CITY OF ALAMEDA

SPECIFICATIONS AND PLANS

FOR

GROUP 2 – SEWER PUMP STATION RENOVATIONS FOR RELIABILITY AND SAFETY IMPROVEMENTS

No. P.W. 03-14-10

MANDATORY PREBID MEETING:	August 6, 2015, 1:30 PM – 2:30 PM
LOCATION:	City Hall West 950 W. Mall Square, Room 156 Alameda, CA 94501
BID OPENING:	August 13, 2015, 2:00 PM
LOCATION:	Public Works Department 950 W. Mall Square, Room 110 Alameda, CA 94501

Mark Obergfell
Acting City Engineer

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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 proposals at the time and place specified in the advertisement calling for bids for:

GROUP 2 – SEWER PUMP STATION RENOVATIONS FOR RELIABILITY AND SAFETY IMPROVEMENTS NO. P.W. 03-14-10

Plans and Specifications are expected to be available immediately. Paper copies of the Plans and Specifications can be obtained from BPXpress Reprographics located at 4903 Central Avenue, Richmond, CA 94804 for a non-refundable cost of $125 per set. Shipping and handling are extra, depending on the delivery method. Electronic copies of the documents are also available for a non-refundable cost of $100 per set. Copies of the documents can be viewed and ordered at www.blueprintexpress.com/alameda. They can also be ordered by contacting BPXpress Reprographics by phone at (510) 559-8299 or by email at Richmond@blueprintexpress.com. For any questions about ordering or downloading process, please contact BPXpress.

It is the responsibility of each prospective bidder to confirm his/her firm is on the plan holders list held at BPXpress to ensure receipt of any subsequent communications, 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 proposals must be made upon blank forms which are included in these specifications.

All bids must give the prices proposed, **both in writing and 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 PROPOSAL. 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 2 – SEWER PUMP STATION RENOVATIONS FOR RELIABILITY AND SAFETY IMPROVEMENTS, No. P.W. 03-14-10", not later than **2:00 p.m.** on the date set forth in the following paragraph.

Bids will be opened in the Office of the Public Works Department, 950 W. Mall Square, Room 110, Alameda, California, California**, at 2:00 p.m. on August 13, 2015.**

A **mandatory pre bid meeting** will be held at the City Hall West, Alameda Point, Building 1, 950 West Mall Square, Room 156, Alameda, California, at 1:30 p.m. on August 6, 2015. City reserves the right to hold additional pre bid meetings as necessary for contractors to visit the sites.

F. BIDDER'S GUARANTY. All bids shall be presented under sealed cover and 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. It is mutually agreed by the parties hereto that, upon failure of the bidder to execute said contract, that provision be made herein for liquidated damages.

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 proposals 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 proposals 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. Proposals 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 proposals. 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 10th business day following bid opening.

1. The initial protest document shall contain a complete statement of the basis for the protest.
2. The protest shall refer to the specific portion of the document which forms the basis 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. In the event of a delay of award due to City review time required to confirm Contractor conformance with requirements stated herein or no City Council Meeting schedule conflicts, 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. 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://efiling.dir.ca.gov/PWCR

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 regulation 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. https://apps.dir.ca.gov/ecpr/das/altlogin

C. 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.

4. 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.

5. Contractors must coordinate with the Alameda Unified School District and St. Joseph's Notre Dame Schools on the streets that are in the vicinity of schools. The work may or may not be affected.

D. CERTIFIED PAYROLL.

a. 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.

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

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

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

E. 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.

F. 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.

G. 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.

H. 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. Bay Area Air Quality Management District (BAAQMD) to install and operate the standby engine-generator sets. Reference technical specification section 01410-3.01.
4. Fire Permit (CB14-0825, CB14-0826, CB14-0828, CB14-0829, and CB14-0830) from the City of Alameda, 2263 Santa Clara Avenue, Room 190, Alameda
5. Combination Building Permit (CB14-0825, CB14-0826, CB14- 0827, CB14-0828, CB14-0829, and CB14-0830) from the City of Alameda, 2263 Santa Clara Avenue, Room 190, Alameda
6. Rights of Entry permission for Temporary construction easements located on private property adjacent to existing City easements on private property.
7. 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.D

I. 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.

K. 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.

J. 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.

K. 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).

L. 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.

M. 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.

N. 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.

O. 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.

P. 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.

Q. 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.

R. 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 Prevention Plan (SWPPP) to the City Engineer for review. The SWPPP 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 reviewed the Contractor's SWPPP.

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 SWPPP. 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 15), 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 or shovel 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, Environmental Services Division 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 SWPPP 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.

Payment for maintaining construction site controls shall be included in the in the prices paid for the various bid items.

S. RECYCLING OF CONCRETE AND ASPHALT MATERIALS. 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. Attached is a suggested list of facilities that will accept construction and demolition waste materials (Exhibit B). 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. .

The City of Alameda Administrative Instruction 36 requires that contractors doing business with the City of Alameda shall comply with the guidelines for use of recycled materials (Exhibit J). The Contractor shall submit a Waste Reduction and Recycling Plan (WRRP, Exhibit K) prior to construction. The WRRP must be submitted for review and approved by the Public Works Staff before demolition. A Waste Reduction and Recycling Plan Final Summary Report (Exhibit L) must be filled out and signed by the Contractor at the project completion. The Contractor shall also submit a Waste Management Report (Exhibit M).

T. ASBESTOS AND LEAD BASED PAINTS. Reports of a survey of possible asbestos and lead based paints, in the path of construction, was prepared by ACC Environmental.

U. 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.

V. 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.

W. 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 - 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.

X. ENVIRONMENTAL PROTECTION AGENCY (EPA) REQUIRES CONTRACTORS TO BECOME CERTIFIED LEAD RENOVATORS. All contractors who perform renovation, repair, or painting projects that may disturb lead paint to be Lead RRP Certified. The Certified Lead Renovator Training Course is now available at www.cleanedison.com. The EPA's new requirement will affect most contractors conducting common renovation and repair work activities since demolition, deconstruction, sanding, and cutting can generate hazardous lead dust and chips by disturbing lead-based paint. This lead contamination has been proven harmful to both adults and children. To protect against these risks, the EPA is now requiring that all contractors be enrolled in the Lead RRP-Certification by September 30, 2010 in order to perform renovation, repair and painting projects in homes, rental facilities, child-occupied facilities, and schools built before 1978. For any contractor performing this work without the Lead RRP Certification, the EPA may seek penalties of up to $37,500 per violation, per day.

SECTION III. SCOPE OF WORK

A. WORK TO BE DONE. The project consists of removing and replacing equipment, rehabilitating, and installing new equipment at six (6) sewage lift stations. Equipment to be replaced and installed include pumps, piping, valves, electrical equipment, adding two (2) standby engine 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.

The Notice to Proceed (NTP) for this project is tentatively scheduled to be issued October 5, 2015.

The Initial Project Submittal Package shall address the entire project, and shall include the Traffic Control Plan (first 20 working days at minimum), SWPPP, 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 and twenty (220) consecutive working days from the date the work is to commence pursuant to the Notice to Proceed to complete the entire work, including punch list items.

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 Tuesday, July 1, 2 p.m. through 8 a.m. Saturday, July 5. 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 1. No crack sealing or slurry seal shall be applied on July 1 on these streets.

Contractor shall not work during City holidays. Remaining City holidays for 2015 and 2016 holidays include:

Independence Day	Friday, July 3, 2015
Labor Day	Monday, September 7, 2015
Veteran's Day	Wednesday, November 11, 2015
Thanksgiving Day	Thursday, November 26, 2015
Day after Thanksgiving Day	Friday, November 27, 2015
Christmas Day	Friday, December 25, 2015
New Years Day	Friday, January , 1, 2016
Martin Luther King, JR.	Monday, January 18, 2016
Presidents Day	Monday, February 15, 2016
Memorial Day	Monday, May 30, 2016
Independence Day	Monday, July 4, 2016
Labor Day	Monday, September 5, 2016
Veteran's Day	Friday, November 11, 2016
Thanksgiving Day	Thursday, November 24, 2016
Day after Thanksgiving Day	Friday, November 25, 2016
Christmas Day	Monday, December 26, 2016

The following City events are planned for the remaining Calendar Year 2015. Contractor must consult with City in advance of Calendar Year 2016 to determine applicable Calendar Year 2016 dates

Event	**Date**
Classic Car Show (Park Street)	October 10, 2015
Trick or Treat at Webster Street	October 31, 2015
Santa on Webster Street	TBD
Concerts at the Cove	2nd Friday in June, July and August 2015

Farmer's Market (Webster Street at Haight Avenue)
Every Tuesday and Saturday (year-round) from 9 a.m. to 1 p.m.

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 5-1.02, 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 the Contractor and shall provide detailed and dimensioned information regarding all changes that were made during Construction.

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"x 36" 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 confirm his/her firm is on the plan holders list held at BPXpress to ensure receipt of any subsequent communications, such as 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.

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 hour 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 4 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 MATERIALS

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), SWPPP, 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.
4. Not apply the slurry seal on streets the same day that trash and recycling pickup is scheduled.

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 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 PAYMENTS

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 9-1.06 of the Standard Specifications "Partial 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 7101.

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", 2006 for front end specs and latest edition for technical specs, 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.

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, and /or pre-construction meeting and walk - through. 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, not including add alternates, depending on available funding.

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

The Contractor must meet the following requirements:

- **The contractor must be able to furnish evidence of at least three (3) years of experience performing similar work as described in the scope of work.**
- **Contractor must submit a list of at least (3) references including names and phone numbers for the work comparable to that discussed in the scope of work with the Bid.**

The base bid consists of ninety one (91) bid items, as outlined below and detailed in Section XII, construction details and Extent of Contract, Section XII, T. The project also includes ZERO add alternates.

TABULATION OF PRELIMINARY ESTIMATE OF QUANTITIES

Bid Item No.	Description	Est. Qty.	Unit	Unit Price	Total Price
1	Mobilization and Demobilization	1	LS		
Adelphain Pump Station					
2	Adelphian Temporary Facilities and Bypass Pumping	1	LS		
3	Adelphian Demolition	1	LS		
4	Adelphian Shoring of Open Excavations	1	LS		
5	Adelphian Submersible Pumps, Rails & Accessories	2	EA		
6	Adelphian Piping, Fittings, and Valves	1	LS		
7	Adelphian Wetwell Modifications	1	LS		
8	Adelphian Wetwell Coating System	1	LS		

Bid Item No.	Description	Est. Qty.	Unit	Unit Price	Total Price
9	Adelphian Concrete Work	1	LS		
10	Adelphian Generator	1	EA		
11	Adelphian Electrical Control Panel	1	LS		
12	Adelphian Service Pedestal	1	LS		
13	Adelphian SCADA Pole	1	LS		
14	Adelphian Site Light	1	LS		
15	Adelphian Maintenance Cabinet	1	LS		
16	Adelphian Fence and Gates	1	LS		
17	Adelphian Gravel Surface	160	SF		
18	Adelphian Miscellaneous Electrical Work, Wiring and Sensors	1	LS		
19	Adelphian Site Restoration, Landscaping, and Cleanup	1	LS		
Verdemar Station					
20	Verdemar Temporary Facilities and Bypass Pumping	1	LS		
21	Verdemar Demolition	1	LS		
22	Verdemar Shoring of Open Excavations	1	LS		
23	Verdemar Submersible Pumps, Rails & Accessories	2	EA		
24	Verdemar Piping, Fittings, and Valves	1	LS		
25	Verdemar Bypass Pumping Connection	1	LS		
26	Verdemar Wetwell Modifications	1	LS		
27	Verdemar Wetwell Coating System	1	LS		
28	Verdemar Concrete Work	1	LS		
29	Verdemar Electrical Control Panel	1	LS		
30	Verdemar Service Pedestal	1	LS		
31	Verdemar SCADA Pole	1	LS		
32	Verdemar Water Service, Hose Bib, and Enclosure	1	LS		
33	Verdemar Gravel Surface	25	SF		
34	Verdemar Miscellaneous Electrical Work, Wiring and Sensors	1	LS		
35	Verdemar Site Restoration, Landscaping, and Cleanup	1	LS		
Harbor Bay Parkway II Station					
36	Harbor Bay Parkway II Temporary Facilities and Bypass Pumping	1	LS		
37	Harbor Bay Parkway II Demolition & Abandonment	1	LS		
38	Harbor Bay Parkway II Shoring of Open Excavations	1	LS		
39	Harbor Bay Parkway II Submersible Pumps, Rails & Accessories	2	EA		
40	Harbor Bay Parkway II Piping, Fittings, and Valves	1	LS		
41	Harbor Bay Parkway II Valve Vault and Hatch	1	LS		
42	Harbor Bay Parkway II Wetwell Modifications	1	LS		

Bid Item No.	Description	Est. Qty.	Unit	Unit Price	Total Price
43	Harbor Bay Parkway II Wetwell Coating System	1	LS		
44	Harbor Bay Parkway II Concrete Work	1	LS		
45	Harbor Bay Parkway II Generator	1	EA		
46	Harbor Bay Parkway II Electrical Control Panel	1	LS		
47	Harbor Bay Parkway II Service Pedestal	1	LS		
48	Harbor Bay Parkway II SCADA Pole	1	LS		
49	Harbor Bay Parkway II Site Light	1	LS		
50	Harbor Bay Parkway II Maintenance Cabinet	1	LS		
51	Harbor Bay Parkway II Fence and Gates	1	LS		
52	Harbor Bay Parkway II Water Service, Hose Bib, and Enclosure	1	LS		
53	Harbor Bay Parkway II Miscellaneous Electrical Work, Wiring and Sensors	1	LS		
54	Harbor Bay Parkway II Site Restoration and Cleanup	1	LS		
Willow-Whitehall Pump Station					
55	Willow-Whitehall Temporary Facilities and Bypass Pumping	1	LS		
56	Willow-Whitehall Dewatering During Construction	1	LS		
57	Willow-Whitehall Demolition and Abandonment	1	LS		
58	Willow-Whitehall Shoring of Open Excavations	1	LS		
59	Willow-Whitehall Submersible Pumps, Rails & Accessories	2	EA		
60	Willow-Whitehall Pump Discharge Piping, Fittings, and Valves	1	LS		
61	Willow-Whitehall New Wetwell	1	LS		
62	Willow-Whitehall Wetwell Coating System	1	LS		
63	Willow-Whitehall 4" Force Main	1	LS		
64	Willow-Whitehall 10" Gravity Sewer Main	1	LS		
65	Willow-Whitehall Sewer Manhole	1	EA		
66	Willow-Whitehall Modify Invert of Existing Manhole	2	EA		
67	Willow-Whitehall Concrete Work	1	LS		
68	Willow-Whitehall Electrical Control Panel	1	LS		
69	Willow-Whitehall Service Pedestal	1	LS		
70	Willow-Whitehall SCADA Pole	1	LS		
71	Willow-Whitehall Miscellaneous Electrical Work, Wiring and Sensors	1	LS		
72	Willow-Whitehall Site Restoration, Landscaping, and Cleanup	1	LS		
Haile Station					
73	Haile Temporary Facilities and Bypass Pumping	1	LS		
74	Haile Demolition	1	LS		

Bid Item No.	Description	Est. Qty.	Unit	Unit Price	Total Price
75	Haile Bypass Pumping Connection	1	LS		
76	Haile Concrete Work	1	LS		
77	Haile Gravel Surface	110	SF		
78	Haile Electrical Control Panel	1	LS		
79	Haile Service Pedestal	1	LS		
80	Haile Miscellaneous Electrical Work, Wiring and Sensors	1	LS		
81	Haile Site Restoration and Cleanup	1	LS		
Bay Fairway Hall Station					
82	Bay Fairway Hall Temporary Facilities and Bypass Pumping	1	LS		
83	Bay Fairway Hall Demolition	1	LS		
84	Bay Fairway Hall Solenoid Valve on Water Service	1	LS		
85	Bay Fairway Hall Concrete Work	1	LS		
86	Bay Fairway Hall Wetwell Coating System	1	LS		
87	Bay Fairway Hall Fence and Gate	1	LS		
88	Bay Fairway Hall Electrical Control Panel	1	LS		
89	Bay Fairway Hall Service Pedestal	1	LS		
90	Bay Fairway Hall Miscellaneous Electrical Work, Wiring and Sensors	1	LS		
91	Bay Fairway Hall 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 GROUP 2 - SEWER PUMP STATION RENOVATIONS FOR RELIABILITY AND SAFETY IMPROVEMENTS which is summarized in Section III -Scope of Work and which is described in detail in the plans and specifications.

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 Contractor must meet the following requirements:

- **The contractor must be able to furnish evidence of at least three (3) years of experience performing similar work as described in the scope of work.**
- **Contractor must submit a list of at least (3) references including names and phone numbers for the work comparable to that discussed in the scope of work with the Bid.**

B. PLANS The drawings titled 'GROUP 2 - SEWER PUMP STATION RENOVATIONS FOR RELIABILITY AND SAFETY IMPROVEMENTS' are incorporated into these Specifications:

Title	Drawing No.	Case
City of Alameda Group 2 – Sewer Pump Station Renovations for Reliability and Safety Improvements	9370	95

The following Standard Plans by the State of California, Department of Transportation July 2006, MUTCD-CA, and the City of Alameda Standard Drawings are incorporated into these Specifications:

Work in center of road with Low Traffic Volume	TA-15
Traffic Control System for Lane Closure on Two Lane Conventional Highways	T13
Closure in Center of Intersection	TA-26
Closure at Side of Intersection	TA-27
Sidewalk Detour or Diversion	TA-28
Crosswalk Closure and Pedestrian Detour	TA-29

Standard Plan, Curb, Gutter, Sidewalk and Driveway	6295B	24
Standard Plan, Curb, Gutter, Sidewalk and Driveway	6297	24
Standard Handhole Frame and Cover Circular	6194	12
Standard Precast Concrete Manhole Type "A"	2815	34
Excavation of Trenches for Pipe Sewers	3147B	32
Install Drop Manhole Detail	8214	32
Detail of Reinforcing Required in Sidewalk Around Utility Boxes	6080	22

Standard Detail 64 – Caltrans Revised Standard Plan RSP A88A

SECTION XII. CONSTRUCTION DETAILS

The construction details covered under this Section XII shall be Special Provisions as set forth in Section VIII and the Division 1 to 16 of the Technical Specifications, sections 01110 to 16901.

A. MAINTAINING TRAFFIC. Attention is directed to Section 7-1.08, "Public Convenience", 7-1.09, "Public Safety", of the State of California Standard Specifications, and to Section II, Article P 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 7-1.08 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 12-2.02 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 9:00 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 than 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 C23 (Road Work Ahead) or C24 (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 Manual on Uniform Traffic Control Devices-CA (MUTCD-CA) 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 7-1.09, "Public Safety," of the Standard Specifications.

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

See Section II, N. 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 5-1.05, "Order of Work", of the Standard Specifications and these Special Provision and Section 01140 of the Technical Specifications for "Work Restrictions".

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 the Section 10-1.01, "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 the Section 10-1.01, "PUBLIC CONVENIENCE AND PUBLIC SAFETY" of these Specifications. All of these costs shall be borne by the Contractor.

C. PORTLAND CEMENT CONCRETE.

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 REINFORCED 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 B 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 preserve and protect City survey monuments and benchmarks per State of California Business and Professions Code Section 8771

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 pipe 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, protecting and supporting 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 hour 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 pump station sites. 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 shall be presumed by Contractor that the presence of high groundwater will require significant 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.

Guidelines for site preparation, suitable backfill material, material requirements, fill placement and compaction are outlined in technical specification section 02300.

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.

Payment for sewage pumping whether on public right-of-way and private property shall be included for each pump station under a separate Bid Item in the various contract items of work.

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 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.

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 R, 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 S, 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. 1. MOBILIZATION AND DEMOBILIZATION Mobilization shall conform to the provisions in Section 11, "Mobilization," of the Standard Specifications and the following items.

1) Signed Contract by the City and the Contractor
2) Completion of all tasks and submittals of all documents (bond, insurance, schedule, etc.) required as conditions of issue the Notice to Proceed.
3) Moving on to the site of all Contractors equipment required for operations.
4) Installing temporary construction water supply, power, wiring, and lighting facilities as required.
5) Providing field office trailers if needed by the Contractor.
6) Providing all on-site communication facilities, including telephones, and radio pagers.
7) Obtaining all required permits.
8) Having all OSHA required notices and establishment of safety programs.
9) Beginning work on the project or at the subject site as applicable.
10) Obtaining approved traffic control plan from the City.

Payment for mobilization shall be at the contract lump sum price paid in accordance with Section 01125 of the Technical Standard Specifications.

M. MAINTAINING TRAFFIC Maintaining traffic shall be in conformance with Section XII, A, "MAINTAINING TRAFFIC" of these specifications.

Payment for maintaining traffic including temporary traffic control, plan, signs, flagman, and traffic control satisfactory implementation shall be paid as included in the in the prices paid for the various items and shall be considered full compensation for labor, materials, tool, equipment, and incidentals required for maintaining traffic during construction.

N. EXCAVATION OF TRENCHES.

a. 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 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 Category 3, 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," and Drawing No. 3147B, Case 32. 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.

d. Sewer Cleaning. Sewer cleaning shall include removal of foreign material and objects from the line to permit for the proper testing of the sewer facilities. Multiple passes may be required and shall be included in the cost to perform the tests. The Contractor is responsible for any damage or clean-up on private property caused by negligent sewer cleaning operations.

e. 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**.**

f. . 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 lateral replacement work, the curb and/or gutter, and/or sidewalk will be replaced per Standard Drawing No. 6297, Case 24.

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 will 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 included in item titled 'Piping , Fittings and Valves" and is listed per each pump station as a line item, or as applicable to the electrical wiring .

O. RECONSTRUCT SIDEWALK, RECONSTRUCT CURB AND GUTTER: Concrete curb, gutter, sidewalk, residential and/or commercial driveways and approaches removed for installation of laterals, cleanouts, mains, and/or manholes, shall be reconstructed in accordance with Drawing 6297, Case 24, and in conformance with the applicable requirements of Section 73 of the Standard Specifications, these Special Provisions, and technical specification section 02772. Sidewalks shall be Portland cement concrete three inches (3") thick. Residential driveways and their approaches shall be of Portland cement concrete four inches (4") thick. Commercial driveways and their approaches shall be of Portland cement concrete six inches (6") thick. Concrete shall be saw cut and reconstructed to the limits shown on plan and established in the field by the Engineer.

Gutter shall be 8 inches (8") in thickness and 30 inches (30") in width, or as shown on plans, or as needed to conform with existing gutter.

All sidewalk constructed shall be given the same surface finish as the surrounding sidewalk, and the surface shall be colored by adding to the mix a proportionate amount of the best quality lampblack, such proportion to be determined by the Engineer (**add 1.5 pounds of Lump Black per cubic yard of Concrete**). Concrete, Curb, Gutter and Sidewalk replacements shall extend to the nearest score-mark or as directed by the engineer or his representative.

Damage to existing sidewalk, curb, gutter, or driveways beyond the limits shown on the plans, or reconstruction required by the Engineer, caused by carelessness or inefficiency of the Contractor, shall be repaired or replaced at the Contractor's expense.

Payment shall be at the contract lump sum for concrete replacement for sidewalk which includes driveways, and approaches and at the contract unit price per linear foot of curb and gutter, including full compensation for all labor, tools, equipment, and materials, and doing all work involved in saw cutting, removal, and replacing concrete curb, gutter, sidewalk, driveways and approaches.

P. ASPHALT CONCRETE BRIDGE An asphalt bridge for street patch, having a width of one foot, shall be constructed on either side of the pipe trench according to trench detail included on the Drawings. Asphalt concrete shall be Type A, ½" maximum aggregate with medium gradation, and shall conform to applicable requirements of Section 39 of the Standard Specifications. Paving asphalt of the Viscosity Grade AR 4000 shall be used unless otherwise permitted by the Engineer. The four-inch (4") section shall be placed in two-inch lifts.

Payment for Asphalt Bridge for street patch shall be considered included in the various price under Piping, Fittings and Valves, and other items requiring trenching as specified for street patching. Said contract unit price shall include full compensation for furnishing all labor, tools, equipment and materials, and doing all the work involved in reconstructing the trenches complete and in place as herein specified, and all other incidental work connected herewith.

Q. 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.

Payment for restoring existing traffic striping and marking, temporary striping and marking, new striping and marking, and restoration of traffic loops shall be considered to be included in the various items and this shall be considered full compensation for labor, materials, tools, equipment, and incidentals to furnish and install striping and marking.

R. 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.

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, for first working days of the start up of each pump station construction site
- Erosion/Storm Water Pollution Prevention Plan
- Waste Reduction and Recycling Plan
- Potholing plan and schedule

The initial Project Submittal package shall address the entire project, and shall include the above items and full project 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)

Security For Compensation Certificate

Important Instructions

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EXHIBIT "A"
SECTION XVI. BIDDER'S PROPOSAL

Specifications and Special Provisions

No. 03-14-10

Filed:

Group 2 - Sewer 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:

Bid Item No.	Description	Est. Qty.	Unit	Unit Price	Total Price
1	Mobilization and Demobilization	1	LS		
Adelphain Pump Station					
2	Adelphian Temporary Facilities and Bypass Pumping	1	LS		
3	Adelphian Demolition	1	LS		
4	Adelphian Shoring of Open Excavations	1	LS		
5	Adelphian Submersible Pumps, Rails & Accessories	*2*	EA		
6	Adelphian Piping, Fittings, and Valves	1	LS		
7	Adelphian Wetwell Modifications	1	LS		
8	Adelphian Wetwell Coating System	1	LS		
9	Adelphian Concrete Work	1	LS		
10	Adelphian Generator	1	EA		
11	Adelphian Electrical Control Panel	1	LS		
12	Adelphian Service Pedestal	1	LS		
13	Adelphian SCADA Pole	1	LS		
14	Adelphian Site Light	1	LS		
15	Adelphian Maintenance Cabinet	1	LS		
16	Adelphian Fence and Gates	1	LS		
17	Adelphian Gravel Surface	160	SF		
18	Adelphian Miscellaneous Electrical Work, Wiring and Sensors	1	LS		

Bid Item No.	Description	Est. Qty.	Unit	Unit Price	Total Price
19	Adelphian Site Restoration, Landscaping, and Cleanup	1	LS		
Verdemar Station					
20	Verdemar Temporary Facilities and Bypass Pumping	1	LS		
21	Verdemar Demolition	1	LS		
22	Verdemar Shoring of Open Excavations	1	LS		
23	Verdemar Submersible Pumps, Rails & Accessories	2	EA		
24	Verdemar Piping, Fittings, and Valves	1	LS		
25	Verdemar Bypass Pumping Connection	1	LS		
26	Verdemar Wetwell Modifications	1	LS		
27	Verdemar Wetwell Coating System	1	LS		
28	Verdemar Concrete Work	1	LS		
29	Verdemar Electrical Control Panel	1	LS		
30	Verdemar Service Pedestal	1	LS		
31	Verdemar SCADA Pole	1	LS		
32	Verdemar Water Service, Hose Bib, and Enclosure	1	LS		
33	Verdemar Gravel Surface	25	SF		
34	Verdemar Miscellaneous Electrical Work, Wiring and Sensors	1	LS		
35	Verdemar Site Restoration, Landscaping, and Cleanup	1	LS		
Harbor Bay Parkway II Station					
36	Harbor Bay Parkway II Temporary Facilities and Bypass Pumping	1	LS		
37	Harbor Bay Parkway II Demolition & Abandonment	1	LS		
38	Harbor Bay Parkway II Shoring of Open Excavations	1	LS		
39	Harbor Bay Parkway II Submersible Pumps, Rails & Accessories	2	EA		
40	Harbor Bay Parkway II Piping, Fittings, and Valves	1	LS		
41	Harbor Bay Parkway II Valve Vault and Hatch	1	LS		
42	Harbor Bay Parkway II Wetwell Modifications	1	LS		
43	Harbor Bay Parkway II Wetwell Coating System	1	LS		
44	Harbor Bay Parkway II Concrete Work	1	LS		
45	Harbor Bay Parkway II Generator	1	EA		
46	Harbor Bay Parkway II Electrical Control Panel	1	LS		
47	Harbor Bay Parkway II Service Pedestal	1	LS		
48	Harbor Bay Parkway II SCADA Pole	1	LS		
49	Harbor Bay Parkway II Site Light	1	LS		
50	Harbor Bay Parkway II Maintenance Cabinet	1	LS		
51	Harbor Bay Parkway II Fence and Gates	1	LS		

Bid Item No.	Description	Est. Qty.	Unit	Unit Price	Total Price
52	Harbor Bay Parkway II Water Service, Hose Bib, and Enclosure	1	LS		
53	Harbor Bay Parkway II Miscellaneous Electrical Work, Wiring and Sensors	1	LS		
54	Harbor Bay Parkway II Site Restoration and Cleanup	1	LS		
Willow-Whitehall Pump Station					
55	Willow-Whitehall Temporary Facilities and Bypass Pumping	1	LS		
56	Willow-Whitehall Dewatering During Construction	1	LS		
57	Willow-Whitehall Demolition and Abandonment	1	LS		
58	Willow-Whitehall Shoring of Open Excavations	1	LS		
59	Willow-Whitehall Submersible Pumps, Rails & Accessories	2	EA		
60	Willow-Whitehall Pump Discharge Piping, Fittings, and Valves	1	LS		
61	Willow-Whitehall New Wetwell	1	LS		
62	Willow-Whitehall Wetwell Coating System	1	LS		
63	Willow-Whitehall 4" Force Main	1	LS		
64	Willow-Whitehall 10" Gravity Sewer Main	1	LS		
65	Willow-Whitehall Sewer Manhole	1	EA		
66	Willow-Whitehall Modify Invert of Existing Manhole	2	EA		
67	Willow-Whitehall Concrete Work	1	LS		
68	Willow-Whitehall Electrical Control Panel	1	LS		
69	Willow-Whitehall Service Pedestal	1	LS		
70	Willow-Whitehall SCADA Pole	1	LS		
71	Willow-Whitehall Miscellaneous Electrical Work, Wiring and Sensors	1	LS		
72	Willow-Whitehall Site Restoration, Landscaping, and Cleanup	1	LS		
Haile Station					
73	Haile Temporary Facilities and Bypass Pumping	1	LS		
74	Haile Demolition	1	LS		
75	Haile Bypass Pumping Connection	1	LS		
76	Haile Concrete Work	1	LS		
77	Haile Gravel Surface	110	SF		
78	Haile Electrical Control Panel	1	LS		
79	Haile Service Pedestal	1	LS		
80	Haile Miscellaneous Electrical Work, Wiring and Sensors	1	LS		
81	Haile Site Restoration and Cleanup	1	LS		

Bay Fairway Hall Station					
82	Bay Fairway Hall Temporary Facilities and Bypass Pumping	1	LS		
83	Bay Fairway Hall Demolition	1	LS		
84	Bay Fairway Hall Solenoid Valve on Water Service	1	LS		
85	Bay Fairway Hall Concrete Work	1	LS		
86	Bay Fairway Hall Wetwell Coating System	1	LS		
87	Bay Fairway Hall Fence and Gate	1	LS		
88	Bay Fairway Hall Electrical Control Panel	1	LS		
89	Bay Fairway Hall Service Pedestal	1	LS		
90	Bay Fairway Hall Miscellaneous Electrical Work, Wiring and Sensors	1	LS		
91	Bay Fairway Hall Site Restoration and Cleanup	1	LS		
				TOTAL BID	
TOTAL BID (written in words):_____					

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: _____

DIR Registration 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.)

The Bidder shall list the name and address 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.

LIST OF SUBCONTRACTORS

Name/Address /CA Contractor License #/DIR Reg # Work Subcontracted_

_____

_____

_____

_____

_____

_____

_____

(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.

SUBCONTRACTORS TO BE USED IN THE PERFORMANCE OF THIS CONTRACT

Name/Address /CA Contractor License #/DIR Reg # Work Subcontracted

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.

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EXHIBIT B

LIST OF PROCESSORS BY MATERIAL

List of Processors by Material

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EXHIBIT "B"

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 'C'
NOT USED

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Exhibit 'D'

SAMPLE CONTRACT AGREEMENT/ ADDITIONAL INSURED CERTIFICATE

Sample of Contract Agreement

Additional Insured Certificates

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EXHIBIT D

CONTRACTOR AGREEMENT

THIS AGREEMENT, entered into this _____ day of _____ 2015, by and between CITY OF ALAMEDA, a municipal corporation (hereinafter referred to as "City"), and **COMPANY NAME.**, a (California corporation, partnership, sole proprietor, individual) whose address is **(**hereinafter called the "Contractor"), in reference to the following:

RECITALS:

A. City 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. City and Contractor desire to enter into an agreement for Group 2 – Sewer Pump Station Renovations for Reliability and Safety Improvements, in accordance with Specifications, Special Provisions and Plans, adopted therefor, No. P.W. 03-14-10, filed in the office of the City Clerk on _____, 2015, which is incorporated herein by reference.

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

1. **TERM**:

The Contractor shall begin work within five (5) working days after receiving notice from the Engineer to commence the work, and shall diligently prosecute the work to completion before the expiration of two hundred and twenty (220) consecutive working days from the date of receipt of notice to begin work.

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. Contractor shall perform each requested task set forth in the Bidder's Proposal detailed in Exhibit "A", as directed by the City, which is attached hereto and incorporated herein by this reference. 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 task 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, to be taken from CIP 91008.

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 $_____.

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. This clause applies to both DBE and non-DBE subcontractors.

4. **TIME IS OF THE ESSENCE:**

Contractor and 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 FIVE HUNDRED DOLLARS ($500) 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 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 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 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 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 City 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 thirty (30) days' advance written notice to the City of Alameda by certified mail, "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 City 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 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.

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 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, 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 Attorney. 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 Attorney:

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 City. 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, claims for money by Contractor from 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 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 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 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 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 City.

Contractor shall, at such time and in such form as 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 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 City or its designees at all proper times, and gives 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 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 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 City shall be addressed to City at:

Public Works Department
950 West Mall Square, Room 110
Alameda, CA 94501
Attention: Erin Smith, Acting Deputy Public Works Director
Ph: (510) 747-7938 / Fax: (510) 769-6030

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

_____
_____
_____
Attention: _____
Ph: ( ) / Fax: ( )
Email: _____

18. **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.

19. **DEPARTMENT OF INDUSTRIAL RELATIONS COMPLIANCE AND PREVAILING WAGE REOUIREMENTS 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 l, 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.l (a)). Register at https://efiling.dir.ca.gov/PWCR

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://apps.dir.ca.gov/ecpr/das/altlogin

20. **PREVAILING WAGES**:

a. 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.

b. 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 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.

c. 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.

d. 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.

e. 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

f. 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.

g. 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.

h. 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.

21. **HOURS OF LABOR**.

a. 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.

b. 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.

c. 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**.

a. 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.

b. 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.

c. 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.

d. 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)
    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) and 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.
- ❑ 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:
    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), carbamates (e.g., carbaryl), and fipronil
    4. 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.*

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 City of written notice of default, specifying the nature of such default and the steps necessary to cure such default, City may terminate the Agreement forthwith by giving to the Contractor written notice thereof.

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. **COMPLIANCES**:

Contractor shall comply with all applicable laws, state, federal, and all ordinances, rules and regulations enacted or issued by City.

31. **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.

32. **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 City to do otherwise.

33. **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.

34. **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 City and Contractor.

35. **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.

36. **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.

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

CONTRACTOR
A _____ Corporation

_____
Name
Title

_____
Name
Title

CITY OF ALAMEDA
A Municipal Corporation

_____
Elizabeth D. Warmerdam
Interim City Manager

RECOMMENDED FOR APPROVAL

_____
Liam Garland
Interim Public Works Director

APPROVED AS TO FORM:
City Attorney

_____
Andrico Penick
Assistant City Attorney

POLICY NUMBER: COMMERCIAL GENERAL LIABILITY
CG 20 10 10 93

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

ADDITIONAL INSURED - OWNERS, LESSEES or CONTRACTORS FORM B

This endorsement modifies insurance provided under the following:

COMMERCIAL GENERAL LIABILITY COVERAGE PART

SCHEDULE

Name of Person or Organization:

City of Alameda
Public Works Department
Alameda Point, Building 1
950 West Mall Square, Room 110
Alameda, CA 94501-7558

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

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

REF: _____
The City of Alameda, its City Council, boards and commissions, officers & employees are additional insured for work done on their behalf by the named insured.

PRIMARY INSURANCE:
IT IS UNDERSTOOD AND AGREED THAT THIS INSURANCE IS PRIMARY AND ANY OTHER INSURANCE MAINTAINED BY THE ADDITIONAL INSURED SHALL BE EXCESS ONLY AND NOT CONTRIBUTING WITH THIS INSURANCE.

SEVERABILITY OF INTEREST:
IT IS AGREED THAT EXCEPT WITH RESPECT TO THE LIMIT OF INSURANCE, THIS COVERAGE SHALL APPLY AS IF EACH ADDITIONAL INSURED WERE THE ONLY INSURED AND SEPARATELY TO EACH INSURED AGAINST WHOM CLAIM IS MADE OR SUIT IS BROUGHT.

WAIVER OF SUBROGATION:
IT IS UNDERSTOOD AND AGREED THAT THE COMPANY WAIVES THE RIGHT OF SUBROGATION AGAINST THE ABOVE ADDITIONAL INSURED (S), BUT ONLY AS RESPECTS THE JOB OR PREMISES DESCRIBED IN THE CERTIFICATE ATTACHED HERETO.

NOTICE OF CANCELLATION:
IT IS UNDERSTOOD AND AGREED THAT IN THE EVENT OF CANCELLATION OF THE POLICY FOR ANY REASON OTHER THAN NON-PAYMENT OF PREMIUM, 30 DAYS WRITTEN NOTICE WILL BE SENT TO THE CERTIFICATE HOLDER BY MAIL. IN THE EVENT THE POLICY IS CANCELED FOR NON-PAYMENT OF PREMIUM, 10 DAYS WRITTEN NOTICE WILL BE SENT TO THE ABOVE.

POLICY NUMBER:

COMMERCIAL AUTO
CG 20 48 02 99

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

DESIGNATED INSURED

This endorsement modifies insurance provided under the following:

BUSINESS AUTO COVERAGE FORM
GARAGE COVERAGE FORM
MOTOR CARRIER COVERAGE FORM
TRUCKERS COVERAGE FORM

With respect to coverage provided by this endorsement, the provisions of the Coverage Form apply unless modified by this endorsement.

This endorsement identifies person(s) or organization(s) who are "insureds" under the Who Is An Insured Provisions of the Coverage Form. This endorsement does not alter coverage provided in the Coverage Form.

This endorsement changes the policy effective on the inception date of the policy unless another date is indicated below.

Endorsement Effective:	Countersigned By:
Named Insured:	(Authorized Representative)

SCHEDULE

Name of Person or Organization:

City of Alameda
Public Works Department
950 West Mall Square, Room 110
Alameda, CA 94501-7558

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

REF: _____
The City of Alameda, its City Council, boards and commissions, officers & employees are additional insured for work done on their behalf by the named insured.

NOTICE OF CANCELLATION:
IT IS UNDERSTOOD AND AGREED THAT IN THE EVENT OF CANCELLATION OF THE POLICY FOR ANY REASON OTHER THAN NON-PAYMENT OF PREMIUM, 30 DAYS WRITTEN NOTICE WILL BE SENT TO THE CERTIFICATE HOLDER BY MAIL. IN THE EVENT THE POLICY IS CANCELED FOR NON-PAYMENT OF PREMIUM, 10 DAYS WRITTEN NOTICE WILL BE SENT TO THE ABOVE.

Exhibit B

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:
    - Acute Toxicity Category I chemicals as identified by the Environmental Protection Agency (EPA)
    - Organophosphate pesticides (e.g., those containing Diazinon, chlorpyrifos or malathion)
    - Pyrethroids (bifenthrin, cyfluthrin, beta-cyfluthrin, cypermethrin, deltamethrin, esfenvalerate, lambda-cyhalothrin, permethrin, and tralomethrin), carbamates (e.g., carbaryl), and fipronil
    - 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

Exhibit C

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

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Exhibit ‘E’

EMERGENCY FORM

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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: Group 2 – Sewer Pump Station Renovations for Reliability and Safety Improvements

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EXHIBIT "F"

PERFORMANCE BOND FORM

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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 _____, 2015, 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

of which shall be deemed an original, this the _____ day of _____, 2015.
(Number)

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

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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 _____, 2015, 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 _____, 2015.

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

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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: _____, 2001. _____

_____
Principal

_____
Surety

By: _____

EXHIBIT "H"

CERTIFICATE OF ACKNOWLEDGMENT

State of California
County of Alameda

On this _____ day of _____ in the year 2014 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

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EXHIBIT "I"

List of Submittals

Group 2 – Sewer Pump Station Renovations for Reliability and Safety Improvements No. P.W. 03-14-10

Shall include but not limited to the following:

Item	Section Reference	Due Date/Frequency
1. Schedule of Values	01125	With Bid Package
2. Contract Bonds	Section I, Paragraph N	Within 10 days of award
3. Certified Payroll	Section II, Paragraph D	Submitted weekly
4. Emergency Form	Exhibit E	Preconstruction meeting
5. Insurance	Contract, Exhibit D	Within 10 days of award
6. Licenses/Permits	Section II, Paragraph I	Preconstruction meeting
7. Traffic Control Plan	Section II, Paragraph P	Preconstruction meeting
8. Technical Submittals	Relevant Technical Specifications	Preconstruction meeting and updated at weekly meetings
9. Stormwater PPP	Section II, Paragraph T	Preconstruction meeting
10. Work Schedule	Section VI, Paragraph A	Preconstruction meeting and updated at weekly meetings
11. Product List	Section 1630	Preconstruction meeting

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

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EXHIBIT "J"

RECYCLED CONTENT STANDARDS

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EXHIBIT "J"

RECYCLED CONTENT STANDARDS

ITEM	MINIMUM % OF RECOVERED MATERIAL	MINIMUM % OF POSTCONSUMER MATERIAL
BINDERS		
Press board cover	up to 100%	20%
Paperboard in plastic covering	up to 100%	75%
Solid plastic cover	up to 100%	25%
Plastic covering	25%	not set
COPIER PAPER	up to 100%	20%
FIBERGLASS INSULATION	30% cullet	not set
FILE STORAGE BOXES	up to 100%	50%
FLEXIBLE DELINEATOR POSTS	up to 100%	25%
INTEROFFICE ENVELOPES	up to 100%	20%
PAPER TOWELS	up to 100%	40%
PLAYGROUND SURFACES	90%	90%
PLASTIC FOOD SERVICE TRAYS		
Durable plastic	up to 100%	25%
Disposable polystyrene	up to 100%	25%
Disposal paper	80%	not set
PLASTIC LUMBER BENCHES	up to 100%	50%
RE-FINED MOTOR OIL	up to 100%	70%
SOIL AMENDMENT - COMPOST	80%	not set
TRASH CANS/ROLLING CARTS		
Plastic	up to 100%	20%
Paper	up to 100%	50%
Plastic rolling cart	up to 100%	10% body, 50% lid
TRASH CANS LINERS	up to 100%	30%
UNBOUND AGGREGATES	up to 100%	not set

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EXHIBIT "K"

WASTE REDUCTION & RECYCLING PLAN (Form)

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CITY OF ALAMEDA

Waste Reduction & Recycling Plan (Form)

Submit to: City of Alameda
Public Works Department
Environmental Services Division
950 West Mall Square, #110
Alameda, CA 94501-7752

Permit No. _____
Project Name _____
• Approved
• Not Approved

Staff Initials _____
Staff Phone # _____
for City's use only

Project Address: _____
Name of Project Manager: _____
Phone Number: _____
Cellular Phone Number: _____
Fax Number: _____

Please provide the following information:

(a) What type is this project? Please check all that apply.

1. • New Construction
2. • Repair
3. • Addition
4. • Move
5. • Alteration
6. • Demolition

(b) What is the size of this project? _____ sq. ft.

(c) What is the permit valuation of this project? $ _____

2. Briefly state how materials will be sorted for recycling, reuse or salvage on the job site.

_____
_____
_____
_____
_____

3. Briefly state how you plan to inform and ensure participation by your workers and any sub-contractors of your Waste Reduction and recycling Plan.

_____
_____
_____
_____
_____

4. Complete page 2 of this Form.

WASTE REDUCTION AND RECYCLING PLAN

For this project identify the materials and quantities that you estimate can be recycled, reused or salvaged. Estimate the amount of solid waste that will be generated and disposed in landfills.

Goal: Reduce materials going to the landfills by 50%

Material Type	Est. Amount (tons/yards)	Proposed Processing Methods (Check all that apply)			
	A	B Recycle	C Reuse	D Salvage	Landfill
Asphalt & Concrete					
Brick/Tile					
Building Fixtures					
(Doors, Windows, Fixtures, etc.)					
Corrugated Cardboard					
Dirt/Clean Fill					
Drywall					
Padding-Carpet/Foam					
Scrap Metal					
Unpainted Wood & Pallets					
Yard Trimmings (Brush, Trees,					
Other (list)					
Garbage-Solid Waste Trash, and Rubbish					
Total					

Do columns (B+C+D) = 50% of column A?

• YES • NO If NO, please explain why.

