brand and type and from the same plant of manufacture as the cementitious materials used in the concrete represented by the submitted field test records or used in the trial mixtures.

2.04 AGGREGATES

A. Aggregates for hardrock concrete must conform to ASTM C33.

B. Aggregates used for entire project must be obtained from the same sources and have the same size ranges as the aggregates used in the concrete represented by submitted historical data or used in trial mixtures.

2.05 WATER

A. Mixing Water for concrete must be clean and free from deleterious amounts of chlorides, acids, alkalis or organic materials.

2.06 CHEMICAL ADMIXTURES

A. Do not use chemicals that contain calcium chloride or will result in total soluble chloride ions in hardened concrete at ages from 28 to 42 days contributed from water, aggregates, cementitious materials, and admixtures in excess of 0.30 percent by weight of cement for reinforced concrete and 0.06 percent by weight of cement for prestressed concrete. Measure water-soluble chloride-ion content in accordance with ASTM C1218. Admixtures containing chloride salts must not be used where concrete is poured on top of the metal deck. Calcium chloride or any admixture containing chloride ions must not be used in drilled piers.

B. Air Entrainment Admixture: ASTM C260.

1. Acceptable Products subjected to compliance with requirements:

a. Sika Aer; Sika Corporation.

b. MB-VR or MB-AE; Master Builders.

c. Darex AEA; W.R. Grace.

C. High Range Water Reducing and Retarding Admixture: ASTM C 494 Type G.

D. High Range Water Reducing Admixture (Super Plasticizer): ASTM C494 Type F.

1. Acceptable Products subjected to compliance with requirements:

a. WRDA19; W.R. Grace..

b. Sikament; Sika Chemical Corporation..

c. Pozzolith 400; Master Builders..

E. Water Reducing and Retarding Admixture: ASTM C494 Type D.

1. Acceptable Products subjected to compliance with requirements:

a. Pozzolith 300-R; Master Builders.

b. Daratard; W.R. Grace.

c. Plastiment; Sika Chemical Corporation.

F. Water Reducing Admixture: ASTM C494 Type A.

1. Acceptable Products subjected to compliance with requirements:

a. Eucon WR-75; Euclid Chemical Company.

b. Pozzolith 344; Master Builders.

c. Plastocrete 160; Sika Chemical Corporation.

G. Admixtures used in concrete must be the same as those used in the concrete represented by the submitted field test records or used in the trial mixtures.

2.07 ACCESSORY MATERIALS

A. Grouts: See Section 03600

B. Anchoring Systems: See Section 05501

2.08 BONDING AND JOINTING PRODUCTS

A. Epoxy Bonding System: Epoxies must be a two component material for use on dry or damp surfaces and must conform to the requirements of ASTM C881. Epoxy bonding agents and adhesives must be used in strict accordance with manufacturer's recommendations.

1. Acceptable Products subjected to compliance with requirements:

a. Sikadur Armatec 110; Sika Chemical Corporation or equal.

B. Waterstops: Rubber, complying with COE CRD-C513.

1. Acceptable products subjected to compliance with requirements:

a. The Burke Company.

b. Progress Unlimited.

c. Williams Products.

d. Edoco Technical Products

C. Joint Filler: 1/2 inch thick unless noted on the drawings, with removable top section that will form 1/2 inch deep sealant pocket after removal.

2.09 CURING MATERIALS

A. Curing Compound, Naturally Dissipating: Clear, water-based, liquid membrane-forming compound, that dissipates within 3 to 5 weeks; complying with ASTM C309.

B. Curing and Sealing Compound, Low Gloss: Liquid, membrane-forming, clear, non-yellowing acrylic; complying with ASTM C1315 Type 1 Class A.

C. Curing and Sealing Compound, High Gloss: Liquid, membrane-forming, clear, non-yellowing acrylic; complying with ASTM C1315 Type 1 Class A.

D. Moisture-Retaining Sheet: ASTM C171.

2.10 CONCRETE MIX DESIGN

A. Admixtures: Where admixtures are used they must be added as recommended in ACI 211.1 for normal weight concrete and at rates recommended by manufacturer. Admixtures are subject to the engineer's review.

B. Normal Weight Concrete Mix Requirements:

1. Must be made with aggregates for hardrock concrete.

2. Minimum Compressive Strength, f'c, when tested in accordance with ASTM C39 at 28 days: As scheduled below.

3. Minimum Cementitious Material Content:

a. For concrete (f'c = 3000 psi and greater) used in floors and slab-on-grades, cementitious material content must not be less than indicated

in the following table:

Nominal maximum size of aggregate, in	Minimum cementitious material content, sacks
1.5	5
1	5.5
3/4	6
1/2	6.5

b. For placing concrete under water, cementitious material content must not be less than 7 sacks per cy.

4. Maximum Water-Cement Ratio: As scheduled below. Significant volume of liquid admixtures should be considered as part of the mixing water.

5. Maximum Aggregate Size: Nominal maximum size of coarse aggregate must not exceed three-fourths of the minimum clear spacing between reinforcing bars, one-fifth of the narrowest dimension between sides of forms, or one-third of the thickness of slabs or toppings.

		Maximum Water/Cementitious Material Ratio	
Concrete Class	Minimum 28-day Compressive Strength f'c	Non-Air Entrained	Air Entrained
Class D	3,000 psi	0.55	0.55

C. Concrete Mix Designs: The following table presents a schedule of classes of concrete, maximum aggregate, maximum slump and air content for each type of concrete, which must be as follows:

Concrete Element	Class of Concrete	Max. Size Aggregate	Max. Slump (inch) at point of discharge
Footings, equipment pads, walks, curbs, structures, etc.	D	1.5	3

D. Determine the slump by ASTM C143 at the point of truck discharge. Slump must not exceed 3" for any concrete placement where top of surface slopes more than 2%. When use of a Type I or II plasticizing admixture conforming to ASTM C1017 or when a Type F or G high-range water-reducing admixture conforming to ASTM C494 is permitted to increase the slump of concrete, concrete must have a slump of 2 to 4 in. before the admixture is added and a maximum slump of 8 in. at the point of truck discharge after the admixture is added unless otherwise specified.

E. Add an air entraining agent to the concrete to provide specified amounts of entrained air per table below unless noted otherwise. Measure air content at the point of delivery in accordance with ASTM C173. Tolerance is plus/minus 1.5%. For specified compressive strengths above 5000 psi, the air contents indicated in the following table may be reduced by 1%.

Nominal maximum aggregate size, in	Air content, percent	
	Exposure Class F1	Exposure Classes F2 and F3
3/8	6	7.5

1/2	5.5	7
3/4	5	6
1	4.5	6
1.5	4.5	5.5

2.11 COLORING

A. All concrete with exposed surfaces (such as equipment and access pads, sidewalks, curb and gutter, driveways, and catch basins) shall be colored by adding 1.5 pounds of Lamp Black per cubic yard of Concrete.

2.12 MIXING

A. Use ready-mixed concrete complying with ASTM C94 and with the requirements of Contract Documents. Mix for a period of not less than ten (10) minutes; at least three (3) minutes of the mixing period must be immediately prior to discharging at the job.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify lines, levels, and dimensions before proceeding with work of this section.

3.02 PREPARATION – NOT USED

3.03 WEATHER REQUIREMENTS

A. Reinforcement, forms and ground which concrete will contact must be completely free of frost.

B. When the average of the highest and lowest temperature during the period from midnight to midnight is expected to drop below 40° F for more than three successive days, deliver concrete to meet the following minimum temperatures immediately after placement:

1. 55° F for sections less than 12 in. in the least dimension;
2. 50° F for sections 12 to 36 in. in the least dimension;
3. 45° F for sections 36 to 72 in. in the least dimension; and
4. 40° F for sections greater than 72 in. in the least dimension.

The temperature of concrete as placed must not exceed these values by more than 20° F. These minimum requirements may be terminated when temperatures above 50° F occur during more than half of any 24 h duration.

C. The temperature of concrete as placed must not exceed 90° F. When temperature of steel reinforcement, embedments, or forms is greater than 120° F, fog steel reinforcement, embedments, and forms with water immediately before placing concrete. Remove standing water before placing concrete.

D. Do not begin to place or continue to place concrete while rain, sleet, or snow is falling unless adequate protection is provided and, when required, acceptance of protection is obtained. Do not allow rain water to increase mixing water or to damage the surface of the concrete.

3.04 CONVEYING AND PLACING CONCRETE

A. All concrete must be mixed, delivered and discharged in accordance with the requirements of ASTM C94. All concrete must be placed, finished and cured and all other pertinent construction practices must be in accordance with the requirements of ACI 301.

B. Notify Engineer not less than 48 hours prior to commencement of placement operations.

C. Before placing, clean mixing and conveying equipment, clean forms and space to be occupied by concrete and wet forms. Remove ground water until completion of work.

D. Place no concrete in any unit of work until all formwork has been completely constructed, all reinforcements secured in place, all items to be built into concrete are in place, form ties at constructions joints tightened and all preparation have been checked by the Inspector. A placing record must be kept on the site of the time and date of placing the concrete in each portion of the structure until the completion of the structure and must be open to the Inspector.

E. Slabs must not be subjected to occupant or storage loads exceeding 20 psf until specified strength is reached (28 days minimum).

F. Concrete must be placed so that a uniform appearance of surfaces will be obtained. The concrete will be free of all rock pockets, honeycombs and voids.

G. The subgrade must be moist when the concrete is placed for floor slab to prevent excessive loss of water from the concrete mix.

H. Pumping of concrete may require admixtures to increase slump beyond the maximum slump listed. Admixtures are subject to the engineer's review.

I. Carry on concreting, once started, as a continuous operation until the section of approved size and shape is completed. Make pour cut-offs of approved detail and location.

J. Handle concrete as rapidly as practicable from mixer to place of deposit by methods which prevent separation or loss of ingredients. Deposit as nearly as practicable in final position to avoid rehandling or flowing. Do not drop concrete freely where reinforcing bars will cause segregation, impact the soil face of excavations nor drop freely more than eight feet. Use hoppers, chutes or trunks of varying length so that the free unconfined fall of concrete must not exceed eight feet. Deposit to maintain a plastic surface approximately horizontal.

K. Consolidating: All concrete must be placed with mechanical vibration unless noted otherwise. Employ as many vibrators and tampers as necessary to secure the desired results. Minimum: one per each 20 cubic yards of concrete placed per hour. Eliminate the following practices: Pushing of concrete with vibrator; external vibration of forms; allowing vibrator to vibrate against reinforcing steel where steel projects into green concrete; allowing vibrator to vibrate contact faces of forms. Vibrators must function at a minimum frequency of 3600 cycles per minute when submerged in concrete. Supplement vibration by forking and spading along the surfaces of the forms and between reinforcing whenever flow is restricted. Drilled piers must be vibrated only to a depth of 3 times the pier diameter measured from the top of pier.

3.05 SLAB JOINTING

A. Saw Cut Control Joints: Saw cut joints with the Soff-Cut system or approved equal as soon as the surface is firm enough so that it will not be damaged by the blade, usually within 2 to 4 hours after placing; use 3/16 inch thick blade and cut at least 1 inch deep but not less than one quarter (1/4) the depth of the slab.

3.06 FLATNESS AND LEVELNESS TOLERANCES

A. An independent testing agency, hired by the contractor, will inspect finished slabs for conformance to specified tolerances.

B. Maximum Variation of Surface Flatness

1. Slab installations 10,000 square foot or less in total project area:

a. 1/4 inch in 10 ft in accordance with the "10-ft straight edge method" in ACI 117.

b. Correct the slab surface if minimum 10% of the data samples are greater than 1/4 inch or if some data are not less than 3/8 inch.

C. Correct the slab surface if composite overall values are less than specified and if local values are less than three-fifth of specified value. Correct defects by grinding or by removal and replacement of the defective work. Areas requiring corrective work will be identified. Re-measure corrected areas by the same process.

3.07 CONSTRUCTION JOINTS

A. Location and details of construction joints must be as indicated on drawings, specified, or as approved by the Engineer. Locate so as not to impair the strength of the structure.

B. Sandblast all construction joints using coarse sand or waterblast to clean and roughen entire surface of joint to 1/4 inch amplitude at all construction joints unless noted otherwise, exposing coarse aggregate solidly embedded in mortar matrix uniformly. Clean forms and reinforcing of drippings. Clear away debris by compressed air.

3.08 CONCRETE FINISHING

A. Finishing Formed Surfaces: Finish per Engineer’s specifications and requirements of ACI 301.

1. If the type of finish is not specified by Engineer, use grout-cleaned finish for permanently exposed formed surfaces except foundation surfaces and smooth-rubbed finish for exposed foundation surfaces.

B. Finishing Unformed Surfaces: Finish per Engineer specifications and requirements of ACI 301. Start finishing after bleeding of concrete is finished. The presence of bleed water is detected visually but when concrete surface is getting dry fast and rate of evaporation is so high, place a clear plastic sheet over a section of the concrete to block evaporation and to allow observation of bleeding.

C. Measure slabs for suspended floors and slabs-on-ground to verify compliance with the tolerance requirements of ACI 117 as specified below:

1. For nonresidential floor installations 10,000 square foot or less in total project area and for residential floors, 1/4 inch in 10 ft in accordance with the "10-ft straight edge method" in ACI 117.

3.09 CURING AND PROTECTION

A. Comply with requirements of ACI 301. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.

B. Maintain concrete with minimal moisture loss at above 50° F for the period of time necessary for hydration of cement and hardening of concrete.

1. Normal concrete: At least the first 7 days after placement.

2. High early strength concrete: At least the first 3 days after placement.

C. Curing methods must comply with ACI 308R.

D. Curing compounds conforming to ASTM C309 or ASTM C1315 must be applied in accordance with the recommendations of the manufacturer and must not be used on any surface against which additional concrete or other cementitious finishing materials are to be bonded, where epoxy flooring is called for, where concrete topping is to receive waterproofing membrane, where not recommended by integral color maker, nor on surfaces where such curing is prohibited by the project specifications.

E. Unformed concrete surfaces: Start curing as soon as the bleed water sheen has disappeared and before surface is dry.

1. Initial Curing: If surface drying starts before initial set of concrete, keep concrete continuously moist up to final set of concrete by fog spray. Time of initial set is also known as the vibration limit where concrete cannot be properly consolidated after reaching initial set. Before initial set, the concrete is not stiff enough to support the weight of a finisher or finishing machine. Water from fogging should be removed or allowed to evaporate before finishing.

2. Final Curing: Begin immediately after finishing. If finishing is completed but concrete has not reached final set, keep concrete continuously moist by fog spray, a liquid-applied evaporation reducer spray, or liquid membrane-forming curing compound spray. Water from fogging should be removed or allowed to evaporate before finishing. After final set of concrete, curing must be accomplished by one of the following materials or method:

a. Ponding, continuous fogging, or continuous sprinkling;

b. Application of a curing compound.

c. Application of mats or fabric kept continuously wet.

d. Application of moisture-retaining sheet conforming to ASTM C171.

e. Other moisture-retaining covering as reviewed by Engineer.

F. Formed concrete surfaces: Steel forms and all wood forms in contact with the concrete must be kept wet until they are removed. After formwork removal cure concrete by one of the method in final curing.

G. Remove protection in such a manner that the maximum decrease in temperature measured at the surface of the concrete in a 24 hr period must not exceed the following:

1. 50° F for sections less than 12 in. in the least dimension;
2. 40° F for sections from 12 to 36 in. in the least dimension;
3. 30° F for sections 36 to 72 in. in the least dimension; or
4. 20° F for sections greater than 72 in. in the least dimension.

H. Measure concrete temperature using a method acceptable to the Engineer, and record the concrete temperature. When the surface temperature of the concrete is within 20° F of the ambient or surrounding temperature, protection measures may be removed.

3.10 PATCHING AND CLEANING

A. After forms are removed, remove projecting fins, form ties, nails, etc. not necessary for the work or cut back one inch from the surface. Joint marks and fins in exposed work must be smoothed off and cleaned as directed by the Engineer.

B. Repair defects in concrete work as directed by the Engineer and per ACI 301. Chip voids and stone pockets to a depth of one inch or more as required to remove all unsound material. Voids, surface irregularities, chipped areas, etc., must be filled by patching, gunite or rubbing, as directed by the Engineer. Repaired surfaces must duplicate appearance of unpatched work.

C. Clean exposed concrete surfaces and adjoining work stained by leakage of concrete to approval of Engineer.

3.11 CLEANUP

A. Clean up all concrete and cement work on completion of this portion of the work, except protective coatings or building papers must remain until floors have completely cured or until interior partitions are to be installed.

3.12 GROUTING

A. Bearing plates and channels: The space between plates and channels bearing against masonry or concrete must be filled with grout when required by the Engineer. The grout must be mixed and placed in strict accordance with manufacturer's instructions. Care must be taken in the grouting to ensure that there are no voids or air pockets, and that there is full bearing between the bearing plates and channels and the grout.

3.13 POST INSTALLED ANCHORS

A. Installation of anchors and adhesive including drilling, cleaning of holes and torque must be in accordance with the current ICC/IAPMO evaluation report. Post installed anchors must be used only in applications permitted by the Evaluation Report. Anchors must use washer sized to prevent crushing of the attached member at installation torque.

B. Provide stainless steel anchors for exterior use or when expose to weather or in chemically corrosive environments. Provide galvanized carbon steel anchors at

other locations unless noted otherwise on the Drawings.

C. If reinforcement is encountered during drilling, abandon and shift the hole location to avoid the reinforcement. Provide a minimum of 2 anchor diameters or 1 inch, whichever is larger, of sound concrete between the anchor and the abandoned hole. Fill the abandoned hole with non-shrink grout. If the anchor or dowel may not be shifted as noted above, the Engineer will determine a new location.

D. Adhesive Anchors:

1. Insert the anchor or dowel in the hole with a twisting motion to the required embedment depth. Do not pump the anchor or dowel in and out of the hole.

2. Wedge bars tight and centered in the hole with wooden wedges (golf tees) to hold it in place until the adhesive sets.

E. Expansion Anchors:

1. Install per the ICC/IAPMO report to the nominal embedment depth shown on the plans. Tightening of the anchor must not reduce the embedment below that specified on the plans by more than eight threads. Projecting portions of the anchor must not be cut off before inspection is complete.

3.14 FIELD QUALITY CONTROL

A. Engineer Review: The Engineer must inspect the surfaces between plates and channels bearing on masonry and concrete to determine if grouting of space is necessary. If grouting of space is necessary, the City's agent must inspect the grouting procedure.

B. Acceptance of concrete strength is in accordance with ACI 318 section 5.3 unless noted otherwise.

C. When the strength of field-cured cylinders is less than 85% of companion laboratory-cured cylinders, evaluate current operations and provide corrective procedures for protecting and curing in-place concrete.

D. Field Acceptance of concrete: Concrete not within the specified limits of air-entrainment, slump and temperature must not be used in the work.

E. Additional Tests: The City's agent will make additional tests of in-place concrete when test results indicate specified concrete strengths and other characteristics have not been attained in the structure or deficiencies in protection and curing has occurred, as directed by Engineer. City's agent may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C42, or by other methods as directed. Contractor must pay for such tests conducted, other additional testing as may be required, and cost of repairing areas of structure tested when unacceptable concrete is verified.

3.15 DEFECTIVE CONCRETE

A. General: Work considered to be defective may be ordered by the Engineer to be replaced in which case the Contractor must remove the defective work at his expense. Work considered to be defective must include, but not be limited to, the following:

1. Concrete in which defective or inadequate reinforcing steel has been placed.
2. Concrete in 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.
3. Concrete below specified strength.
4. Concrete not meeting the maximum allowable drying shrinkage requirements.
5. Concrete containing wood, cloth, or other foreign matter, rock pockets, voids, honeycombs, cracks or cold joints not scheduled or indicated on the drawings.

3.16 CORRECTION OF DEFECTIVE WORK

A. The Contractor must, 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, must be chipped out until all unconsolidated material is removed.

C. Secure approval of chipped-out areas before patching. Patch per ACI 301-latest governing edition.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 03400
PRECAST CONCRETE

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: Precast valve vaults, manholes, wetwells, wetwell top slabs, electrical pull boxes, and joint sealers.

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM):

1. C 150 - Specification for Portland Cement.
2. C 478 - Precast Reinforced Concrete Manhole Sections
3. C 858 - Underground Precast Concrete Utility Structures.
4. C 913 - Precast Concrete Water/Wastewater Structures.

1.03 SUBMITTALS

A. Precast Concrete

1. Concrete Mix design and data.
2. Design and load calculations stamped and signed by a California licensed Civil or Structural Engineer. (shall be in conformance with the project geotechnical report and the specifications herein).
3. Shop drawings showing dimensions, reinforcement, connections, etc.

B. Quality Control Submittals

1. Manufacturer's application instructions for curing compound.
2. Ready-mix delivery tickets for each truck in accordance with ASTM C94.

PART 2 PRODUCTS

2.01 PRECAST CONCRETE STRUCTURES

A. Where shown on the plans, the Contractor may use reinforced concrete structures that are cast at an off-site location. In general these structures include vaults and electrical pull boxes. Precast concrete structures shall conform to ASTM C478, C858 and C913.

B. All precast concrete structures will be manufactured in a plant especially designed for that purpose. Standard products may be used wherever feasible.

C. All precast concrete structures shall be HS-20 traffic rated and certified for continuous street loading, unless otherwise specified on the plans.

D. Design of precast concrete structures is the responsibility of the Contractor and Contractor's Engineer. Design Calculations shall be stamped and signed by a California licensed Civil or Structural Engineer. Design requirements are listed below:

1. Manholes shall be design based on the loading criteria in ASTM C 857 and ACI 350.

2. Structures shall be designed to resist buoyant forces from groundwater assuming a depth of groundwater at finish grade.

3. Design loads shall consist of dead load, live load, impact load, full depth interior fluid, loads due to groundwater table at finish grade, seismic loads, and any other loads which may be imposed on the structure. Soil properties and loading values detailed in the project geotechnical report shall be used for the design of precast concrete structures.

4. Valve Vault and Wet Well – The bottom 3 feet of the wall riser shall be cast integrally with the bottom slab to eliminate a joint at the wall to base interface.

5. Individual riser sections shall be designed to utilize as few joints as possible. Vertical joints are not allowed.

6. Precast structures shall be designed to be water tight and to limit movement and deflections.

E. All precast concrete structures shall be manufactured in a plant especially designed for that purpose. Standard products may be used wherever feasible.

F. The Contractor shall submit shop drawings showing reinforcement, connections, embedded items, etc. Pipe penetrations shall be formed or core drilled. Penetrations 4 inches in diameter or larger shall be formed at the precast concrete plant.

G. Hatches for precast structures shall be installed at the precast concrete plant. The size and position of hatches shall be as shown on the Plans. The hatches shall be as specified in Section 08310.

2.02 MATERIALS

A. Concrete shall be meet the requirements of Section 03300.

B. Reinforcing steel shall conform to Section 03200.

2.03 JOINT SEALERS

A. All joints between precast concrete sections shall be made water-tight by using a preformed plastic material that is permanently self-adhering and flexible. Compound shall be "Ram-Nek" as manufactured by K.T. Snyder Company, Houston, Texas or approved equal. ("Ram-Nek" is distributed locally by Hanson Concrete Products of Milpitas.) Follow manufacturer's recommended installation procedures.

B. Where cast-in-place concrete is poured against an existing concrete structure, a pre-formed rubber hydrophilic water stop with adhesive back shall be installed on the precast side of the joint prior to the pour. Water stop shall be Adeka Ultra Seal MC-2010M or equivalent. Follow manufacturer's recommended installation procedures.

2.04 NON-SHRINK GROUT

A. Grout shall meet the requirements of Section 03600.

PART 3 EXECUTION

3.01 CASTING

A. Precast concrete structures shall be cured at the plant following manufacturer's procedures. Structures shall not be shipped to the site until fully cured.

3.02 STORAGE, HANDLING AND DELIVERY

A. Precast structures shall be fully braced (with temporary struts if necessary) until the structures have been delivered to the project site, installed, leveled and anchored into place as shown on the plans.

B. After cure, structures may be stored on the project site at the Contractor's own risk. Contractor is responsible for coordinating the delivery of precast concrete structures, and all trades required for their installation and anchorage

3.03 INSTALLATION

A. Precast concrete structures shall be installed as shown on the plans, according to manufacturer's recommendations.

B. Joint sealers shall be used as specified herein for a water-tight installation.

3.04 DEFECTIVE CONCRETE AND REPAIRS

A. Concrete shall be considered defective for the following reasons:

1. Failure of finished concrete profiles to conform to the plans within tolerance.
2. Failure to meet the specified cylinder strength requirements.
3. Concrete showing cracks, rock pockets, voids, spalls, or defects that adversely affect the structural adequacy of the concrete.

B. Defective concrete that results from improper casting or curing shall be repaired or replaced at the plant prior to shipment; damaged concrete that results from transportation, handling, or storage after the piece leaves the plant shall be repaired or replaced at no expense to the City.

C. Repairing and Patching: Immediately after removing forms, all concrete surfaces shall be inspected and any pour joints, voids, rock pockets, tie holes, except as specified, etc., shall be patched at once. Defective areas shall be chipped away to a depth of about one inch with the edges perpendicular to the surface

END OF SECTION

SECTION 03600
GROUT

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. Nonshrink 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. Simpson Strong-Tie Company Inc., Pleasanton, CA, FX-228.

   b. Five Star Products, Inc., Fairfield, CT, Five Star Grout.

   c. Master Builders, Inc., Cleveland, OH, Masterflow 928.

   d. 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. Simpson Strong-Tie Company Inc., Pleasanton, CA, FX-1200.
    b. Five Star Products, Inc., Fairfield, CT, Five Star Epoxy Grout.
    c. Master Builders, Inc., Cleveland, OH, Masterflow 648 CP Plus.
    d. 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 as specified in Section 03071 with not more than 2 parts sand.

b. For vertical or overhead work, consist of 1 part epoxy gel as specified in Section 03071 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. Inspect baseplate and anchor systems for rust, oil, and other deleterious substances that may affect the bond or performance of grout.

C. Confirm that newly placed concrete has been cured sufficiently to attain its design strength and limit further shrinkage.

D. 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 05120
STRUCTURAL STEEL FRAMING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Structural steel framing members.

1.02 RELATED REQUIREMENTS

A. Section 03300 - Cast-in-Place Concrete: Grouting of column bases and placement of anchor bolts, assemblies and embeds

1.03 REFERENCE STANDARDS (Editions adopted by current governing California Building Code)

A. AISC 303 - Code of Standard Practice for Steel Buildings and Bridges; American Institute of Steel Construction, Inc.

B. AISC 341 - Seismic Provisions for Structural Steel Buildings; American Institute of Steel Construction, Inc.

C. AISC 348 (RCSC) - Specification for Structural Joints Using ASTM A325 or A490 Bolts; American Institute of Steel Construction, Inc.

D. AISC 360 - Specification for Structural Steel Buildings; American Institute of Steel Construction Inc.

E. ASTM A36 - Standard Specification for Carbon Structural Steel.

F. ASTM A53 - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

G. ASTM A108 - Standard Specification for Steel Bar, Carbon and Alloy, Cold Finished.

H. ASTM A123 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

I. ASTM A153 - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

J. ASTM A193 - Standard Specification for Alloy-Steel and Stainless Steel Bolting for High Temperature or High Pressure Service and Other Special Purpose Applications.

K. ASTM A240 - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.

L. ASTM A276 - Standard Specification for Stainless Steel Bars and Shapes.

M. ASTM A307 - Standard Specification for Carbon Steel Bolts.

N. ASTM A325 - Standard Specification for Structural Bolts, Steel, Heat Treated.

O. ASTM A449 - Standard Specification for Hex Cap Screws, Bolts and Studs, Steel, Heat Treated, 120/105/90 ksi Minimum Tensile Strength, General Use.

P. ASTM A490 - Standard Specification for Structural Bolts, Alloy Steel, Heat-Treated.

Q. ASTM A500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.

R. ASTM A563 - Standard Specification for Carbon and Alloy Steel Nuts.

S. ASTM A572 - Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel.

T. ASTM A 588 - Standard Specification for High-Strength Low-Alloy Structural Steel with 50 ksi Minimum Yield Point with Atmospheric Corrosion Resistance.

U. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

V. ASTM A780 - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.

W. ASTM A786 - Standard Specification for Hot-Rolled Carbon, Low-Alloy, High-Strength Low-Alloy, and Alloy Steel Floor Plates.

X. ASTM A992 - Standard Specification for Structural Steel Shapes.

Y. ASTM A1085 - Standard Specification for Cold-Formed Welded Carbon Steel Hollow Structural Sections (HSS).

Z. ASTM B695 - Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel.

AA. ASTM F436 - Standard Specification for Hardened Steel Washers.

AB. ASTM F593 - Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.

AC. ASTM F594 - Standard Specification for Stainless Steel Nuts.

AD. ASTM F844 - Standard Specification for Washers, Steel, Plain (Flat), Unhardened for General Use.

AE. ASTM F959 - Standard Specification for Compressible-Washer-Type Direct Tension Indicators for Use with Structural Fasteners.

AF. ASTM F1554 - Standard Specification for Anchor Rods, Steel, 36, 55, and 105-ksi Yield Strength.

AG. ASTM F1852 - Standard Specification for “Twist Off” Type Tension Control Structural Bolt /Nut /Washer Assemblies, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.

AH. AWS D1.1 - Structural Welding Code - Steel; American Welding Society.

AI. AWS D1.6 - Structural Welding Code - Stainless Steel; American Welding Society.

AJ. AWS D1.8 - Structural Welding Code Seismic Supplement; American Welding Society.

AK. SSPC-SP 2,3,6 - Society for Protective Coatings.

1.04 SUBMITTALS

A. See Section 01330 - Submittal Procedures.

B. Shop Drawings
   1. Shop drawings for steel fabrications must show details of members, including connections, sizes, spacing of bolts and welds. They must show the marking and position of each member, erection plans and the limits of paint applications. A complete anchor bolt/rod setting plan for the execution of the work must be submitted.
   2. Shop drawings and calculations for temporary shoring and bracing must be submitted for review. The shop drawings must show layout, size of members and connection details. Calculations must show all stresses in members and connections, from dead, live, and lateral loads in accordance with the requirements of the CBC current governing edition. Shop drawings and calculations for temporary shoring and bracing must be stamped and signed by a civil engineer registered in the State of California.

C. Certificates of Compliance
   1. Structural Steel
      a. The Contractor must provide Mill Certificates for each grade of steel for each heat to be used on project and certify that products meet or exceed specified requirements.
      b. Mill Certificates must include name of mill, date of rolling, date of shipping, ultimate tensile strength, yield strength, and percent of elongation.
      c. Mill Certificates must be furnished with each lot of material shipped to the site and must be signed by the Contractor which will serve to certify that all structural steel materials installed comply with specified requirements.
   2. Welding Material
      a. The Contractor must provide manufacturer's Certificates of Compliance for all electrodes, fluxes and shielding gasses to be used and certify that the filler metal meets the supplemental notch toughness requirements, as applicable.
   3. Bolts
      a. The Contractor must provide Certificates of Compliance for bolts and certify that products meet or exceed specified requirements.
   4. When Mill Certificates cannot be provided or does not supply required supplemental certifications, the Contractor must hire a professional testing laboratory to verify compliance of each type of material to be used and provide laboratory test reports. The cost of testing must be paid for by the Contractor.

D. Laboratory Test Reports
   1. Laboratory test reports must show the name of testing agency, date of testing, types of tests performed and must 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 must be submitted for each type of steel for each heat to show compliance with appropriate ASTM Standards and these specifications.

E. Welding Procedure Specifications (WPS)
   1. Welding procedure specifications for all prequalified joints must be submitted per AWS D1.1, Clause 3 and reviewed prior to beginning fabrication. Non-prequalified joints must be qualified per AWS requirements. WPS must specify

all applicable variables of AWS D1.1, power source information, and electrode manufacturer and trade name.

1.05 QUALITY ASSURANCE

A. Codes and Standards: The fabrication, priming and erection of structural steel members must comply with the current governing edition of CBC, AISC 360, AISC 303, AWS D1.1, AWS D1.6, and RCSC Specifications except where more stringent requirements are shown or specified.

B. Sampling, Testing, and Inspection:
   1. General
      a. If the special inspector, 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.
   2. Contractor
      a. The Contractor must cooperate with and notify Owner's agent at least 24 hours in advance of inspections required and must supply samples, test pieces, and facilities for inspection without extra charge.
      b. The Contractor must identify and tag each lot of fabricated steel to be shipped to the site by heat numbers in such a manner that it can be accurately identified at the job site.
      c. The Contractor must remove all unidentified steel received at the site.

C. Qualifications: Welding processes and welding operators must be qualified in accordance with AWS D1.1. Welders to be employed are to provide AWS certification for the type of welding necessary.