_____

_____

_____

_____

_____ _____

General Contractor's Signature Date

EXHIBIT "L"

WASTE REDUCTION & RECYCLING PLAN
FINAL SUMMARY REPORT (Form)

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CITY OF ALAMEDA

Permit No. _____
Project Name: _____
Address: _____
_____

Review results:
50% diversion attained
Good faith effort
Non-attained

Staff Initials: _____
Staff Phone # _____

Waste Reduction & Recycling Plan
FINAL SUMMARY REPORT (Form)

At project completion submit to:

City of Alameda
Public Works Department
Environmental Services Division
950 West Mall Square, Room #110
Alameda, CA 94501-7552

(1) List the estimated amounts from your WRRP form for this project.
(2) Indicate actual quantities of materials that were recycled, reused or salvaged from this project.
(3) Describe the handling procedure and destination of each material.
(4) Indicate the **actual** amount of solid waste produced and disposed in a landfill.

Goal: Materials going to the landfills are reduced by 50%

Material Type	**Est. Amount From WRRP (tons/yards)**	**Actual Quantities**				**Handling Procedure/Destination**
	A	B Recycled	C Reused	D Salvaged	Landfilled	
Asphalt & Concrete *(Example)*	70 tons		65 tons		5 tons	ground on-site and resized as fill
Brick/Tile						
Building Fixtures (Doors, Windows, Fixtures, etc.)						
Corrugated Cardboard						
Dirt/Clean Fill						
Drywall						
Padding-Carpet Foam						

Material Type	Est. Amount From WRRP (tons/yards)	Actual Quantities				Handling Procedure/Destination
	A	B Recycled	C Reused	D Salvaged	Landfilled	
Scrap Metal						
Unpainted Wood & Pallets						
Yard Trimmings (Brush, trees, stumps, etc.)						
Other (list)						
Garbage, Solid Waste Trash, Rubbish, Discarded						
Total						

(1) Do Columns (B+C+D) = 50% of column A? YES NO

(2) If estimated amounts from the WRRP were not recycled, reused, or salvaged, please provide a justification.

_____
_____
_____

(3) Please list any recommendation that would help further construction and demoliton recycling in Alameda.

_____
_____
_____

_____ _____
Contractor Signature Date

EXHIBIT "M"

WASTE MANAGEMENT REPORT FOR CONTRACTORS

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EXHIBIT "M"

WASTE MANAGEMENT REPORT
FOR CONTRACTORS

The City of Alameda is requesting that all contractors document materials generated (reused, recycled or landfilled).

Please complete this form each time materials are removed from the site or reused on-site.

JOB SITE LOCATION: _____ DATE: _____

COMPANY: _____

MATERIAL: _____

WAS THE MATERIAL RECYCLED? YES NO

VOLUME/WEIGHT: _____ HAULER: _____

RECYCLING COMPANY OR DISPOSAL SITE: _____

SUBMITTED BY: _____

PHONE NUMBER: _____

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EXHIBIT "N"

City of Alameda Collection & Hauling

of Recyclable Materials

Acknowledgement of Receipt of the City of Alameda Construction & Demolition Debris Information Packet

Construction and Demolition Debris Waste Management Plan (WMP)

Materials Conversion Sheet (Information Only)

Instruction and Worksheet for Mixed Debris Recycling

Construction & Demolition Debris Recycling Summary Report

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EXHIBIT N

ACKNOWLEDGMENT OF RECEIPT OF THE CITY OF ALAMEDA CONSTRUCTION AND DEMOLITION DEBRIS INFORMATION PACKET FOR PROJECTS VALUED AT $100,000 OR MORE

I do hereby acknowledge that I understand the following:

1. I must use the City's franchised waste hauler, Alameda County Industries (ACI) or another permitted hauler (permitted specifically by the City of Alameda).

2. If I choose to haul my own Construction and Demolition (C&D) debris, I must request to become a permitted hauler and apply for and receive a separate hauling permit.

Should I decide to use a permitted hauler, other than ACI, I must provide completed copies of the following forms:

1. C&D Debris Waste Management Plan (WMP) Form
   Due with my Building Permit Application
2. C&D Debris Recycling Summary Report Form
   Due within thirty (30) days of completion of the project.
   No Final Inspection can be scheduled until reports are received and outstanding fees paid.

I, the applicant, understand that failure to observe these guidelines may delay final inspection and issuance of an occupancy permit.

Project Address: _____ Application/Permit #: _____

Applicant Name (print): _____ Title: _____

Company: _____ Project Name: _____

Signature: _____ Date: _____

City Staff Name (print): _____ Date: _____

Kerry Parker, Program Specialist
City of Alameda California
Public Works Department
950 W. Mall Square, Room 110
Alameda, California 94501-7575
Phone: 510-747-7930
Fax: 510-769-6030 / TDD 510-522-7538
kparker@ci.alameda.ca.us

Construction and Demolition Debris
Waste Management Plan (WMP)
Alameda Municipal Code, Chapter XXI, Article VI

This C&D Debris Waste Management Plan must be completed for all construction and demolition projects reasonably valued by the City of Alameda to cost $100,000 or more. Building or demolition permits will not be issued without an approved C&D Debris WMP unless the permit applicant has certified the use of the services of the City's franchise hauler, Alameda County Industries (ACI), as the sole C&D debris hauler for the project.

Please submit the following information to: City of Alameda, Public Works Department, Environmental Services, 950 W. Mall Square, Room 110, Alameda, CA 94501, fax (510) 769-6030. If you have questions, please call (510) 747-7930.

Alameda County Industries (ACI), will be used

Complete and sign the following statement if the City of Alameda's franchised hauler, Alameda County Industries (ACI), will be used as the sole C&D debris hauler for the project.

I (*name of person submitting this form*)_____ hereby certify under the penalty of perjury, per the laws of the State of California, that Alameda County Industries (ACI) will be contracted as the sole service provider to collect and haul the construction and demolition debris related to this project.

Project Application/Permit #: _____ **Project Address**: _____

_____ _____
Signature and Date **Company and Title (if applicable)**

Alameda County Industries (ACI), will not be used

Complete the remaining portions of the form only if the City of Alameda's franchise hauler, Alameda County Industries (ACI), will not be used as the sole C&D debris hauler for the project. Note: only ACI and City of Alameda permitted haulers can collect and haul C&D debris in Alameda.

Name of Permitted Hauler that will be used: _____
Project Application/Permit #: _____ **Project Address**: _____
Contact Name: _____ Title: _____
Company Name: _____
Contact Mailing Address: _____
Phone: _____ Fax: _____ Email: _____

Type of Project: ☐ New Construction ☐ Addition/Alteration ☐ Demolition

Type of Building: ☐ Commercial ☐ Single-Family Residence

☐ Public Building ☐ Multi-Family Residence

Tenant Improvement: ☐ Yes ☐ No

Size of Project _____ sq. ft. Construction Valuation $ _____

Estimated Start Date _____/_____/_____ Estimated Completion Date _____/_____/_____

Briefly state how solid waste materials will be handled **at this project site** to ensure salvage/reuse or recycling. Also explain how you will inform the workers/sub-contractors of your Waste Management Plan requirements and ensure their participation (attach additional sheets if necessary).

Requirement: reduce the quantity of materials <u>disposed</u> at landfills by 50% or more (determined by weight)

Column A – List **<u>estimated quantity</u>** of waste for each material type (in **tons**). To convert other units (e.g. cubic yards) to tons, use the attached Materials Conversion Worksheet. *This includes demolition debris <u>and</u> discarded materials/scrap generated during construction.*
Columns B, C – List **<u>estimated quantities</u>** to be reused, recycled or disposed.
Column D – State the name of all vendors or facility you plan to reuse, recycle or dispose of material listed. See example below for cases where more than one facility was used for a particular material type.
Column Totals – Add up all quantities listed in Columns A, B and C.
Recycled Mixed Debris – This category is only for mixed debris loads that will be taken to a <u>recognized</u> facility (please refer to list of Mixed Debris Recycling Facilities). Use the Materials Conversion Sheet to calculate the quantity of mixed materials that can be credited towards recycling. Receipts must be provided with your Summary Report (due at project completion) to receive recycling credit.

Application/Permit # _____ Project Address: _____

Proposed Material Handling Methods – Indicate quantities (in tons only) for each material listed.

Material Type	**A Total Quantity Discarded**	**B Reuse/Recycling**	**C Disposal**	**D Proposed Destination(s)**
Example: Cardboard	2 tons	1.5 tons	0.5 tons	(Recycle) Davis St. Recycling Center (Disposal) Davis St. Transfer Station
Asphalt				
Concrete				
Brick/Masonry/Tile				
Cabinets, doors, fixtures, windows (circle all that apply)				
Carpet				
Carpet padding/Foam				
Ceiling tile (acoustic)				
Drywall (used)				
Drywall (new, unpainted sheets or scrap)				
Landscape debris (brush, trees, stumps, etc.)				
Scrap metal				
Unpainted wood and pallets				
Garbage/Trash				
Other (do not include dirt) Material: _____				
Recycled mixed debris (see instructions above)				
Column Totals	A	B	C	D

- Fill in the blanks below to determine if your plan meets the City's requirement of reducing project waste disposal by 50% or more.
- Column Totals B _____ ÷ A = _____ x 100 = _____ %
- Is the percentage calculated greater than or equal to 50%? ☐ YES ☐ NO. If no, explain why:

_____
_____
_____

Name: _____ Signature: _____ Date: _____

Send completed form to Public Works Department, Environmental Services

INFORMATION ONLY

Materials Conversion Sheet

The following table lists materials typically generated from a construction or demolition project and provides assistance in converting common units (i.e. cubic yards (cy), square feet (sq ft) and board feet (bd ft)) to tons. Use these conversion factors and receipts from previous projects to help you estimate the amount of materials and waste.

Material	**Unit**	**Tons/unit**
Asphalt	By cubic yard	0.7 tons/cy
Brick	Broken – By cubic yard Whole, palletized – By cubic yard	0.7 tons/cy 1. 512 tons/cy
Building Materials (doors, windows, cabinets, etc.)	By cubic yard	0. 15 tons/cy
Cardboard	By cubic yard	0.05 tons/cy
Carpet	By square foot By cubic yard	0.0005 tons/sq ft 0.3 tons/cy
Carpet Padding/Foam	By square foot	0.000125 tons/sq ft
Ceiling Tiles	Whole (palletized) – By square foot Loose – By cubic yard	0.0003 tons/sq ft 0.0875 tons/cy
Concrete	Broken – By cubic yard Solid slab - By cubic yard	0. 9 tons/cy 1.3 tons/cy
Drywall (new or used)	1/2" (by square foot) 5/8" (by square foot) Demo/used (by cubic yard)	0.0008 tons/sq ft 0.00105 tons/sq ft 0. 25 tons/cy
Landscape Debris (brush, trees, etc.)	By cubic yard	0. 15 tons/cy
Masonry block (broken)	By cubic yard	0.6 tons/cy
Scrap Metal	By cubic yard	0. 453 tons/cy
Tile	By square foot	0. 00175 tons/sq ft
Unpainted Wood & Pallets	By board foot By cubic yard	0.001375 tons/bd ft 0. 15 tons/cy
Wood (chipped)	300 - 650 lbs/cy	0.15 – 0.3 tons/cy
Garbage/Trash	By cubic yard	0. 175 tons/cy

Examples: 1,000 square feet carpet (old, removed) x 0. 0005 tons/square feet = 0. 5 tons carpet
5 cubic yards of broken concrete x 0. 9 tons/cubic yard = 4. 5 tons broken concrete

Instructions and Worksheet for Mixed Debris Recycling

There are several options for recycling Mixed Construction and Demolition Debris in the San Francisco Bay Area. However, the types and percentage of materials recovered from mixed loads (and the quantity your project will be credited for recycling) differs with each facility. See "% Recycled" column in table below.

Alameda County Facilities*	**Address**	**% Recycled**
Davis Street Transfer Station** (Self Haul Only)	2615 Davis St., San Leandro (510) 638-2303	60%
Out of County Facilities*	**Address**	**% Recycled**
Guadalupe Landfill	15999 Guadalupe Mines Road, San Jose (408) 268-1670	60%
Marin Resource Recovery Center	565 Jacoby Street, San Rafael (415) 485-5647	60%
Newby Island Landfill	1601 Dixon Landing Road, San Jose (408) 262-1401	60%
Sanitary Fill Company	501 Tunnel Ave., San Francisco (415) 330-1400	60%
Zanker Material Processing Facility	705 Los Esteros Road, San Jose (408) 263-2384	70%

* Listing in this directory is not a recommendation or endorsement by the City of Alameda. Please call the facilities first to determine prices as well as types and quantities of materials accepted.
** For recycling you must request (a) that materials be sorted for recycling, and (b) a receipt documenting recycling.

To calculate the quantity of materials you can count towards meeting the City's waste reduction and recycling requirements, use the worksheet below. Use estimated quantities for your C&D Debris WMP. For your C&D Debris Recycling Summary Report, you are required to provide actual quantities based on weight tags or other verifiable documents.

1. Enter estimated quantity of Recycled Mixed Debris for the facility. If your estimate is based on tons, enter the quantity directly in Column III. If your estimate is based on cubic yards (cy), follow the steps below:
   i. Enter the quantity in Column I.
   ii. Multiply by tons/unit (Column II).
   iii. Enter the result in Column III.
2. Multiply total from Column II by Mixed Debris recycling credit (Column IV).
3. Enter total tons of mixed debris generated from Column III into Column A of Recycled Mixed Debris category in your C&D Debris WMP or Recycling Summary Report.
4. Enter total Column V in Column B of C&D Debris WMP or Recycling Summary Report.

Recycled Mixed Debris Worksheet

Facility	**Column I** **Total Cubic Yards**		**Column II** **tons/cy**		**Column III** **Total tons (To Column A)**		**Column IV** **Recycling Credit**		**Column V** **Total Recycled (To Column B)**
Davis Street	_____ cy	x	0.175	=	_____	x	0.60	=	_____
Guadalupe Lndfl.	_____ cy	x	0.175	=	_____	x	0.60	=	_____
Marin Res. Rec.	_____ cy	x	0.175	=	_____	x	0.60	=	_____
Newby Is. Lndfl.	_____ cy	x	0.175	=	_____	x	0.60	=	_____
Sanitary Fill Co.	_____ cy	x	0.175	=	_____	x	0.60	=	_____
Zanker MPF	_____ cy	x	0.175	=	_____	x	0.70	=	_____

Construction and Demolition Debris

Recycling Summary Report

This C&D Debris Recycling Summary Report must be completed for all construction and demolition projects reasonably valued by the City of Alameda to cost $100,000 or more. Completed Summary Reports must be submitted to the City of Alameda prior to: Final Inspection, issuance of Certificate of Occupancy or Temporary Certificate of Occupancy. A separate Summary Report is required for each permit issued.

Please submit the completed C&D Debris Recycling Summary Report within thirty (30) days after the completion of the project to: City of Alameda, Public Works Department, Environmental Services, 950 W. Mall Square, Room 110, Alameda, CA 94501, fax (510) 769-6030. If you have questions, please call (510) 747-7930.

Complete and sign the following statement only if the City of Alameda's franchise hauler, Alameda County Industries (ACI), was used as the sole C&D hauler for the project. You might be asked to submit documents to prove that only ACI provided C&D hauling services related to this project.

I (*name of person submitting this form*)_____ hereby certify under the penalty of perjury, per the laws of the State of California, that Alameda County Industries (ACI) was contracted as the sole service provider to collect and haul the construction and demolition debris related to this project.

Project Application/Permit #: _____ **Project Address**: _____

_____ _____

Signature and Date **Company and Title (if applicable)**

Complete all the remaining portions of this Summary Report only if the City of Alameda's franchise hauler, Alameda County Industries (ACI), was not used as the sole C&D debris hauler for the project. Please provide proof that only City of Alameda permitted haulers were used for the project.

Project Application/Permit #: _____ **Project Address**: _____

Contact Name: _____ Title: _____

Company Name: _____

Contact Mailing Address: _____

Phone: _____ Fax: _____ Email: _____

Type of Project: ☐ New Construction ☐ Addition/Alteration ☐ Demolition

Type of Building: ☐ Commercial ☐ Single-Family Residence

☐ Public Building ☐ Multi-Family Residence

Tenant Improvement: ☐ Yes ☐ No

Size of Project _____sq. ft. Construction Valuation $ _____ Completion Date ___/___/___

Name of hauler company(ies) used for the project: _____

_____

For City Use Only. ☐ Documentation Requested ☐ Documentation Provided

Permit No. _____ Submitted ____/ ____/ ____

Project Name _____ Inspector's Name _____

ESD Staff Initials _____ Received ____/ ____/ ____ Type of Assistance _____

Applicant Contacted ____/ ____/ ____ Time Spent _____

☐ 50% Diversion ☐ Good Cause ☐ Non-Attainment (Percent Diverted _____%)

Reason for non-attainment:

Requirement: reduce the quantity of materials disposed at landfills by 50% or more (determined by weight)
Column A – List **actual quantity** of waste for each material type (in **tons**). To convert other units (e.g. cubic yards) to tons, use the attached Materials Conversion Worksheet. *This includes demolition debris and discarded materials/scrap generated during construction.*
Columns B, C – List **actual** quantities reused, recycled or disposed.
Column D – State the name of all vendors or facilities you utilized for reuse, recycling or disposal of materials listed. See example below for cases where more than one facility was used for a particular material type.
Column Totals – Add up all quantities listed in Columns A, B and C.
Recycled Mixed Debris – This category is only for mixed debris loads that were taken to a recognized facility (please refer to list of Mixed Debris Recycling Facilities). Use the Materials Conversion Sheet to calculate the quantity of mixed materials that can be credited towards recycling. Receipts must be provided with your C&D Debris Recycling Summary Report (due at project completion) to receive recycling credit.

Application/Permit # _____ Project Address: _____

Actual Material Handling Methods – Indicate quantities (in tons only) for each material listed.

Material Type	A Total Quantity Discarded	B Reused/Recycled	C Disposed	D Actual Destination(s)
Example: Cardboard	2.4 tons	1.8 tons	0.6 tons	(Recycle) Davis St. Recycling Center (Disposal) Davis St. Transfer Station
Asphalt				
Concrete				
Brick/Masonry/Tile				
Cabinets, doors, fixtures, windows (circle all that apply)				
Carpet				
Carpet padding/Foam				
Ceiling tile (acoustic)				
Drywall (used)				
Drywall (new, unpainted sheets or scrap)				
Landscape debris (brush, trees, stumps, etc.)				
Scrap metal				
Unpainted wood and pallets				
Garbage/Trash				
Other (do not include dirt) Material: _____				
Recycled mixed debris (see instructions above)				
Column Totals	A	B	C	D

- Fill in the blanks below to determine if your plan meets the City's requirement of reducing project waste disposal by 50% or more.
- Column Totals B _____ ÷ A = _____ x 100 = _____ %
- Is the percentage calculated greater than or equal to 50%? ☐ YES ☐ NO. If no, explain why:

_____
_____

Name: _____ Signature: _____ Date: _____

Send completed form to Public Works Department, Environmental Services

EXHIBIT "O"

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

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

The City of Alameda (City) is mandated to:

(c) Minimize its reliance on pesticides that threaten water quality, and
(d) 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:
    - Acute Toxicity Category I chemicals as identified by the Environmental Protection Agency (EPA)
    - Organophosphate pesticides (e.g., those containing Diazinon, chlorpyrifos or malathion)
    - Pyrethroids (bifenthrin, cyfluthrin, beta-cyfluthrin, cypermethrin, deltamethrin, esfenvalerate, lambda-cyhalothrin, permethrin, and tralomethrin), carbamates (e.g., carbaryl), and fipronil
    - 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

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EXHIBIT "P"

STANDARDIZATION OF MAJOR EQUIPMENT COMPONENTS FOR SEWER PUMP STATIONS

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EXHIBIT "P"

STANDARDIZATION OF MAJOR EQUIPMENT COMPONENTS 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 16427 - Power Pedestals
• Unitronics Pump Controller	Section 16427 – Power Pedestals
• Hydrostatic (Pressure) Level Transmitter	Section 16427 – Power Pedestals, and sheet notes
• Float Type Level Switches Floats	Section 16427 – Power Pedestals

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EXHIBIT "Q"

SPECIAL INSPECTION AND TESTING

AGREEMENT FORM

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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 2-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.

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

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		

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

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.

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 wetwell, manhole, 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

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**

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	3121 Diablo Avenue 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 EVALUATION

GEOTECHNICAL INVESTIGATION

for

WILLOW-WHITEHALL SEWER PUMP STATION
Alameda, California

Prepared For:

City of Alameda
Department of Public Works
West City Hall
950 West Mall Square, Room 110
Alameda, California

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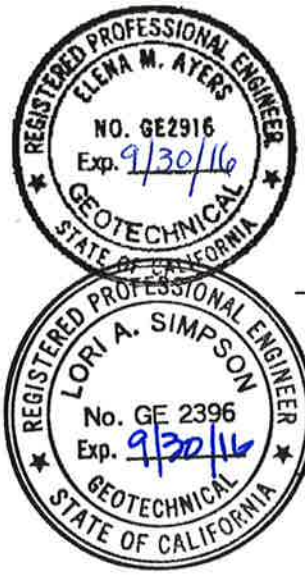

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Senior Project Manager

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Principal

22 December 2014
750513314

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GEOTECHNICAL INVESTIGATION
WILLOW-WHITEHALL SEWER PUMP STATION
Alameda, California

1.0 INTRODUCTION

This report presents the results of the geotechnical investigation performed by Langan Treadwell Rollo for the planned Willow-Whitehall Sewer Pump Station project in Alameda, California. This investigation was performed in accordance with our revised proposal dated 22 October 2014. This report presents our conclusions and recommendations regarding geotechnical aspects of the project.

The project is located along four blocks of Willow Street in southern Alameda, as shown on Figure 1. The site is bordered by Otis Drive on the northeast, Shoreline Drive on the southwest, and commercial and residential properties on the northwest and southeast, as shown on Figure 2. The ground surface elevation at the site ranges from about 4.5 feet to 5.5 feet.[1] The site is located in an area of Alameda that consists of reclaimed land extending from the original bay margin to the present shoreline.

We understand the project consists of construction of a new pump station, including a wet well, force main, gravity sewer pipe, below-grade utility vaults, and equipment panel on the northwest side of Willow Street at the intersection of Whitehall Place. The pump station wet well will be located in Willow Street beneath the parking lane and will extend about 15 feet to about Elevation -9.0 feet (not including the foundation slab). The control panel will be located adjacent to the wet well in the landscaping area between the street and sidewalk. A new 10-foot-deep manhole will be constructed at the existing sanitary sewer line near the Willow Street centerline, and the new gravity sewer main will be installed between the new wet well, new manhole, and an existing manhole near the center of the Willow-Whitehall

[1] Elevations referenced in this report are based on the 90% project plans titled "City of Alameda, Group 2 – Sewerage Pump Station Renovations for Reliability and Safety Improvements, Alameda, California, Project No. PW 03-14-10," prepared by Schaff & Wheeler, October 2014.

intersection. The new force main will be constructed between the new wet well and an existing manhole on Willow Street just northeast of Whitehall Place.

The project also includes installation of approximately 1,660 feet of new 8-inch-diameter gravity sewer line between Shoreline Drive and Otis Drive. Between Shoreline Drive and the new Willow-Whitehall pump station, the sewer line will be constructed using open cut trenching methods. Between the new pump station and Otis Drive, the gravity sewer line will be installed within an existing alignment using pipe bursting techniques. Several new manholes, ranging from about 6 to 10 feet deep, will be installed along the sewer alignment.

We understand that existing improvements at the site will be demolished and removed prior to construction of new pump station and sewer line. An existing 2-inch-diameter gas main beneath Willow Street will be rerouted around the proposed pump station construction area.

2.0 SCOPE OF SERVICES

The purpose of our investigation was to evaluate subsurface conditions at the site and provide conclusions and recommendations for the geotechnical aspects of the design of the project. In accordance with our revised proposal dated 22 October 2014, our scope of services consisted of exploring the subsurface conditions at the site and performing engineering analyses to develop conclusions and recommendations regarding:

- soil and groundwater conditions
- site seismicity and seismic hazards
- mitigation of seismic hazards
- foundation base material and depth for the wet well and manholes
- temporary cut slopes and shoring
- excavation and dewatering

- utility trenches
- criteria for protection of nearby existing structures and property improvements, including relocation of the existing gas main
- criteria for utility trench backfill quality and compaction
- construction considerations.

3.0 FIELD INVESTIGATION

3.1 Current Investigation

Subsurface conditions were explored at the site by advancing five cone penetration tests (CPTs), designated CPT-1 through CPT-4A. CPT-2 was advanced near the planned pump station location and the remaining CPTs were performed along the proposed sewer line alignment, as shown on Figure 2. Prior to performing our field investigation, we notified Underground Service Alert and retained a private underground utility locating service to check that locations of exploratory points were clear of existing utilities. In addition, we obtained a drilling permit from Alameda County Public Works Agency (ACPWA) and right-of-way and encroachment permits for street work from the City of Alameda.

The CPTs were advanced to depths between about 50 and 90 feet below the existing ground surface (bgs) on 25 November 2014 by Middle Earth Geo Testing, Inc. of Fremont, California. Initially, only four CPTs were planned. Upon completion of CPT-4, it was determined that the CPT had bottomed in a weak and compressible soil deposit at a depth of about 50 feet bgs. Additionally, a pore pressure dissipation test conducted in CPT-4 failed to measure the groundwater level. An additional CPT, designated CPT-4A, was advanced about three feet south of CPT-4 to a depth of about 90 feet bgs to evaluate the full thickness of the compressible soil deposit and obtain a groundwater level reading.

The CPTs were performed by hydraulically pushing a 1.4-inch-diameter, cone-tipped probe with a projected area of 10 square centimeters into the ground. The cone-tipped probe measures tip

resistance, and the friction sleeve behind the cone tip measures frictional resistance. Electrical strain gauges within the cone continuously measure soil parameters for the entire depth advanced. Soil data, including tip resistance and frictional resistance, were recorded by a computer while the test was conducted. Accumulated data was processed by computer to provide engineering information such as the types and approximate strength characteristics of the soil encountered. The CPT logs, showing tip resistance, friction resistance, friction ratio, interpreted standard penetration test blow counts, and soil classifications by depth, are presented in Appendix A on Figures A-1 through A-5.

Upon completion, the CPT holes were backfilled with cement grout and pavement surfaces were patched. A representative from the City of Alameda Public Works Department was present to observe the grouting.

3.2 Previous Investigation by Others

Previous investigations were performed in the site vicinity by Ninyo and Moore and Peter Kaldveer and Associates, Inc., the results of which were presented in reports dated 24 July 2012 and 20 September 1983, respectively. The approximate locations of the nearest borings from these reports are presented on Figure 2; the borings logs are presented in Appendix B.

4.0 SUBSURFACE CONDITIONS

Subsurface information from our field investigation and the available borings by others indicate the site is underlain by about 10 to 20 feet of fill consisting of soil predominantly interpreted as medium dense to dense sand with variable fines content. The fill is underlain by soil interpreted as soft to medium stiff, compressible clay with variable silt content (known locally as Bay Mud) and medium stiff to very stiff silt with variable clay content. At CPT-1 through CPT-3, the clay and silt layer is about 13 to 25 feet thick, and at CPT-4 and -4A, this layer is about 60 feet thick.

The clay and silt are underlain by soil interpreted as medium dense to very dense sand with variable gravel and fines content to the maximum depth explored of 90 feet bgs.

During our investigation, groundwater was encountered in the CPTs at the depths shown in Table 1. The groundwater level is expected to vary due to seasonal fluctuations of rainfall and with the tides.

TABLE 1
Measured Groundwater Levels

CPT No.	Depth to Groundwater (feet, bgs)
CPT-1	7.1
CPT-2	3.3
CPT-3	2.8
CPT-4	not measured
CPT-4A	3.3

5.0 REGIONAL SEISMICITY AND FAULTING

The major active faults in the area are the Hayward, San Andreas, Calaveras, and Mount Diablo Thrust faults. These and other faults of the region are shown on Figure 3. For each of the active faults within 50 kilometers (km) of the site, the distance from the site and estimated maximum Moment magnitude[2], M_w, [2007 Working Group on California Earthquake Probabilities (WGCEP, 2008) and Cao, et al. (2003)] are summarized in Table 2.

[2] Moment magnitude is an energy-based scale and provides a physically meaningful measure of the size of a faulting event. Moment magnitude is directly related to average slip and fault rupture area.

TABLE 2
Regional Faults and Seismicity

Fault Segment	Approximate Distance from Site (km)	Direction from Site	Mean Characteristic Moment Magnitude
Total Hayward	7.3	Northeast	7.00
Total Hayward-Rodgers Creek	7.3	Northeast	7.33
N. San Andreas - Peninsula	22	West	7.23
N. San Andreas (1906 event)	22	West	8.05
Total Calaveras	23	East	7.03
Mount Diablo Thrust	23	Northeast	6.70
Green Valley Connected	28	East	6.80
N. San Andreas - North Coast	28	West	7.51
San Gregorio Connected	30	West	7.50
Monte Vista-Shannon	36	South	6.50
Greenville Connected	40	East	7.00
Rodgers Creek	40	Northwest	7.07
West Napa	45	North	6.70
Great Valley 5, Pittsburg Kirby Hills	46	Northeast	6.70

Figure 3 also shows the earthquake epicenters for events with magnitude greater than 5.0 from January 1, 1800 through August 2014. Since 1800, four major earthquakes have been recorded on the San Andreas Fault. In 1836, an earthquake with an estimated maximum intensity of VII on the Modified Mercalli (MM) scale (Figure 4) occurred east of Monterey Bay on the San Andreas Fault (Toppozada and Borchardt 1998). The estimated Moment magnitude, M_w, for this earthquake is about 6.25. In 1838, an earthquake occurred with an estimated intensity of about VIII-IX (MM), corresponding to a M_w of about 7.5. The San Francisco Earthquake of 1906 caused the most significant damage in the history of the Bay Area in terms of loss of lives and property damage. This earthquake created a surface rupture along the San Andreas Fault from Shelter Cove to San Juan Bautista approximately 470 km in length. It had a maximum intensity of XI (MM), a M_w of about 7.0, and was felt 560 km away in Oregon, Nevada, and Los Angeles.

The Loma Prieta Earthquake occurred on 17 October 1989, in the Santa Cruz Mountains with a M_w of 6.9, approximately 87 km from the site.

In 1868, an earthquake with an estimated maximum intensity of X on the MM scale occurred on the southern segment (between San Leandro and Fremont) of the Hayward Fault. The estimated M_w for the earthquake is 7.0. In 1861, an earthquake of unknown magnitude (probably a M_w of about 6.5) was reported on the Calaveras Fault. The most recent significant earthquake on this fault was the 1984 Morgan Hill earthquake (M_w=6.2). The most recent earthquake felt in the Bay Area occurred on 24 August 2014 and was located on the West Napa Fault, approximately 52 km north of the site, with a M_W of 6.0.

The 2007 WGCEP at the U.S. Geologic Survey (USGS) predicted a 30-year probability of a magnitude 6.7 or greater earthquake occurring in the San Francisco Bay Area to be about 63 percent. More specific estimates of the probabilities for different faults in the Bay Area are presented in Table 3.

TABLE 3
WGCEP (2008) Estimates of 30-Year Probability of a Magnitude 6.7 or Greater Earthquake

Fault	Probability (percent)
Hayward-Rodgers Creek	31
N. San Andreas	21
Calaveras	7
San Gregorio	6
Concord-Green Valley	3
Greenville	3
Mount Diablo Thrust	1

6.0 DISCUSSION AND CONCLUSIONS

We conclude that from a geotechnical standpoint, the pump station, sewer lines, and associated improvements can be installed as planned, provided the recommendations presented in this report are incorporated into the project plans and specifications and are implemented during construction. The primary geotechnical issues to be addressed for the project are the difficulty of constructing the improvements below the groundwater level and the presence of potentially-liquefiable soil at the site. Our conclusions regarding these and other issues are discussed in the remainder of this section.

6.1 Seismic and Geologic Hazards

During a major earthquake on one of the nearby faults, strong to very strong shaking is expected to occur at the site. Strong shaking during an earthquake can result in ground failure such as that associated with soil liquefaction,[3] lateral spreading,[4] and cyclic densification.[5] We used the results of the CPTs to evaluate the potential for these phenomena to occur at the site. The results of our evaluation are presented below.

6.1.1 Fault Rupture

Historically, ground surface displacements closely follow the trace of geologically young faults. The site is not within an Earthquake Fault Zone, as defined by the Alquist-Priolo Earthquake Fault Zoning Act, and no active or potentially active faults exist on the site. In a seismically active area, the remote possibility exists for future faulting in areas where no active faults

[3] Liquefaction is a transformation of soil from a solid to a liquefied state during which saturated soil temporarily loses strength resulting from the buildup of excess pore water pressure, especially during earthquake-induced cyclic loading. Soil susceptible to liquefaction includes loose to medium dense sand and gravel, low-plasticity silt, and some low-plasticity clay deposits.

[4] Lateral spreading is a phenomenon in which surficial soil displaces along a shear zone that has formed within an underlying liquefied layer. Upon reaching mobilization, the surficial blocks are transported downslope or in the direction of a free face by earthquake and gravitational forces.

[5] Cyclic densification is a phenomenon in which non-saturated, cohesionless soil is compacted by earthquake vibrations, causing differential settlement.

previously existed; however, we conclude the risk of surface faulting and consequent secondary ground failure from previously unknown faults is low.

6.1.2 Soil Liquefaction and Associated Hazards

The California Geological Survey (CGS)[6] has prepared a map titled *State of California Seismic Hazard Zones, Oakland West Quadrangle*, *Official Map,* dated 14 February 2003. This map was prepared in accordance with the Seismic Hazards Mapping Act of 1990. The project site is within a mapped liquefaction hazard zone, as shown on Figure 5.

A peak ground acceleration (PGA) of 0.59g was used for the project. This PGA was calculated using the procedures specified in the provisions of 2013 California Building Code (CBC)/ASCE 7-10 for the Maximum Considered Earthquake, using site class D. We assumed an earthquake magnitude of 7.3, which is the maximum Moment magnitude for the Hayward Fault, located 7.3 km from the site, as shown on Table 2. Groundwater levels used in our analyses were based on the water levels measured in the CPTs.

The liquefaction analyses were performed in accordance with the methodology presented in the publication titled *Proceedings of the NCEER Workshop on Evaluation of Liquefaction Resistance of Soils*, prepared by the National Center for Earthquake Engineering Research (NCEER), dated 31 December 1997. The susceptibility of sand to liquefaction under seismic loading was evaluated in general accordance with the procedure presented by Seed and Idriss (1982). The results of our liquefaction analysis using the CPT data indicates there are zones of medium dense granular soil below the groundwater table that are susceptible to liquefaction (FS_{liq}<1.3) following a major earthquake on a nearby fault. Table 4 presents a summary of the calculated liquefaction-induced settlements for each CPT.

[6] Formerly the California Division of Mines and Geology.

TABLE 4
Summary of Calculated Liquefaction-Induced Settlement

CPT No.	Calculated Liquefaction-Induced Settlement (inches)
CPT-1	4.0
CPT-2	3.6
CPT-3	2.3
CPT-4	1.5
CPT-4A	2.1

Based on our liquefaction analyses, we conclude that between 2 and 4 inches of liquefaction-induced settlement could occur at the site as a result of a major earthquake on a nearby fault. Differential settlement on the order of 1 inch could occur over short distances.

The project drawings indicate the wet well invert will be approximately 15 feet bgs (corresponding to Elevation -9 feet). Assuming the wet well foundation slab will be about 6 to 12 inches thick and that 12 inches of crushed rock will be placed beneath the slab as shown on the drawings, we anticipate that the wet well excavation will extend through existing sand fill into native clay and clayey silt. We calculate that on the order of 2¼ inches of liquefaction-induced settlement could occur beneath the wet well; however, the liquefaction will occur about 13 feet below the bottom of the wet well foundation slab in the sand underlying the clay and silt layer. Therefore, we conclude that the potential for loss of bearing support as a result of liquefaction beneath the wet well is low.

The liquefaction-induced settlements should be anticipated in the design of the pump station structures and planned sewer alignment, and use of flexible joints where the utilities connect to the wet well and manholes should be considered. However, it is possible that even with

flexible connections, significant repair of the proposed improvements may be required as a result of damage from a major earthquake.

The potential for liquefaction-induced ground rupture and sand boils to occur at the site depends on the thickness of the liquefiable soil layer relative to the thickness of the overlying non-liquefiable material. Ishihara (1985) presented an empirical relationship that provides criteria that can be used to evaluate whether liquefaction-induced surface ruptures and sand boils would be expected to occur under a given level of shaking for a liquefiable layer overlain by a non-liquefiable surficial layer. The potentially-liquefiable soil layers encountered in the CPTs are relatively shallow (about 3 to 9 feet bgs) and relatively thick (about 1 to 7 feet). Therefore, we conclude there is a possibility for liquefaction-induced ground rupture or sand boils to occur in isolated areas in the vicinity of the site during a major earthquake on a nearby fault.

6.1.3 Lateral Spreading

Lateral spreading occurs when a continuous layer of soil liquefies at depth and the soil layers above move toward an unsupported face, such as an open slope cut, or in the direction of a regional slope or gradient. The potential for lateral spreading to occur at a site is typically evaluated using an empirical relationship developed by Youd et al. (2002). This relationship incorporates the thickness of the liquefiable layer, the fines content and mean grain-size diameter of the liquefiable soil, the relative density of the liquefiable soil, the magnitude and distance of the earthquake from the site, the slope of the ground surface, and boundary conditions (such as a free face or edge of shoreline), to estimate the horizontal ground movement.

In our analysis, we considered site grades sloping at about one percent. The corrected SPT $(N_1)_{60}$ blow counts for the potentially-liquefiable soil layers in the CPTs are generally greater than 15, with the exception of thin layers (about 2 to 7 feet thick) encountered in each CPT between depths of about 11 to 22 feet bgs. Soil layers with corrected blowcounts greater than 15 are considered too dense to laterally spread. However, we conclude that the layers with SPT $(N_1)_{60}$ blow counts less than 15 are susceptible to lateral spreading during a large earthquake on a

nearby fault. Based on the results of our analyses, we conclude that within the project site, isolated areas of the ground surface may move laterally up to about 3 feet during a major earthquake. Larger lateral ground movements may occur along the free face of the shoreline that borders the site to the southwest.

6.1.4 Cyclic Densification

Seismically induced compaction or densification of nonsaturated sand (sand above the groundwater table) caused by earthquake vibrations can result in settlement of the ground surface. The soil above the groundwater level generally consists of medium dense to dense sand with variable fines content. We compute that surface improvements within these non-saturated granular layers will settle less than 1/4 inch as a result of cyclic densification during strong shaking from a large earthquake, with a possibility of abrupt differential settlements of up to 1/4 inch.

6.2 Foundation Design and Settlement

Based on the results of our investigation, the majority of the planned pump station wet well will be below groundwater and the soil below the wet well will consist of soft to medium stiff clay. The subgrade soil has low strength and high compressibility. We judge the wet well and other below-grade structures should be supported on mat foundations, which can provide adequate support of the improvements and help reduce potential differential settlement. In addition, if the mat is designed to extend beyond the walls of the below-grade structure, the soil overlying the mat extensions can be used to help resist buoyancy forces associated with the shallow groundwater table. Because the subgrade soil will be soft and easily disturbed, we conclude the wet well mat will need to be underlain by a working pad consisting of either 12 inches of open-graded crushed rock wrapped in reinforcement geotextile (Mirafi 600x or equivalent) or lean concrete. Additional construction considerations regarding installation of the wet well are discussed in Sections 6.3 and 6.4. Recommendations for design of the below-grade structures are provided in Section 7.2 and 7.3.

At grade improvements, including the equipment panel, will be underlain by existing sandy fill. We conclude at grade improvements can be supported on a concrete pad bearing on 12 inches of compacted Caltrans Class 2 aggregate base (AB) over the existing sandy fill. The soil subgrade should be prepared in accordance with our recommendations in Section 7.1.

The proposed improvements are generally lightweight, and the below-grade structures will have relatively low net bearing pressures[7]. We estimate total static settlement of the wet well will be less than 1/2 inch. We anticipate settlement of the mats for at-grade improvements, including the equipment panel, which will be supported in existing fill, will be less than one inch. A majority of these static settlements will occur during construction. Additional settlement will likely occur beneath the structures immediately after a major seismic event, as discussed in Section 6.1. Where ground surface ruptures or movement occur as a result of liquefaction during a major earthquake, the planned sewer elements may require significant repair.

Because it will extend below the groundwater level, the wet well will need to be waterproofed, if groundwater intrusion is not acceptable, and designed to resist hydrostatic uplift loads.

6.3 Excavation and Shoring

We anticipate an excavation on the order of 17 feet will be needed to install the wet well; this includes the thickness of the mat and an additional 1 foot of excavation for placement of a crushed rock pad. In addition, excavations on the order of 2 to 10 feet will be needed to install the planned manholes, utility boxes, and for open-cut utility trenches. The soil to be excavated consists of sand, which can be excavated using conventional earth-moving equipment such as loaders and backhoes. Temporary shoring of the excavations will be required where temporary slopes are not possible because of space constraints.

[7] Net bearing pressure is the pressure imposed by the weight of the structure/improvements less the weight of the soil removed.

The excavations for the wet well and manholes will extend below groundwater. It is also likely that groundwater will be encountered in some of the open-cut trench excavations for the sewer. Where excavations extend below the groundwater level, braced or cantilevered sheet piles can be used to reduce the lateral flow of groundwater into the excavation, thus reducing the amount of water to be pumped during construction. Sheet piles consist of interlocking steel sheets that are vibrated into the ground to create a continuous shoring wall. A disadvantage of sheet piles are the vibrations associated with installation of the sheets; vibration monitoring may be required to reduce the potential for damaging nearby improvements. In addition, based on recent experience on other pump station projects, we anticipate vibrations caused during the extraction of the sheet piles may result in settlement of below-grade structures bearing on soft or loose soil or crushed rock. We therefore conclude that if sheet piles are used for shoring, consideration should be given to leaving the sheet piles in place after the below grade structures have been installed.

6.4 Groundwater and Dewatering

As discussed in Section 4.0 and summarized in Table 1, groundwater was measured in the CPTs at depths ranging from about 3 to 7 feet bgs. The groundwater levels observed during our investigation do not represent stable groundwater conditions; nearly saturated soil is likely present in a zone approximately 1 to 2 feet higher than the measured groundwater level. In addition, the water level at the site will be influenced by seasonal rainfall and the tides. We conclude a design groundwater level of 2 feet bgs is appropriate for the project.

As discussed in Section 6.3, we anticipate the excavation for the wet well will extend below groundwater. Groundwater may also be encountered in some of the open-cut trench excavations. Dewatering will be required when excavations extend below groundwater. During installation of the wet well, the groundwater inside the wet well excavation will need to be lowered to a depth of at least three feet below the bottom of the planned excavation and maintained at that level until sufficient weight and/or uplift capacity is available to resist the hydrostatic uplift pressure.

We anticipate dewatering will consist of a series of dewatering wells surrounding the perimeter of the area to be dewatered. The wells would be "continuously" pumped using float switches to maintain the groundwater level at least three feet below the base of the excavation. Considering the relatively high permeability of the sandy soil at the site, dewatering will likely generate a large volume of water. As previously discussed, the use of sheet pile shoring would reduce the lateral flow of groundwater into the excavation and the volume of water to be pumped.

7.0 RECOMMENDATIONS

Our recommendations regarding earthwork, pump station design, excavation, temporary shoring, and other geotechnical aspects of the project are presented in this section.

7.1 Earthwork

7.1.1 Site Preparation

Site preparation should include removal of all existing structures, pavements, and underground utilities that will interfere with the planned construction. Underground utilities to be abandoned should be removed to service connections or to the limits of the project and properly capped or plugged with concrete. Where existing utility lines will not interfere with the proposed construction, they may be abandoned in-place provided the lines are filled with lean concrete or cement grout.

We understand the existing 2-inch-diameter gas main beneath the planned pump station site will need to be relocated outside the construction area prior to excavation for the pump station. From a geotechnical perspective, the gas main should be relocated outside the work area a minimum horizontal distance of at least 5 feet from the edge of any planned excavation. This distance should be confirmed by the project civil engineer and the gas utility company. Excavations adjacent to the relocated gas main will need to be shored or sloped in accordance with OSHA requirements.

From a geotechnical standpoint, asphalt and concrete removed from the site may be crushed and reused as fill provided it is free of organic material and rocks or lumps greater than four inches in greatest dimension. Where crushed asphalt pavement materials are used as fill, particles between 1-1/2 and 4 inches in greatest dimension should comprise no more than 30 percent of the fill by weight.

7.1.2 Subgrade Preparation

The wet well mat should bear on at least 12 inches of open-graded crushed rock wrapped in a layer of reinforcement geotextile (Mirafi 600x or equivalent), or 12 inches of lean concrete. The subgrade soil below the wet well is anticipated to be soft, compressible clay. The soil subgrade should be cut into undisturbed soil. Even with dewatering, the clay will be near saturation and easily disturbed. Disturbed soil should be removed from the excavation prior to placing the filter fabric and crushed rock. The crushed rock should be tamped in place.

Depending on their final depths, the planned manholes will extend close to or below the groundwater level, and the sandy fill at subgrade is likely to be close to saturation. The subgrade for the manholes should be cut into undisturbed soil to provide a firm surface. Any soft or pumping areas within the sandy fill at subgrade should be stabilized by overexcavating to a depth of 12 inches, placing a layer of reinforcement geotextile (Mirafi 600x or equivalent), and placing either 12 inches of Caltrans Class 2 AB (above groundwater) or 12 inches of open-graded crushed rock (above or below groundwater). The AB should be compacted to at least 95 percent relative compaction;[8] the crushed rock should be tamped in place and wrapped in filter fabric.

The at-grade equipment pad should bear on 12 inches of Caltrans Class 2 AB. The soil subgrade should be scarified to a depth of at least eight inches, moisture-conditioned to above the

[8] Relative compaction refers to the in-place dry density of soil expressed as a percentage of the maximum dry density of the same material, as determined by the ASTM D1557 laboratory compaction procedure.

optimum moisture content, and compacted to at least 95 percent relative compaction. The AB should also be compacted to 95 percent relative compaction.

7.1.3 Fill Placement

We anticipate fill placement at the site will consist primarily of backfill around and over the planned subsurface structures and backfill of open-cut utility trenches. Sandy soil excavated during construction will generally be acceptable for use as general fill and backfill, provided it is free of organic material and contains no rocks or lumps larger than four inches in greatest dimension; soft clay excavated from below the existing fill is not acceptable for re-use as fill. Soil excavated from below the groundwater level will have a high moisture content and may require drying before it can be re-used as backfill. Alternatively, where space around the perimeter of the pump station and other below-grade structures is limited, backfill may consist of crushed rock or controlled density fill. If crushed rock is used as backfill, it should be tamped in place. All crushed rock should be wrapped in filter fabric. On-site sandy soil, Caltrans Class 2 AB, and clean sand or gravel (defined as soil with less than 10 percent fines by weight) used as fill should be placed in horizontal lifts not exceeding eight inches in uncompacted thickness, moisture-conditioned to above optimum moisture content, and compacted at least 95 percent relative compaction. Jetting should not be permitted.

All fill material, including on-site fill, should be submitted to the Geotechnical Engineer for approval at least three working days before it is used on site. For imported fill, the grading subcontractor should provide analytical test results or other suitable environmental documentation indicating the proposed fill material is free of hazardous materials at least three days before use at the site. If these data are not provided, up to two weeks may be required to perform any required analytical testing on proposed import soil. Bulk samples of all soil materials should be provided to the Geotechnical Engineer at least three working days before use at the site so a compaction curve and/or gradation analysis can be obtained.

7.1.4 Utility Trenches and Trenchless Utility Installation

7.1.4.1 Open-Cut Utility Trenches

Utilities should be designed to accommodate the predicted differential settlement throughout the project site, as well as differential settlement where they connect to new and existing structures. To accommodate the seismically-induced differential settlement discussed in Section 6.1, flexible connections should be used between the sewer structures. In addition, flexibility should be incorporated into the design of utilities because of the potential for seismically-induced settlement.

Excavations for utility trenches can be made with a backhoe. All trenches should conform to the current CAL-OSHA requirements for slopes, shoring, and other safety concerns. To protect adjacent buildings (if any), the bottom of trenches adjacent to buildings should be above a 1:1 (horizontal to vertical) plane projected downward from the bottom of adjacent building foundations. If the trenches extend below the 1:1 plane, the adjacent building foundations should be underpinned. We can provide recommendations for underpinning, if needed.

Trenches below the groundwater level will need to be dewatered. Where necessary, trench excavations should be shored and braced to prevent cave-ins in accordance with all safety regulations. Where sheet piling is used as shoring for utilities, and is to be removed after backfilling, it should be placed a minimum of three feet away from the pipes or conduits to reduce the disturbance to them as the sheet piles are extracted. Vibrations caused during the extraction of sheet piles may result in settlement of utilities bearing on soft or loose soil or tamped crushed rock. Therefore, we recommend that if sheet piles are used for shoring of utility trenches, consideration should be given to leaving the sheet piles in place.

To provide uniform support, pipes or conduits should be bedded on a minimum of six inches of sand or fine gravel. After the pipes and conduits are tested, inspected (if required), and approved, they should be covered to a depth of six inches with sand or fine gravel, which should be mechanically tamped. If groundwater is encountered during trench excavation, the

gravel used as bedding and cover should be replaced with Caltrans Class 2 permeable material below the water level, or the open-graded gravel used as bedding and cover should be wrapped in filter fabric (Mirafi 140N or equivalent) to reduce the potential for infiltration of fines. Backfill for utility trenches and other excavations is also considered fill and should be placed and compacted according to the recommendations previously presented. Backfill material for utility trenches within pavement areas should conform to the City of Alameda Standard Drawings. If Caltrans Class 2 AB or clean sand or gravel (defined as soil with less than 10 percent fines) is used as backfill, it should be compacted to at least 95 percent relative compaction. Jetting of trench backfill should not be permitted. Special care should be taken when backfilling utility trenches in pavement areas. Poor compaction may cause excessive settlements, resulting in damage to the pavement section.

7.1.4.2 Trenchless Utility Installation

We understand the new sewer line between the new pump station and Otis Drive will likely be installed using the trenchless pipe bursting techniques. Pipe bursting consists of using a pneumatic, static, or hydraulic bursting tool to break an existing pipe and push fragments of the pipe into the surrounding soil. A new pipe is then pushed or pulled into place behind the bursting tool. Pipe bursting should be performed by a contractor experienced in similar projects; they should review the subsurface information shown on our CPT logs.

We anticipate the pipe bursting techniques will be performed on existing pipelines within the sandy fill, and likely below the groundwater level. We recommend the soil in the vicinity of the pipe alignment be dewatered prior to pipe bursting to reduce the potential for flowing sands obstructing the work or resulting in settlement or damage to adjacent structures.

The required jacking pit and receiving pit excavations should be temporarily shored as discussed in Section 7.4. If the back of the jacking pit excavation will be used for resistance in the pipe bursting operation, the allowable passive resistance gained against the jacking pit wall

should be computed using an equivalent fluid weight of 300 pcf above the groundwater level or 150 pcf below groundwater.

7.2 Foundation Support

The pump station wet well will be bottomed below grade, and the equipment panel will be supported at grade. To reduce the possible detrimental effects of liquefaction-induced settlement and differential static settlement (and for the wet well, to help resist hydrostatic uplift forces, assuming the mat edge extends beyond the wet well wall) we recommend the structures be supported on mat foundations. Mats supported within the existing fill (for at or near-surface improvements such as the equipment panel) should bear on a 12-inch-thick layer of compacted AB. The mat for the wet well should be supported on 12 inches of crushed rock wrapped in filter fabric or lean concrete as recommended in Section 7.1.2.

7.2.1 At-Grade Structures

The at-grade equipment panel may be supported a mat foundation bearing on 12 inches of Caltrans Class 2 AB. Prior to placement, the subgrade should be prepared as described in Section 7.1.2. The mat foundation may be designed using an allowable bearing pressure of 1,800 pounds per square foot (psf) for dead plus live loads, with a one third increase under total loads, including wind or seismic forces.

Lateral loads on the mat may be resisted by a combination of passive resistance acting against the vertical faces of the mat and friction along its base. Passive resistance for shallow foundations may be calculated using an equivalent fluid weight (triangular distribution) equal to 300 pounds per cubic foot (pcf); however the upper foot of soil should be ignored unless confined by a concrete slab or pavement. Frictional resistance against the non-expansive fill should be computed using a base friction coefficient of 0.30. The passive resistance and base friction values include a factor of safety of about 1.5 and may be used in combination without reduction.

We should check the mat excavation subgrade preparation prior to the placement of reinforcing steel. Foundation excavations should be free of standing water, debris, and disturbed materials prior to placing concrete. The bottoms and sides of the footings excavations and the subgrade should be maintained in a moist condition until concrete is placed.

7.2.2 Below-Grade Structures

We recommend below-grade structures bearing in sandy fill be designed using an allowable bearing pressure of 2,000 psf for dead plus live loads. The wet well mat, which will bear on soft, compressible clay, should be designed using an allowable bearing pressure of 1,800 psf for dead plus live loads. These values include a factor of safety of approximately 2.0. For total loads, including seismic loading, these allowable bearing pressures may be increased by one third, which includes a factor of safety of 1.5. In addition, a temporary allowable bearing pressure of 2,400 psf may be used for the wet well during construction; this value includes a factor of safety of 1.5.

For the wet well, we expect the average bearing pressures under the mat to be significantly lower than 1,800 psf, particularly once the groundwater level is reestablished following construction. However, concentrated stresses may occur at the edges of the mat. The current project drawings indicate the wet well mat will extend beyond the walls of the structure. In determining the dead load of the wet well, the structural engineer should include the weight of the backfill soil above the mat extensions.

Lateral loads on the mats can be resisted by a combination of passive resistance acting against the vertical faces of the mats and friction along their bases. We recommend passive resistance for below-grade structures bearing in fill be calculated using equivalent fluid weights (triangular distribution) equal to 300 pcf above the groundwater level and 150 pcf below the groundwater level, plus frictional resistance along the bottom of the mat computed using a base friction coefficient of 0.30. For the wet well, we recommend the passive resistance on the mat be calculated using a uniform pressure (rectangular distribution) of 670 psf, plus a base friction

coefficient along the bottom of the mat of 0.25. For all structures, the upper foot of soil should be ignored unless confined by a concrete slab or pavement. The passive resistance and base friction values include a factor of safety of about 1.5 and may be used in combination without reduction.

Because the wet well will extend below groundwater, it should be designed to resist hydrostatic uplift loads associated with a design groundwater level at 2 feet bgs. The hydrostatic uplift force may be resisted by the dead load of the wet well, the weight of the soil above mat foundation extensions, and friction along the sides of the wet well. The soil weight can be calculated using unit weights of 60 pcf for soil below the design groundwater table (γ_b) and 125 pcf for soil above the design groundwater table (γ_T). We recommend using an ultimate uplift frictional resistance equal to a uniform friction of 130 psf along the sides of the wet well. This value assumes that the sheet piles or casing used to install the wet well have been left in place, as previously recommended, and engineered fill is placed in the annular space between the shoring and the wet well. We recommend a factor of safety of at least 2.0 be used for permanent uplift.

7.3 Permanent Below-Grade Walls

The walls of below-grade structures should be designed as retaining walls restrained from rotation. The walls should be designed to resist both static lateral earth pressures and lateral pressures caused by earthquakes. The walls should be designed for the governing condition of the at-rest earth pressure or active earth pressure plus seismic pressures. We recommend the walls be designed for the more critical of the following conditions:

1) At-rest equivalent fluid weight of 55 pcf where the walls are fully backdrained and above the groundwater level (2 feet bgs), and 90 pcf for where the walls are below the groundwater level or not backdrained.

2) Active equivalent fluid weight of 35 pcf for walls that are fully backdrained and above the groundwater level and 80 pcf for walls below the groundwater level or not backdrained, plus seismic earth pressure consisting of an equivalent fluid weight of 29 pcf above the groundwater level and 14 pcf below the groundwater level. We used the procedures outlined in Sitar et al. (2012) to compute the seismic pressures.

In addition, because traffic is expected within 10 feet of the walls, a surcharge pressure of 100 psf should be added to the top 10 feet of below-grade walls. If groundwater intrusion is not acceptable, the wet well should be waterproofed and water stops placed at all construction joints. The waterproofing should be placed directly against the backside of the walls. During placement of backfill behind the walls of below-grade structures, the walls should be braced, or hand compaction equipment should be used, to reduce compaction-induced pressures on the walls (as determined by the structural engineer).

7.4 Temporary Cut Slopes and Shoring

We judge that temporary cuts in sandy soil inclined no steeper than 1.5:1 (horizontal to vertical) will be stable provided that they are above groundwater and are not surcharged by equipment or building material. The safety of workers and equipment in or near excavations is the responsibility of the contractor. The contractor should be familiar with applicable local, state, and federal regulations for temporary shoring, including the current OSHA Excavation and Trench Safety Standards. Excavations that will be deeper than five feet and will be entered by workers should be sloped or shored in accordance with the Occupational Safety and Health Administration (OSHA) standards (29 CFR Part 1926).

We anticipate excavations on the order of 2 to 10 feet deep will be needed to install the planned manholes and utility boxes, and for open-cut utility trenches. An excavation on the order of 17 feet deep will be needed to install the wet well. Therefore, cut slopes or temporary shoring will be required. Temporary shoring will be required where temporary cut slopes are not possible because of space constraints, and where excavations extend below groundwater.

We recommend sheet piles be used for temporary shoring to reduce groundwater flow into the excavation. A cantilevered sheet pile wall may be designed using active earth pressures corresponding to 35 pcf and 80 pcf above and below the design groundwater elevation, respectively. Where excavation depths exceed 12 feet, internal bracing will likely be required. Figure 6 presents the lateral earth pressures we recommend for design of an internally-braced sheet pile wall. The toe embedment of the sheet piles should be sufficient to maintain stability of the base of the excavation. A vibration monitoring program should be established to evaluate the effects of the sheet pile installation on surrounding improvements.

If traffic is within a distance equal to the shoring depth, a uniform surcharge load of 100 psf acting on the upper 10 feet should be used in the design. In addition, an increase in lateral design pressure for the shoring may be required where heavy construction equipment or stockpiled materials will be within a distance equal to the shoring depth. The increase in pressure should be determined after the surcharge loads are known.

Sheet piles should be located to avoid existing below-grade utilities. The civil engineer should provide criteria for minimum clearances for piles near existing utilities; we recommend the existing gas main at the pump station site be relocated a horizontal distance of at least 5 feet from the edge of any planned excavations.

The anticipated deflections of the shoring system should be estimated to check whether they are acceptable. The shoring system should be sufficiently rigid to prevent detrimental movement of the temporary shoring and possible damage to existing improvements, including adjacent structures and underground utilities. In our experience, the deflection of a properly designed shoring system should generally be within 1 inch.

Although sheet piles are temporary, our experience with similar pump stations is that if the sheet piles are vibrated out following construction, settlement of the pump stations occur. We therefore recommend that the sheet piles be left in place. Following installation of the below-

grade structures, the upper portions of the sheet piles can be cut off as necessary to reduce conflicts with other improvements.

The shoring system should be installed by an experienced shoring contractor. The contractor should be solely responsible for the design of temporary shoring. We should review the final shoring plans to check that they are consistent with the recommendations presented in this report. In addition, we recommend that a representative from our office observe installation of the temporary shoring system.

7.5 Dewatering

During excavation of the wet well using sheet pile shoring, the groundwater will need to be lowered to a depth of at least three feet below the bottom of the planned excavation and maintained at that level until sufficient weight and/or uplift capacity is available to resist the hydrostatic uplift forces on the structure.

The selection and design of the dewatering system should be the responsibility of an experienced dewatering contractor. However, we should check the design of the proposed dewatering system prior to installation. If wells are installed within the excavation, they should be properly sealed through the mat upon abandonment to reduce the potential for water leakage.

7.6 Protection of Nearby Improvements

Protection of nearby improvements, including existing buildings, utilities, pavements, and landscaping, during construction activities is the responsibility of the contractor. As previously discussed and recommended in this report, the potential for damaging nearby improvements can be reduced during construction by using the following procedures:

- potholing to locate existing utilities within the project limits prior to excavation and installation of shoring

- relocating the existing 2-inch-diameter gas main a minimum horizontal distance of 5 feet outside any planned excavation areas (to be confirmed by the project civil engineer and gas utility company)

- maintaining the bottom of open-cut utility trench excavations above a 1½:1 (horizontal to vertical) plane projected downward from the bottom of adjacent building foundations

- performing a thorough crack survey on adjacent pavement and sidewalks prior to excavation and installation of sheet piles

- monitoring nearby structures for vibrations produced during installation of sheet piles (if installed using vibratory methods)

- planning to abandon sheet piles in place rather than removing them upon completion of installation of below-grade improvements.

8.0 ADDITIONAL GEOTECHNICAL SERVICES

Prior to construction, Langan Treadwell Rollo should review the project plans and specifications to check their conformance with the intent of our recommendations. During construction, we should observe site preparation, shoring installation, excavation, and pump station installation, and observe placement and check compaction of fill. These observations will allow us to compare the actual with the anticipated soil conditions and to check that the contractor's work conforms with the geotechnical aspects of the plans and specifications.

9.0 LIMITATIONS

The conclusions and recommendations presented in this report result from limited engineering studies based on our interpretation of the geotechnical conditions existing at the time of the investigation. Actual subsurface conditions may vary. If any variations or undesirable conditions are encountered during construction, or if the proposed construction will differ from that

described in this report, Langan Treadwell Rollo should be notified to make supplemental recommendations, if necessary.

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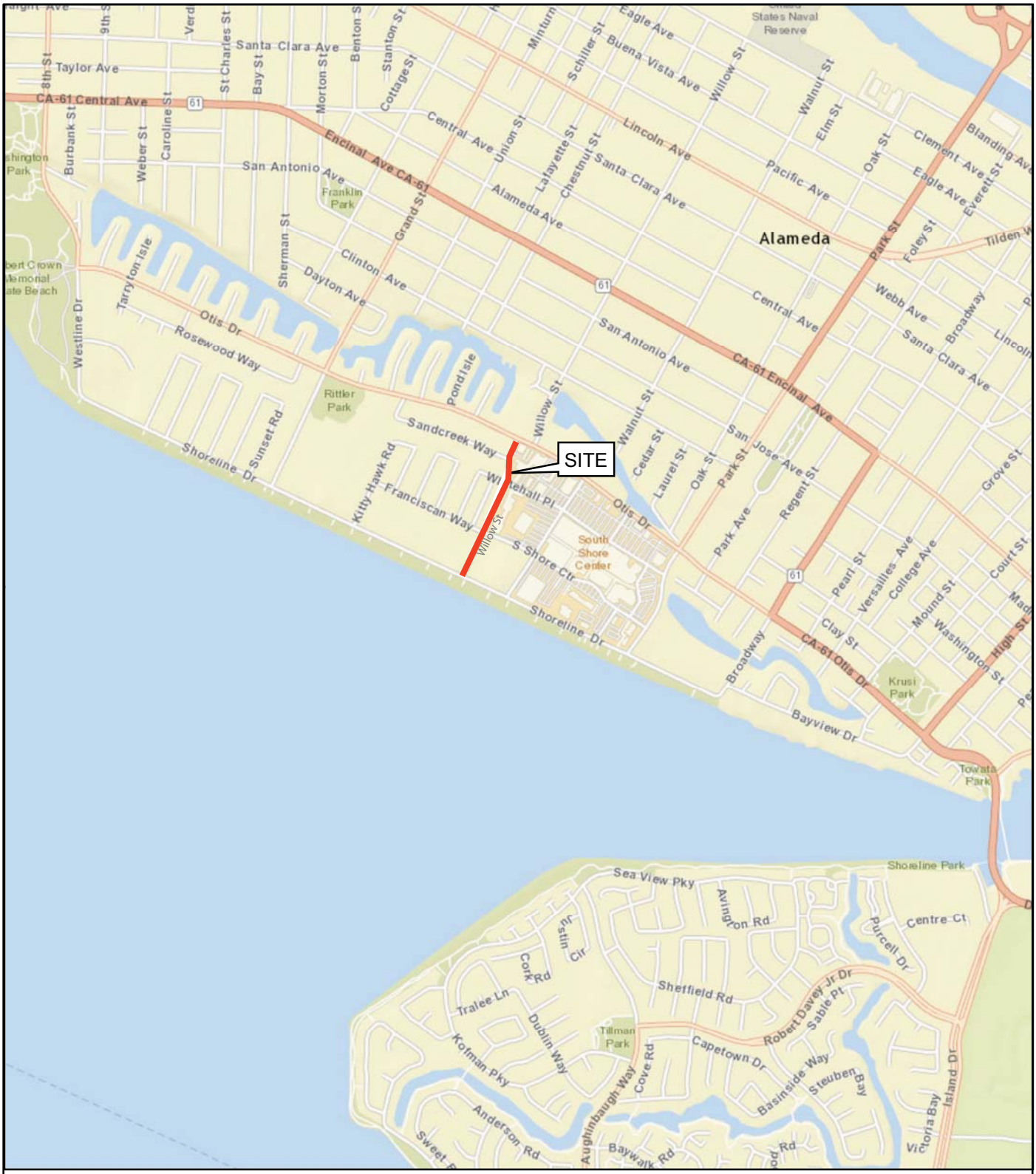
FIGURES



NOTES:

World street basemap is provided through Langan's Esri ArcGIS software licensing and ArcGIS online.
Credits: Sources: Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN.

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WILLOW-WHITEHALL SEWER PUMP STATION
Alameda, California

SITE LOCATION MAP

LANGAN TREADWELL ROLLO

Date 12/16/14	Project No. 750513314	Figure 1

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EXPLANATION

CPT-1 — Approximate location of cone penetration test by Langan Treadwell Rollo, November 2014

B-11 — Approximate location of boring by Ninyo & Moore, June 2012

B-12 — Approximate location of boring by Peter Kaldveer & Associates, August 1983

Approximate site boundary

Approximate location of proposed pump station

Reference: Esri, Digital Globe, GeoEye, i-cubed, USDA, USGS AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and GIS User Community .

WILLOW-WHITEHALL SEWER PUMP STATION
Alameda, California

SITE PLAN

LANGAN TREADWELL ROLLO

Date 12/16/14 | Project No. 750513314 | Figure 2

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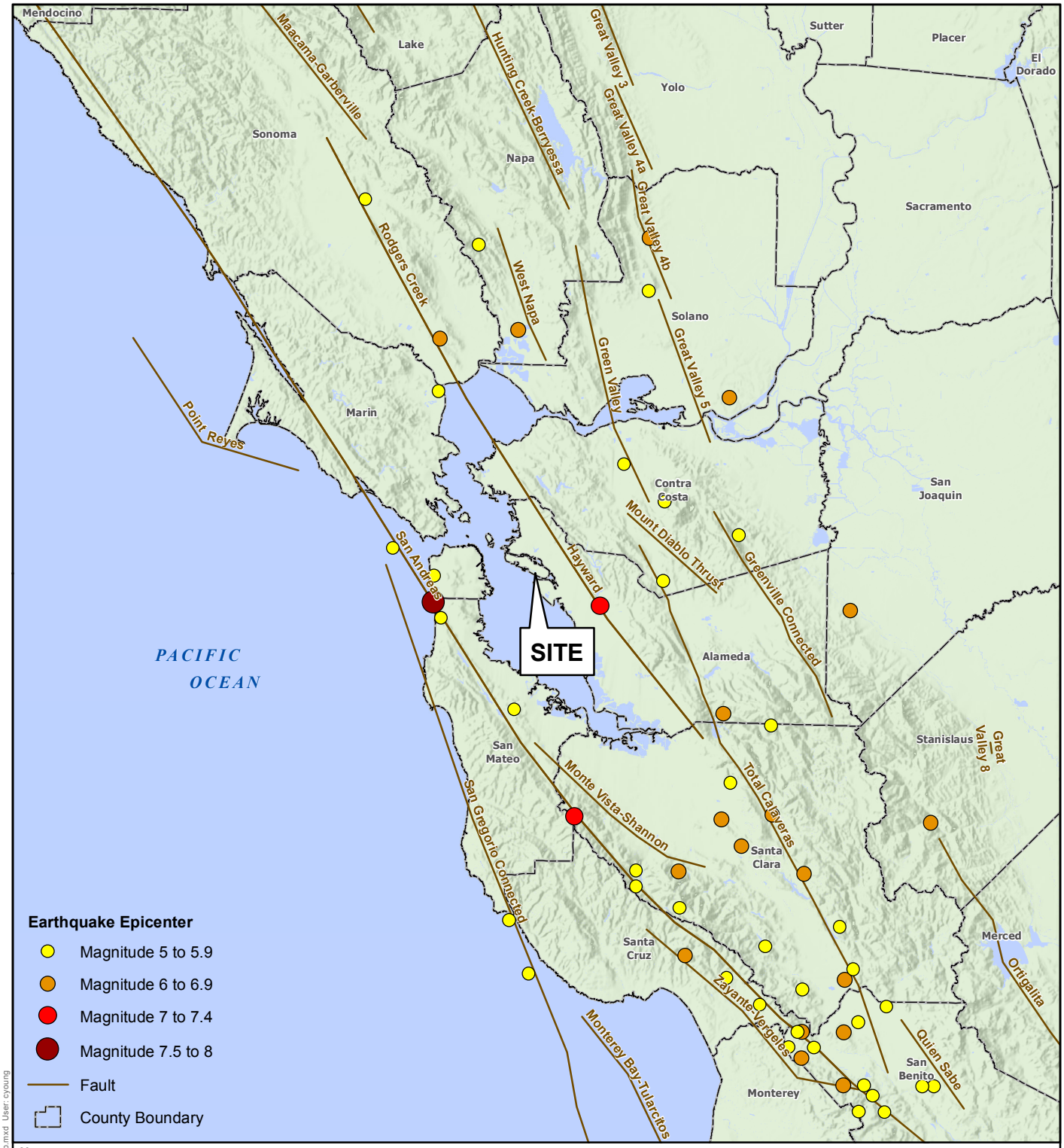

Notes:

1. Quaternary fault data displayed are based on a generalized version of USGS Quaternary Fault and fold database, 2010. For cartographic purposes only.
2. The Earthquake Epicenter (Magnitude) data is provided by the U.S Geological Survey (USGS) and is current through 08/26/2014.
3. Basemap hillshade and County boundaries provided by USGS and California Department of Transportation.
4. Map displayed in California State Coordinate System, California (Teale) Albers, North American Datum of 1983 (NAD83), Meters.

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WILLOW-WHITEHALL SEWER PUMP STATION
Alameda, California

MAP OF MAJOR FAULTS AND EARTHQUAKE EPICENTERS IN THE SAN FRANCISCO BAY AREA

LANGAN TREADWELL ROLLO

Date 12/16/2014	Project No. 750513314	Figure 3

I **Not felt by people, except under especially favorable circumstances. However, dizziness or nausea may be experienced.**
Sometimes birds and animals are uneasy or disturbed. Trees, structures, liquids, bodies of water may sway gently, and doors may swing very slowly.

II **Felt indoors by a few people, especially on upper floors of multi-story buildings, and by sensitive or nervous persons.**
As in Grade I, birds and animals are disturbed, and trees, structures, liquids and bodies of water may sway. Hanging objects swing, especially if they are delicately suspended.

III **Felt indoors by several people, usually as a rapid vibration that may not be recognized as an earthquake at first. Vibration is similar to that of a light, or lightly loaded trucks, or heavy trucks some distance away. Duration may be estimated in some cases.**
Movements may be appreciable on upper levels of tall structures. Standing motor cars may rock slightly.

IV **Felt indoors by many, outdoors by a few. Awakens a few individuals, particularly light sleepers, but frightens no one except those apprehensive from previous experience. Vibration like that due to passing of heavy, or heavily loaded trucks. Sensation like a heavy body striking building, or the falling of heavy objects inside.**
Dishes, windows and doors rattle; glassware and crockery clink and clash. Walls and house frames creak, especially if intensity is in the upper range of this grade. Hanging objects often swing. Liquids in open vessels are disturbed slightly. Stationary automobiles rock noticeably.

V **Felt indoors by practically everyone, outdoors by most people. Direction can often be estimated by those outdoors. Awakens many, or most sleepers. Frightens a few people, with slight excitement; some persons run outdoors.**
Buildings tremble throughout. Dishes and glassware break to some extent. Windows crack in some cases, but not generally. Vases and small or unstable objects overturn in many instances, and a few fall. Hanging objects and doors swing generally or considerably. Pictures knock against walls, or swing out of place. Doors and shutters open or close abruptly. Pendulum clocks stop, or run fast or slow. Small objects move, and furnishings may shift to a slight extent. Small amounts of liquids spill from well-filled open containers. Trees and bushes shake slightly.

VI **Felt by everyone, indoors and outdoors. Awakens all sleepers. Frightens many people; general excitement, and some persons run outdoors.**
Persons move unsteadily. Trees and bushes shake slightly to moderately. Liquids are set in strong motion. Small bells in churches and schools ring. Poorly built buildings may be damaged. Plaster falls in small amounts. Other plaster cracks somewhat. Many dishes and glasses, and a few windows break. Knickknacks, books and pictures fall. Furniture overturns in many instances. Heavy furnishings move.

VII **Frightens everyone. General alarm, and everyone runs outdoors.**
People find it difficult to stand. Persons driving cars notice shaking. Trees and bushes shake moderately to strongly. Waves form on ponds, lakes and streams. Water is muddied. Gravel or sand stream banks cave in. Large church bells ring. Suspended objects quiver. Damage is negligible in buildings of good design and construction; slight to moderate in well-built ordinary buildings; considerable in poorly built or badly designed buildings, adobe houses, old walls (especially where laid up without mortar), spires, etc. Plaster and some stucco fall. Many windows and some furniture break. Loosened brickwork and tiles shake down. Weak chimneys break at the roofline. Cornices fall from towers and high buildings. Bricks and stones are dislodged. Heavy furniture overturns. Concrete irrigation ditches are considerably damaged.

VIII **General fright, and alarm approaches panic.**
Persons driving cars are disturbed. Trees shake strongly, and branches and trunks break off (especially palm trees). Sand and mud erupts in small amounts. Flow of springs and wells is temporarily and sometimes permanently changed. Dry wells renew flow. Temperatures of spring and well waters varies. Damage slight in brick structures built especially to withstand earthquakes; considerable in ordinary substantial buildings, with some partial collapse; heavy in some wooden houses, with some tumbling down. Panel walls break away in frame structures. Decayed pilings break off. Walls fall. Solid stone walls crack and break seriously. Wet grounds and steep slopes crack to some extent. Chimneys, columns, monuments and factory stacks and towers twist and fall. Very heavy furniture moves conspicuously or overturns.

IX **Panic is general.**
Ground cracks conspicuously. Damage is considerable in masonry structures built especially to withstand earthquakes; great in other masonry buildings - some collapse in large part. Some wood frame houses built especially to withstand earthquakes are thrown out of plumb, others are shifted wholly off foundations. Reservoirs are seriously damaged and underground pipes sometimes break.

X **Panic is general.**
Ground, especially when loose and wet, cracks up to widths of several inches; fissures up to a yard in width run parallel to canal and stream banks. Landsliding is considerable from river banks and steep coasts. Sand and mud shifts horizontally on beaches and flat land. Water level changes in wells. Water is thrown on banks of canals, lakes, rivers, etc. Dams, dikes, embankments are seriously damaged. Well-built wooden structures and bridges are severely damaged, and some collapse. Dangerous cracks develop in excellent brick walls. Most masonry and frame structures, and their foundations are destroyed. Railroad rails bend slightly. Pipe lines buried in earth tear apart or are crushed endwise. Open cracks and broad wavy folds open in cement pavements and asphalt road surfaces.

XI **Panic is general.**
Disturbances in ground are many and widespread, varying with the ground material. Broad fissures, earth slumps, and land slips develop in soft, wet ground. Water charged with sand and mud is ejected in large amounts. Sea waves of significant magnitude may develop. Damage is severe to wood frame structures, especially near shock centers, great to dams, dikes and embankments, even at long distances. Few if any masonry structures remain standing. Supporting piers or pillars of large, well-built bridges are wrecked. Wooden bridges that "give" are less affected. Railroad rails bend greatly and some thrust endwise. Pipe lines buried in earth are put completely out of service.

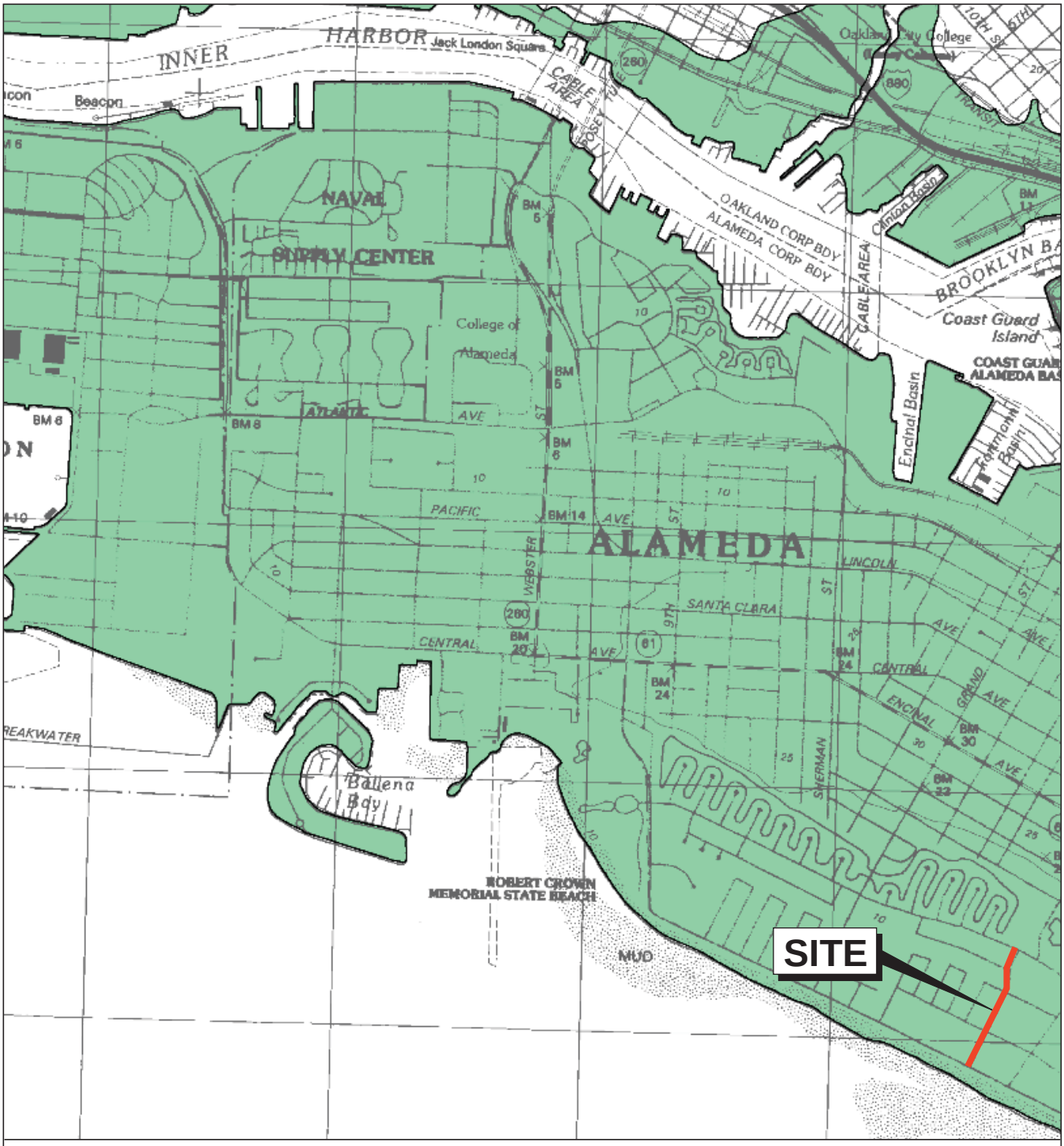
XII **Panic is general.**
Damage is total, and practically all works of construction are damaged greatly or destroyed. Disturbances in the ground are great and varied, and numerous shearing cracks develop. Landslides, rock falls, and slumps in river banks are numerous and extensive. Large rock masses are wrenched loose and torn off. Fault slips develop in firm rock, and horizontal and vertical offset displacements are notable. Water channels, both surface and underground, are disturbed and modified greatly. Lakes are dammed, new waterfalls are produced, rivers are deflected, etc. Surface waves are seen on ground surfaces. Lines of sight and level are distorted. Objects are thrown upward into the air.

WILLOW-WHITEHALL SEWER PUMP STATION
Alameda, California

MODIFIED MERCALLI INTENSITY SCALE

LANGAN TREADWELL ROLLO

Date 12/16/14	Project No. 750513314	Figure 4



EXPLANATION

Liquefaction Hazard Zone

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0 2000 Feet

Approximate scale

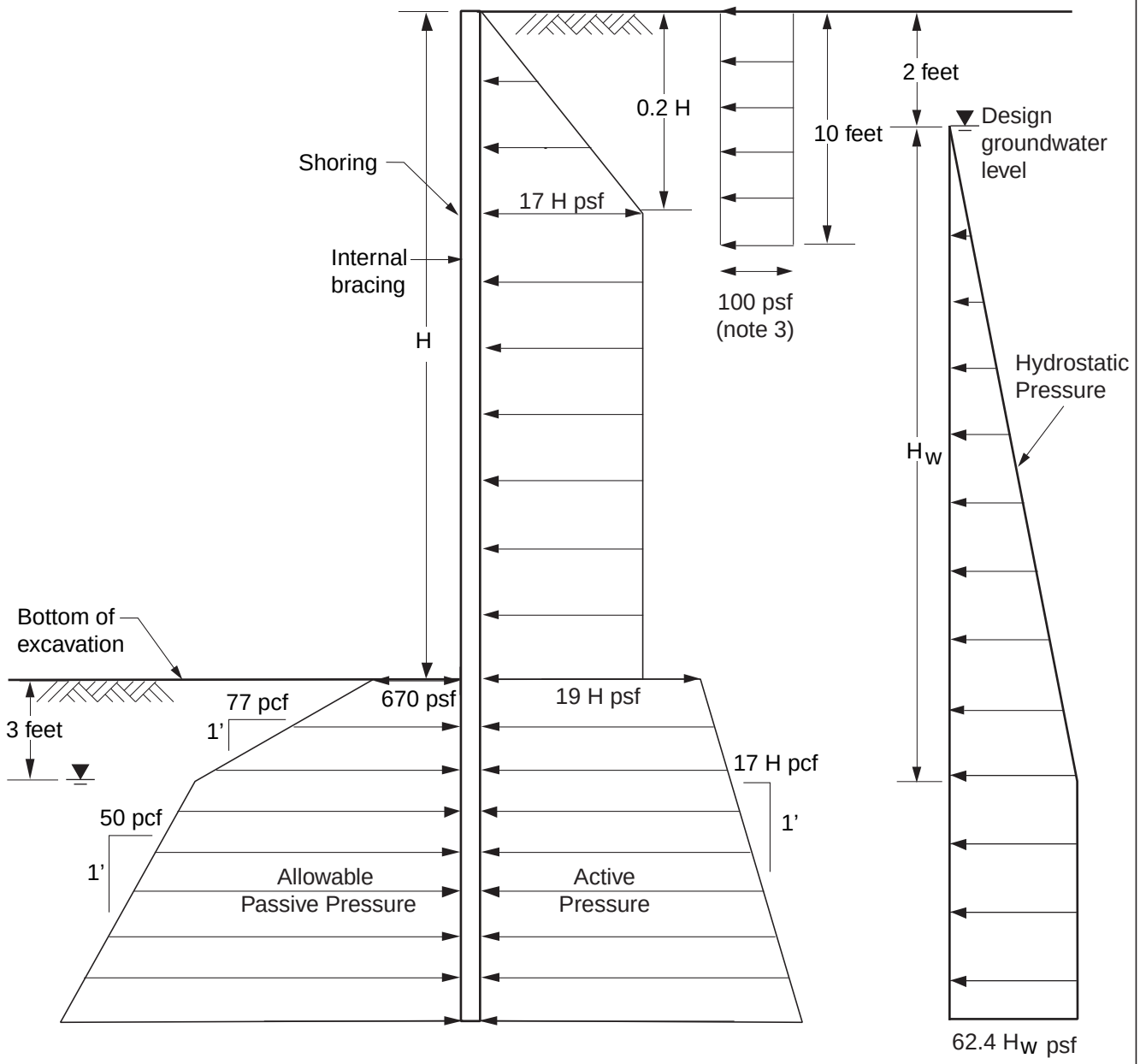
Reference:
State of California "Seismic Hazard Zones," Oakland West Quadrangle, Released on February 14, 2003.

WILLOW-WHITEHALL SEWER PUMP STATION
Alameda, California

REGIONAL SEISMIC HAZARD ZONES MAP

LANGAN TREADWELL ROLLO

Date 12/16/14	Project No. 750513314	Figure 5



Notes:
1. The above pressure diagram assumes that the shoring walls consist of impervious sheetpile shoring system.
2. Passive pressure values include a factor of safety of about 1.5.
3. Pressure due to vehicle surcharge along streets (heavy equipment should come no closer than 5 feet to face of excavation).
4. Assumes a dewatering system is used at the base of the excavation and groundwater is retained behind the shoring system.