PART 2 PRODUCTS

2.01 MATERIALS

A. MC Channels: ASTM A36.

B. Steel Plates, and Bars: ASTM A36 unless noted otherwise.

C. Threaded Rod and Nuts: ASTM F1554 Grade 36 Class 2A with matching finish ASTM A563 nuts. Washers are required per AISC 360. Rods embedded in concrete, grout or adhesive must be galvanized or non-lubricated unless noted otherwise.

D. Anchor Rods and Nuts: ASTM F1554 Grade 36 Class 2A with matching finish ASTM A563 nuts. Rods embedded in concrete, grout or adhesive must be galvanized or non-lubricated unless noted otherwise. Washers are required per AISC 360. Embedded rods must be threaded full length unless noted otherwise. Rods, nuts and washers in contact with preservative-treated wood must be hot-dipped galvanized.

E. Washers must be flat circular, rectangular or square beveled washers and must conform to ASTM F436 Type 1 for high strength bolts/rods and ASTM F844 for other bolts/rods. Washer finish must match nut. Washers must be installed under the element being turned for A325 bolts and under both the head and the nut for ASTM A490 bolts. Washers over oversized or slotted holes must also comply with RCSC Specification section 6.

F. Welding Filler Metal: Arc-welding electrodes must be E70 series electrodes for A36,

A572 and A992 material. Electrodes must be as recommended by their manufacturers for the positions and conditions of actual use.

1. Weld metal toughness must be reported on the filler metal manufacturer's certificate of compliance. All filler metal must be capable of welds with a minimum CVN value of 20 ft-lbs at 0° F. Exceptions: Metal deck welding, stair and handrail welding, and light gage steel welding.
2. Demand critical welds (DCW) must use filler metal with a minimum CVN value of 20 ft-lbs at -20° F and 40 ft-lbs at 70° F.

G. Stainless Steel:
1. Anchor Rods, Bolts and Nuts: ASTM F593 CW1(316) for diameters between 1/4 inch to 5/8 inch and ASTM F593 CW2(316) for diameters between 3/4 inch to 1-1/2 inch with ASTM F594 nuts. Nuts must be the same alloy group as the bolt. Threaded parts except the length embedded in concrete must be lubricated with Neolube or approved equal prior to assembly.
2. Bars, Shapes and Headed Stud: ASTM A276, Type 304L or 316L.
3. Plates: ASTM A240, Type 304L or 316L.
4. Washers: ASTM A240.

2.02 FABRICATION

A. The Fabricator must provide quality control inspections for welding and bolting operation; and reduced beam sections, where exist, per AISC 341 Chapter J.

B. Shop fabricate to greatest extent possible.

C. Locate concrete reinforcement and confirm final concrete anchor locations prior to fabricating plates, members or other steel assemblies attached with anchors.

D. Welding:
1. Connections and joints must be welded in accordance with the applicable requirements of AWS. In addition, connections and joints that are part of SFRS must be welded in accordance with AWS D1.8.
2. Tack welds, air-arc gouging and flame cutting must not be performed without adequate preheat or incorporation into the final weld.
3. The filler metal manufacturer's published recommendations must be the basis for determining the allowable range of essential variables for a prequalified WPS. Unless noted otherwise on the plans, back-up bars for CJP welds must be removed followed by backgouging and backwelding.
4. Coatings and contaminates, including galvanizing, must be removed to 1” minimum clear from areas to be welded.

E. High Strength Bolting: All high strength bolted connections must be Slip Critical type connections unless noted otherwise.

F. Holes, notches, slots, etc. are not allowed in steel members and attached plates unless shown on the structural drawings or requested and specifically accepted by the Engineer.

2.03 FINISH

A. Galvanizing:
1. Galvanize all structural steel exposed to weather that are not primed, in contact with preservative-treated wood and fire-retardant-treated wood, or where shown on the drawings.

2. Galvanizing of products fabricated from rolled, pressed and forged steel shapes, plates, bars and strip 1/8 inch thick or thicker, must conform to ASTM A123.
3. Galvanizing of standard pipe must conform to ASTM A53.
4. Galvanizing of iron and steel hardware and nuts and bolts must conform to ASTM A153 class C, except whenever threaded studs, bolts, nuts, and washers are specified to conform to ASTM A307, A325, A449, A563, or F436 and zinc coating is required, they must be hot-dip zinc coated per ASTM A153 or mechanically zinc coated per ASTM B695 class 55 or greater. Unless otherwise specified, galvanizing must be performed after fabrication. Components of bolted assemblies must be galvanized separately before assembly.
5. Nuts to be used on bolts/rods/studs before hot-dip galvanizing, and then hot-dip galvanized in accordance with ASTM A153 class C, must be tapped oversize after coating and must conform to thread dimension and overtapping allowances in ASTM A563.
6. Galvanized surfaces that are modified or damaged at any time after the application of the zinc coating must be repaired by thoroughly wire brushing the areas and removing loose and cracked coating, after which the cleaned areas must be painted with 2 applications of unthinned zinc-rich primer containing not less than 92% zinc dust by weight in the dried film according to ASTM A780. Aerosol cans must not be used.

PART 3 EXECUTION

3.01 ERECTION

A. The Contractor will be responsible to erect the complete structural frame plumb and true to line and grade, in conformance with the AISC 303.

B. Temporary Bracing and Shoring:
   1. The Contractor must temporarily brace the frame in both directions and must maintain columns plumb until the final connections of the framework and construction of diaphragms are complete.
   2. The Contractor must provide such temporary shoring and additional bracing of steel frame as required to adequately and safely support any or all loads imposed upon the structure during construction.

C. After erection, where the member is galvanized or painted, field welds, abrasions or scratched surfaces, and surfaces not shop primed or galvanized, must be primed if member is painted or painted if member is galvanized, except surfaces to be in contact with concrete. The entire work must be left in a neat, clean and acceptable condition.

3.02 FIELD QUALITY CONTROL

A. The Contractor must provide field quality control inspections for welding and bolting operation; and reduced beam sections, where exist, per AISC 341 Chapter J.

B. The Contractor must hire the Engineer responsible for the design of temporary bracing and shoring to inspect the work as detailed on the reviewed shop drawings.

C. The Engineer responsible for design, temporary bracing and shoring must write a letter to the Engineer of record/City Representative certifying construction of temporary bracing and shoring is in accordance with the reviewed shop drawings,

prior to start of construction requiring temporary bracing or shoring.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 05501
ANCHOR BOLTS

PART 1 GENERAL

1.01 DESCRIPTION

A. This section specifies anchor bolts, adhesive anchoring systems, expansion anchors, and cast-in-place inserts, complete with washers and nuts. Unless otherwise specified, anchor bolts shall be Type 316 stainless steel.

1.02 RELATED REQUIREMENTS

A. Section 03100 – Concrete Forming and Accessories

B. Section 03200 – Concrete Reinforcing

1.03 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	2013 California Building Code

1.04 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. Design calculations in accordance with Paragraph 05501-2.03.
7. 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

B. Adhesive anchoring system

1. Adhesive anchoring system in concrete must be SET-XP (ESR-2508) or approved equal with a current ICC/IAPMO evaluation report.

C. Expansion anchors

1. Expansion anchors must be CS STRONG BOLT-2 (ESR-1771) by SIMPSON or approved equal with a current ICC/IAPMO evaluation report.

D. Inserts with ASTM A36 threaded rod

1. Dewalt Snake+ (ESR-2272) with ASTM A36 threaded rod
2. HILTI HIS-N Inserts (ESR-3187) with ASTM A325 bolts.
3. HILTI HIS-RN Inserts (ESR-3187) with ASTM A193 Grade B8M stainless steel bolts.

2.03 DESIGN

A. Anchor bolts for equipment frames and foundations shall be designed in accordance with Section 01610 – Seismic Design Criteria. Seismic forces shall

be considered acting at the center of gravity of the piece under consideration. Additionally, if wind loading is applicable, a basic wind speed of 115 miles per hour, Exposure Category C, and an Importance Factor of 1.00 shall be used.

B. Calculations and shop drawings shall be submitted with the equipment submittal in accordance with Paragraph 05501-1.04 and Section 01300 - Submittals for all anchorage details. All calculations shall be prepared and signed by a civil or structural Professional Engineer licensed to practice in the state where the Project is located.

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.

B. Anchor minimum edge distances defined by the current ICC/IAPMO evaluation report must be met at edges, control joints and cracks greater than 0.015 inches wide. Installation of anchors and adhesive including drilling, cleaning of holes and torque must be in accordance with the current ICC/IAPMO evaluation report. Verify whether the evaluation report requires a maximum or minimum torque. Confirm torque with a torque wrench calibrated to the inspector's torque wrench. Post installed anchors must be used only in applications permitted by the Evaluation Report. Anchors must use washer sized to prevent crushing of the attached member at installation torque.

C. Provide stainless steel anchors for exterior use or when expose to weather or in chemically corrosive environments. Provide galvanized carbon steel anchors at other locations unless noted otherwise on the Drawings.

D. If reinforcement is encountered during drilling, abandon and shift the hole location to avoid the reinforcement. Provide a minimum of 2 anchor diameters or 1 inch, whichever is larger, of sound concrete between the anchor and the abandoned hole. Fill the abandoned hole with non-shrink grout. If the anchor or dowel may not be shifted as noted above, the Engineer will determine a new location.

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 – Cast-in-Place 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 ANCHORS:

A. Insert the anchor or dowel in the hole with a twisting motion to the required embedment depth. Do not pump the anchor or dowel in and out of the hole.

B. Wedge bars tight and centered in the hole with wooden wedges (golf tees) to hold it in place until the adhesive sets.

3.04 EXPANSION ANCHORS AND SCREW ANCHORS:

A. Install per the ICC/IAPMO report to the nominal embedment depth shown on the plans. Tightening of expansion anchors must not reduce the embedment below that specified on the plans by more than eight threads. Projecting portions of expansion anchors must not be cut off before inspection is complete.

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
2. Section 05120 – Structural Steel Framing

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; 2013 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 08310
ACCESS DOORS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: Access doors.

1.02 SUBMITTALS

A. Product Data.

B. Shop Drawings: Show the following:

1. Access door attachment to structure in each typical condition.
2. Locations of access doors.
3. Detailed drawings showing all dimensions and materials.

1.03 DELIVERY, STORAGE, AND HANDLING

A. Identify type and size of each door in way not to damage finish prior to delivery.

B. Deliver products only after proper facilities are available.

C. Deliver and store packaged products in original containers with seals unbroken and labels intact until time of use.

D. Handle carefully to prevent damage and store on clean concrete surface or raised platform in safe, dry area. Do not dump onto ground.

E. Protect access doors during shipment and storage to prevent warping, bending, and corrosion.

PART 2 PRODUCTS

2.01 FLOOR HATCHES

A. **Top Mounted Access Hatches**:

1. Top mounted access hatches shall be rated for pedestrian loading (300 pounds per square foot and 2000 pound point load).
2. Access hatch shall be manufactured by EJ, USF Fabrication, or approved equal.
3. Hatch frame shall be extruded aluminum, with a mounting flange for a top mount application to be mounted to the existing concrete structure.

4. Hatch shall be bolted with a minimum of 3 bolts per side. Bolts shall be 306 SS Kwik Bolt TZ as manufactured by Hilti at 18” on center all around frame, or approved equal.
5. Hinges: Heavy forged aluminum hinges, each having a minimum 1/4" (6.3 mm) diameter Type 316 stainless steel pin, shall be provided, and shall pivot so the cover does not protrude into the channel frame. Shall be specifically designed for horizontal installation and shall be through bolted to the cover with tamper-proof Type 316 stainless steel lock bolts and shall be through bolted to the frame with Type 316 stainless steel bolts and locknuts.
6. Recessed Padlock Clip: Hatch shall have a recessed padlock compartment and padlocks. The recessed padlock clip shall be supplied with its own separate hinged cover for access. The separate hinged cover shall be supplied with a spring-loaded cover so that there is no possibility of the cover being left in the “open” position, which would cause a tripping hazard.
7. Lift Handle: Hatch shall have cast stainless steel lift handles, flush with the top surface of the hatch.
8. Cover shall be equipped with a hold open arm which automatically locks the cover in the open position. A Type 316 stainless steel snap lock with fixed handle shall be mounted on the underside of the cover.
9. Hardware shall be anticorrosion throughout. Factory finish shall be anodized aluminum with bituminous coating applied to the exterior of the frame.
10. Hatches shall be designed for easy opening by one person from both inside and outside and shall be balanced to require no more than 30 lbs. of opening force.
    a. If necessary to meet this requirement, hatch shall be supplied with heavy duty stainless steel pneu-spring for smooth, easy, and controlled door operation throughout the entire arc of opening and closing.
    b. Spring shall consist of a minimum ½” stainless steel shaft which slides into a minimum 1” stainless steel tube. Spring shall be charge with an inert gas (nitrogen).
11. Mechanical, torsion, or coil type springs shall not be accepted as equal.
12. Hatch shall be equipped with a self-engaging safety bar to prevent closing
13. Clear open spaces indicated on the drawings shall be provided for all hatches.
14. Hatch shall have fall through protection as specified below.
15. Contractor is responsible for measuring existing structure dimensions and openings prior to ordering access hatches. Contractor is also responsible for confirming that the clear open dimensions of the access hatches and fall protection do not impede the installation and removal of pumps. See the plans for additional notes and requirements.

16. Hatches at the Marina Village Pump Station may require custom designed frames to accommodate existing conditions.

B. **H20 Rated Access Hatches:**

1. H20 Rated Access Hatches shall be designed for unintended H-20 loading conditions.
2. Access hatch shall be manufactured by EJ, Style CHS – Heavy Duty H-20 Rated SAFE HATCH, or approved equal.
3. Channel frame shall be extruded aluminum, to match the hatch material, cast into the new concrete structure. A continuous EPDM gasket shall be mechanically attached to the aluminum frame to create a gastight barrier around the entire perimeter of the cover and eliminate dirt and debris that may enter the channel frame.
4. Hinges: Heavy forged aluminum hinges, each having a minimum 1/4" (6.3 mm) diameter Type 316 stainless steel pin, shall be provided and shall pivot so the cover does not protrude into the channel frame. Shall be specifically designed for horizontal installation and shall be through bolted to the cover with tamper-proof Type 316 stainless steel lock bolts and shall be through bolted to the frame with Type 316 stainless steel bolts and locknuts.
5. Recessed Padlock Clip: Hatch shall have a recessed padlock compartment and padlocks. The recessed padlock clip shall be supplied with its own separate hinged cover for access. The separate hinged cover shall be supplied with a spring-loaded cover so that there is no possibility of the cover being left in the “open” position, which would cause a tripping hazard.
6. Lift Handle: Hatch shall have cast stainless steel lift handles, flush with the top surface of the hatch.
7. Hatches shall be designed for easy opening by one person from both inside and outside and shall be balanced to require no more than 30 lbs. of opening force.
8. Lifting Mechanisms: Manufacturer shall provide the required number and size of compression spring operators enclosed in telescopic tubes to provide, smooth, easy, and controlled cover operation throughout the entire arc of opening and to act as a check in retarding downward motion of the cover when closing. The upper tube shall be the outer tube to prevent accumulation of moisture, grit, and debris inside the lower tube assembly. The lower tube shall interlock with a flanged support shoe fastened to a formed 1/4" gusset support plate.
9. Cover shall be equipped with a hold open arm which automatically locks the cover in the open position. A Type 316 stainless steel snap lock with fixed handle shall be mounted on the underside of the cover.
10. Hardware shall be anticorrosion throughout. Factory finish shall be anodized aluminum with bituminous coating applied to the exterior of the frame.

11. If necessary to meet this requirement, hatch shall be supplied with heavy duty stainless steel pneu-spring for smooth, easy, and controlled door operation throughout the entire arc of opening and closing.
12. Spring shall consist of a minimum ½" stainless steel shaft which slides into a minimum 1" stainless steel tube. Spring shall be charge with an inert gas (nitrogen).
13. Mechanical, torsion, or coil type springs shall not be accepted as equal.
14. Hatch shall be equipped with a self-engaging safety bar to prevent closing
15. Clear open spaces indicated on the drawings shall be provided for all hatches.
16. Hatch shall have fall through protection as specified below.

C. Clear open spaces indicated on the drawings shall be provided for all hatches. Contractor shall verify that pump and rail system will work and fit with the proposed hatch and openings.

D. Fall Through Protection:

1. The Safety Grate shall be made of 6061-T6 aluminum and designed per the Specifications for Aluminum Structures by the Aluminum Association, Inc. 5th Edition, Dec. 1986 for "Bridge Type Structures".
2. Design shall combine covering of the opening, fall through protection per OSHA Standard 1910.23 and controlled confine space entry per OSHA Standard 1910.146.
3. The grating shall be designed to withstand a minimum live load of 300 pounds per square foot using 17,300 psi as the design stress for the aluminum. Deflection shall not exceed 1/150" of the span.
4. Grate openings shall allow for visual inspection, limited maintenance and float adjustments while the safety grate fall through protection is left in place. Each grate shall be provided with a permanent hinging system, which will lock the grate in the 90° position once opened. Grates in the open position create a visual barrier around the opening, alerting passing pedestrians.
5. Each aluminum safety grate shall be coated with a safety orange color, promoting visual awareness of the hazard, by a powder coat system, applied by the electrostatic spray process. The coating is a thermosetting powder coat finish with a minimum thickness of 2 mils-4 mils and shall be baked at 350°-375°F until cured.
6. See Section 2.01-G below.

E. Manufacturer shall guarantee against defects in hatch material or workmanship for a period of ten years.

F. Contractor shall ensure that the fall protection grates and mounting hardware will not interfere with the placement of the pump guiderails or removal of the pumps from the pump station wet well. Access hatch hinge and mounting brackets shall not be placed above, or within 2 inches of the pump guide rails.

The Contractor shall ensure that the pumps can be easily removed and replaced.

2.02 FINISHES

A. Floor Access Doors:
   1. Aluminum: Manufacturer's anodized finish. Top wearing surface shall be ¼" diamond plate unless otherwise noted.
   2. Aluminum in Contact with Dissimilar Metals and Concrete: Manufacturer's standard bituminous coating.
   3. Steel: Manufacturer's standard red oxide primer.

B. Aluminum top wearing surface for the valve vault access hatch at the Harbor Bay Parkway 1 pump station shall be non-slip.

   1. Non-Slip surfaces shall be SlipNOT®, grit-free, aluminum Grip Plate® / Grip Grate® Grade #2 – Medium, as manufactured by the W.S. Molnar Company, or approved equal

   2. Non-slip surfaces shall incorporate an anti-slip aluminum surface covering 100% of substrate consisting of a random hatch matrix and a bond strength of at least 2,000 psi. The non-slip surface shall have a minimum coefficient of friction of 0.8 and be listed as slip resistant by Underwriters Laboratories.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine construction to receive access door and verify correctness of dimensions and other supporting or adjoining conditions.

B. Contractor shall replace any defective or damaged equipment at no additional cost to the City.

3.02 PREPARATION

A. Coordinate details with other work supporting, adjoining, or requiring access doors.

B. Verify dimensions, profiles, and fire-resistive rating for each opening.

C. Verify that location will serve portion of work to which access is required. Where proposed functional location conflicts with other work, notify the Engineer before installation.

3.03 INSTALLATION

A. Install access doors in accordance with manufacturer's instructions.

B. Ensure correct types and adequate sizes at proper locations.

C. Securely attach frames to supporting work and ensure doors, frames and hardware operate smoothly and are free from warp, twist and distortion.

D. See 2.01-G above and Section 03400.

E. Contractor shall note that the wetwells are specified to have a coating system which may affect the installation of hatch equipment. The Contractor shall coordinate all work to ensure that the fall protection is installed per the manufacturer's recommendations.

3.04 ADJUSTING

A. Adjust doors, frames and hardware to operate smoothly, freely, and properly, without binding.

3.05 CLEANING

A. Thoroughly clean surfaces of grease, oil, or other impurities, touch-up abraded prime coat.

END OF SECTION

SECTION 09875
CONCRETE COATINGS FOR WASTEWATER STRUCTURES

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope: Provide and install coatings on all interior concrete surfaces, as indicated herein, in the Specifications and on the Drawings.

B. System shall be a multi-component resin-based mortar lining system specifically designed to protect the concrete surfaces of municipal wastewater structures from chemical attack. The main purpose of this membrane is to offer protection of the substrate from chemicals or gases that might cause deterioration.

C. Rehabilitation of existing concrete structures specified to be rehabilitated/coated shall be prepared as recommended by the manufacturer and as specified herein:
   1. Clean with water and/or abrasive blasting all interior surfaces in accordance with manufacturer's recommendations.
      a. Contractor shall complete all surface cleaning and preparation in accordance with asbestos and lead removal abatement requirements if these materials are identified during mobilization phase inspection work. Asbestos and lead in paint removal portion of work shall be paid as extra work.
   2. Replace or treat corroded and exposed steel.
   3. Repair hydrostatic leaks where water is actively running from outside structure with hydrostatic pressure grouting.
   4. Repair any hydrostatic leaks where evidence of leak is present but no water is actively running with hydraulic cement mortar.
   5. Remove infiltrating roots and fill cracks and joints with hydraulic cement mortar.
   6. Form fillets and make modifications to interior of pump station structure in accordance with drawings and relevant specification sections.
   7. Apply minimum 1" thick Sprayable Microsilica Cement Mortar to all interior floor, wall and ceiling surfaces.

D. New concrete structures specified to be coated shall be prepared as recommended by the manufacturer and as specified herein:
   1. Clean with water and/or abrasive blasting all interior surfaces in accordance with manufacturer's recommendations.
   2. Form fillets and make modifications to interior of pump station structure in accordance with drawings and relevant specification sections.
   3. Remove fill cracks and joints with hydraulic cement mortar.

E. Wetwell and manhole Concrete Coating System shall include at minimum the following, and as further defined herein:
   1. Surface preparation and cement mortar installation as specified above.
   2. Apply 125 mils of ultra-high build epoxy coating to all interior floor, wall and ceiling surfaces as specified herein.

1.02 QUALITY ASSURANCE

A. Experience: Both coatings manufacturer and coatings installer shall have a minimum 5 years' experience in production and application, respectively, of specified products. Coatings installer shall be approved and endorsed, in writing, by coatings manufacturer.

B. Regulations: Meet federal, state, and local requirements which apply to the work, including, but not limited to those regulations limiting the emission of volatile organic compounds.

C. Coatings Manufacturer Recommendations: Coatings installer shall follow all recommendations of the coatings manufacturer regarding storage, handling, surface preparation, application of coatings, re-coat times, environmental conditions during storage, preparation and application of coatings, and all other coatings manufacturer recommendations.

D. Warranty: Both Coatings Manufacturer and Coatings Installer shall provide a 1-year complete replacement warranty for all coatings. Manufacturer shall provide 5-year warranty for long-term performance of coatings in addition to 1-year warranty.

1.03 SUBMITTALS

A. Coatings Manufacturer shall submit for approval the following:
   1. 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.
   2. Letter from the Coatings Manufacturer certifying the Coatings Installer as factory trained and qualified.
   3. 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.
   4. Test reports from an independent testing laboratory confirming chemical resistance of coating for chemicals common to municipal wastewater treatment facilities.

1.04 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Protection: Protect all pre-coated items from coating damage during shipping.

B. Store products in accordance with manufacturer’s directions.

C. Store products in a neat, orderly fashion. Protect products from damage. Protect storage area from damage from stored products.

PART 2 - PRODUCTS

2.01 PRODUCT AND MANUFACTURER:

A. Coating for Exposed Steel Prior to Sprayable Cement Mortar Application
   1. Madewell 1312 Epoxy putty or approved equal

B. Hydrostatic Pressure Grout
   1. Avanti A-220, DeNeef, or approved equal

C. Hydrostatic Cement Mortar
   1. Madewell Mainstay ML-10, Preco Plug, Octocrete, Burke Plug or approved equal

D. Sprayable Microsilica Cement Mortar
   1. Madewell ML-72 or approved equal

E. Ultra High-Build Epoxy Coating System
   1. Madewell Mainstay DS5 or approved equal

F. Coating Systems
   1. Madewell
      a. Mainstay DS5
   2. Global Ecotechnologies, Inc.
      a. Underlayment: Endura-Flex 1200P with 1200F Filler or approved equal
      b. Primer: Endura-Flex 1200P or approved equal
      c. Surface Material: Endura-Flex 1988 or approved equal
   3. Environmental Coatings, LLC
      a. Surface Material: Sewer Shield 100 trowelable grade or approved equal
   4. Sauereisen SewerGard
      a. Underlayment: Sauereisen Filler Compound No. 209 or approved equal
      b. Surface Material: Sauereisen No. 210S or approved equal

2.02 SERVICE CONDITIONS AND PERFORMANCE

A. Provide a 100% solids, VOC-free resin based coating system specifically formulated for wastewater applications.
   1. The lining system shall be a non-sagging application permitting repair of vertical, horizontal, and overhead surfaces.
   2. The lining system shall provide an impermeable, high-strength, corrosion-resistant, monolithic lining for manholes, grit chambers, wetwells, wastewater channels, and related structures subject to attack from hydrogen sulfide and acid generated by microbiological sources.

B. The lining system, including underlayment, primer and surface materials, shall be from a single manufacturer.

C. Chemical Resistance (ASTM D 1308):
   a. Reagent: 6% sulfuric acid solution.
   b. Film Integrity: Unaffected.

D. Coating Thickness: 125 mils thick, minimum.

E. Texture: Semi-smooth for all surfaces.

2.03 PROPERTIES

A. Either trowel or spray application is acceptable provided the Installer follow all Manufacturer recommendations.

B. Physical Properties
   1. Bond strength to dry or damp concrete: Failure in concrete per ASTM C4541
   2. Compressive strength: >6,700 psi per ASTM C579
   3. Flexural strength: >4,600 psi per ASTM C580
   4. Tensile strength: >2,400 psi per ASTM C580
   5. Moisture absorption: <0.2% per ASTM C413

PART 3 - EXECUTION

3.01 STORAGE, MIXING, AND THINNING OF MATERIALS

A. Manufacturer's Recommendations: Unless otherwise specified herein, the coating manufacturer's printed recommendations and instructions for thinning, mixing, handling, applying, and protecting its coating materials, for preparation of surfaces for coating, and for all other procedures relative to coating shall be strictly observed.

B. All protective coating materials shall be used within the manufacturer's recommended shelf life.

C. 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.

D. 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 INSPECTION

A. Contractor and his installer shall examine the areas and conditions under which concrete coatings are to be placed and notify Engineer, in writing, of any conditions which could be detrimental to the proper and timely installation of the Work. Do not proceed with the Work until any unsatisfactory conditions have been corrected in a manner acceptable to the Engineer.

3.03 SURFACE PREPARATION

A. Surface preparation shall not begin until at least 7 days after new concrete has been placed. Chemical resistant coatings shall not be applied until at least 28 days after new concrete has been placed.

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 D-4258: Standard Practice for Surface Cleaning Concrete for Coating
   2. ASTM D-4259: 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).
   1. Evaluation of blast cleaned surface preparation work will be based upon comparison of the blasted surfaces with the standard samples available from the NACE, using NACE Standard TM-01-70.
   2. The air compressor must be equipped with efficient oil and water traps to ensure that the compressed air is clean and free of oil particles. Refer to NACE procedure for “Blotter Testing” of compressed air.

D. Concrete surfaces requiring repairs in excess of one-quarter inch (¼") depth shall be restored with underlayment, and brought flush with the surface, in accordance with the coating manufacturers' recommendations to provide a continuously smooth and even surface for application of top coat.

E. Surfaces shall be clean and as recommended by the coating manufacturer before coating or lining is started.

F. 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.

G. All surfaces to be coated shall be completely dry, clean, and contaminant-free prior to application. For polyurethane lining system, after completing surface preparation, surface dryness shall be verified according to ASTM D4263. Any indication of moisture will require an appropriate corrective measure. The surface shall be re-tested after taking the corrective measure.

H. The concrete surface shall be notched to a depth equal to the total lining thickness with a power grinding tool on the perimeter of all lining termination points. The notch shall be clean and neat.

3.04 APPLICATION

A. Coatings shall be installed on all surfaces described in Paragraph 1.01.A of this Section, with the systems indicated.

B. Contractor shall give the Engineer a minimum of 3 days advance notice of the start of any field surface preparation work or coating application Work. All such Work shall be performed only in the presence of the Engineer.

C. All concrete surfaces shall be coated before installation of any equipment in the area to be protected, including chemical storage tanks, pumps, pipe supports and stands, etc.

D. The Contractor shall either make provisions for installation of hatch fall protection after the coating is installed, or the hatch fall protection shall be installed prior to coating.

E. Contractor shall supply all temporary heating, cooling or night-time work, if required, and provide protection from the sun, heat, or other environmental conditions which may adversely affect the coatings. Moisture content of concrete, air temperature, relative humidity, and all other conditions shall be within limits recommended by coatings manufacturers.

F. Contractor shall fill all "bug holes" and other defects in the concrete to which the chemical resistant coatings are applied prior to application of the chemical resistant coatings system in accordance with the recommendations of the coatings manufacturer approved for use in each area. Filler shall be allowed to cure in accordance with manufacturers recommendation.

G. All surfaces receiving the polyurethane membrane lining shall be visually dry and at least 5°F (3°C.) above the Dew Point prior to starting the installation to prevent moisture entrapment. The Relative Humidity must be below 85%.

H. Contractor shall apply coating to prepared concrete surface. Contractor shall repeat coating application as recommended by manufacturer for complete coverage. Application and mixing shall be by the method recommended by the coatings manufacturer with the equipment recommended as the best for installing the coating system supplied. Apply the materials in the recommended quantities to provide the dimensional requirements and chemical resistance specified for the system. Successive topcoats shall be applied within 24 hours so as to not exceed the recoat window.

I. Contractor shall apply termination and expansion joint strips at the junction of the chemical resistant coating with other surfaces and at expansion joints as recommended by the coatings manufacturers.

J. Wet film thickness shall be monitored throughout the installation by means of frequent measurements with a high-range wet film thickness gage.

K. 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).

3.05 CURING OF COATINGS

A. Contractor shall provide curing conditions in accordance with the conditions recommended by the coating material manufacturer or by this Section, whichever is the highest requirement, prior to placing the completed coating system into service.

B. In the case of enclosed hydraulic structures, forced air ventilation, using heated or cooled air if necessary, is required for the application and curing of coatings on the interior surfaces.
   1. During curing periods continuously exhaust air from the lowest level of the structure using portable ducting. After all interior coating operations have been completed provide a final curing period for a minimum of 10 days, unless a shorter period is recommended by the coating manufacturer, during which the forced ventilation system shall operate continuously.

3.06 FIELD TESTING

A. Inspection by the Engineer, or the waiver of inspection of any particular portion of the work, shall not relieve Contractor of its responsibility to perform the Work in accordance with this Specification.

B. 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.

C. The Engineer will conduct wet-film thickness testing. Contractor shall recoat any areas found deficient in thickness.

D. 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 which will be submerged in water or other liquids, or surfaces which are enclosed in a vapor space in such structures and surfaces coated with any of the submerged and severe service coating systems.
      a. Holiday testing equipment and procedures shall be done in strict accordance with the latest edition of the NACE “Standard Recommended Practice 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.

E. Adhesion Testing:
   1. If deemed necessary by the City, adhesion testing will be performed by an independent inspector hired and paid for 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 manufacturers recommendations after testing is complete.

F. Any damaged areas, faulty areas, or discontinuities (pinholes) found during quality control inspection shall be repaired in accordance with the Manufacturer’s recommendations.

3.07 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 09960
COATINGS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Field applied coatings.
2. Coating accessories.

B. Related Sections:

1. Section 01330 - Submittal Procedures.
2. Section 09875 – Concrete Coatings for Wastewater Structures
3. Section 15100 – Piping and Fittings
4. Section 15110 - Valves

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM):

1. D 16 - Terminology Relating to Paint, Varnish, Lacquer, and Related Products.

B. SSPC – Society for Protective Coatings:

1. SSPC SP1 - Solvent Cleaning.
2. SSPC SP2 - Hand Tool Cleaning.
3. SSPC SP3 - Power Tool Cleaning.
4. SSPC SP5 - White Metal Blast Cleaning.
5. SSPC SP6 - Commercial Blast Cleaning.
6. SSPC SP7 - Brush-Off Blast Cleaning.
7. SSPC SP8 - Pickling.
8. SSPC SP10 - Near-White Blast Cleaning.
9. SSPC SP 11 - Power Tool Cleaning to Bare Metal.
10. SSPC-SP 12 - High- and Ultrahigh-Pressure Water Jetting.

1.03 DEFINITIONS

A. Submerged Metal: Steel or iron surfaces below tops of channel or structure walls which will contain water even when above expected water level.