WILLOW-WHITEHALL SEWER PUMP STATION
Alameda, California

TYPICAL LATERAL EARTH PRESSURES FOR WET WELL WITH INTERNAL BRACING AND DEWATERING

LANGAN TREADWELL ROLLO

Date 12/16/14 | Project No. 750513314 | Figure 6

APPENDIX A

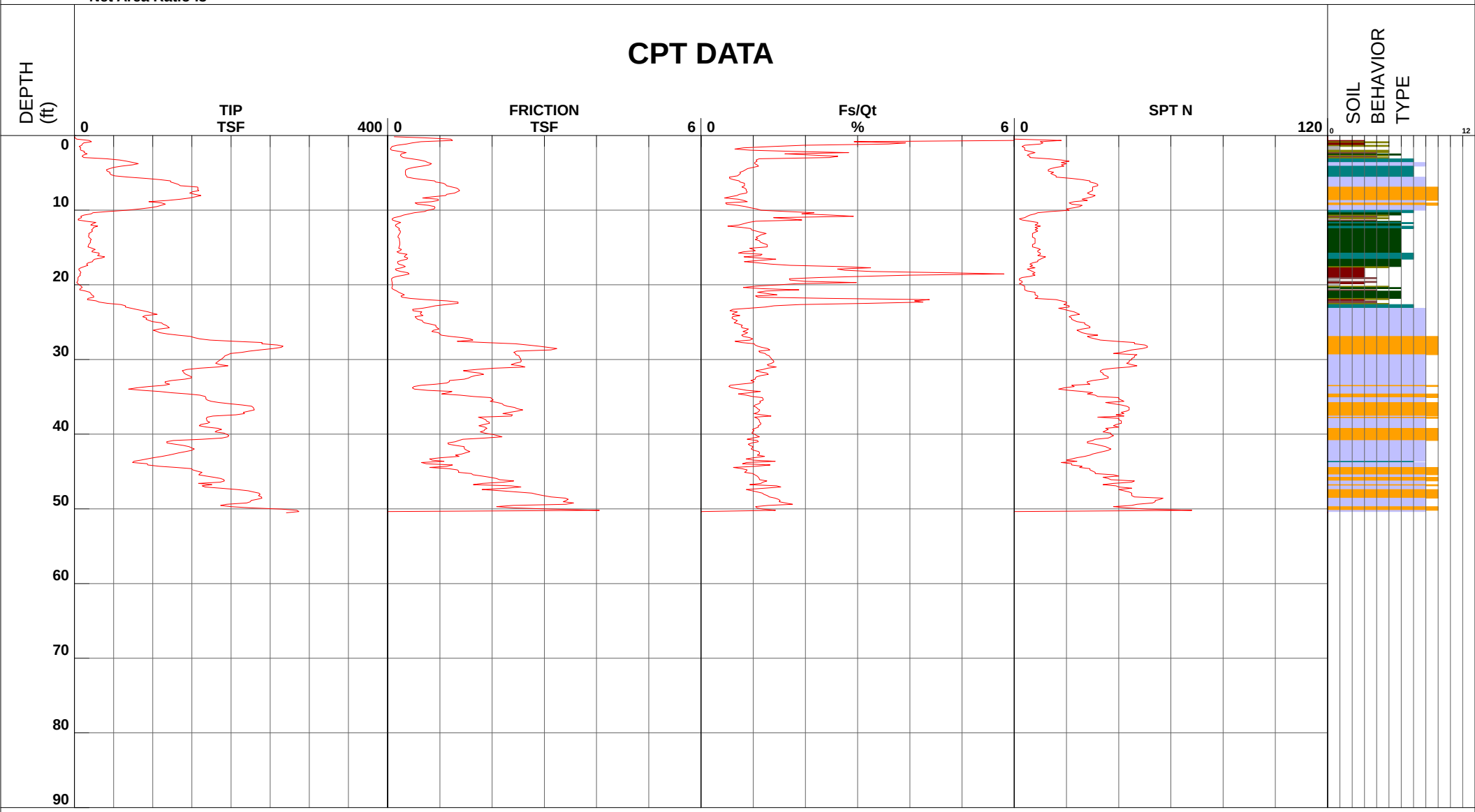
CONE PENETRATION TEST RESULTS

Treadwell & Rollo

Project	Willow-Whitehall Sewer	Operator	CB/MM	Filename	SDF(495).cpt
Job Number	750513314	Cone Number	DDG1298	GPS	
Hole Number	CPT-01	Date and Time	11/25/2014 7:33:52 AM	Maximum Depth	50.52 ft
EST GW Depth During Test		7.00 ft			

Net Area Ratio .8

CPT DATA



1 - sensitive fine grained
2 - organic material
3 - clay
4 - silty clay to clay
5 - clayey silt to silty clay
6 - sandy silt to clayey silt
7 - silty sand to sandy silt
8 - sand to silty sand
9 - sand
10 - gravelly sand to sand
11 - very stiff fine grained (*)
12 - sand to clayey sand (*)

Cone Size 10cm squared

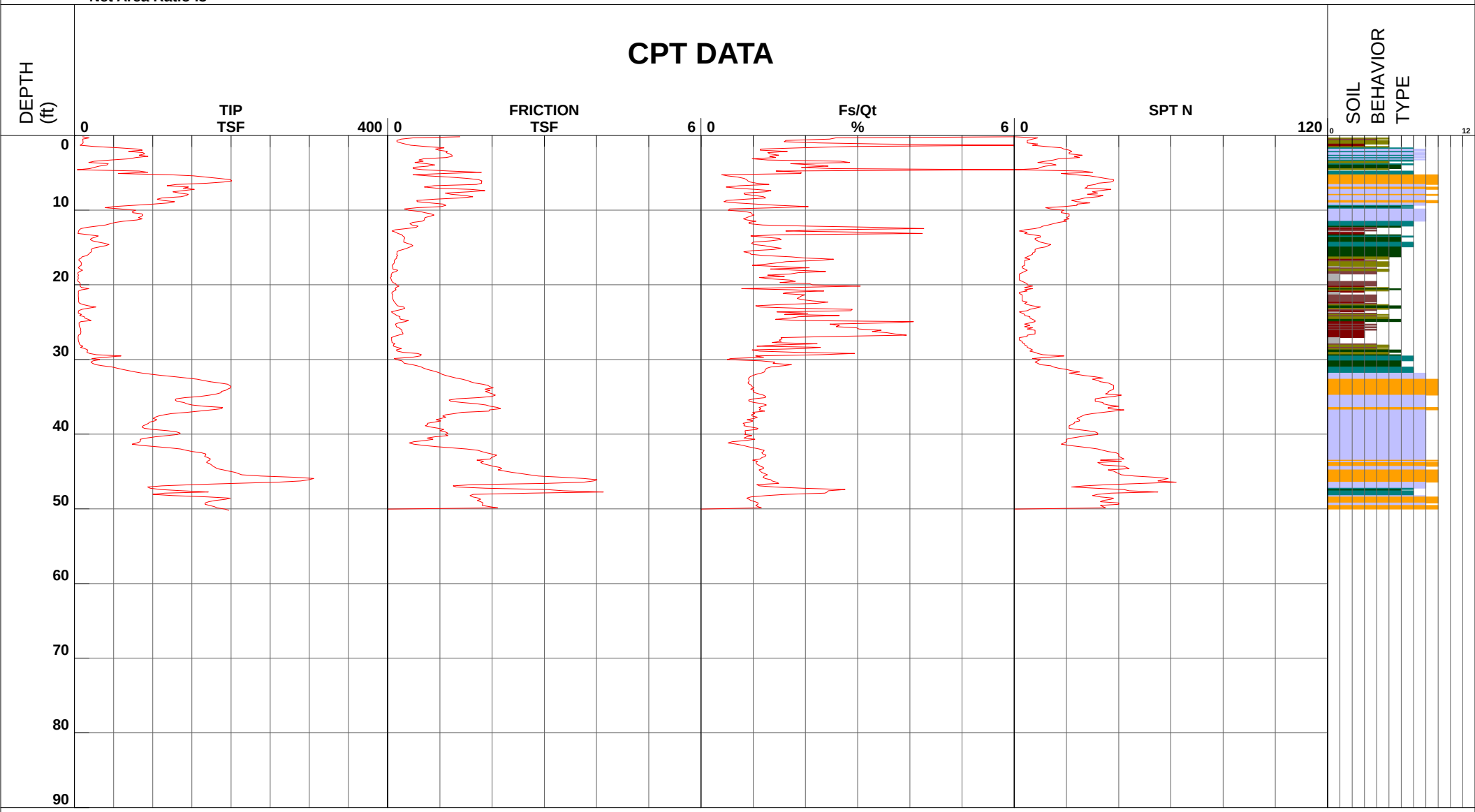
S*Soil behavior type and SPT based on data from UBC-1983

Treadwell & Rollo

Project	Willow-Whitehall Sewer	Operator	CB/MM	Filename	SDF(496).cpt
Job Number	750513314	Cone Number	DDG1298	GPS	
Hole Number	CPT-02	Date and Time	11/25/2014 8:52:18 AM	Maximum Depth	50.20 ft
EST GW Depth During Test		3.00 ft			

Net Area Ratio .8

CPT DATA



1 - sensitive fine grained
2 - organic material
3 - clay
4 - silty clay to clay
5 - clayey silt to silty clay
6 - sandy silt to clayey silt
7 - silty sand to sandy silt
8 - sand to silty sand
9 - sand
10 - gravelly sand to sand
11 - very stiff fine grained (*)
12 - sand to clayey sand (*)

Cone Size 10cm squared

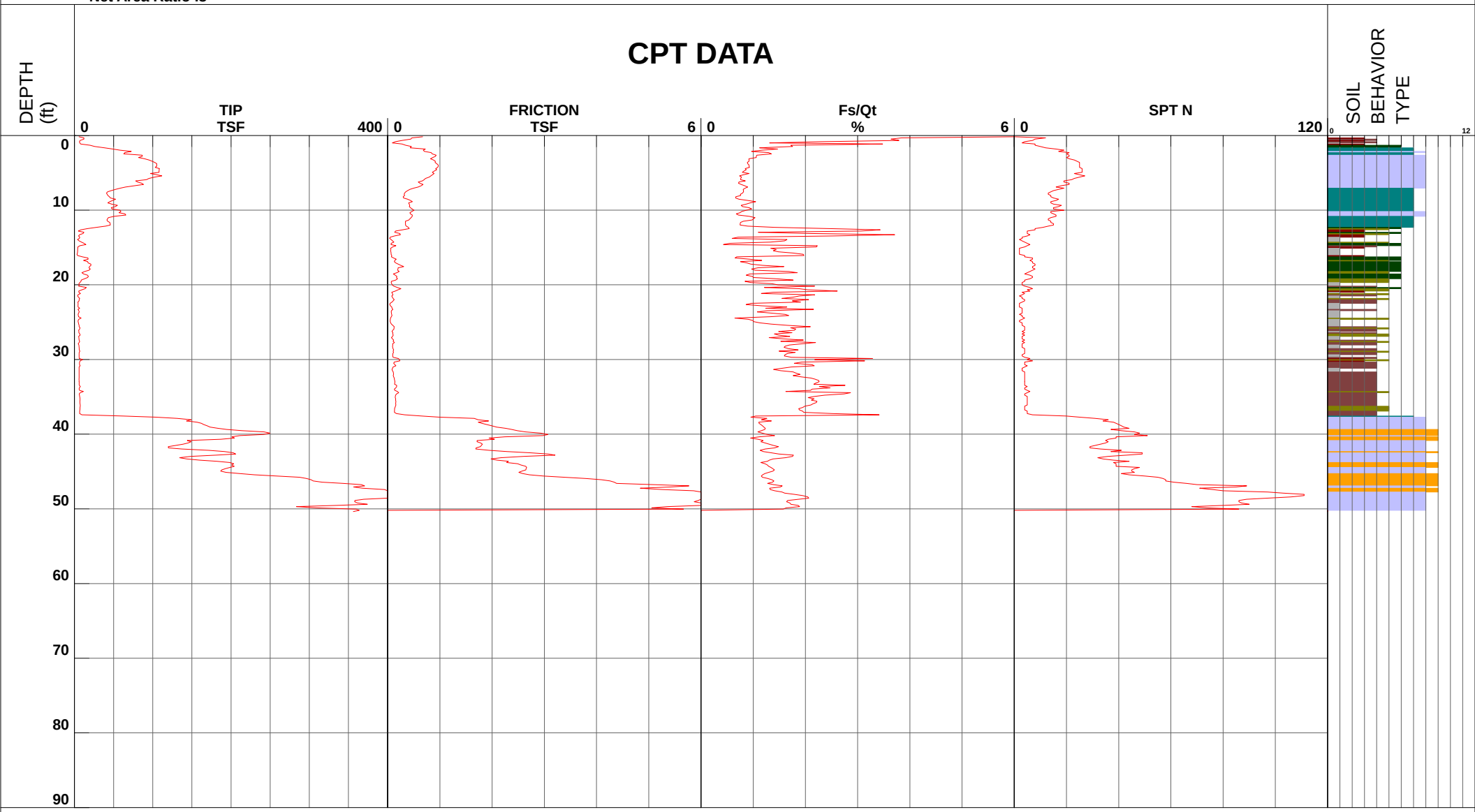
S*Soil behavior type and SPT based on data from UBC-1983

Treadwell & Rollo

Project	Willow-Whitehall Sewer	Operator	CB/MM	Filename	SDF(497).cpt
Job Number	750513314	Cone Number	DDG1298	GPS	
Hole Number	CPT-03	Date and Time	11/25/2014 10:04:22 AM	Maximum Depth	50.36 ft
EST GW Depth During Test		3.00 ft			

Net Area Ratio .8

CPT DATA



1 - sensitive fine grained
2 - organic material
3 - clay
4 - silty clay to clay
5 - clayey silt to silty clay
6 - sandy silt to clayey silt
7 - silty sand to sandy silt
8 - sand to silty sand
9 - sand
10 - gravelly sand to sand
11 - very stiff fine grained (*)
12 - sand to clayey sand (*)

Cone Size 10cm squared

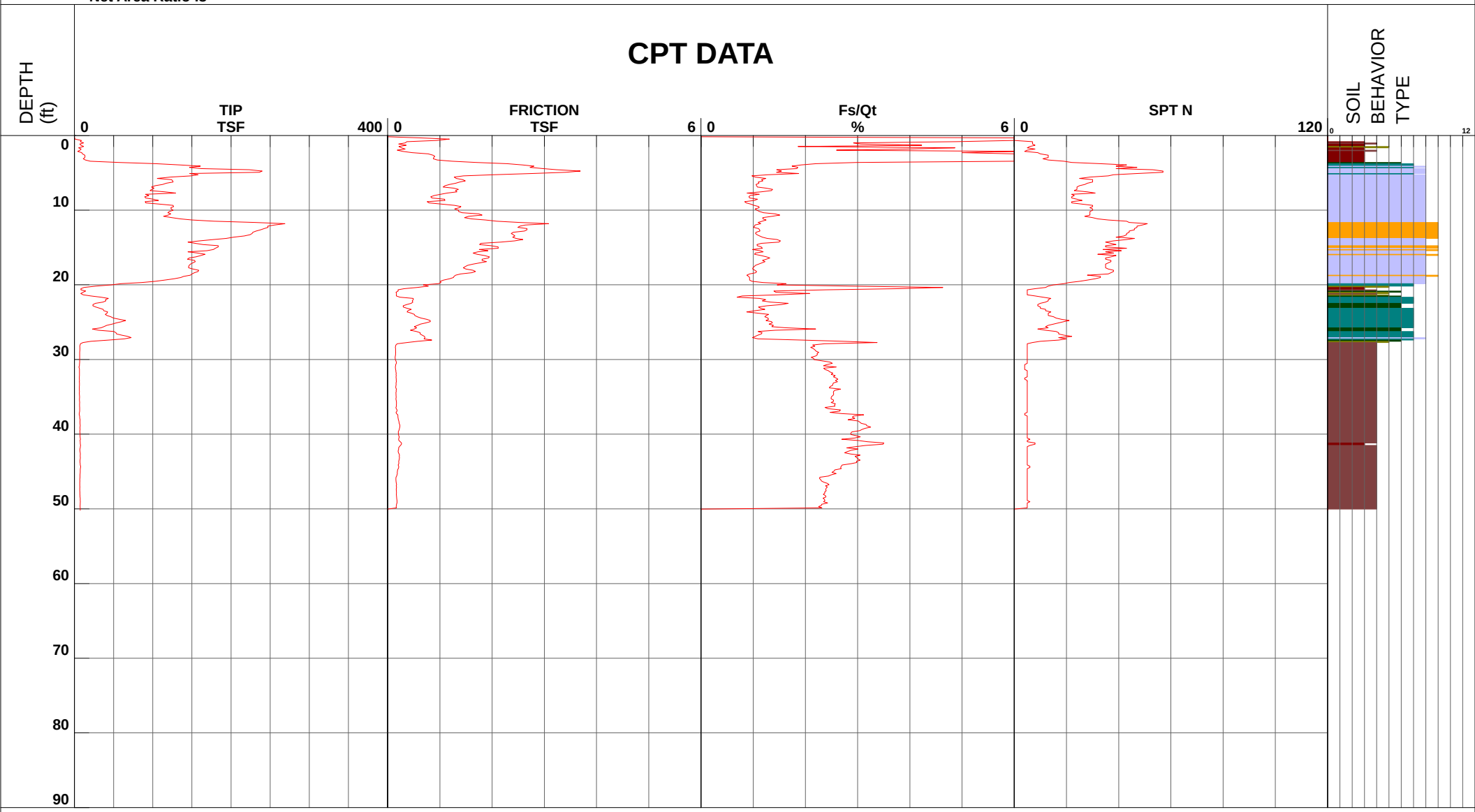
S*Soil behavior type and SPT based on data from UBC-1983

Treadwell & Rollo

Project	Willow-Whitehall Sewer	Operator	CB/MM	Filename	SDF(498).cpt
Job Number	750513314	Cone Number	DDG1298	GPS	
Hole Number	CPT-04	Date and Time	11/25/2014 11:06:44 AM	Maximum Depth	50.20 ft
EST GW Depth During Test		3.00 ft			

Net Area Ratio .8

CPT DATA



1 - sensitive fine grained
2 - organic material
3 - clay
4 - silty clay to clay
5 - clayey silt to silty clay
6 - sandy silt to clayey silt
7 - silty sand to sandy silt
8 - sand to silty sand
9 - sand
10 - gravelly sand to sand
11 - very stiff fine grained (*)
12 - sand to clayey sand (*)

Cone Size 10cm squared

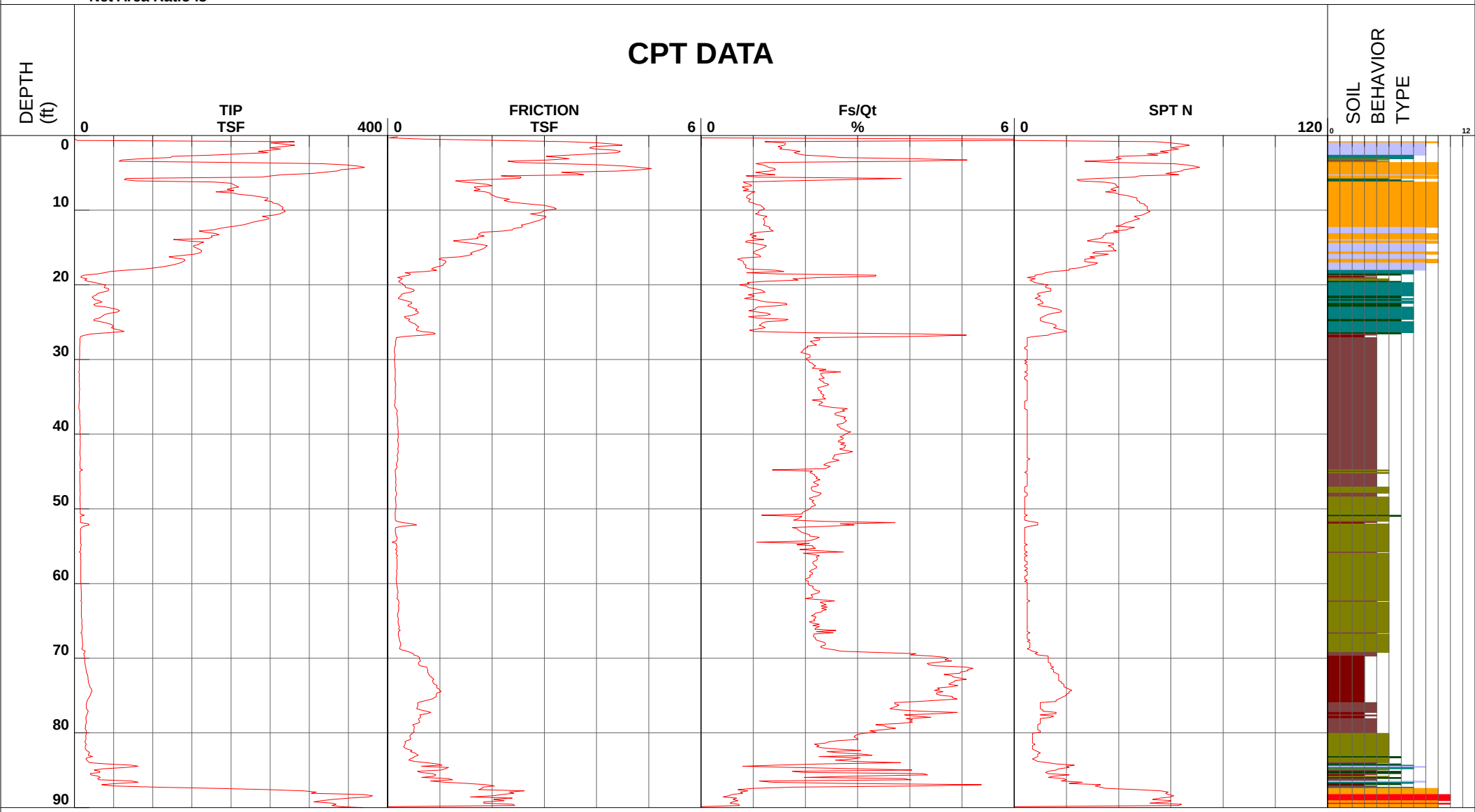
S*Soil behavior type and SPT based on data from UBC-1983

Treadwell & Rollo

Project	Willow-Whitehall Sewer	Operator	CB/MM	Filename	SDF(499).cpt
Job Number	750513314	Cone Number	DDG1298	GPS	
Hole Number	CPT-04 A	Date and Time	11/25/2014 11:58:28 AM	Maximum Depth	90.06 ft
EST GW Depth During Test		3.00 ft			

Net Area Ratio .8

CPT DATA



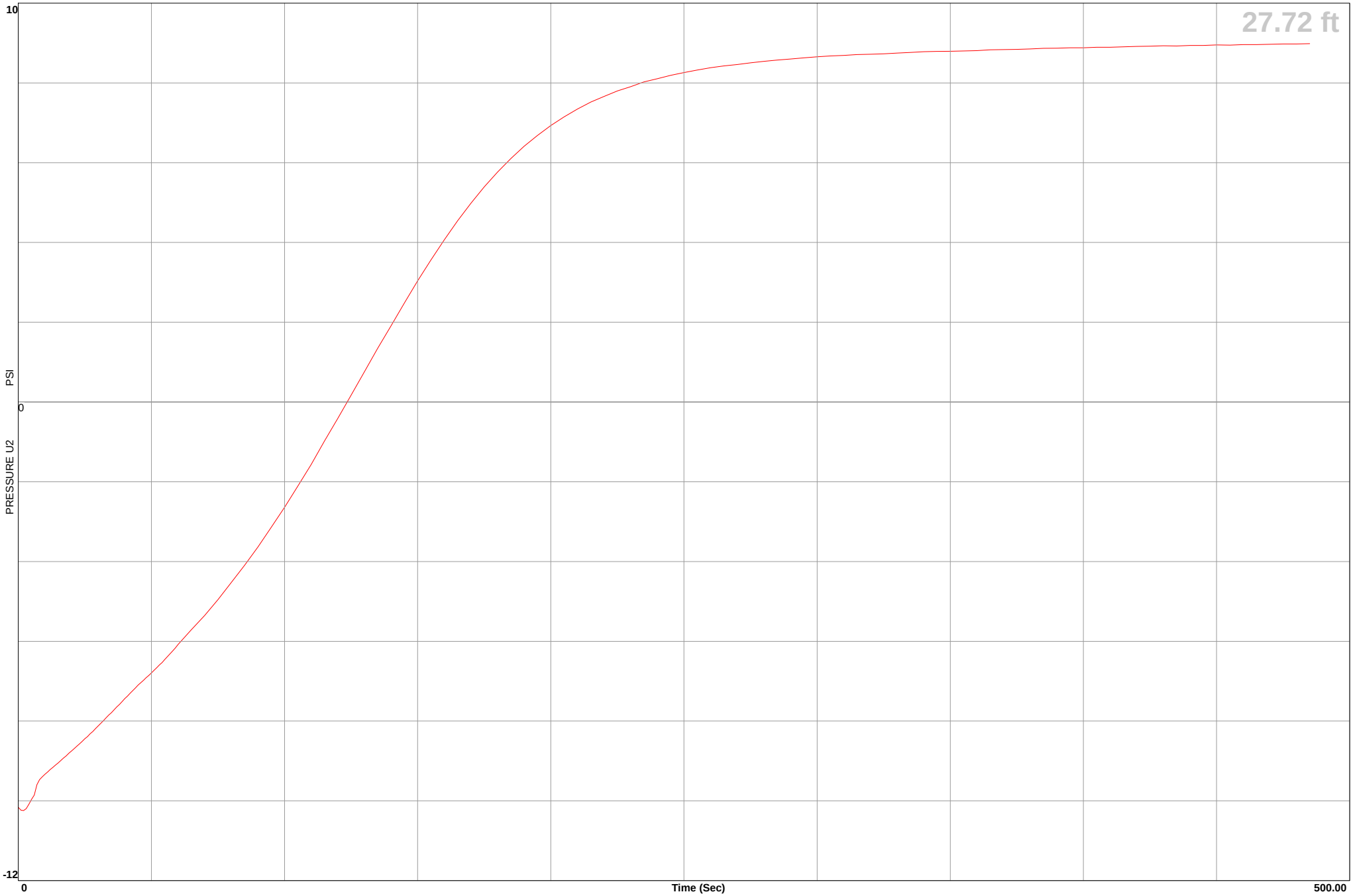
1 - sensitive fine grained
2 - organic material
3 - clay
4 - silty clay to clay
5 - clayey silt to silty clay
6 - sandy silt to clayey silt
7 - silty sand to sandy silt
8 - sand to silty sand
9 - sand
10 - gravelly sand to sand
11 - very stiff fine grained (*)
12 - sand to clayey sand (*)

Cone Size 10cm squared

S*Soil behavior type and SPT based on data from UBC-1983

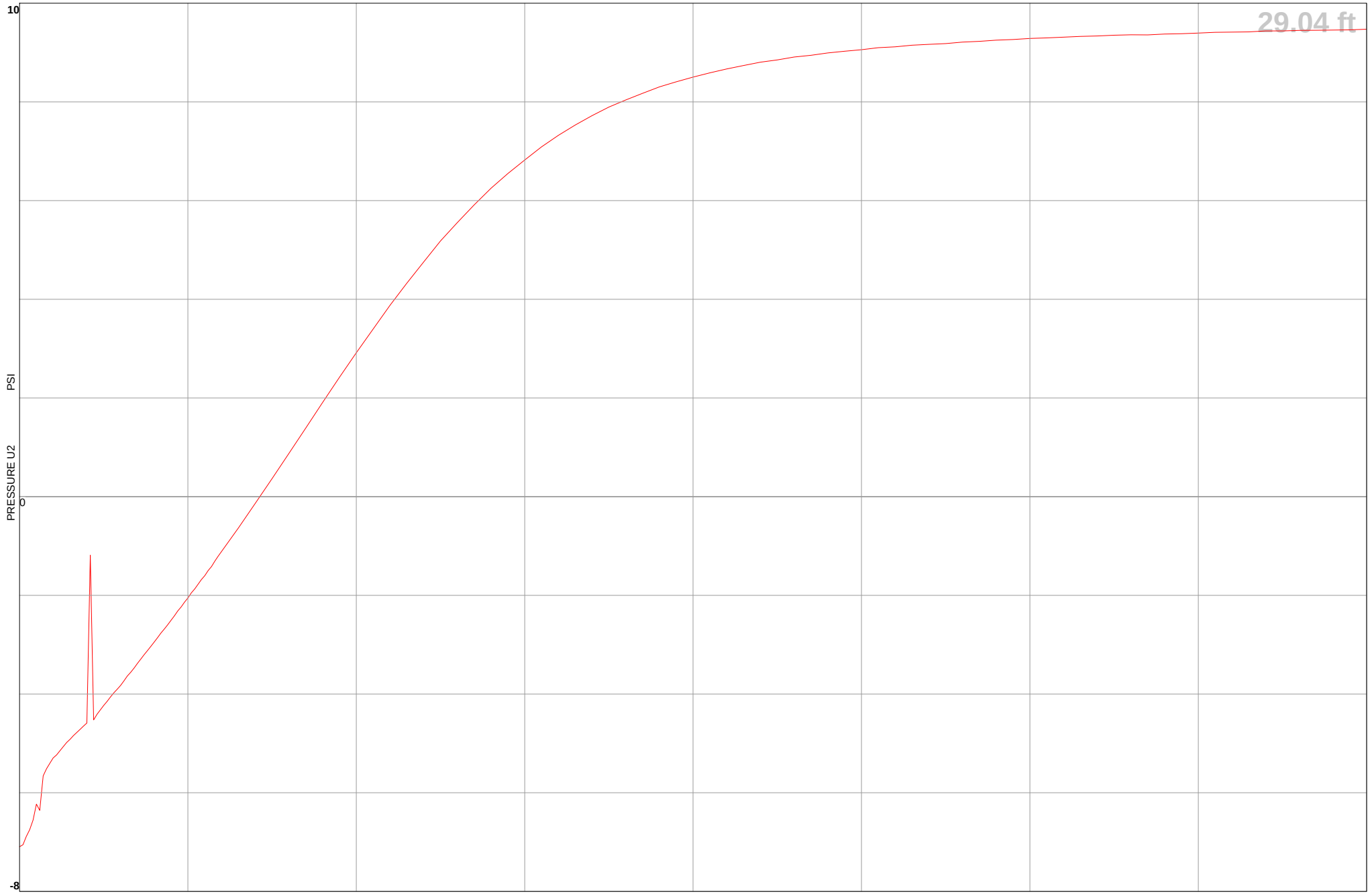
Treadwell & Rollo

Location	**Willow-Whitehall Sewer**	**Operator**	**CB/MM**	**GPS**
Job Number	**750513314**	**Cone Number**	**DDG1298**	
Hole Number	**CPT-01**	**Date and Time**	**11/25/2014 7:33:52 AM**	
Equilized Pressure	**8.9**	**EST GW Depth During Test**	**7.1**	



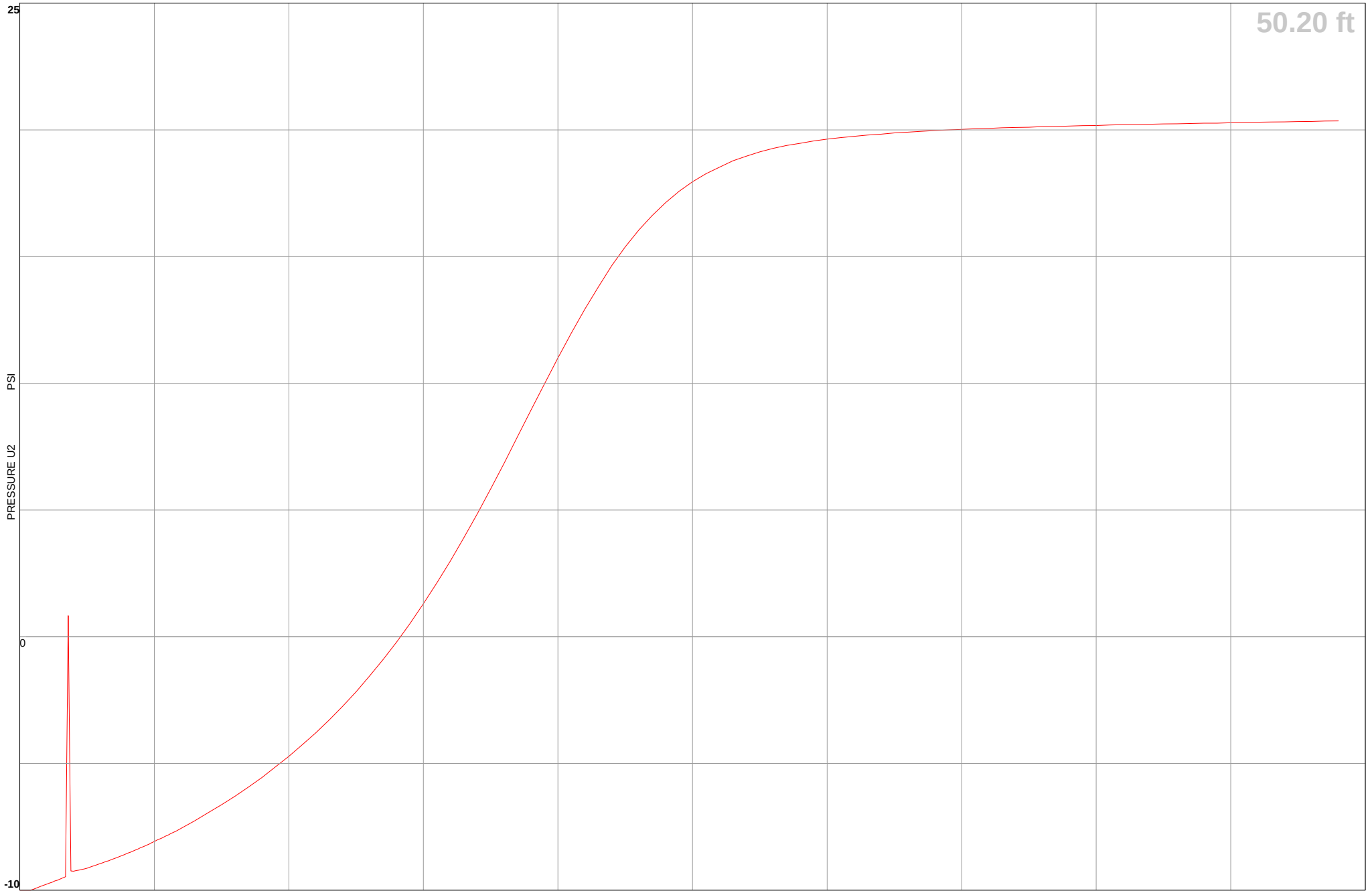
Treadwell & Rollo

Location	Willow-Whitehall Sewer	Operator	CB/MM	
Job Number	750513314	Cone Number	DDG1298	GPS
Hole Number	CPT-01	Date and Time	11/25/2014 7:33:52 AM	
Equilized Pressure	9.4	EST GW Depth During Test	7.1	



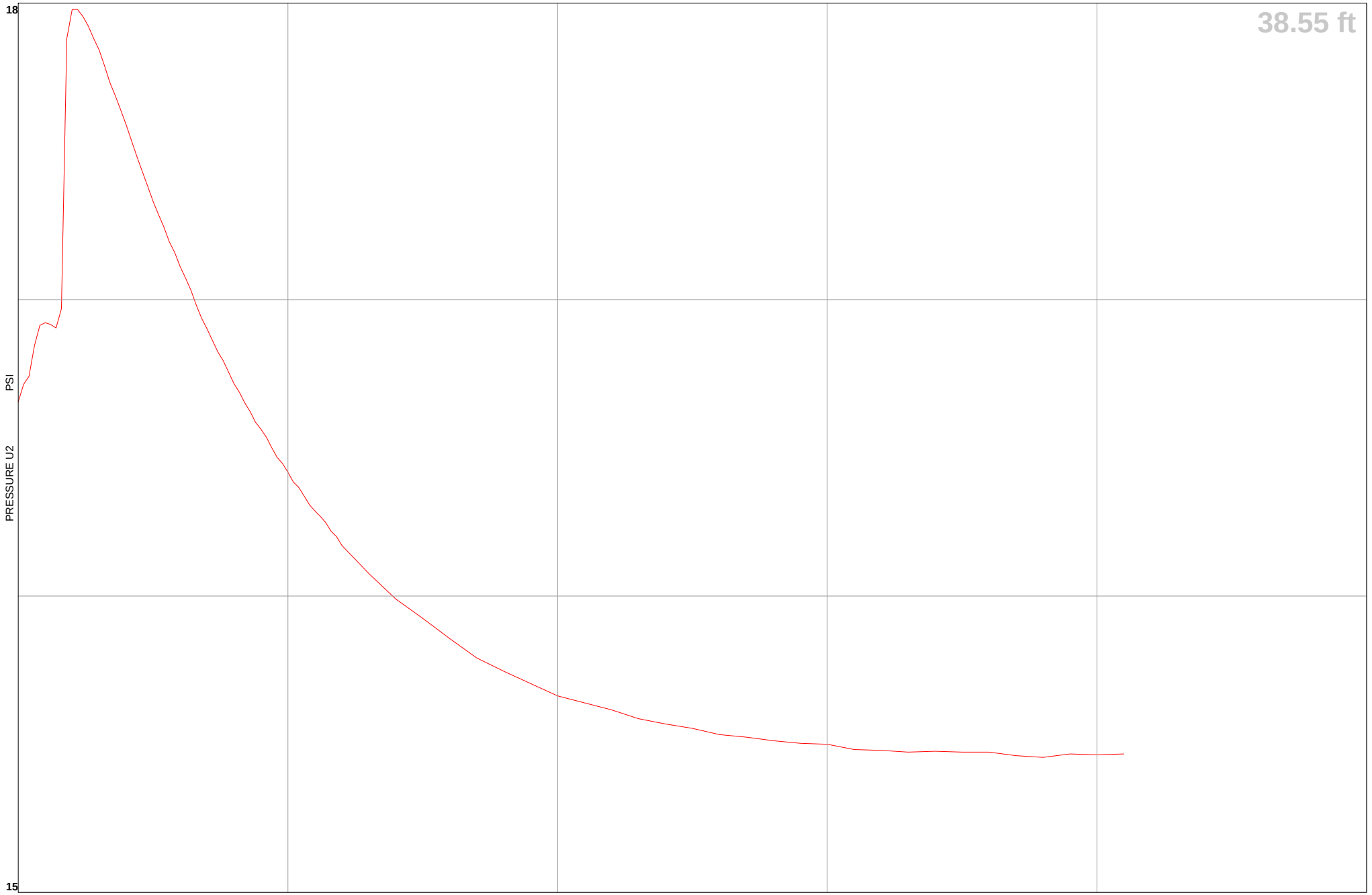
Treadwell & Rollo

Location	**Willow-Whitehall Sewer**	**Operator**	**CB/MM**	**GPS**	
Job Number	**750513314**	**Cone Number**	**DDG1298**		
Hole Number	**CPT-02**	**Date and Time**	**11/25/2014 8:52:18 AM**		
Equilized Pressure	**20.2**	**EST GW Depth During Test**	**3.3**		



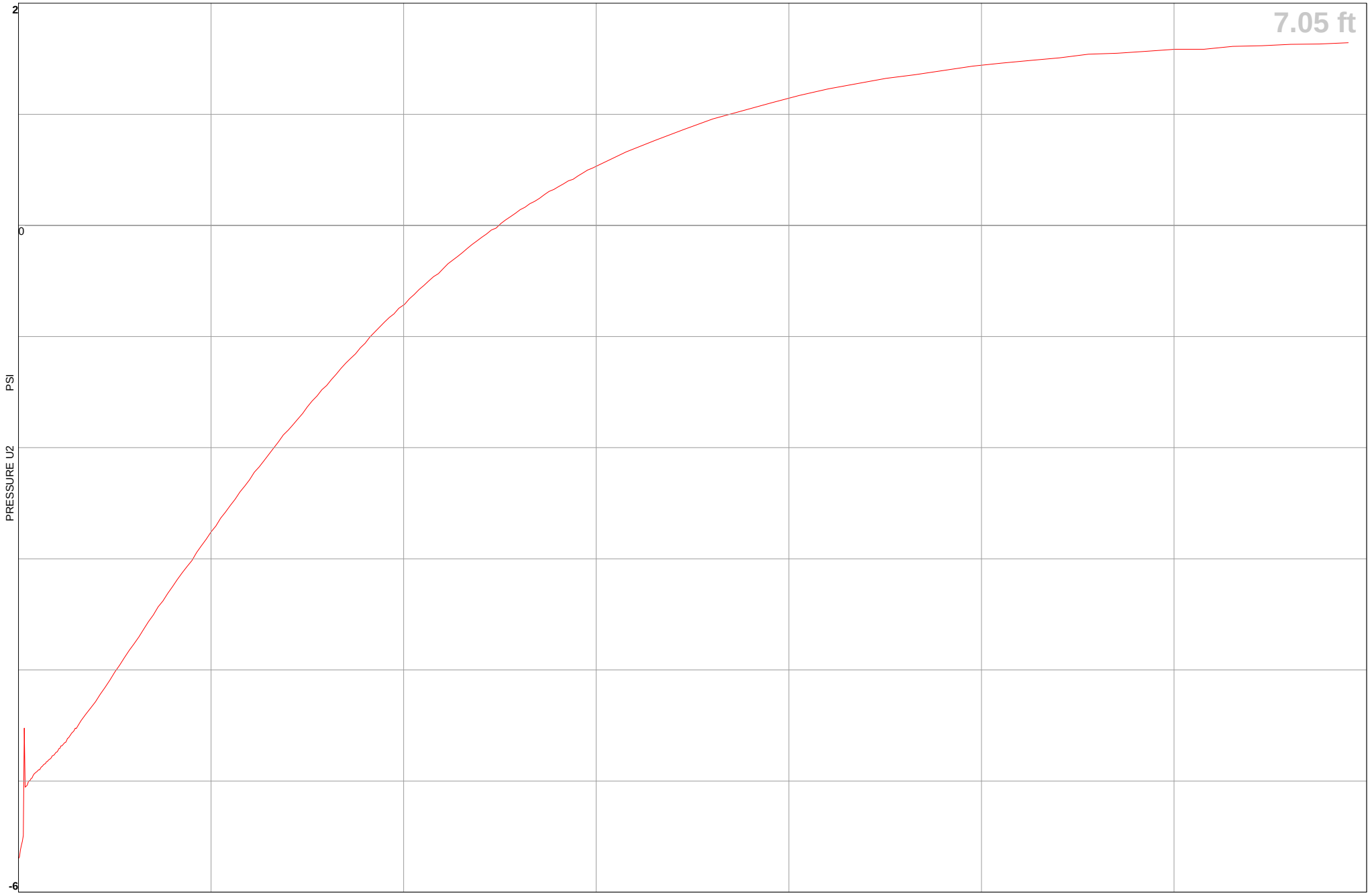
Treadwell & Rollo

Location	**Willow-Whitehall Sewer**	**Operator**	**CB/MM**	**GPS**	
Job Number	**750513314**	**Cone Number**	**DDG1298**		
Hole Number	**CPT-03**	**Date and Time**	**11/25/2014 10:04:22 AM**		
Equilized Pressure	**15.4**	**EST GW Depth During Test**	**2.8**		



Treadwell & Rollo

Location	Willow-Whitehall Sewer	Operator	CB/MM		
Job Number	750513314	Cone Number	DDG1298	GPS	
Hole Number	CPT-04 A	Date and Time	11/25/2014 11:58:28 AM		
Equilized Pressure	1.6	EST GW Depth During Test	3.3		



APPENDIX B

LOGS OF BORINGS BY OTHERS

DRILL RIG	Continuous Flight Auger	SURFACE ELEVATION	- -	LOGGED BY	MMc
DEPTH TO GROUNDWATER	4½'(See Note 2)	BORING DIAMETER	6 Inches	DATE DRILLED	8/25/83

DESCRIPTION AND REMARKS	COLOR	CONSIST.	SOIL TYPE	DEPTH (FEET)	SAMPLER	PENETRATION RESISTANCE (BLOWS/FT.)	WATER CONTENT (%)	DRY DENSITY (PCF)	UNCONFINED COMPRESSIVE STRENGTH (KSF)
5" AC									
SAND, (fine-to medium-grained) some silt and shells	gold brown	medium dense	SM	1		21			
				2					
				3		15			
				4					
	grey brown			5		15			
Bottom of Boring = 5 Feet				6					
Notes:				7					
1. The stratification line represent the approximate boundary between soil typs and the transitions may be gradual.				8					
2. Groundwater level was measured at time of drilling				9					
				10					
				11					
				12					
				13					
				14					
				15					
				16					
				17					
				18					
				19					
				20					

PETER KALDVEER AND ASSOCIATES, INC.
Geotechnical Consultants

EXPLORATORY BORING LOG

SOUTH SHORE CENTER EXPANSION
Alameda, California

PROJECT NO.	DATE	BORING NO.
K246-19	September 1983	12

DATE DRILLED 6/29/12 BORING NO. B-11

GROUND ELEVATION 10' ± MSL SHEET 1 OF 1

METHOD OF DRILLING 4" Solid Stem Auger; Mobile B-24 (California Geotech)

DRIVE WEIGHT 140 LBS. (Cathead) DROP 30"

SAMPLED BY LLB LOGGED BY LLB REVIEWED BY KG

DEPTH (feet)	SAMPLES (Bulk / Driven)	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S	DESCRIPTION/INTERPRETATION
0							ASPHALT CONCRETE: Approximately 6½ inches thick. Paving fabric located approximately 2 inches from top of core.
						SM	AGGREGATE BASE: Approximately 2-3 inches thick.
							FILL: Light yellowish brown, moist, medium dense, silty SAND.
		32	17.4	104.4			Saturated.
10		5					Dark gray, loose, few clays; scattered shells.
		21				SP-SM	MERRITT SAND: Dark yellowish brown, saturated, loose to medium dense, poorly-graded SAND with silt.
20		24					Yellowish brown to greenish gray, medium dense.
							Total depth = 20 feet.
							Groundwater was measured at a depth of approximately 5 feet in borehole after completion of drilling. Groundwater may rise to a level higher than that measured in borehole due to seasonal variations in precipitation and several other factors as discussed in the report.
							Backfilled with Portland cement grout on 6/29/12.
30							
40							

Ninyo & Moore

BORING LOG

ALAMEDA SEWER REPLACEMENT PH 10
ALAMEDA, CALIFORNIA

PROJECT NO.	DATE	FIGURE
401960001	7/12	A-11

DISTRIBUTION

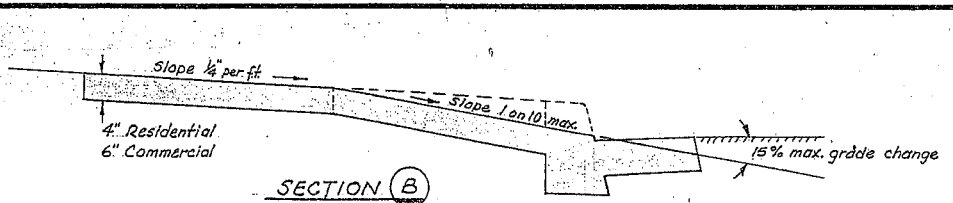
6 copies: Ms. Carol Clark
City of Alameda - Public Works Department
950 West Mall Square
Alameda, California 94501

QUALITY CONTROL

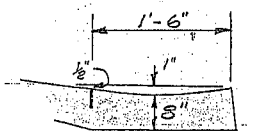
Richard D. Rodgers, GE
Geotechnical Engineer

ATTACHMENT "C"

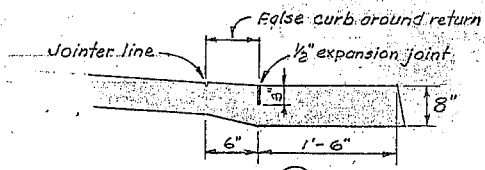
APPLICABLE CITY OF ALAMEDA STANDARD PLANS AND DETAILS



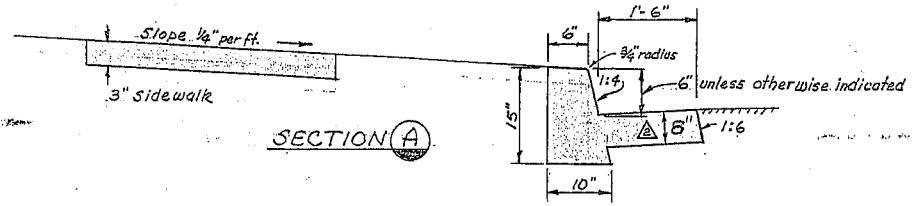
SECTION (B)
(AT DRIVEWAY)



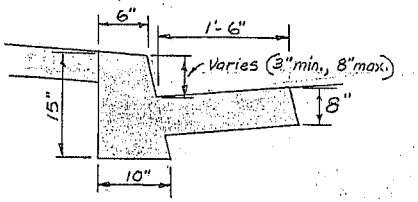
SECTION (D)
AT FLUSH RETURN



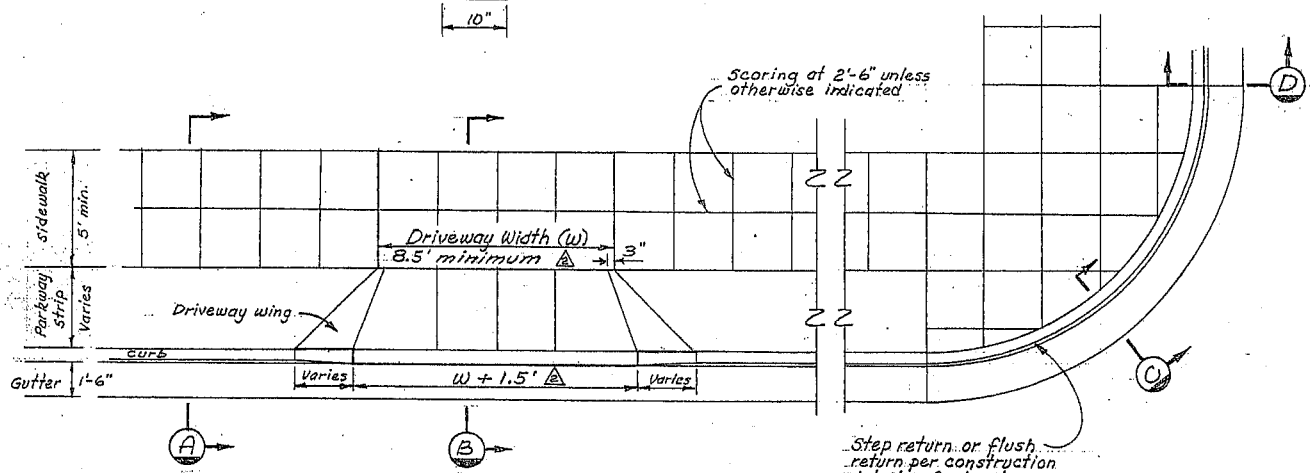
SECTION (C)
AT FLUSH RETURN

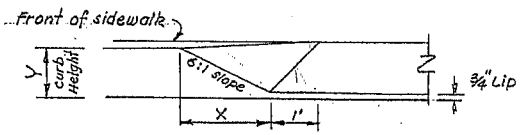


SECTION (A)



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, 2500psi 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.