B. Immersion Service: Surfaces which are or will be -

1. Normally or intermittently underwater.

2. In structures which normally contain water.
3. Below tops of walls of water containing structures.
4. Exposed to corrosive gases.

C. Exposed Surface: Any metal or concrete surface, indoors or outdoors that is exposed to view.

D. Dry Film Thickness (DFT): Thickness of fully cured coating, measured in mils.

E. Volatile Organic Compound: Volatile Organic Compound (VOC): Content of air polluting hydrocarbons in uncured coating product measured in units of grams per liter or pounds per gallon.

F. Paints: Manufacturer's best ready-mixed coatings, except when field catalyzed, with fully ground pigments having soft paste consistency and capable of being readily and uniformly dispersed to complete homogeneous mixture, having good flowing and brushing properties, and capable of drying or curing free of streaks or sags.

1.04 PERFORMANCE REQUIREMENTS

A. Coating materials for concrete and metal surfaces shall be especially adapted for use in wastewater treatment plants and pumping stations.

B. Coating for final coats shall be fume resistant, compounded with pigment suitable for exposure to sewage gases, especially to hydrogen sulfide and to carbon dioxide.

C. Pigments shall be materials that do not darken, discolor, or fade due to action of sewage gases.

1.05 SUBMITTALS

A. General: Submit in accordance with Section 01330.

B. Shop Drawings: Include schedule of where and for what use coating materials are proposed in accordance with requirements for Product Data.

C. Product Data: Include description of physical properties of coatings including solids content and ingredient analysis, VOC content, temperature resistance, typical exposures and limitations, and manufacturer's standard color chips.

1. Regulatory Requirements: Submit data concerning the following
    a. Volatile organic compound limitations.
    b. Coatings containing lead compounds and PCBs.
    c. Abrasives and abrasive blast cleaning techniques, and disposal.

D. Samples: Samples: Include 8 inch square draw-downs or brush-outs of topcoat finish when requested. Identify each sample as to finish, formula, color name and number and sheen name and gloss units.

E. Certificates: Submit in accordance with requirements for Product Data.

F. Manufacturer's Instructions: Include the following:

1. Special requirements for transportation and storage.
2. Mixing instructions.
3. Shelf Life.
4. Pot life of material.
5. Precautions for applications free of defects.
6. Surface preparation.
7. Method of application.
8. Recommended number of coats.
9. Recommended thickness of each coat.
10. Recommended total thickness.
11. Drying time of each coat, including prime coat.
12. Required prime coat.
13. Compatible and non-compatible prime coats.
14. Recommended thinners, when recommended.
15. Limits of ambient conditions during and after application.
16. Time allowed between coats.
17. Required protection from sun, wind and other conditions.
18. Touch-up requirements and limitations.

G. Manufacturer's Field Reports: Submit for ENGINEER's record only.

H. Operations and Maintenance Data: Submit as specified in Section 01782.

I. Quality Assurance Submittals:

1. Quality Assurance plan.
2. Qualifications of coating applicator including List of Similar Projects.

1.06 QUALITY ASSURANCE

A. Applicator Qualifications:

1. Minimum of 5 years experience applying specified type or types of coatings under conditions similar to those of the Work.
    a. Provide qualifications of applicator and references listing five similar projects completed in the past two years.
2. Manufacturer approved applicator when manufacturer has approved applicator program.

B. Regulatory Requirements: Comply with governing agencies regulations by using coatings that do not exceed permissible volatile organic compound limits and do not contain lead.

C. Certification: Certify that applicable pigments are resistant to discoloration or deterioration when exposed to hydrogen sulfide and other sewage gases and product data fails to designate coating as "fume resistant".

D. Field Samples: Paint one complete surface of each color scheme to show colors, finish texture, materials and workmanship. Obtain approval before painting other surfaces. Approved field sample may be part of Work.

E. Compatibility of Coatings: Use products by same manufacturer for prime coats, intermediate coats, and finish coats on same surface, unless specified otherwise.

F. Services of Coating Manufacturers Representative: Arrange for coating manufacturers representative to attend pre-installation conferences and to make periodic visits to the project site to provide consultation and inspection services during surface preparation and application of coatings.

1.07 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products in accordance with Section 01600.

B. Remove unspecified and unapproved paints from Project site immediately.

C. Deliver containers with labels identifying the manufacturer's name, brand name, product type, batch number, date of manufacturer, expiration date or shelf life, color, and mixing and reducing instructions.

D. Store coatings in well ventilated facility that provides protection form the sun weather, and fire hazards. Maintain ambient storage temperature between 45 and 90 degrees Fahrenheit, unless otherwise recommended by the manufacturer.

E. Take precautions to prevent fire and spontaneous combustion.

1.08 ENVIRONMENTAL CONDITIONS

A. Do Not Apply Coatings:

1. Under dusty conditions, unless tenting, covers, or other such protection is provided for structures to be coated.
2. When light on surfaces measures less than 15 foot-candles.
3. When ambient or surface temperature is less than 45 degrees Fahrenheit.
4. When relative humidity is higher than 85 percent.
5. When surface temperature is less than 5 degrees Fahrenheit above dew point.
6. When surface temperature exceeds the manufacturer's recommendation.

7. When ambient temperature exceeds 90 degrees Fahrenheit, unless manufacturer allows a higher temperature.

8. Apply clear finishes at minimum 65 degrees Fahrenheit.

B. Provide fans, heating devices, dehumidifiers, or other means recommended by coating manufacturer to prevent formation of condensate or dew on surface of substrate, coating between coats and within curing time following application of last coat.

C. Provide adequate continuous ventilation and sufficient heating facilities to maintain minimum 45 degrees Fahrenheit for 24 hours before, during and 48 hours after application of finishes.

1.09 PROTECTION

A. Protect adjacent surfaces from paint and damage. Repair damage resulting from inadequate or unsuitable protection.

B. Furnish sufficient drop cloths, shields and protective equipment to prevent spray or droppings from fouling surfaces not being painted and in particular, surfaces within storage and preparation area.

C. Place cotton waste, cloths and material which may constitute fire hazard in closed metal containers and remove daily from site.

D. Remove electrical plates, surface hardware, fittings and fastenings, prior to painting operations. Carefully store, clean and replace on completion of painting in each area. Do not use solvent or degreasers to clean hardware that may remove permanent lacquer finish.

1.10 EXTRA MATERIALS

A. Extra Materials: Deliver to City maintenance yard as directed. Include minimum 1 gallon of each type and color of coating applied.

1. When manufacturer packages material in gallon cans, deliver unopened labeled cans as comes from factory.

2. When manufacturer does not package material in gallon cans, deliver material in new gallon containers, properly sealed and identified with typed labels indicating brand, type and color.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Paints: One of the following or equal:

1. Carboline: Carboline, St. Louis, MO.

2. Devoe: Devoe Coatings, Louisville, KY.

3. Dunn Edwards: Dunn Edwards Paints, Los Angeles, CA.
4. Frazee: Frazee/Deer-O Paints, City of Commerce, CA.
5. Fuller: Fuller O'Brien Paints, San Francisco, CA.
6. Pittsburgh: Pittsburgh Paints.
7. P & L: Pratt & Lambert.
8. S-W: Sherwin-Williams Co., Cleveland, OH.
9. Sinclair: Sinclair Paints.
10. Tnemec: Tnemec Co., Kansas City, MO.

B. Special Coatings: One of the following or equal:

1. Ameron: Ameron International, Brea, CA.
2. Carboline: Carboline, St. Louis, MO.
3. Ceilcote: Ceilcote Corrosion Control, Brecksville, OH.
4. Devoe: Devoe Coatings, Louisville, KY.
5. Dudick: Dudick, Inc., Streetsboro, OH.
6. Enduraflex: Global Eco Technologies, Pittsburg, CA.
7. IET: Integrated Environmental Technologies, Santa Barbara, CA.
8. International: International Protective Coatings, Houston, TX.
9. Plasite: Plasite Protective Coatings, Inc., Green Bay, WI.
10. PPC: Polymorphic Polymers Corp., N. Miami, FL.
11. Sanchem: Sanchem, Chicago, IL.
12. Sancon: Sancon Engineering, Inc., Huntington Beach, CA.
13. Superior: Superior Environmental Products, Inc., Addison, TX.
14. S-W: Sherwin-Williams Co., Cleveland, OH.
15. Tnemec: Tnemec Co., Kansas City, MO.
16. Wasser: Wasser High Tech Coatings, Kent, WA.

2.02 PRETREATMENT, PRIMERS, AND PRIMER-SEALERS

A. Pretreatment, primers, and primer-sealers shall be as specified herein or as recommended by the specific paint manufacturer for each paint system furnished.

B. Primers and primer-sealers shall be as manufactured by the paint supplier or certified as compatible with the paint system. Colors of prime and intermediate coats shall be compatible with color of top coat.

C. Surface Cleaner and Degreaser: As manufactured by one of the following or equal:

1. Carboline Surface Cleaner No.3.

2. Devoe: Devprep 88.

2.03 GENERAL COATING MATERIALS

A. Alkali Resistant Bitumastic: As manufactured by one of the following or equal:

1. Carboline: Bitumastic Super Service Black.
2. Tnemec: 46-465.
3. Wasser: MC-Tar.

B. Wax Coating: As manufactured by one of the following or equal:

1. Sanchem: No-Ox-Id A special.

C. High Solids Epoxy Primer Not less than 75 Percent Solids by Volume): As manufactured by one of the following or equal:

1. Ameron: Amerlock 400.
2. Carboline: Super Hi-Gard 891.
3. Devoe: Bar Rust 233H.
4. International: Intergard 750 HS.
5. Tnemec: Series 135 Chembuild.

D. High Solids Epoxy Not less than 75 Percent Solids by Volume): As manufactured by one of the following or equal:

1. Ameron: Amerlock 400.
2. Carboline: Super Hi-Gard 891.
3. Devoe: Bar Rust 233H.
4. International: Intergard 565HS.
5. Tnemec: Series 135 Chembuild.

E. Protective Coal Tar: As manufactured by one of the following or equal:

1. Carboline: Bitumastic No. 50.
2. S-W: Cooper Black, No. 750.
3. Tapecoat Co.: T.C. Mastic.

2.04 MIXES

A. Mix epoxy parts in accordance with manufacturer's instructions.

B. Mix epoxy in containers furnished by manufacturer for mixing purposes. Mix unit quantities only. Use power mixer for minimum time recommended by manufacturer. Do not include time during pouring or stirring in mixing time.

2.05 PIPE COATINGS

A. Piping, associated fittings, and valves shall be lined and coated per Section 15100.

B. All joint bolts shall be field coated with AWWA C210 coal-tar epoxy and encased to match the pipe wrapping.

C. A mastic compound shall be applied at all field joints or fittings with irregular or uneven surfaces that require field tape coatings. The mastic shall be applied to provide a smooth, regular surface to allow tape wrapping to be placed without gaps, folds, or air pockets. Mastic compound shall be flexible such as “Ram-Nek” as distributed by Hanson Concrete Products of Milpitas, CA, or equal.

PART 3 EXECUTION

3.01 GENERAL PROTECTION

A. Protect adjacent surfaces from coatings and damage. Repair damage resulting from inadequate or unsuitable protection:

B. Protect adjacent surfaces not to be coated from spatter and droppings with drop cloths and other coverings.

1. Mask off surfaces of items not to be coated or remove items from area.

C. Furnish sufficient drop cloths, shields and protective equipment to prevent spray or droppings from fouling surfaces not being coated and in particular, surfaces within storage and preparation area.

D. Place cotton waste, cloths and material which may constitute fire hazard in closed metal containers and remove daily from site.

E. Remove electrical plates, surface hardware, fittings and fastenings, prior to application of coating operations. Carefully store, clean and replace on completion of coating in each area. Do not use solvent or degreasers to clean hardware that may remove permanent lacquer finish.

3.02 GENERAL PREPARATION

A. Prepare surfaces in accordance with coating manufacturer's instructions, or when none, the following:

1. Galvanized Surfaces: Remove surface contamination and oils and wash with degreasers. Apply coat of etching type primer.

2. Plaster: Fill hairline cracks, small holes and imperfections with patching plaster. Smooth off to match adjacent surfaces. Wash and neutralize high alkali surfaces where they occur.

3. Concrete Masonry: Remove weak laitance and solid contaminants by chipping or scarification. Patch and repair as required using Tnemec Series 54-562 modified masonry filler, or an approved equal.

4. Unprimed Steel and Iron: Remove grease, rust, scale, dirt and dust by wire brushing, sandblasting or other necessary method.

5. Shop Primed Steel: Sand and scrape to remove loose primer and rust. Feather out edges to make touch-up patches inconspicuous. Clean surfaces. Prime bare steel surfaces.
6. Mildew: Remove by scrubbing with solution of tri-sodium phosphate and chlorine bleach. Rinse with clean water and allow surface to dry completely.

B. Protect following surfaces from abrasive blasting by masking, or other means:
1. Threaded portions of valve and gate stems.
2. Machined surfaces for sliding contact.
3. Surfaces to be assembled against gaskets.
4. Surfaces of Shafting on which sprockets are to fit.
5. Surfaces of shafting on which bearings are to fit.
6. Machined surfaces of bronze trim, including those slide gates.
7. Cadmium-plated items except cadmium-plated, zinc-plated, or sherardized fasteners used in assembly of equipment requiring abrasive blasting.
8. Galvanized items, unless scheduled to be coated.

C. Protect installed equipment, mechanical drives, and adjacent coated equipment from abrasive blasting to prevent damage caused by entering sand or dust.

D. Concrete:
1. Allow new concrete to cure for minimum of 28 days before coating.
2. Clean concrete surfaces of dust, mortar, fins, loose concrete particles, form release materials, oil, and grease. Fill voids so that surface is smooth. Etch or brush-off blast clean in accordance with SSPC SP-7 to provide surface profile similar to 80-grit sandpaper, or as recommended by coating manufacturer.
3. See Section 09875 for concrete structures to be coated.

E. Ferrous Metal Surfaces:
1. Remove grease and oil in accordance with SSPC SP-1.
2. Remove rust, scale, and welding slag and spatter, and prepare surfaces in accordance with SSPC SP-2 through SP-10.
3. Abrasive blast surfaces prior to coating.
4. When abrasive blasted surfaces rust or discolor before coating, abrasive blast surfaces again to remove rust and discoloration.
5. When metal surfaces are exposed because of coating damage, abrasive blast surfaces before touching-up.

F. Ferrous Metal Surfaces Not to be Submerged: Abrasive blast in accordance with SSPC SP-6, unless blasting may damage adjacent surfaces, prohibited or specified otherwise. Where not possible to abrasive blast, power tool clean surfaces in accordance with SSPC SP-3.

G. Ferrous Metal Surfaces to be Submerged: Unless specified otherwise, abrasive blast in accordance with SSPC SP-10 or better to clean and provide roughened surface profile of not less than 2 mils and not more than 4 mils in depth when measured with Elcometer 123, or as recommended by the coating manufacturer.

H. Ductile Iron Pipe and Fittings to be lined or Coated: Prepare in accordance with the National Association of Pipe Fabricators Standard NAPF 500-03.

I. Sherardized, Aluminum, Copper, and Bronze Surfaces: Prepare in accordance with paint manufacturer's instructions.

J. Galvanized Surface:

1. Degrease or solvent clean to remove oily residue.
2. Power tool or hand tool clean or whip abrasive blast.
3. Apply metal pretreatment within 24 hours before coating galvanized surfaces that cannot be thoroughly abraded physically, such as bolts, nuts, or preformed channels.

K. Shop Primed Metal:

1. Certify that primers applied to metal surfaces in the shop are compatible with coatings to be applied over such primers in the field.
2. Remove shop primer from metal to be submerged by abrasive blasting in accordance with SSPC SP-10, unless greater degree of surface preparation is required by manufacturer of coating system.
3. Correct abraded, scratched or otherwise damaged areas of shop prime coat by sanding or abrasive blasting in accordance with SSPC SP-6.
4. When entire shop priming fails or has weathered excessively, or when recommended by coating manufacturer, abrasive blast shop prime coat to remove entire coat and prepare surface in accordance with SSPC SP-10.
5. When incorrect prime coat is applied, remove incorrect prime coat by abrasive blasting in accordance with SSPC SP-10.
6. When prime coat not authorized by ENGINEER is applied, remove unauthorized prime coat by abrasive blasting in accordance with SSPC SP-10.
7. Shop Applied Bituminous Paint Asphalt Varnish): Abrasive blast clean shop applied bituminous paint or asphalt varnish from surfaces scheduled to receive non-bituminous coatings.

L. Abrasive blast cadmium-plated, zinc-plated, or sherardized fasteners in same manner as unprotected metal when used in assembly of equipment designated for abrasive blasting.

M. Abrasive blast components to be attached to surfaces which cannot be abrasive blasted before components are attached.

N. Grind sharp edges to approximately 1/8 inch radius.

O. Remove and grind smooth all excessive weld material and weld spatter before blast cleaning.

P. PVC and FRP Surfaces:

1. Prepare surfaces to be coated by light sanding and wipe-down with clean cloths, or by solvent cleaning in strict accordance with coating manufacturer's instructions.

Q. Cleaning of Previously Coated Surfaces:

1. Utilize cleaning agent to remove soluble salts such as chlorides and sulfates from concrete and metal surfaces.

a. Cleaning Agent: Biodegradable non-flammable and containing no volatile organic compounds.

b. Manufacturer: Chlor-Rid International, Inc., or accepted equal.

2. Cleaning of surfaces utilizing the decontamination cleaning agent may be accomplished in conjunction with abrasive blast cleaning, high pressure, washing, or hand washing as approved by the coating manufacturer's representative and the Engineer.

3. Test cleaned surfaces in accordance with the cleaning agent manufacturer's instructions to ensure all soluble salts have been removed. Additional cleaning shall be carried out as necessary.

4. Final surface preparation prior to application of new coating system shall be made in strict accordance with coating manufacturer's printed instructions.

3.03 MECHANICAL AND ELECTRICAL EQUIPMENT

A. Remove grilles, covers and access panels for mechanical and electrical system from location and coat separately.

B. Finish coat primed equipment with color selected by the ENGINEER.

C. Prime and coat insulated and bare pipes, conduits, boxes, insulated and bare ducts, hangers, brackets, collars and supports, except where items are plated or covered with prefinished coating.

D. Replace identification markings on mechanical or electrical equipment when coated over or spattered.

E. Coat interior surfaces of air ducts, convector and baseboard heating cabinets that are visible through grilles and louvers with 1 coat of flat black paint, to limit of sight line.

F. Coat dampers exposed immediately behind louvers, grilles, convector and baseboard cabinets to match face panels.

G. Coat exposed conduit and electrical equipment occurring in finished areas with color and texture to match adjacent surfaces.

H. Coat both sides and edges of plywood backboards for electrical equipment before installing backboards and mounting equipment on them.

I. Color code equipment, piping, conduit and exposed ductwork and apply color banding and identification, such as flow arrows, naming and numbering, in accordance with DIVISIONS 15 and 16.

3.04 GENERAL APPLICATION REQUIREMENTS

A. Apply coatings in accordance with manufacturer's instructions.

B. Coat metal unless specified otherwise.

1. Above-ground piping to be coated shall be empty of contents during application of coatings.

C. Verify metal surface preparation immediately before applying coating in accordance with SSPC Pictorial Surface Preparation Standard.

D. Allow surfaces to dry, except where coating manufacturer requires surface wetting before coating.

E. Wash coat and prime sherardized, aluminum, copper, and bronze surfaces, or prime with manufacturer's recommended special primer.

F. Prime shop primed metal surfaces. Spot prime exposed metal of shop primed surfaces before applying primer over entire surface.

G. Apply minimum number of specified coats.

H. Apply coats to thicknesses specified, especially at edges and corners.

I. Apply additional coats when necessary to achieve specified thicknesses.

J. Coat surfaces without drops, ridges, waves, holidays, laps, or brush marks.

K. Remove spatter and droppings after completion of coating.

L. When multiple coats of same material are specified, tint prime coat and intermediate coats with suitable pigment to distinguish each coat.

M. Dust coatings between coats. Lightly sand and dust surfaces to receive high gloss finishes, unless instructed otherwise by coating manufacturer.

N. Apply coating by brush, roller, trowel, or spray, unless particular method of application is required by coating manufacturer's instructions or these Specifications.

O. Spray Application:

1. Stripe coat edges by brush before beginning spray application, as necessary, to ensure specified coating thickness along edges.

2. When using spray application, apply coating to thickness not greater than that suggested in coating manufacturer's instructions for brush coat application.
3. Use airless spray method, unless air spray method is required by coating manufacturer's instruction or these Specifications.
4. Conduct spray coating under controlled conditions. Protect adjacent construction and property from coating mist or spray.

P. Drying and Recoating:

1. Provide fans, heating devices, or other means recommended by coating manufacturer to prevent formation of condensate or dew on surface of substrate, coating between coats and within curing time following application of last coat.
2. Limit drying time to that required by these Specifications or coating manufacturer's instructions.
3. Do not allow excessive drying time or exposure which may impair bond between coats.
4. Recoat epoxies within time limits recommended by coating manufacturer.
5. When time limits are exceeded, abrasive blast clean prior to applying another coat.
6. When limitation on time between abrasive blasting and coating cannot be met before attachment of components to surfaces which cannot be abrasive blasted, coat components before attachment.
7. Ensure primer and intermediate coats of coating are unscarred and completely integral at time of application of each succeeding coat.
8. Touch up suction spots between coats and apply additional coats where required to produce finished surface of solid, even color, free of defects.
9. Leave no holidays.
10. Sand and recoat scratched, contaminated, or otherwise damaged coating surfaces so damages are invisible to naked eye.

Q. Concrete:

1. Apply first coat (primer) only when surface temperature of concrete is decreasing in order to eliminate effects of off-gassing on coating.

3.05 ALKALI RESISTANT BITUMASTIC

A. Preparation:

1. Prepare surfaces in accordance with general preparation requirements.

B. Application:

1. Apply in accordance with general application requirements and as follows:
   a. Apply at least 2 coats, 8 to 14 mils dry film thickness each.

3.06 WAX COATING

A. Preparation:

1. Prepare surfaces in accordance with general preparation requirements.

B. Application:

1. Apply in accordance with general application requirements and as follows:

a. Apply at least 1/32 inch thick coat with 2 inch or shorter bristle brush.

b. Thoroughly rub coating into metal surface with canvas covered wood block or canvas glove.

3.07 HIGH SOLIDS EPOXY SYSTEM

A. Preparation:

1. Prepare surfaces in accordance with general preparation requirements and as follows:

a. Abrasive blast ferrous metal surfaces to be submerged at jobsite in accordance with SSPC SP-5 prior to coating. When cleaned surfaces rust or discolor, abrasive blast surfaces in accordance with SSPC SP-10.

b. Abrasive blast non-submerged ferrous metal surfaces at jobsite in accordance with SSPC SP-10, prior to coating. When cleaned surfaces rust or discolor, abrasive blast surfaces in accordance with SSPC SP-6.

c. Abrasive blast clean ductile iron surfaces in accordance with SSPC SP-7.

B. Application:

1. Apply coatings in accordance with general application requirements and as follows:

a. Apply minimum 2 coat system with minimum total dry film thickness (DFT) of 12 mils.

b. Recoat or apply succeeding epoxy coats within time limits recommended by manufacturer. Prepare surfaces for recoating in accordance with manufacturer's instructions.

c. Coat metal to be submerged before installation when necessary, to obtain acceptable finish and to prevent damage to other surfaces.

d. Coat entire surface of support brackets, stem guides, pipe clips, fasteners, and other metal devices bolted to concrete.

e. Coat surface of items to be exposed and adjacent 1 inch to be concealed when embedded in concrete or masonry.

3.08 EPOXY AND POLYURETHANE COATING SYSTEM

A. Preparation:

1. Prepare surfaces in accordance with general preparation requirements and as follows:
    a. Prepare concrete surfaces in accordance with general preparation requirements.
    b. Touch up shop primed steel and miscellaneous iron.
    c. Abrasive blast ferrous metal surfaces at jobsite in accordance with SSPC SP-6, Commercial Blast Cleaning, prior to coating. When cleaned surfaces rust or discolor, abrasive blast surfaces in accordance with SSPC SP-6.
    d. Degrease or solvent clean, whip abrasive blast, power tool, or hand tool clean galvanized metal surfaces.
    e. Lightly sand fiberglass and plastic to be coated and wipe clean with dry cloths, or solvent clean in accordance with coating manufacturer's instructions.
    f. Abrasive blast clean ductile iron surfaces in accordance with SSPC SP-7.

B. Application:
1. Apply coatings in accordance with general application requirements and as follows:
2. Apply 3 coat system consisting of:
    a. Primer: 4 to 5 mils dry film thickness high solids epoxy primer,
    b. Intermediate Coat: 4 to 5 mils dry film thickness high solids epoxy intermediate coat, and
    c. Top Coat: 2.5 to 3.5 mils dry film thickness aliphatic or aliphatic-acrylic polyurethane topcoat.
3. Recoat or apply succeeding epoxy coats within 30 days or within time limits recommended by manufacturer, whichever is shorter. Prepare surfaces for recoating in accordance with manufacturer's instructions.

3.09 PROTECTIVE COAL TAR

A. Preparation:
1. Prepare surfaces in accordance with general preparation coal tar requirements.

B. Application:
1. Apply coatings in accordance with general application requirements and as follows:
    a. Apply minimum 20 mils dry film thickness coating.

3.10 FIELD QUALITY CONTROL

A. Each coat will be inspected. Strip and remove defective coats, prepare surfaces and recoat. When approved, apply next coat.

B. Control and check dry film thicknesses and integrity of coatings.

C. Measure dry film thickness with calibrated thickness gauge.

D. Dry film thicknesses may be checked with Elcometer or Positector 2000.

E. Verify coat integrity with low-voltage holiday detector. Allow ENGINEER to use detector for additional checking.

F. Check wet film thickness before coal tar epoxy coating cures on concrete or non-ferrous metal substrates.

G. Arrange for services of Coating manufacturer's field representative to provide periodic field consultation and inspection services to ensure proper surface preparation of facilities and items to be coated, and to ensure proper application and curing.

1. Notify ENGINEER 24 hours in advance of each visit by Coating Manufacturer's representative.

2. Provide ENGINEER with a written report by Coating Manufacturer's representative within 48 hours following each visit.

3.11 SCHEDULE OF ITEMS NOT REQUIRING COATING

A. General: Unless specified otherwise, the following items do not require coating.

1. Items that have received final coat at factory and not listed to receive coating in field.

2. Aluminum, brass, bronze, copper, plastic, rubber, stainless steel, chrome, everdur, or lead.

3. Buried or encased piping or conduit.

4. Exterior Concrete.

5. Galvanized roof decking, electrical conduits, pipe trays, cable trays, and other items.

a. Areas on galvanized items or parts where galvanizing has been damaged during handling or construction shall be repaired as follows”

1) Clean damaged areas by SSPC SP-1, SP-2, SP-3, or SP-7 as required.

2) Apply two coats of a cold galvanizing zinc compound such as ZRC World Wide Innovative Zinc Technologies of Mansfield, MA or accepted equal, in strict accordance with manufacturer’s instructions.

6. Grease fittings.

7. Fiberglass ducting or tanks in concealed locations.

8. Steel to be encased in concrete or masonry.

3.12 SCHEDULE OF SURFACES TO BE COATED IN THE FIELD

A. In general, Apply coatings to steel, iron, and wood surfaces unless specified or otherwise indicated on the Drawings. Coat concrete surfaces and anodized aluminum only when specified or indicated on the Drawings.

B. The following schedule is incomplete. Coat unlisted surfaces with same coating system as similar listed surfaces. Verify questionable surfaces with ENGINEER.

C. The following schedule is not necessarily complete. Coat unlisted surfaces with same coating system as similar listed surfaces. Verify questionable surfaces with ENGINEER.

1. Concrete:
    a. High Solids Epoxy:
        1) Interior floors and walls.
        2) Safety markings.
2. Metals:
    a. Alkali Resistant Bitumastic:
        1) Aluminum surfaces to be placed in contact with wood, concrete, or masonry.
    b. Wax Coating per Section 09960:
        a) Sliding faces of sluice and slide gates and threaded portions of gate stems.
        b) All mechanical, submerged surfaces subject to submergence.
3. Epoxy and Polyurethane System: [Interior and] exterior non-immersed ferrous metal surfaces including:
    a. Doors, door frames, ventilators, louvers, grilles, exposed sheet metal, and flashing.
    b. Pipe, valves, pipe hangers, supports and saddles, conduit, cable tray hangers, and supports.
    c. Motors and motor accessory equipment not coated at factory.
    d. Drive gear, drive housing, coupling housings, and miscellaneous gear drive equipment not coated at factory.
    e. Valve and gate operators and stands.
    f. Structural steel including galvanized structural steel.
    g. Crane and hoist rails.
    h. Mechanical equipment supports, drive units, and accessories.
    i. Pumps not submerged, when not factory coated.
    j. Grinders, frames, supports, and associated equipment, when not factory coated.

k. Other miscellaneous metals.

4. Epoxy and Polyurethane

a. Fiberglass and Plastic Surfaces:

1) Exterior of fiberglass ducting and fan housings not factory finished.

2) Fiberglass exposed to sunlight.

3) PVC Piping exposed to view.

5. High Solids Epoxy System:

a. Field priming of ferrous metal surfaces with defective shop prime coat where no other prime coat is specified; for non-immersion service.

b. Bell rings, underside of manhole covers and frames.

c. Sump pumps, including underside of base plates and submerged suction and discharge piping.

d. Exterior of submerged piping and valves other than stainless steel or PVC piping.

e. Submerged pipe supports and hangers.

f. Stem guides.

g. Other submerged iron and steel metal unless specified otherwise.

h. Interior surface of suction inlet and volute of submersible pumps. Apply coating prior to pump testing.

i. Submerged piping.

j. Exterior of pumps and pump submerged discharge piping.

3.13 CLEANING

A. As work proceeds and upon completion, promptly remove paint where spilled, splashed, or spattered.

B. During progress of work keep premises free from unnecessary accumulation of tools, equipment, surplus materials and debris.

C. Upon completion of work leave premises neat and clean.

END OF SECTION

SECTION 11312
SUBMERSIBLE PUMPS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: Requirements for provision of pump systems including submersible non-clog motor-driven pumps for service in raw sewage.

B. Related Sections:

1. Section 01140 - Work Restrictions.
2. Section 01330 - Submittal Procedures.
3. Section 01610 - Seismic Design Criteria.
4. Section 01756 - Testing, Training, and Facility Start-up.
5. Section 09960 - Coatings.
6. Section 15050 - Basic Mechanical Materials and Methods.

1.02 REFERENCES

A. American Bearing Manufacturers Association (ABMA):

1. 9 - Load Ratings and Fatigue Life for Ball Bearings.
2. 11 - Load Ratings and Fatigue Life for Roller Bearings.

B. American Society for Testing and Materials (ASTM):

1. A 48 - Standard Specification for Gray Iron Castings.
2. A 108 - Standard Specification for Steel Bars, Carbon, Cold-Finished, Standard Quality.
3. A 167 - Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
4. A 176 - Standard Specification for Stainless and Heat-Resisting Chromium Steel Plate, Sheet and Strip.
5. A 276 - Specification for Stainless Steel Bars and Shapes.
6. A 283 - Specification for Low and Intermediate Tensile Strength Carbon Steel Plates.
7. A 532 - Specification for Abrasion-Resistant Cast Irons.
8. A 576 - Specification for Steel Bars, Carbon, Hot Wrought, Special Quality.
9. A 582 - Specification for Free-Machining Stainless and Heat-Resisting Steel Bars.

10. A 743 - Specification for Castings, Iron-Chromium, Iron-Chromium-Nickel, Corrosion-Resistant, for General Application.
11. B 148 - Specification for Aluminum-Bronze Sand Castings.
12. B 505 - Specification for Copper-Base Alloy Continuous Castings.
13. B 584 - Specification for Copper Alloy Sand Castings for General Applications.
14. E 10 - Test Method for Brinell Hardness of Metallic Materials.
15. E 18 - Test Methods for Rockwell Hardness and Rockwell Superficial Hardness of Metallic Materials.
16. F 593 - Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
17. F 594 - Specification for Stainless Steel Nuts.

C. American National Standards Institute/Hydraulic Institute (ANSI/HI):

1. 1.1-1.5 - Centrifugal Pumps - Nomenclature, Definitions, Application and Operation.
2. 1.6 - Centrifugal Pump Tests.
3. 9.1-9.5 - General Pump Standards For Types, Definitions, Application, And Sound Measurements.