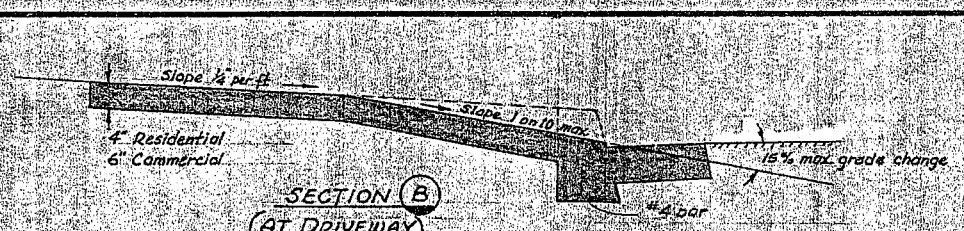
NO.	REVISED	BY	APP.
(3)	April 1998	JF	
(2)	Jan. 1974	Terry	MH
(1)	Jan. 1972	Terry	MH

COMPILED LONG & WONG
DRAWN H. J. WONG
CHECKED J. PAU
DATE OCT. 1968
SCALE NONE

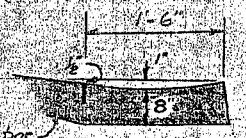
CITY OF ALAMEDA
CALIFORNIA
ENGINEERING DEPARTMENT

STANDARD PLAN
CURB GUTTER SIDEWALK AND DRIVEWAY

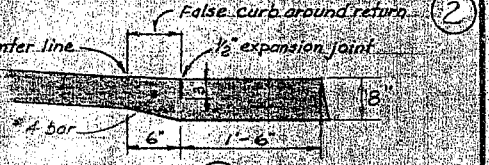
SHEET 1 OF 1
APPROVED BY
M. J. Hanna
CITY ENGINEER
REG. C. E. NO. 7061
DATE 10-28-68
DWG. 6297
CASE 24



SECTION (B)
(AT DRIVEWAY)



SECTION (D)
AT FLUSH RETURN



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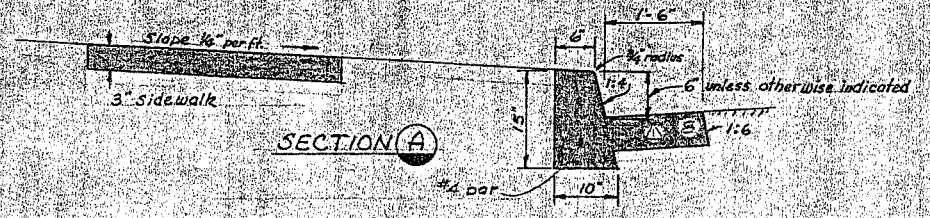
AT FLUSH RETURN



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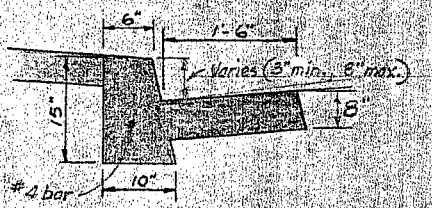
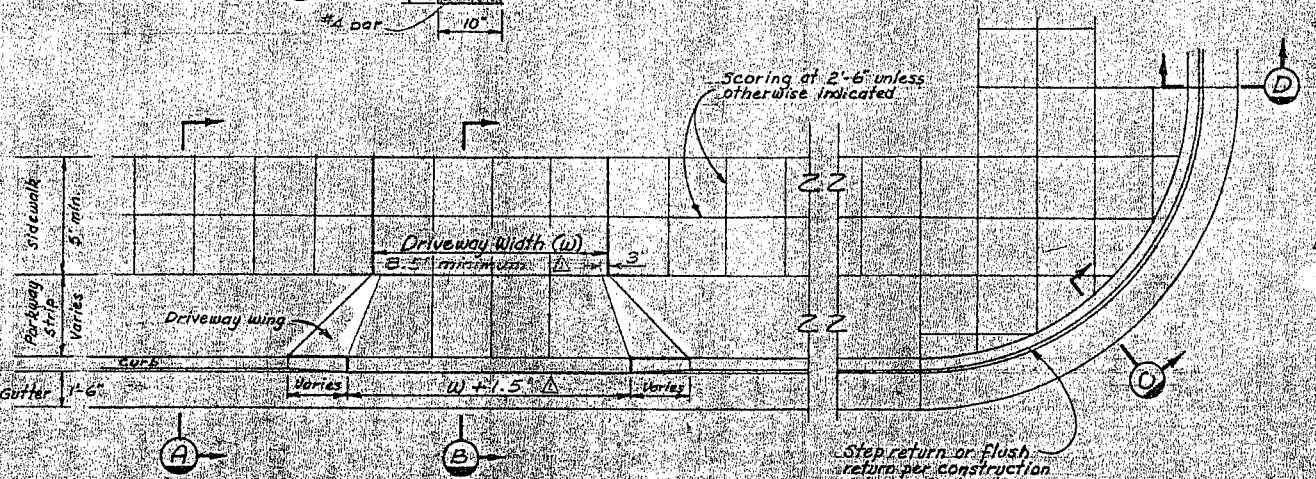


SECTIONS (C) & (D)
AT STEP RETURN



NOTES:

△ Required mix design is 5 sack, ¾" aggregate 2500 psi with 1½ lb. lampblack per cu.yd.

CURB AND GUTTER

½" expansion joints at 10'.
Jointer line at 5'.
Finish as specified.
Transition to existing wider gutter shall be 5' long.

SIDEWALK AND DRIVEWAY

½" expansion joints at 10'.
Finish as specified.

See dwg. 6270-22 where driveway slopes exceed limits shown.

FRONT VIEW AT DRIVEWAY WING

Y	4"	5"	6"	8"
X	19½"	25½"	31½"	43½"

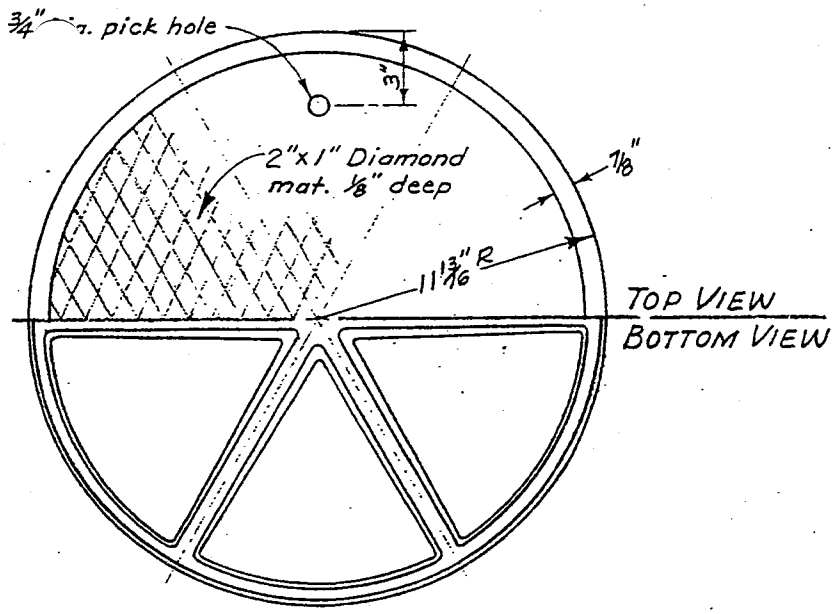
DRIVEWAY WING LENGTHS FOR VARIOUS CURB HEIGHTS

NO.	REVISED	BY	APP.
△	April 1998	JF	
△	Jan. 1974	Terry	MJ

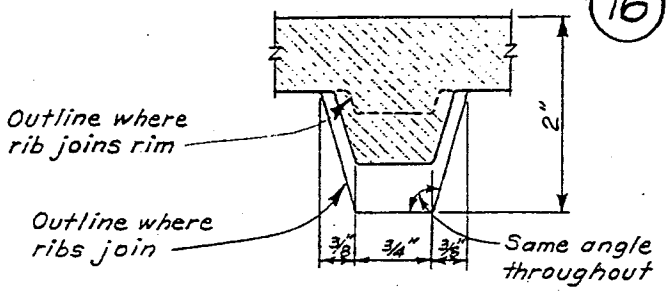
COMPILED LONG & WONG
DRAWN H. J. WONG
CHECKED S. PAU
DATE OCT. 1968 SCALE NONE

CITY OF ALAMEDA
CALIFORNIA
ENGINEERING DEPARTMENT
STANDARD PLAN
CURB GUTTER SIDEWALK AND DRIVEWAY (IN SUBSIDENCE AREAS)

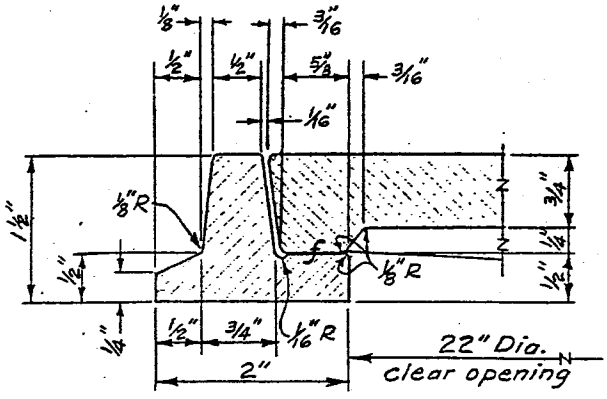
SHEET 1 OF 1
APPROVED BY
M. J. Garcia
CITY ENGINEER
REG. C. E. NO. 7061
DATE 10-25-68
DWG. 6295B
CASE 24



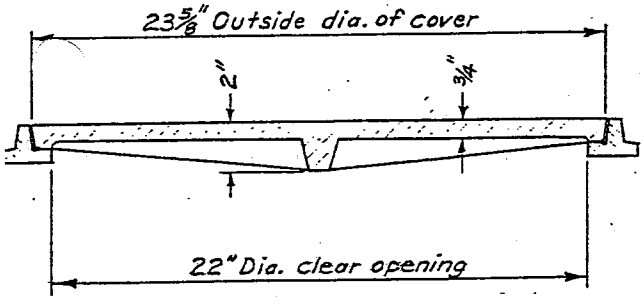
COVER
Scale: 1½"=1'-0"



CROSS SECTION THRU RIB AT MID RADIUS
No Scale



CROSS SECTION THRU RIM
No Scale



CROSS SECTION THRU FRAME AND COVER
Scale: 1½"=1'-0"

NOTES:

1. Frame and cover shall be gray cast iron conforming to the latest A.S.T.M. specifications.
2. Frame and cover shall be tested for accuracy of fit and shall be marked in sets before delivery.
3. After installation, frame and cover shall be thoroughly cleaned and painted with asphalt black paint, Teclac T, as manufactured by the Inter-Coastal Paint Corporation or an approved equal.
4. Cover shall not rattle after installation.

Approx. Wts.
Cover: 100 #
Frame: 30 #

NO.	REVISED	BY	APVD.

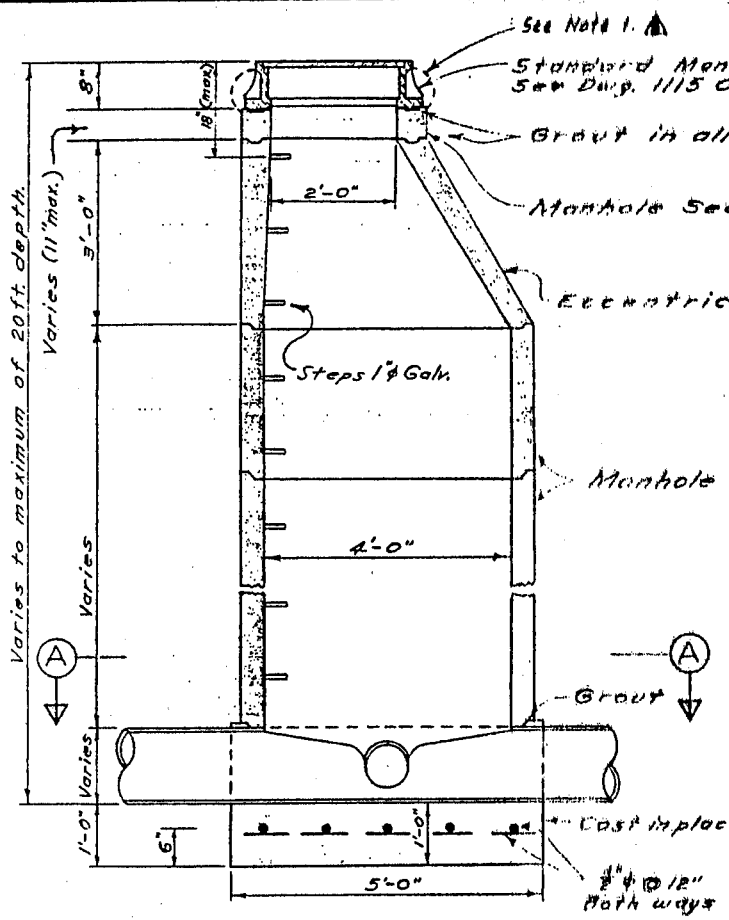
COMPILED H. J. Wong
DRAWN A. Tang
CHECKED C. T. Coffey
DATE July 1968
SCALE As Noted

CITY OF ALAMEDA
CALIFORNIA
ENGINEERING DEPARTMENT

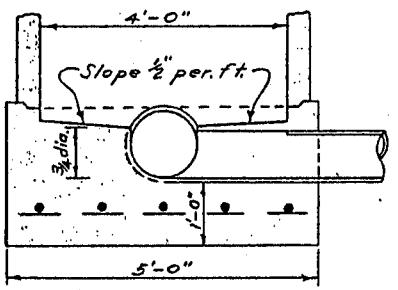
STANDARD HANDHOLE FRAME AND COVER CIRCULAR

SHEET 1 OF 1
APPROVED BY
M J Hanna
CITY ENGINEER
REG. C. E. NO. 7061
DATE 7-5-68
DWG. 6194
CASE 12

78-10-48-250



SECTION (C)
Scale ½"=1'-0"

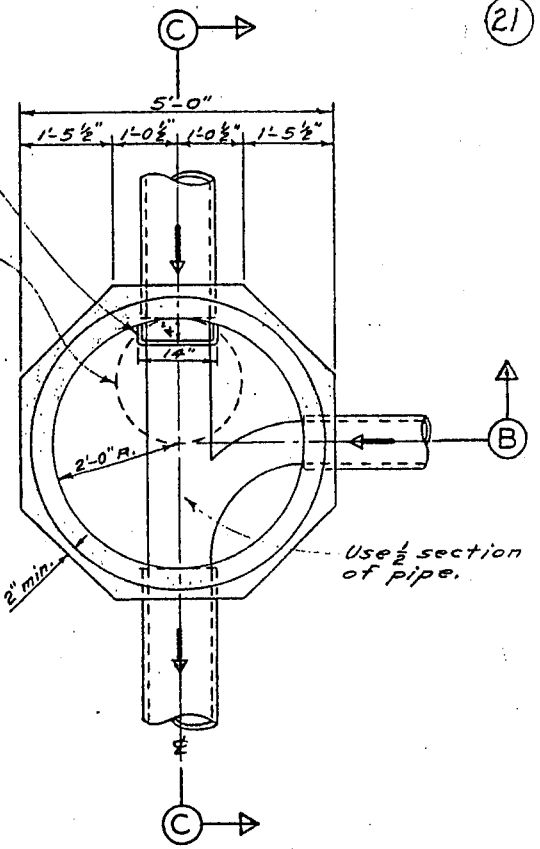


SECTION (B)
Scale ½"=1'-0"

⚠ Steps 1"ϕ galv. located on the upstream side of main line, unless otherwise specified by the Engineer.

Location of frame opening

⚠ NOTE: ⚠ When main is 18" in diameter or larger, eccentric cone & steps shall be set 90° from direction of flow.



SECTION (A)
Scale ½"=1'-0"

NOTES

⚠ 1. A ring of mortar approximately 6" deep & extending past the outer edge of the ring shall be placed all around & on top of the bottom flange. The mortar shall be smoothly finished & have a slight slope to shed water away from the frame. (This condition applies in nonpavement areas only. A standard street patch shall be used in paved areas.)
2. Steps shall be installed equally spaced at 16" centers minimum.
3. External bands shall be applied.
4. All joints shall be watertight.
5. Use Type "A" Manhole for depth of cover on main sewer pipe over 3'-5". See Dwg. 5432-34 for shallower depths.

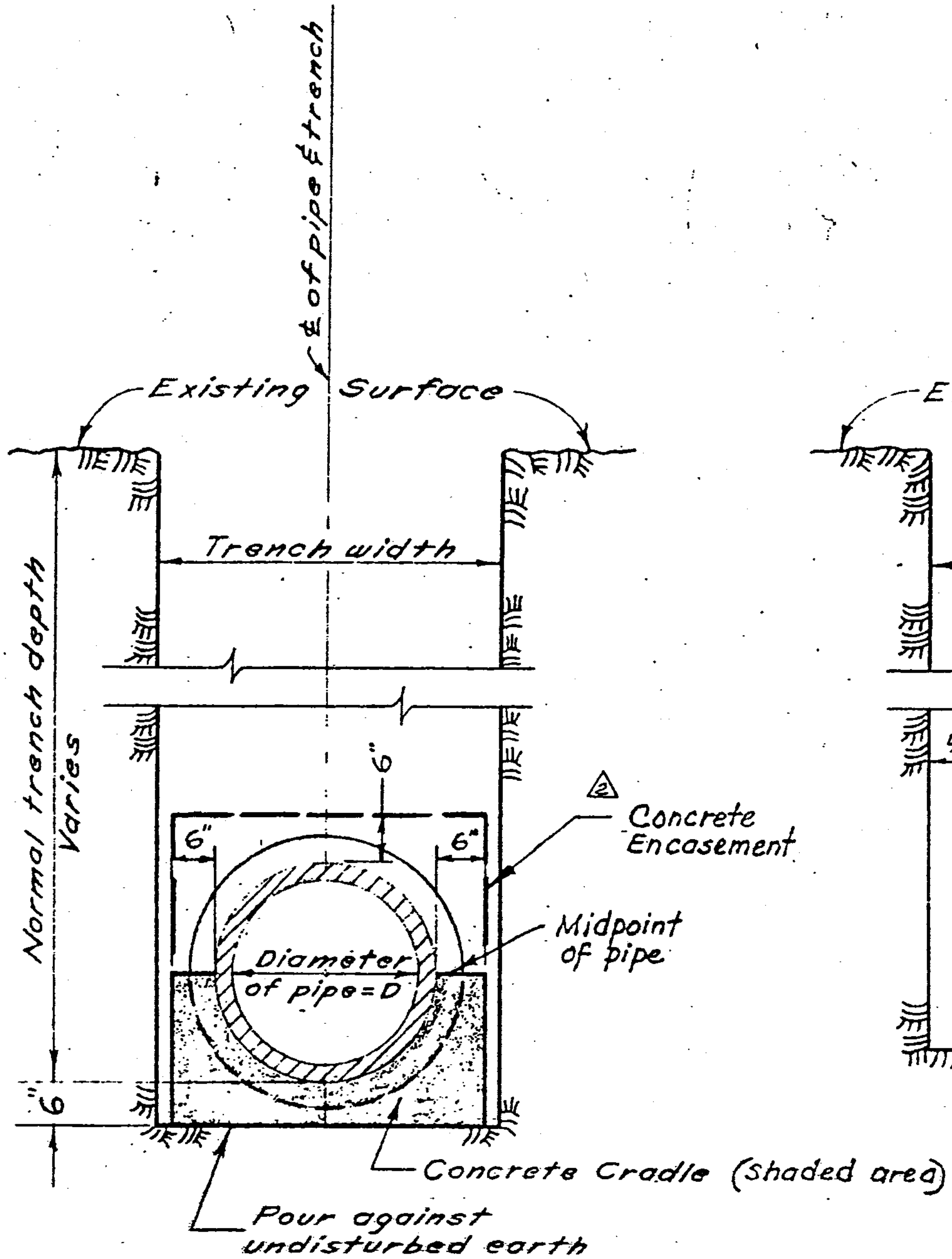
NO.	REVISED	BY	APP.
⚠	Jan. 1972	Terry	MH
⚠	Feb. 1970	Terry	MH
⚠	Feb. 1987	Vogel	TDE
⚠	May 1979	Reilly	MH

COMPILED P.H. Long
DRAWN W. Terry
CHECKED P.H. Long
DATE Jan. 1964
SCALE ½"=1'-0"

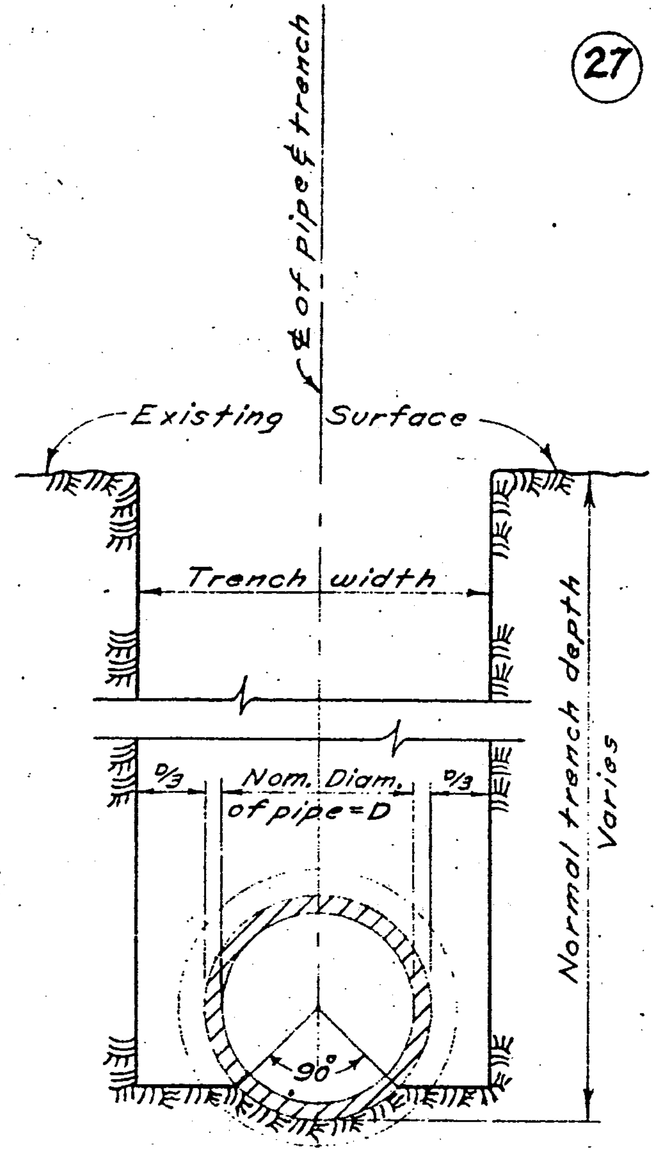
CITY OF ALAMEDA
CALIFORNIA
ENGINEERING DEPARTMENT

STANDARD PRE-CAST CONCRETE MANHOLE TYPE "A"

SHEET 1 OF 1
APPROVED BY M. J. Hanna CITY ENGINEER
REG. C. E. NO. 7061
DATE 1-16-64
DWG. 2815
CASE 34



CONCRETE CRADLE AND ENCASEMENT



FIRST CLASS LAYING

△1 Re-drawn

NO.	REVISED	BY	APVD.
△2	7-19-68	HW	
△1	12-6-61	Terry	

COMPILED

DRAWN W. Terry

CHECKED

DATE	SCALE
Dec. 1961	None

CITY OF ALAMEDA
CALIFORNIA
ENGINEERING DEPARTMENT

EXCAVATION OF TRENCHES FOR PIPE SEWERS

SHEET 1 OF 1

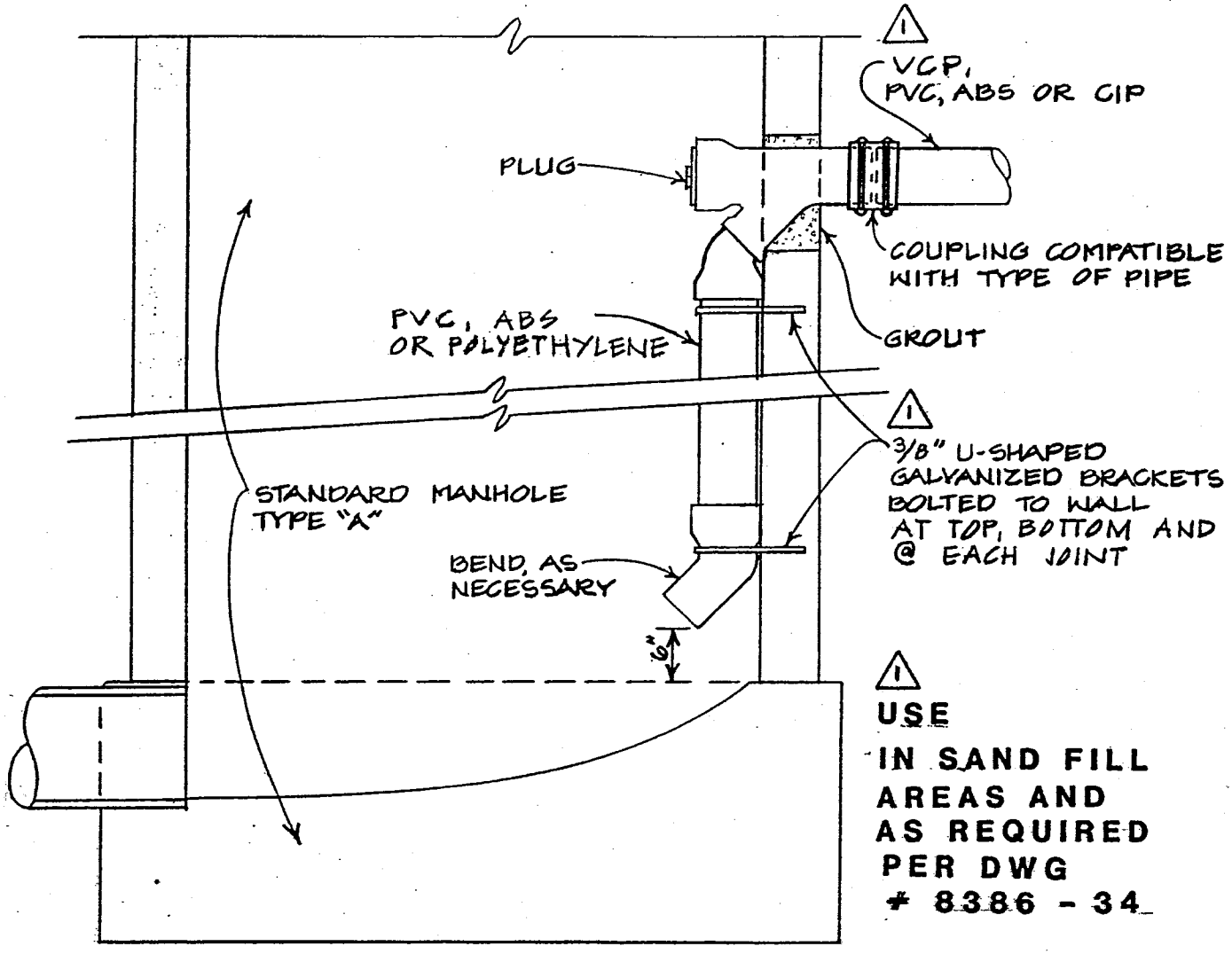
APPROVED BY [signature]

CITY ENGINEER
REG. C. E. NO. 7061

DATE 12-7-'61

DWG.	CASE
3147 B	32

2578-10-46-250



NOTE:

PLASTIC JOINTS SHALL BE SOLVENT WELDED & CONFORM TO ASTM D2680 (ABS JOINTS) OR ASTM D3915 (PVC JOINTS).

NO.	REVISED	BY	APVD.
1	AREAS/MATERIALS	EC	ASG

DESIGNED
DRAWN KERPEL
CHECKED SANDERSON

DATE	SCALE
FEB. 1987	NONE

CITY OF ALAMEDA
CALIFORNIA
ENGINEERING DEPARTMENT

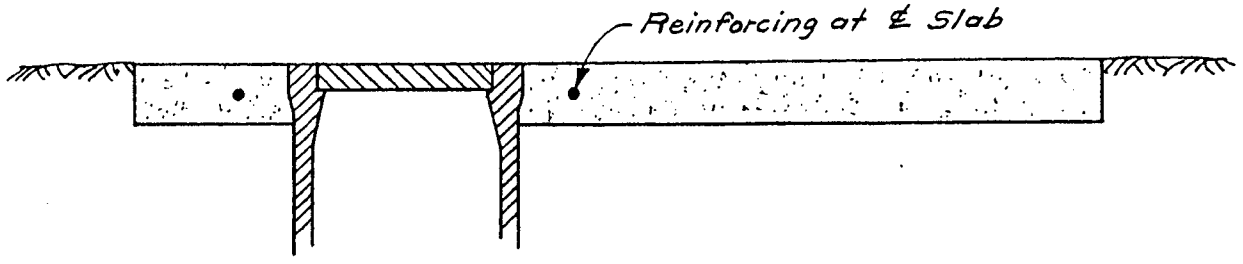
INSIDE DROP MANHOLE DETAIL

1 For Pipes 4 to 12 inches in Diameter

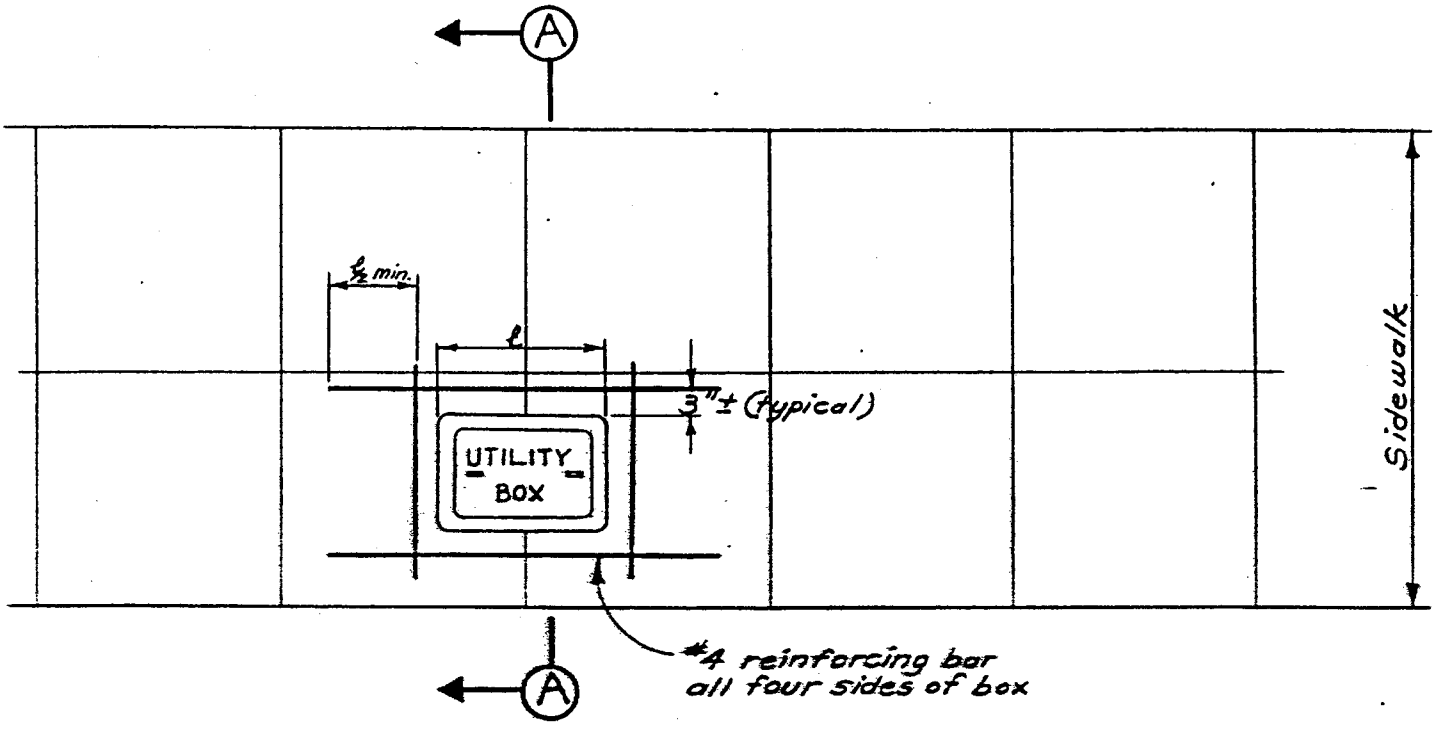
APPROVED BY
CITY ENGINEER
REG. C. E. NO. 16071
DATE 2-26-87

SHEET 1 OF 1

DWG.	CASE
8214	32



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

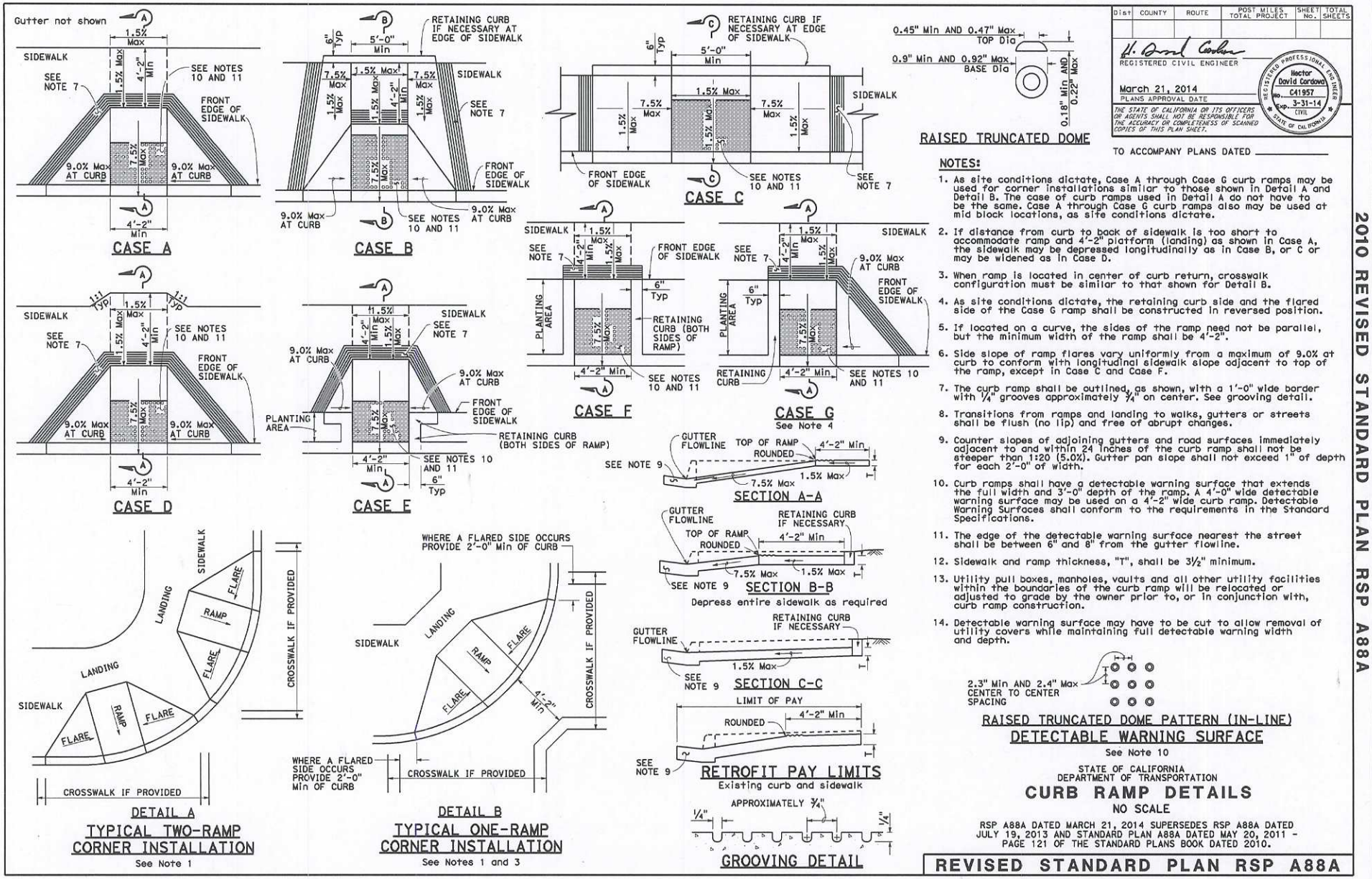
SHEET 1 OF 1
APPROVED BY

CITY ENGINEER
REG. C. E. NO. 7061

DATE
DWG. 6080 | CASE 22

9578-10-48-250

STANDARD DETAIL 64



Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

March 21, 2014
PLANS APPROVAL DATE

Hector David Cardona, No. C41957, Exp. 3-31-14, CIVIL, REGISTERED PROFESSIONAL ENGINEER, STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

TO ACCOMPANY PLANS DATED _____

NOTES:

1. As site conditions dictate, Case A through Case G curb ramps may be used for corner installations similar to those shown in Detail A and Detail B. The case of curb ramps used in Detail A do not have to be the same. Case A through Case G curb ramps also may be used at mid block locations, as site conditions dictate.
2. If distance from curb to back of sidewalk is too short to accommodate ramp and 4'-2" platform (landing) as shown in Case A, the sidewalk may be depressed longitudinally as in Case B, or C or may be widened as in Case D.
3. When ramp is located in center of curb return, crosswalk configuration must be similar to that shown for Detail B.
4. As site conditions dictate, the retaining curb side and the flared side of the Case G ramp shall be constructed in reversed position.
5. If located on a curve, the sides of the ramp need not be parallel, but the minimum width of the ramp shall be 4'-2".
6. Side slope of ramp flares vary uniformly from a maximum of 9.0% at curb to conform with longitudinal sidewalk slope adjacent to top of the ramp, except in Case C and Case F.
7. The curb ramp shall be outlined, as shown, with a 1'-0" wide border with 1/4" grooves approximately 3/4" on center. See grooving detail.
8. Transitions from ramps and landing to walks, gutters or streets shall be flush (no lip) and free of abrupt changes.
9. Counter slopes of adjoining gutters and road surfaces immediately adjacent to and within 24 inches of the curb ramp shall not be steeper than 1:20 (5.0%). Gutter pan slope shall not exceed 1" of depth for each 2'-0" of width.
10. Curb ramps shall have a detectable warning surface that extends the full width and 3'-0" depth of the ramp. A 4'-0" wide detectable warning surface may be used on a 4'-2" wide curb ramp. Detectable Warning Surfaces shall conform to the requirements in the Standard Specifications.
11. The edge of the detectable warning surface nearest the street shall be between 6" and 8" from the gutter flowline.
12. Sidewalk and ramp thickness, "T", shall be 3½" minimum.
13. Utility pull boxes, manholes, vaults and all other utility facilities within the boundaries of the curb ramp will be relocated or adjusted to grade by the owner prior to, or in conjunction with, curb ramp construction.
14. Detectable warning surface may have to be cut to allow removal of utility covers while maintaining full detectable warning width and depth.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
CURB RAMP DETAILS
NO SCALE

RSP A88A DATED MARCH 21, 2014 SUPERSEDES RSP A88A DATED JULY 19, 2013 AND STANDARD PLAN A88A DATED MAY 20, 2011 - PAGE 121 OF THE STANDARD PLANS BOOK DATED 2010.

REVISED STANDARD PLAN RSP A88A

2010 REVISED STANDARD PLAN RSP A88A

CALTRANS REVISED STANDARD PLAN RSP A88A AS SHOWN HEREIN HAS BEEN ADOPTED FOR USE AS THE CITY'S STANDARD DETAIL 64 FOR THE USE ON THE GROUP 2 - SEWERAGE PUMP STATION RENOVATIONS FOR RELIABILITY AND SAFETY

ATTACHMENT “D”

ARBORIST TREE REPORTS FOR THE FOLLOWING PUMP STATIONS

- **ADELPHIAN**
- **VERDEMAR**

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 Adelphian Pump station

Location: 103 Adephian Way

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 for the utility trenching and tree and plant locations. This report provides tree protection commentary for specific trees. *Appendix 2* provides overall Guidelines for Tree Protection.

Summary

The primary trees that will be impacted by the project are palm Trees #s 3 and 5 and Monterey Cypress Tree #8; the cypress tree is most at risk. The recent pruning has caused some stress and any root loss will contribute to greater stress. The palm trees will be less impacted by the utility trenching due to their root regeneration ability, which is much better with warm weather and warm soil conditions.

Tree Protection requires that the bases of trees that could potentially be damaged be provided specified protections. Other plant materials located in areas of trenching can be removed, held in containers, and replanted after work activities are complete. Comparable nursery container sizes of the plants have been provided if new plants are needed for replacement.

Soil protections using trenching plates or 1 1/8 inch plywood is required when equipment is operating within ten feet of the palms and 18 feet from the cypress Tree #8. Depending upon the time of year, supplemental irrigation and mulch may be required. For general Tree Protection Guidelines, please refer to *Appendix 2*.

Table 1 Tree Survey Data

Trees highlighted in grey are at risk during construction. Tree locations can be found in Appendix 1 with the numbers corresponding to those in the table below.

No.	Species	Common Name	DBH/CT[1]	Health*	Structure*	Distance to Pump Structures	Notes	Action
1	*Washingtonia robusta*	Mexican Fan Palm	10' of CT	G	G	3.5' to water box	1 adjacent flax *(Phormium)*	Protect
2	*Washingtonia robusta*	Mexican Fan Palm	10.5' of CT	G	G	8' to slab	1 adjacent flax	Protect
3	*Washingtonia robusta*	Mexican Fan Palm	9' of CT	G	G	5.5' to slab	2 adjacent flax	Protect
4	*Washingtonia robusta*	Mexican Fan Palm	15' of CT	G	G	14' to slab		Protect
5	*Washingtonia robusta*	Mexican Fan Palm	13' of CT	G	G	17' to slab		Protect, Rearrange conduit around tree
6	*Washingtonia robusta*	Mexican Fan Palm	16' of CT	G	G	20' to slab		Protect
7	*Washingtonia robusta*	Mexican Fan Palm	13' of CT	G	G	10' from path	3 tree ferns to the East	Protect
8	*Hesperocyparis macrocarpa*	Monterey Cypress	22" DBH	F	F	18" to control panel	Recent pruning; Adjacent *ceanothus* to 35' from utility box; Protect	Protect in-place

*** G is Good, F is Fair, P is Poor**

Shrubs and Ground Cover

Shrubs – Flax *(Phormium),* Tree Fern *(Cyatheales),* California Lilac *(Ceanothus griseus)*

Discussion of Plants at Risk

Palm Trees – All palm trees appear to be in good health. Tree #5 appears to be located on the direct line of a utility trench. The two possible treatments include tunneling under the tree or relocating the

[1] DBH is Diameter at Breast Height or 4.5 feet above soil grade/ CT is the number of feet from soil grade to the first living palm frond.

conduit around the roots. Palm Tree #3 will likely suffer some root loss but is not anticipated to be seriously impacted. Supplemental irrigation may be required as mitigation.

Cypress Tree – This tree appears to be in fair health. Any significant root loss resulting from trenching is of concern. Supplemental irrigation and mulching are to be utilized for health mitigation if determined necessary.

Shrubs – The Flax and *Ceanothus* will be significantly impacted by the project. The flax can be likely removed and replanted after the work is complete. The *Ceanothus* is considered to be senescent and well past viability. It is recommended that as much of the *Ceanothus* as possible be removed and replaced. As this is a fast growing, short lived plant, new one gallon size replacements are most appropriate. Larger container size *Ceanothus* generally suffer from root problems due to rapid growth.