1.03 DEFINITIONS

A. Pump head (Total Dynamic Head, TDH), flow capacity, pump efficiency, net positive suction head available (NPSHa), and net positive suction head required (NPSHr): As defined in ANSI/HI 1.1-1.5, 1.6 and 9.1-9.5 and as modified in the Specifications.

B. Suction Head: Gauge pressure available at pump intake flange or bell in feet of fluid above atmospheric; average when using multiple suction pressure taps, regardless of variation in individual taps.

C. Tolerances: As defined in ANSI/HI 1.6 and 2.6, or more restrictive tolerances specified herein.

1.04 SYSTEM DESCRIPTION

A. Submersible Pumps with Components: Submersible pump, motor driver, bearings, seals, supports, electrical cable, necessary controls and instrumentation, taps, lifting eyes, lifting cable or chain and guide rails, guide rail supports, self aligning discharge connection, mounting pedestal and similar type items as specified and as required for complete operational units ready for use as specified and installed as indicated on the Drawings.

B. **Modifications to Existing Pumps:**

1. Where existing dry well pumps are specified to be re-used, the contractor shall provide all necessary equipment, materials, and labor to convert the existing Flygt dry well (NT Configuration) pumps to rail-mounted submersible pumps (NP Configuration). At a minimum, the following new equipment and modifications for each existing pump are required. All pump modifications and

equipment shall be supplied by the pump manufacturer's (Flygt) representative:

a. Sliding bracket and hardware attached to pump volute

b. Stainless Steel Guide rails and guide rail top bracket

c. Discharge elbow base and anchors

d. Power Cables, 30 feet minimum length or as required for the installation

e. Stainless Steel Lifting chain, 25 feet minimum

f. Accessories shown on Contract drawing

2. Contractor shall protect existing pumps from damage. Any damage to the pumps during removal, storage, and re-installation shall be repaired by the Contractor at his cost.

3. The existing dry well pumps can be modified to a wet well configuration and installed at the following pump stations:

a. Catalina: Existing Serial #3153.095-1450001 and 3153.095-S1230020

b. Grand Otis: Existing Serial #3127.095-1230006 and 3127.095-1230007

c. Park Otis: Existing Serial #3153.095-1710113 and 3153.095-1710112

C. **New pumps** shall be supplied and installed with all components listed in 1.04A and Part 2 of this Specification section. Pumps supplied and installed shall be rail-mounted submersible (NP Configuration), centrifugal, Flygt pumps having the general characteristics as indicated on the Drawings. The Contractor shall furnish Flygt pumps; no other pump manufacturers will be accepted.

1. Harbor Bay Parkway 1 (Rail-Mounted)

a. Flygt Model NP 3127 LT Adaptive (Two Pumps)

1)	Design Capacity per Pump (gpm)	1009
2)	Rated Total Pump Head at Design (feet)	27
3)	Maximum Rotative Speed (rpm)	1735
4)	Shutoff Head (feet)	51
5)	Motor Horse Power	10
6)	Motor Voltage (3 phase)	200
7)	Discharge Size (inches)	5 7/8
8)	Impeller (in)	7.72 (196 mm)
9)	Impeller Material	Hard Iron
10)	Impeller Type	Adaptive N

11) Pump Curve:

0	gpm	51.3 ft
50	gpm	50 ft
100	gpm	48.8 ft
200	gpm	46.3 ft

300	gpm	43.8 ft
400	gpm	41.3 ft
500	gpm	38.8 ft
600	gpm	36.3 ft
700	gpm	33.8 ft
800	gpm	31.3 ft
900	gpm	28.8 ft
1000	gpm	26.3 ft
1100	gpm	23.8 ft
1200	gpm	21.3 ft
1300	gpm	18.8 ft
1400	gpm	16.3 ft
1500	gpm	13.8 ft

2. Cola Ballena (Rail-Mounted)

   a. Flygt Model NP 3085 MT Adaptive (Two Pumps)

      1) Design Capacity per Pump (gpm) 238
      2) Rated Total Pump Head at Design (feet) 24
      3) Maximum Rotative Speed (rpm) 1710
      4) Shutoff Head (feet) 36
      5) Motor Horse Power 3
      6) Motor Voltage (3 phase) 230
      7) Discharge Size (inches) 3 1/8
      8) Impeller (in) 5.98 (152 mm)
      9) Impeller Material Hard Iron
      10) Impeller Type Adaptive N
      11) Pump Curve:

0	gpm	36.3 ft
119	gpm	29.3 ft
179	gpm	26.8 ft
258	gpm	23.5 ft
338	gpm	20.0 ft
417	gpm	16.2 ft
497	gpm	12.7 ft
576	gpm	8.9 ft

3. Marina Village (Rail-Mounted)

   a. Flygt Model NP 3127 LT Adaptive (Three Pumps)

      1) Design Capacity per Pump (gpm) 963
      2) Rated Total Pump Head at Design (feet) 18.1
      3) Maximum Rotative Speed (rpm) 1750
      4) Shutoff Head (feet) 37
      5) Motor Horse Power 7.5

6)	Motor Voltage (3 phase)	460
7)	Discharge Size (inches)	5 7/8
8)	Impeller (in)	6.85 (174 mm)
9)	Impeller Material	Hard Iron
10)	Impeller Type	Adaptive N
11)	Pump Curve:	

0	gpm	36.8 ft
101	gpm	35.0 ft
203	gpm	33.3 ft
304	gpm	31.3 ft
406	gpm	29.3 ft
507	gpm	27.6 ft
609	gpm	25.9 ft
710	gpm	24.1 ft
812	gpm	22.0 ft
913	gpm	19.4 ft
1015	gpm	16.7 ft
1116	gpm	14.0 ft

1.05 SUBMITTALS

A. The manufacturer shall submit to the Engineer for approval, certified performance curves, and shop and assembly drawings. The drawings shall show the dimensions, ratings, component parts, arrangements, and materials of construction for all items covered under this section. The performance curves shall be based on data secured during actual tests run at the factory on the pump model proposed for installation, and signed by a responsible manufacturer's representative. The curves shall show the make, model, size, and trim of the impeller, the developed head, brake horse power, NPSH, and efficiency at intervals of 100 gpm in capacity for the model operating at the specified rotative speed over the operating range of the pump.

B. Manufacturer shall supply standard submittals meeting specification Section 01330, and shall contain the following minimum information:

1. Pump Outline Drawings
2. Motor Performance Data
3. Cable and Protective Device Data
4. Typical Installation Guides
5. Certified Pump Performance Curves
6. Fabrication Drawings for Mounting Pedestal
7. Detailed Description and Dimensions of All Accessories
8. Detailed Electrical Data
9. Control Drawings and Data
10. Technical Manuals

11. Parts Lists
12. Printed Warranty
13. Certificates from the Contractor and equipment suppliers that they have properly coordinated the pumps with the Motor Control Center (MCC) supplier and the Motors and MCC are mutually compatible.

1.06 QUALITY ASSURANCE

A. **General:** Pumps shall be suitable for pumping municipal wastewater and shall be designed and fully guaranteed for this use. Motors supplied with submersible pumps under this specification shall be suitable for continuous operation under submerged, partially submerged, or dry conditions. Motors shall be non-overloading throughout the full range of pump operation, as established by the pump model performance curve.

B. **Standards:** Equipment furnished and installed by the contractor shall be in full conformity and harmony with the intent to secure the best standard of construction and equipment as a whole or in part. Pumps shall be installed in strict accordance with manufacturer specifications, their standard drawings, and their installation instructions.

C. **Manufacturer**: All equipment furnished and installed under this section shall be manufactured by Flygt as indicated on the project drawing; no other products will be acceptable. Pumps shall be installed in strict accordance with manufacturer specification, their standard drawings, and their instructions.

D. **Submittals:** Submittal data provided shall be of sufficient depth to illustrate compliance with these specifications, the plans, and other specifications that may influence the proper operation of this pump. No pump equipment shall be shipped until the required drawings and curves have been submitted to and acknowledged by the Engineer as being of general compliance and conformance with the information in the contract documents.

E. **Testing:** Model pumps shall be factory tested to determine head versus capacity, efficiencies, and kilowatt draw required for the operating points specified. All tests shall be run in accordance with the latest edition of the American Hydraulic Institute Standards. The actual pumps furnished shall also be tested for:

1. Impeller, propeller, motor rating, and electrical connections tests shall be run for compliance with specification requirements.
2. Motor and cable insulation test for moisture content or insulation defects shall be performed with a 1,000 volt DC megger.
3. After a submerged test run of 30 minutes under 6 feet of water, Test 2 shall be repeated.
4. If any deviation of the above tests is found, that pump shall be rejected.

F. **Operation and Maintenance Manuals:** The pump supplier shall provide operation and maintenance manuals for all equipment and accessories furnished. The manuals shall be original (no photocopies) and contain at least the following:

1. Identification stating the general nature of the manual, which appears on or is readable through the front cover.
2. Neatly typewritten index near the front of the manual, furnishing immediate information as to location in the manual of all emergency data regarding the equipment.
3. Complete and detailed instructions regarding operation and maintenance of all equipment involved.
4. Complete nomenclature of all replaceable parts, their part numbers, current cost, list of recommended spare parts to be kept on hand, and name, address and telephone number of nearest vendor of parts.
5. Copies of all guaranties and warranties issued.
6. Copies of the favorably reviewed shop drawings with all data concerning changes made during construction.
7. Where content of manuals includes manufacturers' catalog pages, clearly indicate the precise items included in this installation.

G. **Guarantee:** Products furnished and installed under this section shall be guaranteed for a minimum period of five (5) years. Parts and labor for the first eighteen (18) months of this guaranty period shall be provided in full, at no additional cost.

1.07 DELIVERY, STORAGE, AND HANDLING

A. As specified in Section 15050.

1.08 PROJECT CONDITIONS

A. Environmental Requirements: As specified in Section 15050.

B. Install pumps as indicated on the drawings.

C. Provide bypass pumping as needed during installation, and as specified.

1.09 SEQUENCING AND SCHEDULING

A. Coordinate with restrictions as specified in Section 01140.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Pump: Named manufacturer only. No other manufacturer is acceptable for City maintenance standardization:

1. ITT Flygt, as specified on the project Drawings.

2.02 SUBMERSIBLE PUMPS AND MOTORS

A. Pumps shall be designed for municipal wastewater. Pump characteristics shall be such that the motor nameplate rating is not exceeded at any point on the operating curve.

B. Pumps shall be the Flygt models specified herein and shall have intake and discharge dimensions specified herein and as shown on the plans. The pumps shall be suitable for wet-pit installation. All pumps and motors shall be explosion-proof (X Designation).

C. Pump and motor characteristics; including pump design and construction, cable seal, cooling system, wear rings, seals, impellers, bearings and motors; shall strictly meet Flygt's published Performance Specification (latest release).

D. Pump motors shall be the squirrel-cage induction type, housed in a NEMA B air filled, watertight chamber, rated for continuous full load operation. The stator windings shall be insulated with moisture resistant Class H insulation rated for 180°C (356°F). The motor shall be inverter duty rated in accordance with NEMA MG1, Part 31. The stator shall be heat-shrink fitted into the cast iron stator housing. Motors shall be capable of withstanding up to 15 starts per hour and shall have a minimum 1.15 service factor.

E. The impellers shall be dynamically balanced, semi-open, multi-vane, back swept, screw-shaped, non-clog design. The impeller leading edges shall be mechanically self-cleaned automatically upon each rotation as they pass across a spiral groove located on the volute suction. The screw-shaped leading edges of the gray iron impeller shall be hardened to Rc 45 and shall be capable of handling solids, fibrous materials, heavy sludge, and other matter normally found in wastewater. The screw shape of the impeller inlet shall provide an inducing effect for the handling of up to 5% sludge and rag-laden wastewater. The impeller to volute clearance shall be readily adjustable by the means of a single trim screw. The impellers shall be locked to the shaft, held by an impeller bolt and shall be coated with alkyd resin primer.

F. The pump volute shall be a single piece gray cast iron, ASTM A-48, Class 35B, non-concentric design with smooth passages of sufficient size to pass any solids that may enter the impeller. Minimum inlet and discharge size shall be as specified. The volute shall have a replaceable suction cover insert ring in which are cast spiral-shaped, sharp-edged groove(s). The spiral groove(s) shall provide trash release pathways and sharp edge(s) across which each impeller vane leading edge shall cross during rotation so to remain unobstructed.

G. **Nameplates:** Motors shall have a stainless steel plate showing the motor connection diagram and a stainless steel nameplate indicating type, frame, insulation class, full load current, horsepower, full load minimum guaranteed efficiency and nominal power factor, rpm, degree rise in Celsius, maximum ambient temperature rating in degrees Celsius, manufacturer's name, serial number, model, voltages, locked motor Kva code and bearing numbers.

2.03 ACCESSORIES

A. Pump accessories shall be furnished by the pump manufacturer and be compatible with each of the submersible pumps and the conditions of their installation.

B. All accessory hardware including anchor bolts and cable brackets shall be Type 316 stainless steel.

C. Accessories for each submersible pump and motor:

D. Accessories for each submersible pump and motor:

1. Discharge connection and base pedestal for mounting to concrete slab. Wet well submersible pump discharge connections shall be self-aligning.
2. Stainless steel guide rails and mounting accessories, where applicable, as recommended by the pump manufacturer for pump removal and installation without the need to enter the wet well.
3. Intermediate guide bar brackets for guide rails where applicable.
4. Discharge Elbow.
5. At least 30 LF of submersible motor cable or as necessary to complete the installation.
6. Cable holder.
7. At least 25 LF of stainless steel lifting chain.
8. Lifting eye compatible with the pump.
9. Dual moisture sensing probe system to detect the entrance of moisture and provide an alarm. The moisture detection system shall be designed to detect the entrance of moisture in the high heat transfer fluid reservoir and the air-filled motor stator housing.
10. A316 stainless steel anchor bolts as recommended by the pump supplier and any other miscellaneous supplies required to complete the installation.
11. A selection of spare parts shall be included with each pump. The minimum spare parts included shall be bearings, mechanical seals, o-rings, and wear rings.

2.04 DISCHARGE ELBOW

A. Discharge elbow to mate to pump discharge and transition to discharge piping.

B. The entire weight of the pump/motor shall be supported by the pump discharge elbow. Provide seismic resistance and anchorage in accordance with Section 01610.

2.05 COATINGS

A. Equipment shall receive final finish coats at the factory. Each coat of paint shall be of the consistency as supplied by the paint 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. Care shall be taken to obtain a uniform, unbroken coating over welds, edges, and corners. Weld splatter shall be removed and all welds neutralized with thinner. Blasted surfaces shall be coated within four hours of being sandblasted. All dust shall be removed from surfaces prior to coating.

B. All surfaces to be coated or painted shall be in the specified condition to receive the material before any coating or painting is performed. Follow manufacturer's instructions. 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. Coating testing and repair of damages, flawed areas, holidays, or mishaps shall conform to applicable AWWA standards.

C. Care shall be taken to prevent damage to coated surfaces during shipment. Any coatings damaged during shipment shall be refinished as the original at no extra cost to the City.

D. Coatings shall be guaranteed for a period of one year following the date of final acceptance.

PART 3 EXECUTION

3.01 INSTALLATION

A. Pumps shall be installed in strict accordance with the manufacturer’s approved procedures, specifications and their instructions.

B. Anchor bolts and grout pads for the pump pedestals shall be drilled and epoxied into place per Section 03300 after the pumps and discharge piping are set.

3.02 FIELD QUALITY CONTROL

A. Witnessing: All field testing shall be witnessed by the ENGINEER; provide advanced notice of field testing as specified in Section 01756.

B. Inspection and Check-out: As specified in Section 15050.

C. Equipment Performance Test: Test pump operations using automatic level controls as scheduled with the City and described herein.

D. All water and electricity required for field testing shall be provided at CONTRACTOR’s sole expense.

E. Operational Testing:

1. After installation, equipment shall be tested in the presence of the Engineer by an authorized pump manufacturer representative who shall certify, in writing, that the pumps are operating in compliance with these specifications and are free from binding, scraping, overloading, vibration or other defects.

2. Each pumping unit shall be run and monitored for a minimum duration of one (1) hour during the test period. A minimum of 6 pump cycles shall occur during pump testing. Motor running current readings shall be taken for each phase. Coordinate testing with the City.
3. The manufacturer's representative shall perform the following:
    a. Check motor stator and power cables.
    b. Check seal lubrication.
    c. Check for proper rotation.
    d. Check power supply voltage.
    e. Measure motor operating load and no load current for each phase.
    f. Check level control operation and sequence.

3.03 MANUFACTURER'S FIELD SERVICES

A. Require manufacturer to inspect system before initial start-up and certify that system has been correctly installed and prepared for start-up as specified in this section and Section 15050.

B. Training: As specified in Section 01756.

C. The pump manufacturer shall be present during pump station start-up.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 15050
BASIC MECHANICAL MATERIALS AND METHODS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: Basic design and performance requirements for mechanical equipment.

B. Related Sections:

1. Section 01610 - Seismic Design Criteria.
2. Section 01756 - Testing, Training, and Facility Start-up.
3. Section 01782 - Operating and Maintenance Data.
4. Section 03600 - Grouts.
5. Section 05501 - Anchor Bolts.
6. Section 09960 - Coatings.
7. Section 11312 - Submersible Pumps.

1.02 REFERENCES

A. American Gear Manufacturer's Association (AGMA) Standards:

1. AGMA 2001-B88 - Fundamental Rating Factors and Calculation Methods for Involute Spur and Helical Gear Teeth.
2. AGMA 6000-A88 - Specification for Measurement of Linear Vibration on Gear Units.
3. AGMA 6010-E88 - Standard for Spur, Helical, Herringbone, and Bevel Enclosed Drives.
4. AGMA 6019-E89 - Standard for Gear motors using Spur, Helical, Herringbone, Straight Bevel or Spiral Bevel Gears.
5. AGMA 6025-C90 - Sound for enclosed Helical, Herringbone and Spiral Bevel Gear Drives.

B. 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.

C. 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.

D. 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).

E. 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.
3. ANSI/HI 2.1-2.5 - Vertical Pumps - Nomenclature, Definitions, Application and Operation.
4. ANSI/HI 2.6 - Vertical Pump Tests.
5. ANSI/HI 3.1-1.5 - Rotary Pumps - Nomenclature, Definitions, Application and Operation.
6. ANSI/HI 3.6 - Rotary Pump Tests.
7. ANSI/HI 4.1-4.6 - Sealless Rotary Pumps - Nomenclature, Definitions, Application, Operation and Test.
8. ANSI/HI 5.1-1.6 - Sealless Centrifugal Pumps - Nomenclature, Definitions, Application, Operation and Test.
9. ANSI/HI 6.1-6.5 - Reciprocating Power Pumps - Nomenclature, Definitions, Application and Operation.
10. ANSI/HI 7.1-7.5 - Controlled Volume Pumps - Nomenclature, Definitions, Application and Operation.
11. ANSI/HI 9.1-9.5 - Pumps - General Guidelines for Types, Definitions, Application and Sound Measurement.

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. Design connections and related details for seismic design criteria as specified in Section 01610.
2. 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.

2. Gear Reduction Units:

a. Engineering information per applicable AGMA standards.

b. Gear mesh frequencies.

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 criteria specified in Section 01610.

2. Bearing L_{10} life calculations in accordance with ABMA 9 or ABMA 11 calculation methods for drivers, pumps, gears, shafts, motors, and other drive line components with bearings.

3. Calculations and other information to substantiate that operating rotational frequencies meet the requirements of this Section.

4. 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.

5. Calculations for connection details demonstrating compliance with specified structural design requirements.

6. Require Professional Engineer registered in state where Project is located to stamp and sign calculations.

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. Start-up Plan: Proposed plan for field-testing equipment as specified in Section 01756.

6. Certificate of Proper Installation: As specified in Section 01756.

7. Submit material test reports a specified in the equipment sections.

E. Operation and Maintenance Manuals:

1. As specified in Section 01782.

2. Submit prior to training of OWNER's personnel.

3. Make available at project site complete copy of manuals for use by field personnel and ENGINEER during start-up and testing of equipment.

4. Include manufacturer and model number of every bearing; include calculated ball pass frequencies of the installed equipment for both the inner and outer raceways.

5. 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.

b. Furnish Certificate of Proper Installation as specified in Section 01756.

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.

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. Site Elevation: About 10 feet above mean sea level.
   d. 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.
3. Functional testing requirements as specified in Sections 01756 and the equipment sections.

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 OWNER; cover parts and labor.

B. Where a warranty exceeds one year, manufacturer's warranty shall be issued in the OWNER'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 Parts:
1. Assume responsibility until turned over to OWNER.
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. Anchors Bolts: As specified

E. 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 WARNING SIGNS

A. Provide for equipment that starts automatically or remotely.

B. Material and Size: Rigid Acrylic, 12” x 9” with pre-drilled mounting holes.

C. Colors: Per OSHA standards for danger and warning signs.

D. Submit catalog cut sheet for approval.

2.04 FABRICATION

A. Structural Steel Members: As specified in Sections 05120 and 05505.

B. Nameplates:

1. Engraved or stamped on Type 304 stainless steel and fastened to equipment at factory in an accessible and visible location.
2. 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.
3. 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.

C. 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.

D. Shop Finishing:

1. Provide factory and field coating as specified in Section 09960. If not specified in Section 09960, provide coating as follows:
    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 in Section 09910.

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. 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.

5. Grout: As specified in Section 03600.

D. Special Techniques: Use applicable special tools and equipment, including precision machinist levels, dial indicators, and gauges as required in equipment installations.

E. Tolerances:

1. Completed Equipment Installations: Comply with requirements for intended use and specified vibration and noise tolerances.

F. Warning Signs: Mount securely with stainless fasteners at equipment which can be started automatically or from remote locations.

3.04 FIELD QUALITY CONTROL

A. Perform operational testing as required by Section 01756.

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 as specified in Section 01756.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

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 01140 - Work Restrictions.
2. Section 09960 - Coatings.
3. Section 15061 - Pipe Supports.
4. Section 15100 – Piping and Fittings.
5. Section 15110 – Valves

1.02 REFERENCES

A. 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. D 2240 - Test Method for Rubber Property B Durometer Hardness.

B. American Water Works Association

1. AWWA C104 - Cement-Mortar Lining for Ductile Iron Pipe and Fittings
2. AWWA C110 - Ductile Iron and Gray Iron Fittings, 3-inch through 48-inch
3. AWWA C111 - Rubber-Gasket Joints for Ductile Iron Pressure Pipe and Fittings
4. AWWA C115 - Flanged Ductile Iron Pipe with Ductile Iron or Gray Iron Threaded Flanges
5. AWWA C116 - Protective Fusion-bonded Epoxy Coatings for the Interior and Exterior Surfaces of Ductile Iron and Gray Iron Fittings
6. AWWA C151 - Ductile Iron Pipe, Centrifugally Cast
7. 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 actually 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.

3. 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 all valves and fittings.

b. Determine thrust forces by multiplying the nominal cross sectional area of the piping by design test pressure of the piping.

c. Provide restraints with ample size to withstand thrust forces resulting from test pressures.

d. During testing, provide suitable temporary restraints where piping does not require permanent restraints.

2. Provide underground mechanical restraints 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. Protect domestic water supplies from contamination.

1) Make connections between domestic water supply and other water systems in accordance with requirements of public health authorities.

2) Provide devices approved by OWNER of domestic water supply system to prevent flow from other sources into the domestic supply system.

2. Make connections to existing piping and valves after sections of new piping to be connected have been tested and found satisfactory.

3. Provide sleeves, flanges, nipples, couplings, adapters, and other fittings needed to install or attach new fittings to existing piping and to make connections to existing piping.

D. Connections to In-service Piping:

1. Shutdown in-service piping in accordance with Section 01140.

a. Establish procedures and timing in a conference attended by CONTRACTOR, ENGINEER, and OWNER of the in-service piping.

b. Where operation and maintenance of existing facilities require that a shutdown be made during hours other than normal working hours, perform the related work in coordination with the hours of actual shutdown.

c. Additional provisions regarding shutdown of existing facilities are specified in Section 01140 Work Restrictions.

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: Capable of withstanding specified test pressures for piping sections and fabricated with ends to fit 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.

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 aboveground masonry and 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. Support piping in accordance with Section 15061.

1. 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.

3.05 CLEANING

A. Piping Cleaning: Upon completion of installation, clean piping interior of foreign matter and debris. Perform special cleaning when required by the Contract Documents.

3.06 ABBREVIATIONS

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

SS FM	Sanitary Sewer Force Main
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 09960 - Coatings.
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. Type and style as shown on the Plans.

B. 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 304 or 316): Use in all submerged locations, above water level but below top of wall inside water bearing structures and where specifically indicated on the Drawings.
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. All pipe support connections and base assemblies shall be fully welded to prevent movement and to restrain against uplift.

C. Carefully determine locations of inserts. Anchor to formwork prior to placing concrete.

D. Use flush shells only where indicated on the Drawings.

E. Do not use anchors relying on deformation of lead alloy.

F. Do not use stud type powder actuated fasteners for securing metallic conduit or steel pipe larger than 1 inch to concrete, masonry, or wood.

G. Suspend pipe hangers from hanger rods. Secured with double nuts.

H. Install continuously threaded hanger rods only where indicated on the Drawings.

I. Use adjustable ring hangers; or adjustable clevis hangers, for 6 inch and smaller diameter pipe.

J. Use adjustable clevis hangers for pipe larger than 6 inches in diameter.

K. Secure pipes with galvanized double nutted U-bolts or suspend pipes from hanger rods and hangers.

L. 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.

M. 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.

N. Securely anchor plastic pipe, valves, and headers to prevent movement during operation of valves.

O. Anchor plastic pipe between expansion loops and direction changes to prevent axial movement through anchors.

P. Support base fittings with metal supports or when indicated on the Drawings, concrete piers.

Q. Size hanger rods, supports, clamps, anchors, brackets, and guides in accordance with ANSI/MSS SP 58 and SP 69.

R. Do not use chains, plumbers' straps, wire, or similar devices for permanently suspending, supporting, or restraining pipes.

S. Support plumbing drainage and vents in accordance with California Plumbing Code.

T. Supports, Clamps, Brackets, and Portions of Support System Bearing Against Copper Pipe: Copper plated, copper throughout, or isolated with neoprene or polyvinyl chloride tape.

U. Where pipe is insulated, install over-sized supports and hangers.

V. Install insulation shield in accordance with ANSI/MSS SP 69, Type 40. Shield shall be galvanized steel unless specified elsewhere.

W. Install riser clamps at floor penetrations and where indicated on the Drawings.

X. Provide dielectric protection whenever fastening dissimilar metals.

Y. Paint or Coat support system components as specified in Sections 09960.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 15100
PIPING AND FITTINGS

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:** Pipe, fittings, connections, supports, anchors and all other necessary appurtenances as shown, specified, and/or required. Inspection of new pipe to be installed.

B. **Related Work Specified Elsewhere**

1. Submersible Pumps: Section 11312.
2. Valves: Section 15110.
3. Sanitary Sewer Testing: Section 02770

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.

A. ANSI B16.1 *Cast Iron Pipe Flanges and Flanged Fittings*

B. AWWA C104 *Cement-Mortar Lining for Ductile Iron Pipe and Fittings*

C. AWWA C110 *Ductile Iron and Gray Iron Fittings, 3-inch through 48-inch*

D. AWWA C111 *Rubber-Gasket Joints for Ductile Iron Pressure Pipe and Fittings*

E. AWWA C115 *Flanged Ductile Iron Pipe with Ductile Iron or Gray Iron Threaded Flanges*

F. AWWA C116 *Protective Fusion-bonded Epoxy Coatings for the Interior and Exterior Surfaces of Ductile Iron and Gray Iron Fittings*

G. AWWA C151 *Ductile Iron Pipe, Centrifugally Cast*

H. AWWA C207 *Steel Pipe Flanges for Waterworks Service*

I. AWWA C-606 *Grooved and Shouldered Joints*

J. ASTM D3350 *Polyethylene Plastics Pipe and Fittings Materials*

K. ASTM D1248 *Polyethylene Plastics Extrusion Materials for Wire and Cable*

L. ASTM F714 *Polyethylene (PE) Plastic Pipe (DR-PR) Based on Outside Diameter*

1.04 QUALITY ASSURANCE

A. The Contractor shall furnish all labor necessary to assist the Engineer in inspecting pipe upon delivery. The Contractor shall remove rejected pipe immediately.

B. All pipe of any manufacturer may be rejected if there are unsatisfactory joint assembly operations, even if the pipe conforms to ANSI and AWWA Specifications. The Contractor shall remove all unsatisfactory pipe of that manufacturer of same shipment from work and shall furnish pipe from another manufacturer conforming to these specifications.

C. All tests shall be made in conformance with methods prescribed by ASTM and AWWA specifications, and acceptance or rejection is based on the test results.

D. All new gravity sewer pipe shall be tested per Section 02770.

E. All new force main pipe shall be tested per Section 02770.

1.05 SUBMITTALS

A. **Product Data**: The Contractor shall submit shop plans, manufacturer's product data and installation instructions demonstrating that the proposed pipe and fittings are in compliance with the referenced standards as well as the intended service. If plans are returned disapproved or not stamped, they shall be revised or corrected as necessary and resubmitted for review, approval, and stamping.

B. **Certification**: Certified test reports with each delivery that pipe complies with this specification.

PART 2 - PRODUCTS

2.01 PIPE AND TUBE

A. **General:** Pipe sizes are nominal inside diameter unless otherwise noted. All sizes shall be as called out on the plans and specified herein. All pipe and fittings delivered to the job site shall be clearly marked to identify the material, class, thickness, and manufacturer. All material shall be new and free of blemishes.

The Contractor is responsible for furnishing and installing all items necessary to make a complete and workable piping system. These include, but are not limited to, valve boxes, manholes, insulating couplings and gaskets, piping specialties and all other items required by the nature of the installation. Any item not specified herein but required by the nature of the installation shall be of the first quality and equal in grade to similar materials specified herein.

B. **Ductile Iron Pipe:** Manufactured in accordance with AWWA C151, Pressure Class 350 ductile iron pipe with threaded flanges.

1. Ductile Iron Pipe shall be interior lined with Protecto 401 Ceramic Epoxy or Tnemec 431 Perma-Shield. The lining material shall be amine cured novalac epoxy containing at least 20 percent by volume of ceramic quartz pigment. The dry film thickness shall be no less than 40 mils. Exterior coating shall be:
    a. Buried Pipe: Buried pipe shall be coated with asphaltic material as specified in AWWA C151. A minimum thickness of 1-mil asphaltic coating shall be applied.
    b. Exposed Pipe: Exposed pipe within the wetwell, valve vault, and under the Cola Ballena bridge shall be coated with an exterior protective pipe coating incorporating high solids amine cured epoxy for maximum protection of the exterior of ductile iron pipe. Coating shall be Tnemec Series 141 at a minimum of 16 mils dry film thickness, or US Pipe Ceramawrap at a minimum dry film thickness of 20 mils.

2. Ductile Iron Pipe shall be prepared per the National Association of Pipe Fabricators Standard NAPF 500-03.

C. **Schedule 40 and Schedule 80 Polyvinyl Chloride (PVC) Pipe:** ASTM D1785 Type 1, Grade 2, Schedule 40 or Schedule 80 as indicated on the plans, unless otherwise specified.

D. **Steel:** Schedule 40. Flanges shall be ANSI B16.1 Class 125 standard pattern. All steel pipe shall be fusion bonded epoxy coated and lined.

E. **SDR-26 PVC GRAVITY PIPE AND FITTINGS**

1. Minimum wall and strength requirements of SDR-26 in conformance with ASTM D3034.

2. Bell and spigot type joints conforming to ASTM D 3212.

3. Pipe shall be made of PVC plastic having a cell classification of 12454 or 12364 as defined in ASTM D 1784.

4. Sealing gaskets shall be factory installed and meet the requirements of ASTM F477.

5. Pipe shall be marked with “SANITARY SEWER” in 1-5/8” high block lettering with permanent ink. The marking shall be repeated at 2-foot spacing along the pipe length.

F. **RESTRAINED JOINT POLYVINYL CHLORIDE (PVC) PLASTIC PRESSURE SEWER PIPE, C-900 AND C-905 – PVC FORCE MAINS.**

1. SCOPE. This specification designates general requirements for restrained joint PVC pipe.

2. MATERIALS. PVC Pipe and Fittings shall conform to all the requirements of AWWA C-900 for pipe diameters 4" through 12" DR=18 and AWWA C-905 for pipe diameters 14" through 18" with a DR=18. Pipe, couplings, and locking splines shall be completely non-metallic. Pipe and couplings shall be made from unplasticized PVC

compounds having a minimum cell classification of 12454, as defined in ASTM D-1784. The compound shall qualify for a Hydrostatic Design Basis of 4000 psi for water at 73.4°F, in accordance with the requirements of ASTM D-2837.