Replacement Sizes for Shrubs

- Flax *(Phormium)- 24" box size*
- Tree Fern *(Cyatheales)- 24" box size*
- California Lilac *(Ceanothus griseus) – 1 gallon size plants. Plants are senescent and in decline. Smaller planting stock for this shrub is preferable.*

Photo 1. *Photo above shows palms. Red arrows point to palm Trees 3 and 5, which may be at risk during proposed improvements.*

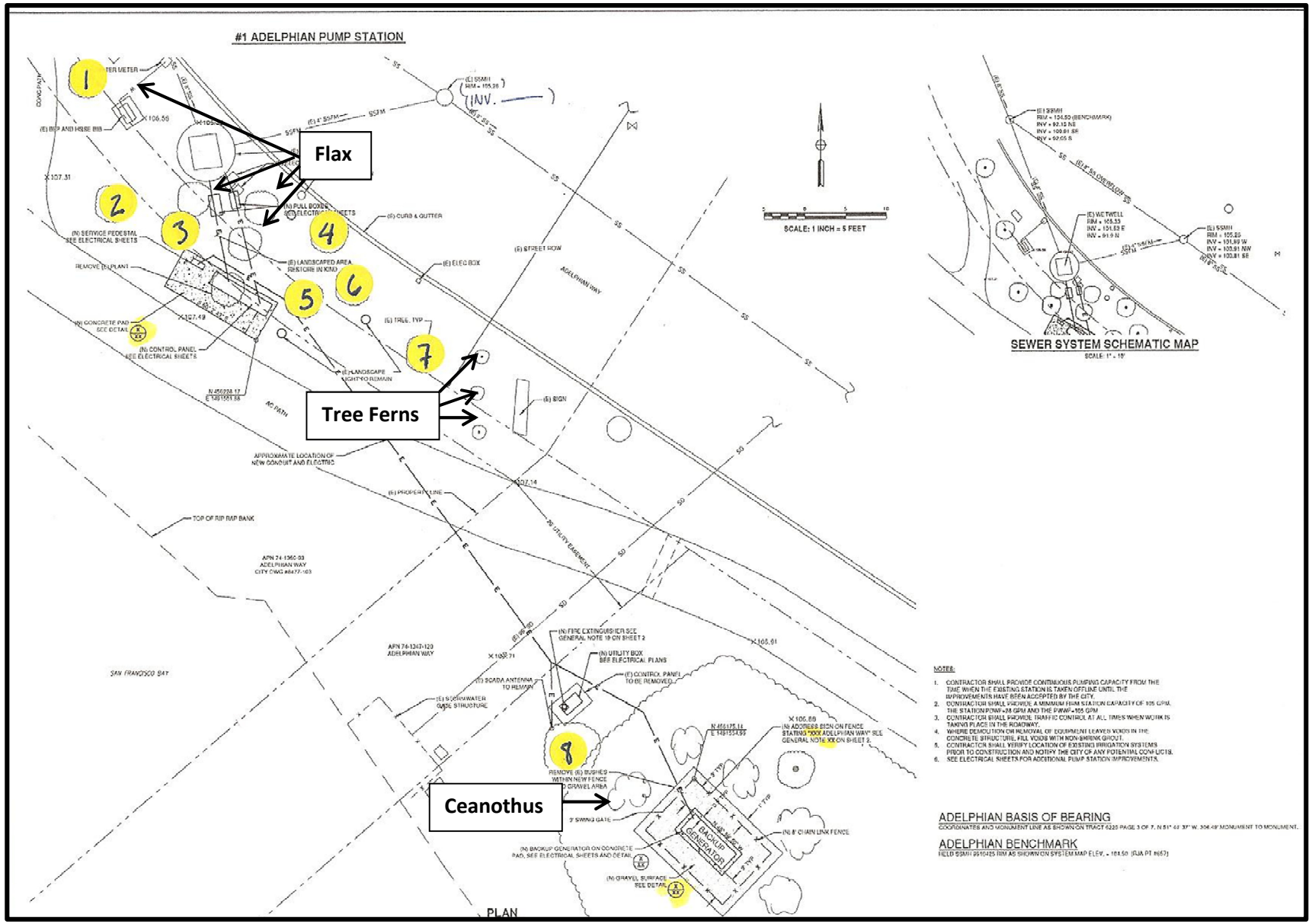
Photo 2. *Photo to the left shows Monterey Cypress Tree #8, which is also of concern during construction. Tree Protection measures will apply.*

Photo 3. *Photo above shows the senescent* Ceanothus *and dead cypress. These plants are no longer viable and can be cleared and replanted as part of the new landscape design.*

End Report

Appendix Material

Appendix 1 – Tree and Plant Location Map
Appendix 2 – Tree Protection Guidelines


#1 ADELPHIAN PUMP STATION
Flax
Tree Ferns
Ceanothus
1
2
3
4
5
6
7
8
SCALE: 1 INCH = 5 FEET
SEWER SYSTEM SCHEMATIC MAP
NOTES:
1. CONTRACTOR SHALL PROVIDE CONTINUOUS PUMPING CAPACITY FROM THE TIME WHEN THE EXISTING STATION IS TAKEN OFFLINE UNTIL THE IMPROVEMENTS HAVE BEEN ACCEPTED BY THE CITY.
2. CONTRACTOR SHALL PROVIDE A MINIMUM RWM STATION CAPACITY OF 105 GPM, THE STATION PWWF=78 GPM AND THE PWWF=105 GPM.
3. CONTRACTOR SHALL PROVIDE TRAFFIC CONTROL AT ALL TIMES WHEN WORK IS TAKING PLACE IN THE ROADWAY.
4. WHERE DEMOLITION OR REMOVAL OF EQUIPMENT LEAVES VOIDS IN THE CONCRETE STRUCTURE, FILL VOIDS WITH NON-SHRINK GROUT.
5. CONTRACTOR SHALL VERIFY LOCATION OF EXISTING IRRIGATION SYSTEMS PRIOR TO CONSTRUCTION AND NOTIFY THE CITY OF ANY POTENTIAL CONFLICTS.
6. SEE ELECTRICAL SHEETS FOR ADDITIONAL PUMP STATION IMPROVEMENTS.
ADELPHIAN BASIS OF BEARING
ADELPHIAN BENCHMARK
PLAN

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: January 8, 2014

To: Carol Clark
950 West Mall Square, Room 110
Alameda, CA 94501-7575

Subject: Verdemar Pump Station Vegetation

Location: 3049 Flora Vista Street

Assignment: *Arborist was requested provide information on the vegetation surrounding the pump station including species, condition and future viability.*

Summary

Five trees were identified in the proximity of the pump station. The large olive tree and Cercis are likely the most at risk from the project**.** The area is densely planted with shrubs and groundcovers, and many will likely have to be replaced or, if possible, relocated in pots until renovations have ceased. Since the inspection, the decayed Silver Dollar Gum tree has been removed. The City owned Raywood Ash located in the sidewalk is diseased with ash dieback, and will never recover. We recommend that this tree be replaced with a viable specimen of another species that is properly planted.

Table 1 Tree Survey Data

Trees highlighted in grey are at risk during construction. Tree locations can be found in *Appendix 1* with the numbers corresponding to those in the table below. ***G is Good, F is Fair, P is Poor**

No.	Species	Common	DBH	Height	Health*	Structure	Notes	Action
1	*Cercis occidentalis*	Western Redbud	1", 1"	5'	G	F	Remove stakes	Protect
2	*Olea europaea*	Olive	12.5, 10.5, 11	35'	F	F	Valuable tree	Protect
3	*Eucalyptus polyanthemos*	Silver Dollar Gum	20"	45'	F	F	Lean	Protect
4	*Eucalyptus polyanthemos*	Silver Dollar Gum	-	-	-	-	-	HOA has Removed tree
5	*Fraxinus oxycarpa 'Raywood'*	Raywood Ash	3"	10'	P	P	Dying	City to Remove
6	*Olea europaea*	Olive	2	5'	G	G	Newly planted	Protect

Protection of Olive Tree – The olive tree is the center focus of the landscape and as such is quite valuable. Though it is located in an area where it appears no construction activities will occur, it is close enough to the construction activities that it will require both scaffold and root protection. If serious adverse impact is expected, it is best removed and maintained to be replanted after project completion.

Redbud – The redbud is quite small. It is recommended that at least four tree stakes be placed installed surrounding the tree and wrapped with orange plastic fencing. If the tree is damaged, a 24 inch box size specimen would be a suitable replacement size.

Raywood Ash – This is a City street tree, and is located in the adjacent parkway planting strip. The tree is diseased with ash dieback (*Botryosphaeria stevensii* or *Diplodia mutila*) and is well along on the mortality spiral, for which it will never recover. Ash dieback attacks stressed trees. It is likely this tree became stressed due to the settling of the rootball below grade, mower damage, and dysfunctional root system. It is recommended the tree be removed and replaced with a better suited species planted correctly.

Additional Plants – Arborist identified and counted all the plants in the landscape in an around the pump station. It is likely that there may be significant damage to the plant materials due to the proximity of the work activities. Some plants can be removed and held until after the work is finished and others would be best replaced. The size of the plants provide information to be used in selecting replacements for any plants that are lost.

	Common Name	Species	Size	Amount	Photo
1	Dusty Miller	*Senecio cineraria*	4x4, 3x3, 1x1 (width)	10	
2	California Lilac 'Carmel Creeper'	Ce*anothus griseus horizontalis*	2x3 (width)	6	
3	Yarrow	*Achillea millefolium*	6x3, 5x3 (width)	7	

4	Tall Fescue	*Festuca*		6	
5	Breath of Heaven	*Coleonema pulchrum*	4x3 (width)	4	
6	Flax	Phormium	5-6 feet tall	14	
7	Lily of the Nile	*Agapanthus*	3-5 feet wide	45-50	
8	Oak Leaf Hydrangea	*Hydrangea quercifolia*	4-6 feet tall	8	
9	Tibouchinia Tree	*Tibouchina grandiflora*	4 feet tall	4	

Please refer to the Tree Protection Guidelines for general procedures for vegetation protection.

Fencing – As much of the landscape as possible should be fenced off. This is the area where work activities will not be conducted.

Removing, maintaining and replacing plant materials – It is not generally practical to remove, hold and maintain, and then replace plant materials due to potential mortality and maintenance costs. Greater success in moving plants can be had during winter months. When being held, the materials should be held in a shady area at all times and provided supplemental moisture on a regular and monitored manner.

Replacement of Plant Materials with New Stock – Though smaller size planting stock is recommended, the container sizes recommended for replacement materials would range from 1 gallon size up to 15 gallon size stock.

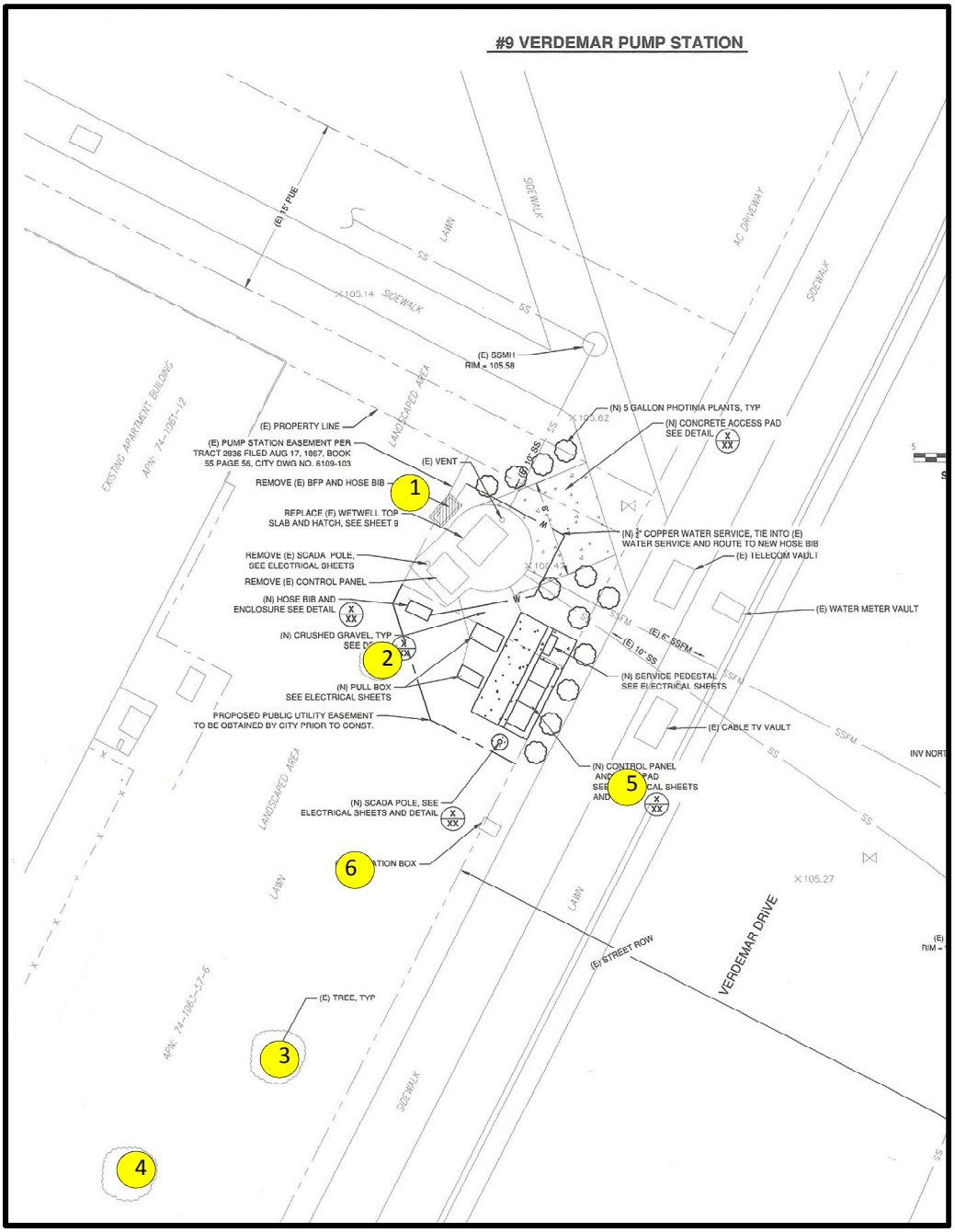
Replacement planting will be easiest for establishment if the planting is undertaken in the late fall season. This will minimize the amount of supplemental moisture needed during the early stages of development.

Photo 1. *Photo to the left shows the large olive tree and some of the landscape plants growing through the pump station area.*

Because of the density of the planting, some damage to the landscape plants is likely. A clear idea of the plants that will be lost can be determined at the beginning of the pump station upgrade project.

Photo 2. *Photo to the right shows the Raywood Ash in the parkway planting site. This City tree was planted too deep. It has never grown and is slowly dying from ash dieback. The replacement tree would likely be close to equal in size.*

End



No.	Species
1	*Cercis occidentalis*
2	*Olea europaea*
3	*Eucalyptus polyanthemos*
4	*Eucalyptus polyanthemos*
5	*Fraxinus oxycarpa 'Raywood'*
6	*Olea europaea*

CITY OF ALAMEDA
ALAMEDA COUNTY, CALIFORNIA

TECHNICAL PROVISIONS
FOR THE
CONSTRUCTION OF

CITY OF ALAMEDA
GROUP 2 – SEWERAGE PUMP STATION RENOVATIONS FOR RELIABILITY AND SAFETY IMPROVEMENTS

PROJECT NO. P.W. 03-14-10

MAY 13, 2015

SECTION 01005
CERTIFICATION

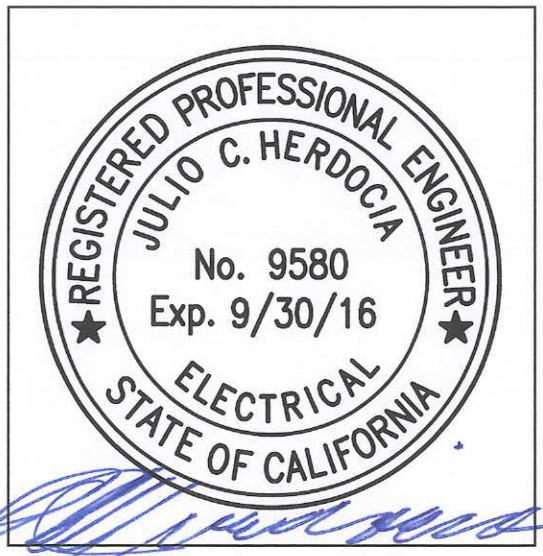
THE FOLLOWING SECTIONS:

Division 16

OF THESE TECHNICAL PROVISIONS WERE PREPARED UNDER THE SUPERVISION OF:

Julio C. Herdocia, P.E.
California Registered Electrical Engineer No. E9580
Expiration 9/30/16

MTH Engineers, Inc.
3350 Scott Boulevard # 11
Santa Clara, CA 95054
(408) 986-8558



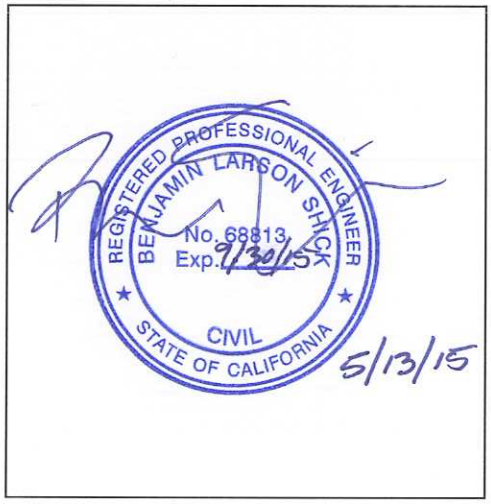
THE FOLLOWING SECTIONS:

Divisions 1, 2, 8, 9, 11, and 15 and Section 03400

OF THESE TECHNICAL PROVISIONS WERE PREPARED UNDER THE SUPERVISION OF:

Benjamin L. Shick, P.E.
California Registered Civil Engineer No. 68813
Expiration 9/30/15

Schaaf & Wheeler, Consulting Civil Engineers
870 Market Street, Suite 1278
San Francisco, CA 94102
(415) 433-4848



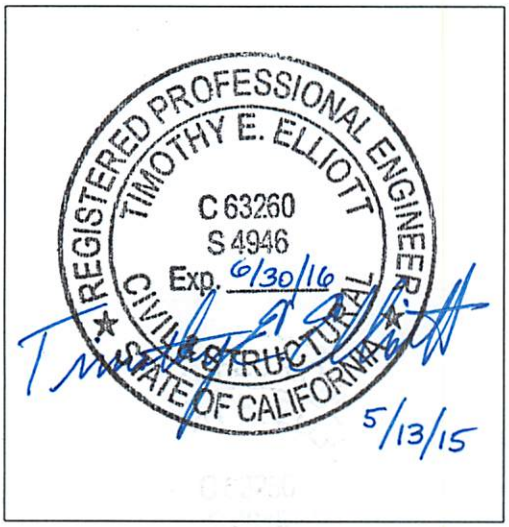
THE FOLLOWING SECTIONS:

Sections 01610, 03300, 03600, 05501, and 05505

OF THESE TECHNICAL PROVISIONS WERE PREPARED UNDER THE SUPERVISION OF:

Timothy E. Elliott, P.E.
California Registered Civil Engineer No. C63260
California Registered Structural Engineer No. S4946
Expiration 6/30/16

Finn Design Group, Inc.
5000 Hopyard Road, Suite 300
Pleasanton, California 94588
(925) 737-1600



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DIVISION 1 - GENERAL REQUIREMENTS

DIVISION 2 - SITE CONSTRUCTION

DIVISION 16 - ELECTRICAL

END OF SECTION

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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, and installing new equipment at SIX (6) sewage lift stations. Equipment to be replaced and installed include various pumps, piping, valves, electrical equipment, new wetwells, adding two (2) standby engine 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 2 Sewerage Pump Station Renovations for Reliability and Safety Improvements, PW 03-14-10.”
   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

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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). 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 Prevention

Plan (SWPPP) 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. Adelphian 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 Adelphian Pump Station. Temporary facilities include, but are not limited to; power supply and energy costs during construction, water/sanitary facilities, construction fencing, SWPPP 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 Adelphian Pump Station as required by these Specifications and the Contract Drawings.

3. Adelphian Demolition

The lump sum price bid for this item shall constitute full compensation for all work, equipment and materials necessary for demolishing, removing and disposing of equipment and materials from the Adelphian pump station as identified in the Contract Drawings and these Specifications, including, but not limited to, removal of existing pumping equipment, piping and valves, control panel, electrical service, wetwell top slab, items within the wetwell as indicated on the Contract Drawings, and other items as necessary for construction.

4. Adelphian Shoring of Open Excavations

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 Adelphian Pump Station, which shall conform to applicable safety orders.

5. Adelphian Submersible Pumps, Rails & 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.

6. Adelphian Piping, Fittings, and Valves

This bid item includes all material, labor and equipment required to furnish and install all pipe spools, fittings, valves, pipe supports, and accessories necessary to provide a complete and functional pump discharge and bypass pumping connection 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, curb & gutter replacement, AC pavement 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.

7. Adelphian Wetwell Modifications

This bid item includes all necessary labor, materials and equipment to furnish and install a precast concrete top slab and access hatch conforming to the requirements of these Specifications and the Contract Drawings. This bid item also includes cleaning the existing wetwell, and addition of chamfers within the invert of the existing wetwell. Payment for this bid item will be on a lump sum basis.

8. Adelphian Wetwell Coating System

This bid item includes all work necessary to install a coating system on the interior surfaces of the wetwell in accordance with these specifications. This bid item includes all necessary surface cleaning, blasting, and preparation measures. Payment for this bid item will be on a lump sum basis.

9. Adelphian Concrete Work

This bid item includes all necessary labor, materials and equipment to furnish and install cast-in-place concrete pads for the control panel, service pedestal, generator, and maintenance cabinet 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 the concrete pads. Payment for this bid item shall be on a lump sum basis.

10. Adelphian Generator

This bid item includes 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 be on a per generator basis.

11. Adelphian 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 Adelphian pump station conforming to the requirements of these specifications and the Contract Drawings. This bid item also includes a fire department

approved key-lock box. Payment for this bid item shall be on a lump sum basis.

12. Adelphian 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 Adelphian 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, sidewalk replacement, and curb & gutter replacement necessary to construct the electrical service and pedestal. Payment for this bid item shall be on a lump sum basis.

13. Adelphian 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.

14. Adelphian 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.

15. Adelphian 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.

16. Adelphian Fence and Gate

This bid item includes all labor, materials and equipment necessary to furnish and install the fencing and gate at the Adelphian 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.

17. Adelphian Gravel Surface

This bid item includes all labor, materials and equipment to construct crushed gravel surface at the Adelphian Pump Station. This bid item includes all necessary clearing, grubbing, excavation, grading, bedding, weed barrier fabric, wood headers, backfill, and other items necessary for the construction of the gravel surface. Payment for this item shall be on a square foot basis.

18. Adelphian 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, AC pavement replacement, and other items as necessary to construct the improvements. Payment for this bid item shall be on a lump sum basis.

19. Adelphian 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 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.

20. Verdemar 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 Verdemar pump station. Temporary facilities include, but are not limited to; power supply and energy costs during construction, water/sanitary facilities, construction fencing, SWPPP 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 Verdemar pump station as required by these Specifications and the Contract Drawings.

21. Verdemar Demolition

The lump sum price bid for this item shall constitute full compensation for all work, equipment and materials necessary for demolishing, removing and disposing of equipment and materials from the Verdemar pump station as identified in the Contract Drawings and these Specifications, including, but not limited to, removal of existing pumping equipment, piping and valves, control panel, electrical service, items within the wetwell as indicated on the Contract Drawings, and other items as necessary for construction. This bid item also includes tree removal as indicated on the Drawings.

22. Verdemar Shoring of Open Excavations

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 Verdemar Pump Station, which shall conform to applicable safety orders.

23. Verdemar Submersible Pumps, Rails & 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.

24. Verdemar Piping, Fittings, and Valves

This bid item includes all material, labor and equipment required to furnish and install all pipe spools, fittings, valves, pipe supports, 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, sidewalk 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.

25. Verdemar Bypass Pumping Connection

This bid item includes all material, labor and equipment required to furnish and install a bypass pumping connection in conformance with 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 the construction of the bypass pumping connection. Payment for this bid item shall be on a lump sum basis.

26. Verdemar Wetwell Modifications

This bid item includes all necessary labor, materials and equipment to furnish and install a precast concrete top slab and access hatch conforming to the requirements of these Specifications and the Contract Drawings. This bid item also includes cleaning the existing wetwell, and addition of chamfers within the invert of the existing wetwell. Payment for this bid item will be on a lump sum basis.

27. Verdemar Wetwell Coating System

This bid item includes all work necessary to install a coating system on the interior surfaces of the wetwell in accordance with these specifications. This bid item includes all necessary surface cleaning, blasting, and preparation measures. Payment for this bid item will be on a lump sum basis.

28. Verdemar Concrete Work

This bid item includes all necessary labor, materials and equipment to furnish and install cast-in-place concrete access pad and equipment pads for the control panel, service pedestal, and hose bib and 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 the concrete pads. Payment for this bid item shall be on a lump sum basis.

29. Verdemar 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 Verdemar 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.

30. Verdemar 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 Verdemar 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 sidewalk replacement necessary to construct the electrical service and pedestal. Payment for this bid item shall be on a lump sum basis.

31. Verdemar 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.

32. Verdemar Water Service, Hose Bib, and Enclosure

    This bid item includes all labor, materials and equipment necessary to furnish and install new piping, hose bib, fittings, valves, pipe stand, enclosure 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.

33. Verdemar Gravel Surface

    This bid item includes all labor, materials and equipment to construct crushed gravel surface at the Verdemar Pump Station. This bid item includes all necessary clearing, grubbing, excavation, grading, bedding, weed barrier fabric, wood headers, backfill, and other items necessary for the construction of the gravel surface. Payment for this item shall be on a square foot basis.

34. Verdemar 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. Verdemar 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 reconstruction of curbs, gutters, sidewalks, 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 also includes the installation of new landscaping and irrigation modifications as indicated on the Contract Drawings and as necessary for construction of the improvements.

36. Harbor Bay Parkway II 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 II pump station. Temporary facilities include, but are not limited to; power supply and energy costs during construction, water/sanitary facilities, construction fencing, SWPPP 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 II pump station as required by these Specifications and the Contract Drawings.

37. Harbor Bay Parkway II Demolition and Abandonment

The lump sum price bid for this item shall constitute full compensation for all work, equipment and materials necessary for demolishing, removing and disposing of equipment and materials from the Harbor Bay Parkway II pump station as identified in the Contract Drawings and these Specifications, including, but not limited to, removal of existing pumping equipment, piping and valves, control panel, electrical service, wetwell top slab and cone section, fence, items within the wetwell as indicated on the Contract Drawings, and other items as necessary for construction. This bid item also includes the removal of the top portion of the existing drywell and abandonment of the drywell to remain.

38. Harbor Bay Parkway II Shoring of Open Excavations

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 II Pump Station, which shall conform to applicable safety orders.

39. Harbor Bay Parkway II Submersible Pumps, Rails & 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.

40. Harbor Bay Parkway II Piping, Fittings, and Valves

This bid item includes all material, labor and equipment required to furnish and install all pipe spools, fittings, valves, bypass pumping connection and accessories necessary to provide a complete and functional pump discharge at the Harbor Bay Parkway II pump station 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, 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. Harbor Bay Parkway II Valve Vault and Hatch

This bid item includes all necessary labor, materials and equipment to furnish and install a precast concrete valve vault, access hatch, and drain system 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.

42. Harbor Bay Parkway II Wetwell Modifications

This bid item includes all necessary labor, materials and equipment to furnish and install a precast concrete wetwell sections, top slab, access hatch, and concrete collar at the Harbor Bay Parkway II pump station conforming to the requirements of these Specifications and the Contract Drawings. This bid item also includes cleaning the existing wetwell, filling the invert of the existing wetwell, excavation and backfill. Payment for this bid item will be on a lump sum basis.

43. Harbor Bay Parkway II Wetwell Coating System

This bid item includes all work necessary to install a coating system on the interior surfaces of the wetwell in accordance with these specifications. This bid item includes all necessary surface cleaning, blasting, and preparation measures. Payment for this bid item will be on a lump sum basis.

44. Harbor Bay Parkway II Concrete Work

This bid item includes all necessary labor, materials and equipment to furnish and install the cast-in-place concrete access pads and equipment pads for the control panel, service pedestal, generator, maintenance cabinet and hose bib and 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 the concrete pads. Payment for this bid item shall be on a lump sum basis.

45. Harbor Bay Parkway II Generator

    This bid item includes 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 be on a per generator basis.

46. Harbor Bay Parkway II 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 II pump station conforming to the requirements of these specifications and the Contract Drawings. This bid item also includes a fire department approved key-lock box. Payment for this bid item shall be on a lump sum basis.

47. Harbor Bay Parkway II 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 II 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 sidewalk replacement necessary to construct the electrical service and pedestal. Payment for this bid item shall be on a lump sum basis.

48. Harbor Bay Parkway II 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.

49. Harbor Bay Parkway II 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.

50. Harbor Bay Parkway II 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.

51. Harbor Bay Parkway II Fence and Gates

This bid item includes all labor, materials and equipment necessary to furnish and install the fencing and gates at the Harbor Bay Parkway II 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.

52. Harbor Bay Parkway II Water Service, Hose Bib, and Enclosure

This bid item includes all labor, materials and equipment necessary to furnish and install new piping, hose bib, fittings, valves, pipe stand, enclosure 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.

53. Harbor Bay Parkway II 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.

54. Harbor Bay Parkway II 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 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.

55. Willow-Whitehall 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 Willow-Whitehall pump station. Temporary facilities include, but are not limited to; power supply and energy costs during construction, water/sanitary facilities, construction fencing, SWPPP 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 Willow-Whitehall pump station as required by these Specifications and the Contract Drawings.

56. Willow-Whitehall Dewatering During Construction

The lump sum price bid for this item shall constitute full compensation for all work, equipment and materials necessary for dewatering the excavations and work areas at the Willow-Whitehall pump station as

necessary to perform the work and as identified in the Contract Drawings and these Specifications. This work may require the installation of several dewatering wells as well as other means to keep the work area dry.

57. Willow-Whitehall Demolition and Abandonment

The lump sum price bid for this item shall constitute full compensation for all work, equipment and materials necessary for demolishing, removing and disposing of equipment and materials from the Willow-Whitehall pump station as identified in the Contract Drawings and these Specifications, including, but not limited to, removal of existing pumping equipment, piping and valves, control panel, electrical service, wetwell top slab and sections, items within the wetwell as indicated on the Contract Drawings, and other items as necessary for construction. This bid item also includes the abandonment of the existing wetwell and piping to remain as shown on the plans and specified herein.

58. Willow-Whitehall Shoring of Open Excavations

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 Willow-Whitehall Pump Station, which shall conform to applicable safety orders.

59. Willow-Whitehall Submersible Pumps, Rails & 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.

60. Willow-Whitehall Piping, Fittings, and Valves

This bid item includes all material, labor and equipment required to furnish and install all pipe spools, fittings, valves, 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 piping, valves, etc. from the pump to the bypass pumping connection. This bid item includes all necessary clearing, grubbing, excavation, bedding, backfill, AC pavement replacement, pipe penetrations, and other items necessary for the construction of the discharge piping. Payment for this bid item shall be on a lump sum basis.

61. Willow-Whitehall New Wetwell

This bid item includes all necessary materials, equipment and labor necessary to furnish and install a precast concrete manhole for use as a wetwell, top slab, access hatch, and accessories as indicated on the Contract drawings. This bid item includes excavation, excavation support, subgrade preparation, backfill, compaction, and AC pavement replacement necessary to construct the wetwell. Payment for this item shall be paid on a lump sum basis.

62. Willow-Whitehall Wetwell Coating System

This bid item includes all work necessary to install a coating system on the interior surfaces of the wetwell in accordance with these specifications. This bid item includes all necessary surface cleaning, blasting, and preparation measures. Payment for this bid item will be on a lump sum basis.

63. Willow-Whitehall 4" Force Main

This bid item includes all necessary materials, equipment and labor necessary to furnish and install the Willow-Whitehall force main from the bypass pumping connection to the discharge manhole as indicated on the Contract drawings and specified herein. This bid item includes excavation, excavation support, subgrade preparation, backfill, compaction, 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 on a lump sum basis.

64. Willow-Whitehall 10" Gravity Sewer Main

This bid item includes all necessary materials, equipment and labor necessary to furnish and install the gravity sewer main as indicated on the Contract drawings and specified herein. This bid item includes excavation, excavation support, subgrade preparation, backfill, compaction, and AC pavement replacement, connection to the existing manhole, removal of existing sewer main, and other items as necessary to construct the gravity 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 on a lump sum basis.

65. Willow-Whitehall Sewer Manhole

This bid item includes all necessary materials, equipment and labor necessary to furnish and install a new sewer manhole as indicated on the Contract drawings and specified herein. This bid item includes excavation, excavation support, subgrade preparation, backfill, compaction, and AC pavement replacement, connection to the existing sewer main, removal of existing sewer main, and other items as necessary to construct the manhole. Payment for this item shall be paid on a per manhole basis.

66. Willow-Whitehall Modify Invert of Existing Manhole

This bid item includes all necessary labor, materials and equipment to modify the invert of the existing manholes as shown on the Contract Drawings and specified herein. Payment for this bid item will be on a per manhole basis.

67. Willow-Whitehall Concrete Work

This bid item includes all necessary labor, materials and equipment to furnish and install the cast-in-place concrete equipment pads for the control panel and service pedestal, new curb & gutter, new sidewalk, and other concrete 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. Payment for this bid item shall be on a lump sum basis.

68. Willow-Whitehall 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 Willow-Whitehall 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.

69. Willow-Whitehall 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 II 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, curb & gutter replacement, and sidewalk replacement necessary to construct the electrical service and pedestal. Payment for this bid item shall be on a lump sum basis.

70. Willow-Whitehall 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.

71. Willow-Whitehall 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, AC pavement replacement, sidewalk replacement, and other items as necessary to construct the improvements. Payment for this bid item shall be on a lump sum basis.

72. Willow-Whitehall 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 reconstruction 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 also includes replacement of damaged street stripping, painting of curbs, and other items as necessary for construction of the improvements.

73. Haile 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 A Haile Pump Station. Temporary facilities include, but are not limited to; power supply and energy costs during construction, water/sanitary facilities, construction fencing, SWPPP 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 Haile Pump Station as required by these Specifications and the Contract Drawings.

74. Haile Demolition

The lump sum price bid for this item shall constitute full compensation for all work, equipment and materials necessary for demolishing, removing and disposing of equipment and materials from the Haile pump station as identified in the Contract Drawings and these Specifications, including, but not limited to, removal of existing piping, control panel, electrical service, concrete pad, items within the wetwell as indicated on the Contract Drawings, and other items as necessary for construction.

75. Haile Bypass Pumping Connection

This bid item includes all material, labor and equipment required to furnish and install a bypass pumping connection in conformance with 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 the construction of the bypass pumping connection. Payment for this bid item shall be on a lump sum basis.

76. Haile Concrete Work

This bid item includes all necessary labor, materials and equipment to furnish and install cast-in-place concrete pads for the control panel and service pedestal 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 the concrete pads. Payment for this bid item shall be on a lump sum basis.

77. Haile Gravel Surface

This bid item includes all labor, materials and equipment to construct crushed gravel surface at the Haile Pump Station. This bid item includes all necessary clearing, grubbing, excavation, grading, bedding, weed barrier fabric, wood headers, backfill, and other items necessary for the construction of the gravel surface. Payment for this item shall be on a square foot basis.

78. Haile 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 Haile 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.

79. Haile 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 Haile 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, sidewalk replacement, and other items as necessary to construct the electrical service and pedestal. Payment for this bid item shall be on a lump sum basis.

80. Haile 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.

81. Haile 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 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.

82. Bay Fairway Hall 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 A Bay Fairway Hall Pump Station. Temporary facilities include, but are not limited to; power supply and energy costs during construction, water/sanitary facilities, construction fencing, SWPPP 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 Bay

Fairway Hall Pump Station as required by these Specifications and the Contract Drawings.

83. Bay Fairway Hall Demolition

The lump sum price bid for this item shall constitute full compensation for all work, equipment and materials necessary for demolishing, removing and disposing of equipment and materials from the Bay Fairway Hall pump station as identified in the Contract Drawings and these Specifications, including, but not limited to, removal of existing piping, control panel, floor sink, AC pavement, items within the wetwell as indicated on the Contract Drawings, and other items as necessary for construction.

84. Bay Fairway Hall Solenoid Valve on Water Service

This bid item includes all material, labor and equipment required to furnish and install a solenoid valve on the building water service in conformance with the requirements of these Specifications and the Contract Drawings. This bid item includes all necessary clearing, grubbing, excavation, bedding, backfill, AC pavement replacement, and other items necessary for the construction of the solenoid valve. Payment for this bid item shall be on a lump sum basis.

85. Bay Fairway Hall Concrete Work

This bid item includes all necessary labor, materials and equipment to furnish and install cast-in-place concrete pads for the control panel and service pedestal conforming to the requirements of these Specifications and the Contract Drawings. This bid item includes all necessary clearing, grubbing, excavation, bedding, backfill, AC pavement replacement and other items necessary for construction of the concrete pads. Payment for this bid item shall be on a lump sum basis.

86. Bay Fairway Hall Wetwell Coating System

This bid item includes all work necessary to install a coating system on the interior surfaces of the wetwell in accordance with these specifications. This bid item includes all necessary surface cleaning, blasting, and preparation measures. Payment for this bid item will be on a lump sum basis.

87. Bay Fairway Hall Fence and Gate

This bid item includes all labor, materials and equipment necessary to furnish and install the fencing and gate at the Bay Fairway Hall 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.

88. Bay Fairway Hall 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 Bay Fairway Hall 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.

89. Bay Fairway Hall 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 Bay Fairway Hall 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, sidewalk replacement, AC pavement replacement, curb and gutter replacement and other items as necessary to construct the electrical service and pedestal. Payment for this bid item shall be on a lump sum basis.

90. Bay Fairway Hall 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.

91. Bay Fairway Hall 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 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.

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. Unless authorized in writing by the City, the Contractor shall construct the improvements at each pump station in the following sequence:

a. First – Willow-Whitehall Pump Station

b. Second – Verdemar

c. Third – Haile

d. Fourth – Bay Fairway Hall

e. Fifth – Harbor Bay Parkway II

f. Sixth - Adelphian

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 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 representative Lonnie Hasty at 510-715-6111 or at AMP Dispatch at 510-748-3964 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 8am to 4:30pm 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 Dept is closed on Fridays. Contractor shall schedule work and inspections accordingly.

D. The City's Public Works Inspectors perform inspections from 9:00 AM to 3:00PM Monday through Thursday; no inspections are available on Fridays.

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.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

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 at 950 West Mall Square, Alameda, CA 94501, unless another mutually agreeable place is designated.

B. Submit submittals in ample time for each 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. Submit specified number of copies of submittal.

F. Provide or furnish products and execute the Work in accordance with accepted submittals, unless in conflict with Contract Documents.

G. 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. Shop and Fabrication Drawings: Submit electronic copies of review submittals, and four (4) hard copies of final approved submittals.

G. Product Data and Manufacturer's Instructions: Submit electronic copies of review submittals, and four (4) hard copies of final approved submittals. Excise or cross out non-applicable information and clearly mark applicable information with citations to and terminology consistent with Contract Documents.

H. 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.

I. 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.

J. 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 three (3) copies of a submittal are returned to the Contractor marked "NO EXCEPTIONS TAKEN/PROCEED," formal revision and resubmission of said submittal will not be required.

2. If three (3) copies of a submittal are returned to the Contractor marked "MAKE CORRECTIONS NOTED/PROCEED CONDITIONALLY" formal revision and resubmission of said submittal will not be required.

3. If one (1) copy of a submittal is returned to the Contractor marked "REJECTED-RESUBMIT/DO NOT PROCEED," the Contractor shall revise said submittal and shall resubmit six (6) copies of said revised submittal 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 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 City is not aware of substantial contamination at these Work sites, but given the historic use of the facilities, contaminated material could include asbestos, 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 Uniform 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. Uniform Building Code (UBC).
12. Bay Area Air Quality Management District (BAAQMD).
13. East Bay Municipal Utility District (EBMUD) Ordinances and Wastewater Discharge Permit Requirements
14. 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.

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. All generators for this project are less than 50 horsepower; therefore, BAAQMD permit fees are not anticipated.

C. The generators at the Harbor Bay Parkway 2 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 required.

D. See Section 16263 Diesel Generator Set and Section 01140 Work Restrictions of these technical specifications for additional requirements.

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 maintain existing pumping capacity 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 for each pump station are provide below:

1. Adelphian Pump Station
   a. Peak Wet Weather Flow = 105 gpm
   b. Total Dynamic Head at PWWF = 15 feet
2. Verdemar Pump Station
   a. Peak Wet Weather Flow = 139 gpm
   b. Total Dynamic Head at PWWF = 13 feet
3. Harbor Bay Parkway II Pump Station
   a. Peak Wet Weather Flow = 111 gpm
   b. Total Dynamic Head at PWWF = 11 feet
4. Willow-Whitehall Pump Station
   a. Peak Wet Weather Flow = 222 gpm
   b. Total Dynamic Head at PWWF = 15 feet
5. Cola Ballena Pump Station
   a. Peak Wet Weather Flow = 42 gpm
   b. Total Dynamic Head at PWWF = 18 feet
6. Marina Village Pump Station
   a. Peak Wet Weather Flow = 375 gpm
   b. Total Dynamic Head at PWWF = 16 feet
7. Haile Pump Station
   a. Peak Wet Weather Flow = 28 gpm
   b. Total Dynamic Head at PWWF = 10 feet
8. Bay Fairway Hall Pump Station
   a. Peak Wet Weather Flow = 15 gpm
   b. Total Dynamic Head at PWWF = 15 feet

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 whenever the pump stations are inoperable. Contractor must provide the minimum pump capacity identified on the plans 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 existing generator at Eight-Portola or new emergency backup generators may be used for backup power; however, if these generators are not in service, the Contractor shall supply alternate means of emergency backup power.

F. Contractor shall maintain a receptacle for connecting a portable backup generator at all times during construction. The receptacles shall fit with the Contractor's backup generator to be used in the event of a power failure.

G. Bypass pumping is only feasible through existing force mains; there are no adjacent sewer systems available for bypass pumping. Upstream gravity lines shall not be allowed to surcharge at any time during construction.

H. 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.

I. 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.

J. Above ground bypass piping is not allowed within the travel lanes of any roadway during non construction hours.

K. All elements of the by-pass pumping system (pumps, pipes, controls, alarms, etc.) shall be tested prior to pump station demolition to verify that it works correctly.

L. Bypass pumping equipment shall remain in place until the new pump station is fully function and has passed all testing requirements.

M. Contractor shall coordinate pumping with any Alameda Municipal Power service interruptions.

N. 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 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.

3.03 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.

3.04 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

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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. 2013 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 2013 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 to practice in the state where the Project is located.

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, 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 Section 16010 and 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, 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. Contractor shall also fill all generator diesel fuel tanks upon completion of testing.

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.

B. Furnish written report prepared and signed by the electrical Subcontractor certifying:

1. Automatic transfer switch operators and transfers load upon loss of utility power.
2. Generator start-up, shutdown, sequencing, interlocks and emergency shutdown has been tested and is properly operating.

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

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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 _____

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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 AND MANHOLES

A. Contractor is responsible for cleaning and removing solids within existing wetwells prior to construction and for maintaining a clean wetwell as necessary during construction.

B. Contractor is responsible for cleaning and removing solids within existing manholes associated with the work prior to construction and for maintaining a clean manholes as necessary during construction.

END OF SECTION

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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 03300 - Reinforced 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.”

END OF SECTION

SECTION 02223

LIGHTWEIGHT ENGINEERED FILL

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. Furnish all labor, materials, equipment, facilities, transportation and services for the placement of lightweight engineered fill as shown on the Drawings and specified herein.

B. **Related Work Specified Elsewhere**

1. Clearing and Demolition: Section 02100.
2. Cast in Place Concrete: Section 03300.

1.03 REFERENCE STANDARDS

ASTM C150 *Portland Cement*

1.04 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.

1.05 SUBMITTALS

A. List of projects demonstrating compliance with these requirements.

B. Mix Design: Mix design shall be submitted and shall show names and brands of all materials, proportions, slump, strength, gradation of coarse and fine aggregates, and location to be used on job.

C. Product Data: Manufacturer's catalog sheets including instructions for use and description of application shall be provided on each of the following materials:

1. Portland Cement
2. Lightweight Aggregate
3. Admixtures
4. Curing Compounds
5. Chemical Hardener

D. Weight and Batch Tags: Weight and batch tags will be supplied to the engineer upon request.

PART 2 - PRODUCTS

2.01 MATERIALS

A. **Lightweight Aggregate:** Lightweight aggregate shall be Perlite, CL Lava material from Clear Lake Lava Inc., or approved equal.

B. **Cement:** Portland cement shall comply with ASTM C150. The mix shall be designed by the manufacturer of the engineered fill.

C. **Water:** Potable water free from deleterious amounts of alkali, acid, and organic materials that would adversely affect the setting time or strength of the engineered fill shall be used.

D. **Admixtures:** Admixtures may be used when specifically approved by the manufacturer of the engineered fill.

2.02 PROPERTIES

A. Engineered fill shall meet the following requirements:

Maximum dry density	90 pcf
Maximum wet density	100 pcf
Minimum compressive strength at 28 days	500 psi

PART 3 - EXECUTION

3.01 JOB CONDITIONS

A. The Contractor shall, prior to submitting his bid, visit the site and become familiar with actual site working 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. Correct conditions detrimental to timely and proper completion of work. Do not proceed until unsatisfactory conditions are corrected.

3.02 INSTALLATION

A. Installation of engineered fill shall be in accordance with the procedures provided by the manufacturer.

B. The area to be filled shall not have any standing water in it prior to placement of engineered fill.

C. Any items to be encased in the fill shall be properly set and stable prior to the installation of engineered fill. The placement of fill shall be sequenced to allow the construction of all proposed improvements, without the need to remove fill placed prior to the construction of those structures.

D. Cast the engineered fill in lifts as recommended by the manufacturer. The material shall be placed in such a manner to prevent segregation. The final surface finish shall be within ±0.1 foot of the elevation shown on the Drawings.

3.04 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.

3.05 COMPLETION

A. Construction traffic 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

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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 Conference of Building Officials (ICBO):
   1. Uniform Building Code (UBC).

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. Where General Engineering Design Practice is specified, provide drawings and signed calculations and have design performed by 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.

B. Design Loads:
   1. Contractor shall design all shoring based on the loading conditions described in the geotechnical report.

C. Design Requirements:
   1. General:
      a. Design shall incorporate findings and recommendations for excavation support as found in the project's geotechnical report titled "Geotechnical Investigation for Willow-Whitehall Sewer Pump Station, Alameda, California" prepared by Langan Treadwell Rollo and incorporated into these specifications by reference. The geotechnical report is included as an attachment to the special provisions.
      b. 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.
      c. Design steel members in accordance with the Uniform Building Code and the AISC Manual of Steel Design.
      d. Design shoring involving materials other than steel in accordance with Uniform Building Code.
      e. When electing to design with material stresses for temporary construction higher than allowable stresses prescribed in the Manual of Steel Construction and the Uniform Building Code, increase in such stresses shall not exceed 10 percent of value of prescribed stresses.
      f. Minimum safety factor used for design shall not be less than 1.5.

g. 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.
h. 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.
i. 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.
j. 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.
k. 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.

D. 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 5 feet and deeper.
c. For trenches less than 5 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. Submit location and details of control points and method and schedule of measurements in accordance with requirements of this Section.
2. 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. 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, 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. Pressure preservative treated wood lagging may be left in place when acceptable to the ENGINEER.

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

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 artificial fill.
6. Finish grading.

C. Related Sections:

1. Section 01140 – Work Restrictions.
2. Section 02260 - Excavation Support and Protection.
3. Section 02318 - Trenching.
4. Section 02722 - Aggregate Base Course.
5. 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 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, pipe bedding, and where necessary to stabilize excavation bottoms shall be a clean, durable uniformly graded rock between ½ inch and 1½ inch size.
3. Aggregate Base Course: As specified in Section 02722.
4. Lightweight Engineered Fill: See Section 02223.

5. Controlled Density Fill (CDF): CDF shall be self compacting upon backfilling placement and shall be composed of cementitious materials, aggregates, water, and an air-entraining admixture, as follows:

    a. Cementitious materials shall be Portland cement in combination with fly ash.

    b. Admixture shall be an air-entraining agent.

    c. 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.

    d. Total calculated air content shall not exceed 30 percent, as tested in accordance with ASTM C231.

    e. CDF shall have an unconfined compressive strength at 28 days from a minimum of 50 psi to a maximum of 150 psi.

6. Pipe Bedding and Pipe Zone Material:

    a. As shown on the plans and specified herein, the pipe bedding and pipe zone material 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.

7. General Fill:

    a. Material for general site filling should be obtained from suitable native or import material as described herein.

    b. Trench backfill above the pipe zone shall be general fill.

8. 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.

9. 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.

c. Imported materials shall conform to the following gradation as tested in accordance with ASTM D422:

Sieve	Percentage of Dry Material Passing by Weight
3/4”	100
3/8”	70 – 90
3/16”	55 – 85
No. 8	45 – 75
No. 40	20 – 50
No. 100	0 – 10
No. 200	0 – 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 at grade: Consist of native material with top 8 inches moisture conditioned and 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.

3.06 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 preceeding 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, as identified in the geotechnical report. 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 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.

C. If the site conditions do not allow for, or if the Contractor is unable to completely seal off all sides and bottom of the excavation, the Contractor may need to install dewatering pits surrounding the excavation to control the presence of groundwater. Similar work within the City of Alameda has required installation of several dewatering wells. Construction of new manholes and wetwells has required 8 or more dewatering wells. The Contractor is responsible for performing any and all work necessary to control water during construction. No additional compensation will be made to control water.

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

SECTION 02318
TRENCHING

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: Trench excavation, fine grading, pipe bedding, backfilling, and compaction for the following:
   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.

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.

PART 2 PRODUCTS

2.01 MATERIALS

A. General:
   1. Provide bedding and backfill material per Section 02300.

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) Geotextile filter fabric (Mirafi 140N 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 as specified in Section 02300 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.

3.03 FIELD QUALITY CONTROL

A. Shall meet the compaction and testing requirements in Section 02300-3.06

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

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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 - Reinforced 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

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SECTION 02810
IRRIGATION

PART 1 GENERAL

1.01 SUMMARY

A. Related Documents:

1. Review the Contract Documents for additional requirements and information that apply to work under this section.

B. Section Includes:

1. Contractor shall furnish all labor, tools, equipment, products, material and transportation; and perform all operations necessary and incidental to properly execute and complete all irrigation work in accordance with the Drawings and these Specifications.

C. Related Sections:

1. Section 02950: Plants

1.02 REFERENCES

A. Reference Data:

1. If the year of the adoption or latest revision is omitted from the designation, it shall mean the specification, manual or test designation in effect the date the Notice to Proceed with the Work is given.

2. ASTM: American Society for Testing and Materials
   a. D1785: Standard Specification for Polyvinyl Chloride (PVC) plastic pipe, Class 200, Class 315.
   b. D2446: Standard Specification for Polyvinyl Chloride (PVC) plastic pipe fittings, Schedule 40 and Schedule 80.

3. NSF: National Sanitation Foundation

B. Drawings:

1. For purposes of clarity and legibility, Drawings are essentially diagrammatic to the extent that many offsets, bends, unions, special fittings, and exact locations of items are not indicated, unless specifically dimensioned.

2. Exact routing of piping, etc., shall be governed by location of existing irrigation equipment, site conditions, and location of proposed improvements. 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.

3. The Contractor shall not willfully install the irrigation system as shown on the Drawings when it is obvious in the field that unknown obstructions, grade differences or discrepancies in area dimensions exist. Such obstructions or differences shall be brought to the attention of the Engineer. In the event this notification is not performed, the Contractor shall assume full responsibility for any revision necessary.

1.03 SUBMITTALS

A. Material List:

1. Submit a complete material list prior to performing any work. The material list shall include the manufacturer, model number and description of all materials and equipment to be used.

2. Equipment or materials installed or furnished without prior acceptance may be rejected and if so shall be removed from the site by the Contractor.

B. Record Drawings:

1. Provide Record Drawings as follows:

2. On a clean print or reproducible site plan, dimension from two permanent points of reference, building corners, sidewalk, or road intersections, etc., the location of the following items:
   a. Connection to existing water lines
   b. Connection to existing electrical power
   c. Routing of pressure lines (dimension max. 100 feet long along routing)
   d. Electrical control valves
   e. Routing of control wiring
   f. Quick-coupling valves
   g. Other related equipment installed as part of this project.

3. At Substantial Completion, submit Record Drawings. Delivery of the drawings shall not relieve the Contractor of the responsibilities of furnishing required information that may have been omitted.

1.04 PRODUCT DELIVERY, 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 a 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. Avoid kinking polyethylene tubing. If this should occur, straighten to original roundness, or cut out kinks and insert couplings.

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 MANUFACTURERS

A. Acceptable Manufacturers:

1. Manufacturers of setting materials are listed to set a standard for design and product performance.

2. Products of manufacturers not listed may be proposed for substitution, provided that they are equal in design, product performance and warranty to the products specified.

3. The burden of proof of equality of proposed products is on the Contractor.

2.02 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, Grade I, PVC compound conforming to ASTM D1785. All pipe shall meet requirements as set forth in ASTM D2441, with an appropriate standard dimension (S.D.R.). (Solvent-weld pipe.)

3. All PVC pipe 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 polyvinyl chloride (PVC) Schedule 40, Type 1120/1220 with solvent weld connections.

C. Pipe Fittings:

1. Steel fittings shall be galvanized, Schedule 40, double headed, standard thread type.

2. Plastic fittings, except those for mainline pipe, shall be Schedule 40 PVC solvent weld type, Type I and in full compliance with ASTM D1784-75 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: Scotch Lock #3576, 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. Reduced Pressure 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. 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. Site 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. Exercise extreme care in excavating and working near existing utilities. Contractor shall be responsible for damages to utilities that are caused by his operations or neglect.

a. Check City utility drawings for existing utility locations.
b. Before digging, call USA (Underground Service Alert) Digalert 800-227-2600.

3. 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.

4. The Contractor shall carefully check all grades to satisfy him/herself that he may safely proceed before starting work on the sprinkler irrigation.

5. The design is diagrammatic. All piping, valves, etc., shown within paved areas is design clarification only. Install piping, valves, etc., in planting areas.

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 2” minimum.

B. Backfilling:

1. Do not backfill trenches until all required tests are performed. Carefully backfill trenches with specified excavated materials for backfilling, consisting of earth, loam, sandy clay, sand, or other acceptable materials, free from large clods of earth or stones. 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 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 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 FINAL REVIEW PRIOR TO ACCEPTANCE

A. Operate each system in its entirety for the Engineer at time of final review. Any items deemed not acceptable shall be reworked.

B. Final review shall take place after submission of all specified lists, Record Drawings, and manuals.

3.08 TESTING SCHEDULE

A. Notify the City 48 hour prior to system inspection and testing.

END OF SECTION

SECTION 02830
CHAIN LINK FENCING

PART 1 GENERAL

1.01 SCOPE OF WORK

A. New chain link fencing and gates 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 - Reinforced Concrete.

1.02 REFERENCE STANDARDS

A. American Society for Testing and Materials (ASTM):

1. A36 - Structural Steel.
2. A53 - Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
3. A123 - Zinc (Hot-Dipped Galvanized) Coatings on Iron and Steel Products.
4. A153 - Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
5. A392 - Zinc-Coated Steel Chain-Link Fence Fabric
6. A817 - Metal-Coated Steel Wire for Chain-Link Fence Fabric and Marcelled Tension Wire.
7. F567 - Installation of Chain-Link Fence.
8. F626 - Fence Fittings.
9. F668 - Polyvinyl Chloride Coated Steel Chain-Link Fences.
10. F900 - Industrial and Commercial Swing Gates.
11. F1043 - Strength and Protective Coatings on Metal Industrial Chain-Link Fence Framework.
12. F1083 - Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures.
13. F1184 - Specification for Industrial and Commercial Horizontal Slide Gates

B. State of California Department of Transportation (Caltrans).

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: Chain link fencing, gates and all accessories.
2. Manufacturer's Certificates: Zinc-coating complies with complies with specifications.
3. Chain link coating and slat color samples.

B. Contractor shall submit shop drawings for the gates. Approval by the engineer is required before fabrication.

C. Fence layouts shall be submitted and approved by the engineer showing post and gate locations.

PART 2 PRODUCTS

2.01 GENERAL

A. Materials shall conform to ASTM F1083 and ASTM A392 for ferrous metals, zinc-coated; and detailed specifications forming the various parts thereto; and other requirements specified herein. Zinc-coat metal members (including fabric, gates, posts, rails, hardware and other ferrous metal items) after fabrication shall be reasonably free of excessive roughness, blisters and sal-ammoniac spots.

2.02 CHAIN LINK FABRIC

A. A392 knuckled top and bottom. Single width fabric to full height of fence. Nine (9) gauge finished wire size, three-inch by 5-inch mesh for the insertion of slats. Class 1 chain link fence fabric with 1.2 ounces of zinc coating per square foot of uncoated wire surface shall be used. Vinyl coated chain link fence shall be green polyvinyl chloride coated steel link fabric and fittings. Polyvinyl chloride shall be applied by the thermal extrusion process.

B. Top and bottom tension wire shall be ASTM A817 and ASTM F626, having the same coatings as the fence fabric.

C. Chain link fabric shall be pre-woven with 2-3/8 inches wide green virgin polyethylene slats with ultra violet inhibitors with a wall thickness of .030 inch plus or minus .003 inch. The length of the slats shall be 3-1/2 to 3-3/4 inches shorter than the height of the chain link fence to allow for the installation of the bottom retaining channel. Slats shall be Viewguard Fabric with PDS slats or approved equal.

2.03 POSTS AND RAILS

A. ASTM A53 steel hot-dipped galvanized and covered with an electostatically applied 3-mil green polyester powder coating over an appropriate primer.

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.

2.04 ACCESSORIES

A. Accessories as necessary shall include caps, rail and brace ends, wire ties or clips, braces and tension bands, tension bars, truss rods, and miscellaneous accessories conforming to ASTM F626. Accessories shall be galvanized and vinyl coated as appropriate.

2.05 SWING GATES

A. Swing gates shall be ASTM F900, type as shown on the drawings.

B. Gate framing, bracing, latches, hardware and coatings shall be the same as the fabric.

C. Gate leaves more than 8 feet wide shall have either intermediate members and diagonal truss rods, or shall have tubular members as necessary to provide rigid construction, free from sag or twist.

D. Attach gate fabric to the gate frame by a method standard with the manufacturer, except that welding will not be permitted.

E. Arrange latches for padlocking so that padlock will be accessible from both sides of the gate regardless of the latching arrangement.

2.06 ROLLING SLIDE GATES

A. Rolling slide gates shall be ASTM F1184, Type II, Class 1 External Roller Design.

B. Gate framing, bracing, latches, hardware and coatings shall be the same as the fabric.

C. Gate frame shall be fabricated by welding, vertical and horizontal members installed no greater than 8 feet apart. Welded joints shall be protected by applying zinc-rich pain in accordance with ASTM Practice A780.

D. Gate shall have tubular members as necessary to provide rigid construction, free from sag or twist.

E. Gates shall be designed to open or close by applying an initial pull force no greater than 40 lbs.

F. Attach gate fabric to the gate frame by a method standard with the manufacturer, except that welding will not be permitted.

G. Gate shall have positive locking pressed steel latch, galvanized after fabrication.

H. Provide safety protective guards for the top and bottom external rollers following ASTM F1184 guidelines.

2.07 GATE HARDWARE

A. Manufacturer's standard products, installed complete. The type of hinges shall allow gates to swing through 180 degrees, from closed to open position. Hang and secure gates in such a manner that, when locked, they cannot be lifted off hinges.

B. Provide stops and keepers for all double gates. Latches shall have a plunger-bar arranged to engage the center stop. Arrange latches for locking. Center stops shall consist of a device arranged to be set in concrete and to engage a plunger bar. Keepers shall consist of a mechanical device for securing the free end of the gate when in full open position.

C. Provide provision for locking gate with padlock and chain, provided by City.

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. Install fence in accordance with ASTM F567 and with the manufacturer's printed installation instructions, except as modified herein or as shown. Maintain all equipment, tools, and machinery while on the project in sufficient quantities and capacities for proper installation of posts, chain links and accessories.

C. Supply accessories (posts braces, tension bands, tension bars, truss rods, and miscellaneous 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 manufacturer’s printed installation instructions.

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 recommended by the manufacturer.

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. Fit all exposed ends of post with caps.

1. Provide caps that fit snugly and are weathertight.

2. Where top rail is used, provide caps to accommodate the top rail.

3. Install post caps as recommended by the manufacturer.

3.04 TOP AND BOTTOM RAILS

A. Install rails before installing chain link fabric. Provide suitable means for securing rail ends to terminal and intermediate post.

B. Top rails shall pass through intermediate post supporting arms or caps.

C. The rails shall have expansion couplings (rail sleeves) spaced as recommended by the manufacturer.

1. Where fence is located on top of a wall, install expansion couplings over expansion joints in wall.

3.05 FABRIC

A. Install and pull taut tension wire before installing the chain-link fabric.

B. Pull fabric taut and secured with wire ties or clips to the top rail, bottom rail and tension wire close to both sides of each post and at intervals of not more than 24 inches on center.

1. Secure fabric to posts using stretcher bars and ties or clips.

3.06 GATES

A. Install gates plumb, level, and secure for full opening without interference.

B. Set keepers, stops and other accessories into concrete as required by the manufacturer.

C. Adjust hardware for smooth operation and lubricate where necessary.

D. Gate drop bar receivers shall be set in a concrete footing minimum 6 in. diameter and 24 in. deep.

3.07 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.

3.08 FINAL CLEAN-UP

A. Remove all debris, rubbish and excess material from the station site.

END OF SECTION

SECTION 02850
REDWOOD FENCING

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 - Reinforced 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.

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

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SECTION 02920
SOIL PREPARATION

PART 1 -GENERAL

1.01 SUMMARY:

A. Related Documents:

1. Review the Contract Documents for additional requirements and information that apply to work under this section.

1.02 REFERENCES:

A. Reference Data:

1. If the year of the adoption or the latest revision is omitted from the designation, it shall mean the specification, manual, or test designation is in effect the date the Notice to Proceed with the Work is given.

B. Contractor shall furnish all labor, tools, equipment, products, material and transportation; and perform all operations necessary and incidental to properly execute and complete all work in accordance with the Drawings and these Specifications.

1. The work includes:

a. placement of on site and imported topsoil
b. supply, placement and rototilling of soil amendments and fertilizers
c. finish grading

C. Related work specified elsewhere:

1. Section 02950: Plants
2. Section 02810: Irrigation

1.04 SUBMITTALS:

A. General Requirements:

1. Submit product information, material samples, lab test results, etc, to Engineer for action.

1.05 PROJECT CONDITIONS:

A. Protect all existing and installed elements.

B. Review earthwork and site grading operations and report any discrepancies to the Engineer before starting work. In the event this notification is not performed, the Contractor shall assume full responsibility for any revision necessary.

C. Sequencing and scheduling: It is the responsibility of the Contractor to coordinate all phases of landscape installation with other phases of construction so as not to incur any scheduling or installation conflicts, so as to be efficient in the construction process.

D. No soil preparation work shall be performed during wet, muddy, or frozen conditions.

E. Maintaining conditions at Project site:

1. Keep Project site reasonably free from accumulation of debris, topsoil, and other materials resulting from work specified under this Specification Section.

2. Remove topsoil, textural soil amendments, and soil mixes from walks and paving on a daily basis.

3. Broom and hose down areas daily as necessary to maintain clean pavement.

4. At completion of each area of work, remove debris, equipment and surplus materials.

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING:

A. Store soil amendments in a dry place and protect from moisture.

B. Coordinate stockpiling and placement of soil amendments and imported topsoil with the City.

PART 2-PRODUCTS

2.01 MANUFACTURERS:

A. Acceptable Manufacturers:

1. Manufacturers of setting materials are listed to set a standard for design and product performance.

2. Products of manufacturers not listed may be proposed for substitution, provided that they are equal in design, product performance and warranty to the products specified.

3. The burden of proof of equality of proposed products is on the Contractor.

B. Soil Amendment:

1. Amount/1000 square feet:

a. 6 cubic yards Nitrogen/Iron Treated amendment at all planting areas. Amendment to conform to Specification Guidelines under item 2 below.

b.

15 pounds	12-12-12 or equal Commercial Fertilizer
10 pounds	Soil Sulfur
10 pounds	Iron Sulfate (20% Iron)

2. Wood residual organic soil amendment Specification Guideline:

a. Physical Properties:

Percent Passing	Sieve Designation
95-100	6.35 mm, (1/4")
75-100	2.38 mm, No. 8, 8 mesh
0-30	500 microns, No. 35, 32 mesh

b.

Source	Redwood Sawdust	Redwood Bark Fiber	Fir or Cedar	Fir or Pine Bark	Hard-Wood Bark
Nitrogen Content, dry wt. basis, if nitrogen stabilized:	0.4-0.6%	0.35-0.5%	0.56-0.84%	0.8-1.2%	0.8-1.2%
Dry bulk density, lbs./cu.yd.	270-370	250-350	270-370	450-580	400-500

c. Iron content: Minimum 0.08% dilute acid soluble iron based on dry weight if specified as or claimed to be iron treated.

d. Soluble salts: Maximum 3.0 millimhos/ centimeter @ 25 degrees C as determined in saturation extract.

e. Organic content: Minimum 92% based on dry weight and determined by ash method.

f. Mineralized: Other mineral fertilizers or chemical amendments may be specified for incorporation.

C. Imported Topsoil:

1. Topsoil for Planting Beds: fertile, friable, natural topsoil of sandy loam character, without admixture of sub-soil material, obtained from a well drained arable site, reasonably free from clay, lumps, coarse sands, stones, plants, roots, sticks, and other foreign materials, with acidity range of between pH 6.0 and 6.8.

a. Identify source location of topsoil proposed for use on the project.

b. Provide topsoil free of substances harmful to the plants which will be grown in the soil.

PART 3-EXECUTION

3.01 INSPECTION OF SITE CONDITIONS:

A. Examine site for conditions that will adversely affect execution, permanence, and quality of work.

B. Verify rough grades and slopes of planting areas are acceptable prior to commencing work of this Section.

C. Begin work required under this Section only after conditions are satisfactory.

3.02 PREPARATION:

A. Clearing and grubbing will be done as specified and all suitable topsoil will be stockpiled for re-use.

1. At new planting beds, place minimum 24 inches in depth imported topsoil as needed to bring surface to finish grade.

2. Deposit and spread topsoil using methods that will prevent excessive compaction of topsoil.

3. Cultivate all topsoil not in a loose and friable condition.

4. Provide a relatively smooth even grade and slope by blading, dragging or other appropriate methods. Remove high spots and fill depressions. Place grades, slopes and mounds to drain in accordance with drawings and as approved by the City.

B. Soil Amendments:

1. Planting areas:

a. Spread the soil amendments and fertilizers evenly over topsoil, at rates and depths indicated, then uniformly and thoroughly incorporate into upper 6 inches of soil, obtaining a homogeneous soil mix. Topsoil shall be in a moist condition at time of mixing.

2. Ornamental trees and shrubs at spacing of 3 feet on center or greater:

a. Individual plant holes to be backfilled with premixed topsoil and amendment as detailed on drawings.

C. Finish Grading:

1. Contractor shall finely finish surfaces by raking smoothly and evenly, removing all exposed, extraneous matter 1-inch or larger in size to facilitate natural run-off. Drag for smooth area surface.

2. Finish grades shall slope to drain, without water pockets or irregularities (humps or hollows). Finish grades shall meet all existing controls and shall be 1/2 inches below adjacent top of paving, curbs, sidewalks, and planters. Grades shall be of uniform slope between points of fixed elevation. Establish vertical curves or roundings at abrupt changes in slope.

3. All finish grades shall be approved prior to commencing the Planting Operations.

3.03 PROGRESS INSPECTIONS:

A. The following inspections will be required:

1. Tillage and soil preparation of all planting areas.

2. Finish grading.

3.04 DISPOSAL OF WASTE MATERIALS:

A. Haul from site, and legally dispose of waste materials, including excess excavated materials, rock, trash, and debris.

B. Maintain disposal route clear, clean, and free of debris.

3.05 CLEANING:

A. Upon completion of earthwork operations, clean areas within contract limits, remove tools, and equipment. Provide site clear, clean, free of debris, and suitable for site work operations.

END OF SECTION

SECTION 02950
PLANTS

PART 1-GENERAL

1.01 SUMMARY

A. Related Documents:

1. Review the Contract Documents for additional requirements and information that apply to work under the section.

B. Contractor shall furnish all labor, tools, equipment, products, material and transportation; and perform all operations necessary and incidental to properly execute and complete all work in accordance with the Drawings and these Specifications.

1. Provide plants as shown and specified. The work includes:

a. Backfill soil mixture
b. Excavate plant pits
c. Planting
d. Placing backfill material
e. Mulching
f. Tree staking
g. Application of herbicide
h. Fertilizing

C. Related work specified elsewhere:

1. Section 02810: Irrigation
2. Section 02920: Soil Preparation

1.02 REFERENCES

A. Reference Data:

1. If the year of the adoption or latest revision is omitted from the designation, it shall mean the specification, manual or test designation in effect the date the Notice to Proceed with the Work is given.

1.03 QUALITY ASSURANCE

A. Licensing requirements: Contractor shall possess a State of California Landscape Contractor's license and must meet the State of California licensing requirements for the application of herbicides.

B. Plant material: All plants shall have been grown in nurseries which have been inspected by State of California Department of Agriculture and shall be tagged with correct names as per Standard Plant Names. All plant material shall be

inspected by the Engineer before being planted, and all plant material not meeting Specification requirements shall be rejected. Contractor shall, at his own expense, replace rejected trees, shrubs and groundcovers with plant materials of species and variety that meet Specification requirements.

C. Drawings: For the purposes of clarity and legibility, the Drawings are essentially diagrammatic, exact location of items are not indicated unless specifically dimensioned. The Contractor shall not willfully install the landscape materials as shown on the Drawings when it is obvious in the field that unknown obstructions, grade differences or discrepancies in area dimensions exist. Such obstructions or differences shall be brought to the attention of the City. In the event this notification is not performed, the Contractor shall assume full responsibility for any revision necessary. Final locations of trees to be approved by City prior to planting.

1.04 SUBMITTALS

A. General Requirements:

1. Submit product information, material samples, lab test results, etc, to Engineer for action.

B. Material List

1. Submit a complete list of materials prior to performing any work. The material list shall include a description of each item, the quantity of each item and the dealer source of each item.

2. A complete plant list indicating specie and variety, quantity and size shall be submitted to and accepted prior to locating plant material on site.

1.05 PROJECT CONDITIONS

A. Sequencing and scheduling: It is the responsibility of the Contractor to coordinate all phases of landscape installation with other phases of construction so as not to incur any scheduling or installation conflicts, so as to be efficient in the construction process.

B. Environmental Conditions: All site work and landscape installation shall not be performed during wet, muddy or frozen conditions.

C. Protection of Work: The Contractor shall provide adequate protection for all work until completion and final acceptance. Contractor shall take particular precautions to protect: existing buildings, fencing, electroliers, overhead and underground utilities, and all existing trees to remain. All damaged, stained or disturbed items shall be replaced or repaired at the expense of the Contractor prior to final acceptance.

D. Maintaining conditions at Project site

1. Keep Project site reasonably free from accumulation of debris, topsoil, and other materials resulting from Work specified under this Specification Section.

2. Remove topsoil, fertilizers, textural soil amendments, and soil mixes from walks and paving on a daily basis.

3. Broom and hose down areas daily as necessary to maintain clean pavement.

4. At completion of each area of work, remove debris, equipment and surplus materials.

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Store fertilizers and soil amendments in a dry place and protect from intrusion of moisture.

B. Plant Material

1. Protect plant material at all times during handling, shipping, storage and planting from extreme weather conditions, wind, drying roots and rootballs, and injury.

2. Support root system of container plant material when lifting and moving to minimize injury to the root system.

3. Plant material showing damage from shipping, while in storage or during planting may be rejected by the City. Rejected plant material shall be replaced by the Contractor at his own expense.

1.07 GUARANTEE

A. Guarantee plant material to remain alive and be in healthy, vigorous condition for a period of one year after completion and acceptance of entire project.

1. Inspection of plants will be made by the City at completion of planting.

B. Replace, in accordance with the Drawings and Specifications, all plants that are dead or, as determined by the City are in an unhealthy or unsightly condition, and have lost their natural shape due to dead branches, or other causes due to the Contractor's negligence. The cost of such replacement(s) is at Contractor's expense. Warrant all replacement plants for one year after installation.

C. Warranty shall not include damage or loss of trees, plants, or groundcovers caused by fires, floods, freezing rains, lightning storms, or winds over 75 miles per hour, winter kill caused by extreme cold and severe winter conditions not

typical of planting area; acts of vandalism or negligence on the part of the Owner.

D. Remove and immediately replace all plants, as determined by the City to be unsatisfactory during the initial planting installation.

PART 2-PRODUCTS

2.01 MATERIALS

A. Plants: Provide plants typical of their species or variety; with normal, densely-developed branches and vigorous, fibrous root systems. Provide only sound, healthy, vigorous plants free from defects, disfiguring knots, sunscald injuries, frost cracks, abrasions of the bark, plant diseases, insect eggs, borers, and all forms of infestation. All plants shall have a fully-developed form without voids and open spaces.

B. Plants larger than those specified in the plant list may be used when acceptable to the City.

1. If the use of larger plants is acceptable, increase the spread of roots or root ball in proportion to the size of the plant.

C. Meet requirements of USA Standard for Nursery Stock, published by the American Association of Nurserymen, Inc., except as otherwise supplemented and modified under this Specification Section.

D. Cold storage plants are not acceptable.

E. Container plants, one gallon size and larger, shall have grown therein a minimum of six months and a maximum of two years, with roots filling the containers but not showing evidence of being or having been restricted, deformed or root bound.

F. Shrubs shall have well-developed branch systems; shrubs full foliaged, not leggy.

G. Thin, weak and leggy plants will be rejected.

H. All plant material shall be legibly tagged by specie and variety with minimum of one tag per 10 shrubs.

I. Nomenclature: Genus, specie and variety as indicated on Plant Material Listing. Plant names are in accordance with those given in Standardized Plant Names, most current edition; names of varieties not included therein go by names generally accepted in nursery trade.

J. Plant material not meeting these requirements shall be removed from the site and replaced.

2.02 ACCESSORIES

A. Soil amendment: To match specification in Section 02920: Soil Preparation.

B. Topsoil: As required to complete all work to proposed finish grade and match specification in Section 02920: Soil Preparation.

C. Top Dressing Mulch: 3/4" diameter ground bark.

D. Herbicide: Pre-emergent weed control

1. Casoron or equal pre-emergent weed control product which can match the performance specification of this product.

E. Fertilizer:

1. Plant Fertilizer Type "A": Commercial type approved by Architect containing nitrogen, phosphoric acid, and potash by weight. One-quarter of nitrogen in the form of nitrates, one-quarter in the form of ammonia salt, and one-half in the form of organic nitrogen.

2. Fertilizer tablets: Slow release, 21 gram, NPK analysis 20-10-5.

PART 3-EXECUTION

3.01 INSPECTION

A. Examine proposed planting areas and conditions of installation. Do not start planting work until unsatisfactory conditions are corrected.

3.02 INSTALLATION

A. Shrubs:

1. Verify special protection instructions, clearance requirements and pruning requirements with City prior to planting installation.

2. The Contractor is responsible for installation of all areas of planting indicated on plans at specified spacings.

3. The Contractor shall locate plants on site for acceptance by the City prior to plant installation. Notify the City 48 hours prior to review of all staked out locations.

4. Plant pits shall be two times the root ball in width. Scarify sides of pit. Fill representative pit with water in each area, then observe drainage rate for problems prior to plant installation. If water is present in pit after 4 hours, a poorly drained area is indicated. Notify the City prior to

planting and proceed with the following unit price work only if authorized.

5. Backfill mix: Thoroughly mix soil amendments and soil in the following proportion:

   a. 2 parts on-site or imported topsoil
   b. 1 part soil amendment
   c. 16-8-8 Type 'A' fertilizer per manufacturer's recommendation.
   d. 20-10-5 Fertilizer tablets (21 gram tablets): Place in bottom of the pit:

      - 1-gallon container: 1 tablet
      - 5-gallon container: 2 tablets
      - 15-gallon container: 3 tablets
      - 24" box container: 8 tablets
      - 36" box container: 10 tablets

6. Set plant root ball on settled, moist existing soil or compacted subgrade 2 inches above finish grade and backfill planting pit.

7. Apply top dressing to all landscaping areas.

8. A 4-inch high temporary water basin shall be constructed around each shrub and tree except when plant is located in a lawn area. After planting, water each plant by filling basin twice. Remove basin prior to applying pre-emergent.

9. Watering

   a. Water planting thoroughly every two to three days as required to establish proper rooting.

3.03 CLEAN-UP

A. Keep Project site reasonably free from accumulation of debris resulting from Work specified under this Section. Broom clean pavement daily. Remove dirt and overspray from building walls, pavement, and curbs immediately.

B. At completion of planting, remove all debris, equipment, and surplus materials; thoroughly clean adjacent pavement, curbs, walls, walks, etc.

3.04 PROTECTION

A. Contractor shall provide barriers, adequately marked with white flags, throughout the duration of the planting and maintenance periods to protect the planted areas from traffic.

3.05 INSPECTION

A. A written notice or phone call requesting an inspection shall be given the City at least two business days prior to any anticipated inspection date.

B. Progress inspections: The following inspections will be required:

1. Inspection and approval of all plant materials prior to installation.

2. Inspection and approval of plants at site after being spotted by Contractor.

3. The actual planting operations of all plants.

4. Top dressing applications.

3.06 ACCEPTANCE

A. Planted areas will be accepted provided all requirements have been complied with and plant materials are alive and in a healthy, vigorous condition.

END OF SECTION

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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. Depth of aggregate base course shall match depth of existing aggregate base course or shall be a minimum of 6 inches, whichever is greater.

B. Related Sections:
1. Section 02772 - Concrete Curbs, Gutters, and Sidewalks.
2. Section 03300 - Reinforced 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 State Standard Specifications.
2. Prime Coat and Tack Coat: Grade SC-70, conforming to Section 93-1.01 of the State Standard Specifications.
3. Fog Seal: Asphaltic Emulsion, Grade SS-1h, conforming to Section 94-1.01 of the State Standard Specifications.

B. Asphalt Aggregate:

1. Aggregate for asphalt concrete shall conform to Section 39-2.02 of the State Standard Specifications for Type B grading, 1/2-inch maximum, medium.
2. Aggregate for asphalt concrete base shall conform to Section 39-2.02 of the State Standard Specifications for Type B 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 State Standard Specifications.
2. Drying shall conform to Section 39-3.02 of the State Standard Specifications.
3. Proportioning shall conform to Section 39-3.03 of the State Standard Specifications.
4. Mixing shall conform to Section 39-3.04 of the State Standard Specifications.

2.03 PORTLAND CEMENT PAVEMENT

A. Conform to the requirements of Section 03300.

2.04 SLURRY SEAL

A. Slurry seal, Type II, shall be applied in conformance with the provisions in Section 37-2, and all applicable referenced sections of the State Standard Specifications, at the following locations:

1. In all streets and private property easement in which excavation is performed by the Contractor, slurry seal shall be applied from gutter lip to gutter lip. The slurry seal shall extend 5 feet beyond any excavation in the direction parallel to the gutters.

2.05 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.

2.06 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 State Standard Specifications.
2. Compacting: Compact in accordance with sections of State 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

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SECTION 03300
REINFORCED CONCRETE

PART 1 GENERAL

1.01 REFERENCES

A. The following is a list of standards which may be referenced in this section. The latest edition of referenced publication in effect at the time of bid opening shall govern.

Reference	Title
American Concrete Institute (ACI)	
ACI 301	Specifications for Structural Concrete for Buildings
ACI 305R	Hot Weather Concreting
ACI 306R	Cold Weather Concreting
ACI 318/318R	Building Code Requirements for Reinforced Concrete
ACI 347	Formwork for Concrete
American Society for Testing and Materials (ASTM)	
ASTM A615	Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
ASTM C31	Standard Practice for Making and Curing Concrete Test Specimens in the Field
ASTM C39	Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
ASTM C94	Standard Specification for Ready-Mixed Concrete
ASTM C150	Standard Specification for Portland Cement
ASTM C260	Standard Specification for Air-Entraining Admixtures for Concrete
ASTM C309	Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
ASTM C494	Standard Specification for Chemical Admixtures for Concrete
ASTM C618	Standard Specification for Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete
ASTM D994	Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type)
Concrete Reinforcing Steel Institute (CRSI)	
	Manual of Standard Practice, 1990, 25th Edition
	Recommended Practice for Placing Reinforcing Bars

1.02 SUBMITTALS

A. Shop Drawings

1. Reinforcing steel in accordance with CRSI 1990 Manual of Standard Practice and ACI SP.
2. Curing compound data.
3. Complete data on the concrete mix, including aggregate gradations and admixtures, in accordance with ASTM C94.
4. Data compiled by a certified Testing Laboratory from a minimum of 30 previous compression tests and 10 previous drying shrinkage tests, for each mix design submitted.

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.

1.03 QUALITY ASSURANCE

A. Codes and Standards

1. Comply with all Federal, State and Local Codes and Safety Regulations. In addition, comply with the provisions of the following codes, specifications, and standards, except where more stringent requirements are shown or specified.
2. California Building Code, 2013 Edition, CBC.
3. Formwork: Unless otherwise specified, follow the recommendations of ACI 347.
4. Concrete and Reinforcement: Unless otherwise specified, meet the requirements of ACI 301 and 318/318R.
5. Hot Weather Concreting: Conform to ACI 305R.

1.04 ENVIRONMENTAL REQUIREMENTS

A. Do not use curing compound where solvents in the curing compounds are prohibited by state or federal air quality laws. Use only water curing methods.

PART 2 PRODUCTS

2.01 CONCRETE

A. Ready-mixed meeting ASTM C94, Option A.

B. Portland Cement: ASTM C150, Type II.

C. Aggregates: Furnish from one source.

1. Natural Aggregates
   a. Free from deleterious coatings and substances in accordance with ASTM C33, except as modified herein.

b. Free of materials and aggregate types causing pop outs, discoloration, staining, or other defects on surface of concrete.

2. Non-Potentially Reactive: In accordance with ASTM C33, Appendix XI, paragraph X1.1.

3. Aggregate Soundness: Test for fine and coarse aggregates in accordance with ASTM C33 and ASTM C88 using sodium sulfate solution.

4. Fine Aggregates

a. Clean, sharp, natural sand.

b. ASTM C33.

c. Materials Passing 200 Sieve: 4 percent maximum.

d. Limit deleterious substances in accordance with ASTM C33, Table 1 with material finer than 200 sieve limited to three percent, coal and lignite limited to 0.5 percent.

5. Coarse Aggregate

a. Natural gravels, combination of gravels and crushed gravels, crushed stone, or combination of these materials containing no more than 15 percent flat or elongated particles (long dimension more than five times the short dimension).

b. Materials Passing 200 Sieve: 0.5 percent maximum.

D. Admixtures

1. Air-Entraining: ASTM C260.

2. Water-Reducing: ASTM C494, Type A or D.

3. Superplasticizers: ASTM C494, Type F or G.

4. Fly Ash: ASTM C618, Class C or F.

E. Coloring

1. 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.

F. Mix Design

1. Minimum 28-day Compressive Strength when cured and tested in accordance with ASTM C31 and C39.

a. Equipment Pads and Access Pads: 4,000 psi

b. Miscellaneous Site Concrete: 3,000 psi

2. Coarse Aggregate Size: 1½ inches and smaller.

3. Slump Range: three to five inches.

4. Air Entrainment: Between one and three percent by volume.

5. Water Reducers: Use in concrete without plasticizers.

G. Proportions

1. Design mix to meet aesthetic and structural concrete requirements.

2. Water-cement ratio (or water-cement plus fly ash ratio) shall control amount of total water added to concrete as follows:

Coarse Aggregate Size	W/C Ratio
1½ inch	0.50
1 inch	0.45

3. Minimum Cement Content (or Combined Cement Plus Fly Ash Content When Fly Ash is Used):

a. 540 pounds per cubic yard for concrete with 1½-inch maximum size aggregate.

b. 564 pounds per cubic yard for one-inch maximum size aggregate.

4. Increase cement content or combined cement plus fly ash content, as required to meet strength requirements and water-cement ratio.

H. Mixing: Minimum 70 and maximum 270 revolutions of mixing drum. Non-agitating equipment is not allowed.

2.02 REINFORCING STEEL

A. Deformed Bars: ASTM A615, Grade 60. Reinforcing steel to be welded shall be ASTM A706, Grade 60.

B. Welded Wire Fabric: ASTM A497.

2.03 ANCILLARY MATERIALS

A. Cast-in-Place Anchor Bolts, Adhesive Anchor Bolts, Expansion Anchors: see Section 05501 – Anchor Bolts.

B. Expansion Joint Filler: ASTM D994, ½ inch thick, or as shown.

C. Bonding Compounds

1. Epoxy resin bonding compounds shall be used for wet areas and shall be Master Builder, Concresive Nos. 1001, 1001-LPL or 1180 as applicable; Sika Chemical Corporation, Sikadur 35, Hi-Mod LV, Sikadur 32, Hi-Mod, or Sikadur 31, Hi-Mod Gel as applicable; Burke Company 881 LPL Epoxy; or equal.

2. Non-epoxy bonding compounds shall be used for dry areas and shall be Burke Company, Acrylic Bondcrete; Imperial Chemical Industrial, Inc., Thoro System Products, Acryl 60; Thorobond; or equal. Bonding compounds shall be applied in accordance with the manufacturer's instructions.

D. Curing Compound

1. Material: Solvent based containing chlorinated rubber solids in accordance with ASTM C309, with additional requirement that the moisture loss not exceed 0.030 gram per centimeter squared per 72 hours.
2. Manufacturers and Products:
    a. Chemrex Inc., Shakopee, MN; Masterkure CR.
    b. Euclid Chemical Co.; Euco Super Floor Coat.

E. Surface Hardener

1. Surface hardener shall be premixed, noncolored, nonmetallic Master Builders, Mastercron; Sonneborn, Harcol; A. C. Horn Inc., Durafax; Burke Company Non-Metallic Floor Hardner; or equal. Surface hardener shall be applied in accordance with manufacturer's instructions.

PART 3 EXECUTION

3.01 FORMWORK

A. Form Materials

1. Use hard plastic finished plywood for exposed areas, and new ship lap or plywood for unexposed areas.
2. Earth cuts may be used for forming footings.

B. Form Ties

1. Fixed conical or spherical type inserts that remain in contact with forming material and allow for dry packing of form tie holes.
2. Ties shall withstand pressures and limit deflection of forms to acceptable limits.
3. Wire ties are not acceptable.

C. Construction

1. In accordance with ACI 347.
2. Make joints tight to prevent escape of mortar and to avoid formation of fins.
3. Brace as required to prevent distortion during concrete placement.
4. On exposed surfaces locate form ties in uniform pattern or as shown.
5. Construct so ties remain embedded in the wall with no metal within 1-inch of concrete surface when forms, inserts, and tie ends are removed.

D. Form Removal

1. Remove after concrete has attained 28-day strength, or approval is obtained in writing from Engineer.
2. Remove forms with care to prevent scarring and damaging the surface.

3.02 PLACING REINFORCING STEEL

A. Unless otherwise specified, place reinforcing steel in accordance with CRSI Recommended Practice for Placing Reinforcing Bars.

B. Splices and Laps

1. Top Bars: Horizontal bars placed such that 12 inches of fresh concrete is cast below in single placement.
2. Horizontal wall bars are considered top bars.
3. All bar lap splices shall be Class B in accordance with ACI 318.
4. Tie splices with 18-gauge annealed wire as specified in CRSI Standard.

3.03 PLACING CONCRETE

A. Place concrete in accordance with ACI 301.

B. Prior to placing concrete, remove water from excavation and debris and foreign material from forms. Check reinforcing steel for proper placement and correct discrepancies.

C. Before depositing new concrete on old concrete, clean surface using sandblast or bush hammer or other mechanical means to obtain a ¼ inch rough profile, and pour a cement-sand grout to minimum depth of ½ inch over the surface. Proportion 1 part cement to 2.5 parts sand by weight.

D. Place concrete as soon as possible after leaving mixer, without segregation or loss of ingredients, without splashing forms or steel above, and in layers not over two feet deep. Place within 1½ hours after adding cement to mix.

E. Eight feet maximum vertical drop to final placement, when not guided with chutes or other devices to prevent segregation due to impact with reinforcing.

F. Hot Weather

1. Prepare ingredients, mix, place, cure, and protect in accordance with ACI 305R.
2. Maintain concrete temperature below 80 degrees F at time of placement, or furnish test data or provide other proof that admixtures and mix ingredients do not produce flash set plastic shrinkage, or cracking due to heat of hydration. Ingredients may be cooled before mixing to maintain fresh concrete temperatures at 80 degrees F or less.
3. Make provisions for windbreaks, shading, fog spraying, sprinkling, ice, or wet cover, or other means to provide concrete with temperature specified.
4. Prevent differential temperature between reinforcing steel and concrete.

3.04 COMPACTION

A. Vibrate concrete as follows:

1. Apply approved vibrator at points spaced not farther apart than vibrator's effective radius.
2. Apply close enough to forms to vibrate surface effectively but not damage form surfaces.
3. Vibrate until concrete becomes uniformly plastic.
4. Vibrator must penetrate fresh placed concrete and into previous layer of fresh concrete below.

3.05 CONSTRUCTION JOINTS

A. Locate as shown or as approved.

B. Maximum Spacing Between Construction Joints: 40 feet.

3.06 FINISHING

A. Floor Slabs and Tops of Walls

1. Screed surfaces to true level planes.
2. After initial water has been absorbed, float with wood float and trowel with steel trowel to smooth finish free from trowel marks.
3. Do not absorb wet spots with neat cement.

B. Unexposed Slab Surfaces: Screed to true surface, bull float with wood float, and wood trowel to seal surface.

C. Smooth Wall Finish

1. Patch tie holes.
2. Grind off projections, fins, and rough spots.
3. Patch defective areas and repair rough spots resulting from form release agent failure or other reasons to provide smooth uniform appearance.

D. Tolerances: Floors shall not vary from level or true plane more than ¼ inch in 10 feet when measured with a straightedge.

E. Exterior Slabs and Sidewalks

1. Bull float with wood float, wood trowel, and lightly trowel with steel trowel.
2. Finish with broom to obtain nonskid surface.
3. Finish exposed edges with steel edging tool.
4. Mark walks transversely at 5-foot intervals with jointing tool.