3. Pipe shall be marked per AWWA C900 and shall include the following as a minimum:
   a. Nominal size
   b. PVC
   c. Dimension Ratio
   d. Shall be labeled “SEWER FORCE MAIN” or “NOT FOR POTABLE USE” with 1-5/8” high block lettering with permanent ink. The marking shall be repeated at 2-foot spacing along the pipe length.
   e. Extrusion production record code
   f. Trademark or trade name.

3. TYPE AND MANUFACTURE. All pipe, fittings, and accessories shall be of the same manufacture in order that restrained joint configurations will be identical. The bell shall consist of an integral wall section stiffened with two PVC retainer rings which securely lock the solid cross section rubber ring into position. Methods of installation shall be in strict conformance with the recommendations of the manufacturer.

4. JOINTS AND COUPLINGS. Pipe shall be joined using non-metallic couplings. High-strength flexible thermoplastic splines shall be inserted into mating, precision machined grooves in the pipe to provide full 360 degree restraint with evenly distributed loading. Couplings shall be design for use at or above the pressure class of pipe with which they are utilized, and shall incorporate twin elastomeric sealing gaskets conforming to ASTM F-477. Joints shall be designed to meet the zero leakage test requirements of ASTM D-3139.

5. APPROVED MANUFACTURERS. CertainTeed C900/RJIB PVC restrained joint pipe or approved equal.

2.02 FITTINGS

A. **Material:** Fittings for ductile iron pipe shall conform to AWWA C110.

B. **Pattern:** All fittings shall be flanged to ANSI B16.1 Class 125 standard pattern.

C. **Coating and Lining:** Flanged fittings shall be fusion bond epoxy lined and coated at the factory in conformance with AWWA C116.

D. **Schedule 40 and Schedule 80 PVC Pipe Fittings:** ASTM D2466 Schedule 40 or Schedule 80 socket-type PVC plastic pipe fittings to match pipe weight and Schedule indicated on the plans.
   a. Exposed PVC pipe and fitting shall be coated per Section 09960.

E. **SDR-26 PVC Couplings:** SDR-26 PVC couplings shall only be used in locations shown on the plans. Couplings shall be banded rubber coupling shall be of a variety designed to couple the new PVC with the existing pipe material. Connections to new PVC pipe shall be Mission MR02 ARC couplings or approved equal.

F. **Cam-Lock Fittings:** Cam-lock fittings shall be 316 stainless steel and shall be supplied with dust plug (Type DP) as detailed on the plans. Cam-lock fittings shall be female, Type B. Blind flange for cam-lock connection shall be 316 stainless steel. Cam-lock shall have a minimum working pressure of 100 psi.

2.03 PIPE JOINTS AND COUPLINGS

A. Discharge pipe shall be joined by flanged, mechanical or grooved joints as shown on the Drawings.

B. **Flanged Joints:** Provide full face gaskets per AWWA C111.

C. **Restrained Flanged Coupling Adapters (RFCA)**: Restrained flange coupling adapters shall be provided as shown on the Drawings and as deemed necessary by the Contractor for pipe assembly. Couplings shall be EBAA Iron 2100 Megaflange restrained flange adapter, or approved equal. Cast gland bodies shall be coated with MEGA-BOND.

D. **Thrust Restraint Glands:** All fittings, joints, and connections shall be restrained against trust. Thrust restraint glands shall be EBAA Iron MEGALUG Series 1100. Thrust restraint gland for PVC force main pipe shall be specifically designed for the use with C900 PVC pipe such as EBAA Iron MEGALUG 2000PV or approved equal. Cast gland bodies shall be coated with MEGA-BOND. All hardware shall be stainless steel and all nuts and bolts shall be coated with Xylan Fluoropolymer coating.

D. **Restrained Flexible Coupling:** Restrained flexible couplings shall be constructed with a solid ductile iron mechanical joint sleeve with thrust restrain glands on both sides. Ductile iron sleeve shall be fusion bond epoxy lined and coated at the factory in conformance with AWWA C116. All hardware shall be stainless steel and all nuts and bolts shall be coated with Xylan Fluoropolymer coating.

E. **Coupling Adapters:** All fittings, joints, and connections shall be restrained against trust. Coupling adapters shall be EBAA Iron MEGA-COUPLING Series 3800 or approved equal. Cast gland bodies shall be coated with MEGA-BOND. The wedge assemblies and all nuts and bolts shall be coated with Xylan Fluoropolymer coating.

F. **Flex-Tend Flexible Expansion Joints:** Flexible expansion joints shall be FLEX-TEND as manufactured by EBAA Iron, Inc., or approved equal. Flexible expansion joints shall be installed in the locations indicated on the drawings and shall be manufactured of ductile iron conforming to the material requirements of ASTM A536 and ANSI/AWWA C153/A21.53. Each flexible expansion joint shall be pressure tested prior to shipment against its own restraint to a minimum of 250 PSI. A minimum 2:1 safety factor, determined from the published pressure rating, shall apply. Each flexible expansion joint shall consist of an expansion joint designed and cast as an integral part of a ball and socket type flexible joint, having a minimum per ball deflection of: 20º and 8-inches minimum expansion.

1. All internal surfaces (wetted parts) shall be lined with a minimum of 15 mils of fusion bonded epoxy conforming to the applicable requirements of ANSI/AWWA C213. Sealing gaskets shall be constructed of EPDM. The coating shall meet ANSI/NSF-61.

2. Exterior surfaces shall be coated with a minimum of 6 mils of fusion bonded epoxy conforming to the applicable requirements of ANSI/AWWA C116/A21.16.

3. Flexible expansion joints shall be protected with plastic film wrap as specified in Section 2.04 below.

G. **Gaskets, Bolts and Nuts**: Gaskets shall be rated for wastewater service, made of synthetic rubber such as Buna-N not less than one-eighth (1/8) inch thick. All gaskets shall be the full width of the flange to which applied. Bolts and nuts shall be ASTM A316 stainless steel, and shall have sound well-fitting threads. Nuts and bolts shall be coated with Xylan Fluoropolymer coating. Bolts shall be provided with hexagonal chamfered heads and nuts. The underside of all bolt heads and nuts shall have true surfaces at right angles to the axis of the bolts. The lengths of the bolts shall be such that after joints are made up, the bolts shall protrude through the nuts, but in no case shall they protrude more than one-half (½) inch.

H. **Plastic (PVC) Pipe:** Schedule 40 and Schedule 80 Plastic (PVC) pipe shall be solvent weld in conformance with ASTM D2855.

2.04 PLASTIC FILM WRAP

All ductile-iron and steel pipe and fittings buried underground shall be protected with plastic film wrap in accordance with AWWA C105, unless noted otherwise below. Wrap shall be a loose 8-mil-thick polyethylene tube. All joints between plastic tubes shall be wrapped with 2-inch-wide polyethylene adhesive tape, Polyken 900, Scotch wrap 50, or approved equal.

2.05 SUPPORTS, ANCHORS, AND SEALS

A. Support for the pump discharge piping shall be provided as detailed on the Drawings.

B. Link-seal shall be used as shown on the Drawings.

PART 3 - EXECUTION

3.01 PREPARATION

Foreign material, scale and dirt, inside and outside, shall be removed from pipe and fitting materials before assembly.

3.02 CONNECTIONS

A. Pipe connections shall be made in accordance with applicable standards and manufacturer's recommendations.

B. Non-conducting connections shall be provided wherever jointing dissimilar metals.

3.03 INSTALLATION

A. **General**: Pipe shall be installed in accordance with good trade practice and AWWA C600. The methods employed in the handling and placing of pipe, fittings, and equipment shall be such as to insure that after installation and testing they are in good condition. Should

damage occur to the pipe, fittings, or equipment, repairs satisfactory to the City shall be made at no additional cost to the City.

B. **Handling and Storage of Pipe**: During loading, transportation, and unloading, every precaution shall be taken to prevent pipeline damage. Any damaged pipe shall be replaced or repaired to the satisfaction of the City. Where pipe is placed in stockpiles, it shall be neatly piled and blocked with strips between tiers.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 15110
VALVES

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: Basic requirements for valves.

B. Related Sections:

1. Section 09960 - Coatings.
2. Section 15052 - Basic Piping Materials and Methods.
3. Section 15100 – Piping and Fittings.

1.02 REFERENCES

A. American National Standards Institute/American Society of Mechanical Engineers (ANSI/ ASME):

1. B16.1 - Cast Iron Pipe Flanges and Flanged Fittings
2. B16.21 - Nonmetallic Flat Gaskets for Pipe Flanges.
3. B16.34 - Valves - Flanged, Threaded, and Welding End.

B. American Society for Testing and Materials (ASTM):

1. A 167 - Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
2. A 536 – Specification for Ductile Iron Castings.
3. E 527 - Practice for Numbering Metals and Alloys (UNS).

C. American Water Works Association (AWWA):

1. C110 - Ductile Iron and Gray Iron Fittings, 3-inch through 48-inch.
2. C 504 - Standard for Rubber-Seated Butterfly Valves.
3. C 507 - Ball Valves, 6-inch through 48-inch
4. C 509 - Resilient-Seated Gate Valve for Water and Sewage Systems
5. C 550 - Protective Epoxy Interior Coatings for Valves and Hydrants

D. Steel Structures Painting Council (SSPC):

1. SP 2 - Surface Preparation Specification for Hand Tool Cleaning.
2. SP10 - Surface Preparation Specification for Near-White Blast Cleaning.

1.03 DESIGN REQUIREMENTS

A. Pressure Rating:

1. Suitable for service under minimum working pressures of 150 pounds per square inch gauge.
2. When a piping system is specified in the Piping Schedule to be tested at a pressure greater than 150 pounds per square inch gauge, provide valves for that piping system with design working pressure which is sufficient to withstand the test pressure.

B. Valve to Piping Connections:

1. Valves 3 Inch Nominal Size and Larger: Flanged ends.
2. Valves less than 3 Inch Nominal Size: Screwed ends.
3. Plastic Valves in Plastic Piping:
   a. Up to 2.5 Inches: Provide solvent or heat welded unions.
   b. 3 Inches and Above: Provide solvent or heat welded flanges.

1.04 SUBMITTALS

A. Submittals Prior to Installation:

1. Product Data: Submit detailed technical information relating to the valve including description of component parts, materials of construction, performance, dimensions, and weights.

B. Operation and Maintenance Data:

1. Furnish bound sets of installation, operation, and maintenance instructions for each type of valve 4 inch in nominal size and larger. Include information on valve operators in operation and maintenance instruction manual.

C. Certification: Certified test reports with each delivery that the valve(s) comply with this specification.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications:

1. Valves: Manufactured by manufacturers whose valves have had successful operational experience in comparable service.

B. Valve Connections: Suitable valves shall be provided to connect to adjoining piping as specified for pipe joints.

1.06 DELIVERY STORAGE AND HANDLING

A. Protect valves and protective coatings from damage during handling and installation; repair coating where damaged.

PART 2 PRODUCTS

2.01 GATE VALVES

A. Gate Valves for Non-Buried Service:

1. Gate valves for non-buried service shall be non-rising stem resilient wedge gate valves meeting AWWA C509 standards with flanged ends drilled to ANSI B16.1 Class 125 standards. Where indicated on the Drawings, gate valves shall be supplied with mechanical joint connections.

2. Bronze and Brass Alloys: Use bronze and brass alloys with not more than 6 percent zinc and not more than 2 percent aluminum in the manufacture of valve parts; UNS Alloy C83600 or C92200 unless specified otherwise.

3. Valve Bodies: Cast iron in accordance with ASTM A 126 Class 30 minimum or ductile iron in accordance with ASTM A 536 Grade 65-45-12 minimums unless specified otherwise.

4. Provide a removable hand wheel for each gate valve.

5. Resilient wedge gate valves shall have a cast iron wedge fully encapsulated in molded rubber complying with ASTM D2000, with extended wedge guides molded as part of the wedge. Resilient seat shall affect a bubble-tight seal across the wedge at a full differential of 200 psi. The wedge shall be designed to minimize solids build-up and stem binding. Internal working parts shall be corrosion resistant and accessible without removing the main body from the discharge line.

6. Valves shall be epoxy lined and 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 C550. Lining materials shall not be applied to valve stems, wedges or wedge seats; nor build up in thickness to interfere with joint assembly or with the operation of the lined unit.

7. Valve, Gate, and Operator Bolts and Nuts:

   a. Fabricated of Type 316 stainless steel for the following installation conditions:

      1) Submerged in sewage or water.

      2) In an enclosed space above sewage or water.

      3) In structures containing sewage or water, below top of walls.

      4) At openings in concrete or metal decks.

   b. Where dissimilar metals are being bolted, use stainless steel bolts with isolation bushings and washers.

B. Gate Valves for Buried Service:

1. Gate valves for buried service shall be resilient wedge gate valves meeting AWWA C509 standards with flanged ends drilled to ANSI B16.1 Class 125 standards. Where indicated on the Drawings, gate valves shall be supplied with mechanical joint connections.

2. Iron body, resilient seat, non-rising stem, double O-ring stem seal. Resilient seat shall affect a bubble-tight seal across the wedge at a full differential of 200 psi. The wedge shall be designed to minimize solids build-up and stem binding. Internal working parts shall be corrosion resistant and accessible without removing the main body from the discharge line.
3. Ductile or cast iron wedge encapsulated in nitrile rubber and capable of sealing in either flow direction.
4. Bronze stem with double or triple O-ring or braided packing stem seals.
5. Interior and exterior surfaces of valve body and bonnet shall be epoxy lined and 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 C550. Lining materials shall not be applied to valve stems, wedges or wedge seats; nor build up in thickness to interfere with joint assembly or with the operation of the lined unit.
6. Valve Operator: Provide standard AWWA 2-inch operating nut, matching valve key and valve box for operating stem.
7. Flanges installed on force mains shall be restrained.
8. Manufacturers: One of the following or equal:
    a. M&H/Kennedy Valve Company.
    b. Mueller Company.
    c. American Flow Control.

2.02 UNDERGROUND VALVES

A. Provide underground valves with flanged, mechanical, or other type of joint required for the type of pipe to which the valve is to be connected.

B. Coating and Wrapping:
1. Prior to installation, coat buried valves with 2 coats of protective coal tar in accordance with Section 09960.
2. After installation, wrap valves with polyethylene as specified for ductile iron piping in Section 15100.
    a. Ascertain that polyethylene wrapping does not affect operation of valve.

2.03 BALL CHECK VALVES

A. Where indicated on the contract drawings, ball type check valves shall be used.

B. Valves shall be designed for vertical installation with a sinking ball.

C. Valves shall be flanged.

D. Ball check valves shall be Flygt Type 5087 or approved equal.

2.04 SWING CHECK VALVES

A. Check valves shall be flanged swing check valves with outside weight and lever specifically designed for wastewater service. Check valves shall meet the requirements of AWWA C508.

B. The valve shall have a heavy duty body shall be constructed of high-strength cast iron conforming to ASTM A126 Class B with integral flanges, faced and drilled per ANSI B16.1 Class 125 and be suitable for horizontal installation.

C. The valve body shall be the full waterway type, designed to provide a net flow area equal to at least the nominal inlet pipe size when swung open no more than 25 degrees. The valve shall have a replaceable stainless steel body seat.

D. Valve disc shall be cast iron and faced with a renewable resilient seat ring of rubber or other suitable material, held in place by a follower ring and stainless steel screws.

E. The disc arm shall be ductile iron or steel, suspended from, and keyed to an austenitic stainless steel shaft which is completely above the waterway and supported at each end by heavy bronze bushings. The shaft shall rotate freely without the need for external lubrication. The shaft shall be sealed where it passes through the body by means of a stuffing box and adjustable packing. Simple O-ring shaft seals are not acceptable.

F. The valve shall be supplied with an outside lever and adjustable counterweight to initiate valve closure.

G. The valve shall swing open smoothly at pump start and close quickly and quietly upon pump shutdown to prevent flow reversal. When closed, the valve shall seat drop tight.

H. Interior and exterior surfaces of valve body shall be epoxy lined and 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 C550. Lining materials shall not be applied to wedges or wedge seats; nor build up in thickness to interfere with joint assembly or with the operation of the lined unit.

I. Swing check valves shall be Clow Valve Company Horizontal Swing Check Valve Style 1106LW, or approved equal. Swing check valves shall be certified by the manufacturer for wastewater service in a horizontal position.

2.05 AIR RELEASE VALVES:

A. Air release valves shall be specifically designed for use in a sewage application with liquids carrying solid particles.

B. Valves shall be equipped with a ball valve for isolation.

C. Valves shall be equipped with a ball valve to release trapped pressure and drain the valve body prior to maintenance and for back-flushing during maintenance. Provide drain piping as shown on the plans.

D. Ball valve shall be 316 stainless steel as specified herein.

E. Valve body, base, and cover assembly of air release valve shall be 316 stainless steel.

F. Valve shall be equipped with a threaded inlet as shown on the Drawings.

G. Valve shall be Val-Matic Model 49AS.

H. Valve shall be rated for a design pressure between 3 – 150 psi

2.06 BALL VALVES

A. Ball valves shall be ASTM A351, Type 316 stainless steel

B. Connections as shown on the plans

C. Locking handle

D. Full port

E. 1,000 psi minimum pressure rating

F. Sharpe Series 5303 or approved equal

2.07 INTERIOR PROTECTIVE COATING

A. Provide valves with type of protective coating specified in the particular valve specification.

B. Apply protective coating to interior, non-working surfaces, except stainless steel surfaces.

C. Coating Types:

1. Powder Epoxies:

a. Manufacturers: One of the following or equal:

1) 3-M Company, ScotchKote 134; certified to NSF 61 for drinking water use.

b. Clean surfaces to meet SSPC-SP-10, near white metal blast cleaning, with grit of size recommended by epoxy manufacturer.

c. Apply in accordance with manufacturer's published instructions.

d. Coating Thickness: 0.010 to 0.012 inches except that:

1) Coating Thickness in Grooves for Gaskets: 0.005 inches.

2) Do not coat seat grooves in valves with bonded seat.

e. Quality Control:

1) Coating Thickness: Measured with a non-destructive magnetic type thickness gauge.
2) Verify coating integrity with a wet sponge-testing unit operating at approximately 60 volts.
3) Consider tests successful when coating thickness meets specified requirements and when no pinholes are found.
4) Correct defective coating disclosed by unsuccessful tests, and repeat test.
5) Repair pinholes with liquid epoxy recommended by manufacturer of the epoxy used for coating.

PART 3 EXECUTION

3.01 EXAMINATION

A. Preparation: Required Information Prior to Installation:

1. Install valves after the required submittal on installation has been accepted.
2. Determine, after flanged valves and flanged check valves are selected, the face-to-face dimensions of flanged valves and flanged check valves.

B. Fabricate piping to lengths taking into account the dimensions of flanged valves and flanged check valves.

3.02 INSTALLATION

A. Provide incidental work and materials necessary for installation of valves including flange gaskets, flange bolts and nuts, valve boxes and covers, concrete bases, blocking, and protective coating.

B. Where needed, furnish and install additional valves for proper operation and maintenance of equipment and plant facilities under the following circumstances:

1. Where such additional valves are required for operation and maintenance of the particular equipment furnished by CONTRACTOR.
2. Where such additional valves are required as a result of a substitution or change initiated by CONTRACTOR.

C. Install Valves with their stems in vertical position above the pipe, except as follows:

1. Butterfly valves, gate valves aboveground, globe valves, ball valves, and angle valves may be installed with their stems in the horizontal position.
2. Buried plug valves with geared operators shall be installed with their stems in a horizontal position.

D. Install valves so that handles clear obstructions when the valves are operated from fully open to fully closed.

E. Place top of valve boxes flush with finish grade or as otherwise indicated on the Drawings.

F. Valves with Threaded Connections:

1. Install valves by applying wrench on end of valve nearest the joint to prevent distortion of the valve body.

2. Apply pipe joint compound and Teflon tape on external (male) threads to prevent forcing compound into valve seat area.

G. Valves with Flanged Connections:

1. Align flanges and gasket carefully before tightening flange bolts.

2. When flanges are aligned, install bolts and hand tighten.

3. Tighten nuts opposite each other with equal tension before moving to next pair of nuts.

H. Valves with Soldered Connections:

1. Do not overheat connection to prevent damage to resilient seats and metal seat rings.

2. Position valves in full open position before starting soldering procedure.

3. Apply heat to piping rather than to valve body.

3.03 TESTING

A. Valves shall be tested at the same time that the adjacent pipeline is tested. Joints shall show no visible leakage under test. Joints that show signs of leakage shall be repaired prior to final acceptance. If there are any special parts of control systems or operators that might be damaged by the pipeline test, they shall be properly protected. The Contractor shall be held responsible for any damage caused by the testing.

B. If requested by the City, the valve manufacturer shall furnish an affidavit stating that the materials and options furnished comply with these specifications.

END OF SECTION

SECTION 16010
GENERAL ELECTRICAL REQUIREMENTS

PART 1 GENERAL

1.01 INCLUDED WORK

A. The General Conditions and Special Conditions form a part of these specifications.

B. The provisions of this section shall apply to the furnishing of all labor, materials, equipment and supervision to provide the complete electrical requirements necessary for the operation of the Group 4 – Sewerage Pump Stations Renovations of the City of Alameda. In general, the electrical equipment and installation shall include but is not limited to the following items:

1. Automatic Transfer Switch
2. Standby Diesel Engine-Generator
3. Service Pedestal
4. Pump Control Panel
5. Pressure Level Transmitter
6. Float Switches
7. Underground conduits, and pullboxes
8. Low voltage power cables
9. Rigid steel and PVC coated rigid steel conduit system
10. Grounding system
11. Testing and system startup.

C. Additional requirements are also provided in specific technical sections of the project specifications. Conflicting provisions between this general electrical requirement section and specific section requirements shall be brought to the attention of the Engineer for proper resolution.

1.02 APPLICABLE PUBLICATIONS

A. The electrical equipment shall be manufactured, installed and tested in accordance with the latest edition of the following applicable standards:

1. AMERICAN NATIONAL STANDARD INSTITUTE (ANSI)
   a. ANSI C2, National Electrical Safety Code
2. CALIFORNIA BUILDING STANDARDS COMMISSION
   a. California Electrical Code (CEC)
   b. California Building Code (CBC)
3. CODE OF FEDERAL REGULATIONS (CFR)

a. 29 CFR 1910.147, Control of Hazardous Energy (Lock Out/Tag Out)

4. INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, INC. (IEEE)
   a. IEEE 100, Dictionary of Electrical and Electronics Terms
5. INTERNATIONAL TESTING ASSOCIATION, INC
   a. NETA ATS, Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems
6. NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)
   a. NEMA ICS 1, General Standards for Industrial Control and Systems
   b. MEMAS ICS 2, Industrial Control Devices, Controllers and Assemblies
   c. NEMA ICS 4, Terminal Blocks for Industrial Use
   d. NEMA ICS 6, Enclosures for Industrial Controls and Systems
7. NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)
   a. NFPA 70E Standard for Electrical Safety in the Workplace
   b. NFPA 820, Standard for Fire Protection in Wastewater Treatment and Collection Facilities
8. STATE OF CALIFORNIA PUBLIC UTILITIES COMMISSION
   a. G.O. 128, Rules for Construction of Underground Electric Supply and Communication Systems
9. UNDERWRITTERS LABORATORIES (UL)
   a. UL 50, Enclosure for Electrical Equipment
   b. UL 508A, Standard for Industrial Control Panels
   c. UL698A, Standard for Industrial Control Panels Relating to Hazardous (Classified) Locations

1.03 MODIFICATION OF REFERENCES

A. In each of the publications referred to herein, consider the advisory provisions to be mandatory, as though the word, “shall” had been substituted for “should” wherever it appears.

1.04 DEFINITIONS

A. Unless otherwise specified or indicated, electrical and electronics terms used in these specifications, and on the drawings, shall be as defined in IEEE 100.

B. The technical sections referred to herein are those specification sections, within this electrical specification, that describe products, systems, installation procedures, equipment, operations, and test methods.

1.05 ELECTRICAL CHARACTERISTICS

A. The service equipment will consist of a metered service pedestal. The service pedestal shall be rated as indicated on the Drawings

1.06 SUBMITTALS

A. General

1. Submittals required in the technical sections which refer to this section shall conform to the following additional requirements. Submittals shall include the manufacturer's name, trade name, place of manufacture, catalog or model number, nameplate data, size, layout dimensions, capacity, project specification and technical paragraph reference. Submittals shall also include applicable industry, and technical society publication references, and years of satisfactory service, and other information necessary to establish contract compliance of each item to be provided. Photographs of existing installations are unacceptable and will be returned without approval.

B. Manufacturer's Catalog Data

1. Submittals for each manufactured item shall be current manufacturer's descriptive literature of cataloged products, equipment drawings, diagrams, performance and characteristic curves, and catalog cuts. Handwritten and typed modifications and other notations not part of the manufacturer's preprinted data will result in the rejection of the submittal. Should manufacturer's data require supplemental information for clarification, the supplemental information shall be submitted as requested.

C. Drawings

1. Submit drawings a minimum of 11-inches by 17-inches in size using a minimum scale of ⅛-inch per foot. Include wiring diagrams and installation details of equipment indicating proposed location, layout and arrangement, control panels, accessories, piping, ductwork, and other items that must be shown to ensure a coordinated installation. Wiring diagrams shall identify circuit terminals and indicate the internal wiring for each item of equipment and the interconnection between each item of equipment. Drawings shall indicate adequate clearance for operation, maintenance, and replacement of operating equipment devices.

D. Instructions

1. Where installation procedures or part of the installation procedures are required to be in accordance with manufacturer's instructions, submit printed copies of those instructions prior to installation. Installation of the item shall not proceed until manufacturer's instructions are received. Failure to submit manufacturer's instructions shall be cause for rejection of the equipment or material.

E. Certificates

1. Submit manufacturer's certification as required for products, materials, finishes, and equipment as specified in the technical sections. Certificates from material suppliers are not acceptable. Preprinted certifications and copies of previously submitted documents will not be acceptable. The manufacturer's certifications shall name the appropriate products, equipment, or materials and the publication specified as controlling the quality of that item. Certification shall not contain statements to imply that the item does not meet requirements specified, such as "as good as"; "achieve the same end use and results as materials formulated in accordance with the referenced publications"; or "equal or exceed the service and performance of the specified material." Certifications shall simply state that the item conforms to the requirements specified. Certificates shall be printed on the manufacturer's letterhead and shall be signed by the manufacturer's official authorized to sign certificates of compliance.

1.07 REFERENCE STANDARD COMPLIANCE

A. Where equipment or materials are specified to conform to industry and technical society reference standards such as American National Standards Institute (ANSI), American Society for Testing and Materials (ASTM), National Electrical Manufacturers Association (NEMA), Underwriters Laboratories Inc. (UL), and Association of Edison Illuminating Companies (AEIC), submit proof of such compliance. The label or listing by the specified organization will be acceptable evidence of compliance.

1.08 CODE COMPLIANCE

A. Code compliance is mandatory. Nothing in these Drawings and Specifications permits work not conforming to these codes. Where work is shown to exceed minimum code requirements, comply with Drawings and Specifications.

B. No work shall be concealed until after inspection and approval by proper authorities. If work is concealed without inspection and approval, the Contractor shall be responsible for all work required to open and restore the concealed areas in addition to all required modifications.

1.09 INDEPENDENT TESTING ORGANIZATION CERTIFICATE

A. In lieu of the label or listing, submit a certificate from an independent testing organization, competent to perform testing, and approved by the Engineer. The certificate shall state that the item has been tested in accordance with the specified organization's test methods and that the item complies with the specified organization's reference standard.

1.10 QUALITY ASSURANCE

A. Material and Equipment Qualifications

1. Provide materials and equipment that are products of manufacturers regularly engaged in the production of such products which are of equal material, design, and workmanship. Products shall have been in

satisfactory commercial or industrial use for 10 years prior to bid opening. The 10 year period shall include applications of equipment and materials under similar circumstances and of similar size. The product shall have been on sale on the commercial market through advertisements, manufacturer's catalogs, or brochures during the 10-year period. Where two or more items of the same class of equipment are required, these items shall be products of a single manufacture; however, the component parts of the item need not be the products of the same manufacturer unless stated in the technical section.

B. Regulatory Requirements

1. Equipment, materials, installation, and workmanship shall be in accordance with the mandatory and advisory provisions of CEC.

C. Alternative Qualifications

1. Products having less than a 10-year field service record will be acceptable if a certified record of satisfactory field operation for not less than 20,000 hours, exclusive of the manufacturer's factory or laboratory tests, is furnished.

1.11 SEISMIC ANCHOR DESIGN CALCULATIONS

A. Standby Diesel Generator, Pump control panel, service cabinet and electrical materials shall be so installed as to remain in a secure and captive position when subjected to a horizontal force in accordance with the 2016 California Building Code for the areas where the equipment is to be installed. A seismic importance factor, corresponding to Essential Facility Occupancy Category, shall be used. Method of securing shall constrain equipment against both vertical and horizontal forces and overturning forces.

B. Calculations shall be submitted, prepared by a structural engineer registered in the State of California, of earthquakes forces on all specified equipment, details of securing devices, layout, location and size of all bolts, straps, clips or other devices used.

1.12 DRAWINGS AND SPECIFICATIONS

A. All drawings and all Divisions of these specifications shall be considered as a whole and work of this Division shown anywhere therein shall be furnished under this Division.

B. Drawings are diagrammatic and indicate the general arrangement of equipment and wiring. Most direct routing of conduits and wiring is not assured. Exact requirements shall be governed by civil, architectural, structural and mechanical conditions of the job. Consult all other drawings in preparation of the bid. Extra lengths of wiring or addition of pull or junction boxes, etc. necessitated by such conditions shall be in the bid. Check all information and report any apparent discrepancies before submitting bid.

1.13 SERVICE SUPPORT

A. The equipment items shall be supported by service organizations which are reasonably convenient to the equipment installation in order to render satisfactory service to the equipment on a regular and emergency basis during the warranty period of the contract.

1.14 SITE CONDITIONS

A. Visit to site is required of all bidders prior to submission of bid. All will be held to have familiarized themselves with all discernible conditions and no extra payment will be allowed for work required because of these conditions, whether specifically mentioned or not.

1.15 EXISTING UTILITIES

A. When shown on the drawings, the locations of existing utility mains, etc. are approximate only. The accuracy of completeness of this information is not guaranteed and all utility lines, conduits etc. of any nature (surface or subsurface) that may be affected by the Work shall be checked by the Contractor and shall not be disturbed, disconnected or damaged by him during the progress of the Work, unless specifically shown on the plans to be relocated, removed or otherwise revised. Should the Contractor during the performance of the Work disturb, disconnect, or damage any of the above, all expenses of whatever nature arising from such disturbance or the replacement or repair thereof shall be borne by Contractor.

B. Carefully excavate all underground piping and conduit affected by the work and verify the elevations.

C. When it is necessary to interrupt any existing utility service to make connections, the Contractor shall obtain authorization from the City of Alameda and Alameda Municipal Power and a minimum of 24 hours advance notice shall be given to both organizations. Interruption in utility service shall be of the shortest duration for the work at hand and shall be approved by the City's Project Manager.

PART 2 PRODUCTS

2.01 MATERIALS

A. All materials and equipment used in the electrical work herein specified shall be new, suited to the intended use, and shall be listed by the Underwriters Laboratories, Inc., or other nationally recognized testing laboratories. All material and equipment shall meet their requirements and bear their label whenever standards have been established and label service is regularly furnished by that agency.

B. Materials shall be delivered to the site and stored in original containers suitably sheltered from the elements, but readily accessible for inspection by the City or

his designated representative until installed. All items subject to moisture damage shall be stored in dry, heated spaces.

C. Materials of the same general type shall be of the same make throughout the work to provide uniform appearance, operation and maintenance.

D. Equipment specified by manufacturer's number shall include all accessories, control, etc., listing in catalog as standard with equipment. Furnish optional or additional accessories as specified.

E. Where no specified make of material or equipment is mentioned, any product of reputable manufacturer which conforms to requirements of system may be used.

2.02 ALTERNATE EQUIPMENT

A. If Contractor wishes to submit equipment other than as specified and submittal of equipment is found to be not acceptable, the specified equipment shall be furnished at no change in contract price. The decision of the Engineer shall be final.

B. If Contractor wishes to propose equipment that represents an extensive change in system concept, he shall reimburse the Agency for engineering charges required to analyze and evaluate these changes. These changes shall be paid by the Contractor regardless of whether the proposed equipment is accepted or not.

C. In the event that changes are made after submittal approval, Contractor shall revise the plans and resubmit for approval. Revised plans shall incorporate a dated revision note. Revision and resubmittal is required for any deviation between approved plans and the final installation regardless of the reason for the deviation. If the revised and resubmitted plans are not approved, Contractor shall modify the work to comply with approved plans at his expense.