3.07 FINISHING AND PATCHING FORMED SURFACES

A. Cut out honeycombed and defective areas.

B. Cut edges perpendicular to surface at least one-inch deep. Do not feather edges. Soak area with water for 24 hours.

C. Finish surfaces to match adjacent concrete.

D. Keep patches damp for minimum 7 days or spray with curing compound to minimize shrinking.

E. Fill form tie holes with non-shrink, non-metallic grout.

3.08 PROTECTION AND CURING

A. Protect fresh concrete from direct rays of sunlight, drying winds, and wash by rain.

B. Keep concrete slabs continuously wet for a seven-day period. Intermittent wetting is not acceptable.

C. Use curing compound only where approved by Engineer. Cure formed surfaces with curing compound applied in accordance with manufacturer's directions as soon as forms are removed and finishing is completed.

D. Remove and replace concrete damaged by freezing.

3.09 FIELD QUALITY CONTROL

A. Provide adequate facilities for safe storage and proper curing of concrete test cylinders onsite for first 24 hours, and for additional time as may be required before transporting to test lab.

B. Provide concrete for testing of slump, air content, and for making cylinders from the point of discharge into forms.

C. Evaluation will be in accordance with ACI 301, Chapter 17 and Specifications.

D. Specimens will be made daily, cured, and tested in accordance with ASTM C31 and ASTM C39.

E. The City (or the City’s Representative) will prepare test cylinders daily during concrete placement. Frequency of testing may be changed at discretion of Engineer.

F. Reject concrete represented by cylinders failing to meet the strength and air content specified.

END OF SECTION

SECTION 03400
PRECAST CONCRETE

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. Provide all labor, materials, equipment, facilities, transportation and services necessary for the installation of precast concrete structures.

B. **Work Included:** The work includes, but is not necessarily limited to the following:

1. Valve vaults
2. Manholes/Wetwells
3. Wetwell top slabs
4. Electrical pull/splice boxes.
5. Inserts, sleeves, steps, anchor bolts and other items embedded in precast concrete, whether furnished under this section or other sections.

C. **Related Work Specified Elsewhere**

1. Cast-in-Place Concrete: Section 03300.

1.03 SUBMITTALS

A. Concrete Design and Calculations

1. Concrete Mix Design
2. Design Calculations stamped and signed by a California licensed Civil or Structural Engineer.
3. Load Calculations stamped and signed by a California licensed Civil or Structural Engineer.
4. Shop drawings showing reinforcement, connections, embedded items, etc.

1.04 QUALITY ASSURANCE

A. *California Building Code*, latest edition.

B. American Concrete Institute (ACI), *Building Code Requirements for Reinforced Concrete*.

C. Caltrans (State) Standard Specifications, latest edition.

1.05 REFERENCE STANDARDS

Standards listed below are a part of this section as specified and modified. In case of conflict between the requirements of this section and those of listed standards, the requirements of this section shall prevail. Where two or more standards are at variance, the most restrictive requirement shall apply.

A. ASTM C150 *Portland Cement*

B. ASTM C478 *Precast Reinforced Concrete Manhole Sections*

C. ASTM C858 *Underground Precast Concrete Utility Structures*

D. ASTM C913 *Precast Concrete Water/Wastewater Structures*

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 H20 rated and certified for continuous street loading. Precast concrete structures shall be designed by the Contractor, design Calculations shall be stamped and signed by a California licensed Civil or Structural Engineer. Load Calculations stamped and signed by a California licensed Civil or Structural Engineer.

D. The Contractor shall submit shop drawings showing reinforcement, connections, embedded items, etc.

2.02 MATERIALS

Portland cement concrete and steel reinforcement shall conform to these specifications, although concrete compressive strength and reinforcement yield strength may be at the discretion of the manufacturer. Lightweight concrete shall not be used.

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 (Gates Unlimited, Santa Clara) or equivalent. Follow manufacturer's recommended installation procedures.

PART 3 - EXECUTION

3.01 CASTING

A. No concrete shall be cast until all submittals have been favorably reviewed by the Engineer and returned to the Contractor.

B. 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 05501
ANCHOR BOLTS

PART 1 GENERAL

1.01 DESCRIPTION

A. This section specifies anchor bolts complete with washers and nuts. Unless otherwise specified, anchor bolts shall be Type 316 stainless steel.

1.02 REFERENCES

A. This section contains references to the following documents. They are a part of this section as specified and modified. The latest edition of referenced publications in effect at the time of bid opening shall govern. In case of conflict between the requirements of this section and those of the listed documents, the requirements of this section shall prevail.

Reference	Title
ASTM A36/A36M	Carbon Structural Steel
ASTM A307	Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength
ASTM A320/A320M	Alloy Steel Bolting Materials for Low-Temperature Service for Pressure and High-Temperature Parts
ASTM A449	Quenched and Tempered Steel Bolts and Studs
CBC	2013 California Building Code

1.03 SUBMITTALS

A. Submittals shall be provided in accordance with Section 01300 – Submittals and shall include the following information:

1. Data indicating load capacities.
2. Chemical resistance.
3. Temperature limitations.
4. Installation instructions.
5. Evaluation Report for expansion type anchors as specified in Paragraph 05501-3.04.
6. 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

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 05501-1.03 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.

3.02 CAST-IN-PLACE ANCHOR BOLTS

A. Anchor bolts to be embedded in concrete and concrete unit masonry shall be placed accurately and held in the correct position while the concrete or grout is placed or, if specified, recesses or blockouts shall be formed in the concrete and the metalwork shall be grouted in place in accordance with Section 03300 – Reinforced Concrete. The surfaces of metalwork in contact with concrete shall be thoroughly cleaned.

B. After anchor bolts have been embedded, their threads shall be protected by grease and the nuts run on.

3.03 ADHESIVE ANCHOR BOLTS

A. Use of adhesive anchors shall be subject to the following conditions:

1. Use shall be limited to locations where exposure, on an intermittent or continuous basis, to acid concentrations higher than ten percent, to chlorine gas, or to machine or diesel oils, is extremely unlikely.
2. Use shall be limited to applications where exposure to fire or exposure to concrete or rod temperature above 120 degrees F is extremely unlikely. Overhead applications (such as pipe supports), because of the above concerns, shall be disallowed.
3. If required, approval from the Engineer for a specific application and from the supplier of the equipment to be anchored.
4. Anchor diameter and grade of steel shall be per contract documents or per equipment supplier specifications. Anchor shall be threaded or deformed full length of embedment and shall be free of rust, scale, grease, and oils.
5. Embedment depth shall be as specified on the Drawings or as required by an approved equipment anchorage submittal.
6. New concrete shall attain a minimum age of 21 days before holes are drilled for adhesive anchors.
7. All installation recommendations by the anchor system manufacturer shall be followed carefully, including maximum hole diameter.
8. Holes shall have rough surfaces, such as can be achieved using a rotary percussion drill.

9. Holes shall be blown clean with compressed air and be free of dust or standing water prior to installation.

10. Anchor shall be left undisturbed and unloaded for full adhesive curing period.

11. Concrete temperature (not air temperature) shall be compatible with curing requirements of adhesives per adhesive manufacturer. Anchors shall not be placed in concrete below 25ºF.

3.04 EXPANSION ANCHORS

A. Use of expansion anchors shall be subject to Conditions 2-3 and 7-9 specified in Paragraph 05501-3.03 and approval by the Engineer.

B. The Contractor shall supply the Engineer with the current evaluation report from the International Code Council – Evaluation Service for the particular brand of expansion anchors to be used.

END OF SECTION

SECTION 05505
MISCELLANEOUS METALS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Furnishing all material, supplies, equipment, tools, transportation and facilities and performing all labor and services necessary for, required in connection with or properly incidental to furnishing and installing miscellaneous metal, as described in this Section of the Specifications, shown on the accompanying Plans, or reasonably implied therefrom.

1.02 REFERENCED SECTIONS

A. The following Sections are referenced in this Section

1. Section 01300 – Submittals

1.03 SUBMITTALS

A. Comply with Section 01300 – Submittals.

B. Certified test reports: Before delivery of any miscellaneous metalwork, provide certificates which attest to material compliance with these specifications.

C. Layout or installation shop drawings for all miscellaneous metals, including but not limited to, seat angles, brackets, flashing, pipe supports.

PART 2 PRODUCTS

2.01 MATERIALS

A. Wide Flange Beams: ASTM A992.

B. Structural Steel Shapes (other than Wide Flange Beams) and Plates: ASTM A36.

C. Structural Tubing (HSS): ASTM A500, Grade B.

D. Structural Pipe: ASTM A53, Grade B or ASTM A501.

E. Stainless Steel: ASTM A320, Type 304 or Type 316, as specified

F. Machine Bolts, Nuts, and Washers: ASTM A307.

G. High Strength Bolts: ASTM A325 bearing-type connections.

H. Hardened Steel Washers: ASTM F436.

I. Heavy Hex Nuts: ASTM A563.

J. Welded Headed Studs: ASTM A108.

K. Welding Materials: AWS D1.1 and D1.3; type required for materials being welded.

2.02 FABRICATION

A. Fabricate structural steel members in accordance with AISC Specification.

B. Conform to Chapter 22, California Building Code; 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.

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. Door leaf shall be anodized aluminum diamond pattern; designed to withstand the loading conditions identified on the Plans. Maximum deflection under the specified loading condition shall be 1/150th of the span.

   1. 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.

   2. **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.

3. **Drain Coupling:** Provide a 1-1/2" (38mm) drain coupling located in the right front corner of the channel frame (away from the hinges).

4. **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.

5. A removable exterior turn/lift handle with a spring loaded ball detent shall be provided to open the cover and the latch release shall be protected by a flush, gasketed, removable screw plug.

6. 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.

7. Hardware shall be anticorrosion throughout. Factory finish shall be mill finish aluminum with bituminous coating applied to the exterior of the frame.

B. 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.

C. Where indicated on the plans, hatch shall have an integral fall protection system. Provide a “safe hatch system” designed to combine the covering of the access hole per OSHA Standard 1910.23, and include fall through protection and controlled confined space entry. Safety grates shall be made of 6063-T6 aluminum. Aluminum grating shall be designed to withstand a live load as specified by the pump manufacturer, which is determined by the weight of the pump that may be placed on top of the safety grate. Deflection shall not exceed 1/150th of the span.

D. Manufacturer shall guarantee against defects in hatch material or workmanship for a period of ten years.

2.02 FINISHES

A. Floor Access Doors:
   1. Aluminum: Manufacturer’s standard mill finish.
   2. Aluminum in Contact with Dissimilar Metals and Concrete: Manufacturer’s standard bituminous coating.
   3. Steel: Manufacturer’s standard red oxide primer.
   4. Ductile Iron: Black Asphaltic coating

B. Non-Rated Access Doors:
   1. Steel or Galvanized Steel: Chemically etch and apply baked-on rust inhibitive zinc dust prime coat.
   2. Aluminum: Manufacturer's standard finish.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine construction to receive access door and verify correctness of dimensions and other supporting or adjoining conditions.

3.02 PREPARATION

A. Coordinate details with other work supporting, adjoining, or requiring 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. 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 properly.

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

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SECTION 09875
CONCRETE COATINGS FOR WASTEWATER STRUCTURES

PART 1 - GENERAL

1.1 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. Wetwell and manhole Concrete Rehabilitation and Coating System shall include at minimum the following, and as further defined 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 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.
   8. Apply 80 mils of ultra high build epoxy coating to all interior floor, wall and ceiling surfaces.
   9. Flow channels of manholes shall not be coated.

1.2 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.

1.3 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.
   5. Certification that all products (restoration mortar and corrosion barrier mortar) are from a single source. Single source being defined as a single entity (person or company) that owns all rights to both the restoration mortar and corrosion barrier mortar formulations and testing data.

1.4 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

2.1 PRODUCT AND MANUFACTURER:

A. The lining system, including underlayment, primer and surface materials, shall be from a single manufacturer.

B. Coating for Exposed Steel Prior to Sprayable Cement Mortar Application
   1. Madewell 1312 Epoxy putty or approved equal

C. Hydrostatic Pressure Grout
   1. Avanti A-220, DeNeef, or approved equal

D. Hydrostatic Cement Mortar
   1. Madewell Mainstay ML-10, Preco Plug, Octocrete, Burke Plug or approved equal

E. Sprayable Microsilica Cement Mortar
   1. Madewell ML-72 or approved equal

F. Ultra High-Build Epoxy Coating System
   1. Madewell Mainstay DS5 or approved equal

G. Coating Systems
   1. Madewell or approved equal
      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

2.2 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. Chemical Resistance (ASTM D 1308):
   a. Reagent: 6% sulfuric acid solution.
   b. Film Integrity: Unaffected.

C. Coating Thickness: 125 mils thick, minimum.

D. Texture: Semi-smooth for all surfaces.

2.3 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

3.1 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.

3.2 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.

3.3 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.

3.4 APPLICATION

A. Coatings shall be installed on all surfaces described in Paragraph 1.1.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 $5^{o}F$ ($3^{o}C$.) 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).

3.5 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.

3.6 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. 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.

3.7 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 15057 - Fusion Bonded Epoxy Lining

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. Discharge piping and associated fittings shall be coated with the following system, following manufacturer’s recommendations.

1. Sandblast all surfaces to be coated in conformance with SSPC 10 (near-white blast cleaning).
2. Blasted surfaces shall be coated with two coats of a high-build polyamide epoxy such as Tnemec Series 69 Epoxoline II, or an approved equal, at a dry film thickness of 4.0 to 6.0 mils per coat; and two coats of an acrylic polyurethane such as Tnemec Series 75 Endura-Shield, at a dry film thickness of 2.0 to 5.0 mils per coat.

B. Piping, associated fittings and other ferrous metals shall be fusion bonded epoxy lined and coated in conformance with Section 15057.

C. All joint bolts shall be field coated with AWWA C210 coal-tar epoxy and encased to match the pipe wrapping.

D. 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: Abrasive blast clean in accordance with SSPC SP-7.

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. Identify equipment, ducting, piping, and conduit in accordance with Section 15075 and Section 16075.

B. Remove grilles, covers and access panels for mechanical and electrical system from location and coat separately.

C. Finish coat primed equipment with color selected by the ENGINEER.

D. 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.

E. Replace identification markings on mechanical or electrical equipment when coated over or spattered.

F. 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.

G. Coat dampers exposed immediately behind louvers, grilles, convector and baseboard cabinets to match face panels.

H. Coat exposed conduit and electrical equipment occurring in finished areas with color and texture to match adjacent surfaces.

I. Coat both sides and edges of plywood backboards for electrical equipment before installing backboards and mounting equipment on them.

J. 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 01612 - 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. Pump Types: Pumps supplied and installed shall be rail-mounted submersible or dry-pit submersible, centrifugal, Flygt pumps having the general characteristics as indicated on the Drawings and tabulated below. The Contractor shall furnish Flygt pumps; no other pump manufacturers will be accepted.

1. Adelphian, Verdemar, and Willow-Whitehall Pump Stations (Rail-Mounted)
   a. Flygt Model NP 3085 MT Adaptive (Two Pumps per Station)
      1) Design Capacity per Pump (gpm) 197
      2) Rated Total Pump Head at Design (feet) 19
      3) Maximum Rotative Speed (rpm) 1710
      4) Shutoff Head (feet) 26
      5) Motor Horse Power 3
      6) Motor Voltage (3 phase) 230
      7) Discharge Size (inches) 3
      8) Impeller (in) 5.31 (135 mm)
      9) Pump Curve:

0	gpm	26 ft
49	gpm	24.6 ft
131	gpm	21.8 ft
213	gpm	18.4 ft
295	gpm	15.2 ft

378	gpm	11.4 ft
476	gpm	7.5 ft

2. Harbor Bay Parkway 2 Pump Station (Rail-Mounted)
   a. Flygt Model NP 3085 MT Adaptive (Two Pumps per Station)
      1) Design Capacity per Pump (gpm) 197
      2) Rated Total Pump Head at Design (feet) 19
      3) Maximum Rotative Speed (rpm) 1690
      4) Shutoff Head (feet) 26
      5) Motor Horse Power 3
      6) Motor Voltage (3 phase) 200
      7) Discharge Size (inches) 4
      8) Impeller (in) 5.31 (135 mm)
      9) Pump Curve:

0	gpm	26 ft
49	gpm	24.4 ft
131	gpm	21.5 ft
212	gpm	18.2 ft
294	gpm	15.0 ft
375	gpm	11.3 ft
474	gpm	7.4 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 and Barnes, 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 SUPPORT BASE AND DISCHARGE ELBOW

A. Where applicable, provide fabricated support base and ductile iron discharge elbow suitable for installation in the dry pit as shown on the Drawings.

B. Discharge elbow to mate to pump discharge and transition to discharge piping.

C. The entire weight of the pump/motor shall be supported by the pump support base. 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. Where applicable, sump pump supplier shall furnish steel pump pedestals in accordance with pump manufacture specifications for drywell installations.

C. 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

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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 01612.
   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 01612.
   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 Section 05120.

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

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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

(The PIPING SCHEDULE follows on the next pages.)

END OF SECTION

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SECTION 15057
FUSION BONDED EPOXY LINING

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: Fusion bonded epoxy lining for steel and ductile iron pipe and fittings.

B. Related Sections:
   1. Section 15052 - Basic Piping Materials and Methods.
   2. Section 15100 – Piping and Fittings
   3. Section 15110 - Valves

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM):
   1. D 1002 - Test Method for Apparent Shear Strength of Single-Lap-Joint Adhesively Bonded Metal Specimen by Tension Loading (Metal-to-Metal).
   2. G 8 - Test Methods for Cathodic Disbonding of Pipeline Coatings.

B. Steel Structures Painting Council Standards (SSPC):
   1. SSPC-SP10 - Surface Preparation Specification for Near-White Blast Cleaning.

C. American Water Works Association
   1. AWWA C210 – Liquid Epoxy Coating Systems for the Interior and Exterior of Steel Water Pipelines.
   2. AWWA C 213 – Fusion-Bonded Epoxy Coating for the Interior and Exterior of Steel Water Pipelines.

1.03 SUBMITTALS

A. Product data.

B. Test Reports: Include manufacturer's certification that lining passed tests.

C. Manufacturer's application instructions.

PART 2 PRODUCTS

2.01 EPOXY RESIN POWDER

A. Material: Thermosetting, fusion bonded dry powder epoxy, 100 percent solids, with following performance characteristics when applied:
   1. Cathodic Disbondment Resistance: Average maximum 48 millimeters when tested in accordance with ASTM G 8.

2. Adhesion Shear Resistance: Minimum 4,700 pounds per square inches when tested in accordance with ASTM D 1002.

2.02 FABRICATION

A. Blast fitting interior surfaces of pipe and fittings in accordance with SSPC-SP10.

B. Apply epoxy resin powder to blasted surfaces by either fluidized bed method or electrostatic coating method to obtain minimum 16 mil thick lining in accordance with manufacturer's instructions.

C. Fuse lining to piping in accordance with manufacturer's instructions.

2.03 SOURCE QUALITY CONTROL

A. Test lining with either 100 volt per mil thickness holiday detectors or low voltage wet sponge holiday detectors.

B. Reject pipe and fitting with linings that contain pinholes, discontinuities or other defects.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install pipe and fitting in accordance with Section 15052.

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 05505 – Miscellaneous Metals.
   2. Section 09960 - Coatings.
   3. Section 15052 - Basic Piping Materials and Methods.

1.02 REFERENCES

A. American National Standard Institute or Manufacturer's Standardization Society (ANSI/MSS):
   1. SP-58 - Standard for Pipe Hangers and Supports - Materials, Design, and Manufacture.
   2. SP-69 - Standard for Pipe Hangers and Supports - Selection and Application.

1.03 SUBMITTALS

A. Shop Drawings: Include schedule, indicating where supports will be installed, and drawings of pipe support system components.

PART 2 PRODUCTS

2.01 PIPE SUPPORTS

A. Standard U-bolt: ANSI/MSS SP-69 Type 24.
   1. Manufacturers: One of the following or equal:
      a. Anvil, Figure 137.
      b. Bergen-Paterson, Part 6510.
      c. B-Line Systems, Inc., Figure B3188.

B. Pipe Clamps: ANSI/MSS SP 69 Type 4.
   1. Manufacturers: One of the following or equal:
      a. Anvil, Figure 212.
      b. Bergen-Paterson, Part 6100.
      c. B-Line Systems, Inc., Figure B3140.
      d. Unistrut.

C. Clevis Hangers: ANSI/MSSS SP 69 Type 1
   1. Manufacturers: one of the following or equal:
      a. Anvil, Figure 590.

D. Anchor Bolts, Flush Shells, Powder Actuated Fasteners, and Concrete Anchors: As specified in Section 05120.

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. Carefully determine locations of inserts. Anchor to formwork prior to placing concrete.

C. Use flush shells only where indicated on the Drawings.

D. Do not use anchors relying on deformation of lead alloy.

E. Do not use stud type powder actuated fasteners for securing metallic conduit or steel pipe larger than 1 inch to concrete, masonry, or wood.

F. Suspend pipe hangers from hanger rods. Secured with double nuts.

G. Install continuously threaded hanger rods only where indicated on the Drawings.

H. Use adjustable ring hangers; or adjustable clevis hangers, for 6 inch and smaller diameter pipe.

I. Use adjustable clevis hangers for pipe larger than 6 inches in diameter.

J. Secure pipes with galvanized double nutted U-bolts or suspend pipes from hanger rods and hangers.

K. Support Spacing:
   1. Support 2 inch and smaller piping on horizontal and vertical runs at maximum

4 feet on center, unless otherwise specified.
2. Support larger than 2 inch piping on horizontal and vertical runs at maximum 6 feet on center, unless otherwise specified.
3. Support exposed polyvinyl chloride and other plastic pipes at maximum 5 feet on center, regardless of size.

L. Install Supports at:
1. Horizontal bends.
2. Both sides of flexible pipe connections.
3. Base of risers.
4. Floor penetrations.
5. Connections to pumps, blowers and other equipment.
6. Valves and appurtenances.

M. Securely anchor plastic pipe, valves, and headers to prevent movement during operation of valves.

N. Anchor plastic pipe between expansion loops and direction changes to prevent axial movement through anchors.

O. Support base fittings with metal supports or when indicated on the Drawings, concrete piers.

P. Size hanger rods, supports, clamps, anchors, brackets, and guides in accordance with ANSI/MSS SP 58 and SP 69.

Q. Do not use chains, plumbers' straps, wire, or similar devices for permanently suspending, supporting, or restraining pipes.

R. Support plumbing drainage and vents in accordance with California Plumbing Code.

S. Supports, Clamps, Brackets, and Portions of Support System Bearing Against Copper Pipe: Copper plated, copper throughout, or isolated with neoprene or polyvinyl chloride tape.

T. Where pipe is insulated, install over-sized supports and hangers.

U. Install insulation shield in accordance with ANSI/MSS SP 69, Type 40. Shield shall be galvanized steel unless specified elsewhere.

V. Install riser clamps at floor penetrations and where indicated on the Drawings.

W. Provide dielectric protection whenever fastening dissimilar metals.

X. Paint or Coat support system components as specified in Sections 09960.

END OF SECTION

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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. Fusion Bonded Epoxy Lining: Section 15057.
2. Valves: Section 15110.
3. Submersible Pumps: Section 11312.

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.

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:** ANSI/AWWA C115, Class 53 ductile iron pipe with threaded flanges. All ductile iron pipe for pump discharge service shall be fusion bonded epoxy lined and coated per AWWA C213 and Section 15057 of these specifications. Flanges shall be factory assembled.

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-35 PVC GRAVITY PIPE AND FITTINGS**

a. PVC gravity sewer pipe and gaskets shall be certified to CSA B182.2 and conform to ASTM D3034, NQ 3624-130 and NQ 3624-135 standards.

b. Pipe shall be manufactured from 12454-B or 12364-C compound. The minimum stiffness (F/ΔY) shall be 320 kPA (46 psi) for DR35 pipe. Thicker and/or stronger pipe may be substituted.

c. Injection-molded gasketed PVC fittings shall be certified to CSA B182.1 or CSA B182.2. Fabricated fittings shall conform to CSA B182.2.

d. Sealing gaskets shall meet the requirements of CSA B182.2 and ASTM F477, with the additional requirement that the pipe joints shall be able to withstand 50 psi hydrostatic pressure.

F. HDPE Pipe:

a. All HDPE pipe and fittings shall be high molecular weight. The material shall be listed by the Plastic Pipe Institute (PPI) as having a material designation of PE 3408. The pipe shall contain no recycled compound except that generated in the manufacturer's own plant from resin of the same specification from the same raw material pipe. Pipe and fittings shall be homogeneous throughout and free of visible cracks, holes, foreign inclusions or other injurious defects. They shall be uniform in color, opacity, density, and other physical properties. Any pipe and fittings not meeting these criteria shall be rejected.

b. HDPE pipe and fittings shall have a standard dimensional ratio (SDR) of 17 or less, ASTM D1248/D3350/F714, and shall conform to the following:

i. Inside: The inner wall shall be white, light green or natural. Yellow, black, and light purple are not acceptable.

ii. Outside: The outer wall shall be black, white, light green, or natural. Yellow and light purple are not acceptable.

c. The interior colored surface of the HDPE pipe shall be resistant to sewer abrasives and chemicals (including hydrogen sulfide) and over time will not fade or experience color loss.

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.

2.03 PIPE JOINTS

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. **Flanged Coupling Adapters**: Flange coupling adapters shall be provided as shown on the Drawings or as deemed necessary by the Contractor for pipe assembly. Couplings shall be Victaulic Style 341 flange adapter for grooved joints, or equal. Adapter material shall be ductile iron coated with fusion bond epoxy in conformance with AWWA C116.

D. **Thrust Restraint Glands:** All fittings, joints, and connections shall be restrained against trust. Thrust restraint glands shall be EBAA Iron MEGALUG Series 1100. Cast gland bodies shall be coated with MEGA-BOND. The wedge assemblies and all nuts and bolts shall be coated with Xylan Fluoropolymer coating.

E. **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. 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. Anti-galling compound shall be used in installation.

G. **Plastic (PVC) Pipe:** Schedule 40 and Schedule 80 Plastic (PVC) pipe shall be solvent weld in conformance with ASTM D2855.

H. **HDPE Pipe:**

a. Butt fusion shall conform to ASTM D2657 and pipe manufacturer's criteria for the type of joining. Joint strength shall be equal to that of the adjacent pipe.

b. Sections of HDPE pipe shall be joined into continuous lengths on the job site above ground. The joining method for pipe shall be the butt fusion and/or electro-fusion method and HDPE saddles shall be fused on. All fusion shall be performed in strict accordance with the pipe manufacturer's recommendations. Fusion equipment used in the joining procedure shall be capable of meeting all conditions recommended by the pipe manufacturer, including, but not limited to, fusion temperature, alignment and fusion pressure.

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.

3.04 CCTV INSPECTION

A. Post Construction Televised Inspection (CCTV) shall be performed by the Contractor on all new gravity piping and force main at the Willow-Whitehall Pump Station.

B. The Contractor shall furnish the City with the following records:

   a. Separate televised inspection records of each sewer line (manhole to manhole) on a DVD properly labeled as to date and manhole identification numbers noted on the project plans.
   b. PACP database of inspected sewer lines and associated media files.
   c. Digital images of all lateral connections and all defects.

C. PACP REQUIREMENTS
   All deliverables shall conform to the following list of requirements:

a. Video inspection software shall be NASSCO PACP compliant and conform to its pipeline assessment procedures.
b. All observations and defects shall be documented in a database and shall include digital video recording and digital photographs.
c. Each video clip and photograph provided shall correspond to inspection data in the database, and each set of inspection data listed in the database shall be properly linked to the appropriate video clip and photos.
d. All observations should be standard PACP codes as outlined in NASSCO's current PACP Reference Manual with any additional comments regarding the observation indicated in the remarks box.
e. The severity of each defect or observation shall be recorded and rated according to the PACP method.
f. Each pipe segment (manhole to manhole) shall be identified with an initial text screen and completed in accordance with PACP's CCTV inspection form header Instructions.
g. The Contractor shall make a continuous color digital recording in MPEG 4 format for each pipe segment inspected.
h. The database, videos, and photographs shall have the ability to be "Exported". Export is the process of selecting all or portions of the original data, video, and pictures and creating a complete and independent copy of the information, which can be synchronized with the City's program. The export process will validate the PACP data and reject any non-compliant inspections, notifying the user via log files.

** END OF SECTION **

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.

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 15251.
      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.

E. New bronze plug-type globe valves with quarter-turn shutoff handles shall be supplied for the relocated backflow device as called out on the Drawings.

2.04 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.

2. High Solids Polyamine Cured Epoxy:
   a. Product: As specified in Section 09960.
   b. Quality Control: After coating is cured, check coated surface for porosity with a holiday detector set at 1,800 volts.
      1) Repair holidays and other irregularities and retest coating.
      2) Repeat procedure until holidays and other irregularities are corrected.

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 Phase 1 Group 1 Upgrades of the City of Alameda Sanitary Sewer Pump Stations. In general, the electrical equipment and installation shall include but is not limited to the following items:

1. Service Pedestal
2. Backup Diesel Fueled Generator System
3. Automatic Transfer Switch
4. Pump Control Panel
5. Float Switches
6. Underground conduits, and pullboxes
7. Low voltage power cables
8. Rigid steel and PVC coated rigid steel conduit system
9. Grounding system
10. 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
   b. California Building Code
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 6, Enclosures for Industrial Controls and Systems
7. CALIFORNIA CODE OF REGULATIONS
    a. Title 24, Part 2, 2010 California Building Code
    b. Title 24, Part 3, 2010 California Electrical Code
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. Standards for Safety

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 metering 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 NFPA 70.

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. Backup diesel fueled 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 2010 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 automatic transfer switch, backup generator, and 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 LOCK-OUT TAG-OUT 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.

B. Provide general lockout tag-out written procedures for all electrical equipment being installed under this project.

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 backup generator and 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 backup generator and 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. Backup Diesel Fueled Generator and Automatic Transfer Switch.

2. 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.

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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, 2010 California Building Code
    b. Title 24, Part 3, 2010 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 6, Electrical Rigid Metal Conduit-Steel

b. UL 83, Thermoplastic-Insulated Wire and Cable

c. UL 360, Liquid-Tight Flexible Steel Conduit

d. UL 467, Grounding and Bonding Equipment

e. UL 486 A, Wire Connectors

f. UL 486 C, Splicing Wiring Connectors

g. UL 508, Industrial Control Equipment

h. UL 514 B, Conduit, Tubing, and Cable Fittings

i. UL 651, Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings

j. UL 943, Ground Fault Circuit Interrupters

1.03 SUBMITTALS

A. Product Data: Provide material, finish, dimensions and weights for rigid metal conduit, liquidtight flexible 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 shall be provided where indicated on the Drawings. Sealing fittings shall be EY series for vertical or horizontal as manufactured by Appleton, Killark or approved equivalent.

B. Liquid-Tight Flexible Steel Conduit

1. Liquid-tight flexible steel conduit shall be in accordance with UL 360 and shall be provided with a protective jacket of PVC extruded over a flexible interlocked galvanized steel core to protect wiring against moisture, oil, chemicals, and corrosive fumes.

2. Fittings for liquid-tight flexible steel conduit shall be specifically designed for such conduit.

C. 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 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 service pedestal, pump control panel, transfer switch and backup generator 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 NEC 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 in Dry 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, automatic transfer switch, receptacles, light switches, and backup generator, 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.

* * *

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.

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. 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

5. 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

6. 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 70, National Electrical Code

d. NFPA 110, Standard for Emergency and Standby Power Systems

7. 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

8. CALIFORNIA AIR RESOURCES BOARD (CARB)

a. BAY AREA AIR QUALITY MANAGEMENT DISTRICT

9. 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

which presents the load information for each of the pump stations where a generator is to be provided. Minimum generator size is shown on the project Drawings.

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.

   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, sensor ports, anchor bolt template and recommended clearances for operation and maintenance. Identify location and type of vibration isolators furnished.

      3) 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 verifying the integrity of the isolators and anchoring systems. 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. Factory test reports

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 at each pump station. An allowance bid item is included for all permit fees. The contractor shall submit an application in order to obtain a letter of exemption for all generators that are less than 50 horsepower.

    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 one 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 (1.0 for 1-Phase Generator)
Engine-Generator Application	Stand-Alone
Heat Exchanger Type	Fin-Tube
Governor Type	Electronic Governor
Governor Application	Isochronous
Frequency Bandwidth	± 0.25%
(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	12%
Maximum Step Load Increase	Single step load pickup of 100% nameplate and power factor
Frequency Recovery Time	1 second maximum
Frequency Deviation	10% maximum
Tolerance for Recover	1.5 Hz
Voltage Recovery Time	1 second maximum
Voltage Deviation	20% maximum
Maximum Time to Start and be Ready To Assume Load	10 seconds
Seismic Zone	Per 2010 CBC
Installation Elevation	Sea level

B. Generator set ratings: As shown on the Drawings. 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 ± 0.5 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 kVA capability at 90% sustained voltage, shall be 75 kVA.

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, 65A minimum, and solid-state voltage regulator.

2.03 AC GENERATOR

A. The AC generator 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 generator 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 which is 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 labeled, CSA282-M1989 certified, and meet IEC8528 part 4. 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 65A 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 switches, lamps and meters shall be oil-tight and dust-tight, and the enclosure door shall be gasketed. There shall be no exposed points in the control (with the door open) that operate in excess of 50V.

3. All switches shall be provided with fully illuminated back-lit labels and all metering shall be individually lighted to allow for easy reading of functions in a completely dark room.

4. 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 a digital readout

display which shall be integral to the equipment. All adjustments shall be made with digital tactile feel raise/lower switches which include position indicators. No rotary pots shall be acceptable for any function of the control system provided for the generator set. Control equipment shall contain a system of diagnostic LED's to assist in analyzing proper system function.

5. 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 RS232 port on the control.

6. The generator set mounted control shall include the following features and functions:

   a. Three position control switch labeled RUN/OFF/AUTO. 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. Pushbutton RESET switch. The RESET switch shall be used to clear a fault and allow restarting the generator set after it has shut down for any fault condition.

   d. Pushbutton PANEL LAMP switch. Depressing the panel lamp switch shall cause the entire panel to be lighted with DC control power. The panel lamps shall automatically be switched off 10 minutes after the switch is depressed or after the switch is depressed a second time. Lamps shall be rated for operation at twice the control voltage supplied, for optimum lamp life.

   e. Pushbutton LAMP TEST switch. Depressing the lamp test switch shall cause all alarm and status lamps on the panel to be lighted, and cause the digital display panel to sequentially display all the alarm and status messages in the control system.

7. 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 the RUN position only. 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 an 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.

8. 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 LED 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.

9. 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 90 degree scale analog voltmeter, ammeter, frequency meter, and kilowatt (kW) meter. These meters shall be provided with a phase select switch with LED indicating lamp and an indicating LED lamp for upper and lower scale on the meters. Ammeter and kW meter 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 analog meters and meter switches 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 current, frequency, output current, output kW, kW-hours, and power. 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, and existing alarm and shutdown 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 a two line, 16 characters per line, LED 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	LAMP COLOR	ALARM HORN	SHUTDOWN UNIT
Low DC Voltage	Amber	*	
High DC Voltage	Amber	*	
Weak Battery	Amber	*	
Low Oil Pressure Alarm	Amber	*	
Low Coolant Temp Alarm	Amber	*	
High Coolant Temp Alarm	Amber	*	
Leak Detected – Day Tank	Amber	*	
Ground Fault	Amber	*	
Overcurrent Alarm	Amber	*	
Oil Pressure Sender Failure	Amber	*	
Engine Temp Sender Failure	Amber	*	
Low Fuel Level	Amber	*	
Not in Auto	Red	*	*
High Coolant Temp	Red	*	*
Low Oil Pressure	Red	*	*
Overcurrent	Red	*	*
Short Circuit	Red	*	*
Overcrank	Red	*	*
Overspeed	Red	*	*
Under Frequency	Red	*	
Under Voltage	Red	*	*
Over Voltage	Red	*	*
Low Coolant Level	Red	*	*
Emergency Stop	Red	*	*
Automatic	Green		
Generator Running	Green		

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 a two line, 16 character per line, LED 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 sound attenuated housing that shall reduce the sound level of the generator set, while operating at full rated load, to an average of 67.1 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 National 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 100F. 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. Enclosure shall be constructed of minimum 12 gauge aluminum for framework and 14 gauge aluminum for panels. All hardware and hinges shall be stainless steel.

E. A factory-mounted exhaust muffler silencer shall be of the size and configuration as selected by the manufacturer. The muffler shall be critical type, and 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 fitted for the engine exhaust flange.

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 2010 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. A UL listed/CSA certified 10 A minimum voltage regulated battery charger shall be provided for each engine-generator set. 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). An Analog DC voltmeter and ammeter, 12 hour equalize charge timer, AC and DC fuses shall also be provided on the charger.

F. 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.

G. Sub-Base Fuel Storage Tank shall be double wall fuel storage tank with minimum capacity for 48 hours of operation with one pump motor running plus the control panel total auxiliary 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 gauge. The tank shall be constructed of corrosion resistant steel and shall be UL 142 listed and labeled. Installation shall be in compliance to NFPA37. Tank shall be provided with 2-inch bolt-thru risers to allow visual inspection under the tank. Suitable rodent barrier shall be provided. The equipment, as installed, shall meet all local and regional requirements for above ground tanks.

H. 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 all diesel generator tanks 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
2. Complete project description, including equipment serial numbers for generator sets.
3. Introduction
4. Describes the major components and power of the system.
5. Safety Precautions
6. Describes system operation and maintenance precautions.
7. Operation
8. Describes generator set operations.
9. Periodic Maintenance
10. Describes necessary procedures to maintain the system.
11. Adjustments
12. Describes generator set adjustments.
13. Troubleshooting
14. Describes generator set troubleshooting.
15. Generator Set Manual
16. Include a copy of the generator set manuals.
17. Wiring Diagrams
18. Include all system wiring diagrams.
19. Copy of factory and on-site test reports.
20. 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.

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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
5. CALIFORNIA CODE OF REGULATIONS
    a. Title 24, Part 3, 2010 California Electrical Code

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 2010 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.

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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, 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. Catalog Data of the portable generator receptacle.
4. 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 and, where required, the portable generator main breaker. Both main breakers shall be mechanically interlocked so that only one of the main circuit breakers can be closed at any given time. The main circuit breakers, 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 3R 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 hot dipped galvanized steel. Doors shall be equipped with 316 stainless steel handles with 3-point roller bearing latches and hasps for City's padlocks. Where indicated on the drawings the enclosure shall be NEMA 4X Stainless Steel construction.

C. Circuit Breakers

1. Main circuit breakers shall have interrupting capacities of not less than 10,000 amperes or as indicated on the Drawings. Circuit breakers 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". Service pedestal ground rod shall be connected to an external ground rod, of the same size, installed adjacent to the service pedestal and spaced a minimum of 6 ft apart. 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 WUESSC 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. Generator Receptacle

1. A generator receptacle is to be installed on the side of the service pedestal for the connection of a portable generator. Generator receptacle type and configuration shall be as indicated on the Drawings. Generator receptacle shall be reverse service in accordance with the CEC Article 406.6 B.

G. 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.

H. Enclosure Finish

1. 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. Color of enclosure exterior shall be light grey. Provide color chip samples to the City for approval. 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.

I. 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.

* * *

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. 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 shall be provided to the pump control panel manufacturer for installation inside one of the sections of the control panel.

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 for NFPA 70, 99, and 110.

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 one 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 the pump control panel by the control panel manufacturer. 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 AUTOMATIC CONTROLS

A. Control shall be solid-state and designed for a high level of immunity to power line surges and transients, demonstrated by test to IEEE Standard 587. The control shall have optically isolated logic inputs, high isolation transformers for AC inputs, and relays on all outputs.

B. Solid-state undervoltage sensors shall simultaneously monitor all phases of both sources. Pick-up and drop-out settings shall be adjustable. Voltage sensors shall allow for adjustment to sense partial loss of voltage on any phase. Voltage sensors shall have field calibration of actual supply voltage to nominal system voltage.

C. Automatic controls shall signal the engine-generator set to start upon signal from normal source sensors. Solid-state time delay start, adjustable from 0 to 5 seconds, shall be provided to avoid nuisance start-ups. Battery voltage starting contacts shall be gold, dry type contacts factory wired to a field wiring terminal block.

D. The switch shall transfer when the emergency source reaches the set point voltage and frequency. Provide a solid-state time delay on transfer, adjustable from 0 to 120-seconds.

E. The switch shall retransfer the load to the normal source after a time delay retransfer, adjustable from 0 to 30-minutes. Retransfer time delay shall be immediately bypassed if the emergency power source fails.

F. Controls shall signal the engine-generator set to stop after a time delay, adjustable from 0 to 10-minutes, beginning on return to the normal source.

G. Power for transfer operation shall be from the source to which the load is being transferred.

H. The control shall include latching diagnostic indicators to pinpoint the last successful step in the sequence of control functions, and to indicate the present status of the control functions in real time, as follows:

1. Source 1 OK
2. Start Gen Set
3. Source 2 OK
4. Transfer Timing

5. Transfer Complete
6. Retransfer Timing
7. Retransfer Complete
8. Timing for Stop

I. The control shall include provisions for remote transfer inhibit and area protection.

J. Transfer switch shall be equipped with a field adjustable time delay during switching in both directions, during which time the load is isolated from both power sources, to allow load residual voltage to decay before closure to the opposite source. The delay feature shall have an adjustable range of 0 to 7.5 seconds. Phase angle monitor is not acceptable.

2.05 FRONT PANEL DEVICES

A. Provide devices to be mounted on pump control panel door consisting of:

B. A key-operated selector switch to provide the following positions and functions:

1. Test - Simulates normal power loss to control for testing of generator set. Controls shall provide for a test with or without load transfer.
2. Normal - Normal operating position.
3. Retransfer - Momentary position to override retransfer time delay and cause immediate return to normal source, if available.

C. Transfer switch position and source available lamps.

2.06 ACCESSORY ITEMS

A. Transfer switch shall be equipped with accessories as follows:

1. Exerciser Clock
   a. Provide solid state exerciser clock to set the day, time, and duration of generator set exercise/test period. Provide a with/without load selector switch for the exercise period.

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. The transfer switch shall be installed inside the pump control panel at location indicated on the Drawings.

B. Installation of transfer switch shall be performed by the pump control panel manufacturer, including 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.

C. 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. 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 transfer switches.

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.

* * *

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 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, automatic transfer switch, 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 Consultant. Thunderbird Communications will perform the programming and commissioning of the SCADA system. Contractor shall submit the SCADA schematic, wiring diagrams, and proposed communications to the City and to the City's SCADA consultant for their review and approval prior to performing the work.

D. Perform a full function test of all SCADA alarms and status indication points at all pump stations in the presence of City staff. Confirm the receipt lf all points at the SCADA RTU and communication and transmission of all points to the City's Remote Monitoring Station.

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

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, variable frequency drives, 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 the assembly shall be the manufacturer of the major components within the assembly.

B. For the equipment specified herein, the manufacturer shall be ISO 9000, 9001 or 9002 certified.

C. 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.

D. The pump control panel shall be suitable for and certified to meet all applicable seismic requirements of the 2010 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, auxiliary devices and automatic transfer switch 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 a NEMA 3R, with hinged outer and inner doors, constructed of 12 gauge steel minimum, fully welded construction. Minimum dimensions of enclosure shall be as indicated on the drawings. Inner door shall be hinged and provided with suitable latches to secured door in place. Outer door shall be provided with a 3-point latching mechanism and handle with provisions for padlocking. 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. Enclosure shall have a powder coated light grey finished paint color. Provide paint chips samples to City for their approval. Where indicated on the drawings the pump control panel enclosure shall be NEMA 4X Stainless Steel Construction.

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 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 custom 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.

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.

C. VARIABLE FREQUENCY DRIVES

1. Variable frequency drive (VFD) shall be compact, 1-phase input, 3-phase output, with voltage and kW ratings as indicated on the Drawings.

2. VFD shall be sensorless flux vector control and shall be provided with HMI interface mounted on the front of the VFD.

3. VFD shall provide thermal motor protection, short circuit protection, overheating, and line supply under and overvoltage protection.

4. VFD shall be Schneider Electric, ALTIVAR 12 as indicated on the drawings.

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. For existing motors, the pump control panel manufacturer shall re-installed the moisture detection device salvaged from the existing control panel at pump stations indicated on the drawings.

D. Control relays shall be general purpose, blade type, 3PDT contact configuration with neon indicating light. Provide matching socket base with hold down clips.

E. Each section of the control panel shall be provided with anti-condensation space heaters, thermostatically controlled.

F. 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.

G. 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, 316L stainless steel 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 11 with MP-11 Moisture Protection Seal. Install the MP-11 Moisture Protection Seal in Control Panel and return the TE11 box to the City.

H. 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.

I. 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.

J. 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 TS350. Level controller shall be provided with one (1) RS232/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 TS350 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 850 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 2.5A at 24 VDC, UL 508 listed. Power supply shall be SOLA Catalog Number SDN 2.5-24-100P or approved equal.

2.11 AUTOMATIC TRANSFER SWITCH

A. Automatic transfer switch shall be as specified in Section 16495. Automatic transfer switch shall be installed by the control panel manufacturer in a section of the control panel as indicated on the Drawings.

B. Control panel manufacturer shall coordinate automatic transfer switch installation requirements with the manufacturer of the automatic transfer switch. Coordinate installation of all door mounted devices and connecting wiring.

2.12 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.

2.13 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 NEC 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. 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. 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 all VFD protection parameters and operation parameters.
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 and the City's RTU.

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.

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