2.03 MANUFACTURER'S NAMEPLATE

A. Each item of equipment shall have a nameplate bearing the manufacturer's name, address, model number, shop order number, serial number and date of manufacture securely affixed in a conspicuous place. The nameplate of the distributing agent will not be acceptable.

2.04 EQUIPMENT IDENTIFICATION NAMEPLATES

A. Provide laminated plastic nameplates for pump control panel. Each nameplate inscription shall identify the function and, when applicable, the position. Nameplates shall be phenolic, laminated, plastic, 0.125-inch thick, white with black center core. Surface shall be matte finish. Corners shall be square. Accurately align lettering and engrave into the core. Minimum size of nameplates shall be 1 x 2.5-inches. Lettering shall be a minimum of 0.25-inch high normal block style.

2.05 CABLE TAGS IN HANDHOLES AND PULLBOXES

A. Provide tags for each cable, wire or splice located in handholes, and pullboxes. Tag all wire and cable provided by this contract. The tags shall be polyethylene. Do not provide handwritten letters. Coordinate cable legend with City's Representative.

B. Provide tags of polyethylene that have an average tensile strength of 4500 pounds per square inch; and that are 0.035-inch thick, non-corrosive, nonconductive; resistive to acids, alkalis, organic solvents, and salt water; and distortion resistant to 300 degrees F. Provide a one-piece nylon, self-locking tie at each end of the cable tag. Ties shall have a minimum loop tensile strength of 175 pounds. The cable tags shall have block letters, numbers, and symbols 1/4-inch high on a yellow background. Letters, numbers, and symbols shall not fall off or change positions regardless of the cable tags' orientation.

C. Locate the tags so that they are clearly visible without disturbing cabling or wiring in the handholes and pullboxes.

PART 3 EXECUTION

3.01 PROTECTION OF PROPERTY, MATERIALS, AND WORK

A. The Contractor shall be responsible for protecting all properties of whatever description lying within the scope of the project from damage resulting from, or incidental to, this Contract. Likewise, the Contractor shall be obliged to pay for all such damage occurring during the progress of the work.

B. All materials and equipment, both before and after erection, shall be properly protected from the weather and other hazards and kept in a clean and orderly manner.

C. All conduit ends, and parts or equipment left unconnected shall be capped, plugged, or otherwise properly protected to prevent damage or the intrusion of foreign matter.

D. At the completion of the work, equipment and materials shall be cleaned and turned over to the City in a condition satisfactory to the City.

E. Damage or defects developing before acceptance of the work shall be replaced with new at the Contractor's expense.

F. Manufacturer's direction shall be followed completely in the delivery, storage, protection, and installation of all equipment and materials.

3.02 STORED EQUIPMENT

A. Storage shall be located on the site in a location specifically approved by the City and shall be moved at Contractor's expense if necessary because of interference with the work of any other Contractor.

3.03 ALTERNATE EQUIPMENT PLACEMENT

A. Where equipment requiring a different arrangement of connections from those indicated is approved, it shall be the responsibility of the Contractor to install the equipment to operate properly and in harmony with all trades with the intent of the Drawings and Specifications.

B. Where directed by the City or his designated representative, the Contractor shall submit drawings showing the proposed installation.

C. If the proposed installation is approved, the Contractor shall make all incidental changes in piping, duct work, supports, insulation, wiring, etc. He shall provide all additional modifications and equipment required for the proper operation of the system resulting from the selection of equipment, including all required changes in affected trades.

D. The Contractor shall be responsible for the proper location of roughing in and connections by other trades. All changes shall be made at no increase in the Contract amount or additional cost to the other trades.

3.04 CONTRACTOR RESPONSIBILITIES

A. The Contractor shall furnish and install all equipment, accessories, connections and incidental items necessary to fully complete the work, ready for use and operation by the City in the manner intended by the Contract Documents.

B. Provide services of an experienced superintendent who shall be constantly in charge of the erection of this work, together with all necessary journeymen, helpers, and laborers required to properly unload, erect, connect, adjust, start, operate and test functions properly in every detail.

C. At the time that any electrical system included under this Contract is released for operation to the City, the Contractor shall furnish a competent instructor to advise the maintenance and/or operating personnel as to the proper maintenance and operation of all components of the system.

D. The Contractor shall study thoroughly all Civil, Structural, Mechanical and Electrical Drawings, shop drawings and catalog data to determine how equipment is to be installed, fit the space available with proper access, mounted or suspended.

E. The Contractor shall promptly notify the City or his designated representative in writing of any conflict between any requirement of the Contract Documents and the manufacturer's directions before proceeding with the work.

F. Should the Contractor perform any work that does not comply with the manufacturer's directions or such written instructions from the City or his designated representative, he shall bear all costs arising in correcting the deficiencies. In the event the requirements of the manufacturer are different than those indicated on the Contract Drawings, such requirements shall be furnished by the Contractor at no additional cost to the City.

3.05 DISPOSAL OF EXCAVATED MATERIAL

A. The Contractor shall be responsible for the removal from the premises of all excess excavated materials unless otherwise directed by the City or his designated representatives.

3.06 RECORD DRAWINGS

A. The Contractor shall keep one set of plans to record all changes and deviations from the original design. These plans shall be used for no other purposes and shall be kept clean from all dirt and obstructions. All changes shall be made each day on the plans as they come about. Immediately upon final inspection and acceptance by the City but before final payment, the Contractor shall deliver to the City the complete record drawings showing all the changes neatly and accurately arranged.

3.07 LOCKOUT REQUIREMENTS

A. Provide disconnecting means capable of being locked out for machines and other equipment to prevent unexpected startup or release of stored energy in accordance with 29 CFR 1910.147.

3.08 PAINTING OF EQUIPMENT

A. Factory Applied

1. Electrical equipment shall have factory-applied painting systems which shall, as a minimum, meet the requirements of NEMA ICS 6 corrosion-resistance test and the additional requirements specified in the electrical sections.

B. Field Applied

1. Paint electrical equipment as required to match finish of adjacent surfaces or to meet the indicated or specified safety criteria. Painting shall be as specified in the section specifying the associated electrical equipment.

3.09 ACCEPTANCE DEMONSTRATION

A. Upon completion of the work, at a time to be designated by the City of Alameda, the Contractor shall demonstrate to the City the operation of the electrical installation, including any and all special items installed by him or installed under his supervision.

3.10 INSTRUCTIONS TO CITY'S OPERATIONS AND MAINTENANCE PERSONNEL

A. Contractor shall provide the services of competent instructors to give full instruction to designated City's personnel in the adjustment, operation, and maintenance of the below specified systems and equipment, including pertinent safety requirements as necessary for the safe, reliable and continuous operation of the pump control system. Instructors shall be thoroughly familiar with all parts of the installation and shall be trained in operating theory as well as

practical operation and maintenance work associated with sewage pump station control systems.

B. Instruction shall be given during the first regular workweek after the equipment or systems have been accepted and turned over to the City for regular operation. The following systems and equipment shall require instruction to City's personnel:

1. Standby Diesel Generator
2. Automatic Transfer Switch
3. Pump Station Control Panel.

C. The minimum number of man-days (8 hours per day) of instruction furnished for the above systems and equipment shall be as indicated in the equipment specifications sections. Classroom instructions shall be at a City specified facility. Field instructions shall be at the pump stations project site.

3.11 PROJECT COMPLETION

A. The Contractor shall remove from the site all packing cartons, scrap materials, and other rubbish or debris and leave the premises in a condition acceptable to the City.

B. The Contractor shall, at completion of the project, leave the entire system installed under his contract properly operating, lubricated, and in a thoroughly clean condition.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 16050
BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 GENERAL

1.01 WORK INCLUDED

A. Furnish and install all materials and equipment and provide all labor required and necessary to complete the work shown on the Drawings and/or specified in this Section and all other work and miscellaneous items, not specifically mentioned, but reasonably inferred for a complete installation including all accessories and appurtenances required for testing the system. It is the intent of the Drawings and Specifications that all systems be complete, and ready for operation.

1.02 APPLICABLE PUBLICATIONS

A. All work and materials shall comply with the latest edition of the standards, rules, codes, and regulations including, but not limited to the following:

1. AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)
    a. ASTM B3, Standard Specification for Soft Annealed Copper Wire
    b. ASTM B8, Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium, or Soft
    c. ASTM B228, Standard Specification for Concentric-Lay-Stranded Copper Clad Steel Conductors
2. CALIFORNIA CODE OF REGULATIONS
    a. Title 24, Part 2, 2016 California Building Code
    b. Title 24, Part 3, 2016 California Electrical Code
3. NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)
    a. NEMA 250, Enclosures for Electric Equipment (1000 Volts Maximum)
    b. NEMA AB 1, Molded Case Circuit Breakers, Molded Case Switches and Circuit Breaker Enclosures
    c. NEMA ICS 2, Industrial Control and Systems Controllers, Contactors and Overload Relays Rated 600 Volts
    d. NEMA FB 1, Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable
    e. NEMA FU1, Low Voltage Cartridge Fuses
    f. NEMA RN 1, Polyvinyl -Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit
    g. NEMA TC 2, Electrical Polyvinyl Chloride (PVC) Tubing and Conduit

h. NEMA TC 3, Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing

i. NEMA WC 70, Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy

4. UNDERWRITER'S LABORATORIES, INC. (UL)

a. UL 44, Thermoset-Insulated Wires and Cables

b. UL 6, Electrical Rigid Metal Conduit-Steel

c. UL 467, Grounding and Bonding Equipment

d. UL 486 A, Wire Connectors

e. UL 486 C, Splicing Wiring Connectors

f. UL 508, Industrial Control Equipment

g. UL 514 B, Conduit, Tubing, and Cable Fittings

h. UL 651, Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings

i. UL 83, Thermoplastic-Insulated Wires and Cables

j. UL 943, Ground Fault Circuit Interrupters

1.03 SUBMITTALS

A. Product Data: Provide material, finish, dimensions and weights for rigid metal conduit, rigid nonmetallic conduit, fittings, boxes, conduit bodies, conductors, and grounding equipment.

PART 2 PRODUCTS

2.01 MATERIALS APPROVAL

A. All materials must be new and bear Underwriters' Laboratories label. Materials that are not covered by UL testing standards shall be tested and approved by an independent testing laboratory or a governmental agency.

B. Material not in accordance with these Specifications may be rejected either before or after installation.

2.02 CONDUITS AND OTHER RACEWAY

A. Rigid Steel Conduit

1. Rigid steel conduit (RSC) shall be in accordance with UL 6 and shall be galvanized by the hot-dip process. PVC Coated Rigid Steel Conduits shall be in accordance with NEMA RN1.

2. Fittings for rigid steel conduit shall be threaded, PVC coated. Sealing fittings for Class I, Division 1 and Division 2 shall be provided where indicated on the Drawings. Sealing fittings shall be EY series for vertical or horizontal as manufactured by Appleton, Crouse-Hinds, Killark or approved equivalent.

B. Rigid Nonmetallic conduit

1. Rigid nonmetallic conduit shall be in accordance with NEMA TC 2 and shall be PVC with wall thickness not less than Schedule 40. Conduit shall be approved for use as a nonmetallic raceway with 90 degree Centigrade conductors.

2. PVC Conduit Fittings shall be in accordance with NEMA TC 3.

2.03 CONDUCTORS

A. All conductors shall be of size noted on the plans. All conductors shall be stranded copper type XHHW-2 insulation. Minimum size conductors shall be #12 AWG.

B. Wiring shall be color coded as follows:

Location or Use	**Type**	**Color**
For 240/120V, 1-Phase System	Phase A	Black
	Phase B	Red
	Neutral	White
	Ground	Green
For 240/120V, 3-Phase System and	Phase A	Black
For 208/120V, 3-Phase System	Phase B	Red
	Phase C	Blue
	Neutral	White
	Ground	Green
For 480/277V, 3-Phase System	Phase A	Brown
	Phase B	Orange
	Phase C	Yellow
	Neutral	Gray
	Ground	Green

C. Wires that are #10 AWG and smaller shall be color-coded over the entire length of the wire. Wires that are #8 AWG and larger may be color-coded with PVC tape that covers at least 50% of the length of the wire that is visually accessible in pull boxes, service pedestal, pump control panel, and similar places.

D. Wires for control and instrumentation shall be #14 AWG, 600 V, stranded copper, type MTW or THWN.

E. Wire for analog signal circuits shall be twisted shielded pair, #16 AWG, 600 V insulation, stranded copper wire.

2.04 TERMINALS AND SPLICING DEVICES

A. Only compression type terminals and splicing devices shall be used for stranded conductors. Where equipment to which it is to connect has box type terminal lugs, no separate lug will be required.

2.05 GROUNDING

A. Grounding electrode system cables shall be medium drawn, bare copper cables, concentric-stranded, in accordance with ASTM B8. The solid wires used in forming the cable shall be in accordance with ASTM B3.

B. Ground cable taps and connections shall be made with exothermic type welded connections. Exothermic welded connections shall be specifically designed for the conductor sizes to be used and shall be manufactured by Caldweld or approved equal.

C. All cable fittings, lugs, clamps and connectors, together with bolts, nuts and washers used therewith, shall be of copper alloy, solderless type and shall have current-carrying capacity not less than that of the copper cables with which they are used. The connectors shall be clamped firmly and locked securely with spring-type lock washers.

D. All machine screws used in grounding shall be corrosion resistant, stainless steel, bronze or brass.

E. Ground rods shall be cone pointed copper-clad steel, conforming to ASTM B228, ¾" diameter by 10 feet long, unless otherwise indicated on the Drawings.

F. Ground rod boxes shall be 9 inch diameter, 12 inches deep, precast concrete unit, with cast iron traffic cover. Covers shall be embossed with the words "Ground Rod".

G. Equipment grounding conductor shall be insulated and of the same type as the power carrying conductors.

PART 3 EXECUTION

3.01 GENERAL

A. Electrical system layouts indicated on the Drawings are generally diagrammatic, but shall be followed as closely as actual construction and work of the trades will permit. Govern exact routing of conduit and wiring and the locations of devices by the structure and equipment served.

3.02 WIRING METHOD

A. Conduit

1. All conduits shall be sized per CEC Table 4, ¾-inch minimum or larger, as noted on the Drawings, and shall be of types listed below:

Location or Use	Type
Underground Conduits	PVC Schedule 40
Underground Conduits from Pump Control Panel to Wet Well	PVC Coated Rigid Steel
Conduits Outdoors, Above Ground	Rigid Steel

2. Run all conduits concealed unless otherwise noted or shown.
3. Run exposed conduit parallel to or at right angles to center lines of equipment.
4. Run no conduit in concrete slabs or floors except where indicated on the Drawings. All penetrations shall be at right angles to wall and slab surfaces.
5. Support conduits with UL's listed steel conduit supports at intervals required by the CEC.

3.03 INSTALLATION OF WIRES

A. Pull no wire into any portion of the conduit system until all construction work which might damage the wire has been completed.

B. Install all wire continuous from equipment to equipment. Splices in cables, when required, shall be made in handholes, pull boxes or junction boxes.

C. All control and instrumentation wiring shall be connected to equipment with insulated, compression type ring tongue terminations. All conductors shall be identified with a wire name as shown on the Drawings or as designated by equipment manufacturer. Wire identification shall be of the heat shrink type, installed at both wire ends.

D. Perform wiring insulation tests in accordance with NETA ATS testing guidelines.

E. Install sealing fittings for Class I, Division 1 at all power, control and instrumentation conduits interfacing with the wet well equipment. Sealing fitting shall be installed in the underground pullboxes having conduit interface with the pump station control panel equipment.

3.04 GROUNDING

A. Contractor shall provide a grounding electrode system as shown on the Drawings and in accordance with CEC Article 250.50. Separately derived alternating current systems shall be grounded in accordance with CEC Article 250.30.

B. Ground non-current carrying metal parts of electrical equipment enclosures, frames, conductor raceways, to provide a low impedance path for line-to-ground fault current and to bond all non-current carrying metal parts together.

C. Equipment grounding conductor shall be electrically and mechanically continuous from the electrical circuit source to the equipment to be grounded. Size equipment grounding conductors per CEC Article 250.122 unless larger conductors are shown on drawings.

D. Perform test to measure the ground resistance of the ground system. Submit certified test report to the engineer for review and approval. Ground resistance tests shall be conducted by a testing company qualified to conduct tests of this nature.

3.05 IDENTIFICATION

A. Provide a phenolic nameplate for service pedestal, pump control panel, and for other major items of electrical equipment. Secure nameplate to equipment with stainless steel screws. For pump control panel, indicate the equipment designation, voltage, current, number of phases, and wires and the source of power. For all other equipment and cabinets provide engraving as shown on the Drawings or as directed by the City's representative.

END OF SECTION

SECTION 16263
DIESEL GENERATOR SET

PART 1 GENERAL

1.01 WORK INCLUDED

A. This specification covers the equipment and services necessary for the design, manufacture, factory testing, installation, and site testing of a complete and operable on-site standby power system composed of diesel engine-driven generator set and all other devices, equipment, and appurtenances which are specified herein, shown on the drawings or required for the service. Equipment shall be new, factory tested, and delivered complete and ready for installation, without requiring any field assembly.

B. The City has standardized on Cummins Generators. No other generator manufacturer is acceptable.

1.02 APPLICABLE STANDARDS

A. The Diesel Engine Generator Set and all associated equipment shall be designed, manufactured and tested in accordance with the following applicable standards:

1. AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

    a. ANSI C2, National Electrical Safety Code

2. AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

    a. ASTM A 53, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless

    b. ASTM A 181, Standard Specification for Carbon Steel Forgings, for General-Purpose Piping

    c. ASTM A 234, Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service

    d. ASTM D 975, Standard Specification for Diesel Fuel Oils

3. AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

    a. ASME B16.3, Malleable Iron Threaded Fittings

    b. ASME B16.5, Pipe Flanges and Flanged Fittings

    c. ASME B16.11, Forged Steel Fittings, Socket-Welding and Threaded

d. ASME B31.1, Power Piping

4. CALIFORNIA CODE OF REGULATIONS

a. Title 24, Part 2, 2016 California Building Code

b. Title 24, Part 3, 2016 California Electrical Code

5. INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

a. IEEE Std 43, Recommended Practice for Testing Insulation Resistance of Rotating Machinery

b. IEEE Std 112, Standard Test Procedure for Polyphase Induction Motor and Generators

c. IEEE Std 115, Test Procedures for Synchronous Machines Part I - Acceptance and Performance Testing Part II-Test Procedures and Parameter Determination for Dynamic Analysis

d. IEEE Std 519, Recommended Practice and Requirements for Harmonic Control in Electric Power Systems

6. NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

a. NEMA ICS 2, Industrial Control and Systems Controllers, Contactors and Overload Relays Rated 600 Volts

b. NEMA ICS 6, Industrial Control and Systems: Enclosures

c. NEMA MG 1, Motors and Generators

7. NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

a. NFPA 30, Flammable and Combustible Liquids Code

b. NFPA 37, Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines

c. NFPA 110, Standard for Emergency and Standby Power Systems

8. UNDERWRITERS LABORATORIES (UL)

a. UL 142, Steel Above Ground Tanks for Flammable and Combustible Liquids

b. UL 508, Industrial Control Equipment

c. UL 1236, Battery Chargers for Charging Engine-Starter Batteries

d. UL 2200, Stationary Engine Generator Assemblies

9. CALIFORNIA AIR RESOURCES BOARD (CARB)

10. BAY AREA AIR QUALITY MANAGEMENT DISTRICT

11. CITY OF ALAMEDA FIRE MARSHAL OFFICE

    a. Municipal Code Requirements for installation of above ground diesel fuel storage tank.

1.03 SUBMITTALS

A. As a minimum for all equipment specified, supplier shall furnish six (6) sets of submittals containing the following information for City's approval:

1. Engine-Generator Sizing Calculations:

    a. Engine-Generator manufacturer shall provide with its bid, sizing calculations confirming that the proposed equipment will meet the specifications and project requirements. Engine-Generator sizing calculations shall be based on the load indicated on the Drawings and as included in Attachment A to this specification.

    b. Maximum starting voltage dip shall not exceed 25% of nominal voltage. Maximum frequency dip shall not exceed 5% of nominal frequency

2. Specification and data sheets.

    a. Manufacturer's standard data for the engine and generator, including sound attenuating enclosure.

    b. Engine generator control panel.

    c. Battery, charger and battery secondary containment.

    d. Exhaust muffler.

3. Equipment and Performance Data

    a. Engine generator output power capability, including efficiency and parasitic load data.

    b. Harmonic and non-linear load capability.

    c. Cooling system maximum and minimum allowable inlet temperature.

    d. Generator Direct-Axis and Quadrature synchronous, transient and subtransient reactance. Negative and Zero sequence reactance, transient open-circuit and short circuit time constants.

e. Magnitude of monitored values which define alarm or action set points and the tolerance (plus and/or minus) at which the devices activate the alarm or action.

f. Vibration isolator performance data for the range of frequencies generated by the engine-generator set during operation from no load to full load and the maximum vibration transmitted to the floor. Provide description of the seismic qualification of the engine-generator mounting, base, and vibration isolation.

4. Manufacturer's published warranty documents.

a. Shop drawings submittal shall include:

1) Plan and elevation views with certified overall, and interconnection point dimensions. Include engine-generator weight data on drawings.

2) Sub-base fuel storage tank, showing dimensions, vents and fuel fill piping, anchor bolt template and recommended clearances for operation and maintenance. Identify location and type of vibration isolators furnished.

3) Outdoor sound attenuating enclosure, showing dimensions, weight, door swings, and attachment to the engine generator base or to the sub-base fuel storage tank.

4) Engine-generator set lifting points and rigging instructions.

5) One-line schematic and wiring diagrams of the generator, exciter, regulator, governor, and instrumentation.

6) Wiring diagrams, schematics, and panel layouts of the safety system, including a detailed description of how it is to work. Description to include a listing of normal parameter ranges, alarm and shutdown values for operating parameters such as pressures, temperatures, voltages, currents, and speeds.

7) Interconnection wiring diagrams showing all external connections required; with field wiring terminals marked in a consistent point-to-point manner.

5. Structural calculations, stamped by an engineer registered in the State of California, verifying the integrity of the isolators and anchoring systems. Calculations shall demonstrate that the systems adequately resist seismic and wind loads according to the 2016 California Building Code. Contractor shall submit anchorage detail to the City Building Department for review and approval. Contractor shall copy the City on all correspondence and submittal with the Building Department.

6. Manufacturer proposed factory and on-site testing plan and procedures.

7. Manufacturer's installation instructions, including pre-start checklist and precautions; startup procedures for test mode, manual start mode, and automatic start mode; running checks, procedures, and precautions; and shutdown procedures, checks and precautions.

8. Manufacturer’s Operations and Maintenance Manual, including recommended list of spare parts.

9. Certified Test Reports documenting factory tests per the requirements of this specification, as well as certified factory test of generator set sensors per NFPA 110 Level 1.

10. Documentation that the engine-generator set manufacturer has a minimum of 5 years experience in the manufacture, assembly and sale of stationary, diesel engine-generator sets for commercial and industrial use.

11. Certificates:

    a. Emissions: A certification from the engine manufacturer stating that the engine emissions meet the federal, state, and local regulations restrictions.

    b. Regulatory Compliance: A certification stating that materials and equipment provided comply with the requirements of UL, wherever a standard covering the material and equipment has been published by such organization.

    c. Contractor shall obtain all required permits from the Bay Area Air Quality Management District (BAAQMD) to install and operate the standby engine-generator set. Permit fees shall be included in the bid item for the diesel generator set.

    d. Functional Facilities: A letter certifying that all facilities are complete and functional, that each system is fully functional, and that each item of equipment is complete, free from damage, adjusted and ready for beneficial use.

1.04 SERVICE CAPABILITY

A. The equipment supplier shall have qualified service engineers available. These engineers shall be available on a 24-hours, 7 days per week basis. The service facility shall be located within 100 miles radius from the project site.

1.05 WARRANTY

A. Shall be provided for all products against defects in materials and workmanship, for two year period from the start-up and acceptance date, per the manufacturer's Base Coverage Warranty.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

A. The engine-generator shall be provided complete, with all necessary ancillary equipment, including air filtration; starting system; generator controls, protection, and isolation; instrumentation; lubrication; fuel system; cooling system; and engine exhaust system. The engine-generator set shall satisfy the requirements specified in the following Engine-Generator Parameter Schedule.

ENGINE-GENERATOR PARAMETER SCHEDULE	
Power Application	Standby
Power Factor	0.8 Lagging
Engine-Generator Application	Stand-Alone
Heat Exchanger Type	Fin-Tube
Governor Type	Electronic Governor
Governor Application	Isochronous
Voltage Operational Bandwidth	±0.5% from No Load to Full Load
(Steady State)	
Frequency Bandwidth	± 0.25% from No Load to Full Load
(Steady State)	
Maximum Speed	1800 rpm
Frequency	60 Hz
Voltage	As Shown on the Drawings
Phases	As Shown on the Drawings
Maximum Generator Subtransient Reactance	8%
Maximum Step Load Increase	Single step load pickup of 100% nameplate and power factor
Frequency Recovery Time	2 seconds maximum
Frequency Deviation	5% maximum
Tolerance for Recover	1.5 Hz
Voltage Recovery Time	3 seconds maximum
Voltage Deviation	25% maximum
Maximum Time to Start and be Ready To Assume Load	10 seconds
Seismic Zone	Per 2016 CBC
Installation Elevation	50 ft Above Sea level

B. Generator set ratings: As shown on the Drawings. Minimum kW Standby rating, shall be based on site conditions of: Altitude at sea level, ambient temperatures up to 120ºF.

C. The integrated generator set control system shall include required voltage regulation and governing systems, inherent overcurrent, short circuit and overload protection, digital and analog AC metering equipment, sensor failure detection, required protective relaying, and remote monitoring and control capability.

D. The transient response characteristics of the engine-generator set shall be controlled by the governor and voltage regulator, which shall cause the engine-generator to respond to the maximum step load changes such that output voltage and frequency recover to and stabilize within the operational bandwidth within the transient recovery time. The engine-generator set shall respond to maximum step load changes such that the maximum voltage and frequency deviations from bandwidth are not exceeded.

E. Voltage regulation shall be ± 1.0 percent for any constant load between no load and rated load. Random voltage variation shall be ± 0.5 percent.

F. Frequency regulation shall be isochronous from steady state no load to steady state rated load. Random frequency variation with any steady load from no load to full load shall not exceed ± 0.25 percent.

G. The diesel engine-generator set shall be capable of single step load pick up of 100% nameplate kW and power factor, less applicable derating factors, with the engine-generator set at ambient temperature.

H. The generator set shall be capable of sustaining a minimum of 90% of rated no load voltage with the specified kVA load at near zero power factor applied to the generator set. Minimum motor starting capability shall be 90 kVA (Paru and Cola Ballena Pump Station), 110 kVA (Marina Village Pump Station), 150 kVA (Harbor Bay Parkway 1 Pump Station).

2.02 ENGINE

A. The engine shall be diesel, 4-cycle, 1800 RPM, radiator and fan cooled. The horsepower rating of the engine at its minimum tolerance level shall be sufficient to drive all connected accessories and the alternator at full generator set rated load. Two cycle engines are not acceptable. The engine must meet all current EPA and CARB emission standards without the use of exhaust after treatment devices.

B. An electronic governor system shall provide automatic isochronous frequency regulation. The engine governing system shall not utilize any exposed operating linkage.

C. Skid-mounted radiator and cooling system rated for full load operation in 122ºF (50ºC) ambient as measured at the generator air inlet. Provide prototype test

data verifying total cooling system performance with submittal documentation. Radiator shall be provided with a duct adapter flange. The cooling system shall be filled with 50/50 ethylene glycol/water mixture by the equipment supplier. Rotating parts shall be guarded against accidental contact per OSHA requirements.

D. An electric starter capable of up to five complete cranking cycles without overheating.

E. Positive displacement, mechanical, full pressure, lubrication oil pump. Full flow lubrication oil filters with replaceable spin-on canister elements and dipstick oil level indicator.

F. An engine driven, mechanical, positive displacement fuel pump. Fuel filter with replaceable spin-on canister element.

G. Replaceable dry element air cleaner with restriction indicator.

H. Flexible supply and return fuel lines.

I. Engine mounted battery charging alternator, with solid-state voltage regulator. The battery charging alternator shall have sufficient capacity to recharge the batteries, with all parasitic loads connected, within 4 hours after a normal engine starting sequence.

2.03 ALTERNATOR

A. The alternator shall be synchronous, four pole, 2/3 pitch, revolving field, dripproof construction, single prelubricated sealed bearing, air cooled by a direct drive centrifugal blower fan, and directly connected to the engine with flexible drive disc.

B. All insulation system components shall meet NEMA MG1 temperature limits for Class H insulation system. Actual temperature rise measured by resistance method at full load shall not exceed 125 degrees Centigrade.

C. The alternator shall be capable of delivering rated output kVA at rated frequency and power factor, at any voltage not more than 5 percent above or below rated voltage.

D. A permanent magnet generator (PMG) shall be included to provide a reliable source of excitation power for optimum motor starting and short circuit performance. The PMG and controls shall be capable of sustaining and regulating current supplied to a single phase or three phase fault at approximately 300% of rated current for not more than 10 seconds.

2.04 ENGINE-GENERATOR SET CONTROL

A. The generator set shall be provided with a microprocessor-based control system and an integral backlit LED display panel having status LED indicating lights, tactile feel membrane switches, and 128x64 pixels digital readout. Control

panel shall be designed to provide governing, voltage regulation, metering, protective relaying, automatic starting, monitoring, and control functions for the generator set. The control system shall also be designed to allow local monitoring and control of the generator set, and remote monitoring and control as described in this specification. The control shall be mounted on the generator set. The control shall be vibration isolated and prototype tested to verify the durability of all components in the system under the vibration conditions encountered. The control shall be UL508 recognized and suitable for use on UL 2200 listed generator sets. The controls, including all control, monitoring and protective functions, shall meet or exceed the requirements of Mil-Std 461C part 9, and IEC Std 801.2, 801.3, and 801.5 for susceptibility, conducted, and radiated electromagnetic emissions. The entire control shall be tested and meet the requirements of IEEE 587 for voltage surge resistance. Manufacturers utilizing components which have not been tested as a system, as installed, (as demonstrated by a statement of performance on standard published literature) shall conduct RFI/EMI testing on the equipment in the manufacturer's facility prior to shipping the equipment to the project job site. Voltage surge testing shall be performed on an identical prototype unit.

1. System control voltage shall be 12VDC. The control system provided shall withstand the DC surge voltage produced by a DC battery charging alternator operating at full load when the battery bank is disconnected. The test shall be successfully completed without tripping protective circuit breakers or blowing fuse protective devices. Generator set governing, voltage regulation, protection, and control equipment shall be capable of proper operation with battery voltage levels down to 8VDC.

2. All adjustments to the control system for voltage and frequency set-up, governing, and voltage regulation settings shall be made from the front of the generator set control panel, with the aid of the digital readout display which shall be integral to the equipment. All adjustments shall be made with the digital tactile feel raise/lower switches which shall include position indicators. No rotary pots shall be acceptable for any function of the control system provided for the generator set. Control panel status LED's lights shall provide system diagnostic to assist in analyzing proper system functions, alarms and system shutdowns.

3. The entire generator set control system, as supplied, shall be capable of being directly monitored and controlled by a personal computer connected to the control for monitoring, diagnosis, service, and adjustment of the system via an RS-485 port on the control panel.

4. The generator set mounted control shall include the following features and functions:

    a. RUN/OFF/AUTO control. In the RUN position the generator set shall automatically start, and accelerate to rated speed and voltage. In the OFF position the generator set shall immediately stop, bypassing all time delays. In the AUTO position the generator set shall be ready to

accept a signal from a remote device to start and accelerate to rated speed and voltage.

b. Red "mushroomhead" pushbutton EMERGENCY STOP switch. Depressing the emergency stop switch shall cause the generator set to immediately shut down and be locked out from automatic restarting. Reset of the control shall require reset of the emergency stop switch and the control system.

c. The OFF membrane button shall also be used to acknowledge warning and shutdown messages after the fault condition has been cleared and allow restarting the generator set after it has shut down for any fault condition.

d. LED Status Lights Test. This function shall be integrated into the Display Panel by accessing the Service Menu “LAMP TEST” function.

5. Generator Set and Engine Control Functions:

a. The control system provided shall include a cycle cranking system which allows for user selected crank time, rest time, and # of cycles. Initial settings shall be for 3 cranking periods of 15 seconds each, with 15 second rest period between cranking periods.

b. The control system shall include an idle mode control which allows the engine to run in idle mode. In this mode, the alternator excitation system shall be disabled and the engine protection parameters for engine oil pressure and engine temperature shall be reduced to proper levels to reflect the lower engine operating speed.

c. The control system shall include a digital engine governor control, which functions to provide steady state frequency regulation as noted elsewhere in this specification.

d. The governor control shall include adjustments for gain, damping, and a ramping function to control engine speed and limit exhaust smoke while the unit is starting. The control system shall automatically adjust governor gain and stability settings to compensate for engine performance variation related to engine temperature.

e. The control system shall include time delay start (adjustable 0-300 seconds) and time delay stop (adjustable 0-600 seconds) functions. Indicators shall be provided to reflect that the time delays are in operation, and the time remaining for completion of the time delay period.

f. The starting control logic shall check for engine rotation at each signal for the engine starter to run. If engine rotation is not present when the starter is operating, a “fail to crank” alarm and shutdown shall be indicated on the generator set control panel.

g. The control system shall include sender failure monitoring logic for speed sensing, oil pressure, and engine temperature which is capable of discriminating between failed sender or wiring components, and an actual engine failure conditions.

h. Generator set start contacts rated 10 A at 32VDC.

i. Cooldown time delay, adjustable: 0-600 seconds. The control panel shall indicate the time remaining in the time delay period when the generator set is timing for shutdown.

j. Start time delay, adjustable: 0-300 seconds. The control panel shall indicate the time remaining in the time delay period when the generator set is timing for start.

k. A battery monitoring system shall be provided which initiates alarms when the DC control and starting voltage is less than 12VDC. During engine starting, the low voltage limit shall be disabled, and the system shall conduct a battery capacity test. A "weak battery" alarm shall be initiated if the starting/control battery does not pass this test.

6. Alternator Control Functions:

a. The generator set shall include an automatic voltage regulation system which shall be matched and prototype tested with the governing system provided. It shall be immune from miss operation due to load-induced voltage waveform distortion and provide a pulse width modulated output to the alternator exciter. The voltage regulation system shall be equipped with three-phase RMS sensing and shall control buildup of AC generator voltage to provide a linear rise and limit overshoot. The system shall include a torque-matching characteristic which shall reduce output voltage in proportion to frequency below a threshold of 59 Hz. The voltage regulator shall include adjustments for gain, damping, and frequency roll-off. Adjustments shall be broad range and made via digital raise-lower switches, with an alpha-numeric LCD readout to indicate setting level.

b. Electronic alternator overcurrent alarm and shutdown protection. The overcurrent alarm shall be indicated when the load current on the generator set is more than 110% of rated current for more than 60 seconds. The overcurrent shutdown shall be matched to the thermal damage curve of the generator set, and shall not have an instantaneous function.

c. Electronic alternator short circuit protection. Short circuit shutdown shall occur when the load current on the generator set is more than 175% of rated current and an aggregate time/current calculation indicates that the system is approaching the thermal damage point of the alternator. The equipment used shall not have an instantaneous function.

d. The system shall control the alternator output to provide 300% of rated current under short circuit conditions for both single phase and three phase faults. Systems which regulate single phase and 3-phase faults at identical excitation levels are not acceptable.

e. Controls shall be provided to monitor the kW load on the generator set and initiate an alarm condition when total load on the generator set exceeds the generator set rating for a time period in excess of 5 seconds.

f. Controls shall include a load shed control, to operate a set of dry contacts (for use in shedding customer load devices) when the generator set is overloaded.

g. A three-phase sensing AC over/under voltage monitoring system shall initiate shutdown of the generator set when alternator output voltage exceeds 110% of the operator-set voltage level for more than 10 seconds, or with no intentional delay when voltage exceeds 130%. Under voltage shutdown shall occur when the output voltage of the alternator is less than 85% for more than 10 seconds.

h. An under frequency sensing and protection system shall be provided which causes a shutdown of the generator set if true RMS frequency falls below 90% of rated for more than 20 seconds.

7. Control Interfaces for Remote Monitoring

a. All control and interconnection points from the generator set to remote components shall be brought to a single separate connection box. No field control connections shall be made in the control enclosure or in the AC power output enclosure.

b. The field connections shall be made on permanently labeled terminal blocks which are designed and tested by the manufacturer of the generator set to be suitable for use without wire termination lugs. Provisions shall be made for future addition of DIN-rail mounted components.

c. Provide the following features in the control system:

1) Form "C" dry common alarm contact set rated 2A @ 30VDC to indicate existence of any warning or alarm condition on the generator set.

2) Form "C" dry common alarm contact set rated 2A @ 30VDC to indicate existence of any shutdown condition on the generator set. .

3) One set of contacts rated 2A @ 30VDC to indicate generator set is ready to load. The contacts shall operate when voltage and frequency are greater than 90% of rated condition.

4) A fused 10 amp switched 12VDC power supply circuit shall be provided for customer use. DC power shall be available from this circuit whenever the generator set is running.

5) A fused 10 amp 12VDC power supply circuit shall be provided for customer use. DC power shall be available from this circuit at all times from the engine starting/control batteries.

6) The control shall be provided with provisions for connection of remote monitoring equipment as described herein or shown on the drawings.

2.05 GENERATOR SET AC OUTPUT METERING

A. The generator set shall be provided with a metering set with the following features and functions:

1. Provide bar graph analog display in percentage for voltmeter, ammeter, frequency meter, and kilowatt (kW) meter and for power factor. Ammeter and kW meter bar scales shall be color coded and scaled in the following fashion: readings from 0-90% of generator set standby rating: green; readings from 90-100% of standby rating: amber; readings in excess of 100%: red. The bar graph analog meters and shall be installed so that they are totally oil-tight and dust-tight.

2. Digital metering set, 0.5% accuracy, to indicate generator RMS voltage and output current, frequency, and total kVA. Generator output voltage shall be available in line-to-line and line-to-neutral voltages, and shall display all three-phase voltages (line to neutral or line to line) simultaneously.

2.06 GENERATOR SET ALARM AND STATUS MESSAGE DISPLAY

A. The generator set shall be provided with alarm and status indicating lamps to indicate non-automatic generator status, generator running, common warning alarms, common shutdown, manual run mode, and remote start conditions. The lamps shall be high-intensity LED type. The lamp condition shall be clearly apparent under bright lighting conditions. In addition, the generator set control shall indicate the existence of alarm and shutdown conditions on the LCD digital display panel. Multiple warning or shutdown conditions shall all be stored, and require individual clearing by the operator. Alarm horn shall be located on the generator set control panel. Conditions to be annunciated on the generator set control shall include, as a minimum:

FUNCTION	ALARM HORN	SHUTDOWN UNIT
Low DC Voltage	*	
High DC Voltage	*	
Weak Battery	*	
Low Oil Pressure Alarm	*	
Low Coolant Temp Alarm	*	
High Coolant Temp Alarm	*	
Leak Detected – Subbase Tank	*	
Overcurrent Alarm	*	
Oil Pressure Sender Failure	*	
Engine Temp Sender Failure	*	
Low Fuel Level	*	
Not in Auto	*	
High Coolant Temp	*	*
Low Oil Pressure	*	*
Overcurrent	*	*
Short Circuit	*	*
Overcrank	*	*
Overspeed	*	*
Under Frequency	*	
Under Voltage	*	*
Over Voltage	*	*
Low Coolant Level	*	*
Emergency Stop	*	*

B. Customer fault alarms: Provisions shall be made for indication of two customer-specified alarm or shutdown conditions. Labeling of the customer-specified alarm or shutdown conditions (on the digital display panel) shall be of the same type and quality as the above specified conditions and shall be programmable by the operator. The non-automatic indicating lamp shall be red, and flash to indicate that the generator set is not able to automatically respond to a command to start from a remote location.

C. Engine Status Monitoring: The following information shall be available on the LCD digital display panel on the generator set control:

1. Engine oil pressure (psi or kPA)

2. Engine coolant temperature (degrees F or C; Both left and right bank temperature shall be indicated on V-block engines.)

3. Engine oil temperature (degrees F or C)

4. Engine speed (rpm)

5. Number of hours of operation (hours)

6. Number of start attempts

7. Battery voltage (DC volts)

2.07 BASE

A. The engine-generator set shall be mounted on a heavy duty steel base to maintain alignment between components. The base shall incorporate a battery tray with hold-down clamps within the rails. The battery tray shall provide secondary containment to the starting batteries in the event a battery jar leaks or ruptures.

2.08 OUTDOOR SOUND-ATTENUATED ENCLOSURE

A. The generator set shall be provided with an outdoor, level 2, sound attenuated aluminum housing that shall reduce the sound level of the generator set, while operating at full rated load, to a maximum of 68 dBA at any location 7 meters from the generator set in a free field environment. The complete assembly shall be listed under UL 2200. The assembly shall comply with the requirements of the California Electrical Code for all wiring materials and component spacing. The assembly of generator set, sub-base tank, and enclosure shall be designed to be lifted into place using spreader bars. Housing shall provide ample airflow for generator set operation at rated load in an ambient temperature of 104F. The housing shall have hinged access doors as required to maintain easy access for all operating and service functions. All doors shall be lockable, and shall include retainers to hold the door open during service. Enclosure roof shall be cambered to prevent rainwater accumulation. Openings shall be screened to limit access of rodents into the enclosure. All electrical power and control interconnections shall be made within the perimeter of the enclosure. Sound attenuated enclosures shall be insulated with non-hydroscopic materials.

B. All sheet metal shall be primed for corrosion protection and finish painted with the manufacturer's standard color using a two step electrocoating paint process, or equal meeting the performance requirements specified below. All surfaces of all metal parts shall be primed and painted. The painting process shall result in a coating that meets the following requirements:

1. Primer thickness, 0.5-2.0 mils. Top coat thickness, 0.8-1.2 mils.

2. Gloss, per ASTM D523-89, 80% plus or minus 5%. Gloss retention after one year shall exceed 50%.

3. Crosshatch adhesion, per ASTM D3359-93, 4B-5B.

4. Impact resistance, per ASTM D2794-93, 120-160 inch-pounds.

5. Salt Spray, per ASTM B117-90, 1000+ hours.

6. Humidity, per ASTM D2247-92, 1000+ hours.

7. Water Soak, per ASTM D2247-92, 1000+ hours.

C. Painting of hoses, clamps, wiring harnesses, and other non-metallic service parts shall not be acceptable. Fasteners used shall be corrosion resistant, and designed to minimize marring of the painted surface when removed for normal installation or service work.

D. All hardware and hinges shall be stainless steel.

E. A factory-mounted, exhaust silencer shall be installed inside the enclosure. The exhaust shall exit the enclosure through a rain collar and terminate with a rain cap. Exhaust connections to the generator set shall be through seamless flexible connections.

F. The enclosure shall include the following maintenance provisions:

1. Flexible coolant and lubricating oil drain lines, that extend to the exterior of the enclosure, with internal drain valves

2. External radiator fill provision.

2.09 GENERATOR SET AUXILIARY EQUIPMENT AND ACCESSORIES

A. Generator main circuit breaker: set-mounted and wired, UL listed, molded case thermal-magnetic type, 80% rated. Field circuit breakers shall not be acceptable for generator overcurrent protection.

B. Engine mounted, thermostatically controlled, jacket water heater. The heater shall be sized as recommended by the generator set manufacturer. Heater voltage shall be 120 V, single-phase, as shown on the project Drawings.

C. Vibration isolators, spring type, quantity as recommended by the generator set manufacturer. Isolators shall include built-in vertical limit stops and seismic restraint in all directions in accordance with 2016 CBC requirements. Provide Seismic Calculations signed by a California State Registered Professional Engineer verifying the integrity of the isolator restraint and the anchor.

D. Starting and control batteries shall be calcium/lead antimony type, 12 VDC, sized as recommended by the generator set manufacturer. Batteries shall be supplied with battery cables and connectors.

E. Provide a UL listed/CSA certified. 10 A minimum, voltage regulated battery charger. The charger shall be mounted on the engine generator set. Input AC voltage and DC output voltage shall be as required. Chargers shall be equipped with float, taper and equalize charge settings. Operational monitors shall provide visual output along with individual form C contacts rated at 4 A, 120 VAC, 30 VDC for remote indication of: Loss of AC power - red light, Low battery voltage - red light, High battery voltage - red light, Power ON - green light (no relay contact). Provide charger with a LCD display to indicate charge rate and battery voltage, 12 hour equalize charge timer, AC and DC fuses.

F. Exhaust muffler shall be of the size and type as recommended by the generator set manufacturer. The muffler shall be critical grade. Provide flexible exhaust fitting sized for the engine exhaust flange.

G. Exhaust pipe and Vent pipe shall be A-53 steel, Schedule 40, black. Provide flip top at end of exhaust pipe and an OPW 523V Pressure Vacuum Vent cap at end of vent pipe.

H. Sub-Base Fuel Storage Tank shall be double wall fuel storage tank with minimum capacity for 24 hours of operation at full load. The tank shall be equipped with high, low, and leak detection switches for remote monitoring and alarms. The tank shall be provided with a visual fuel level gauge. The tank shall be constructed of corrosion resistant steel with a 2 inch spacer at the bottom of the tank to allow visual inspection. Tank shall be UL 142 listed and labeled. Installation shall be in compliance to NFPA37. The equipment, as installed, shall meet all local and regional requirements for above ground tanks, and shall be provided with fill drop tube, high fuel alarm panel, 5 gallon fill/spill bucket and with overfill prevention valve (OFPV).

I. Engine-Generator Remote Emergency Stop Switch, NEMA outdoor rated, shipped loose for installation on the side of the ATS by the Control Panel Manufacturer.

A. Provide City Fire Department approved Knox Key-Lock Box for Fire Department access to generator enclosure. Lock Box to be mounted at convenient location on exterior of generator enclosure per manufacturer's installation instructions. Contact the City Fire Inspector for requirements and applications. Fire Inspector-Ken Jeffrey (510) 337-2121.

PART 3 EXECUTION

3.01 FACTORY TESTS

A. Generator set factory tests on the equipment to be shipped, shall be performed at rated load and rated PF. Generator sets that have not been factory tested at rated PF will not be acceptable. Tests shall include: run at full load for 2 hours, maximum power, voltage regulation, transient and steady-state governing, single step 100% cold load pickup, and safety shutdowns.

B. A certified test report shall be issued, confirming the results of this testing. Copies of test specifications and all performance test data shall be included in project submittals.

3.02 INSTALLATION

A. The engine generator set shall be installed at location indicated on the Drawings. The sub-base fuel storage tank shall be anchored to the concrete pad. The engine generator set shall be installed above the tank on manufacturer's provided vibration isolators.

B. Install flexible fitting, exhaust muffler, pipe, and weather flap.

C. Install vent pipe for sub-base tank and for secondary containment in accordance with the California Mechanical Code.

D. Installation shall be performed by the electrical Contractor, including external point to point power cable and control wiring installation. The manufacturer's representative shall provide periodic inspection and supervision to ensure conformance to installation drawings and instructions.

E. Installation shall comply with applicable state and local codes as required by the authority having jurisdiction. Install equipment in accordance with manufacturer's instructions and instructions included in the listing or labeling of UL listed products.

3.03 START-UP AND TESTING

A. The generator set manufacturer shall provide factory trained personnel to perform the following field services:

1. Visual Inspection of Installation, including:

a. Verify that equipment has not been damaged during shipment.

b. Generator set mounting, exhaust system, fuel system, cooling system and vent system.

2. Verify system interconnection wiring.

3. Normal Check-Out Procedures For All System Functions:

a. Verify Manual and Automatic Modes

b. Safeties and Alarms

4. Contractor shall provide all fuel required during testing and shall fill the diesel generator tank upon completion of testing and acceptance.

3.04 ON-SITE ACCEPTANCE TEST

A. The complete installation shall be tested for compliance with the specification following completion of all site work. Testing shall be conducted by representatives of the manufacturer, with required fuel supplied by Contractor. The City shall be notified in advance and shall have the option to witness the tests. Installation acceptance tests to be conducted on-site shall include a "cold start" 100% load pickup test, a two hour full load test, and a one step rated load pickup test in accordance with NFPA 110. Provide a resistive load bank and make temporary connections for full load test, if necessary. Contractor is to re-fuel the sub-base tank to 100% capacity after the completion of all tests.

B. Demonstration of complete system operation for acceptance testing by Factory Representative during initial on-site testing. This testing shall be a witness test.

3.05 OPERATIONS AND MAINTENANCE MANUAL

A. Provide three (3) sets of the system Operations and Maintenance Manual as "As-Installed" documentation three (3) weeks after completion of installation and start-up. This manual shall include the following:

1. Project Description

    a. Complete project description, including equipment serial numbers for generator sets.

2. Introduction

    a. Describes the major components and power of the system.

3. Safety Precautions

    a. Describes system operation and maintenance precautions.

4. Operation

    a. Describes generator set operations.

5. Periodic Maintenance

    a. Describes necessary procedures to maintain the system.

6. Adjustments

    a. Describes generator set adjustments.

7. Troubleshooting

    a. Describes generator set troubleshooting.

8. Generator Set Manual

    a. Include a copy of the generator set manuals.

9. Wiring Diagrams

    a. Include all system wiring diagrams.

10. Copy of factory and on-site test reports.

11. Glossary

    a. Includes a list of specialized terms and their meanings.

3.06 TRAINING

A. The equipment manufacturer shall provide maintenance and operational training to the City's personnel. There shall be a 4 hours allowance for on site training. A training date shall be scheduled and coordinated with the City.

3.07 SPARE PARTS

A. The equipment manufacturer's distributor shall stock critical control components in quantities as needed in the local or nearest field service office. These parts shall typically be printed circuit boards, control fuses, LEDs, breakers, and isolating relays. This shall be part of the manufacturer's Parts Department's standard procedure and the cost of these spare parts shall not be added to the proposal.

END OF SECTION

ATTACHMENT A

GENERATOR SIZING CALCULATIONS – PARU PUMP STATION

Generator sizing calculations based on the following requirements:

Load Step 1:

Heaters	Control Panel Heaters, 120V, 0.5 kW, 100% PF
Control/ Instrumentation	UPS, 120V, 1.0 kVA Output, 90% PF, 90% Eff
Motor load:	Pump No. 1, 5 HP, 230V, 3-Ph, 81% Running Power Factor, 85% Efficiency, NEMA Design Letter B, NEMA Code Letter G, 1745 RPM, VFD Started,

Load Step 2:

Motor load:	Pump No. 2, 5 HP, 230V, 3-Ph, 81% Running Power Factor, 85% Efficiency, NEMA Design Letter B, NEMA Code Letter G, 1745 RPM, VFD Started.
Miscellaneous	Convenience Receptacle, 120V, 1.2 kW, 90% PF

Maximum starting voltage dip shall not exceed 25% of nominal voltage. Maximum frequency dip shall not exceed 5% of nominal frequency.

GENERATOR SIZING CALCULATIONS – MARINA VILLAGE PUMP STATION

Generator sizing calculations based on the following requirements:

Load Step 1:

Heaters	Control Panel Heaters, 120V, 0.75 kW, 100% PF
Control/ Instrumentation	UPS, 120V, 1.0 kVA Output, 90% PF, 90% Eff
Motor load:	Pump No. 1, 7.5 HP, 460V, 3-Ph, 85% Running Power Factor, 84% Efficiency, NEMA Design Letter B, NEMA Code Letter G, 1750 RPM, Across-The-Line started.

Load Step 2:

Motor load:	Pump No. 2, 7.5 HP, 460V, 3-Ph, 85% Running Power Factor, 84% Efficiency, NEMA Design Letter B, NEMA Code Letter G, 1750 RPM, Across-The-Line started.
Miscellaneous	Convenience Receptacle, 120V, 1.2 kW, 90% PF

Load Step 3:

Motor load:	Pump No. 3, 7.5 HP, 460V, 3-Ph, 85% Running Power Factor, 84% Efficiency, NEMA Design Letter B, NEMA Code Letter G, 1750 RPM, Across-The-Line started.

Maximum starting voltage dip shall not exceed 25% of nominal voltage. Maximum frequency dip shall not exceed 5% of nominal frequency.

GENERATOR SIZING CALCULATIONS – COLA BALLENA PUMP STATION

Generator sizing calculations based on the following requirements:

Load Step 1:

Heaters	Control Panel Heaters, 120V, 0.5 kW, 100% PF
Control/ Instrumentation	UPS, 120V, 1.0 kVA Output, 90% PF, 90% Eff
Motor load:	Pump No. 1, 3 HP, 230V, 3-Ph, 80% Running Power Factor, 78% Efficiency, NEMA Design Letter B, NEMA Code Letter G, 1710 RPM, Across-The-Line started.

Load Step 2:

Motor load:	Pump No. 2, 3 HP, 230V, 3-Ph, 80% Running Power Factor, 78% Efficiency, NEMA Design Letter B, NEMA Code Letter G, 1710 RPM, Across-The-Line started.
Miscellaneous	Convenience Receptacle, 120V, 1.2 kW, 90% PF

Maximum starting voltage dip shall not exceed 25% of nominal voltage. Maximum frequency dip shall not exceed 5% of nominal frequency.

GENERATOR SIZING CALCULATIONS – HARBOR BAY PARKWAY 1 PUMP STATION

Generator sizing calculations based on the following requirements:

Load Step 1:

Heaters	Control Panel Heaters, 120V, 0.5 kW, 100% PF
Control/ Instrumentation	UPS, 120V, 1.0 kVA Output, 90% PF, 90% Eff
Motor load:	Pump No. 1, 10 HP, 200V, 3-Ph, 89% Running Power Factor, 83% Efficiency, NEMA Design Letter B, NEMA Code Letter F, 1735 RPM, Across-The-Line started.

Load Step 2:

Motor load:	Pump No. 2, 10 HP, 200V, 3-Ph, 89% Running Power Factor, 83% Efficiency, NEMA Design Letter B, NEMA Code Letter F, 1735 RPM, Across-The-Line started.
Miscellaneous	Convenience Receptacle, 120V, 1.2 kW, 90% PF

SECTION 16380
UNDERGROUND DISTRIBUTION SYSTEM

PART 1 GENERAL

1.01 WORK INCLUDED

A. The work covered in this section consists of furnishing all labor, supervision, tools, materials, equipment and performing all work necessary to furnish and install a complete underground distribution system, including underground conduits and precast concrete pullboxes, as indicated on the Drawings and as specified herein.

1.02 APPLICABLE PUBLICATIONS

A. All work and materials shall comply with the latest edition of the standards, rules, codes, and regulations including, but not limited to the following:

1. AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)
    a. Standard Specifications for Highway Bridges
2. AMERICAN CONCRETE INSTITUTE (ACI)
    a. ACI 318, Building Code Requirements for Structural Concrete
3. AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)
    a. ANSI C2, National Electrical Safety Code
4. AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)
    a. ASTM A1064, Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete
    b. ASTM A615, Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
    c. ASTM C33, Standard Specification for Concrete Aggregates
    d. ASTM C150, Standard Specification for Portland Cement

1.03 SUBMITTALS

A. Manufacturer’s Data and Shop Drawings: Provide catalog data and shop drawings for all the precast pullboxes sizes, including metal covers.

B. Submit manufacturer’s statement certifying that the products supplied meet specified requirements.

C. Submit and obtain approval from Alameda Municipal Power (AMP) for all material used in connection to the service to the pump station, starting from the point of connection to the meter pedestal. Contractor shall copy the City on all correspondence and submittals to Alameda Municipal Power.

PART 2 PRODUCTS

2.01 PRECAST PULLBOXES

A. General

1. The Contractor shall provide precast concrete pullboxes, subject to the requirements as shown on the Drawings and specified below. Precast units shall be the product of a manufacturer regularly engaged in the manufacture of precast concrete products, including precast pullboxes.

B. Concrete Structure

1. Concrete for precast work shall have an ultimate 28-day compressive strength of not less than 4,000 psi. Structures shall be precast to the size and details indicated on the drawings. Precast pullboxes shall be fabricated monolithically and placed as a unit, or structures may be assembled sections, designed and produced by the manufacturer in accordance with the requirements specified. Structures shall be identified with the manufacturer's name embedded or in otherwise permanently attached to an interior wall face.

C. Covers

1. Covers for pullboxes shall be fabricated of steel, welded by qualified welders in accordance with standard commercial practice. Steel covers shall be rated AASHTO H-20. Frames for pullboxes of interior dimensions, 3 ft x 5 ft, and larger shall have removable full traffic cover support beams. Precast pullbox covers shall be secured to the frame with minimum 7/16" diameter coarse threaded pentahead bolts having approximately 6 threads per inch.

D. Grounding

1. Provide a 3/4-inch diameter, 10-feet long copper-clad ground rod at each handhole, pullbox and splice box.

E. Duct Seal

1. Provide duct seals wherever underground conduits enter an equipment enclosure to prevent water or moisture from entering the equipment enclosure through the conduit. Duct seals shall be compatible with plastic and steel ducts and shall provide a watertight duct seal regardless of whether the duct is empty or occupied by cables. Duct seals shall allow for cable movement due to vibration or load cycling without leaking. Ducts shall be sealed at both the pullbox and at the equipment end.

2.02 UNDERGROUND CONDUIT SYSTEM

A. Underground conduits system shall be PVC Schedule 40, or rigid steel PVC coated, as specified in Section 16050 of this specification.

PART 3 EXECUTION

3.01 UNDERGROUND INSTALLATION

A. General

1. Underground installation shall conform to the 2016 CEC, ANSI C2 and State of California Public Utilities Commission G.O. 128

3.02 PRECAST PULLBOXES INSTALLATION

A. Commercial precast assembly shall be set on 6-inches of level, 90% compacted granular fill, 1-inch to 2-inch size, extending 12-inches beyond the pullbox on each side. Granular fill shall be compacted by a minimum of four passes with a plate type vibrator.

3.03 CONDUIT PLACEMENT

A. Conduit shall have a continuous slope toward underground structures and away from the electrical equipment with a minimum pitch of 3-inches in 100-feet. Except at conduit risers, accomplish changes in direction of runs exceeding a total of 10 degrees, either vertical or horizontal, by long sweep bends. Sweep bends may be made up of one or more curved or straight sections or combinations thereof. Manufactured bends shall have a minimum radius of 24-inches for use with conduits 3-inches in diameter and larger. Excavate trenches along straight lines from structure to structure before ducts are laid or structure constructed so the elevations can be adjusted, if necessary, to avoid unseen obstruction.

B. Terminate PVC conduits in end-bells where conduit enters underground structures. As each section of conduit is completed from structure to structure, conduits shall be cleaned and provided with end plugs to prevent dirt and debris from entering the ducts. For conduit sizes 3-inches and larger, cleaning shall consist of drawing a flexible testing mandrel, approximately 12-inches long with diameter less that the diameter of conduit, through the duct. Following the mandrel, draw a stiff bristle brush, having the same diameter as the conduit through the duct until duct is clear of particles of earth, sand, and gravel, then immediately install end plugs. For conduit sizes less than 3-inches, draw a stiff bristle brush through the conduit, until conduit is clear of particles of earth, sand, and gravel, then immediately install end plugs.

3.04 CONDUIT PLUGS AND PULL ROPE

A. Conduit not used or empty shall be provided with plugs on each end. Plugs shall contain a weephole or screen to allow water drainage. Provide a plastic pull rope having 3-feet of slack at each end of unused or empty conduits.

3.05 CABLE PULLING

A. Test duct lines with a mandrel and thoroughly swab out to remove foreign material before pulling cables. Pull cables down grade with the feed-in point at the handhole, pullbox, or equipment of the highest elevation. Use flexible cable feeds to convey cables through handhole or pullbox openings and into duct runs. Accumulate cable slack at each handhole or pullbox where space permits by training cable around the interior to form one complete loop. Maintain minimum allowable bending radii in forming such loops. Do not provide less than the specified cable bending radii when installing cable under any conditions, including turnups into pump control panel, and other enclosures. If basket-grip type cable-pulling devices are used to pull cable in place, cut off the section of cable under the grip before splicing and terminating.

3.06 CABLE LUBRICANTS

A. Use lubricants that are specifically recommended by the cable manufacturer for assisting in pulling jacketed cables. Lubricant shall not be deleterious to the cable sheath, jacket, or outer coverings.

3.07 CABLE PULLING TENSIONS

A. Tensions shall not exceed the maximum pulling tension recommended by the cable manufacturer. Monitor pulling tension during cable installation to ensure maximum pulling tension is not exceeded.

3.08 GROUNDING CONDUCTOR

A. Provide insulated copper equipment grounding conductor, sized as indicated or required by the rating of the overcurrent device supplying the phase conductors, per NEC.

3.09 CABLES IN PULLBOXES

A. Do not install cables utilizing the shortest route, but route along those walls providing the longest route and the maximum spare cable lengths.

3.10 FIELD TESTING

A. Field testing shall be provided for all cables, and grounding system in accordance with NETA ATS.

END OF SECTION

SECTION 16401
SERVICE PEDESTAL

PART 1 GENERAL

1.01 WORK INCLUDED

A. This specification covers the equipment and services necessary for the design, manufacture, factory testing, installation, and field testing of a complete and operable service pedestal in full compliance with the serving electrical utility company requirements. Service pedestal voltage, number of phases, and ampacity shall be as indicated on the Drawings.

1.02 APPLICABLE STANDARDS

A. The Service Pedestal and all accessory equipment shall be designed, manufactured and tested in accordance with the following applicable standards:

1. NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)
    a. AB-1, Molded-Case Circuit Breakers, Molded Case Switches, and Circuit-Breaker Enclosures
2. UNDERWRITTERS LABORATORIES INC. (UL)
    a. UL-508, Industrial Control Equipment
    b. UL-508A, Industrial Control Panels
3. CALIFORNIA CODE OF REGULATIONS (CCR):
    a. Title 24, Part 3, 2016 California Electrical code (CEC)
4. ALAMEDA MUNICIPAL POWER (AMP)
    a. Conform to utility company metering requirements

1.03 SUBMITTALS

A. Manufacturer shall furnish six (6) sets of submittals containing the following information for Alameda Municipal Power approval:

1. Manufacturer’s literature describing the product.
2. Catalog Data of all circuit breakers, listing interrupting rating and trip functions provided.
3. Manufacturer’s Shop Drawings
    a. Shop drawings of service pedestal indicating the enclosure’s overall dimensions, floor plan, elevation and top view, metering section details, arrangement of circuit breakers, schematic diagram, and nameplate schedule.
    b. Contractor shall submit anchorage details and calculations, signed and stamped by a Civil or Structural Engineer, to the City’s

Building Department for their review and approval. Contractor shall copy the City on all correspondence and submittals with the Building Department.

B. Contractor shall coordinate all submittal information with Alameda Municipal Power and shall copy the City on all correspondence and submittal information.

PART 2 PRODUCTS

2.01 GENERAL

A. The service pedestal shall have a voltage rating as indicated on the Plans and shall be UL listed for service entrance application. Manufacturer shall coordinate metering requirements with the serving utility company.

B. Manufacturers

C. The following manufacturers and equipment suppliers are approved, provided they meet the specifications and requirements listed herein.

1. Tesco
2. Pacific Utility Products

2.02 SERVICE PEDESTAL CONSTRUCTION

A. General

1. The service pedestal shall house the utility service main circuit breaker. The main circuit breaker, and all wiring, shall be located behind an interior dead front door or panel.

B. Enclosure

1. The service pedestal assembly shall be 50 inch high, UL listed weatherproof NEMA 3RX switchboard and instrument pedestal. Enclosure shall be similar to a TESCO Class 27-000 section with dead front interior and hinged gasketed exterior doors. Outer enclosure shall be constructed of 12 gauge 316 stainless steel. Doors shall be equipped with hasps and staples for City's padlocks.

C. Circuit Breaker

1. Main circuit breaker shall have interrupting capacities of not less than 10,000 amperes or higher interrupting rating as indicated on the Drawings. Circuit breaker shall be of the indicating type, providing ON, OFF and TRIPPED positions of the operating handle. Circuit breaker shall be quick-make, quick-break, with a thermal-magnetic action. Circuit breaker shall be the bolted on type, and shall be designed so that an overload on one pole automatically causes all poles to open. Circuit breakers shall meet the requirements of UL and NEMA AB 1.

D. Ground Bus

1. The service pedestal ground bus and incoming neutral service conductor shall be connected to a "rod" type "ground". The ground rod shall be 3/4" x 10' copper clad with connection made by exothermic weld and driven in earth at base of pedestal. The ground rod shall extend up into the service pedestal for visible connection with an approved "exothermic weld". Grounding and bonding wires shall be installed in all PVC conduit runs and connected to ground bus and all equipment.
2. Grounding conductor - All grounding conductor shall be sized as shown on the Drawings or in accordance with the CEC, whichever is larger.
3. Ground bus - A ground bus shall be provided in the service equipment. It shall be connected to the grounding electrode system by exothermic welded stranded copper grounding conductors. Screw type lugs shall be provided for connection of equipment grounding conductors.

E. Utility Meter

1. The electric service meter compartment shall be arranged approximately as shown to meet the electric utility company and EUSERC requirements. Provide neutral bar for grounding. Provide guard over power company watt hour meter with hinged access cover that has a hasp for utility company padlock. Provide wire and lugs for service entrance as required by utility company. The pull section and utility compartments shall be accessible only by the utility company. A lightning arrestor shall be provided to protect the panel equipment from lightning and utility power surges. Provide a meter base, test perch with test by-pass and other materials, as required by the electric utility which will provide service to the facility, for installation of metering equipment and attachment of service conductors.

F. Nameplates

1. Provide individual nameplates for each of the circuit breakers on the service pedestal. Nameplates shall be phenolic type with white characters on black background.

G. Enclosure Finish

1. Exterior of the 316 stainless steel enclosure shall not be painted. The interior finish shall be polyester dry powder, electrostatically applied and baked on at 380 deg. F. Color of interior door and mounting plate shall be white. The painting process shall include five stages of metal preparation using dip tanks as follows:
    a. Alkaline cleaner
    b. Clear water rinse
    c. Iron phosphate application
    d. Clear water rinse
    e. Inhibitive rinse to seal phosphated surfaces.

H. Anchoring Details

1. Service pedestal manufacturer shall provide anchoring details for mounting service pedestal on a concrete pad.

PART 3 EXECUTION

3.01 FACTORY TESTING

A. Service pedestal shall be completely assembled, wired, adjusted and tested at the factory. After assembly, the complete service pedestal shall be tested for operation under simulated service conditions to assure accuracy of the wiring and function of the equipment. Certified copies of factory test reports shall be provided.

3.02 INSTALLATION

A. The service pedestal shall be installed in accordance with manufacturer's instructions at the location shown on the Drawings.

B. Contractor shall provide all labor and material to cast in place concrete pad and to anchor the service pedestal to the concrete pad.

END OF SECTION

SECTION 16495
AUTOMATIC TRANSFER SWITCH

PART 1 GENERAL

1.01 WORK INCLUDED

A. This specification covers the equipment and services necessary for the design, manufacture, factory testing, delivery, installation supervision, site testing and startup of a complete and operable automatic transfer switch with programmed transition. Equipment shall be new, factory tested, and delivered ready for installation. The transfer switch shall be compatible with the diesel engine generator system specified herein. Transfer switch is to installed in an empty section of the Motor Control Center by the Control Panel Manufacturer. Where indicated on the Drawings, transfer switch shall be provided in a NEMA 3RX, outdoor, self supported, stand alone cabinet of approximate dimensions as indicated on the Drawings. Provide cabinet with suitably sized space heaters, control thermostat and humidistat.

1.02 QUALITY ASSURANCE

A. Automatic transfer switch shall be UL1008 listed, CSA certified, comply with the NEMA ICS 2-447, and conform to applicable requirements of NFPA 99, and 110, and CEC.

1.03 SUBMITTALS

A. Supplier shall furnish six (6) sets of submittals containing the following information for City's approval:

1. Specification and data sheets.
2. Manufacturer's published warranty documents.
3. Shop drawings showing plan and elevation views with certified overall dimensions.
4. Schematic control diagrams and wiring diagrams.
5. Interconnection wiring diagrams showing all external connections required; with field wiring terminals marked in a consistent point-to-point manner.
6. Factory test reports.
7. Manufacturer's installation instructions.

1.04 SERVICE CAPABILITY

A. The equipment supplier shall have qualified service engineers available. These engineers shall be available on a 24-hours, 7-days per week basis. The service facility shall be located within 100 miles radius from the project site.

1.05 WARRANTY

A. Shall be provided for all products against defects in materials and workmanship, for two year period from the start-up and acceptance date, per the manufacturer's Base Coverage Warranty.

PART 2 PRODUCTS

2.01 TRANSFER SWITCH REQUIREMENTS

A. General

1. Complete factory assembled transfer equipment with electronic control designed for surge voltage isolation, voltage sensors on all phases of both sources, linear operator, positive mechanical and electrical interlocking, and mechanically held contacts.

2.02 RATINGS

A. Transfer switch shall have ampacity and voltage ratings as indicated on the drawings. The switch shall have a minimum withstand and closing rating of 30 kA RMS (when used with molded case circuit breakers).

B. Main contacts shall be rated for 600 VAC minimum.

C. Transfer switch shall be rated to carry 100 percent of rated current continuously in the enclosure. Circuit breaker type transfer switches do not meet this specification.

D. Transfer switch shall be continuously rated in ambient temperatures of -40 to +50 degrees C, relative humidity up to 95% (non-condensing), and altitudes up to 10,000-feet.

2.03 CONSTRUCTION

A. Transfer switch shall be double-throw, electrically and mechanically interlocked, and mechanically held in both positions.

B. Transfer switch shall be equipped with permanently attached manual operating handles and quick-break, quick-make over-center contact mechanisms suitable for safe manual operation under load.

C. Main switch contacts shall be high-pressure silver alloy. Contact assemblies shall have arc chutes for positive arc extinguishment. Arc chutes shall have insulating covers to prevent interphase flashover.

D. Provide two (2) sets of Form C auxiliary contacts on both sides, operated by transfer switch position, rated 10 A, 250 VAC.

E. Transfer switch shall be mounted inside a section of the Motor Control Center by the Control Panel manufacturer. Where indicated on the Drawings, transfer switch shall be mounted inside a self supported, stand alone cabinet. Transfer switch manufacturer shall provide required wire bend space at point of entry and installation instructions for all enclosure door mounted devices.

F. Transfer switch shall be supplied with a switched neutral pole where indicated on the Drawings. The neutral pole shall be of the same construction and have the same ratings as the phase poles. All poles shall be switched simultaneously using a common crossbar. Equipment using add-on accessory overlapping contacts are not acceptable.

2.04 TRANSFER SWITCH CONTROL FEATURES

A. The transfer switch control system shall be configurable in the field for any operating voltage level up to 600 VAC. Voltage sensing shall be monitored based on the normal voltage at the site. Systems that utilize voltage monitoring based on standard voltage conditions that are not field configurable are not acceptable.

B. All transfer switch sensing shall be configurable from an operator panel or from PC-based service tool. Designs utilizing DIP switches or other electromechanical devices are not acceptable.

C. The transfer switch shall be configurable to accept a relay contact signal and a network signal from an external device to prevent transfer to the generator service.

D. The transfer switch shall provide a relay contact signal prior to transfer or re-transfer. The time period before and after transfer shall be adjustable in a range of 0 to 60 seconds.

E. The control system shall be designed and prototype tested for operation in ambient temperatures from - 40 degrees C to + 60 degrees C (- 40 to +140 degrees F). It shall be designed and tested to comply with the requirements of the noted voltage and RFI/EMI standards.

F. The control shall have optically isolated logic inputs, high isolation transformers for AC inputs and relays on all outputs, to provide optimum protection from line voltage surges, RFI and EMI.

2.05 AUTOMATIC CONTROLS

A. Control panel shall be microprocessor based with sealed membrane pushbuttons for operator controlled functions, and LED lamps for system status indication. Control panel shall include an alphanumeric display for detailed system information. Panel display and indicating lamps shall include permanent labels.

1. The indicator panel LEDs shall display:
    a. Which source the load is connected to (Source 1 or Source 2)
    b. Which source or sources are available
    c. When switch is not set for automatic operation, the control is disabled
    d. When the switch is in test/exercise mode
2. The indicator shall have pushbuttons that allow the operator to activate the following functions:
    a. Activate pre-programmed test sequence
    b. Override programmed delays, and immediately go to the next operation
    c. Reset the control by clearing any faults
    d. Test all of the LEDs by lighting them simultaneously
3. The alphanumeric digital display shall be vacuum fluorescent-type, clearly visible in both bright sunlight and no-light conditions over an angle of 120 degrees, and shall display the following:
    a. AC voltage for all phases, normal and emergency
    b. Source status: connected or not connected.
4. The display panel shall be password-protected, and allow the operator to view and make adjustments:
    a. Set nominal voltage and frequency for the transfer switch
    b. Adjust voltage and frequency sensor operation set points
    c. Set up time clock functions
    d. Set up load sequence functions
    e. Enable or disable control functions including program transition
    f. View real-time clock data, operation log (hours connected, times transferred, failures) and service history

B. Control Functions: Functions managed by the control shall include:
1. Software adjustable time delays:
    a. Engine start (prevents nuisance genset starts in the event of momentary power fluctuation): 0 to 120 seconds
    b. Transfer normal to emergency (allows genset to stabilize before load is transferred): 0 to 120 seconds
    c. Re-transfer emergency to normal (allows utility to stabilize before load is transferred from genset): 0 to 30 minutes
    d. Engine cooldown: 0 to 30 minutes

e. Programmed transition: 0 to 60 seconds

2. Undervoltage sensing: all-phase normal, all-phase emergency source.
3. Over-voltage sensing: all-phase normal, all-phase emergency source.
4. Over/under frequency sensing:
   a. Pickup: +/- 5 to +/-20% of nominal frequency
   b. Dropout: +/-1% beyond pickup
   c. Dropout time delay: 0.1 to 15.0 seconds
   d. Accurate to within +/- 0.05 Hz
5. Voltage imbalance sensing:
   a. Dropout: 2 to 10%
   b. Pickup: 90% of dropout
   c. Time delay: 2.0 to 20 seconds
6. Phase rotation sensing:
   a. Time delay: 100 msec
7. Loss of single-phase detection:
   a. Time delay: 100 msec

C. Control features shall include:

1. Programmable genset exerciser: A field-programmable control shall periodically start and run the generator with or without transferring the load for a preset time period, then re-transfer and shut down the generator after a preset cool-down period.
2. In event of a loss of power to the control, all control settings, real-time clock setting and the engine start-time delay setting will be retained.
3. The system continuously logs information including the number of hours each source has been connected to the load, the number of times transferred, and the total number of times each source has failed. An event recorder stores information, including time and date-stamp, for up to 50 events.
4. Re-Transfer Inhibit Switch: Inhibits automatic re-transfer control so automatic transfer switch will remain connected to emergency power source as long as it is available regardless of condition of normal source.
5. Transfer Inhibit Switch: Inhibits automatic transfer control so automatic transfer switch will remain connected to normal power source regardless of condition of emergency source.

D. Control Interface

1. Provide one set Form C auxiliary contacts on both sides, operated by transfer switch position, rated 10 amps 250 VAC.

E. Engine Starting Contacts

1. One isolated and normally closed pair of contacts rated 10A at 32 VDC minimum.

2.06 FRONT PANEL DEVICES

A. Provide devices to be mounted on pump control panel door consisting of:

1. Transfer Switch Control Panel

2. A key-operated selector switch to provide the following positions and functions:

a. Test - Simulates normal power loss to control for testing of generator set. Controls shall provide for a test with or without load transfer.

b. Normal - Normal operating position.

c. Retransfer - Momentary position to override retransfer time delay and cause immediate return to normal source, if available.

B. Transfer switch position and source available lamps.

PART 3 EXECUTION

3.01 FACTORY TESTS

A. Transfer switch shall be tested at the factory to verify functionality and operational sequence.

B. A certified test report shall be issued, confirming the results of this testing. Copies of test specifications and all performance test data shall be included in project submittals.

3.02 INSTALLATION

A. Installation of transfer switch inside a section of the Motor Control Center by the Control Panel manufacturer, or installed in a self supported, stand alone cabinet also to be provided by the Control Panel manufacturer, including point to point power cable and control wiring installation. The transfer switch manufacturer's representative shall provide periodic inspection and supervision to ensure conformance to installation drawings and instructions.

B. Field installation of the self supported, stand alone transfer switch cabinet shall be performed by the contractor at location indicated on the Drawings. Installation shall comply with applicable state and local codes as required by the authority having jurisdiction. Install equipment in accordance with manufacturer's instructions and instructions included in the listing or labeling of UL listed products.

3.03 START-UP AND TESTING

A. The equipment manufacturer shall provide factory trained personnel to perform the following field services:

B. Verify that equipment has not been damaged during shipment.

C. Visual Inspection of Installation, including:

1. Transfer switch mounting
2. System interconnection wiring.

D. Normal Check-Out Procedures For All System Functions:

1. Verify Manual and Automatic Modes
2. Time delays and pick-up/drop-out settings

3.04 ON-SITE ACCEPTANCE TEST

A. The complete installation shall be tested for compliance with the specification following completion of all site work. Testing shall be conducted by representatives of the manufacturer. Demonstration of complete system operation for acceptance testing by Factory Representative during initial on-site testing of the diesel generator set. This testing shall be a witness test.

3.05 OPERATIONS AND MAINTENANCE MANUAL

A. Provide three (3) sets of the system Operations and Maintenance Manual "As-Installed" documentation three (3) weeks after completion of installation and start-up. This manual shall include the following:

1. Project Description
    a. Complete project description, including equipment serial number for transfer switch.
2. Introduction
    a. Describes the major components and power of the system.
3. Safety Precautions
    a. Describes system operation and maintenance precautions.
4. Operation
    a. Describes transfer switch operations.
5. Periodic Maintenance
    a. Describes necessary procedures to maintain the system.
6. Adjustments
    a. Describes transfer switch adjustments.

7. Troubleshooting
    a. Describes transfer switch troubleshooting.
8. Wiring Diagrams
    a. Includes system wiring diagrams.
9. Copy of factory and on-site test reports.
10. Glossary
    a. Includes a list of specialized terms and their meanings.

3.06 TRAINING

A. The equipment manufacturer shall provide maintenance and operational training of the City's personnel. There shall be 2 hour of on site training. A training date shall be scheduled and coordinated with the City.

3.07 SPARE PARTS

A. The equipment manufacturer's distributor shall stock critical control components in quantities as needed in the local or nearest field service office. These parts shall typically be printed circuit boards, control fuses, LEDs, transformers, and isolating relays. This shall be part of the manufacturer's Parts Department’s standard procedure and the cost of these spare parts shall not be added to the proposal.

END OF SECTION

SECTION 16901
PUMP CONTROL PANEL

PART 1 GENERAL

1.01 WORK INCLUDED

A. The work covered in this section consists of furnishing all labor, supervision, tools, materials, equipment, testing and performing all work necessary to furnish and install an outdoor pump control panel (Motor Control Center) as indicated on the Drawings. The pump control panel shall be completely constructed and pre-wired at the factory of the manufacturer. No part of its construction is to be performed or wiring completed at the job site or during installation.

B. The pump control panel shall include motor feeder circuit breakers, power monitoring relay, surge suppression device, motor starters, motor monitoring, HOA selector switches, toggle switches, indicating lights, elapse time meters, step-down power transformer, control power transformers, pump controller, intrinsically safe relays, zener barriers, 120 VAC uninterruptible power supply (UPS), 24VDC power supply, anti-condensation space heaters, ventilating fans, and all other devices required for a complete and operational system.

C. Space shall be provided on the pump control panel for the installation of the City's RTU equipment. Contractor shall perform the installation and wiring of this equipment under the supervision of Thunderbird Communications, the City's SCADA Contractor. Thunderbird Communications will perform the programming and commissioning of the SCADA system.

1.02 APPLICABLE STANDARDS

A. The pump control panel shall be designed, manufactured and tested in accordance with the latest edition of the standards and publications listed below:

1. INTERNATIONAL TESTING ASSOCIATION (NETA)
    a. NETA-ATS, Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems
2. NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)
    a. AB 1, Molded-Case Circuit Breakers, Molded Case Switches, and Circuit-Breaker Enclosures
    b. ICS-1, Industrial Control and Systems: General Requirements
    c. ICS-2, Controllers, Contactors and Overload Relays Rated 600 V
    d. ICS-4, Application Guideline for Terminal Blocks
    e. ICS-6, Industrial Control and Systems: Enclosures

f. UNDERWRITERS LABORATORIES, INC. (UL)

g. UL 486A, Wire Connectors

h. UL 508, Industrial Control Equipment

i. UL 508A, Industrial Control Panels

j. UL 698A, Standard for Industrial Control Panels Relating to Hazardous (Classified) Locations

1.03 SUBMITTALS

A. Supplier shall furnish six (6) sets of submittals containing the following information for City's approval:

1. Descriptive Bulletins and catalog information of all equipment and devices provided with the pump control panel.
2. Product Data Sheets of all equipment and devices provided with the pump control panel.
3. Shop drawings submittal shall include:
   a. Front view and elevation
   b. Floor plan
   c. Top view
   d. Assembly ratings, including voltage, continuous current and short circuit current rating
   e. Single line diagram
   f. Control diagrams
   g. Nameplate schedule
   h. Conduit entry/exit locations
   i. Anchorage detail and calculations, signed and stamped by a Civil or Structural Engineer. Contractor shall submit panel anchorage detail and calculations to the City Building Department for their review and approval. Contractor shall copy the City with all correspondence and submittals to the Building Department.
4. Component Schedule Bill of Material, including voltage, continuous current and interrupting ratings:
   a. Circuit breakers, power monitoring relay, surge suppression device, step-down power transformer, control power transformers, 120 VAC uninterrruptible power supply (UPS), 24 VDC power supply, full voltage non-reversing starters, pump controller equipment, level controller system, intrinsically safe relays and zener barriers, interposing relays, timing relays, selectors switches, toggle switches, push buttons, pilot lights, elapse time meters, terminal blocks, space heaters, and ventilating fans.
5. Cable terminal lugs sizes

6. Equipment seismic certification
7. Installation information
8. Operations and Maintenance Manual, including:
    a. General description.
    b. Description of all control functions.
    c. Programming documentation of the level controller system.
    d. Performance data and technical data.
    e. Catalog information of all equipment and devices used in the pump control panel.
    f. Operating and Maintenance Procedures.
    g. A complete set of as-built drawings, including one-line diagrams, schematic diagrams, wiring diagrams, plan views, elevations and details.
    h. Certified copy of test reports.
    i. Recommended renewal parts list.

1.04 QUALIFICATIONS

A. The manufacturer of this equipment shall have produced similar electrical equipment for a minimum period of five (5) years. A list of installations with similar equipment shall be provided to demonstrate compliance with this requirement.

B. The pump control panel shall be suitable for and certified to meet all applicable seismic requirements of the 2016 California Building Code (CBC) for the project areas. Guidelines for the installation consistent with these requirements shall be provided by the pump control panel manufacturer and be based upon testing of representative equipment. Panel manufacturer shall also provide Arc Flash label for the completed panel assembly in accordance with NFPA 70E.

PART 2 PRODUCT

2.01 GENERAL

A. The pump control panel shall consist of a custom made multiple sections enclosure sized adequately to accommodate all motor starting equipment, control, instrumentation, and auxiliary devices required for the operation of the pump station equipment.

2.02 RATINGS

A. The pump control panel shall be 600 V class suitable for operation on three-phase or single-phase, 60 Hz system. The system operating voltage and number of wires shall be as indicated on the Drawings.

2.03 CONSTRUCTION

A. The pump control panel enclosure shall be NEMA 3RX, constructed of 12 gauge type 316 stainless steel minimum, fully welded construction, with hinged outer door and provided with 3-point latching mechanism and handle with provisions for padlocking. Minimum dimensions of enclosure shall be as indicated on the drawings. Inner door and interior of control panel shall be cold rolled hot deep galvanized steel, 14 gauge minimum. Inner door shall be hinged and provided with suitable latches to secured door in place. The enclosure base shall have a 2" flange all around, 11 gauge minimum, with pre-drilled holes for anchoring the control panel to the concrete floor. Exterior of enclosure shall not be painted. Control panel interior shall have a powder coated white finished paint color.

B. The control panel enclosure shall include the following accessories:

1. Swing-Out inner door for mounting control and auxiliary devices behind the exterior door.
2. Backpanel for mounting control devices, terminal blocks, control power transformers and other auxiliary devices.
3. Enclosure door contact to send a remote alarm when any of the outside enclosure door is opened.
4. Low profile fluorescent light to illuminate interior of control panel enclosure. Light shall be turned on with a light switch to be mounted flush on the enclosure swing-out panel.
5. Convenience Receptacle to be mounted flush on the enclosure swing-out panel. Receptacle shall be industrial grade, 120V, 20A, GFCI, grounded type.
6. Surge protection device shall have 100,000 amp peak current rating for all mode of protection, 65 kAIC fault current fusing level, LED status and audible alarms. Surge protection device shall be as manufactured by SOLA Hevi-Duty, model number STV100K Series or approved equal.

2.04 CIRCUIT BREAKERS

A. Circuit breaker shall be molded case type, rated as indicated on the Drawings.

2.05 PANELBOARD AND DRY-TYPE TRANSFORMER

A. Panelboards shall be UL 67 construction and shall have ampacity and voltage ratings indicated on the Drawings. Panelboards used in 240 VAC maximum rated voltage systems shall have short-circuit ratings as shown on the Drawings, but not less than 10,000 A RMS symmetrical. Panelboards shall be of the compact type constructed to utilize minimum enclosure space. Circuit breakers shall be bolted on type. Provide phenolic nameplates to identify panelboard and all branch circuit devices.

B. Dry-type transformer shall be Open Core and Coil, Industrial Control Transformer, 180 Deg. C insulation class and maximum temperature rise of 115 Deg. C. Dry type transformers primary and secondary voltage and kVA rating shall be as indicated on the Drawings. Dry type transformers shall be as manufactured by Acme Electric or Jefferson Electric.

2.06 MOTOR STARTERS

A. GENERAL

1. Magnetic starters shall be full voltage, non-reversing, size as required for the horsepower rating of the pump motor. Magnetic starters shall conform to NEMA or to IEC Standards at the option of Control Panel Manufacturer.

B. MAGNETIC STARTERS

1. Magnetic starters shall be equipped with double-break silver alloy contacts. The starter must have straight-through wiring. Each starter shall be provided with the number of auxiliary contacts required for the intended control function indicated on the Drawings, but shall be no less than two (2) NO and two (2) NC auxiliary contact.
2. Coils shall be of molded construction. All coils to be permanently marked with voltage, frequency and part number.
3. Solid-State Overload Relay
    a. Provide a definite-purpose, microprocessor-based Overload Relay (OLR) in each starter compartment for the protection, control and monitoring of the motors. The OLR shall be Eaton / Cutler-Hammer type C441 (Motor Insight) relay. The OLR shall meet UL 1053.
    b. The relay shall not require external current transformers for applications up to 150 amperes for motors rated less than 600 Vac. The relay shall include terminals for remote trip and remote reset.
    c. The OLR shall be provided with a Type 12, panel mounted display/operator-interface option.
    d. The OLR shall be equipped with a Modbus communication module.

2.07 CONTROL, INDICATION AND AUXILIARY DEVICES

A. Provide fused control power transformers, indicating lights, HOA selector switches, toggle switches, pushbuttons, intrinsically safe relays, zener barriers, interposing relays, and other control, indication and auxiliary devices indicated on the Drawings. Indicating lights shall be LED push-to-test type, with lens colors as indicated on the drawings. Selector switches and pushbuttons shall be NEMA 4X, with contact block arrangement as required for the application.

B. The pump control panel manufacturer shall install and wire the Over-Temperature and Seal Failure Detection Relay provided by the pump manufacturer for the additional protection of the pump motors. The Over-Temperature and seal Failure Detection Relay shall be installed in the motor starter compartment of each of the pumps motors.

C. Control relays shall be general purpose, blade type, 3PDT contact configuration with neon indicating light. Provide matching socket base with hold down clips.

D. Each section of the control panel shall be provided with anti-condensation space heaters, thermostatically controlled.

E. Float switches shall be mercury free, and shall consist of a mechanical micro switch in a plastic casing, with normally open and normally closed switch positions. The float switch casing shall be made of smooth polypropylene material, so that deposits or impurities will not adhere to its surface. The float switch cable shall be long enough to reach the pump control panel without the need for an intermediate splice. Float switches shall be provided with a counterweight and mounting bracket for wall mounting at the wet well wall. Float switches shall be as manufactured by MJK Automation Model Number 7030.

F. Level transmitter shall be submersible type, specifically designed for use in pump/lift stations applications. Level transmitter shall be intrinsically safe (IS) suitable for use in Class I, Division 1, Group D environment. Transmitter cable shall be molded polyurethane, vented with Kevlar, 4 conductors, and shall be provided with cable hanger. Level transmitter shall be as manufactured by Process Measurement & Controls, Inc. (PMC) VersaLine VL2000 Series, 4-20 mA electrical configuration, titanium housing, and cable length sufficient to reach the wet well from the control panel without splicing. Full scale range shall be selected to fit the depth of the wet well. Provide Dri-Box termination box, PMC Catalog Number TE 10, for installation in in-ground concrete pullbox.

G. Intrinsically safe relays shall be provided with SPDT contact to control loads to 2A at 250VAC or 1A at 24VDC. Supply voltages shall be as indicated on the Drawings. Intrinsically safe relays shall be PR Electronics type 5202B, or approved equal.

H. Repeaters barriers shall be provided to transmit signals in an intrinsically safe manner. Repeaters barriers shall be rated with supply voltages of 21.6 to 253 VAC and 19.2 to 300 VDC. Repeaters shall be designed for use in conjunction with level transmitter equipment operating in hazardous areas defined as Class I, Division 1, Group D. Repeater barrier shall be dual channel, PR Electronics type 5104B or approved equal.

I. Elapse time meter shall be round case 2-1/2” diameter, 120 VAC input voltage, non-reset, 6 digit counter hour register with tenths of hour register. Elapse time meter shall be weather resistant with sealed window and flange for panel mounting.

2.08 LEVEL CONTROLLER

A. Level controller shall be microprocessor based, with inputs and outputs for controlling and monitoring up to four pumps. Level controller shall be California Motor Controls Pump Vision PV600. Level controller shall be provided with one (1) RS485 port for communication with the solid state overload relay (EATON Motor Insight) and for communication to the station SCADA RTU, and one Ethernet RJ45 port for connection to a future WiFi Router. Level controller shall be installed on the control section of the control panel and shall be provided with a sunshield to reduce glare. The Pump Vision PV600 and the Eaton Motor Insight shall be fully programmed and provided as a package from California Motor Controls.

2.09 120VAC UNINTERRUPTIBLE POWER SUPPLY (UPS)

A. UPS system shall be UL 1778 listed for industrial applications without derating and for use in UL 508 applications. UPS capacity is to be calculated by Pump Control Panel manufacturer, but in no case should be less than 1000 VA.

2.10 24VDC POWER SUPPLY

A. The 24 VDC power supply shall be DIN rail mounted, auto select 115/230VAC input voltage, output rated at a nominal 5.0 A at 24 VDC, UL 508 listed. Power supply shall be SOLA Catalog Number SDN 5-24-100P or approved equal.

2.11 CONTROL REQUIREMENTS

A. The submersible level transmitter and level pump controller shall be fully programmed by the pump control panel manufacturer to perform the control functions described herein and as indicated on the Drawings. A listing of the controller programmed parameters shall be submitted for City's review and approval.

B. The pump controller shall continuously monitor the sanitary sewer water level. The level controller shall be programmed to alternate the lead/lag function to each of the pump station pumps. On rising sewer water level the lead sewer pump shall be started and run until the demand of the pump station is met. If the first pump (lead Pump) is not able to meet the inflow water demand, the second sewer pump (lag Pump) shall be started at the designated water level. On falling water level, both pumps shall be stopped once the water level in the wet well reach the lower stopped level. The sewer pumps shall be alternated after each pump down cycle. An analog signal (4-20 mA) shall be available for connection to the City's RTU. The analog signal shall be programmed and calibrated to transmit the wet well level to a remote location via the City's RTU.

C. Float switches shall be provided as a backup to the submersible level transmitter and level controller. The float switch control system shall be operational upon reaching the high water level float and shall immediately

send a signal to start the first pump after a programmed time delay. Subsequent pumps will be started after a programmed time delay. The pumps will remain on backup float switch control until the water level reaches the low water level float, which upon activation, will stop all pumps.

D. The high water level float switch shall also send an alarm to the City RTU. Both, the high water level float and the low water level float shall provide an input to the level controller.

E. All alarms, indications, controls and instrumentation wiring interfacing with the City's RTU shall be terminated into terminal blocks for easy extension to the City's RTU equipment. Wiring from these terminal blocks to the City's RTU equipment shall also be provided under the supervision of Thunderbird Communication, the City's SCADA contractor.

2.12 NAMEPLATES

A. Provide phenolic nameplates to identify each component of the pump control panel. A nameplate shall also be installed on the outside enclosure door identifying the enclosure as the Sewage Pump Station Control Panel. Each nameplate shall be appropriately sized for the engraved legend. The lettering shall be black $^{3}/_{16}$-inch high, on a white background.

PART 3 EXECUTION

3.01 FACTORY TESTING

A. All factory tests required by the latest ANSI, NEMA and UL standards shall be performed.

B. The pump controller control and alarm functions shall be tested by simulating actual field conditions. The operation of all pump starters shall be tested and verified to be in accordance with the control and alarm functions specified. A test plan shall be submitted to the City for approval prior to performing this factory test.

C. A certified test report of all standard production tests, including all control and alarm functions simulation test shall be provided with the pump control panel operations and maintenance manual.

D. Factory tests as outlined above may be witnessed by the City's representative.

1. The manufacturer shall notify the City two (2) weeks prior to the date the tests are to be performed.

2. The manufacturer shall include the cost of transportation and lodging for up to three (3) City's representatives. The cost of meals and incidental expenses shall be the City's responsibility.

3.02 EXAMINATION

A. Contractor shall fully inspect shipments for damage and report damage to manufacturer and file claim upon shipper, if necessary.

B. Overload relay ratings must be properly sized and coordinated for each motor starter unit.

C. Contractor to verify CEC clearances as dictated on the Contract Drawings prior to installation. Verify UL labeling of the assembly prior to installation.

3.03 INSTALLATION

A. Contractor to follow the installation instructions supplied by the manufacturer.

B. Control wiring shall be as shown on the Contract Drawings except as modified by the approval and submittal process. Interface all local and remote devices into the control wiring and operational systems for each load.

3.04 FIELD ADJUSTMENTS

A. Follow the manufacturer's instructions and the contract documents concerning any overload relay setting, timing relays, or startup of components.

3.05 FIELD TESTING

A. Test the completed installation to demonstrate to the City that the system is performing is intended control function in accordance with this specification, contract drawings and manufacturer's shop drawings.

B. Test each individual SCADA RTU input for proper transmission and confirmation that signal has been received at the City's SCADA System Central Monitoring Station. This test shall be conducted in coordination with the City's SCADA Consultant.

C. Generate a field report on tests performed, test values experienced, etc., and make available to the City upon request.

3.06 FIELD QUALITY CONTROL

A. Provide the services of a qualified factory-trained manufacturer's representative to assist the Contractor in the startup of the equipment specified under this section for a period of 2 working days per site. The manufacturer's representative shall provide technical direction and assistance to the Contractor in connections and adjustments, and testing of the assembly, components contained therein, and provided field devices.

B. The following minimum work shall be performed by the manufacturer's representative, with the assistance of the Contractor:

1. Verify all power wiring and control wiring and verify basic operation of each starter from control power source.

2. Calibrate any solid-state metering or control relays for their intended purpose and make written notations of adjustments on record drawings.

3. Set the microprocessor base overload relays operation, protection and metering parameters. Provide a listing of all settings.

4. Set and calibrate all analog transmitters interfacing with the pump level control equipment and with the City's RTU. Adjust all level control setpoints and test the entire sewage lift pump station controls to the satisfaction of the City.

5. Verify installation level and operation of the backup level float system. Verify start and stop operation of pumps and alarm/indications to level controller.

6. Simulate each SCADA RTU input by actual operation of the field device or control panel device or, if this is not practical, by a jumper across the device terminals. Verify that the correct SCADA RTU input is actuated, transmitted and received at the City's SCADA System Central Monitoring Station.

C. The Contractor shall provide three (3) copies of the manufacturer's field startup report.

3.07 MANUFACTURER'S CERTIFICATION

A. A qualified factory-trained manufacturer's representative shall certify in writing that the equipment has been installed, adjusted and tested in accordance with the manufacturer's recommendations. Equipment shall be inspected prior to the generation of any reports.

B. The Contractor shall provide three (3) copies of the manufacturer's representative's certification.

3.08 TRAINING

A. The Contractor shall provide a training session for up to five (5) City's representatives for 1 workday at the jobsite or other office location chosen by the City.

B. The training session shall be conducted by a manufacturer's qualified representative.

C. The training program shall consist of the following:

1. Review of the factory record shop drawings.

2. Review of all control schematics and pump controller control logic.

3. Review contactor coil replacement and contact replacement procedures.
4. Discuss the maintenance timetable and procedures to be followed in an ongoing maintenance program.
5. Provide three-ring binders to participants complete with copies of drawings and other course material covered.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK