

CITY OF OROVILLE, CALIFORNIA



SPECIFICATIONS AND CONTRACT DOCUMENTS

OROVILLE SEWER PROJECTS – 1D&1F

APRIL 2020



PREPARED FOR:

**CITY OF OROVILLE PUBLIC WORKS DEPARTMENT
OROVILLE, CALIFORNIA**

PREPARED BY:

**BENNETT ENGINEERING SERVICES
ROSEVILLE, CALIFORNIA**

SPECIFICATIONS AND CONTRACT DOCUMENTS FOR

OROVILLE SEWER PROJECTS – 1D&1F

TABLE OF CONTENTS

<u>SECTION NAME</u>	<u>PAGE/SECTION</u>
BIDDING REQUIREMENTS	
Invitation for Bids.....	BR-1
Information for Bidders.....	BR-4
BIDDING DOCUMENTS	
Bid Form.....	BD-1
Bid Schedule.....	BD-4
List of Subcontractors.....	BD-6
Bidder's Bond	BD-7
Equal Opportunity Certification.....	BD-8
Noncollusion Affidavit.....	BD-9
Public Contract Code Section 10285.1 Statement	BD-10
Public Contract Code Section 10162 Questionnaire.....	BD-11
Public Contract Code Section 10232 Statement.....	BD-12
Debarment and Suspension Certification.....	BD-13
CONTRACT FORMS	
Project Contract.....	CF-1
Form of Performance Bond.....	CF-8
Form of Payment Bond	CF-9
GENERAL CONDITIONS	Section GC
SPECIAL PROVISIONS	Section SP
TECHNICAL SPECIFICATIONS	Section TS
Measure and Payment.....	01150
Submittals	01300
Testing of Gravity Sewer Lines and Manholes	01666
Demolition, Clearing, Grubbing, and Stripping.....	02100
Earthwork	02200
Abandonment of Pipelines and Manholes.....	02222
Trenching, Backfilling, and Compacting	02223
Structure Excavation and Backfill.....	02225
Sheeting, Waling, and Shoring.....	02400
Paving and Road Surfacing	02510
Manholes and Cleanouts.....	02601
Temporary Sewer Bypass Pumping	02960
Pipe Removal.....	15030
Plastic Pipe and Fittings	15071
APPENDICES	A & B
PROJECT PLAN SHEETS (15 Sheets Total)	

SECTION - BR
BIDDING REQUIREMENTS

INVITATION FOR BIDS
CITY OF OROVILLE
1735 MONTGOMERY STREET
OROVILLE, CALIFORNIA 95965-4897

Sealed proposals for the work described in the specifications and contract documents entitled:

OROVILLE SEWER PROJECTS – 1D&1F

will be received at the City of Oroville, office of the City Clerk, 1735 Montgomery Street, Oroville, California 95965 until:

TUESDAY, MAY 12, 2020 AT 2:00 PM

at which time they will be publicly opened and read aloud in Conference Room 1 at said address.

NON-MANDATORY PRE-BID MEETING
TUESDAY, APRIL 28, 2020 AT 2:00 PM

All Contractors interested in bidding on this project can attend a non-mandatory pre-bid meeting to be held at Oroville City Hall, 1735 Montgomery Street, Oroville, California. The pre-bid meeting will be held on Tuesday, April 28, 2020 at 2:00 PM.

Proposal forms for this work are included in the document entitled:

OROVILLE SEWER PROJECTS – 1D&1F

The proposed work for this project consists of the following generalized scope of work:

- Install 2,033 linear feet of 15-inch sanitary sewer and 6 sanitary sewer manholes on Table Mountain Boulevard, tie-in to existing sewer, and all associated pavement repair.
- Abandon 2,174 linear feet of existing sanitary sewer and 8 sanitary sewer manholes.
- Remove and replace 70 linear feet of 8-inch sanitary sewer and connect to existing manholes on Table Mountain Boulevard.
- Install 1,072 linear feet of 18-inch sanitary sewer and 4 manholes on Montgomery Street, reconnect laterals, and all associated pavement repair.
- Abandon 1,075 linear feet of 10-inch sanitary sewer and 2 manholes on Montgomery Street.

Contractor's License Classification. The Contractor shall possess a Class A General Engineering Contractor license issued by the State of California Contractors State License Board at the time of contract award. The Contractor's subcontractor(s) performing work shall possess the appropriate State licenses for the work being performed. The awarded Contractor and subcontractors will also be required to obtain a City Business License.

Obtaining or Inspecting Contract Documents. The plans, specifications and contract documents (Contract Documents) are available for download on the City of Oroville website at:

<http://www.cityoforoville.org/business/rfp-rfq-public-bids/project-documentation>

The City will also be transmitting scanned copies of the Contract Documents to building exchanges throughout the Northern Central Valley and the Bay Area. The City will not be providing Contractors paper copies of the Contract Documents. Further information regarding wage requirements, contract time, bonding requirements, federal requirements and other contract provisions are included in the Instructions for Bidders as part of the Contract Documents. Any questions or clarifications regarding the Contract Documents requested by Contractors shall be emailed to the City of Oroville, Project Manager, Mike Massaro, P.E., at mmassaro@ben-en.com after the pre-bid meeting on April 28, 2020.

Questions or clarifications to the Contract Documents will be responded to through the issuance of addendum(s) by the City. As required, Contractors that submit written questions or clarifications to the City by email (mmassaro@ben-en.com) will be automatically placed on the bidders list. Addendums will be posted to the exchange. Addendums will also be placed on the City's website (website address above).

Wage Requirements. The Contractor and Subcontractors on this project must comply with Nondiscrimination, Equal Employment Opportunity, Antitrust, Occupational Safety and Health Standards and Regulations as set forth in the Contract Bid Documents. This municipality is an equal opportunity employer and businesses owned by women or minorities are strongly encouraged to bid. The Department of Public Works hereby notifies all bidders that it will affirmatively insure that in any contract entered into pursuant to this advertisement, disadvantaged business enterprises will be afforded full opportunity to submit bids in response to this invitation and will not be discriminated against on the grounds of race, gender, color or national origin in consideration for the award.

All labor on the project shall be paid the higher of the minimum wage rates as established by the U.S. Secretary of Labor, or the California Director of Industrial Relations. If a discrepancy exists between these two determinations, then all labor on the project shall be paid the higher of the two minimum wage rates. Refer to the Wage Determinations OnLine.gov (www.wdol.gov) for the latest wage rates established by the U.S. Secretary of Labor as of the date of advertisement. This project is subject to State general prevailing wage rates unless a construction trade as part of the project has no listed in the State general prevailing wage rate. In this case, and only if there is no listed federal wage rate for a specific and necessary trade, the State general prevailing wage rate shall apply. It shall be mandatory upon the Contractor to whom the Contract is awarded, and upon any subcontractors under such contract, to pay not less than said prevailing rates to all workers employed by them in the execution of the Contract.

Contract Time. This work shall be constructed in accordance with details as shown on the plans and described in the specifications for this project. The construction work for the entire project shall be completed within one hundred and ten (110) working days.

Bidder's Bond. Bids must be from an appropriately licensed contractor, must be sealed and accompanied by cash, a certified or cashier's check, equivalent to ten percent (10%) of the proposal, payable to the order of the City of Oroville, to guarantee that if a proposal is accepted, a contract will be entered into and its performance secured. A Bidder's Bond to like effect and amount with a corporate surety will be acceptable for this project. Bids must be in writing and signed by or on behalf of the bidder.

Award of Contract. The contract will be awarded on the basis of lowest price for the combination of the base bid and the additive alternative bid from a responsive and responsible bidder and will provide for progressive payments and liquidated damages as fixed in the specifications. Although the additive bid alternative will be used in the determination of the lowest bidder, the additional work for the additive bid alternative will be the sole discretion of the City of Oroville. All proposals must be made on the forms as contained in the specifications for the previously described project and shall in all respects

comply with the Instructions to Bidders and Contract Documents. Bids must be in writing and signed by or on behalf of the bidder.

Bonding Requirements. The successful bidder will be required to furnish a Performance Bond for 100 percent of the contract price to secure fulfillment of all the bidder's obligations under such contract. The successful bidder will further be required to furnish a Labor and Material Bond for 100 percent of the contract price to assure payment as required by law of all persons supplying labor and material in the execution of the work provided for in the contract.

Retainage from Payments. Monthly progress payments shall be made to the Contractor for the value of the work completed during the preceding month, less a five percent (5%) security withhold.

Public Works Contractor Law. Bidders are advised that effective January 1, 2015, SB854 requires that no contractor or subcontractor may be listed on a bid proposal for a public works project (submitted on or after March 1, 2015) unless registered with the Department of Industrial Relations (DIR) pursuant to Labor Code section 1725.5 [with limited exceptions from this requirement for bid purposes only under Labor Code section 1771.1(a)]. Furthermore, 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. After registration, contractors and subcontractors shall submit be required to electronic certified payroll reports to DIR.

The City of Oroville reserves the right to reject any and/or all bids or to utilize any alternate procedures as authorized by California Public Contracts Code Sections 20166 and 20167, and accept such bids as are to the best interest of the City. No bidder may withdraw his/her bid for a period of ninety (90) days after the date set for the opening thereof.

Engineer's Estimate: \$1,398,500

CITY OF OROVILLE

Mike Massaro, P.E.
Contract Engineer

Dated:

April 2, 2020

Advertising Date: April 2, 2020

INFORMATION FOR BIDDERS

Bids will be received by the City of Oroville at the office of the City Clerk, City Hall, 1735 Montgomery Street, Oroville, California 95965-4897, until:

TUESDAY, MAY 12, 2020 AT 2:00 PM

at which time they will be publicly opened and read aloud.

Each bid must be submitted in a sealed envelope, addressed to the City of Oroville, 1735 Montgomery Street, Oroville, California 95965-4897. Each sealed envelope containing a bid must be plainly marked on the outside as bid for:

OROVILLE SEWER PROJECTS – 1D&1F

and the envelope should bear on the outside the name of the bidder, his/her address, his/her license number and classification, and the name of the project for which the bid is submitted. If forwarded by mail, the sealed envelope containing the bid must be enclosed in another envelope addressed to the City of Oroville.

1. SCOPE OF PROJECT

The work to be done under this contract consists of furnishing all materials, plant and equipment, and performing all necessary labor in accordance with the prepared plans, specifications, and special provisions as directed by the City or its authorized representative, as follows:

CONSTRUCTION OF THE OROVILLE SEWER PROJECTS – 1D&1F

2. FORM OF PROPOSAL

All bids must be made on the required bid form, and other forms furnished with the contract documents. All blank spaces for bid prices must be filled in, in ink or typewritten, and the bid form must be fully completed and executed when submitted. Only one copy of the bid form is required. Each bid shall be accompanied by a certified check, cashier's check, or surety bond for not less than ten (10) percent of the amount of the bid, made payable to the order of the City Clerk, City of Oroville. Such check or bond shall be given as a guarantee that the bidder will enter into the contract if awarded to him/her, and will be declared forfeited if the bidder refuses to enter into said contract and give the required contract bonds within five (5) days after being notified to do so by the City. The check or bond accompanying the accepted bid will be retained until the contract documents have been signed by the successful bidder and approved by the City of Oroville.

The following forms shall be completed and signed (where required), and submitted together to constitute a fully responsive bid:

- Bid Form (Pages BD-1 through BD-3)
- Bid Schedule (Page BD-4)
- List of Subcontractors (Page BD-6)
- Bidder's Bond (Page BD-7)

- Equal Opportunity Certification (Page BD-8)
- Noncollusion Affidavit (Page BD-9)
- Public Contract Code Section 10285.1 Statement (Page BD-10)
- Public Contract Code Section 10162 Questionnaire (Page BD-11)

The Contractor shall possess a Class A General Engineering License issued by the State of California Contractors State License Board at the time of contract award. The Contractor's subcontractor performing work elements shall possess the appropriate state licenses for the work being performed. The awarded Contractor and subcontractors will also be required to obtain a City Business License.

The City may waive any informalities or minor defects or reject any and all bids. Any bid may be withdrawn prior to the above scheduled time for the opening of bids or authorized postponement thereof. Any bid received after the time and date specified shall not be considered. No bidder may withdraw a bid within ninety (90) days after the actual date of the opening thereof. The City intends to award the contract at a regularly scheduled City Council Meeting as soon as possible thereafter. Should there be reasons why the contract cannot be awarded within the specified period; the time may be extended by mutual agreement between the City and the bidder.

The proposals may be rejected if they show any alteration of forms, additions not called for, conditional or alternative bids, incomplete bids, erasures or irregularities of any kind. The City of Oroville reserves the right to retain the checks or bonds of the three lowest bidders until an approved contract has been signed. All other bidders' checks will be returned by the City of Oroville.

3. LOCAL CONDITIONS

Bidders must satisfy themselves of the accuracy of the estimated quantities in the bid schedule by examination of the site and a review of the drawings and specifications including addenda. After bids have been submitted, the bidder shall not assert that there was a misunderstanding concerning the quantities of work, the nature of the work to be done or other requirements that are being called for in these specifications.

The City shall provide to bidders, prior to bidding, all information that is pertinent to, and delineates and describes, the land owned and rights-of-way acquired or to be required. The contract documents contain the provisions required for the construction of the project. Information obtained from an officer, agent, or employee of the City or any other person shall not affect the risks or obligations assumed by the Contractor or relieve him/her from fulfilling any of the conditions of the contract.

If any bidder is in doubt as to the true meaning of any part of the drawings, specifications, or other Contract Documents, or finds discrepancies in, or omissions from, the drawings or specifications, he/she may submit to the Design Engineer a written request for a clarification or correction thereof not later than five (5) days before the date bids will be opened. The person submitting the request will be responsible for its prompt delivery. Any clarification or correction will be made by written addendum, which shall be mailed or delivered to each person receiving a set of such documents.

The City will not be responsible for any other explanation or interpretation of the Contract Documents.

Any addenda issued before the time in which to submit bids expires shall form a part of the Contract Documents and shall be covered in the bid. Each bidder shall confirm receipt of any and all addenda in the space provided in the bid form.

4. BASIS OF AWARD

Award will be made to the lowest responsive and responsible bidder. A conditional or qualified bid will not be accepted. All applicable laws, ordinances, and the rules and regulations of all authorities having jurisdiction over construction of the project shall apply to the contract throughout. Each bidder is responsible for inspecting the site and for reading and being thoroughly familiar with the Contract Documents. The failure or omission of any bidder to do any of the foregoing shall in no way relieve any bidder from any obligation in respect to his/her bid. The low bidder shall supply the names and addresses of major material suppliers and subcontractors with the bid proposal on the form provided.

In making the award of the contract the City will consider the balanced character of the bids, the experience and ability of the bidders, as well as the extension of the estimate of quantities at the unit prices bid. The Contract will be awarded to the lowest cost for the work subject to the conditions for the basis of award of a contract. The Owner reserves the right to reject any or all bids and to waive irregularities not affecting substantial rights.

In case of conflict in the proposal between unit price bid and the extended total, the unit price bid shall govern. The basis of the award is subject to all conditions as contained in these specifications. The party to whom the contract is awarded will be required to execute the agreement and obtain the performance bond and payment bond within fourteen (14) calendar days from the date when notice of award (either verbal or written) is delivered to the bidder. The notice of award shall be accompanied by the necessary agreement and bond forms. In case of failure of the bidder to execute the agreement, the City may, at its option, consider the bidder in default, in which case the bid bond accompanying the proposal shall become the property of the City.

5. CONTRACT BONDS

Upon receipt of written notice of award of the contract and not more than five (5) days thereafter, the Contractor shall furnish the following bonds with power of attorney issued by a surety licensed to do business in the State of California and approved by the City. Attorneys-in-fact who sign bid bonds or payment bonds and performance bonds must file with each bond a certified and effective dated copy of their power of attorney. The form of the bonds shall be acceptable to the Owner:

- a. Faithful Performance Bond in a sum equal to one hundred percent (100%) of the amount of the contract awarded. This bond shall be made payable to the City of Oroville to guarantee the faithful performance of the contract.
- b. Labor and Material Bond in a sum equal to one hundred percent (100%) of the amount of the contract awarded. This bond shall be made payable to the City of Oroville to guarantee the payment of all labor, materials, rentals, etc. This bond shall have specific provisions to assure payment of all unemployment contributions which become due and payable.

6. PRECONSTRUCTION CONFERENCE

Prior to the issuance of the Notice to Proceed, a pre-construction conference will be held at a location determined by the City Engineer for the purpose of discussing with the Contractor the Scope of Work, contract drawings, specifications, existing conditions, materials to be ordered, equipment to be used, and all essential matters pertaining to the prosecution and the satisfactory completion of the project as required. The Contractor's representative at this conference shall include all major superintendents for the work and may include major sub-contractors.

7. NOTICE TO PROCEED

The Notice to Proceed (NTP) shall be issued for the date agreed by the City and Contractor as long as the agreement has been executed and the City has received the bonds and insurance documentation required per contract.

8. BIDDER'S QUALIFICATIONS

The City may make such investigations as it deems necessary to determine the ability of the bidder to perform the work, and the bidder shall furnish to the City all such information and data of this purpose as the City may request. The City reserves the right to reject any bid if the evidence submitted by, or investigation of, such bidder fails to satisfy the City that such bidder is properly qualified to carry out the obligations of the agreement and to complete the work contemplated therein.

9. WAGE RATES

All labor on the project shall be paid no less than the minimum wage rates as established by the U.S. Secretary of Labor. Further, pursuant to California Labor Code Section 1770, the California Department of Industrial Relations has specified the general prevailing wage rates for all public projects in California. The wages to be paid to all workers on such projects shall not be less than those specified in such wage rate determination.

10. ESTIMATE OF QUANTITIES

The estimate of quantities of work to be done under the specifications is approximate and is given only as a basis of calculation upon which the award of the contract will be made. The Contractor will be paid for the actual work done including materials and equipment actually installed at the contract unit price as shown on the plans, or as directed by the engineer. The Owner reserves the right to increase or decrease the amount of any class of work or material deemed necessary without restrictions. Bidders must submit balanced bids in order that they may not be affected adversely by an increase or decrease of quantities.

11. SUBLETTING OF CONTRACT

The Contractor shall not sublet, sell, transfer, assign or otherwise dispose of the contract or contracts or any portion thereof, or of his/her right, title, or interest therein, without written consent of the Owner. In case such consent is given, the Contractor will be permitted to sublet a portion thereof but shall perform with his/her own organization not less than 50 percent of the total contract cost, except that any items designated by the Contractor and approved by the Owner as "specialty items" may be performed by subcontract and the cost of any such specialty items so performed by

subcontract may be deducted from the total cost before computing the amount of work to be performed by the Contractor with his/her own organization. No subcontracts or transfer of contract shall release the Contractor of his/her liability under contracts and bonds.

12. WORKER'S COMPENSATION INSURANCE

The Contractor shall provide worker's compensation insurance, as required under the laws of the State of California, protecting the employees on the work, and shall pay all premiums due thereunder.

13. PUBLIC LIABILITY INSURANCE

The Contractor shall not commence any work or permit any subcontractor to commence any work until he/she obtains at his/her expense all required insurance. Such insurance must have the approval of the Owner as to limit, form and amount. Any insurance bearing on adequacy of performance shall be maintained after completion of the project for the full guarantee period.

14. CONTRACT TIME

The Contractor shall begin work within ten (10) calendar days after the date set in the written Notice to Proceed by the Owner and shall diligently prosecute same to completion for all of the proposed construction. The Contract time for the completion of the total project shall be one hundred and ten (110) working days beginning on the date of the written Notice to Proceed.

15. LIQUIDATED DAMAGES

If the Contractor refuses or fails to complete the work within the time specified, including authorized extensions, there shall be deducted from monies due the Contractor, not as a penalty, but as liquidated damages the sum of Two Thousand Dollars (\$2,000.00) for each working day subsequent to the time specified for each project and the time the work is actually completed and accepted. Delays caused by adverse weather conditions or conditions for which the Owner is clearly responsible will be added to the contract time.

16. PAYMENTS

Progress payments shall be made at least once each month as the work progresses. These progress payments shall be based on work accomplished during the previous working month, based on the various contract bid items and the unit bid prices included in the Bid Schedule submitted by the Contractor with his/her bid. In applying for payments, the Contractor shall submit a statement based on this schedule. Payment will be made only for material and work actually incorporated in the work.

17. WITHHOLDING

Owner shall withhold from each payment due the Contractor five percent (5%) of the amount claimed. This 5% of the payment shall be withheld until final acceptance of the total project is given by the Owner. After final acceptance of the project is given and the Contractor has submitted

acceptable release of all liens and furnished the Engineer acceptable red-lined drawings showing the "as-built" condition of the completed project, then the Owner shall release for payment the 5% retention. Owner will make such final payment of retention within thirty-five (35) days of final acceptance of the project and submittal of release of liens and red-lined as-built drawings.

Pursuant to Government Code Section 4590, at the request and expense of the Contractor, securities equivalent to the amount withheld shall be deposited with the City 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 investment under this section shall include those listed in Government Code Section 16430 or bank or savings and loan certificates of deposit. The Contractor shall be the beneficial owner of any securities substituted for monies withheld and shall receive any interest thereon.

18. DEFINITIONS

Whenever in the specifications or on the drawings the word directed, required, permitted, designated, ordered, or words of like import are used, it shall be understood that the direction, requirement, permission, designation or order of the City of Oroville is intended; and, similarly, the words approved, satisfactory, suitable, acceptable, or words of like import, shall mean approved by the representative of the City of Oroville authorized to express such approval.

19. TAXES

Bidders shall have included in their bids any and all Federal, State and local taxes of whatever nature in connection with material to be furnished to the City. Absolutely no extras shall be allowed for such by the City.

20. CONTRACT DOCUMENTS

The form of agreement which the successful bidder, as Contractor, will be required to execute and the form of bonds which he/she will be required to furnish are included in the Contract Documents and should be carefully examined by each bidder. The agreement and bonds will be executed in two (2) original counterparts. The complete contract consists of the Contract Documents as defined in the agreement, and are intended to cooperate and be complementary so that any work called for in one and not mentioned in the other, or vice versa, is to be executed the same as if mentioned in all said documents. The intention of the documents is to include all labor, materials, equipment, transportation and services necessary for the proper execution of the work.

21. DECLARATION FOR FINAL PAYMENT

After the completion of the work of this contract, the Contractor shall file with the City his/her declaration under penalty of perjury stating that all workers and persons employed, all firms supplying the materials and all subcontractors upon the project, have been paid in full and that there are no bills outstanding against the project for either labor or materials except certain items, if any, to be set forth in detail in the declaration. The filing of such declaration by the Contractor and the submittals referred to in the General Provisions shall be a condition precedent to Contractor's receipt of the final payment on this contract.

22. ADMONITION

All bidders hereby are advised that the City of Oroville has adopted General Provisions for this work which might differ from the general provisions provided for private projects or projects undertaken by other governmental agencies. Contractors are admonished to carefully read the General Provisions, as well as the technical provisions, and are advised that the General Provisions shall be enforced strictly.

23. QUALITY

a. Conduct of Work. The construction in place, and all operations on the site and in conjunction with the work of construction, shall comply with all laws, ordinances and regulations of legally constituted authorities having jurisdiction.

b. Manufacturer's Directions. Where specifications require work to be performed in accordance with manufacturer's directions, the Contractor shall obtain and distribute copies of said directions to City, Engineer and field office before starting the affected part of the work.

c. Materials. All materials and equipment incorporated in the work shall be new, except where reuse of existing materials or equipment is specified. All similar materials and equipment shall be products of one manufacturer, and shall be the same model, type and style for the same use throughout the project. This requirement shall apply whether item is furnished under one or several sections of the specifications. It shall be the Contractor's responsibility to coordinate and assure compliance of this requirement. The conditions of this paragraph shall be sufficient cause for rejection of the substitutions.

d. Workmanship.

1. All workmanship shall be performed by skilled laborers in accordance with established standards of first-class workmanship in each of the various trades. All items shown or indicated shall be plumb, level, flat or straight, throughout their entire extent, within limits of tolerances specified. In cases where tolerances are not specified, all items shall be installed in accordance with established standards for first-class work in each trade.

2. Contractor shall, prior to installing any item or material, assure himself that surfaces to receive such items or materials are plumb, level, true to line and straight to the degree necessary to achieve tolerances specified or required. All shimming, blocking, stripping, grinding, or patching required shall be performed without extra cost.

3. All joints in finish materials shall be tight, straight, even and smooth.

4. All operable items shall operate smoothly, without sticking or binding, and without excessive "play" or looseness

5. Finished appearance of all items, and of joints or transitions between items, shall be indicative of highest-quality workmanship.

24. SUBMITTALS

The contractor shall prepare and provide all submittals, shop drawings and samples required by other pertinent sections of the specifications for work, and all incidental submittals required for proper performance of the work. The City shall prepare a submittal schedule prior to the issuance of the Notice to Proceed. All submittals shall be submitted in a timely manner allowing the City a 1-week review time. It is the expressed responsibility of the Contractor to ensure that the submittal, review and approval of submittals by the City do not delay the project schedule.

25. GUARANTEE

In addition to requirements for a guarantee specified in "General Conditions," the effective date of the guarantee shall be the date of recording the notice of final completion.

SECTION - BD

BIDDING DOCUMENTS

BID FORM

Bid Opening Date: May 12, 2020

Hour of Bid Opening: 2:00 p.m.

Place of Bid Opening:

City of Oroville
1735 Montgomery Street, Fireside Room
Oroville, California 95965

TO: The City of Oroville, State of California:

Bid of, _____,
organized and existing under the laws of the State of California, and doing business as:

- a Corporation
- a Partnership
- an Individual

to the City of Oroville, 1735 Montgomery Street, Oroville, California 95965.

The bidder, in compliance with the Invitations for Bids for:

OROVILLE SEWER PROJECTS – 1D&1F

having examined the plans and specifications with related documents of the proposed work, and being familiar with all of the conditions surrounding the construction of the proposed project including the availability of materials and labor, hereby proposes to furnish all labor, materials, and supplies, and to construct the project in accordance with the contract documents, within the time set forth therein, and at the prices stated below. These prices are to cover all expenses incurred in performing the work required under the contract documents, of which this proposal is a part.

The bidder is required to examine carefully the work site, the proposal form, plans, Specifications, Supplemental Specifications, special provisions and contract forms for the work contemplated. It will be assumed that the bidder has investigated and is satisfied as to the conditions to be encountered for performing the work as scheduled, and as to the character, quality and quantities of work to be performed and materials to be furnished, and as to the requirements of the plans, Specifications, Supplemental Specifications, special provisions and contract. The submission of a proposal shall be considered conclusive evidence that the bidder has made such examination and is satisfied as to all the conditions and contingencies.

Bidder hereby agrees to commence work under this contract within 10 working days after issuance of the Notice to Proceed by the City and, will fully complete the project within 110 working days after the issuance of the Notice to Proceed, unless the period of completion is extended thereafter as stipulated in the specifications. Liquidated damages established for this contract are established at \$2,000 per day for each working day that all project work is not

completed after the 110th working day.

Bidder further agrees that should he/she fail to complete any segment of work in the time specified, he/she will pay liquidated damages to the City as prescribed in these specifications. It is understood that the City reserves the right to increase or decrease the quantities of items bid in the contract with no change in the unit prices bid, provided the change in a major item does not exceed 25 percent and of other items, 30 percent.

All items contained in the project bid schedule, including any additive bid alternatives, must be submitted for the entire work. Award of contract will be based on the lowest responsible bidder for the combination of base bid schedule with the additive alternatives, at the City's discretion. The amount of the bid for comparison purposes will be the total bid of all items for each respective Bid Schedule. The unit prices shall include all labor, materials, tools, equipment, overhead, profit, fees and all other items of expense necessary for and incidental to the finished work.

The bidder understands that the City reserves the right to award or reject any or all bids for each respective Bid Schedule. The bidder agrees that their bids shall be good and may not be withdrawn for a period of ninety (90) calendar days after the actual date of opening thereof.

Upon receipt of written notice of the acceptance of this bid, bidder will execute the formal contract attached within ten (10) calendar days and deliver surety bonds as required by the general conditions. The bid security, attached, is to become the property of the City in the event the contract and bonds are not executed within the time set forth as liquidated damages for the delay and additional expense to the City caused thereby.

Accompanying this bid is _____

(Note: Insert the words "cash," "cashier's check," "certified check," or "bidders bond" as the case may be in the amount equal to at least ten (10) percent of the total bid.)

The names of all persons interested in the foregoing proposal as principals are as follows:

IMPORTANT NOTICE: If bidder or other interested person is a corporation, state legal name of corporation, also names of the president, secretary, treasurer and manager thereof; if a co-partnership, state true name of firm, also names of all individual copartners composing firm; if bidder or other interested person is an individual, state first and last names in full.

Licensed in accordance with an act providing for the registration of Contractors,
License No. & Exp. Date: _____ Classification(s) _____

ADDENDA: This proposal is submitted with respect to the changes to the contract included in
addendum number(s) _____

(Fill in addendum numbers if addenda have been received and insert, in this Proposal,
any Engineer's Estimate sheets that were received as part of the addenda.)

Addendum or addenda issued by the department must be noted above.

By my signature on this proposal I certify, under penalty of perjury under the laws of the State of California, that the foregoing questionnaire and statements of Public Contract Code Sections 10162, 10232 and 10285.1 are true and correct and that the bidder has complied with the requirements of Section 8103 of the Fair Employment and Housing Commission Regulations (Chapter 5, Title 2 of the California Administrative Code). By my signature on this proposal I further certify, under penalty of perjury under the laws of the State of California and the United States of America, that the Noncollusion Affidavit required by Title 23 United States Code are true and correct.

Signature of Bidder _____ Date: _____

Name and Title of Bidder: _____

Name of Business: _____

Business Address: _____

Telephone Number: _____

Attest: _____

Dated: _____

License No. & Exp. Date: _____

Classification: _____

SEAL: (If bid by corporation)

OROVILLE SEWER PROJECTS – 1D&1F BID SCHEDULE

Bidder agrees to perform all of the work described in the contract documents and this bid form for the amounts shown in the "Bid Amount" column.

Contractor’s Company Name, Address and Phone Number

Contractor’s Title, Signature and Date

We hereby propose to furnish all labor, materials, equipment, tools, transportation, and services, and to discharge all duties and obligations necessary and required to perform and complete the Project in strict accordance with the Contract Documents for the TOTAL BID PRICE:

BASE BID SCHEDULE

BID ITEM	ITEM DESCRIPTION	UNIT	EST. QTY.	UNIT PRICE	LINE ITEM COST
1	MOBILIZATION/DEMOBILIZATION	LS	1		
2	TRAFFIC CONTROL	LS	1		
3	DEWATERING	LS	1		
4	EROSION CONTROL PLAN	LS	1		
5	SHEETING, SHORING, BRACING	LS	1		
6	8" PVC PIPE	LF	72		
7	15" PVC PIPE	LF	2,033		
8	18" PVC PIPE	LF	1,072		
9	24" PVC PIPE	LF	20		
10	ABANDON PIPE	LF	3,246		
11	48" SANITARY SEWER MANHOLE	EA	10		
12	ABANDON MANHOLE	EA	10		
13	LATERAL RECONNECTION	EA	22		
14	CONNECTION TO EXISTING MANHOLE	EA	2		
			Total Bid Items 1-15:		

Bidders must provide pricing for every bid item. Base Bid items above reflect in the project plans.

The estimated quantities for unit price items are for purposes of comparing bids only and the City makes no representation that the actual quantities of work performed will not vary from the estimates.

In case of discrepancy between the unit price and the line item cost set forth for a unit price item, the line item cost, calculated at the unit price multiplied by the estimated quantity, shall prevail and shall be utilized as the basis for determining the lowest responsive, responsible bidder. However, if the amount set forth as a unit price is ambiguous, unintelligible or uncertain for any cause, or is omitted, or is the same amount as the entry in the “Line Item Cost” column, then the amount set forth in the “Line Item Cost” column for the item shall prevail and shall be divided by the estimated quantity for the item and the price thus obtained shall be the unit price. If any of the above discrepancies exist, the City may recalculate the bid price on the basis of the unit price and the bidder agrees to be bound by such recalculation. Final payment for unit price items shall be determined by the City from measured quantities of work performed.

The contract shall be awarded to the contractor submitting the lowest responsible Base Bid Price.

BASE BID PRICE:

\$ _____
Base Bid in Numbers

Base Bid in Written Form

BIDDER'S BOND

CITY OF OROVILLE

We, _____

_____ as Principal, and

as Surety are bound unto the City of Oroville, hereafter referred to as "Obligee," 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 submitting a bid to the Obligee, for the **OROVILLE SEWER PROJECTS – 1D&1F** as shown on the Project Plans and Technical Specification, for which bids are to be opened at 1735 Montgomery Street, Oroville, California 95965 on **May 12, 2020 at 2:00 P.M.**

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 him/her for signature, enters into a written contract, in the prescribed form, in accordance with the bid, and files two bonds with the Obligee, one to guarantee faithful performance of the contract and 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 judgment is recovered, the Surety shall pay all costs incurred by the Obligee in such suit, including a reasonable attorney's fee to be fixed by the court.

Dated: _____, 20_____

*THIS DOCUMENT
MUST BE NOTARIZED*

Principal

Surety

By: _____

Note: Correspondence or claims relating to this bond should be sent to the surety at the following address:

EQUAL OPPORTUNITY CERTIFICATION

The bidder and proposed subcontractor(s) hereby certify the he/she 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/she 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 reports due under the applicable filing requirements.

Notes: The bidder must place a checkmark after "has" or "has not" in one of the blank spaces provided above. The above Certification is part of the Bid. Signing this Bid on the signature portion of the Bid Schedule thereof shall also constitute signature of this certification. Bidders are cautioned that making a false certification may subject the certifier to criminal prosecution.

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.

NONCOLLUSION AFFIDAVIT

In conformance with Title 23 United States Code Section 112 and Public Contract Code 7106 the bidder declares that the bid is not made in the interest of, or on behalf of, any undisclosed person, partnership, company, association, organization, or corporation; that the bid is genuine and not collusive or sham; that the bidder has not directly or indirectly induced or solicited any other bidder to put in a false or sham bid, and has not directly or indirectly colluded, conspired, connived, or agreed with any bidder or anyone else to put in a sham bid, or that anyone shall refrain from bidding; that the bidder has not in any manner, directly or indirectly, sought by agreement, communication, or conference with anyone to fix the bid price of the bidder or any other bidder, or to fix any overhead, profit, or cost element of the bid price, or of that of any other bidder, or to secure any advantage against the public body awarding the contract of anyone interested in the proposed contract; that all statements contained in the bid are true; and, further, that the bidder has not, directly or indirectly, submitted his or her bid price or any breakdown thereof, or the contents thereof, or divulged information or data relative thereto, or paid, and will not pay, any fee to any corporation, partnership, company association, organization, bid depository, or to any member or agent thereof to effectuate a collusive or sham bid.

Note: The above Statement, Questionnaire, and Non-Collusion Affidavit are a part of the Proposal. Signing this Proposal on the signature portion thereof shall also constitute signature of this Affidavit. Bidders are cautioned that making a false certification may subject the certifier to criminal prosecution.

PUBLIC CONTRACT CODE SECTION 10285.1 STATEMENT

In accordance with Public contract Code Section 10285.1 (Chapter 376, Stats. 1985), the bidder hereby declares under penalty of perjury under the laws of the State of California that the bidder has , has not , been convicted within the preceding three years of any offenses referred to in that section, including any charge of fraud, bribery, collusion, conspiracy, or any other act in violation of any state or federal antitrust law in connection with the bidding upon, award of, or performance of, any public works contract, as defined in Public Contract Code Section 1101, with any public entity, as defined in Public Contract Code Section 1100, including the Regents of the University of California or the Trustees of the California State University. The term "bidder" is understood to include any partner, members, officer, director, responsible managing officer, or responsible managing employee thereof, as referred to in Section 10285.1.

Note: The bidder must place a checkmark after "has" or "has not" in one of the blank spaces provided. The above Statement is part of the Bid. Signing this Bid on the signature portion of the bid schedule thereof shall also constitute signature of this Statement. Bidders are cautioned that making a false certification may subject the certifier to criminal prosecution.

PUBLIC CONTRACT CODE SECTION 10162 QUESTIONNAIRE

In accordance with Public Contract Code Section 10162, the Bidder shall complete, under penalty of perjury, the following questionnaire:

Has the bidder, any officer of the bidder, or any employee of the bidder who has a proprietary interest in the bidder, ever been disqualified, removed, or otherwise prevented from bidding on, or completing a federal, state, or local government project because of a violation of law or safety regulation?

YES_____ NO_____

If the answer is yes, explain the circumstances in the following space.

Note: The bidder must place a checkmark after "YES" or "NO" in one of the blank spaces provided. The above Questionnaire is part of the Bid. Signing this Bid on the signature portion of the bid schedule thereof shall also constitute signature of this Questionnaire. Bidders are cautioned that making a false certification may subject the certifier to criminal prosecution.

PUBLIC CONTRACT CODE SECTION 10232 STATEMENT

In conformance with Public Contract Code Section 10232, the Contractor, hereby states under penalty of perjury, that no more than one final un-appealable finding of contempt of court by a federal court has been issued against the Contractor within the immediately preceding two-year period because of the Contractor's failure to comply with an order of a federal court which orders the Contractor to comply with an order of the National Labor Relations Board.

Note: The above Statement is part of the Bid. Signing this Bid on the signature portion thereof shall also constitute signature of this Statement. Bidders are cautioned that making a false certification may subject the certifier to criminal prosecution.

**DEBARMENT AND SUSPENSION
CERTIFICATION**

TITLE 49, CODE OF FEDERAL REGULATIONS, PART
29

The bidder, under penalty of perjury, certifies that, except as noted below, he/she or any other person associated therewith in the capacity of owner, partner, director, officer, manager:

- is not currently under suspension, debarment, voluntary exclusion, or determination of ineligibility by any Federal agency;
- has not been suspended, debarred, voluntarily excluded or determined ineligible by any Federal agency within the past 3 years;
- does not have a proposed debarment pending; and
- has not been indicted, convicted, or had a civil judgment rendered against it by a court of competent jurisdiction in any matter involving fraud or official misconduct within the past 3 years.

If there are any exceptions to this certification, insert the exceptions in the following space.

Exceptions will not necessarily result in denial of award, but will be considered in determining bidder responsibility. For any exception noted above, indicate below to whom it applies, initiating agency, and dates of action.

Notes: Providing false information may result in criminal prosecution or administrative sanctions. The above certification is part of the Bid. Signing this Bid on the signature portion thereof shall also constitute signature of this Certification.

PROJECT CONTRACT

THIS PROJECT CONTRACT (the "contract" or "Contract"), is made and entered into this day of _____, by and between City of Oroville (referred to herein as the "Owner" or the "City") and _____(the "Contractor").

WITNESSETH: That the parties hereto have mutually covenanted and agreed, and by these presents do covenant and agree with each other as follows:

1. THE CONTRACT DOCUMENTS.

The complete contract is comprised of and may or may not include: Invitation for Bids; Information for Bidders; Bid Schedule; Proposal Form; Bidder's Bond; Contract; General Conditions; Special Provisions; Technical Provisions; Payment Bond; Performance Bond; Notice of Award; Notice to Proceed; Change Orders; Supplemental Drawings Issued; Drawings; Specifications and Contract Documents; All addenda or bulletins issued during the time of bidding or forming a part of the documents loaned to the bidder for preparation of the bid; The complete plans and provisions, regulations, ordinances, codes, and laws incorporated therein or herein by reference or otherwise applicable to the Project.

All of the above documents are intended to cooperate so that any work called for in one and not mentioned in the other, or vice versa, is to be executed the same as if mentioned in all said documents. The documents comprising the complete contract are hereinafter referred to collectively as the Contract Documents.

2. THE WORK.

Contractor agrees to furnish all tools, apparatus, facilities, equipment, labor and materials (except that specifically mentioned as being furnished by others) necessary to perform and complete the work in a "good and workmanlike manner" as called for, and in the manner designated in, and in strict conformity with the Plans, Detail Specifications, and other Contract Documents which are identified by the signatures of the parties to this Contract and are, collectively, entitled:

OROVILLE SEWER PROJECTS – 1D&1F

3. CONTRACT PRICE.

The City agrees to pay and the Contractor agrees to accept, in full payment for the work above agreed to be done, the following compensation: \$_____. In no event shall Contractor's compensation exceed the amount of \$_____ without additional written authorization from the City. Payment by City under this Agreement shall not be deemed a waiver of defects in Consultant's services, even if such defects were known to the City at the time of payment

For the purpose of fixing the amount of bonds referred to in the Instructions to Bidders, it is estimated by both Parties that the total contract price shall be based on the Contractor's Base Bid amount.

4. DISPUTES PERTAINING TO PAYMENT FOR WORK.

Should any dispute arise respecting the true value of any work done or any work omitted, or of any extra work which the Contractor may be required to do, or respecting the size of any payment to the Contractor during the performance of this Contract, the dispute shall be informally mediated between the parties. Following such mediation, either party may file an action exclusively in the Butte County Superior Court or in the United States District Court, Eastern District of California. Under no condition shall there be a cessation of work by the Contractor during any such dispute. This article does not exclude recovery of damages by either party for delays.

5. PAYMENT.

Not later than the 20th day of each calendar month, the Contractor shall make a partial payment request to the City on the basis of an estimate approved by the Engineer of the work performed since the last partial payment request during the preceding month by the Contractor with five percent (5%) of the amount of each such estimate retained by the City, until completion of the Project and the recordation of a Notice of Completion of all work covered by this Contract. The City shall make any partial payments provided for in this contract to the Contractor within 30 days of the City's receipt of an undisputed and properly executed partial payment request from the Contractor. The City shall pay the Contractor interest on the amount of any portion of a partial payment, excluding retention amounts, not made to the Contractor within 30 days of the City's receipt of an undisputed and properly executed partial payment request from the Contractor at the legal rate set forth in California Code of Civil Procedure Section 685.010. Upon receipt of a partial payment request from the Contractor, the City shall review the partial payment request for the purpose of determining whether or not the partial payment request is a proper partial payment request. Any partial payment request determined by the City not to be a proper partial payment request suitable for payment shall be returned to the Contractor by the City within 14 days of the City's receipt of such partial payment request. A partial payment request returned to the Contractor by the City under the provisions of this section shall be accompanied by a written document setting forth the reason(s) why the partial payment request is not proper. The number of days for the City to make a certain partial payment provided for in this Contract, without incurring interest pursuant to this section, shall be reduced by the number of days by which the City exceeds the 14 day return period for such partial payment request, if determined to be improper, as set forth in this section. For the purposes of this section, a "partial payment" means all payments due to the Contractor under this contract, exclusive of that portion of the final payment designated as retention earnings. Also, for the purposes of this section, a partial payment request shall be considered properly executed by the City if funds are available to pay the partial payment request and payment is not delayed due to an audit inquiry by the City's financial officer. The City will release Contractor's retention earnings within 45 days after recordation of Notice of Completion, as defined in California Civil Code Section 3093. Recordation of a Notice of Completion for the Project by the City shall constitute the City's acceptance of the Project work.

6. TIME FOR COMPLETION.

All work under this contract shall be completed within a period of 110 working days from the date of the Contractor's receipt of a Notice to Proceed from the City.

7. EXTENSION OF TIME.

If the Contractor is delayed by acts of negligence of the City, or its employees or those under it by contract or otherwise, or by changes ordered in the work, or by strikes, lockouts, fire, unavoidable casualties, or any causes beyond the Contractor's control, or by delay authorized by the City, or by any justifiable cause which the Engineer shall authorize, then the Contractor shall make out a written claim addressed to the City setting forth the reason for the delay and the extension of the time requested and forward a copy of the claim to the Engineer for approval. The Engineer will evaluate the claim and if the claim is justifiable, will request the City's approval. No such extension will be allowed unless written claim therefore has been made within 3 days after the delay became apparent.

If the Contractor fails or refuses to complete the work within the time specified, including authorized extensions, there shall be deducted from monies due the Contractor, not as a penalty, but as liquidated damages the sum of Two Thousand Seven Hundred Dollars (\$2,700.00) for each calendar day subsequent to the time specified for each project and the time the work is actually completed and accepted. Delays caused by adverse weather conditions or conditions for which the Owner is clearly responsible will be added to the contract time.

8. LABOR PROVISIONS.

The project is subject to both federal and state prevailing wages. The Contractor shall pay laborers the higher of either the federal or state prevailing wage rate determination for the trades to be utilized. The contractor and all subcontractors on the project shall complete electronic reporting of prevailing wage rate reports through the Department of Industrial Relations, with copies of such reports to be provided to the City.

9. CONTRACT WORK HOURS AND SAFETY STANDARDS REQUIREMENTS.

As used in the following provision, the term “laborers” and “mechanics” include watchmen and guards.

a. Overtime Requirements. Neither the Contractor nor any subcontractor contracting for any part of the Project which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek, whichever is greater.

b. Violation; Liability for Unpaid Wages; Liquidated Damages. In the event of any violation of the clause set forth in paragraph a. above, the Contractor and any subcontractor responsible therefore shall be liable for the unpaid wages. In addition, the Contractor and subcontractor shall be liable to the City for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph a. above, in the sum of \$2,700 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph a. above.

c. Withholding for Unpaid Wages and Liquidated Damages. The City shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any monies payable on account of work performed by the Contractor or subcontractor under any such contract or any other Federal contract with the same Contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same Contractor, such sums as may be determined to be necessary to satisfy any liabilities of such Contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph b. above.

d. Working conditions. Neither the Contractor nor any subcontractor may require any laborer or mechanic employed in the performance of any contract to work in surroundings or under working conditions that are unsanitary, hazardous or dangerous to his health or safety as determined under construction safety and health standards (29 CFR Part 1926) issued by the Department of Labor.

e. Subcontracts. The Contractor and any subcontractor shall insert in any subcontracts the clauses set forth in paragraphs a. through d. and also a clause requiring the subcontractor to include these clauses in any lower tier subcontracts. The Contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs a. through d.

10. NONDISCRIMINATION.

The Contractor, with regard to the work performed by it during the contract, shall not discriminate on the grounds of race, color, or national origin in the selection and retention of subcontractors, including procurements of materials and leases of equipment. The Contractor shall not participate either directly or indirectly in the discrimination prohibited by Section 21.5 of the Regulations, including employment practices when the contract covers a program set forth in Appendix B of the Regulations.

11. DISADVANTAGED BUSINESS ENTERPRISE PROGRAM PROVISIONS.

The Contractor, sub recipient or subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The Contractor shall carry out applicable requirements of 49 CFR Part 26 in the award and administration of DOT-assisted contracts. Failure by the Contractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy as recipient deems appropriate.

The Contractor agrees to pay each subcontractor under this contract for satisfactory performance of its contract no later than 10 days from the receipt of each payment the Contractor receives from City. The Contractor agrees further to return retainage payments to each subcontractor within 30 days after the subcontractor's work is satisfactorily completed. Any delay or postponement of payment from the above referenced time frame may occur only for good cause following written approval of the City. This clause applies to both DBE and non-DBE subcontractors.

12. CIVIL RIGHTS.

The Contractor assures that it will comply with pertinent statutes, Executive Orders and such rules as are promulgated to assure that no person shall, on the grounds of race, creed, color, national origin, sex, age or handicap be excluded from participating in any activity conducted with or benefiting from Federal assistance. This Provision binds the Contractor from the bid solicitation period through the completion of the contract. This provision shall be inserted in all subcontracts, subleases and other agreements at all tiers.

13. SOLICITATIONS FOR SUBCONTRACTS, INCLUDING PROCUREMENTS OF MATERIALS AND EQUIPMENT.

In all solicitations either by competitive bidding or negotiation made by the Contractor for work to be performed under a subcontract, including procurements of materials or leases of equipment, each potential subcontractor or supplier shall be notified by the Contractor of the Contractor's obligations under this contract and the Regulations relative to nondiscrimination on the grounds of race, color or national origin.

14. INFORMATION AND REPORTS.

The Contractor shall provide all information and reports required by the Regulations or directives issued pursuant thereto and shall permit access to its books, records, accounts, other sources of information, and its facilities as may be determined by the City to be pertinent to ascertain compliance with such Regulations, orders, and instructions. Where any information required of a Contractor is in the exclusive possession of another who fails or refuses to furnish this information, the Contractor shall so certify to the City and shall set forth what efforts it has made to obtain the information.

15. SANCTIONS FOR NONCOMPLIANCE.

In the event of the Contractor's noncompliance with the nondiscrimination provisions of this contract, the City shall impose such contract sanctions as it may determine to be appropriate, including but not limited to:

- a. Withholding of payments to the Contractor under the contract until the Contractor complies, and/or
- b. Cancellation, termination or suspension of the contract, in whole or in part.

16. INSPECTION OF RECORDS.

The Contractor shall maintain an acceptable cost accounting system. The City, the Federal Aviation Administration, the Comptroller General of the United States or any of their duly authorized representatives shall have access to any books, documents, paper, and records of the Contractor which are directly pertinent to this Contract or the Project for the purposes of making an audit, examination, excerpts, and transcriptions. The Contractor shall maintain all required records for 3 years after the City makes final payment and all other pending matters are closed.

17. RIGHTS IN INVENTIONS.

All rights to inventions and materials, if any, generated under this contract are subject to regulations issued by the City. Information regarding these rights is available from the City.

18. BREACH OF CONTRACT TERMS.

Any violation or breach of terms of this Contract on the part of the Contractor or its subcontractors may result in the suspension or termination of this Contract or such other action that may be necessary to enforce the rights of the City under this Contract. The duties and obligations imposed by the Contract Documents and the rights and remedies available thereunder shall be in addition to and not a limitation of any duties, obligations, rights and remedies otherwise imposed or available by law.

19. TERMINATION OF CONTRACT BY CITY

a. The City may, by written notice, terminate this Contract in whole or in part at any time, either for the City's convenience or because of the Contractor's failure to fulfill its contract obligations. Upon receipt of such notice, services shall be immediately discontinued (unless the notice directs otherwise) and all materials as may have been accumulated in performing this Contract, whether completed or in process, delivered to the City.

b. If the termination is for the convenience of the City, an equitable adjustment in the contract price shall be made, but no amount shall be allowed for anticipated profit on unperformed services.

c. If the termination is due to failure to fulfill the Contractor's obligations, the City may take over the work and prosecute the same to completion by contract or otherwise. In such case, the Contractor shall be liable to the City for any additional cost occasioned to the City thereby.

d. If, after notice of termination for failure to fulfill contract obligations, it is determined that the Contractor had not so failed, the termination shall be deemed to have been affected for the convenience of the City. In such event, adjustment in the contract price shall be made as provided in the second paragraph of this clause.

e. The rights and remedies of the City provided in this clause are in addition to any other rights and remedies provided by law or under this contract.

20. INCORPORATION OF PROVISIONS.

The Contractor shall include the provisions of this contract in every subcontract, including procurements of materials and leases of equipment, unless exempt by the Regulations of directives issued pursuant thereto. The Contractor shall take such action with respect to any subcontract or procurement as the City may direct as a means of enforcing such provisions including sanctions for noncompliance. Provided, however, that in the event the Contractor becomes involved in, or is threatened with, litigation with a subcontractor or supplier as a result of such direction, the Contractor may request the City to enter into such litigation to protect the interests of the City and, in addition, the Contractor may request the United States to enter into such litigation to protect the interests of the United States.

21. CONTRACTOR CLAIMS OF \$375,000 OR LESS.

Claims by the Contractor relating to the Project for (a) a time extension, (b) money or damages arising from work done by, or on behalf of, the Contractor on the Project for which payment is not expressly provided for or to which the Contractor is not otherwise entitled, or (c) an amount that is disputed by the City, with a value of \$375,000 or less, are subject to the claims procedures set forth in California Public Contract Code Sections 20104, et seq., except as otherwise provided in this Contract and the incorporated documents, conditions and specifications.

22. LOBBYING AND INFLUENCING FEDERAL EMPLOYEES.

a. No Federal appropriated funds shall be paid, by or on behalf of the Contractor or its subcontractors, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the making of any Federal grant or the amendment or modification of any Federal grant.

a. If any funds other than Federal appropriated funds have been paid or will be paid by the Contractor or its subcontractors to any person for influencing or attempting to influence an officer or employee of the City, any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with any Federal grant, the contractor shall complete and submit Standard Form-LLL, "Disclosure of Lobby Activities," in accordance with its instructions.

23. ASSIGNMENT OF CERTAIN RIGHTS TO THE CITY.

In entering into this Contract or a subcontract to supply goods, services, or materials pursuant to this Contract, the Contractor and/or subcontractor offers and agrees to assign to the City all rights, title, and interest in and to all causes of action it may have under Section 4 of the Clayton Act (15 U.S.C. Sec. 15) or under the Cartwright Act (Chapter 2 (commencing with Section 16700) of Part 2 of Division 7 of the Business and Professions Code), arising from purchases of goods, services, or materials pursuant to this Contract or the subcontract. This assignment shall be made and become effective at the time the City tenders final payment to the Contractor, without further acknowledgement by the parties.

24. ENERGY CONSERVATION REQUIREMENTS

The contractor agrees to comply with mandatory standards and policies relating to energy efficiency that are contained in the state energy conservation plan issued in compliance with the Energy Policy and Conservation Act (Public Law 94-163)

IN WITNESS WHEREOF, two identical counterparts of this Contract, each of which shall for all purposes be deemed an original thereof, have been duly executed by the parties hereinabove named, on the day and year first herein written.

AGENCY: City of Oroville (First Party)

By: _____
(Chuck Reynolds)

Mayor
(Official Title)

CONTRACTOR: _____(Second Party)

By: _____
(Authorized Representative)

(Official Title)

FORM OF PERFORMANCE BOND

KNOW ALL PERSONS BY THESE PRESENTS: That WHEREAS, the City of Oroville, California hereinafter called City, on _____, 20_____, awarded

Name and Address of Contractor

hereinafter designated as the "Principal", the contract for:

OROVILLE SEWER PROJECTS – 1D&1F

NOW THEREFORE, we the Principal, and _____
_____ as Surety, are held and firmly
bound unto _____,
_____, hereinafter called the
_____, in the penal sum of _____
_____ Dollars (\$_____)

lawful money of the United States, for the payment of which sum we bind ourselves, our heirs, executors, administrators, and successors, jointly and severally firmly by these presents.

THE CONDITIONS OF THIS OBLIGATION ARE SUCH that, if the above bounden Principal, his/her or its heirs, executors, administrators, successors or assign, shall in all things stand to and abide by and keep and perform the covenants, conditions and agreements in the said contract and any alteration thereof made as therein provided, on his/her or their part, to be kept and performed at the time and in the manner therein specified, and in all respects according to their true intent and meaning, and shall indemnify and save harmless the City, its officers and agents, as therein stipulated, then this obligation shall become null and void: otherwise, it shall be and remain in full force and virtue, and also in case suit is brought upon such bond, the above bounden principal and the said surety will pay a reasonable attorney's fee which shall be awarded by the court to the prevailing party in said suit, said attorney's fee to be taxed as costs in said suit and to be included in the judgment therein rendered.

And the 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 the work to be performed or materials and/or equipment to be furnished thereunder or the Specifications accompanying the same, shall in anywise affect its obligations 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.

IN WITNESS WHEREOF three identical counterparts of this instrument, each of which shall for all purposes be deemed an original thereof, have been duly executed by the Principal and Surety above named, on the day of _____, 20 .

By _____

By _____

Surety

Contractor

FORM OF LABOR AND MATERIAL BOND

KNOW ALL PERSONS BY THESE PRESENTS: That we _____ as Surety, and _____, as Principal, are held and firmly bound unto City of Oroville, in the sum of _____ Dollars (\$ _____), said sum being (100% of the estimated amount of the foregoing and annexed contract,

OROVILLE SEWER PROJECTS – 1D&1F

to be paid to said _____, for which payment, well and truly to be made, we bind ourselves, our heirs, executors and administrators, successors or assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH: That if the above bounden principal, as Contractor in the annexed contract or his/her subcontractors, shall fail to pay for any materials, provisions, provender, or other supplies or teams used in, upon, for or about the performance of the work contracted to be done, or shall fail to pay any person, company or corporation renting or hiring teams or implements or machinery for or contributing to said work to be done, or any person who supplies both work and materials therefore, or the amount due under the Employment Insurance Act with respect to such work or labor, the surety will pay for the same, in an amount not exceeding the above obligation, and also, in case suit is brought upon such bond, the above bounden principal and the said surety will pay a reasonable attorney's fee which shall be awarded by the court to the prevailing party in said suit, said attorney's fee to be taxed as costs in said suit and to be included in the judgment therein rendered. This obligation and bond shall insure to the benefit of any and all persons entitled to file claims under Section 1184C of the Code of Civil Procedure and said persons or any of them or their assigns shall have a right to action thereunder.

IN WITNESS WHEREOF, we have hereunto set our hands and seals on this _____ day of _____, A.D., 20 .

Principal _____

Surety _____

(Seal)

By _____

(Attorney in Fact)

STATE OF CALIFORNIA)
) ss.
COUNTY OF BUTTE)

On this _____ day of _____, 20 , before me _____ a Notary Public in and for the County of _____, _____ known

to me to be the person whose name is subscribed to the within instrument as the Attorney in Fact of _____ and acknowledged to me that he has subscribed the name of _____ thereto as surety, and **his/her** own name as Attorney in Fact.

In witness whereof I have hereunto set my hand and affixed my official seal the day and year in this certificate first above written.

Notary Public in and for said County and State

SECTION - GC

GENERAL CONDITIONS

GENERAL CONDITIONS

SECTION - GC	PAGE
1. Definitions and Terms	GC-1
2. Examination of Contract Documents, Bid Items and Bid Submittal	GC-3
3. Interpretation of Plans and Project Specifications	GC-4
4. Field Instructions and Other Written Directives	GC-4
5. Schedules, Reports and Records	GC-4
6. Drawings and Specifications	GC-4
7. Shop Drawings	GC-5
8. Materials, Services and Facilities.....	GC-5
9. Inspection and Testing	GC-5
10. Substitutions	GC-6
11. Patents	GC-7
12. Permits and Regulations.....	GC-7
13. Protection of Work, Property and Persons	GC-7
14. Supervision by Contractor	GC-8
15. Changes in the Work	GC-8
16. Changes in Contract Price	GC-8
17. Time for Completion and Liquidated Damages	GC-9
18. Correction of Work	GC-9
19. Unusual Conditions	GC-9
20. Suspension of Work, Termination and Delay	GC-10
21. Payments to Contractor	GC-11
22. Acceptance of Final Payment as Release	GC-13
23. Insurance Requirements for Contractors	GC-15
24. Contract Security.....	GC-18
25. Assignments	GC-18
26. Indemnification	GC-18
27. Separate Contracts.....	GC-18
28. Subcontracting.....	GC-19
29. Engineer's Authority.....	GC-19
30. Land and Right-of-Way	GC-19
31. Guarantee	GC-20
32. Contract Disputes and Potential Notice of Claim	GC-20
33. Dispute Resolution	GC-22
34. Taxes	GC-22
35. Applicable Wage Rates	GC-23

1. DEFINITIONS AND TERMS

Wherever used in the Contract Documents, the following terms shall have the meanings indicated which shall be applicable to both the singular and plural thereof:

ADDENDA - Written or graphic instruments issued prior to the execution of the Agreement, which modify or interpret the Contract Documents, drawings and specifications by additions, deletions, clarifications or corrections.

BID - The offer or proposal of the bidder submitted on the prescribed form setting forth the prices for the work to be performed.

BIDDER - Any person, firm or corporation submitting a bid for the work.

BONDS - Bid, performance and payment bonds and other instruments of security, furnished by the Contractor and his/her surety in accordance with the Contract Documents.

CALENDAR DAY - Each and every day, including Saturdays, Sundays and legal holidays.

CHANGE ORDER - A written order to the Contractor authorizing an addition, deletion or revision in the work within the general scope of the Contract Documents, or authorizing an adjustment in the contract price or the contract time.

CITY - City of Oroville, 1735 Montgomery Street, Oroville, California.

CONTRACTOR - The person or persons, firm, partnership, corporation or combination thereof, licensed to perform the type of work involved, who has entered into a contract with the City of Oroville for the construction of the improvements within the City of Oroville described herein.

DEPARTMENT OF PUBLIC WORKS - The Department of Public Works of the City of Oroville.

ENGINEER - The Contract City Engineer of the City of Oroville acting either directly or through properly authorized agents, such agents acting within the scope of the particular duties entrusted to them.

PROJECT - The undertaking to be performed as provided in the contract documents.

RESIDENT PROJECT REPRESENTATIVE - The authorized representative of the City who is assigned to the project site or any part thereof.

SHOP DRAWINGS - All drawing, diagrams, illustration, brochures, schedules and other data which are prepared by the Contractor, a subcontractor, manufacturer, supplier or distributor, which illustrate how specific portions of the work shall be fabricated or installed.

SPECIFICATIONS - The directions, provisions and requirements contained herein.

STANDARD PLANS AND SPECIFICATIONS - Whenever reference is made to the "Standard Plans and Specifications" such reference shall be made to the most current of those

certain plans and specifications entitled “State of California, Department of Transportation, Standard Plans and Standard Specifications”.

As used in the Standard Specifications, unless the content otherwise requires, the following terms have the following meanings:

Department of Transportation: The City of Oroville.

Director of Transportation: The Public Works Director of the City of Oroville.

Division of Highways: Department of Public Works of the City of Oroville.

Engineer: The Contract City Engineer of the City of Oroville, acting either directly or through properly authorized agents, such agents acting within the scope of the particular duties entrusted to them.

Laboratory: The designated laboratory authorized by the City of Oroville to test materials and work involved in the contract.

Office of Administrative Hearings: The City Council of the City of Oroville.

Standard Specifications: The most current or 2018 Edition of those certain specifications entitled "State of California, Department of Transportation, Standard Specifications 2018"

Standard Plans: The most current or 2018 Edition of those certain standard plans entitled "State of California, Department of Transportation, Standard Plans 2018"

State: The City of Oroville.

Reference is made to Section 1 of the Standard Specifications for other pertinent definitions.

SUBCONTRACTOR - An individual, firm or corporation having a direct contract with the Contractor or with any other subcontractor for the performance of a part of the work at the site.

SUBSTANTIAL COMPLETION - That date as certified by the Engineer when the construction of the project or a specified part thereof is sufficiently completed, in accordance with the contract documents, so that the project or specified part can be utilized for the purpose for which it is intended.

SUPPLEMENTAL GENERAL CONDITIONS - Modifications to general conditions required by a federal agency for participation in the project or such requirements that may be imposed by applicable State laws.

SUPPLIER - A person or organization who supplies material or equipment for the work, including that fabricated to a special design, but who does not perform labor on the site.

WORK - All labor necessary to produce the construction required by the contract documents and all materials and equipment incorporated or to be incorporated in the project.

WORKING DAY - Each and every day, except Saturdays, Sundays, legal holidays, days on which the Contractor is specifically required by the special provisions to suspend construction operation and days on which the Contractor is prevented by inclement weather or conditions resulting immediately therefrom adverse to the current controlling operation or operations, as determined by the Engineer, from proceeding with at least 75 percent of the normal labor and equipment force engaged on such operation or operations for at least 60 percent of the total daily time being currently spent on the controlling operation or operations.

WRITTEN NOTICE - Any notice to any party of the Agreement relative to any part of this Agreement in writing and considered delivered and the service thereof completed, when posted by certified or registered mail to the said party at his/her last given address, or delivered in person to said party or his/her authorized representative on the work.

2. EXAMINATION OF CONTRACT DOCUMENTS, BID ITEMS AND BID SUBMITTAL

The Contractor shall do all of the work and furnish all labor, materials, tools, equipment, and appliances, except as otherwise herein expressly stipulated, necessary or proper for performing and completing the work herein required, including any Change Order work or disputed work directed by the Engineer in conformity with the true meaning and intent of the Plans and Specifications for the project. The Engineer attempts to express all or most elements of the work with bid items that allow both the Engineer and the Contractor to view, evaluate and understand the cost of the project. At the Engineer's discretion, certain improvements within the project boundaries may not be specifically identified as a line item in the project bid schedule. At times, the project plans may show required construction elements of the project for which there is no discrete bid item. It is the responsibility of the Contractor to account for construction elements for which there may be no discrete bid item. The Contractor shall be responsible for the construction of any and all improvements or construction elements shown on the Project Plans whether there is a bid item or not in the project bid schedule.

By submission of a Bid, the Bidder acknowledges acceptance of the nature and location of the Work, the general and local conditions, conditions of the site, the character, quality and scope of work to be performed, the availability of labor, electric power, water, the kind of surface and subsurface materials on the site, the materials and equipment to be furnished, and all requirements of the Contract or other matters which may affect the Work or the cost. Any failure of a Bidder to become acquainted with all of the available information concerning conditions will not relieve the Bidder from the responsibility for estimating properly the difficulties or cost of the Work. Bidder agrees to inform the Engineer of any errors or oversight by Engineer it perceives in the Bid documents prior to submission of its bid.

Bid prices shall include everything necessary for the completion of the Work and fulfillment of the Contract, including but not limited to furnishing all materials, equipment, tools, excavation sheeting, bracing and supports, plant, labor and services, except as may be provided otherwise in the Contract. Bid prices shall also include labor and material escalation and all Federal, State, and local taxes.

3. INTERPRETATION OF PLANS AND PROJECT SPECIFICATIONS

The component Contract documents (Project Plans, Project-specific Specifications, City Standard Drawings, etc.) are essential parts of the Contract, and intended to provide explanation

for each other. Any work and/or improvements shown on the Plans and not in the Specifications, or vice versa, are to be executed as if indicated both on the Plans and in the Specifications. In case of conflict in the Contract, the Project plans shall govern over project-specific specifications (materials specifications excluded). Any physical construction-related work necessary to complete the improvements shown on the Project Plans for which there are no provisions in the project specifications or elsewhere in the Contract documents shall be performed and completed in accordance with either State Standards and/or Specifications where such specifications exist, City Engineer Standards where such standards exist, or in conformance with generally accepted practices for public works construction.

4. FIELD INSTRUCTIONS OR OTHER WRITTEN DIRECTIVES

The Engineer may issue Field Instructions or other written directives during the course of the Work, and the Contractor shall comply with the Field Instruction or other written directive. A Field Instruction or other written directive may be used to add, delete, modify, or reject work, to note deficiencies in work, to clarify the Contract or to order work to be performed. Work required by a Field Instruction or other written directive shall be in accordance with the Contract and any previously executed Contract Change Orders, except as delineated otherwise in the Field Instruction or other written directive. Drawings included with Field Instructions or other written directives are part of the Contract and shall be incorporated into the Record Drawings. If the Contractor neglects to comply with or make progress in the execution of any Field Instruction or other written directive, the Engineer may employ any person or persons to perform such work and the Contractor shall not interfere with the person or persons so employed. Field Instructions and other written directives issued by the City that serve to alter (either add to or deduct from) the Contract scope and price will be grouped to form a Contract Change Order.

5. SCHEDULES, REPORTS, AND RECORDS

The Contractor shall submit to the City such schedule of quantities and costs, progress schedules, payrolls, reports, estimates, records and other data where applicable as are required by the contract documents for the work to be performed.

Prior to the first partial payment estimate, the Contractor shall submit construction progress schedules showing the order in which he/she proposes to carry out the work, including dates at which he/she will start the various parts of the work, estimated date of completion of each part and as applicable.

6. DRAWINGS AND SPECIFICATIONS

The intent of the drawings and specifications is that the Contractor shall furnish all labor, materials, tools, equipment and transportation necessary for the proper execution of the work in accordance with the contract documents and all incidental work necessary to complete the project in an acceptable manner; ready for use or operation by the City.

In case of conflict between the drawing and specifications, the specifications shall govern. Figure dimensions on drawings shall govern over scale dimensions and detailed drawings shall govern over general drawings.

Any discrepancies found between the drawings and specifications and site conditions or any inconsistencies or ambiguities in the drawings or specifications shall be immediately reported to

the Engineer, in writing, who shall promptly correct such inconsistencies or ambiguities, in writing. Work done by the Contractor after his/her discovery of such discrepancies, inconsistencies or ambiguities shall be done at the Contractor's risk.

7. SHOP DRAWINGS

The Contractor shall provide shop drawings as may be necessary for the construction of the work required by the contract documents. The Engineer shall promptly review all shop drawings. The Engineer's approval of any shop drawings shall not release the Contractor from responsibility for deviations from the requirements of the contract documents. The approval of any shop drawing, which substantially deviates from the requirements of the contract documents, shall be evidenced by a change order.

When submitted for the Engineer's review, shop drawings shall bear the Contractor's certification that he/she has reviewed, checked and approved the shop drawings and that they are in conformance with the requirement of the contract documents.

Portions of the work requiring a shop drawing or sample submission shall not begin until the shop drawing or submission has been approved by the Engineer. A copy of each approved shop drawing and each approved sample shall be kept in good order by the Contractor at the site and shall be available to the Engineer.

8. MATERIALS, SERVICES AND FACILITIES

It is understood that, except as otherwise specifically stated in the contract documents, the Contractor shall provide and pay for all materials, labor, tools, equipment, water, lights, power, transportation, supervision, temporary construction of any nature, and all other services and facilities of any nature whatsoever necessary to execute, complete and deliver the work within the specified time. Material and equipment shall be so stored as to ensure the preservation of their quality and fitness for the work. Stored materials and equipment to be incorporated in the work shall be located so as to facilitate prompt inspection. Manufactured articles, materials and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned as directed by the manufacturer.

Materials, supplies and equipment shall be in accordance with samples submitted by the Contractor and approved by the Engineer. Materials, supplies or equipment to be incorporated into the work shall not be purchased by the Contractor or the subcontractor subject to a chattel mortgage or under a conditional sale contract or other agreement by which an interest is retained by the seller.

9. INSPECTION AND TESTING

All materials and equipment used in the construction of the project shall be subject to adequate inspection and testing in accordance with general accepted standards, as required and defined in the contract documents. The City will provide the inspection and testing services to be employed pursuant to the City Quality Assurance Plan (QAP) for Federally Funded Highway Projects dated January 2015. The City will provide the Contractor a written QAP schedule that will list the types of materials to be tested, test methods and sample and test quantities. The Contractor shall be responsible for coordinating and scheduling the QAP schedule with the City's material testing consultant.

If the contract documents, laws, ordinances, rules, regulations or order of any public authority having jurisdiction require any work to specifically be inspected, tested or approved by someone other than the Contractor, the Contractor will give the Engineer timely notice of readiness. The Contractor will then furnish the Engineer the required certificates of inspection, testing or approval. Inspections, test or approvals by the Engineer or others shall not relieve the Contractor from his/her obligations to perform the work in accordance with the requirements of the contract documents. The Engineer and his/her representative will at all times have access to the work. In addition, authorized representatives and agents of any participating Federal or State agency shall be permitted to inspect all work, materials, payrolls, records of personnel, invoices of materials and other relevant data and records. The Contractor will provide proper facilities for such access and observation of the work and also for any inspection or testing thereof.

If any work is covered contrary to the written instructions of the Engineer, it must, if requested by the Engineer, be uncovered for his/her observation and replaced at the Contractor's expense. If the Engineer considers it necessary or advisable that covered work be inspected and tested by others, the Contractor, at the Engineer's request, will uncover, expose or otherwise make available for observation, inspection or testing as the Engineer may require of that portion of the work in question, furnishing all necessary labor, materials, tools and equipment. If it is found that such work is defective, the Contractor will bear all the expenses of such uncovering, exposure, observation, inspection and testing and of satisfactory reconstruction. If, however, such work is not found to be defective, the Contractor will be allowed an increase in the contract price or an extension of the contract time, or both, directly attributable to such uncovering, exposure, observation, inspection, testing reconstruction and an appropriate change order shall be issued.

All required QAP testing of construction materials, including aggregate base compaction testing, will be provided by the City at no cost to the Contractor. Should tests show materials or methods to be unacceptable, however, and retesting of the same material is required, the City's cost of such retesting will be deducted from payment due the Contractor. The Contractor is encouraged (not required) to perform roadway aggregate base compaction testing independently of the City's QAP. All required performance testing shall be done by the Contractor in the presence of the Engineer.

The specific tests to be performed for this particular job, and the party, Contractor or City, responsible for providing equipment and technical personnel shall be enumerated in the section entitled "REQUIRED TESTING" in the Special Provisions. During each field test, an authorized representative of the Contractor and of the City shall be present. The City inspector will maintain the TEST RECORD for the entire job which lists details of each test performed. The inspector will provide a copy of the TEST RECORD to the Contractor upon request.

10. SUBSTITUTIONS

Whenever a material, article or piece of equipment is identified on the drawings or specifications by reference to a brand name or catalog number, it shall be understood that this is referenced for the purpose of defining the performance or other salient requirements and that other products of equal capacities, quality and function shall be considered.

The Contractor may recommend the substitution of a material, article or piece of equipment of equal substance and function for those referred to in the contract documents by reference to brand name or catalog number, and if, in the opinion of the Engineer, such material, article or

piece of equipment is of equal substance and function to that specified, the Engineer may approve its substitution and use by the Contractor.

Any cost differential shall be deductible from the contract price and the contract documents shall be appropriately modified by change order. The Contractor warrants that if substitutes are approved, no major changes in the function or general design of the project will result. Incidental changes or extra work component parts required to accommodate the substitute will be made by the Contractor without a change in the contract price or contract time.

11. PATENTS

The Contractor shall pay all applicable royalties and license fees. He/she shall defend all suits or claims for infringement of any patent rights and save the City harmless from loss on account thereof, except that the City shall be responsible for any such loss when a particular process, design, or the product of a particular manufacturer or manufacturers is specified. However, if the Contractor has reason to believe that the design, process or product specified is an infringement of a patent, he/she shall be responsible for such loss unless he/she promptly gives such information to the Engineer.

12. PERMITS - REGULATIONS

Permits and licenses of a temporary nature necessary for the prosecution of the work shall be secured and paid for by the Contractor unless otherwise stated in the Supplemental General Conditions. Permits, licenses and easements for permanent structures or permanent changes in existing facilities shall be secured and paid for by the City, unless otherwise specified. If the Contractor observes that the contract documents are at variance therewith, he/she shall promptly notify the Engineer, in writing and any necessary changes shall be adjusted as provided in Section 13, Changes in the Work.

13. PROTECTION OF WORK, PROPERTY AND PERSON

The Contractor will be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the work. He/she will take all necessary precautions for the safety of, and will provide the necessary protection to prevent damage, injury or loss to, all employees on the work and other persons who may be affected thereby, and all the work and all materials or equipment to be incorporated therein, whether in storage on or off the site, and shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocations or replacement in the course of construction.

The Contractor will comply with all applicable laws, ordinances, rules, regulations and orders of any public body having jurisdiction. He/she will erect and maintain, as required by the conditions and progress of the work, all necessary safeguards for safety and protection. He/she will notify owners or adjacent utilities when prosecution of the work may affect them.

The Contractor will remedy all damage, injury or loss to any property caused, directly or indirectly, in whole or in part, by the Contractor, any subcontractor, or anyone directly or indirectly employed by any of them, or anyone for whose acts any of them may be liable, except damage or loss attributable to the fault of the contract documents, or to the acts or omission of the City or the Engineer, or anyone employed by either of them, or anyone for whose acts either

of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of the Contractor.

In emergencies affecting the safety of persons or the work or the property at the site or adjacent thereto; the Contractor, without special instruction or authorization from the Engineer or the City, shall act to prevent threatened damage, injury or loss. He/she will give the Engineer prompt written notice of any significant changes in the work or deviations from the contract documents caused thereby and a change order shall thereupon be issued covering the changes and deviations involved.

14. SUPERVISION BY CONTRACTOR

The Contractor will supervise and direct the work. He/she will be solely responsible for the means, methods, techniques, sequences and procedures of construction. The Contractor will employ and maintain on the work site, a qualified supervisor or superintendent who shall have been designated, in writing, by the Contractor as the Contractor's representative at the site. The supervisor shall have full authority to act on behalf of the Contractor and all communications given to the supervisor shall be as binding as if given to the Contractor. The supervisor shall be present on the site at all times as required to perform adequate supervision and coordination of the work.

15. CHANGES IN THE WORK

The City may, at any time as the need arises, order changes within the scope of the work without invalidating the Agreement. If such changes increase or decrease the amount due under the contract documents, or in the time required for performance of the work, an equitable adjustment shall be authorized by change order.

The Engineer also may, at any time by issuing a field order, make changes in the details of the work. The Contractor shall proceed with the performance of any changes in the work so ordered by the Engineer unless the Contractor believes that such field order entitles him/her to a change in contract price or time, or both, in which event he/she shall give the Engineer written notice thereof within seven (7) days after the receipt of the ordered change.

Thereafter, the Contractor shall document the basis for a change in contract price or time within thirty (30) days. The Contractor shall not execute such changes pending the receipt of an executed change order or further instruction from the City.

16. CHANGES IN CONTRACT PRICE

The contract price may be changed only by a change order. The value of any work covered by a change order, or of any claim for increase or decrease in the contract price, shall be determined by one or more of the following methods in order of precedence listed below:

- a. Unit prices previously approved
- b. An agreed upon lump sum
- c. The actual cost for labor, direct overhead, materials, supplies, equipment and other services necessary to complete the work. Said costs shall be computed and documented in accordance with Section 9-1.04, "Force Account", of the Standard Specifications.

17. TIME FOR COMPLETION AND LIQUIDATED DAMAGES

The date of beginning and the time for completion of the work are essential conditions of the contract documents and the work embraced shall be commenced on a date specified in the Notice to Proceed.

The Contractor will proceed with the work at such rate of progress to ensure full completion within the contract time. All contract work shall be completed within 110 working days after issuance of the Notice to Proceed. Liquidated damages established for this contract are \$2,000.00 for each day beyond the 110 working day timeframe. It is expressly understood and agreed, by and between the Contractor and the City, that the contract time for the completion of the work described herein is a reasonable time, taking into consideration the average climatic and economic conditions and other factors prevailing in the locality of the work.

If the contractor shall fail to complete the work within the contract time, or extension of time granted by the City, the Contractor will pay to the City the amount of liquidated damages as specified in the bid for each calendar day that the Contractor shall be in default after time stipulated in the contract documents.

The Contractor shall not be charged with liquidated damages or any excess cost when the delay in completion of the work is due to the following, and the contractor has promptly given written notice of such delay to the City or Engineer:

- To any preference, priority, or allocation order duly issued by the City.
- To unforeseeable causes beyond the control and without fault or negligence of the Contractor; including but not restricted to acts of God, or of the public enemy, acts of the City, acts of another Contractor in the performance of a contract with the City, fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes and abnormal and unforeseeable weather.
- To any delays of subcontractors occasioned by any of the causes specified above.

18. CORRECTION OF WORK

The Contractor shall promptly remove from the premises all work rejected by the Engineer for failure to comply with the contract documents, whether incorporated in the construction or not, and the Contractor shall promptly replace and re-execute the work in accordance with the contract documents and without expense to the City and shall bear the expense of making good all work of other Contractors destroyed or damage by such removal or replacement.

All removal and replacement work shall be done at the Contractor's expense. If the Contractor does not take action to remove such rejected work within ten (10) days after receipt of written notice, the City may remove such work and store the materials at the expense of the Contractor.

19. UNUSUAL CONDITIONS

The Contractor shall promptly and before such conditions are disturbed, except in the event of an emergency, notify the City by written notice of:

- Subsurface or latent physical conditions at the site differing materially from those indicated in the contract documents; or
- Unknown physical conditions at the site of any unusual nature differing from those ordinarily encountered and generally recognized as inherent in work of the character provided for in the contract documents.

The City shall promptly investigate the conditions, and if it finds that such conditions do so materially differ and cause an increase or decrease in the cost of, or in the time required for, performance of the work, an equitable adjustment shall be made and the contract documents shall be modified by change order. Any claim of the Contractor for adjustment hereunder shall not be allowed unless he/she has given the required written notice; provided that the City may, if it determines the facts so justify, consider and adjust any such claims asserted before the date of final payment.

20. SUSPENSION OF WORK, TERMINATION AND DELAY

The City may suspend the work or any portion thereof for a period of not more than ninety (90) days or such further time as agreed upon by the Contractor, by written notice to the Contractor and the Engineer, which notice shall fix the date on which work shall be resumed. The Contractor will resume that work on the date so fixed. The Contractor will be allowed an increase in the contract price or an extension in the contract time, or both, directly attributable to any suspension.

If the Contractor is adjudged as bankrupt or insolvent, or if he/she makes a general assignment for the benefit of his/her creditors, or if a trustee or receiver is appointed for the Contractor or for any of his/her property, or if he/she files a petition to take advantage of any debtor's act, or to reorganize under the bankruptcy or applicable laws, or if he/she repeatedly fails to supply sufficient skilled workmen or suitable materials or equipment, or if he/she repeatedly fails to make prompt payments to subcontractors or for labor, materials or equipment, or if he/she disregards laws, ordinances, rules, regulations or orders of any public body having jurisdiction over the work, or if he/she otherwise violates any provision of the contract documents; then the City may, without prejudice to any other right or remedy and after giving the Contractor and his/her surety a minimum of ten (10) days from delivery of written notice, terminate the services of the Contractor and take possession of the project and all materials, equipment, tools, construction equipment and machinery thereon owned by the Contractor, and finish the work by whatever method it may deem expedient.

In such case, the Contractor shall not be entitled to receive any further payment until the work is finished. If the unpaid balance of the contract price exceeds the direct and indirect cost of completing the project, including compensation for additional professional services, such excess shall be paid to the Contractor. If such costs exceed such unpaid balance, the Contractor will pay the difference to the City. Such costs incurred by the City will be determined by the Engineer and incorporated into a change order.

When the Contractor's services have been so terminated by the City, said termination shall not affect any right of the City against the Contractor then existing or which may thereafter accrue. Any retention or payment of monies by the City due to the Contractor will not release the Contractor from compliance with the contract documents. After ten (10) days from delivery of a written notice to the Contractor and the Engineer, the City may, without cause and without

prejudice to any other right or remedy, elect to abandon the project and terminate the contract. In such case, the Contractor shall be paid for all work executed and any expense sustained plus a reasonable profit.

If, through no act or fault of the Contractor, the work is suspended for a period of more than ninety (90) days by the City, or under an order of the court, or other public authority, or the Engineer fails to act on any request for payment within thirty (30) days after it is submitted, or the City fails to pay the Contractor substantially the sum approved by the Engineer or awarded by the arbitrators within thirty (30) days of its approval and presentation, the Contractor may, after ten (10) days from delivery of a written notice to the City and the Engineer, terminate the contract and recover from the City payment for all work executed and all expenses sustained. In addition and in lieu of terminating the contract, if the Engineer fails or has failed to act on a request for payment or if the City has failed to make any payment as aforesaid, the Contractor may upon ten (10) days written notice to the City and the Engineer, stop the work until he/she has been paid all amounts then due, in which event and upon resumption of the work, change orders shall be issued for adjusting the contract price or extending the contract time, or both, to compensate for the costs and delays attributable to the stoppage of work.

If the performance of all or any portion of the work is suspended, delayed or interrupted as a result of a failure of the City or Engineer to act within the time specified in the contract documents, or if no time is specified, within a reasonable time, an adjustment in the contract price or an extension of the contract time, or both, shall be made by change order to compensate the Contractor for the costs and delays necessarily caused by the failure of the City or Engineer.

21. PAYMENTS TO CONTRACTOR

Within ten (10) days after receipt of the Notice to Proceed, the Contractor shall submit to the City a proposed Schedule of Values broken down in sufficient detail to evaluate progress at any point in the work. Labor and material costs for each line item shall be shown separately. Cost of contract closeout shall be shown as an individual line item. The schedule of values, when approved by the City, shall be used as a basis for the Contractor's Application and Certification for Payment. Application and Certification for Payment shall utilize American Institute of Architects (AIA) Document G702 (cover sheet) and Document G703 (continuation sheets). The AIA Document G703 sheets will list the Schedule of Values approved by the City and will track any Change Orders that may be issued during the project.

At least ten (10) days before each progress payment falls due, but not more often than once a month, the Contractor will submit to the Engineer a partial payment estimate filled out and signed by the Contractor covering the work performed during the period covered by the partial payment estimate and supported by such data as the Engineer may reasonably require. If payment is requested on the basis of materials and equipment not incorporated in the work but delivered and suitably stored at or near the site, the partial payment estimated shall also be accompanied by such supporting data, satisfactory to the City, that will establish the City's title to the material and equipment and protect its interest therein, including applicable insurance. The Engineer will, within ten (10) days after receipt of each partial payment estimate, either indicate in writing his/her approval of payment and present the partial payment estimate to the City, or return the partial payment estimate to the Contractor indicating in writing his/her reasons for refusing to approve the payment. In the latter case, the Contractor may make the necessary corrections and resubmit the partial payment estimate.

The City will, within ten (10) days of presentation to it of an approved partial payment estimate, pay the Contractor a progress payment on the basis of the approved partial payment estimate. The City shall retain ten (10) percent of the amount of each payment until final completion and acceptance of all work covered by the contract documents. The City at any time, however, after fifty (50) percent of the work has been completed, if it finds that satisfactory progress is being made, may reduce retention to five (5) percent on the current and remaining estimates. When the work is substantially complete, operational or beneficial occupancy, the retained amount may be further reduced below five (5) percent to only that amount necessary to assure completion. Upon completion and acceptance of a part of the work on which the price is stated separately in the contract documents, payment may be made in full, including retention percentages, less authorized deductions. The request for payment may also include an allowance for the cost of such major materials and equipment, which are suitably stored either at or near the site.

Prior to substantial completion, the City, with the approval of the Engineer and the concurrence of the Contractor, may use any completed or substantially completed portion of the work. Such use shall not constitute an acceptance of such portions of the work.

The City shall have the right to enter the premises for the purpose of doing work not covered by the contract documents. This provision shall not be construed as relieving the Contractor of the sole responsibility for the care and protection of the work, or the restoration of any damaged work except such as may be caused by agents or employees of the City.

Upon completion and acceptance of the work, the Engineer shall issue a certificate attached to the final payment request that the work has been accepted by him/her under the conditions of the contract documents. Within fifteen (15) days after the date of acceptance, the City shall cause to be filed in the office of the County Recorder, a Notice of Completion of the work. The entire balance found to be due to the Contractor, including the retained percentages, but except such sums as may be lawfully retained by the City, shall be paid to the Contractor within forty-five (45) days after the date of filing the Notice of Completion.

The Contractor will indemnify and save the City, or the City's agents, harmless from all claims growing out of the lawful demands of subcontractors, laborers, workmen, mechanics, manufacturers, suppliers and furnishers of machinery and parts thereof, equipment, tools, and all supplies incurred in the furtherance of the performance of the work. The Contractor shall, at the City's request, furnish satisfactory evidence that all obligations of the nature designated above have been paid, discharged or waived.

If the Contractor fails to do so, the City may, after having notified the Contractor, either pay unpaid bills or withhold from the Contractor's unpaid compensation a sum of money deemed reasonably sufficient to pay any and all such lawful claims until satisfactory evidence is furnished that all liabilities have been fully discharged whereupon payment to the Contractor shall be resumed in accordance with the contract documents, but in no event shall the provisions of this sentence be construed to impose any obligations upon the City to either the Contractor, his/her surety or any third party. In paying any unpaid bills of the Contractor, any payment so made by the City shall be considered as a payment made under the contract documents by the City to the Contractor and the City shall not be liable to the Contractor for any such payments made in good faith.

If the City fails to make payment forty-five (45) days after the filing of the Notice of Completion, in addition to other remedies available to the Contractor, there shall be added to

each such payment interest at the maximum legal rate commencing on the first day after said payment is due and continuing until the payment is received by the Contractor.

22. ACCEPTANCE OF FINAL PAYMENT AS RELEASE

The acceptance by the Contractor of final payment shall be, and shall operate as, a Release to the City of all claims of Contractor. The Release shall include all things done or furnished by Contractor in connection with the work and every act and neglect of the City relating to or arising out of the work. If the Contractor intends to exclude any claim or claims from the Release, the Contractor must provide a written list of such claims to City, stating the exact dollar amount, within forty-five (45) days after the date of filing the Notice of Completion. No payment, whether a final payment or not, shall serve to release the Contractor or the Contractor's sureties from any obligations under the Contract Documents, or the Performance Bond or the Payment Bond.

23. INSURANCE REQUIREMENTS FOR CONTRACTORS

At no additional cost to City, Contractor shall procure and maintain for the duration of the contract insurance against claims for injuries to persons or damages to property which may arise from or in connection with the performance of the work hereunder by the Contractor, his/her agents, representatives, employees or subcontractors.

A. MINIMUM SCOPE OF INSURANCE:

Coverage shall be at least as broad as:

1. Insurance Services Office Commercial General Liability coverage (occurrence form CG 00 01).
2. Insurance Services Office form number CA 00 01 covering Automobile Liability, code 1 (any auto).
3. Workers' Compensation as required by the State of California and Employer's Liability Insurance.

B. MINIMUM LIMITS OF INSURANCE:

Contractor shall maintain limits no less than:

1. General Liability: \$1,000,000 per occurrence for bodily injury, personal injury and property damage. If Commercial General Liability Insurance or other form with a general aggregate limit is used, either the general aggregate limit shall apply separately to this project/location or the general aggregate limit shall be twice the required occurrence limit.
2. Automobile Liability: \$1,000,000 per accident for bodily injury and property damage.
3. Workers' Compensation and Employers' Liability: \$1,000,000 per accident for bodily injury or disease.

C. DEDUCTIBLES AND SELF-INSURED RETENTIONS:

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

D. OTHER INSURANCE PROVISIONS:

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

1. General Liability and Automobile Liability Coverages.

- a. The City, its officers, officials, employees and volunteers are to be covered as additional insureds with respect to liability arising out of automobiles owned, leased, hired or borrowed by or on behalf of the Contractor; and with respect to liability arising out of work or operations performed by or on behalf of the Contractor including materials, parts or equipment furnished in connection with such work or operations. General liability coverage can be provided in the form of an endorsement to the Contractor's insurance, or as a separate owner's policy.
- b. For any claims related to this project, the Contractor's insurance coverage shall be primary insurance as respects the City, its officers, officials, employees, and volunteers. Any insurance or self-insurance maintained by the City, its officers, officials, employees, or volunteers shall be excess of the Contractor's insurance and shall not contribute with it.
- c. Each insurance policy required by this clause shall be endorsed to state that coverage shall not be canceled by either party, except after thirty (30) days' prior written notice has been given to the City.
- d. Coverage shall not extend to any indemnity coverage for the active negligence of the additional insured in any case where an agreement to indemnify the additional insured

E. ACCEPTABILITY OF INSURERS:

Insurance is to be placed with insurers with a current A.M. Best's rating of no less than A:VII.

F. VERIFICATION OF COVERAGE:

Contractor shall furnish the City with original certificates and amendatory endorsements effecting coverage required by this clause. The endorsements should be on forms that conform to the requirements. All certificates and endorsements are to be received and approved by the City before work commences. The City reserves the right to require complete, certified copies of all required insurance policies, including endorsements affecting the coverage required by these specifications at any time. Any confidential or proprietary information may be removed.

G. SUBCONTRACTORS:

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

24. CONTRACT SECURITY

The Contractor shall, within ten (10) days after the receipt of the Notice of Award, furnish the City with a Performance Bond in the amount of one hundred (100) percent of the contract price, and a Payment Bond in the amount of one hundred (100) percent of the contract price, conditioned upon the performance of the Contractor of all undertakings, covenants, terms, conditions and agreements of the contract documents, and upon prompt payment by the Contractor to all persons supplying labor and materials in the prosecution of the work provided by the contract documents. Such bonds shall be executed by the Contractor and a corporate bonding company approved by the City and licensed to transact business in the State of California. The expense of these bonds shall be borne by the Contractor. If, at any time, a surety on any such bond is declared bankrupt or loses its right to do business in the State of California the Contractor shall, within ten (10) days after notice from the City to do so, substitute an acceptable bond, or bonds, in such form and sum and signed by such other surety or sureties as may be satisfactory to the City. No further payments shall be deemed due, nor shall be made, until the new surety or sureties shall have furnished an acceptable bond to the City.

25. ASSIGNMENTS

Neither the Contractor nor the City shall sell, transfer, assign or otherwise dispose of the contract or any portion thereof, or of his/her right, title or interest therein or his/her obligations thereunder without written consent of the other party.

26. INDEMNIFICATION

The Contractor will indemnify and hold harmless the City, the Engineer, and their agents and employees from and against all claims, damages, losses and expenses including attorney's fees arising out of or resulting from the performance of the work, provided that any such claims, damage, loss or expense is attributable to bodily injury, sickness, disease or death; or to injury or destruction of tangible property including the loss therefrom; and is caused in whole or in part by any negligent or willful act or omission by the Contractor, subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable.

In any and all claims against the City or the Engineer, or any of their agents or employees, by any employee of the Contractor, any subcontractor, anyone directly or indirectly employed by any of them, or anyone for whose acts any of them may be liable, the indemnification obligation shall not be limited in any way by any limitation on the amount or type of damages, compensation or benefits payable by or for the Contractor or any subcontractor under Workmen's Compensation acts, disability acts or other employee benefit acts.

The obligation of the Contractor under this paragraph shall not extend to the liability of the Engineer, his/her agents or employees arising out of the preparation or approval of maps, drawings, opinions, reports, surveys, change orders, designs or specifications. The City will not be held liable for any accident, loss or damage to work prior to its completion and acceptance.

27. SEPARATE CONTRACTS

The City reserves the right to let other contracts in connection with this project. The Contractor shall afford other Contractors reasonable opportunity for the introduction and storage of their materials and the execution of their work and shall properly connect and coordinate his/her work with theirs. If the proper execution or results of any part of the Contractor's work depends upon the work of any other Contractor, the Contractor shall inspect and promptly report to the Engineer any defects in such work that render it unsuitable for such property execution and results.

The City may perform additional work related to the project by itself, or it may let other contracts containing provisions similar to these. The Contractor will afford the other Contractors who are parties to such contracts, or the City if it is performing the additional work itself, reasonable opportunity for the introduction and storage of materials and equipment and the execution of work, and shall properly connect and coordinate his/her work with theirs.

If the performance of additional work by other Contractors or the City, is not noted in the Contract documents prior to the execution of the contract, written notice thereof shall be given to the Contractor prior to starting such additional work. If the Contractor believes that the performance of such additional work by the City or others involves him/her in additional expense or entitles him/her to any extension of contract time, he/she may make a claim therefore as provided in Sections 14 and 15.

28. SUBCONTRACTING

The Contractor may utilize the services of specialty Contractors on those parts of the work, which, under normal contracting practices, are performed by specialty Contractors. The Contractor shall be fully responsible to the City for the acts and omissions of his/her subcontractors and of persons either directly or indirectly employed by them, as he/she is responsible for the acts and omissions of persons directly employed by him/her.

The Contractor shall cause appropriate provisions to be inserted in all subcontracts relative to the work to bind subcontractors to the Contractor by the terms of the contract documents insofar as applicable to the work of the subcontractors and to give the Contractor the same power as regards terminating any subcontract that the City may exercise over the Contractor under the provisions of the contract documents. Nothing contained in this contract shall create any contractual relation between any subcontractor and the City.

29. ENGINEER'S AUTHORITY

The Engineer shall act as the City's representative during the construction period. He/she shall decide questions, which may arise as to quality and acceptability of materials furnished and work performed. He/she shall interpret the intent of the contract documents in a fair and unbiased manner. The Engineer will make visits to the site and determine if the work is proceeding in accordance with the contract documents.

30. LAND AND RIGHT-OF-WAY

Prior to the issuance of Notice to Proceed, the City shall obtain all land and rights-of-way necessary for carrying out and for the completion of the work to be performed pursuant to the contract documents, unless otherwise mutually agreed.

The City shall provide to the Contractor information, which delineates and describes the lands owned and rights-of-way acquired. The Contractor shall provide, at his/her own expense and without liability to the City, any additional land and access thereto that the Contractor may desire for temporary construction facilities, or for storage of equipment or materials.

31. GUARANTEE

The Contractor shall guarantee all materials and equipment furnished and work performed for a period of one (1) year from the date of substantial completion. The Contractor warrants and guarantees for a period of one (1) year from the date of substantial completion of the system that the completed system is free from all defects due to faulty materials or workmanship and the Contractor shall promptly make such corrections as may be necessary by reason of such defects including the repairs of any damage to other parts of the system resulting from such defects.

The City will give notice of observed defects with reasonable promptness. In the event that the Contractor should fail to make such repairs, adjustments or other work that may be necessary by such defects, the City may do so and charge the Contractor the cost thereby incurred. The Performance Bond shall remain in force and effect through the guarantee period.

32. CONTRACT DISPUTES AND NOTICE OF POTENTIAL CLAIM

If the Contractor and Engineer fail to agree whether or not any work or other matter is within the scope of the Contract, the Contractor shall nevertheless immediately perform such work upon receipt of a written Field Instruction or other written directive. It is the intention of this section that disputes between the parties arising under and by virtue of the contract be brought to the attention of the Engineer at the earliest possible time in order that the matters may be resolved, if possible, or other appropriate action can be undertaken.

For disputes arising under and by virtue of the contract, including an act or failure to act by the Engineer, the Contractor shall provide a signed written initial notice of potential claim to the Engineer within 5 days from the date the dispute first arose. The initial notice of potential claim shall provide the nature and circumstances involved in the dispute which shall remain consistent through the dispute. The initial notice of potential claim shall be submitted on State Form CEM-6201A to be furnished by the Engineer and shall be certified with reference to the California False Claims Act, Government Code Sections 12650-12655. The Contractor shall assign an exclusive identification number for each dispute, determined by chronological sequencing, based on the date of the dispute.

The exclusive identification number for each dispute shall be used on the following corresponding documents:

- Initial notice of potential claim.
- Supplemental notice of potential claim.
- Full and final documentation of potential claim.

- Corresponding claim included in the Contractor's written statement of claims.

The Contractor shall provide the Engineer the opportunity to examine the site of work within 5 days from the date of the initial notice of potential claim. The Contractor shall proceed with the performance of contract work unless otherwise specified or directed by the Engineer.

Throughout the disputed work, the Contractor shall maintain records that provide a clear distinction between the incurred direct costs of disputed work and that of undisputed work. The Contractor shall allow the Engineer access to the Contractor's project records deemed necessary by the Engineer to evaluate the potential claim within 20 days of the date of the Engineer's written request.

Within 15 days of submitting the initial notice of potential claim, the Contractor shall provide a signed supplemental notice of potential claim to the Engineer that provides the following information:

- A narrative describing the complete nature and circumstances of the dispute which caused the potential claim.
- The contract provisions that provide the basis of claim.
- The estimated cost of the potential claim, including an itemized breakdown of individual labor and material costs and how the estimate was determined.
- A time impact analysis of the project schedule that illustrates the effect the effect on the scheduled completion date due to schedule changes or disruptions where a request for adjustment of contract time is made.

The supplemental notice of potential claim shall be submitted on State Form CEM-6201B to be furnished by the Engineer and shall be certified with reference to the California False Claims Act, Government Code Sections 12650-12655. The Engineer will evaluate the information presented in the supplemental notice of potential claim and provide a written response to the Contractor within 20 days of its receipt. If the estimated cost or effect on the scheduled completion date changes, the Contractor shall update this information as soon as the change is recognized and submit this information to the Engineer.

Within 30 days of the completion of work related to the potential claim, the Contractor shall provide the full and final documentation of potential claim to the Engineer that provides the following information:

- A detailed factual narration of events fully describing the nature and circumstances that caused the dispute, including, but not limited to, necessary dates, locations, and items of work affected by the dispute.
- The specific provisions of the contract that support the potential claim and a statement of the reasons these provisions support and provide a basis for entitlement of the potential claim.
- When additional monetary compensation is requested, the exact amount requested shall be segregated into the following cost categories:
 1. Labor – A listing of individuals, classifications, regular hours and overtime hours worked, dates worked, and other pertinent information related to the requested reimbursement of labor costs.

2. Materials – Invoices, purchase orders, location of materials either stored or incorporated into the work, dates materials were transported to the project or incorporated into the work, and other pertinent information related to the requested reimbursement of material costs.

3. Equipment – Listing of detailed description (make, model, and serial number), hours of use, dates of use and equipment rates. Equipment rates shall be at the applicable State rental rate as listed in the Department of Transportation publication entitled "Labor Surcharge and Equipment Rental Rates," in effect when the affected work related to the dispute was performed.

- When an adjustment of contract time is requested the following information shall be provided:
 1. The specific dates for which contract time is being requested.
 2. The specific reasons for entitlement to a contract time adjustment.
 3. The specific provisions of the contract that provide the basis for the requested contract time adjustment.
 4. A detailed time impact analysis of the project schedule. The time impact analysis shall show the effect of changes or disruptions on the scheduled completion date to demonstrate entitlement to a contract time adjustment.

The full and final documentation of the potential claim shall be submitted on State Form CEM-6201C to be furnished by the Engineer and shall be certified with reference to the California False Claims Act, Government Code Sections 12650-12655.

Pertinent information, references, arguments, and data to support the potential claim shall be included in the full and final documentation of potential claim. Information submitted subsequent to the full and final documentation submittal will not be considered. Information required in the full and final documentation of potential claim, as listed in items above, that is not applicable to the dispute may be exempted as determined by the Engineer. No full and final documentation of potential claim will be considered that does not have the same nature and circumstances, and basis of claim as those specified on the initial and supplemental notices of potential claim.

The Engineer will evaluate the information presented in the full and final documentation of potential claim and provide a written response to the Contractor within 30 days of its receipt unless otherwise specified. The Engineer's receipt of the full and final documentation of potential claim shall be evidenced by postal receipt or the Engineer's written receipt if delivered by hand. If the full and final documentation of potential claim is submitted by the Contractor after acceptance of the work by the Director, the Engineer need not provide a written response.

Failure of the Contractor to conform to specified dispute procedures shall constitute a failure to pursue diligently and exhaust the administrative procedures in the contract, and is deemed as the Contractor's waiver of the potential claim.

33. DISPUTE RESOLUTION

In the event that disputes cannot be resolved pursuant to the provisions of Section 32, disputes of \$375,000 or less between that parties shall be subject to the provisions set forth in California Public Contract Code sections 20104 et seq.

34. TAXES

The Contractor will pay all sales, consumer, use and other similar taxes required by the law of the place where the work is performed.

35. APPLICABLE WAGE RATES

The Contractor's attention is directed to Section 7-1.02K(2) "Wages" of the Standard Specification and the most recent General Prevailing Wage Determination made by the Director of Industrial Relations, a copy of which is available for examination at the Public Works Office. These prevailing wage rates, and any subsequent amendments thereto made prior to the date of the Invitation for Bids, are the minimum rates to be paid during the life of the contract.

Certified copies of all payroll records shall be submitted to the Engineer each week for the prior week's work. Certified payroll records and submittal thereof shall be in accordance with Section 7-1.02K(3) "Certified Payroll Records" of the Standard Specifications.

In accordance with the California Labor Code, and other applicable labor provisions, the prevailing wages applicable to the project will be determined by the United States Secretary of Labor and/or the State of California Department of Industrial Relations. Current rates can be found here: <https://www.dir.ca.gov/OPRL/2020-1/PWD/Northern.html>

The listings of or reference to minimum rates herein is not a representation that labor can be obtained at these rates. It is the responsibility of bidders to inform themselves as to local labor conditions and prospective changes or adjustments of wage rates. No increase in the contract price shall be allowed or authorized on account of payment of wage rates in excess of those listed or referred to herein.

SECTION SP

SPECIAL PROVISIONS

SPECIAL PROVISIONS

TABLE OF CONTENTS

	Page
1.01 Construction Sequencing and Constraints	2
1.02 Record Drawings.....	2
1.03 Construction Staking.....	3
1.04 Monument Preservation	3

1.01 Construction Sequencing and Constraints

- A. The Contractor is required to maintain local access and access to businesses at all times on Montgomery Street. The Contractor is required to work block-by-block to limit impact to local businesses. The Contractor is not required to work block-by-block for final paving and stripping and final restoration and pipe abandonment.
- B. Working hours on Grand Avenue are limited to between 9:00 AM and 3:00 PM for day work or 7:00 PM to 6:00 AM for night work.
- C. The Contractor is required to either maintain a minimum of one through traffic lane for use by both directions of travel or provide one City street open in each direction of travel.
- D. The Contractor is required to maintain pedestrian pathways and bypass for emergency vehicles at all times on both Montgomery Street and Table Mountain Boulevard. The Contractor is required to meet all public safety and convenience standards as required by the State of California.

1.02 Record Drawings

- A. Maintain on site one set of the following record documents; record actual revisions to the Work:
 - 1. Drawings.
 - 2. Specifications.
 - 3. Addenda.
 - 4. Change Orders and other modifications to the Contract.
 - 5. Reviewed Shop Drawings, Product Data, and Samples.
 - 6. Manufacturer's instruction for assembly, installation, and adjusting.
 - 7. Meter data sheets for all meters installed.
- B. Ensure entries are complete and accurate, enabling future reference by the City.
- C. Store record documents separate from documents used for construction.
- D. Record information concurrent with construction progress.
- E. Specifications: Legibly mark and record at each Product section description of actual Products installed, including the following:
 - 1. Manufacturer's name and product model and number.
 - 2. Product substitutions or alternates utilized.
 - 3. Changes made by Addenda and modifications.
- F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
 - 1. Measured elevation of foundations in relation to project datum.

2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
 3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
 4. Field changes of dimension and detail.
 5. Details not on original Contract drawings.
- G. Submit documents to Engineer with claim for final Application for Payment. Engineer shall withhold a minimum of 5% of the total contract amount from the final progress payments until acceptance of the Record Drawings. This amount is separate, apart, and in addition to any other retention provided for in the Specifications.
- H. Final documents are a part of the Work and must be submitted by the contract completion date. If Record Documents are not completed and submitted by the contract completion date, liquidated damages may be assessed as stated in Contract.

1.03 Construction Staking

- A. The Contractor is responsible for all construction staking associated with the project. The Construction Manager is required to verify that construction staking is completed.

1.04 Monument Preservation

- A. The Contractor is required to preserve all monuments within the limits of work.

SECTION TS

TECHNICAL SPECIFICATIONS

SECTION 01150

MEASUREMENT AND PAYMENT

PART 1: GENERAL

1.01 DESCRIPTION

Payment shall be made at the bid prices and shall be considered as full compensation for furnishing all labor, materials, tools, supplies, and services as required for proper completion of the work described in the following bid items, complete in place, and to the satisfaction of the Engineer.

Items of work or other services which the Contractor is required to supply, such as final clean-up or other incidental items, and which are not listed as separate bid items shall be included in the related bid items and shall be considered as paid in those items, whether or not specifically identified in the following descriptions. Also considered to be included in such costs are any costs associated with the repair of damage which may occur to existing improvements as a result of the Contractor's operations.

1.02 LUMP SUM BREAKDOWN SUBMITTALS

After award of the Contract and prior to approval of initial progress payment requests, the Contractor shall submit a cost breakdown list to the Engineer for all Lump Sum bid items. The list shall consist of the major elements of work that make up each of the lump sum bid items and shall be used for determining progress pay estimates. The Contractor shall provide amounts for each element, pro-rating general costs such as mobilization, setup, temporary facilities and controls, and overhead and profit for each element. The distribution breakdown that the contractor indicates for any lump sum bid item may be revised as deemed necessary by the Engineer if it appears such items are unbalanced, unless the Contractor can substantiate these costs. Only elements of work of value to the City shall be included in the list.

PART 2: BID ITEMS

Bid Item 1 – Mobilization/Demobilization

The lump sum bid for Mobilization shall not exceed four percent (4%) of the total bid price. Mobilization shall include: the obtaining of insurance and bonds; moving onto the site of all equipment; submittal and approval of initial project schedule; obtaining and paying for all permits by other agencies as applicable and not delineated in other bid items; furnishing temporary construction utilities (temporary power, toilets, water, fences, etc.); installing construction signs; temporary buildings and field office trailer(s); establishment of temporary site access and staging area; installation of temporary construction fencing; and all other construction as required for the proper performance and completion of work.

Dewatering is not expected for this project, but should dewatering be required, the pay item for dewatering and all other incidentals required to complete the item is included in Mobilization/Demobilization.

The lump sum bid for Demobilization shall not exceed four percent (4%) of the total bid price. Demobilization shall include: site cleaning and restoration of surfaces within the job site; post-construction meeting; removal of all temporary facilities and equipment from the work area; disconnection of the temporary construction utilities; and turnover of a project to the Owner.

Contractor may apply for payment of mobilization on a percent complete basis as the items covered in Mobilization are being completed.

Contractor may apply for payment of Demobilization after the overall project substantial completion is achieved and the project begins to demobilize.

The lump sum price shall be full compensation for the preparation and installation or submittal of these materials, and for all labor, equipment, tools and incidentals to complete this item.

Bid Item 2 - Traffic Control

The lump sum amount shall include all work and materials necessary to create, obtain approval, and implement a traffic control plan as required by the City of Oroville for this project. Measurement and payment shall be made on a percent complete basis. The price shall be full compensation for updates or changes required by the City.

The lump sum price shall be full compensation for the preparation, submittal, approvals, fees, and implementation of these materials, and for all labor, equipment, tools, and incidentals to complete this item.

Bid Item 3 – Dewatering

The lump sum amount shall include all work and materials necessary for dewatering, including installation of wet well, piping, earthwork, and all other essentials to complete this item as detailed in the Specifications and Plans.

The lump sum price shall be full compensation for all labor, equipment, tools, and incidentals to complete this item.

Bid Item 4 – Erosion Control Plan

The lump sum amount shall include all work and materials necessary for preparation and implementation of an erosion control plan and all other essentials required to complete this item as detailed in the Specifications and Plans.

The lump sum price shall be full compensation for all labor, equipment, tools, and incidentals to complete this item.

Bid Item 5 – Sheeting, Shoring, Bracing

The lump sum amount shall include all work and materials necessary for sheeting, shoring, and bracing, including installation of shores, wales, braces, posts, piling, sheeting, anchorages, fastenings, and all other essentials required to complete this item as detailed in the Specifications and Plans.

The lump sum price shall be full compensation for all labor, equipment, tools, and incidentals to complete this item.

Bid Item 6 – 8" PVC Pipe

The price per linear foot for 8" PVC Pipe shall include all work and materials necessary to install new 8" PVC sanitary sewer, including potholing, sawcutting, trenching, installation of

bedding, temporary plating, utility crossing protection, backfill and compaction, pavement repair, removal and disposal of existing pipe, furnishing of pipe, and all other essentials required to complete this item as detailed in the Specifications and Plans.

The price per linear foot shall be full compensation for all labor, equipment, tools, and incidentals to complete this item.

Bid Item 7 – 15” PVC Pipe

The price per linear foot for 15” PVC Pipe shall include all work and materials necessary to install new 15” PVC sanitary sewer, including potholing, sawcutting, trenching, installation of bedding, temporary plating, utility crossing protection, backfill and compaction, pavement repair, removal and disposal of existing pipe, furnishing of pipe, and all other essentials required to complete this item as detailed in the Specifications and Plans.

The price per linear foot shall be full compensation for all labor, equipment, tools, and incidentals to complete this item.

Bid Item 8 – 18” PVC Pipe

The price per linear foot for 18” PVC Pipe shall include all work and materials necessary to install new 18” PVC sanitary sewer, including potholing, sawcutting, trenching, installation of bedding, temporary plating, utility crossing protection, backfill and compaction, pavement repair, furnishing of pipe, removal and disposal of existing sanitary sewer pipe, and all other essentials required to complete this item as detailed in the Specifications and Plans.

The price per linear foot shall be full compensation for all labor, equipment, tools, and incidentals to complete this item.

Bid Item 9 – 24” PVC Pipe

The price per linear foot for 24” PVC Pipe shall include all work and materials necessary to install new 24” PVC storm drain, including sawcutting, trenching, installation of bedding, temporary plating, utility crossing protection, backfill and compaction, pavement repair, removal of existing storm drain manhole, furnishing of pipe, and all other essentials required to complete this item as detailed in the Specifications and Plans.

The price per linear foot shall be full compensation for all labor, equipment, tools, and incidentals to complete this item.

Bid Item 10 – Abandon Pipe

The price per linear foot for abandon pipe shall include all work and materials necessary to abandon pipe, including flowable fill, caps, grout plugs, repair of holes on existing structures, cutting and disposal of pipe near existing structures, and all other essentials required to complete this item as detailed in the Specifications and Plans.

The price per linear foot shall be full compensation for all labor, equipment, tools, and incidentals to complete this item.

Bid Item 11 – 48” Sanitary Sewer Manhole

The price per each for 48” Sanitary Sewer Manhole shall include all work and materials necessary to install new sanitary sewer manholes, including sawcutting, trenching, removal

and disposal of existing manhole, furnishing and installation of manhole bases, sections, frames, and covers, backfill and compaction, testing, and all other essentials required to complete this item as detailed in the Specifications and Plans.

The price per each shall be full compensation for all labor, equipment, tools, and incidentals to complete this item.

Bid Item 12 – Abandon Manhole

The price per each for Abandon Manhole shall include all work and materials necessary to abandon manholes, including removal and disposal of frames, covers, and castings, flowable fill, grout plugs, backfill and compaction, and all other essentials required to complete this item as detailed in the Specifications and Plans.

The price per each shall be full compensation for all labor, equipment, tools, and incidentals to complete this item.

Bid Item 13 – Lateral Reconnection

The price per each for Lateral Reconnection shall include all work and materials necessary for lateral reconnection, including sawcutting, trenching, cutting of pipe, wye fittings, couplings, backfill and compaction, reconnection of existing lateral to new main, and all other essentials required to complete this item as detailed in the Specifications and Plans.

The price per each shall be full compensation for all labor, equipment, tools, and incidentals to complete this item.

Bid Item 14 – Connection to Existing Manhole

The price per each for Connection to Existing Manhole shall include all work and materials necessary for manhole connection, including sawcutting, excavation, coring of existing manhole, pipe boot, grout, and all other essentials required to complete this item as detailed in the Specifications and Plans.

The price per each shall be full compensation for all labor, equipment, tools, and incidentals to complete this item.

END OF SECTION

SECTION 01300

SUBMITTALS

PART 1: GENERAL

1.01 SECTION INCLUDES

- A. Submittal procedures.
- B. Proposed Products list.
- C. Product Data.
- D. Shop Drawings.
- E. Samples.
- F. Design data.
- G. Test reports.
- H. Certificates.
- I. Manufacturer's field reports.
- J. CPM Qualifications

1.02 SUBMITTAL PROCEDURES

- A. Transmit each submittal with transmittal form provided by Contractor.
- B. Sequentially number the transmittal form. Resubmittals shall be identified with original number and a sequential resubmittal suffix number. The original submittal shall be numbered X-1. The first resubmittal shall be numbered X-2 and so on.
- C. Identify Project, date of submittal, Contractor, Subcontractor or supplier; pertinent drawing and detail number, and specification section number, as appropriate.
- D. Apply Contractor's signature certifying that review, approval, verification of Products required, field dimensions, adjacent construction Work, and coordination of information is in accordance with the requirements of the Work and Contract Documents.
- E. Schedule submittals to expedite the Project and deliver to Engineer at the Engineer's office. Coordinate submission of related items.
- F. For each submittal for review, allow 30 days excluding delivery time to and from the Contractor.
- G. Identify variations from Contract Documents and Product or system limitations which may be detrimental to successful performance of the completed Work.

- H. Provide space for Design Engineer's review stamps.
- I. When revised for resubmission, identify all changes made since previous submission.
- J. Distribute copies of reviewed submittals as appropriate. Instruct parties to promptly report any inability to comply with requirements.
- K. Submittals not requested either in the Contract Documents or in writing from the Engineer will not be recognized or processed.
- L. Within 15 days after Notice to Proceed submit a complete list of all submittals to be submitted and the dates when they will be submitted.
- M. Wherever called for in the Contract Documents, or where required by the Engineer, the Contractor shall furnish to the Engineer for review one electronic copy of each shop drawing submittal. The term "Shop Drawings" as used herein shall be understood to include detail design calculations, shop drawings, fabrication and installation drawings, erection drawings, lists, graphs, catalog sheets, data sheets, and similar items. Whenever the Contractor is required to submit design calculations as part of a submittal, such calculations shall bear the signature and seal of an engineer registered in California, unless otherwise directed.
- N. All Shop Drawing submittals shall be accompanied by the Contractor's standard submittal transmittal form. Any submittal not accompanied by such a form, or where applicable items on the form are not complete, will be returned for resubmittal.
- O. Normally, a separate transmittal form shall be used for each specific item or class of material or equipment for which a submittal is required. Transmittal of a submittal of various items using a single transmittal form will be permitted only when the items taken together constitute a manufacturer's "package" or are so functionally related that expediency indicates review of the group or package as a whole. A multi-page submittal shall be collated into sets, and each set shall be stapled or bound, as appropriate, prior to transmittal to the Engineer.
- P. Except as may otherwise be indicated herein, the Engineer will return prints of each submittal to the Contractor with its comments noted hereon, within 30 calendar days following their receipt by the Engineer. It is considered reasonable that the Contractor shall make complete and acceptable submittal to the Engineer by the second submission of a submittal item. The City reserves the right to withhold monies due to the Contractor to cover additional costs of the Engineer's review beyond the second submittal. The Engineer's maximum review period for each submittal, including all resubmittals, will be 30 days per submittal. In other words, for a submittal that requires two resubmittals before it is complete, the maximum review period for that submittal could be 90 days.
- Q. If a submittal is returned to the Contractor marked "NO EXCEPTIONS NOTED", formal revision and resubmission of said submittal will not be required.
- R. If a submittal is returned to the Contractor marked "MAKE CORRECTIONS NOTED", formal revision and resubmission of said submittal will not be required.

- S. If a submittal is returned to the Contractor marked “AMEND-RESUBMIT”, the Contractor shall revise said submittal and shall resubmit the required number of copies of said revised submittal to the Engineer.
- T. If a submittal is returned to the Contractor marked “REJECTED-RESUBMIT”, the Contractor shall revise said submittal and shall resubmit the required number of copies of said revised submittal to the Engineer.
- U. Fabrication of an item shall be commenced only after the Engineer has reviewed the pertinent submittals and returned copies to the Contractor marked “NO EXCEPTIONS TAKEN” or “MAKE CORRECTIONS NOTED”. Corrections indicated on submittals shall be considered as changes necessary to meet the requirements of the Contract Documents and shall not be taken as the basis for changes to the contract requirements.
- V. The Engineer’s review of Contractor Shop Drawing submittals shall not relieve the Contractor of the entire responsibility for the correctness of details and dimensions. The Contractor shall assume all responsibility and risk for any misfits due to errors in Contractor submittals. The Contractor shall be responsible for the dimensions and the design of adequate connections and details for all connections and details.

1.03 PROPOSED PRODUCTS LIST

- A. Within 15 days after date of Notice to Proceed submit list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.
- B. For products specified only by reference standards, give manufacturer, trade name, model or catalog designation, and reference standards.

1.04 PRODUCT DATA AND SHOP DRAWINGS

- A. Product Data for Review:
 - 1. Submitted to Engineer for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.
 - 2. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article above.
- B. Product Data for Information:
 - 1. Submitted for the Engineer's knowledge as contract administrator or for the City of Oroville.
- C. Product Data for Project Close-out:
 - 1. Submitted for the City's benefit during and after project completion.
- D. Submit one electronic copy of each drawing included in the submittal.

- E. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.
- F. After review distribute in accordance with the Submittal Procedures article above.

1.05 SAMPLES

- A. Samples for Review:
 - 1. Submitted to Engineer for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.
 - 2. After review, produce duplicates and distribute in accordance with SUBMITTAL PROCEDURES article above.
- B. Samples for Information:
 - 1. Submitted for the Engineer's knowledge as contract administrator or for the City.
- C. Include identification on each sample, with full Project information.
- D. Submit the number of samples specified in individual specification sections; one of which will be retained by Engineer.
- E. Reviewed samples which may be used in the Work are indicated in individual specification sections.
- F. Samples will not be used for testing purposes unless specifically stated in the specification section.

1.06 DESIGN DATA

- A. Submit for the Engineer's knowledge as contract administrator or for the City.
- B. Submit for information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.

1.07 TEST REPORTS

- A. Submit for the Engineer's knowledge as contract administrator or for the City.
- B. Submit test reports for information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.

1.08 CERTIFICATES

- A. When specified in individual specification sections, submit certification by the manufacturer, installation/application Subcontractor, or the Contractor to Engineer, in quantities specified for Product Data.
- B. Indicate material or Product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.

- C. Certificates may be recent or previous test results on material or Product but must be acceptable to Engineer.

1.09 MANUFACTURER'S FIELD REPORTS

- A. Submit reports for the Engineer's benefit as contract administrator and for the City.
- B. Submit one electronic copy of each report within 30 days of observation to Engineer for information.
- C. Submit for information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.

1.10 CPM QUALIFICATIONS

- A. Submit a statement for individual who will perform CPM scheduling that identifies who they are and highlights their qualifications.

PART 2: MATERIALS - NOT USED

PART 3: EXECUTION - NOT USED

END OF SECTION

SECTION 01666

TESTING OF GRAVITY SEWER LINES AND MANHOLES

PART 1: GENERAL

1.01 DESCRIPTION

- A. The work of this section consists of testing gravity sewer lines and gravity sewer manholes. Repaired work shall be retested.
- B. Testing Methods: Gravity sewer lines - air test; manholes – vacuum test.

1.02 QUALITY ASSURANCE

- A. Flow meters shall record the actual volume plus or minus 2 percent.
- B. Air test gauges shall be ANSI/ANSI B40.1, Grade 3A (plus or minus 0.25 percent of full-scale accuracy), and 15 psi dial range.

1.03 SUBMITTALS

- A. Accuracy certification by approved independent testing labs for flow meters and test gauges. Certifications shall be dated no more than 90 days prior to actual system testing.
- B. Prior to testing, provide the following information:
 - 1. All Tests: Describe precautions that will be taken to protect system equipment that might be damaged under test pressures, and the proposed method for rerouting sewer flows where the system must remain in service.
 - 2. Air Test: Describe safety devices on air test equipment and personnel safety precautions during air.

1.04 PROJECT CONDITIONS

- A. Testing shall not be performed until each system has been flushed or thoroughly cleaned in accordance with procedures in the section that describes sewer line installation.

PART 2: MATERIALS - NOT USED

PART 3: EXECUTION

3.01 GENERAL

- A. Prepare each section for testing, using adequate bracing; protect system equipment susceptible to damage by test pressures; make provision for installation of Agency's pressure gauge in parallel with Contractor's gauge, if so requested; and maintain services where required.

3.02 GRAVITY SEWER SYSTEMS

- A. Air Test: Test lines less than or equal to 30 inches in diameter between manholes with low pressure air. Safety requires regulator or relief valve on pressurizing equipment, set at 8 psig. No one will be allowed in manholes while there is air pressure against test plugs.
- Lines greater than 30-inches in diameter shall include individual joint testing as specified per these specifications or the manufacturer.
- B. Plug all pipe outlets to resist test pressure. Give special attention to laterals. Plug all other pipes in both upstream and downstream manholes.
- C. Supply air into the line until the test pressure of 3.5 psi in excess of the ground water pressure is attained or 8 psi, whichever is greater. Allow at least 5 minutes for air temperature in the test section to stabilize.
- D. Reestablish the test pressure, and start a stop watch. Determine the time required for pressure to drop 1.0 psig.
- E. For 6-inch and smaller pipe only, if the pressure does not drop during the stabilization period, and no additional air has been added, the section undergoing test will have passed without further testing.
- F. The pipe section will also have passed if the time observed for the pressure to drop 1.0 psig is greater than that determined by using Table 1.

Determine the test time from Table 1 (minimum time 60 seconds).

SIZE	Time per 100-foot	SIZE	Time per 100-foot	SIZE	Time per 100-foot
4-inch	0.3-min.	12-inch	1.8-min.	24-inch	3.6-min
6-inch	0.7-min.	15-inch	2.1-min.	27-inch	4.2-min.
8-inch	1.2-min.	18-inch	2.4-min.	30-inch	4.8-min.
10-inch	1.5-min.	21-inch	3.0-min.		

- G. When a combination of more than one pipe size is under test, the calculated time for the larger pipe shall apply.
- H. For larger sewer pipes, refer to the material specification for testing requirements.

3.03 VISUAL TEST FOR PIPELINES

Interior visual inspection shall be conducted by the Contractor. The Contractor's Inspector shall visibly inspect the line and record findings. Copies of video inspection shall be provided to the City Engineer for review and acceptance of work.

The sewer system shall be completely cleaned by an approved method prior to visual inspection. The sewer system shall be rejected if any of these conditions exist:

- A. Standing water or sags greater than ½-inch in depth.

- B. Standing water in services.
- C. Offset joints.
- D. Cracked pipe.
- E. Infiltration.

3.04 DEFLECTION TESTING OF FLEXIBLE PIPE

All flexible PVC pipe shall be tested for over-deflection as specified in Section 15071.

3.05 LEAKAGE TEST FOR MANHOLES

Sewer manholes shall pass a vacuum test consisting of the following criteria and procedures:

- A. The Contractor shall notify the Engineer at least 72-hours in advance to be present during testing without exception.
- B. The test shall be performed after assembly of the manhole, but prior to backfilling. The Contractor shall perform the test and supply all test equipment. A City Inspector shall witness the test results.
- C. Lift holes shall be filled with non-shrinking grout prior to testing.
- D. Pipe entering and existing the manhole shall be plugged. Securely brace the plugs to prevent them from being drawn into the manhole. Unused channels shall be permanently plugged with a plastic or clay stop and filled with grout.
- E. A vacuum of 10-inches of mercury shall be drawn to start the test. The amount of time required for the vacuum to drop to 9-inches shall be measured. The manhole will pass the test if the amount of elapsed time is greater than 60 seconds for a 48-inch manhole, 75 seconds for a 72-inch manhole, and 120 seconds for an 84-inch manhole. A liquid filled with vacuum gauge shall be used for testing.
- F. If the manhole fails the initial test, necessary repairs shall be made with a non-shrink grout while the vacuum is still being drawn. Retesting shall proceed until the elapsed times are satisfactory.
- G. After passing the vacuum test, all joints shall then be mortared, inside and out. Outside mortared joints shall be allowed to dry before backfilling.

END OF SECTION

SECTION 02100

DEMOLITION, CLEARING, GRUBBING, AND STRIPPING

PART 1: GENERAL

1.01 DESCRIPTION

Work Included: Demolition, clearing, grubbing, and stripping required for this work includes, but is not necessarily limited to:

- A. Felling and removal of trees, stumps, roots, and tree debris.
- B. Removal of surface rock and all debris.
- C. Removal of surface organic topsoil layer.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 02200: Earthwork
- B. Section 02223: Trenching, Backfilling, and Compacting
- C. Section 02225: Structure Excavation and Backfill
- D. Section 02270: Stormwater Runoff Control Program

1.03 LIMITS OF WORK

Perform demolition, clearing, grubbing, and stripping operations to the following limits:

- A. Demolition: Perform demolition of existing facilities as designated on the contract drawings.
- B. Clearing: Perform clearing operations throughout the project site, including, but not limited to, areas upon which facilities, ponds, roadways, structures, landscaping or structural fill will be placed, and all borrow sites.
- C. Grubbing: Perform grubbing operations at all locations identified for clearing.
- D. Stripping: Perform stripping operations at the following locations as:
 - 1. The area of the plant site.
 - 2. The new access roadways.
 - 3. The effluent pipeline corridor.
 - 4. The pond sites
 - 5. Irrigation/borrow fields, as required to meet fill requirements
- E. Any and all areas that have been demolished, cleared, grubbed or stripped that has not be covered by any other order of work and is left as bare or native ground ,excluding the irrigation fields, shall have a finishing treatment applied at the discretion of the engineer and may consist of one of the following: hydroseeded and continuously irrigated until established, covered with 2" Class 2

aggregate base and compacted to 95%, paved, or receive authorization by the engineer to remain in the native state.

1.04 CLEARING

Remove and dispose of trees, snags, stumps, shrubs, brush, limbs, and other vegetative growth to the limits defined in Section 1.03. Remove all evidence of branches greater than 1-inch in diameter or thickness. Remove and dispose of trash piles and rubbish. Protect structures and piping above and below ground, trees, shrubs, and vegetative growth and fencing which are not designated for removal or which exist outside project limits.

1.05 GRUBBING

After clearing, remove and dispose of wood or root matter, including stumps, trunks, roots, or root systems greater than 1-inch in diameter to the limits defined in Section 1.03.

1.06 STRIPPING

After grubbing, strip the organic material to the limits defined in Section 1.03 to a depth of not less than 6-inches or to a depth required to remove all deleterious matter, vegetation, or cementations larger than 1 inch in the maximum dimension. Upon completion of the stripping operation, the remaining material, if utilized for structural fill, shall not exceed a concentration of organics in excess of 3 percent by dry weight. Dilution shall be accomplished by means of disking.

Stripping material shall be stockpiled onsite. All stockpiled material, including existing stockpile in irrigation fields, shall be spread across the borrow site to drain towards the tailwater ditch.

1.07 QUALITY ASSURANCE

- A. Qualifications of Workmen: Provide at least one person who shall be present at all times during tree clearing and grubbing operations and who shall be thoroughly familiar with the types of trees involved and who shall direct the trimming of roots and limbs where required.
- B. Codes and Standards: In addition to complying with all pertinent codes and regulations, comply with the requirements of those insurance carriers providing coverage for this work.

1.08 JOB CONDITIONS

- A. Dust Control: Use all means necessary to prevent the spread of dust during performance of the work; thoroughly moisten all surfaces as required to prevent dust being a nuisance to the public, neighbors, and concurrent performance of other work on the site. Wind in excess of 10 MPH causing dust to leave site will require Contractor to limit dust causing activities.
- B. Burning: On-site burning will not be permitted.
- C. Protection: Use all means necessary to protect existing objects designated to remain and, in the event of damage, immediately notify the Engineer and make all repairs and replacements necessary for approval by the Engineer at no additional cost to the Owner.

PART 2: MATERIALS

2.01 TEMPORARY BARRICADES

Unless otherwise specifically approved by the Engineer, use only new and solid lumber of utility grade or better to construct temporary barricades around the objects designated to remain.

2.02 PRUNING PAINT

Use only a pruning paint specially formulated for horticultural application to cut or damaged plant tissue and approved by the Engineer for use on this work.

2.03 EXPLOSIVES

Do not use explosives on this project.

2.04 OTHER MATERIALS

All other material not specifically described but required for proper completion of the work of this Section, shall be as selected by the Contractor subject to approval of the Engineer.

PART 3: EXECUTION

3.01 PREPARATION

- A. Notification: Notify the Engineer at least two full working days prior to commencing the work of this section.
- B. Site Inspection:
 - 1. Prior to all work of this section, carefully inspect the entire site and all objects designated to be removed and to be preserved.
 - 2. Locate all existing inactive utility lines to be encountered by the new work and determine all requirements for disconnecting and capping. Abandonment of piping requires capping at each end or plugging with concrete to the satisfaction of the Engineer.
 - 3. Locate all existing active utility lines traversing the site and determine the requirements for their protection.
- C. Clarification:
 - 1. The Drawings do not purport to show all objects existing on the site.
 - 2. Before commencing the work of this section, verify with the Engineer all objects to be removed and all objects to be preserved.
- D. Scheduling:
 - 1. Schedule all work in a careful manner with all necessary consideration for neighbors, operation of existing facilities, and the public.
 - 2. Avoid interference with the use of, and passage to and from, adjacent buildings and facilities.

- E. Disconnection of Utilities: Before starting site operations, disconnect or arrange for the disconnection of all utility services designated to be removed, performing all such work in accordance with the requirements of the utility company or Owner involved.
- F. Protection of Utilities: Preserve in operating condition all active utilities traversing the site and designated to remain.

3.02 STRUCTURE DEMOLITION

- A. Facilities so designated on the plans shall be demolished, and all materials therefrom shall become the property of the Contractor and shall be removed and disposed of away from the site. Any equipment or pipework connected within a structure which is designated to be removed and saved or relocated shall be removed before demolition begins. All other equipment within the structure shall become the property of the Contractor.
- B. All concrete and rock shall be removed to firm undisturbed soil and scarified to a depth of 12 inches, unless otherwise noted, and shall be disposed of off-site. Concrete not removed shall be broken to prevent entrapment of water, as directed by the Engineer. Concrete includes all reinforcement and embedded items. Pipework and conduit within 10 feet of a structure shall also be removed to firm undisturbed soil and scarified to a depth of 12 inches unless otherwise noted.
- C. Safety Requirements: The Contractor's attention is directed to the provisions of Subpart T of the OSHA Safety and Health Standards for Construction and the provisions of Article 31 of the Construction Safety Orders of the California Division of Industrial Safety governing the work of demolition. The Contractor shall perform all the work hereunder in accordance with said provisions, and where in conflict, the more stringent shall apply.
- D. Backfill and Grading: After facilities have been demolished and all material removed, any remaining depression or hole shall be backfilled, and the area finish graded as specified in Section 02200. Rubble and broken concrete will not be allowed to be used as fill material.

3.03 ROADWAY DEMOLITION

- A. Where shown on the contract drawings, the Contractor shall remove entire pavement section including base material. This will also be necessary where deemed by the Engineer that extensive pipe construction has caused a loss of pavement integrity. Base material may be stockpiled and reused where appropriate and only with the approval of the Engineer.
- B. Asphalt concrete, concrete curb, and gutter materials to be demolished shall be removed from the site by the Contractor at no additional cost to the Owner.

3.04 PIPE DEMOLITION

- A. Unless otherwise specified, or in conflict with a proposed pipeline or structure, all pipes shown to be demolished shall be abandoned in place and have each end capped with at least a 24-inch long plug of concrete or grout material within the pipe. Piping subject to internal pressure upon abandonment shall be capped with pressure retaining caps or plugs.

- B. All pipe materials to be removed including pipe, fittings, valves, and thrust blocking shall be removed from the site by the Contractor at no additional cost to the Owner.

3.05 CLEARING AND GRUBBING

A. Area to be Cleared and Grubbed:

1. The Contractor shall restrict clearing and grubbing to the areas designated for new construction or adjustment of grades on the plans. Surrounding trees shall be protected from damage.
2. Where limbs or roots of trees designated to remain extend into work areas, the limbs or roots shall be trimmed in accordance with the provisions of this section.

B. Felling of Trees:

1. Use all necessary care to protect the roots and branches of trees designated to remain, and to prevent damage to persons and properties.
2. Immediately after felling a tree, remove the branches, cut trunk and limbs as necessary for removal, and clear the debris. Remove tree roots within a minimum of 3 feet below the existing grade.

C. Trimming of Trees:

1. In company with the Engineer, ascertain the limbs and roots which are to be trimmed and clearly mark them to designate the approved point of cutting.
2. Cut evenly, using proper tools and skilled workmen to achieve neat severance with the least possible damage to the tree.
3. Promptly coat the cut area with the approved pruning paint in strict accordance with the manufacturer's recommendations.
4. In the case of root cuts, apply wet burlap or other protection approved by the Engineer, as required, to prevent drying out.

D. Grubbing:

1. Remove all surface rocks and all stumps, roots, and vegetation within the limits of construction. Roots shall be removed to at least 2.5 feet below proposed finish grade.

3.06 PLACEMENT OF STRIPPINGS

Strippings shall be removed from the site. The contractor may coordinate with the Engineer to stockpile strippings and then spread on project site area should a specific site area be available.

3.07 CONSTRUCTION OF BARRICADES

A. Layout:

1. At all trees designated to be preserved, construct a temporary barricade around the tree at the tree's approximate drip line.

2. Construct barricades at least three feet high, consisting of two inch by four inch or larger posts set at least 18 inches into the ground at not more than six feet on centers, joined at the top by one inch by six inch or larger boards firmly nailed to the posts. Metal post with orange safety fencing may also be used if allowed by the local Owner having jurisdiction.
- B. Protection:
1. Take special care in setting posts to not damage tree roots.
 2. Do not permit stockpiling of materials or debris within the barricaded area nor permit the earth surface to be changed in any way except as specifically approved by the Engineer.
- C. Maintenance: All protective fencing shall be inspected and maintained by the contractor at weekly intervals. Any damaged fencing shall be restored within one week.
- D. Removal of Barricades: All protective fencing including posts and fabric shall be removed from the site at the completion of the work at the Contractor's expense.

3.08 REMOVAL OF DEBRIS

- A. Remove all debris from the site and leave the site in a neat and orderly condition to the approval of the Engineer. Dispose of debris off site at a location approved by the Engineer.
- B. Removal of demolished materials shall be included in the applicable lump sum base bid item and shall not be paid on a unit cost basis.

END OF SECTION

SECTION 02200

EARTHWORK

PART 1: GENERAL

1.1 DESCRIPTION

- A. Contractor furnished labor, materials, equipment, and incidentals necessary to perform all excavation, backfill, grading, and compaction required to complete the work shown on the Plans and specified herein. The work shall include, but not necessarily be limited to, excavation for structures, footings, conduit, pipe, and paving; backfilling and fill; embankment and grading; disposal of surplus and unsuitable materials; hydroseeding; and all incidental related work.

1.2 REFERENCED SECTIONS

- A. The following Sections are referenced in this Section:
1. Section 01300: Submittals

1.3 GEOTECHNICAL REPORT

- A. See Appendix A for the Geotechnical Report.

1.4 QUALITY ASSURANCE

- A. Reference Specifications, Codes, and Standards
1. This section references the following documents. They are a part of this section insofar as specified and modified herein. 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 the listed documents, the requirements of this section shall prevail.

Reference	Title
ASTM D1556	Density of Soil in Place by the Sand-Cone Method
ASTM D1557	Moisture Density Relations of Soils and Soil-Aggregate Mixtures Using 10-lb. (4.54-kg) Rammer and 18-in. (457-mm) Drop
ASTM D2922	Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
ASTM D3017	Moisture Content of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow

B. Tests

1. The City or their Representative shall take samples and perform moisture content, gradation, compaction, and density tests during compaction and placement of backfill materials to check compliance with these specifications.
2. The Contractor shall remove surface material at locations designated by the Engineer and provide such assistance as necessary for sampling and testing.

3. The Engineer may direct the Contractor to construct inspection trenches in compacted or consolidated backfill to determine that the Contractor has complied with these specifications.
4. Tests will be made in accordance with the following:

Test	Standard Procedure
Moisture content	ASTM D3017
Density in-place	ASTM D1556 or ASTM D2922
Moisture-density relationships	ASTM D1557

1.5 SUBMITTALS

- A. Comply with the General Provisions and include test results, certifications, and source for all earthwork materials.

PART 2: PRODUCTS

2.1 MATERIALS

- A. Imported fill
 1. Imported fill shall be imported granular material with a maximum plasticity index 12 and a three-inch maximum particle size. Imported fill shall be approved by the Engineer prior to importation to the site.
- B. Engineered Fill
 1. Engineered fill material shall consist of soil excavated onsite, free of debris, wood, trash, peat, and other objectionable material which may be compressible, or which cannot be compacted properly.
 2. Engineered fill shall be well graded and shall possess sufficient fines such that no nesting or voids result in the compacted mass.
 3. Engineered fill shall contain less than 3% organic matter or other deleterious substances by weight and shall not contain rocks or rubble fragments over three inches in greatest dimension.
 4. Soil removed during excavations will require drying prior to use as engineered fill material. Lime can be mixed with soil to dry it to compactable moisture content. The percentage of lime is dependent on the moisture content of the soils.
 5. Engineering fill shall comply with all material requirements in the Geotechnical Report.
- C. Crushed Rock (Drain Rock)
 1. Crushed rock shall be clean and free draining and conform to the following gradation:

Sieve Size	Percent Passing by Weight
3/4"	100
No. 4	0-5

2. Crushed rock material shall be composed of hard, durable, sound pieces having a specific gravity of not less than 2.60.

D. Pipe Bedding and Pipe Zone Material

1. Pipe bedding and pipe zone material shall be import sand. Sand shall be free of clay or organic material, suitable for the purpose intended, and conform to the following gradation:

Sieve Size	% Passing
#4	90-100
#200	0-5

E. Trench Backfill Material

1. Native material meeting the requirement of Engineered Fill or 3/8-inch minus granular material conforming to the following gradation:

Sieve Size	% Passing
3/4"	100
3/8"	100
#4	35 - 55
#30	20-60
#200	0-10
Sand Equivalent	30min
Minimum Dry Density	80 lb/cu ft
Coefficient of Permeability	1.4 in/hr

F. Gravel Material

1. 1-inch minus aggregate material obtained from a single source of uniformly graded angular rock, shall be clean and free draining with no more than 2% passing a No. 4 sieve, and shall be of such a nature that it can be spread and compacted to produce a stable driving surface.

G. Filter Fabric Material

1. Permeable, nonwoven, shall not act as a wicking agent, and shall conform to the requirements of the Filter Fabric found in Section 88 of the most current Standard Specifications, as issued by the California Department of Transportation.

H. Controlled Low Strength Material (CLSM)

1. Hand-excavatable, free-flowing and self-compacting material that consists of cement, pozzolan fly ash, fine and coarse aggregates, and water that has been mixed in accordance with ASTM C94.
2. The CLSM shall have a minimum 28-day compressive strength of not less than 50 psi and a maximum 28- day compressive strength of no more than 150 psi.
3. Placement of backfill or concrete on top of the CLSM is not allowed until the CLSM passes a ball drop test described in ASTM D6024.

PART 3: EXECUTION

3.1 GENERAL

- A. Control of Water
 - 1. Keep excavations free from water during construction. Groundwater shall be maintained either naturally or by dewatering at least three feet below the lowest anticipated excavation depth.
- B. Surplus Material
 - 1. Unless otherwise specified, surplus excavated material shall be disposed of at the Contractor's expense.
 - 2. The Contractor shall satisfy himself that there is sufficient material available for the completion of the work before disposing of any material inside or outside the site. Shortage of material, caused by premature disposal of any material by the Contractor, shall be replaced by the Contractor at his expense.
- C. Hauling
 - 1. When hauling is done over highways or city streets, the loads shall be trimmed and the vehicle shelf areas shall be cleaned after each loading. The loads shall be watered after trimming to eliminate dust.
- D. Maintenance of Roadways
 - 1. All earthwork operations shall be performed in a manner which does not disrupt the continuous flow of traffic on existing roadways. All streets shall be swept clean daily where dirt and debris result from contractor's operations.
- E. Finish Grading
 - 1. Finish grades and existing or natural grades in the area of work are indicated on the plans. If no finished grade is shown on the Plans, Contractor shall grade to existing.
 - 2. The Contractor shall do all grading, filling or excavating as required to completely grade the site to lines and grades shown, and to provide for the indicated drainage.
 - 3. Where finished grade corresponds practically with existing grade, the ground shall be worked up and graded off evenly with existing grade.
 - 4. Filled areas shall be compacted so as to prevent settlements and the Contractor shall be responsible for a period of one year after final acceptance of the project to provide additional fill as necessary to bring to grade any areas which settle below the indicated grades and to replace or repair any planting or work damaged by such settlement.
- F. Tolerances
 - 1. Finished grade shall be to the line and grade shown on the plans to within a tolerance of plus or minus 0.05 ft.
 - 2. Allowance for topsoil and grass cover, and sub-base and pavement thickness shall be made so that the specified thickness can be applied to attain the finished grade.

- G. Control of Erosion
1. The Contractor shall maintain earthwork surfaces true and smooth and protected from erosion.
 2. Erosion control measures, such as silt fences, filter fabric, sedimentation ponds, placement of straw waddles along the peripheries of construction sites, temporary detention ponds, and terraced slopes, shall be employed as appropriate and shall be in place prior to any clearing or grading activity.

3.2 EXCAVATION AND COMPACTION

- A. General
1. Excavation shall be in accordance with the Plans and as required for construction. Excavations shall be kept free from water while construction is in progress. The Engineer shall be notified immediately in writing if it becomes necessary to remove soft, weak, or wet material. Wet excavated materials may need to be dried by aeration prior to being used as engineered fill.
 2. Soil disturbed or weakened by the Contractor's operations and soils permitted to soften from exposure to weather shall be excavated to firm foundation and refilled with engineered fill material compacted to 95 percent of ASTM D1557, maximum density. All work of this nature will be at the Contractor's expense.
- B. Trench Excavation
1. Trench sides shall be constructed as nearly vertical as practicable. Sides of trenches shall not be sloped between the bottom of the trench and the elevation of the top of the pipe.
 2. Bottom of trenches shall be graded accurately to provide uniform bearing and support for each section of pipe or conduits on undisturbed soil, or bedding material as indicated or specified at every point along its entire length except for portions where it is necessary to excavate for bell holes and for making proper joints.
 3. Bell holes and depressions for joints shall be dug after trench has been graded. Dimension of bell holes shall be as required for properly making the joint to ensure that the bell does not bear on the bottom of the excavation. Trench dimensions shall be as indicated.
- C. Structural Excavation
1. General
 - a. The bottom excavation elevation shall be enough to allow the proper placing of forms and concrete construction to undisturbed weathered material to the elevations indicated, or as specified herein.
 - b. Unless otherwise specified, excavations shall extend enough distance from walls and footings to allow for placing and removal of forms, installation of services, and for inspection, except where concrete is specified to be placed directly against excavated surfaces.
 2. Foundation Inspection

- a. Whenever any structure excavation is substantially completed to grade, the Contractor shall notify the Engineer who will inspect the foundation for uniformity and suitability as a structure foundation.
- b. No gravel, rock, sand, concrete or masonry shall be placed until the foundation has been inspected by the Engineer.
- c. The Contractor shall, if directed by the Engineer, dig test pits and make test borings and foundation bearing tests.
- d. If the material tested complies with the specifications, the cost thereof will be paid for as extra work.
- e. If the material tested does not comply with the specifications, the cost thereof (initial testing, remedial work, re-testing) will be borne by the Contractor.

3.3 SUBGRADE PREPARATION

- A. Ground surfaces receiving fill shall be prepared by clearing and grubbing as specified in these specifications, and by removing soil which is high in organic content and other deleterious material.
- B. Subgrade shall then be scarified to a depth of 8 inches, brought to a uniform moisture content of one (1%) to three percent (3%) above optimum and compacted to at least 90 percent (90%) maximum dry density as determined by ASTM D1557.

3.4 FILLING OPERATIONS

- A. General
 1. The Contractor shall be responsible for the maintenance and protection of all embankments and fills made during the contract period and shall bear the expense of replacing any portion which has been displaced due to carelessness, negligent work, erosion or failure to take proper precautions.
 2. If the existing slope in an area to be filled is greater than 5:1, the Contractor shall bench the area prior to filling to allow each lift to be keyed 1 foot into the existing slope.
- B. Construction of Engineered Fill and Imported Fill
 1. Finish grade shall be established with onsite engineered fill and imported fill placed in lifts not to exceed eight inches in compacted thickness and uniformly compacted at or near the optimum moisture content.
 2. Each layer shall be spread evenly and shall be thoroughly mixed during spreading to promote uniformity of the material in each layer.
 3. When the moisture content of Engineered Fill with clay materials is less than two percent (2%) over optimum, water shall be added until a moisture content of at least two percent (2%) over optimum is achieved.
 4. When the moisture content of Imported Fill is less than optimum, water shall be added until a moisture content of at least optimum is achieved.
 5. When the moisture content of the Engineered Fill is too high to permit the specified compaction, the fill shall be aerated by blading or other methods until satisfactory moisture content is achieved.

6. No fill shall be placed during weather conditions, which will alter the moisture content of the fill materials sufficiently to make adequate compaction impossible.
 7. After placing operations have been stopped because of adverse weather conditions, no additional fill material shall be placed until the last layer compacted has been checked and found to be compacted to the specified densities.
- C. Pipe Bedding and Trench Backfill
1. Bedding
 - a. Provide six-inch minimum bedding material under pipe. Bedding shall be placed in 6-inch maximum loose lifts.
 - b. Provide uniform and continuous support for each section of utility except at bell holes or depressions necessary for making proper joints.
 - c. Bring up evenly on each side and along the full length of the pipe.
 - d. Ensure that no damage is done to piping or their protective coatings.
 - e. Compact each loose lift as specified below before placing the next lift.
 - f. Do not place bedding in freezing weather or where the material in the trench is already frozen or is muddy, except as authorized.
 2. Backfilling
 - a. Backfill shall be placed in 6-inch maximum loose lifts, mechanically consolidated and shovel sliced under the haunches of the pipe. See City Improvement Standards for backfill and compaction requirements.
 - b. Where settlements greater than the tolerance allowed herein for grading occur in trenches and pits due to improper compaction, excavate to the depth necessary to rectify the problem, then backfill and compact the excavation as specified herein and restore the surface to the required elevation.
 - c. Coordinate backfilling with testing of utilities.
 3. Unsuitable Material Under Bedding
 - a. If soft, spongy, unstable, or similar other material is encountered upon which the bedding material or pipe is to be placed, this unsuitable material shall be removed to a minimum depth of 12-inches below the pipe.
 - b. The 12-inch depth shall be backfilled with pervious material or accepted bedding material suitably compacted.
 - c. Sufficient pervious material shall be installed to provide a stable base accepted by the Engineer prior to installation of the utility, pipe, or structure.

3.5 COMPACTION

A. General

1. Each layer or lift of material specified shall be compacted so that the in-place density tested is not less than the percentage of maximum density

identified herein. Compaction shall be accomplished by mechanical equipment such as tamping rollers, sheepsfoot rollers, pneumatic tire rollers, vibrating rollers, or other mechanized tampers suitable for the work.

2. Compaction of materials by ponding and jetting is prohibited.
 3. Compaction equipment and procedures are subject to approval by the Engineer.
 4. Compaction shall be in accordance with Section 02223.
- B. Consolidation of Crushed Rock
1. Crushed rock shall be consolidated by one of three methods, as follows:
 - a. A minimum of three (3) passes with a vibrator plate compactor
 - b. Tamping of the crushed rock as it is placed, using the bucket of the backhoe
 - c. Thoroughly wheel rolling with equipment
 2. Each lift of rock shall not exceed 12 inches of unconsolidated thickness.

3.6 CLEAN UP

- A. After completing all earthwork, the Contractor shall leave the site in a neat and clean condition, doing all such grading as is required by the plans. Any existing features, structures, and other facilities damaged or affected by the work shall be replaced, repaired, or restored to their original condition or better.

END OF SECTION

SECTION 02222

ABANDONMENT OF PIPELINES AND MANHOLES

PART 1: GENERAL

1.01 DESCRIPTION

This section includes abandonment in place of existing pipelines and manholes, when indicated on the Drawings for abandonment.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 01300: Submittals
- B. Section 02223: Trenching, Backfilling, and Compacting

1.03 QUALITY ASSURANCE REFERENCES

This section contains references to some or all of the following documents, most recent edition. They are a part of this section as specified and modified. 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 C150	Standard Specification for Portland Cement.
ASTM C494	Standard Specification for Chemical Admixture for Concrete.
ASTM C618	Standard Specification for Fly Ash and Raw or Calcinated Natural Pozzolan for use as Mineral Admixture in Portland Cement Concrete.
ASTM C940	Standard Test Method for Expansion and Bleeding of Freshly Mixed Grout for Replaced Aggregate Concrete in the Laboratory.
ASTM C1017	Standard Specification for Chemical Admixture for Use in Producing Flowing Concrete.
ASTM C1107	Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Non-Shrink).

1.04 DEFINITIONS

- A. Abandonment. Pipeline abandonment consists of filling or plugging portions of existing pipelines with flowable fill or grout plugs, as indicated on the Drawings. Manhole abandonment consists of removing cylinders, rings, and lids above the depth indicated on the Drawings, and filling the remainder with flowable fill.
- B. Flowable Fill. Flowable fill shall be controlled low-strength material (CLSM) consisting of fluid mixture of cement, fly ash, aggregate, water, and with admixtures as necessary to provide workable properties. Placement of flowable fill may be by grouting techniques in pipelines or other restricted areas, or as mass placement by chutes or tremie methods in unrestricted locations with open access. Long-term hardened strength shall be within specified range.

- C. Backgrouting. Secondary stage pressure grouting to ensure that voids have been filled within abandoned pipes. Backgrouting will only be required if there is evidence of incomplete flowable fill placements.

1.05 SUBMITTALS

- A. Submit flowable fill mix design report.
 - 1. Flowable fill type and production method. Describe if fill will be mixed to final proportions and consistency in batch plant or if constituents will be added in transit mixer at placement location.
 - 2. Aggregate gradation of fill. Aggregate gradation of mix shall be used as pilot curve for quality control during production.
 - 3. Fill mix constituents and proportions including materials by weight and volume, and air content. Give types and amounts of admixtures including air entrainment or air generating compounds.
 - 4. Fill densities and viscosities, including wet density at point of placement.
 - 5. Initial time of set.
 - 6. Bleeding and shrinkage.
 - 7. Compressive strength.
- B. Submit technical information for equipment and operational procedures including projected injection rate, grout pressure, method for controlling grout pressure, bulkhead and vent design and number of stages for grout application.

PART 2: MATERIALS

2.01 FLOWABLE FILL

- A. Design Mix Criteria. Provide design of one or more mixes to meet design criteria and conditions for placement. Present information required by Part 1, Paragraph 1.05-A in mix design, to include the following:
 - 1. Cement: ASTM C150 Type I or II. Volume and weight per cubic yard of fill. Provide minimum cement content of 50 pounds per cubic yard.
 - 2. Fly ash: ASTM C618, Class C or F. Volume and weight per cubic yard of fill. Provide minimum fly ash content of 200 pounds per cubic yard.
 - 3. Potable water: Volume and weight per cubic yard of fill. Amount of water determined by mix design testing.
 - 4. Aggregate gradation: 100 percent passing 3/8-inch sieve and not more than 10 percent passing No. 200 sieve. Mix design report shall define pilot gradation based on following sieve sizes: 3/8 inch, No. 4, 8, 16, 30, 50, 100, and 200. Do not deviate from pilot gradation by more than plus or minus 10 percentage points for any sieve for production material.

5. Aggregate source material: Screened or crushed aggregate, pit or bank run fine gravels or sand, or crushed concrete. If crushed concrete is used, add at least 30 percent natural aggregate to provide workability.
 6. Admixtures: Use admixtures meeting ASTM C494 and ASTM C1017 as needed to improve pumpability, to control time of set and to reduce bleeding.
 7. Fluidifier: Use fluidifier meeting ASTM C937 as necessary to hold solid constituents in suspension. Add shrinkage compensator if necessary.
 8. Performance additive: Use flowable fill performance additive, if needed, to control fill properties.
- B. Flowable Fill Requirements:
1. Unconfined compressive strength: minimum 75 psi and maximum 150 psi at 56 days as determined based on an average of three tests for same placement. Present at least three acceptable strength tests for proposed mix design in mix design report.
 2. Placement characteristics: self-leveling.
 3. Shrinkage characteristics: non-shrink.
 4. Water bleeding for fill to be placed by grouting method in pipes: not to exceed 2 percent according to ASTM C940.
 5. Minimum wet density: 90 pounds per cubic foot.
- C. Grout Plugs
1. Cement-based dry-pack grout conforming to ASTM C1107, Grade B or C.

PART 3: EXECUTION

3.01 REQUIREMENTS BY PIPE LOCATION, SIZE, AND DEPTH

- A. Pipes indicated on the Drawings to be abandoned in place shall be completely filled with flowable fill.
- B. Sewer laterals indicated on the Drawings to be abandoned in place shall not be filled with any flowable fill. Sewer laterals to be abandoned shall be cut at the ends and plugged or capped.
- C. Pipes under structures, waterways, roads, railroad tracks, rail right-of-ways, or similar surface obstructions, and depth or diameter. Pipes indicated on the Drawings to be abandoned in place shall be completely filled with flowable fill.
- D. No existing pipeline facility shall be abandoned until all new facilities serving the same area are in operation and as authorized by the Construction Manager. In the case of water or sewer pipeline that are to be removed due to conflicts with new

work, the existing pipelines may be removed after the bypass system has been installed and tested.

- E. Where existing pipe is to be abandoned, the Contractor shall cut back the abandoned pipe for a distance of five feet from any connecting structure. All holes at the existing structures shall be repaired. The abandoned pipe shall be filled with CLSM or approved alternate pumpable mix design and capped or plugged with at least a 2 foot depth of concrete at both ends prior to backfill.

3.02 PREPARATION

- A. Notify inspector at least 24-hours in advance of grouting with flowable fill.
- B. Select fill placement equipment and follow procedures with sufficient safety and care to avoid damage to existing underground utilities and structures. Operate equipment at pressure that will not distort or imperil portions of the work, new or existing.
- C. Cut and cap portions of the piping system to remain, as shown on the Drawings. Drain water mains to be abandoned.
- D. Clean sewer lines and video to identify connections and locate obstructions. Locate previously unidentified connections which have not been redirected or reconnected as part of the work and report them to the Project Manager. During placement of fill, compensate for irregularities in sewer pipe, such as obstructions or open joints, to ensure no voids remain unfilled.
- E. Perform demolition work prior to starting fill placement. Clean placement areas for pipes and manholes of debris that may hinder fill placement. Remove excessive amounts of sludge and other substances that may degrade performance of the fill. Do not leave sludge or other debris in place if filling more than 2 percent of placement volume. Dispose of waste material in accordance with applicable codes and regulations.
- F. Remove free water prior to fill placement.

3.03 EQUIPMENT

- A. Mix flowable fill in automated batch plant and deliver it to site in ready-mix trucks. Performance additives may be added at placement site if required by mix design.
- B. Use concrete or grout pumps capable of continuous delivery at planned placement rate.

3.04 DEMOLITION OF SEWER MANHOLES PRIOR TO ABANDONMENT

- A. Remove manhole frames and covers and castings and dispose or recycle as applicable. Obtain City approval before reusing frames and covers within the work.

- B. Demolish and remove precast concrete rings to the depth indicated on the plans. Minimum depth of removal shall be 3-feet below finished grade, or 12-inches below any crossing utility, whichever is greater.

3.05 INSTALLATION OF FLOWABLE FILL

- A. Abandon pipelines, as required in Part 3, Paragraph 3.01, by completely filling with flowable fill. Abandon manholes by filling the portion not removed with flowable fill.
- B. Place flowable fill equal to volume of pipe being filled. Continuously place flowable fill from manhole to manhole with no intermediate pour points, but not exceeding 500 linear feet of pipe per fill segment.
- C. Perform operation with experienced crews with equipment to monitor density of flowable fill and to control pressure.
- D. Temporarily plug or cap pipe segments which are to remain in operation during filling to keep lines free of flowable fill.
- E. Pump flowable fill through bulkheads or use other suitable construction methods to contain flowable fill in lines to be abandoned.
- F. Place flowable fill under pressure flow conditions into properly vented open system until flowable fill emerges from vent pipes. Pump flowable fill with sufficient pressure to overcome friction. Fill sewers from the downstream end to vent at upstream end.
- G. Backfill excavations per Section 02223, Trenching, Backfilling, and Compacting.
- H. Collect and dispose of excess flowable fill material and debris.

3.06 INSTALLATION OF GROUT PLUGS

- A. Abandon pipelines of diameter 8-inches and below, as required in Part 3, Paragraph 3.01, by cutting and placing grout plugs.
- B. Clean inside surface of pipe at least 12-inches from ends, achieving firm bond and seal grout plug to pipe surface. Similarly, clean and prepare exterior surface if manufactured cap is to be used.
- C. Place temporary plug or bulkhead approximately 12-inches inside pipe. Fill pipe end completely with dry-pack grout mixture.
- D. Backfill excavations per Section 02223, Trenching, Backfilling, and Compacting.
- E. Collect and dispose of excess grout material and debris.

3.07 QUALITY CONTROL

- A. Provide batch plant tickets for each truck delivery of flowable fill. Note on tickets addition of admixtures at site.
- B. Check flow characteristics and workability of fill as placement proceeds.
- C. Obtain at least three test cylinders for each placement area for determination of 56-day compressive strength and bleeding. Acceptance of placement will be based on average strength of three tests.
- D. Record volume of flowable fill placement to demonstrate that voids have been filled. If voids exceed 10% of pipeline volume, injection grouting may be required at the direction of the Project Manager.

3.08 PROTECTION OF PERSONS AND PROPERTY

- A. Provide safe working conditions for employees throughout demolition and removal operations. Observe safety requirements for work below grade.
- B. Maintain safe access to adjacent property and buildings. Do not obstruct roadways, sidewalks, or passageways adjacent to the work.

END OF SECTION

SECTION 02223

TRENCHING, BACKFILLING, AND COMPACTING

PART 1: GENERAL

1.01 DESCRIPTION

The work of this section consists of trenching and backfilling for the construction and installation of pipelines, conduits, and cables. All trenching will be open cut, unless otherwise approved in writing. It includes all clearing and grubbing, trenching or tunneling, construction of cribbing and cofferdams, dewatering, incidental work, and providing specified backfill.

Excavated soil at the site will generally be suitable for use as backfill above the pipe zone provided it does not contain deleterious matter, vegetation or cementations larger than 3 inches in maximum dimension. Pipe zone materials (bedding shading, etc.) shall conform to the requirements of the pipe manufacturer or utility authority, as appropriate and will likely consist of imported aggregate or sand.

Temporary excavation, sloping, and shoring shall be per Section 02400.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 01300: Submittals
- B. Section 01666: Testing of Gravity Sewer Lines and Manholes
- C. Section 02200: Earthwork
- D. Section 02225: Structure Excavation and Backfill
- E. Section 02400: Sheet piling, Waling, and Shoring
- F. Section 02510: Paving and Road Surfacing

1.03 SUBMITTALS

- A. Submit an electronic copy of a report from a testing laboratory verifying that backfill material conforms to the specified gradations of characteristics for granular material, imported sand, rock refill for foundation stabilization, and water.
- B. Submit method of compaction in pipe zone, including removal sequence of shoring where used.
- C. Provide written description of barricading, shoring, cribbing, bracing, and sloping precautions.

1.04 PROJECT CONDITIONS

- A. Obtain all required permits and licenses before installing utilities under existing roads, other than City roads, and follow the rules and requirements of the authority having jurisdiction.

- B. Arrange construction sequences to provide the shortest practical time that the trenches will be open to avoid hazard to City staff, subcontractors, and the public, and to minimize the possibility of trench collapse.

1.05 TESTING FOR COMPACTION

- A. The Contractor shall test for compaction every 100 feet at locations determined by the Engineer.
- B. Relative compaction is defined as the ratio, as a percentage, of the as-compacted dry density to the laboratory maximum dry density. The laboratory maximum dry density is defined in accordance with ASTM D1557, latest edition.
- C. Where compaction tests indicate a failure to meet the specified compaction, the Contractor will take additional tests every 50 feet in each direction until the extent of the failing area is identified. Rework the entire failed area until the specified compaction has been achieved.

1.06 STREET ZONE

The street zone includes the asphalt concrete and aggregate base pavement section placed over the trench backfill.

1.07 TRENCH ZONE

The trench zone includes the portion of the trench from the top of the pipe zone to the bottom of the street zone in paved areas or to the existing surface in unpaved areas.

1.08 PIPE ZONE

The pipe zone shall include the full width of trench from the bottom of the pipe or conduit to a horizontal level above the top of the pipe, as shown on the contract drawings. Where multiple pipes or conduits are placed in the same trench, the pipe zone shall extend from the bottom of the lowest pipes to a horizontal level above the top of the highest or topmost pipe.

1.09 EXCAVATION BOTTOM CONDITIONS

Based on conditions encountered in our exploratory borings, materials exposed at the base of excavations are expected to be variable ranging from lean clay with sand and gravel to silty sand with gravel.

Generally, some form of excavation bottom stabilization will be necessary where wet, unstable soils are exposed. Since we do not know the extent of potential locally soft or unstable areas, our field representative shall provide mitigation recommendations in the field at the time of construction. Typical mitigation alternatives include overexcavation and replacement with a gravel mat wrapping in geosynthetic fabric to provide a stable bottom.

The weight of pipe, contents and compacted backfill above the pipe will not result in significant increased load over present overburden. Assuming soft and/or unsuitable subgrade areas are mitigated, pipeline settlement shall be negligible.

1.10 PIPE BEDDING

All earthwork operations shall be observed, and all fills tested for recommended compaction and moisture content by a geotechnical inspector.

Pipe zone materials (bedding, shading, etc.) shall conform to the requirements of the City and/or pipe manufacturer, as appropriate, and will likely consist of imported aggregate or sand.

The pipe base or bedding shall be defined as a minimum 6-inches thick layer of material immediately below the bottom of the pipe or conduit and extending over the full trench width in which the pipe is bedded.

Trench backfill shall be mechanically compacted. Flooding or jetting will not be allowed. Backfill shall be placed in lifts 12 inches or less in loose thickness, moisture-conditioned above optimum moisture content, and compacted to at least 90% relative compaction. Excavated soils may require drying prior to placement.

PART 2: MATERIALS

2.01 GRANULAR MATERIAL FOR BACKFILL - STREET ZONE

Granular material or granular soil for backfill used above the pipe zone shall be Class 2 Aggregate Base conforming to City Improvement Standards.

2.02 PIPE BASE AND PIPE ZONE

Pipe base and pipe zone material shall consist of import sand in accordance with Section 02200.

2.03 PIPE ZONE MATERIAL ALTERNATIVE - NOT USED

2.04 TRENCH ZONE MATERIAL

Trench zone material shall consist of native material conforming to engineered fill, in accordance with Section 02200.

2.05 CEMENT SLURRY - PIPE BASE AND PIPE ZONE ALTERNATIVE

Cement slurry backfill shall consist of Type I or II Portland cement, imported sand, and sufficient water for workability, per the most recent Caltrans Standard Specification 19-3.062. The mix shall produce a minimum 28-day strength of 50 PSI and 1×10^{-6} cm/sec permeability. Submit a mix design and confirming test results per Section 01300.

2.06 CONCRETE FOR PIPE ENCASEMENT AND THRUST BLOCKS – NOT USED

2.07 WATER FOR COMPACTION

Water for compaction shall be clean and free of oil, acids, salts, and other deleterious substances. Water shall be supplied by the Contractor at no additional expense to the Owner. The Contractor shall coordinate with the Engineer for the use of the water, shall provide all necessary labor and equipment to extract the water, and shall be responsible for the repair of any damage to the existing facilities which can be attributed to this operation.

PART 3: EXECUTION

3.01 COMPACTION REQUIREMENTS

Unless otherwise shown in the drawings or otherwise described in the specifications for the particular type of pipe installed, relative compaction in pipe trenches shall be as follows:

- A. Pipe Base: 95% relative compaction.
- B. Pipe Zone: 95% relative compaction.
- C. Backfill in Trench Zone not Beneath Paving or Aggregate Base Access Roadways: 90% relative compaction.
- D. Backfill in Trench Zone to Street Zone in Paved Areas or Within Limits of Aggregate Base Roadways: 95% relative compaction.
- E. Backfill in Street Zone in Paved Areas or within Limits of Aggregate Base Roadways: 95% of relative compaction.
- F. Refill for Foundation Stabilization: 95% relative compaction.
- G. Refill for Over-excavation: 95% relative compaction.

3.02 MATERIAL REPLACEMENT

Remove and replace any trenching and backfilling material which does not meet the specifications, at the Contractor's expense.

3.03 SLOPING, SHEETING, SHORING, AND BRACING OF TRENCHES

Trenches shall have sloping, sheeting, shoring, and bracing conforming with 29CFR1926, Subpart P – Excavations, CAL/OSHA requirements, and Section 02400.

3.04 SIDEWALK, PAVEMENT, AND CURB REMOVAL

Cut bituminous and concrete pavements regardless of the thickness and curbs and sidewalks prior to excavation of the trenches with a pavement saw or pavement cutter. Width of the pavement cut shall be at least equal to the required width of the trench at ground surface. Haul pavement and concrete materials from the site. Do not use for trench backfill.

3.05 TRENCH WIDTHS

Trench widths in the pipe zone shall be as shown in the drawings. If no details are shown, maximum width shall be 24 inches greater than the pipe outside diameter. Comply with 29CFR Part 1926 Subpart P – Excavations. Trench width at the top of the trench will not be limited except where width of excavation would undercut adjacent structures and footings. In such case, width of trench shall be such that there is at least 2 feet between the top edge of the trench and the structure or footing.

3.06 TRENCH EXCAVATION

Excavate the trench to the lines and grades shown in the drawings with allowance for pipe thickness, sheeting and shoring if used, and for pipe base or special bedding. If the trench is excavated below the required grade, refill any part of the trench excavated below the grade at no additional cost to the Owner with foundation stabilization material. Place the refilling material over the full width of trench in compacted layers not exceeding 6-inches deep to the established grade with allowance for the pipe base or special bedding.

3.07 DEWATERING

- A. Provide and maintain means and devices to remove and dispose of all water entering the trench excavation during the time the trench is being prepared for the pipelaying, during the laying of the pipe, and until the backfill at the pipe zone has been completed. These provisions shall apply during the noon hour as well as overnight. Dispose of the water in a manner to prevent damage to adjacent property and in accordance with regulatory agency requirements. Do not drain trench water through the pipeline under construction. Do not allow groundwater to rise around the pipe until jointing compound has set hard.

3.08 LOCATION OF EXCAVATED MATERIAL

During trench excavation, place the excavated material only within the working area. Do not obstruct any roadways or streets. Conform the federal, state, and local codes governing the safe loading of trenches with excavated material. All trenches shall be backfilled at the end of each day's operation. Trench patching with asphalt concrete shall be completed within 24 hours of trench backfill.

3.09 LENGTH OF OPEN TRENCH

Limit the length of open trench to 50 feet in advance of pipe laying or amount of pipe installed in one working day, whichever is less, and not more than 50 feet in the rear of pipe laying, except as modified by encroachment permit requirements. At the end of each working day, the trench shall be backfilled to match existing surface.

3.10 TRENCH EXCAVATION IN BACKFILL AND EMBANKMENT AREAS

- A. Construct trench excavation for pipe, pipes, or conduit in backfill or embankment areas in accordance with the following procedures:
- B. Construct and compact the embankment to an elevation of 1-foot minimum over the top of the layer of the largest pipe or conduit to be installed.
- C. Excavate trench in the compacted backfill or embankment. Place cement slurry in the pipe base and pipe zone. Compact backfill above the pipe zone to the relative compaction required for trench zone backfill.

3.11 FOUNDATION STABILIZATION

- A. After the required excavation has been completed, the Owner and/or Agency will inspect the exposed subgrade to determine the need for any additional excavation. It is the intent that additional excavation is conducted in all areas within the influence of the pipeline where unacceptable materials exist at the exposed sub-

grade. Over-excavation shall include the removal of all such unacceptable materials that exists directly beneath the pipeline to the required trench width and to the depth required. Backfill the trench to sub-grade of pipe base with fill material adequate for foundation stabilization. Place the foundation stabilization material over the full width of the trench and compact in layers not exceeding 6-inches deep to the required grade. Foundation stabilization work above and beyond the recommended stabilization of bedding and foundation preparation in this section and Section 02225 may be executed in accordance with a change order. Any claims relating to this work without prior written authorization will be at the contractor's expense.

- B. Refill used by the Contractor for his convenience will not receive any additional payment.

3.12 INSTALLING BURIED PIPING

- A. Backfill per the detailed piping specification for the particular type of pipe and per the following.
- B. Handle pipe in such a manner as to avoid damage to the pipe. Do not drop or dump pipe into trenches under any circumstances.
- C. Inspect each pipe or fitting prior to placing into the trench. Inspect the interior and exterior protective coatings. Patch damaged areas in the field with material recommended by the protective coating manufacturer. Clean ends of pipe thoroughly. Remove foreign matter and dirt from inside of pipe and keep clean during and after installation.
- D. Grade the bottom of the trench to the line and grade to which the pipe is to be laid, with allowance for pipe thickness and bedding depth. Remove hard spots that would prevent a uniform thickness of bedding. Place the specified thickness pipe base material over the full width of trench. Grade the top of the pipe base ahead of the pipe laying to provide firm, continuous, uniform support along the full length of pie, and compact to the relative compaction specified herein. After laying each section of the pipe, check the grade and alignment and correct any irregularities prior to laying next joint.
- E. Excavate bell holes at each joint to permit proper assembly and inspection of entire joint. Fill the area excavated for the joints with the bedding material specified or detailed in the drawings.
- F. When installing pipe, do not deviate more than 1-inch from line or 1/4 -inch from grade. Measure elevation at the pipe invert. The Contractor shall verify pipe grade at not more than 80 feet intervals, in the presence of the Owner's Representative.
- G. After pipe has been bedded, place pipe zone material simultaneously on both sides of the pipe, in maximum 6-inch lifts, keeping the level of backfill the same on each side. Carefully place the material around the pipe so that the pipe barrel is completely supported and that no voids or compacted areas are left beneath the pipe. Use particular care in placing material on the underside of pipe to prevent lateral movement during subsequent backfilling.
- H. For pipe sizes greater than 12-inches in diameter, no more backfill material than the lesser of 6-inches or 1/3rd of the pipe diameter shall be placed prior to shovel

slicing. Sufficient care shall be taken to prevent movement of the pipe during shovel slicing. Shovel slicing shall be witnessed by the Field Inspector and/or Geotechnical Engineer.

- I. Compact each lift to the relative compaction specified herein.
- J. Push the backfill material carefully onto the backfill previously placed in the pipe zone. Do not permit free fall of the material until at least 2 feet of cover is provided over the top of the pipe. Do not drop sharp, heavy pieces of material directly onto the pipe or the tamped material around the pipe. Do not operate heavy equipment over the pipe until at least 3 feet of backfill has been placed and compacted over the pipe.
- K. When pipe laying is not in progress, including the noon hours, close the open ends of pipe. Do not allow trench water, animals, or foreign material to enter the pipe.
- L. Remove and dispose of all water entering the trench during the process of pipe laying. Keep the trench dry until the pipe laying and jointing are completed.

3.13 BACKFILL COMPACTION

Compact per the detailed piping specification for the particular type of pipe and per the following:

- A. Compact trench backfill to the specified relative compaction. Compact by using mechanical compaction or hand tamping. Do not use high impact hammer-type equipment except where the pipe manufacturer warrants in writing that such use will not damage the pipe. Ponding or jetting is not allowed.
- B. Compact material placed within 12-inches of the outer surface of the pipe by hand tamping only.
- C. Do not use any axle-driven or tractor-drawn compaction equipment within 5 feet of building walls, foundations, or other structures.

3.14 CEMENT SLURRY BACKFILL

When cement slurry backfill is utilized, pipe shall be supported by mounding imported backfill material or sandbags filled with imported backfill material. Pipe shall not be supported on wooden or concrete blocks.

END OF SECTION

SECTION 02225

STRUCTURE EXCAVATION AND BACKFILL

PART 1: GENERAL

1.01 DESCRIPTION

The work of this section consists of all structure excavation and backfill required to complete the work, including rock excavation and furnishing select or imported backfill. It includes disposal of surplus or unsuitable material.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 01300: Submittals
- B. Section 02200: Earthwork
- C. Section 02223: Trenching, Backfilling, and Compacting

1.03 QUALITY ASSURANCE

Evaluation of all fill materials and testing required to determine compliance for the work of this section will be the responsibility of the Contractor and at the Contractor's expense. Areas where test results indicate noncompliance shall be corrected before placing additional backfill.

1.04 PROJECT CONDITIONS

Excavations should be performed carefully to avoid damaging existing underground utilities and adjacent structures. Adjacent improvements should be monitored by the Contractor so that excavation methods and support systems can be modified in a timely manner, if surface deflections are observed.

Take necessary precautions to prevent the entrance of soils and other materials into streambeds, lakes, or water courses.

1.05 RELATIVE COMPACTION TEST

- A. The Contractor will test for compaction every 100 square feet at locations determined by the Engineer.
- B. Relative compaction is defined as the ratio, in percent, of the as-compacted dry density to the laboratory maximum dry density. The laboratory maximum dry density is defined in accordance with ASTM D1557, latest edition.
- C. Where compaction tests indicate a failure to meet the specified compaction, the Contractor will take additional tests every 50 square feet in each direction until the extent of the failing area is identified. Rework the entire failed area until the specified compaction has been achieved.

PART 2: MATERIALS

2.01 ENGINEERED FILL

See Section 02200 for Material Requirements.

2.02 CRUSHED ROCK

Material shall be crushed rock of one-inch (1") maximum size, with no material passing a Number four (#4) sieve.

2.03 AGGREGATE BASE

Aggregate base shall be Class 2 aggregate base, ¾" maximum as specified in Section 26 of the most recent California Department of Transportation Standard specifications.

2.04 DRAIN ROCK

Drain rock shall be Class 1, Type B permeable material as specified in Section 68 of the most recent California Department of Transportation Standard specifications.

2.05 DRAIN ROCK FABRIC

Drain rock fabric shall be non-woven geotextile fabric.

PART 3: EXECUTION

3.01 CLEARING

Perform clearing operations in accordance with Section 02100.

3.02 STRUCTURAL EXCAVATION

A. General: All excavation for structures shall be done to the dimensions and levels indicated on the drawings or specified herein.

1. Under all structures, the Contractor shall:

- a. Excavate to sub-grade, remove and dispose of organic material and unsuitable soils.
- b. Scarify the surface a minimum depth of 8 inches; bring the moisture content to at least 3 percent above optimum and compact to not less than 90 percent relative compaction.
- c. Place Engineered Fill in 8-inch maximum lifts to obtain sub-grade elevations. Compact to not less than 95 percent relative compaction and at a moisture content of at least 2 percent above optimum.

2. Under all pavements, the Contractor shall:

- a. Excavate to below sub-grade, remove and dispose of organic material and unsuitable soils.
- b. Scarify the surface a minimum depth of 12 inches; bring the moisture content to at least 3 percent above optimum and compact to not less than 95 percent relative compaction.
- c. Place Engineered Fill in 8-inch maximum lifts to obtain sub-grade elevations. Compact to not less than 95 percent relative compaction and at a moisture content of at least 2 percent above optimum.

Excavation shall be made to such width outside the lines of the structure to be constructed therein as may be required for proper working methods, the erection of forms and the protection of the work. Care shall be taken to

preserve the foundation surfaces shown on the drawings in an undisturbed condition. If the Contractor excavates or disturbs the foundation surfaces shown on the drawings or specified herein without written authorization of the Engineer he shall replace at his expense such foundations with compacted gravel foundation fill or other material approved by the Engineer in a manner which will show by test an equal bearing strength with the undisturbed foundation material.

- B. Bracing, Sheeting, and Shoring: Care shall be exercised in excavating for lower footings not to disturb bearing under higher adjacent footings or structures. Existing structures and pipework shall be adequately braced and cared for so that no damage will result. The Contractor shall submit structural calculations and drawings signed and sealed by a civil engineer registered in the State of California showing members, connections, and anchorage of the proposed bracing, sheeting, and shoring. The Contractor shall provide suitable sheeting and shoring, where necessary, for protection of the excavations. All such sheeting and shoring shall be removed unless otherwise specifically authorized.
- C. Unsuitable Materials: To suit field conditions, excavation below the depths shown may be ordered, but changes may only be made as directed. Soft, spongy, or unsuitable bearing material of any kind shall be entirely removed down to solid bearing soil and replaced with an engineered fill as specified herein. In such event only the excess excavation and fill will be paid for as extra work.
- D. Dewatering: Any water that may be encountered or that may accumulate in excavations shall be removed and kept out by pumping or other approved methods, and all construction shall be carried on in the dry. Water shall be kept down until structures are complete to above water, safe from uplift and horizontal water pressure and the backfill has been placed.
- E. Approval of Excavation: The Contractor shall notify the Engineer when excavation for a structure is complete and no forms, reinforcing steel or concrete, shall be placed until the excavation has been deemed acceptable by the Engineer. Once the excavation is deemed acceptable, the Contractor must protect the work from flooding or groundwater uplift.
- F. Disposal of Waste Excavation: Excavated material determined by the Engineer to be unsuitable, or in excess of the amounts required for backfill shall be disposed off-site at no additional cost to the Owner.

3.03 ENGINEERED FILL

- A. General: All soil under structures, pavements, and at other locations where indicated on the drawings shall be made using Engineered Fill sub-base, carefully controlled and compacted on a prepared surface.
- B. Surface Preparation: The surface on which fill is to be placed shall be free of all vegetation, debris, or other objectionable material, and all large roots shall be grubbed out to a depth of at least 2 feet below footing, slab, or pavement elevations and 5 feet beyond the limits of the proposed improvements. The surface shall be scarified to a depth of 12 inches, brought to a moisture content of optimum plus approximately 2 percent. It may be necessary to adjust the moisture content of the sub-grade soil by watering or aeration to bring the moisture content of the soil near optimum in order that the specified densities can be obtained.
- C. Placement of Fill:

1. Fill materials shall be spread in a maximum of 8-inch lifts and shall have uniform moisture content that will provide the specified dry density after compaction. If necessary to obtain uniform distribution of moisture, water shall be added to each layer by sprinkling and the soil disced, harrowed, or otherwise manipulated after the water is added. If the material is too wet, the moisture content shall be reduced as necessary by spreading and aerating.
2. Field density tests shall be used to check the compaction of the fill materials. Sufficient tests shall be made on each layer by the Engineer to assure adequate compaction throughout the entire area. If the dry densities are not satisfactory, the contractor will be required to increase the weight of the roller or the number of passes as required to produce the specified densities.
3. Where trenches must be excavated in Engineered Fill these trenches shall be backfilled with the fill materials excavated. The backfill shall be placed in 6 inch layers and each layer compacted with pneumatic tampers to provide densities as specified above. Backfill placed adjacent to walls shall be placed in a similar manner to that specified for backfill in excavated trenches.
4. No fill shall be placed during weather conditions which will alter the moisture content of the fill materials sufficiently to make adequate compaction impossible. After placing operations have been stopped because of adverse weather conditions, no additional fill material shall be placed until the last layer compacted has been checked and found to be compacted to the specified densities.

3.04 BACKFILL AGAINST STRUCTURES

Material for filling and backfilling around structures shall meet the requirements for Engineered Fill. Should the material available from excavation be insufficient or unsuitable for the required use, the Contractor shall furnish and place suitable material. Do not place backfill against newly constructed concrete structures for a period of 14 days unless authorized by the Engineer. Hand operated compactors shall be used for backfilling against concrete walls within a horizontal distance of H/2 of the structure, where H is defined as the vertical height of the backfill above the foundation. Backfill shall be placed in even, uniform lifts around the structure.

3.05 TEMPORARY EXCAVATION SLOPES

Based on the conditions encountered in exploratory borings, including shallow groundwater and zones of granular soil type the site may be considered OSHA "Type C". The Contractor shall have an OSHA-approved competent person onsite during excavation and pipe placement to evaluate trench/excavation conditions and to make appropriate recommendations where necessary.

Sloughing and caving should be anticipated, particularly in area with seepage zones of poorly grade, cohesionless sands. Flatter slopes, shoring, or safety shields may be needed in areas where sloughing raveling or running is likely. The Contractor shall have equipment readily available to flatten slopes or install shoring if necessary. Loose or easily erodible soils may be present locally and should be removed from excavation faces before personnel begin work below the slopes. In addition, stockpiled materials, equipment and other surcharge loads should be kept back a minimum distance from the top of the trench equal to the depth of the excavation.

3.06 EXCAVATION BOTTOM CONDITIONS

Based on conditions encountered in our exploratory borings, materials exposed at the base of excavations are expected to be variable ranging from lean clay with sand and gravel to silty sand with gravel.

Generally, some form of excavation bottom stabilization will be necessary where wet, unstable soils are exposed. Since we do not know the extent of potential locally soft or unstable areas, our field representative shall provide mitigation recommendations in the field at the time of construction. Typical mitigation alternatives include overexcavation and replacement with a gravel mat wrapping in geosynthetic fabric to provide a stable bottom.

The weight of pipe, contents and compacted backfill above the pipe will not result in significant increased load over present overburden. Assuming soft and/or unsuitable subgrade areas are mitigated, pipeline settlement should be negligible.

END OF SECTION

SECTION 02400
SHEETING, WALING, AND SHORING

PART 1: GENERAL

1.01 DESCRIPTION

The work of this section covers protective installations consisting of shores, wales, braces, posts, piling, sheeting, anchorages and fastenings required for the work of this project.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 01330: Submittals
- B. Section 02223: Trenching, Backfilling, and Compaction

1.03 QUALITY ASSURANCE

Design Criteria. Contractor shall design and construct temporary and permanent sheeting, shoring, and cofferdams, which are to be used as an aid in construction and portions shall be left in permanently to prevent sediment scour. Design shall be prepared in conformance with applicable requirements of Article 6, "Excavations, Trenches, Earthwork" of Construction Safety Orders of California State Division of Occupational Health and Safety. In addition, sheet piling design shall be based on the material requirements specified herein. Sloping of excavations shall not be employed below the groundwater or maximum aqueduct water elevation. Designs shall be prepared and signed by a Civil Engineer registered in the State of California and shall be based on the stresses for various materials of construction contained in the Uniform Building Code 1994 Edition and latest supplement. The allowable stresses permitted by the Uniform Building Code may be increased 15 percent for temporary shoring used as an aid to construction.

1.04 SUBMITTALS

- A. In accordance with Section 01300.
- B. Submit to the Engineer for record purposes copies of the drawings and calculations used to determine the strength, size, and stability of the protective installations. All designs submitted under this section shall be signed by a Structural or Civil Engineer duly registered in the State of California.
- C. Prior to the start of any work involving sheeting and bracing, the Contractor shall obtain a valid excavation permit from the Cal OSHA District office as required. A copy of the permit and all accompanying drawings, data, and calculations shall be submitted to the Engineer for record purposes only and not for review or approval.

1.05 ALTERNATIVES

The use or application of alternative methods and materials, and the employment of propriety systems under lease or franchise in lieu of that specified herein, may be

allowed. Demonstration of suitability and compliance with these specifications and approval of the Owner shall be required.

PART 2: PRODUCTS

2.01 MATERIALS

A. Sheet Piling

1. Sheeting shall be continuous interlock type. Steel sheeting shall be made in accordance with ASTM A857 from steel meeting the requirements of ASTM A570, Grade 30. Sheeting shall be hot-dipped galvanized per ASTM A123 at a rate of two ounces per square foot total both sides. The sides of each piece of sheeting shall be furnished with an interlock that is continuous for the full length of the sheeting. The interlock shall have an opening of sufficient width to allow free slippage of the adjoining sheet. Sheeting shall be "Metric Sheeting" as manufactured by Contech Construction Products, Inc, or approved equal.
2. Dimensions and Section Properties. Steel sheet piling used for cofferdams or shall be standard rolled metric sections. The sheeting shall be galvanized after fabrication and have the minimum physical and sectional properties; Physical Properties: 5 gauge (0.209 inches), Sectional Properties: Modulus – 6.28 in³, Moment of Inertia – 11.04 in⁴.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. General. Install sheeting and bracing for trench and structure excavation as the work requires. Butt planks to and/or interlock sheets to exclude groundwater and fines, preventing the erosion of voids outside sheeting. In soft, wet ground drive sheeting to a lower level as excavation progresses so that sheeting is embedded in undisturbed earth. Bracing of sheet piling may be permitted to penetrate the structural concrete only as approved by the Engineer. Install wales and struts at close intervals so as to prevent displacement of the surrounding earth and to maintain safe conditions in the work area. Any damage proven to result from improper installation shall be the responsibility of the Contractor.

Temporary sheeting for trench and structure excavation may be removed and re-used. Withdraw individual planks alternatively as the backfill is raised, maintaining sufficient sheeting and bracing to protect the work and workmen. Remove bracing completely. Where unstable conditions occur in the underlying strata from any cause, and withdrawal of sheeting will endanger the work, a portion of the sheeting, including bracing, may be left in place with approval of the Owner. Remove all wood within a zone extending to four (4) feet below finished grade. Leaving such material in place shall not be cause for an increase in Contract in price.

- B. Sheet Piling. The Contractor has the option of using steel sheet piling for temporary protective installations. All piling installations shall be continuous.

1. Installation of Sheet Piling. Depth of piling shall be sufficient to prevent heave when the trench is dewatered. Piles shall be driven with a hammer with an adequate capacity to complete pile driving without changing hammers. The use of air or water jets to assist in driving the sheet piling will be permitted, providing that the last 5 feet of advance is by driving. Piles shall be driven accurately to the lines and grades shown or required, with each section interlocked with the sheet piles driven previously. To ensure proper alignment of the sheet piles, a driving template or jig shall be used. If any pile is damaged during driving, it shall be removed and replaced. If piles are driven out of interlock or are not properly plumbed or aligned, the piles shall be pulled and re-driven.
2. Prevention of Damage. In installing, cutting off, or removing sheet piles, every precaution shall be taken to ensure that damage to the structure or pipeline does not occur. If damage does occur, the Contractor shall perform the necessary repairs at his own expense.

3.02 PROTECTION OF EXISTING FACILITIES

It is the Contractor's responsibility to protect existing facilities from the consequences of his work. Where any sloped excavation infringes on or potentially endangers any existing facilities or structures, provide shoring, sheeting, and bracing according to shop drawings and calculations signed and stamped by a structural or civil engineer registered in the State of California.

END OF SECTION

SECTION 02510

PAVING AND ROAD SURFACING

PART 1: GENERAL

1.1 SECTION INCLUDES

- A. Contractor furnished labor, materials, equipment, and incidentals necessary to construct paving shown on the Plans, and/or specified herein. The work shall include, but not necessarily be limited to, scarifying and preparing the subgrade, placing and compacting engineered fill materials, placing and compacting Class 2 aggregate base, applying paint binder, placing and compacting asphalt concrete, and all related works.

1.2 REFERENCED SECTIONS

- A. The following Sections are referenced in this Section
1. Section 01300: Submittals
 2. Section 02200: Earthwork

1.3 SUBMITTALS

- A. Contractor shall submit the following information:
1. Manufacturer's Data or Certificate of Compliance
 - a. Aggregate base
 - b. Prime coat and paint binder
 - c. Asphalt concrete
 - d. Independent test laboratory name
 2. Certificate of compliance
 - a. A certificate of compliance signed by the manufacturer shall be furnished prior to the use of any asphalt materials.
 - b. The certificate shall state that the material complies with the requirements of these Specifications.
 - c. A certificate shall be furnished with each lot of material delivered to the site; the material provided shall be clearly identified in the certificate.
 - d. Certificates of compliance shall be provided for each type of asphalt product used.

1.4 REFERENCE PUBLICATIONS

Reference	Title
ASTM D2922	Density of Soil and Soil Aggregate in Place by Nuclear Methods
ASTM D3017	Moisture Content of Soil and Soil Aggregate Place by Nuclear Methods

PART 2: MATERIALS

2.1 ENGINEERING FILL

- A. Engineered fill shall be per these Specifications.

2.2 CLASS 2 AGGREGATE BASE

- A. Class 2 aggregate base shall meet all requirements of the most recent Caltrans Standard Specification Section 26-1.02 A for ¾-inch maximum grading.

2.3 PAINT BINDER (TACK COAT)

- A. The paint binder (tack coat) shall meet all the requirements of the most recent Caltrans Standard Specification Section 94.

2.4 HOT MIX ASPHALT

- A. Asphalt concrete shall meet the requirements of the most recent Caltrans Standard Specification for Type A Hot Mix Asphalt (1/2-inch maximum aggregate, medium grading).
- B. The asphalt to be mixed with the aggregate shall meet the section of the most recent Caltrans Standard Specification Section 92 for PG 64-10 steam-refined paving asphalt.

2.5 HEADER BOARD

- A. Composite of recycled wood and plastic fibers.

2.6 TRAFFIC STRIPING AND PAVEMENT MARKINGS

- A. Traffic striping and pavement markings shall be in accordance with Caltrans Standard Specification Section 84. Traffic striping and pavement markings shall match existing.

PART 3: EXECUTION

3.1 FINAL GRADING

- A. The final grade of the hot mix asphalt shall vary not more than 0.05 foot from the elevations indicated on the Plans and shall conform to the requirements of the most recent Caltrans Standard Specification Section 39. All areas shall be graded to drain. All personnel pathways and areas shall conform to minimum slopes as required by ADA Standards.

3.2 SCARIFYING AND COMPACTING

- A. All the subgrade material underlying asphalt concrete surfacing shall be over excavated and filled per these specifications and compacted to a relative compaction of not less than ninety-five percent (95%).

3.3 IMPORTED FILL

- A. Imported fill material under paved areas shall be placed and compacted to a relative compaction of not less than ninety-five percent (95%) to a depth of 24 inches in accordance with these Specifications.

3.4 CLASS 2 AGGREGATE BASE

- A. Class 2 aggregate base shall be placed to depth as shown. Placement, moisturizing, spreading, and compaction of Class 2 aggregate base shall meet all requirements of State Standard Specification Section 26, State Standard Specification Section 17, and the details on the Plans.

3.5 PAINT BINDER (TACK COAT)

- A. After the sub-base and aggregate base are placed, compacted, and tested, to the satisfaction of the Engineer, tack coat shall be applied in accordance with State Standard Specification Section 39.

3.6 HOT MIX ASPHALT

- A. Asphalt concrete shall be placed where indicated on the Plans to a total thickness as shown on the plans. Storing, proportioning, mixing, equipment, spreading, compacting, and miscellaneous asphalt concrete shall conform to the requirements of the most recent Caltrans Standard Specification Section 39, and the most recent Caltrans Standard Specification Section 22.

3.7 HEADER BOARD

- A. A header board shall be placed at all limits of paving not abutting a concrete structure. Attached to 12-inch plastic stakes at three feet on center with metal screws.

3.8 TESTING

- A. The Construction Manager will perform laboratory and the initial field testing for density, moisture, and compaction of the asphalt base. The Contractor shall pay for re-testing of locations failing to meet the specified compaction in the initial test. Test laboratory shall provide written reports on the following test methods:
- B. Moisture, density, and compaction per ASTM D2922 and D3017.

3.9 TRENCH RESTORATION WITHIN PAVED SECTION

- A. Trench restoration within paved sections shall conform to City Standard Detail ST-31.
- B. Roadway features such as brick sidewalks and crosswalks shall be replaced in kind during trench restoration.

3.10 RESTORATION OF TRAFFIC STRIPING AND PAVEMENT MARKINGS

- A. Restoration of traffic striping and pavement markings shall be in accordance with Caltrans Standard Specification Section 84.

END OF SECTION

SECTION 02601
MANHOLES AND CLEANOUTS

PART 1: GENERAL

1.01 DESCRIPTION

The work of this section consists of the furnishing of materials and constructing therewith new manholes and cleanouts as shown on the drawings.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 01300: Submittals
- B. Section 01666: Testing of Gravity Sewer Lines and Manholes
- C. Section 02223: Trenching, Backfilling, and Compacting
- D. Section 02225: Structure Excavation and Backfill

1.03 QUALITY ASSURANCE

Standards, American Association of State Highway and Transportation Officials (AASHTO) and American Society for Testing and Materials (ASTM).

1.04 SUBMITTALS

Shop Drawings and catalog cut sheets shall be submitted for manhole, frames and covers, precast manhole bases and sections, and joint sealer accordance with Section 01300.

PART 2: MATERIALS

2.01 FRAMES AND COVERS

- A. Manhole frames and covers shall be per City Standard Details, cast iron manhole frame and cover set, or approved equal.
- B. Horizontal surfaces of manhole cover seats and under surface of the seat cover which rests upon the frame shall be machined. After machining, it shall not be possible to rock any cover after it has been seated in any position in its frame. Manhole frames and covers shall be designed for heavy duty, H-20 traffic loading. All manholes shall be provided with a nominal 24-inch diameter cover unless otherwise noted on the drawings. Manhole frames shall be capable of receiving standard non-shifting manhole extension (riser) rings.

2.02 PRECAST CONCRETE MANHOLE SECTIONS

Manholes shall be constructed of precast reinforced manhole sections conforming to ASTM C478 and as shown. Precast concrete rings, cones, and flat slabs shall be manufactured by a process that will produce a dense, homogeneous concrete section of first quality. The sections shall be steel reinforced and have a minimum wall thickness of four (4) inches. Cement used in manufacturing the sections shall be Type II/V, Portland

cement, as specified in ASTM C150. Precast concrete sections, cones, and grade rings shall be joined using preformed joint sealant only. Use of mortar will not be allowed. All manholes shall have cast-in-place concrete bases and formed channels with inverts to match the adjoining pipes. Precast manhole base-blocks will not be allowed.

2.03 PRECAST MANHOLE BASES

Precast manhole bases as manufactured by Central Pre-Cast, Jensen Precast, Hanson Precast, or approved equal.

2.04 DESIGN LOADS

- A. Vertical Loads: Design all precast manhole rings and accessories to support an AASHTO H-20 truck loading, in addition to soil weight above sloping ring sections and the dead load of all material supported above.
- B. Lateral Loads: Lateral loads shall be as dictated by the following formula or the geotechnical report requirements, whichever are more stringent.

Operating: $95 \times H$ (psf) triangular equivalent fluid pressure for dead load plus a live load surcharge from an H-20 truck, including impact.

Seismic: $23 \times H^2$ (psf) uniform pressure distribution.

Where H = depth below finished grade.

2.05 CONES

All manhole cones shall be as shown on the plans and conform to ASTM designation C478.

2.06 JOINT SEALER

The joint sealer shall be Ram-Nek by K.T. Snyder Company, Inc.; Kent Seal No. 2, or approved equal.

2.07 CLEANOUTS - NOT USED

2.08 MORTAR

Mortar will not be allowed.

2.09 INTERIOR AND EXTERIOR COATINGS - NOT USED

2.10 MECHANICAL RUBBER SEAL

- A. Modular, mechanical type, consisting of interlocking synthetic rubber links shaped to continuously fill the annular space between the pipe and the wall opening.
- B. EPDM seal element suitable for service to 250 degrees F, except seal element shall be silicone or viton suitable for 300 degrees F for aeration piping.
- C. Composite pressure plates.

- D. 316 stainless steel nuts and bolts.
- E. Thunderline Link-Seal, or equal.

PART 3: EXECUTION

3.01 SETTING BASES

- A. Construct to grades, lines and elevations shown on the drawings or staked in the field. Shape tops of the bases by means of accurate bell-ring forms to receive the barrel section. Wet setting is not permitted. Joint sealer shall be placed on the first joint after the Engineer has approved the manhole base for stacking. The concrete shall cure a minimum of 24 hours before stacking the barrel sections.

Pour foundations on 12-inches of compacted crushed rock wrapped in filter fabric. See plans for manhole details.

- B. Precast bases shall be installed in strict conformance with the manufacturer's written instructions, on a foundation of clean, undisturbed soil or native soil compaction to at least 95% maximum dry density and 6" of $\frac{3}{4}$ " crushed rock.

3.02 SETTING PRECAST SECTIONS

- A. Precast-reinforced concrete sections shall be set so as to be vertical and with sections in true alignment. Joints shall be primed and made with sealer applied in strict accordance with the manufacturer's printed instructions.

3.03 FIELD CONNECTIONS

- A. Openings for field connections shall be made with a motor-driven cutting tool which will provide a smooth round opening no more than 3 inches larger than the outside diameter of the pipe being connected. The new pipe shall be inserted with a waterstop conforming to City Standard Detail SS-03. Jack hammers and chipping hammers will not be allowed. Seal field connections with non-shrink grout.

3.04 INTERIOR DROPS - NOT USED

3.05 INVERT CHANNELS

- A. Smooth and semi-circular in shape conforming to the inside of the adjacent sections. Make changes in flow direction by a smooth curve of radius as large as permitted by manhole size. Make changes in size and grade gradually and evenly. See plans for details.

3.06 SETTING FRAMES AND COVERS

- A. Frames and covers shall be set as detailed on the plans for various locations.

3.07 CLEANOUTS - NOT USED

3.08 EPOXY MANHOLES - NOT USED

END OF SECTION

SECTION 02960

TEMPORARY SEWER BYPASS PUMPING

PART 1: GENERAL

1.01 DESCRIPTION

- A. The Contractor shall provide a complete sewer bypassing system including, but not limited to, the following:
 - 1. Developing a sewer bypassing plan
 - 2. Developing a spill prevention and emergency response plan
 - 3. Submitting and obtaining approval from the City for the sewer bypassing plan and the spill prevention and emergency response plan
 - 4. Implementing the bypassing and spill prevention and emergency response plan
 - 5. Providing bypassing in accordance with the approved plans throughout the duration of the work

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 01300: Submittals
- B. Section 15071: Plastic Pipe and Fittings

1.03 SUBMITTALS

- A. In accordance with Section 01300.
- B. Within 10 days of Notice to Proceed, submit drawings and complete design data for bypass pumping plan. Show all proposed methods, equipment, and discharge locations for bypassing. No construction activities related to bypassing shall begin prior to the approval of the required submittals by the City. Approval of the Contractor's Bypassing and Spill Prevention and Emergency Response Plan in no way relieves the Contractor of his responsibility to maintain sewage service or provide sewer bypassing at all times during construction and to prevent any spills.
- C. Bypassing Plan
 - 1. The Contractor shall design the bypass system to handle the flows of the system. **Contractor shall have plugs on hand for and bypass pump capacity available for 75% of 15-inch flow maximum on Table Mountain Boulevard and 75% of 18-inch flow maximum on Montgomery Street.**
 - 2. The Contractor shall develop and submit to the City, for review and approval, a written Bypassing Plan including sequence of work outlining how sewage flows will be maintained and bypassed during construction. The bypassing plan shall include, but not be limited to:

- a. A primary and 100% redundant backup pumping system, each capable of handling the peak flow of the system. Which shall be on site and available 24 hours a day.
 - b. A flow monitoring plan describing the method of monitoring and showing the location of upstream and downstream monitoring units for all of the construction locations.
3. The bypassing plan shall be developed in conjunction with the traffic control plans in order to minimize the impact to the community. See the City Standard Specifications.

C. Spill Prevention and Emergency Response Plan

1. The Contractor shall develop and submit to the City, for review and approval, a written Spill Prevention and Emergency Response Plan. The Spill Prevention and Emergency Response Plan shall be developed to prevent and respond to any construction related sewage spills. The plan shall include, but not be limited to:
 - a. Identification of all nearby waterways, channels, catch basins and entrances to underground storm drains.
 - b. Furnishing of all the necessary materials, supplies, tools equipment, labor and other services to prevent sewage from coming into contact with these areas.
 - c. Arrangements for an emergency response unit comprised of emergency response equipment and trained personnel to be immediately dispatched to the site in the event of sewage spill(s).
 - d. An emergency notification procedure, which includes an emergency response roster with telephone numbers and arrangements for backup personnel and equipment and an emergency notification roster of designated City representatives.
 - e. Direct phone numbers (no voicemail) for 3 Contractor representatives who shall be accessible and available at all times to respond immediately to any construction related emergency.

1.04 RESPONSIBILITIES OF CONTRACTOR

- A. The Contractor shall observe and comply with all Federal, State, and local laws, ordinances, codes, orders, and regulations which in any manner affect the conduct of the work, specifically as it relates to sewage and prevention of sewage spills. The Contractor shall be fully responsible for preventing sewage spills, containing any sewage spills, recovery and legal disposal of any spilled sewage, paying any and all fines, incurring and handling any penalties, claims, or liability arising from negligently causing or allowing a sewage spill, failure to prevent a sewage spill, or any violation of any law, ordinance, code, order, or regulation as a result of the spillage.

PART 2: MATERIALS

2.01 GENERAL

- A. All equipment and tools used for sewer bypassing shall be designed to prevent any and all sewage leaks or spills.
- B. All equipment used as part of the bypassing system shall not cause a significant noise impact to the community in accordance with local noise ordinances. If noise complaints from residents occur due to the Contractor's activities, the Contractor shall immediately replace the noise-generating equipment or reduce the noise generated with mitigating devices to the satisfaction of the City.
- C. Sewage shall be conveyed/pumped 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.
- D. Suction and discharge manholes shall be sealed to prevent odors.
- E. Access to driveways may not be blocked by the bypass pipe. Flat pipe, a raised platform above bypass pipe, or a shallow trench shall be used to provide access to residents.
- F. If bypass pumping must cross any major arterial streets/roads, piping must be installed in a shallow trench. Flat piping or raised traffic platforms across these streets will not be allowed. Trench shall be backfilled or covered with recessed, secured trench plating.
- G. All shallow trenching shall be backfilled and paved in accordance with the standard specifications following demobilization of sewer bypass. All costs to install, maintain, backfill, and pave temporary shallow trenching shall be included in Contractor's bid item for sewer bypassing and no additional compensation shall be made therefor.
- H. If deemed necessary due to lack of preparedness on the Contractor's part, the City has the option to clean up a sewage spill caused by the Contractor. Clean up costs incurred by the City shall be recoverable in addition to the penalties from the Contractor's progress payments.

2.02 PUMPING EQUIPMENT

- A. All pumps used for sewer bypassing shall be the submersible type and shall only be operated below ground in the sewer manhole or other sewer facility. The use of above ground pumps or pumps not specifically designed for submersible service are not allowed.
- B. The pumps shall be sized to fit in manholes or other confined areas necessary to successfully complete the sewer bypassing. The Contractor shall ensure all equipment used for bypassing will operate under the conditions required and the Contractor will be responsible for all costs associated with changes to the bypassing system due to inappropriate equipment or non-conformance with the Contract Documents.

- C. Electric or fuel/generator driven pumps shall be used. The Contractor shall provide an emergency standby power generator, sized to operate the bypass system at a minimum, to be used to operate the submersible pumps if electrical power is lost during the progress of the work and a sewage spill will occur.
- D. The pumps shall be specifically intended for use with raw sewage and shall be capable of passing a 3-inch diameter solid.
- E. Regardless of power used, the total noise of any equipment used by the Contractor as part of the bypassing system shall be under 68 dba as measured standing thirty (30) feet from the equipment.

PART 3: EXECUTION

3.01 GENERAL

- A. The Contractor shall exercise care not to damage existing public and private improvements, interrupt existing services and/or facility operations which may cause a sewage spill. Any reasonably anticipated utility and/or improvement which is damaged by the Contractor shall be immediately repaired at the Contractor's expense. In the event that the Contractor damages an existing utility or interrupts an existing service which causes a sewage spill, the Contractor shall immediately notify the City representatives. The Contractor shall request and obtain from the City an emergency roster of the designated City representatives with their respective telephone numbers. The Contractor shall take all measures necessary to prevent further damage or service interruption, and to control, contain, and clean up the resultant impacts of the damage, service interruption, and any resulting sewage spill(s).
- B. The Contractor shall continuously monitor the flow levels downstream and upstream of the construction location to detect any possible failure that may cause a sewage backup and spill. The Contractor shall include the means and methods of monitoring the flow in their Sewer Bypassing Plan.

3.02 SEWAGE SPILLS

- A. In case of sewage spill, the Contractor shall act immediately, within fifteen minutes – without instructions from the City – to control the spill and take all appropriate steps to contain it in accordance with their Spill Response Plan.
- B. The Contractor shall immediately notify the City representatives of the sewage spill(s) and all remedial actions taken.
- C. The Contractor shall, within 24 hours from the occurrence of the spill, submit to the City a draft written report describing the following information related to the spill: the location; the nature and volume; the date and time; the duration; the cause; the type of remedial and/or preventive actions taken; and the water body impacted and results of any necessary monitoring. The City will review the draft report, and if revisions are required, the Contractor shall make those revisions and submit the final report to the City within 24 hours of the receipt of comments. Requests for additional compensation for the handling of the spill shall be submitted to the Engineer as a construction claim. The Contractor shall assure the validity, accuracy, and correctness of the claim under penalty of perjury. The Engineer may institute further corrective actions, as deemed necessary, to fully

comply with existing law, ordinance, code, order, or regulation. The Contractor shall be responsible for all costs incurred for the corrective actions.

- D. It shall be the Contractor's responsibility to assure that all field forces, including Subcontractors, know and obey all safety and emergency procedures, including the Spill Response Plan, to be maintained and followed at the site.

3.03 SEWER BYPASSING

- A. The Contractor shall provide temporary means to maintain and handle the sewage flow in the existing system as required to complete the necessary construction.
- B. The Contractor shall size the bypass system to handle the peak flow of the system. The Contractor shall provide a redundant, identically sized, one-hundred percent (100%) backup bypass system. The Contractor shall utilize the backup system to mitigate any additional wet weather flows, perform the necessary maintenance and repairs on the primary bypass system, and exercise and ensure the operability of the backup system. Each pump, including the backup pumps, shall be a complete unit with its own suction and discharge piping. The Contractor shall operate the backup bypass system for a minimum of twenty-five percent (25%) of the time on a weekly basis. The backup bypass system shall be fully installed and operationally ready at all times.
- C. Prior to the full operation of the bypass system, the Contractor shall demonstrate, to the satisfaction of the City, that both the primary and backup bypass systems are fully functional and adequate and shall certify the same, in writing, in a manner acceptable to the City.
- D. The Contractor shall provide all equipment necessary to minimize the noise generated by the bypassing operations. Noise levels from the complete bypassing system shall not exceed the levels allowable under the local jurisdictional codes and requirements.
- E. The Contractor shall continuously (while in use) monitor the operation of the bypass system and all impacted facilities. The Contractor shall submit, as part of their bypass plan, their system monitoring procedure and frequency. The Contractor shall maintain a log of the monitoring in a manner acceptable to the Engineer.
- F. The Contractor shall continuously monitor the flow levels downstream and upstream of the bypass to detect any possible failure that may cause a sewage backup and/or spill. The Contractor shall include the means and methods of monitoring the flow in their Bypassing Plan. The Contractor shall provide flow monitoring data to the City on a weekly basis in a format acceptable to the City.
- G. The Contractor shall routinely inspect and maintain the bypass system, including the backup system. The Contractor shall submit as part of their Bypassing Plan their maintenance procedures and frequency. The Contractor shall maintain a log of all pertinent inspection, maintenance and repair records in a manner acceptable to the Engineer.

- H. At the end of each day's work, the Contractor shall re-establish sewer flows in the gravity sewer system. Work undertaken each day shall only include work that can be completed during that working day.

END OF SECTION

SECTION 15030

PIPE REMOVAL

PART 1: GENERAL

1.01 SUMMARY

- A. Includes general specifications for removing raw water, sanitary sewer, or storm drain pipe.

1.02 SUBMITTALS

- A. Submittals shall be provided in accordance with Section 01300 and shall include the following:
 - 1. A removal plan for review by the Engineer prior to the start of removal after field verification of pipe location, material, and size.
 - 2. Names and descriptions of materials to be used.

PART 2: PRODUCTS

2.01 EQUIPMENT AND MATERIALS

- A. Equipment and materials shall be selected by Contractor as necessary to achieve desired results for removal. Selected equipment and materials are subject to review of Engineer through submittals.
- B. All equipment shall be in good repair and operating order.
- C. Sufficient standby equipment and materials shall be kept available to ensure continuous operation, where required.

PART 3: EXECUTION

3.01 PIPE REMOVAL

- A. Existing sewer pipes shall not be removed until the corresponding new sewer pipes are fully in service or bypass pumping has been established.
- B. Service outages shall not be allowed. Service must be maintained at all times through temporary sewer bypass pumping in accordance with Section 02960.
- C. Pipe shall be removed and salvaged if requested by the Owner; otherwise, pipe shall be removed and disposed of in accordance with all applicable laws.
- D. Backfill pipe removal area with Class II aggregate base.

END OF SECTION

SECTION 15071
PLASTIC PIPE AND FITTINGS

PART 1: GENERAL

1.01 DESCRIPTION

The work of this section consists of furnishing and installing polyvinyl chloride pipe and fittings.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 01300: Submittals
- B. Section 02223: Trenching, Backfilling, and Compacting

1.03 QUALITY ASSURANCE REFERENCES

This section contains references to some or all of the following documents, most recent edition. They are a part of this section as specified and modified. 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 D1248	Polyethylene Plastics Molding and Extrusion Materials.
ASTM D1784	Rigid Polyvinyl Chloride (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds
ASTM D1785	Polyvinyl Chloride (PVC) Plastic Pipe, Schedules 40, 80, and 120
ASTM D2241	Polyvinyl Chloride (PVC) Pressure Rated Pipe (SDR series)
ASTM D2464	Threaded Polyvinyl Chloride (PVC) Plastic Pipe Fittings, Schedule 80
ASTM D2466	Polyvinyl Chloride (PVC) Plastic Pipe Fittings, Schedule 40
ASTM D2467	Socket Type Poly Vinyl Chloride (PVC) Plastic Pipe Fittings, Schedule 80
ASTM D2564	Solvent Cements for Polyvinyl Chloride (PVC) Plastic Pipe and Fittings
ASTM D3034	Type PSM Polyvinyl Chloride (PVC) Sewer Pipe and Fittings
ASTM D4101	Propylene Plastic Injection and Extrusion Materials
ASTM F402	Practice for Safe Handling of Solvent Cements and Primers Used for Joining Thermoplastic Pipe and Fittings

1.04 SUBMITTALS

- A. In accordance with Section 01300.
- B. Submit materials list and catalog data sheets naming each product to be used identified by manufacturer and type number.
- C. The Contractor shall prepare and submit one copy to the City of Oroville of shop drawings and laying diagrams of all pipe, joints, bends, special fittings, and piping appurtenances.

PART 2: MATERIALS

2.01 PVC PRESSURE PIPE – NOT USED

2.02 PVC GRAVITY PIPE

- A. General: Pipe and fittings shall be made of PVC plastic having a cell classification of 12454-B as defined in ASTM D1784 and shall be SDR-35 (PVC). Additives and fillers including but not limited to stabilizers, antioxidants, lubricants, colorants, etc. shall not exceed 10 parts by weight per 100 of PVC resin in the compound.
- B. Pipe: All sewer mains shall be eight inch minimum diameter pipe, and shall be continuously and permanently marked with the manufacturer's name, pipe size, dimension ratio and/or pressure rating in psi. PVC pipe shall have a solid cross-section rubber ring gasket. The gasket shall be securely attached to the pipe to prevent displacement of the gasket when installed in the field. All rubber ring gaskets shall be in accordance with ASTM F477. Lubricant used for field assembly of gasketed PVC pipe shall have no detrimental effect on the gasket, joint, fitting, or pipe and shall be as recommended by the manufacturer. Provide rubber waterstops at the entry of all PVC pipe into manhole bases. PVC gravity sewer pipe and fittings shall conform to ASTM D3034 for diameters from 4-inches to 15-inches. Pipe joints shall conform to ASTM D3212. Pipe shall be solid wall only; profile wall pipe is not allowed.
- C. Fittings: Pipe fittings shall be gasketed fittings matching the pipe SDR and conforming to ASTM D3034, Class SDR-35. The ring groove and gasket ring shall be compatible with PVC pipe ends. Flanged fittings shall be compatible with cast-iron or ductile-iron pipe fittings. The strength class of the fittings shall be not less than the strength class of any adjoining pipe.

PART 3: EXECUTION

3.01 GENERAL

- A. All laying, jointing, and testing for defects and for leakage shall be performed in the presence of the Engineer and shall be subject to inspection before acceptance. All material found during the progress of the work to have defects will be rejected, and the Contractor shall promptly remove such defective materials from the site of the work.
- B. Installation shall conform to the requirements of ASTM D2321 and to the supplementary requirements or modifications specified herein. Wherever the provisions of this Section and the requirements of ASTM D2321 are in conflict, the more stringent provision shall apply.

3.02 INSTALLATION OF PIPE AND FITTINGS

- A. General: In accordance with the Construction Drawings and Specifications, manufacturer's recommendations, and ASTM D2321. Where a conflict exists in language, the Contractor shall adhere to the most stringent requirements.
- B. Plastic piping exposed to sunlight shall be painted with two coats of latex paint. Color shall be white unless otherwise specified.

- C. Pipe and fittings shall be of the sizes indicated. Clean pipe interior of all foreign matter before installing. Pipe shall be square cut with fine tooth saw or other cutter or knife designed for use with plastic pipe. Remove burrs by smoothing edges with a knife, file, or sandpaper. Replace any section of pipe found to be defective or damaged with new acceptable pipe. Handle pipe carefully to prevent gouging or scratching. Any length of pipe having a gouge, scratch, or other permanent indentation more than 10 percent of the wall thickness in depth shall be rejected.

3.03 INSTALLATION OF SOLVENT WELD JOINT TYPE PIPE

In accordance with the recommendations of the pipe manufacturer and the following supplementary requirements:

- A. Do not solvent weld joints if it is raining, if atmospheric temperature is below 40 degrees F or above 90 degrees F, if the pipe is exposed to direct sunlight.
- B. Test fit dry pipe and fittings before applying cement. Pipe should enter socket without forcing at least one third but not more than two thirds the depth of socket. Fittings that are looser or tighter shall not be used. Thoroughly clean and dry the pipe end and socket of fitting with methyl ethyl ketone, acetone, or similar cleaner. Apply cement evenly to outside surface and end of pipe and inside surface of socket. Avoid excess application of cement but insure complete coverage of all bonding surfaces. Mark depth of socket on pipe to guide application of cement and insure full insertion of pipe. Insert pipe in socket, twisting pipe or fitting approximately ½ turn as pipe is being seated in socket. Make sure pipe is fully seated providing a bond between end of pipe and shoulder of socket. Immediately wipe excess cement from pipe leaving no more than a 1/8-inch fillet at fitting end. Hold assembled joint in place for approximately 15 seconds and allow to set for 30 minutes before moving. Avoid rough handling for 48 hours. Longer periods may be required in cold or wet weather.

3.04 INSTALLATION OF PUSH-ON JOINT TYPE PIPE

Clean gaskets and seats of foreign materials prior to joint assembly. Apply lubricant as recommended by the pipe manufacturer. Carefully insert the spigot end into the bell to prevent entry of dirt and incorrect entry angle. With suitable fork tool, crowbar, or by hand, make the joint to the insertion depth recommended by the manufacturer. When the selected pipe uses joints not designed for full depth insertion, prevent further closure of previously completed joints by restraining movement of the installed line while making succeeding joints.

3.05 INSTALLATION OF TUBING – NOT USED

3.06 TESTING

- A. Pressure Testing: Shall be in accordance with Section 01666.
- B. Field Inspection for Plastic Pipe and Fittings: Installed pipe shall be tested to ensure that vertical deflections for plastic pipe do not exceed the maximum allowable deflection. All SDR 26 and 35 PVC Sewer Pipe shall be mandrel tested by the Contractor as outlined below. All C905 PVC pipe may be measured by the Engineer for overdeflection above 3%. Maximum allowable deflections for SDR 26 and 35 pipe shall be governed by the mandrel requirements stated herein and shall nominally be the percentage listed of the maximum average ID.

Nominal Pipe Size	Percentage
Up to and including 12-inch	5.0
Over 12-inch to and including 30-inch	4.0
Over 30-inch	3.0

The maximum average ID shall be equal to the average OD per applicable ASTM Standard minus two minimum wall thicknesses per applicable ASTM Standards. Manufacturing and other tolerances shall not be considered for determining maximum allowable deflections.

Deflection tests shall be performed not sooner than 30 days after completion of placement and densification of backfill. The pipe shall be cleaned and inspected for offsets and obstructions prior to testing.

For all pipes less than 24-inch ID, a rigid mandrel shall be pulled through the pipe by hand to ensure that maximum allowable deflections have not been exceeded. Prior to use, the mandrel shall be certified by the Engineer. Use of an uncertified mandrel or mandrel altered or modified after certification will invalidate the test. If the mandrel fails to pass, the pipe will be deemed to be overdeflected.

Unless otherwise permitted by the Engineer any overdeflected pipe shall be uncovered and, if not damaged, reinstalled. Damaged pipe shall not be reinstalled but shall be removed from the Work site. Any pipe subjected to any method or process other than removal, which attempts, even successfully, to reduce or cure any overdeflection, shall be uncovered, removed from the Work site and replaced with new pipe.

The mandrel shall:

1. Be rigid, non-adjustable, odd-numbering-leg (9 legs minimum) mandrel having an effective length not less than its nominal diameter.
2. Have a minimum diameter at any point along the full length as follows:

Pipe Material	Nominal Size (inches)	Minimum Mandrel Diameter * (inches)
PVC-ASTM D 3033 (SDR 35)	6	5.619
	8	7.309
	10	9.137
	12	10.963
	15	13.849
PVC-ASTM F 679 (T-1 Wall)	18	16.924
	21	19.952
	24	22.446
	27	25.297
	30	28.502
	36	35.03

* Mandrel diameters of SDR 26 pipe shall be based on 4% deflection of the average inside diameter.

3. Be fabricated of steel, be fitted with pulling rings at each end, be stamped or engraved on some segment other than a runner indicating the pipe material specification, nominal size and mandrel OD, (e.g., PVC D 3034-8"-7.524"; and be furnished in a suitable carrying case labeled with the same data as stamped or engraved on the mandrel.

All costs incurred by the Contractor attributable to mandrel and deflection testing, including any delays, shall be borne by the Contractor at no cost to the Owner.

END OF SECTION

APPENDIX A
GEOTECHNICAL REPORT

GEOTECHNICAL ENGINEERING INVESTIGATION REPORT
CITY OF OROVILLE SEWER PROJECT 1A, 1B, 1C, 1D, 1E, AND 1F
OROVILLE, CALIFORNIA
AUGUST 22, 2018

Prepared For:

BENNETT ENGINEERING SERVICES
1082 Sunrise Avenue, Suite 100
Roseville, California 95661

Mr. Mike Massaro

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48 Bellarmine Court
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125618-0070744.00.001



August 22, 2018
Project No. 70744.00.001

Mr. Mike Massaro
Bennett Engineering Services
1082 Sunrise Avenue, Suite, 100
Roseville, California 95661
Email: MMassaro@ben-en.com

**REFERENCE: Geotechnical Engineering Investigation Report for
City of Oroville Sewer Project 1A, 1B, 1C, 1D, 1E, and 1F
Oroville, California**

Dear Mr. Massaro,

NV5 is pleased to provide geotechnical engineering services for development of the City of Oroville Sewer Project 1A, 1B, 1C, 1D, 1E, and 1F in Oroville, California. The geotechnical engineering investigation of the site was performed consistent with the scope of services presented in the Geotechnical Engineering Investigation Proposal (PC16.097-01), dated March 19, 2016.

The findings, conclusions and recommendations presented in this report are based on the following relevant information collected and evaluated by NV5: literature review, surface observations, subsurface exploration, laboratory test results, and experience with similar projects, sites and conditions in the area. It is NV5's opinion that the site is suitable for the proposed construction provided the geotechnical engineering recommendations presented in this report are incorporated into the earthwork and structural improvements. This report should not be relied upon without review by NV5 if a period of 24 months elapses between the issuance report date shown above and the date when construction commences.

NV5 appreciates the opportunity to provide geotechnical engineering services for this important project. Please contact the undersigned below at 530-894-2487 if you have any questions or need additional information.

Sincerely,

NV5

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Dominic J. Potestio, PE 69299
Senior Engineer

Shane D. Cummings, CEG 2492
Associate Engineering Geologist

cc: Addressee (Portable Document Format [PDF] electronic file)

TABLE OF CONTENTS

1.0	INTRODUCTION.....	1
1.1	SCOPE OF SERVICES.....	1
1.2	SITE LOCATION AND DESCRIPTION.....	1
1.3	PROPOSED IMPROVEMENTS.....	2
1.4	INVESTIGATION PURPOSE.....	3
2.0	SITE INVESTIGATION.....	5
2.1	LITERATURE REVIEW	5
2.1.1	Site Improvement Plan Review	5
2.1.2	Previous Reports	5
2.1.3	Geologic Setting and Regional Faulting.....	5
2.2	FIELD INVESTIGATION.....	8
2.2.1	Surface Conditions.....	8
2.2.2	Subsurface Soil Conditions.....	14
2.2.3	Groundwater Conditions	15
3.0	LABORATORY TESTING	16
4.0	SEISMIC SITE RESPONSE	17
4.1	Site Class	17
4.2	Geometric Mean Peak Ground Acceleration	17
5.0	CONCLUSIONS	18
6.0	RECOMMENDATIONS	19
6.1	EARTHWORK GRADING.....	19
6.1.1	Demolition and Abandonment of Existing Site Improvements	19
6.1.2	Import Fill Soil	19
6.1.3	Temporary Excavations	19
6.1.4	Underground Utility Trenches.....	20
6.1.5	Construction De-watering	23
6.1.6	Soil Corrosion Potential	24
6.1.7	Subsurface Groundwater Drainage.....	24
6.1.8	Final Plan Review and Construction Monitoring	24
6.2	STRUCTURAL IMPROVEMENTS	26
6.2.1	Seismic Design Parameters.....	26
6.2.2	Jacking and Receiving Pits Temporary Retaining Walls.....	27
7.0	REFERENCES:	28
8.0	LIMITATIONS	29

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09/26/2018 4:00:13 PM

LIST OF TABLES

Table 3.1-1	Laboratory Test Results	16
-------------	-------------------------------	----

Table 6.1.4-1 Minimum Testing Frequencies for Utility Trench Backfill..... 23
 Table 6.2.1-1 CBC Seismic Design Parameters 26
 Table 6.2.2-1 Design Parameters for Jacking Pit and Receiving Pit Retaining Walls 27

LIST OF FIGURES

Figure 1. Site Location Map..... 4
 Figure 2A. Boring Locations..... 10
 Figure 2B. Boring Locations..... 11
 Figure 2C. Boring Locations..... 12
 Figure 2D. Boring Locations 13

APPENDICES

- A Important Information about This Geotechnical Engineering Report (included with permission of GBA, Copyright 2016)
- B Exploratory Boring Logs
- C Soil Laboratory Test Sheets
- D Seismic Design Map Reports

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ABBREVIATIONS AND ACRONYMS

AB	aggregate base
ASCE	American Society of Civil Engineers
ASTM	ASTM International
bgs	below ground surface
CalEPA	California Environmental Protection Agency
CBC	California Building Code
CGS	California Geological Survey
CQA	construction quality assurance
DTSC	Department of Toxic Substances Control
GBA	Geoprofessional Business Association
MCE	maximum considered earthquake
msl	mean sea level
mybp	million years before present
OSHA	Occupational Safety and Hazards Administration
pcf	pounds per cubic foot
PGA _M	mean peak ground acceleration
PI	plasticity index
ppm	parts per million
psf	pounds per square foot
psi	pounds per square inch
QA/AC	quality assurance/quality control
SEI	Structural Engineering Institute
USCS	Unified Soil Classification System
USGS	United States Geological Survey
UU	unconsolidated-undrained
ybp	years before present

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1.0 INTRODUCTION

NV5 performed a geotechnical engineering investigation of the proposed City of Oroville Sewer Project 1A, 1B, 1C, 1D, 1E, and 1F in Oroville, California. The geotechnical engineering investigation of the site was performed consistent with the scope of services presented in the Geotechnical Engineering Investigation Proposal (PC16.097-01), dated March 19, 2016. The findings, conclusions and recommendations are presented herein.

For your review, Appendix A presents a document prepared by the Geoprofessional Business Association (GBA) entitled "*Important Information About This Geotechnical-Engineering Report.*" This document summarizes project-specific factors, limitations, content interpretation, responsibilities and other pertinent information. Please read this document carefully.

The information presented in this report is organized into the following sections: Introduction, Site Investigation, Laboratory Testing, Conclusions, Recommendations, Limitations, Figures and Appendices.

1.1 SCOPE OF SERVICES

NV5 performed a specific scope-of-services to develop geotechnical engineering recommendations for the proposed earthwork and structural improvements. A brief description of each work scope task is presented below. A detailed description of each work scope task is presented in Section 2 (Site Investigation) of this report.

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- **Task 1 Site Investigation:** NV5 performed a site investigation to characterize the existing surface and subsurface soil, rock and groundwater conditions encountered to the maximum depth excavated. NV5's field engineer/geologist made observations, collected representative soil samples and performed field tests at a limited number of subsurface exploratory excavation locations. NV5 performed laboratory tests on select soil samples to evaluate their geotechnical engineering material properties.
- **Task 2 Data Analysis and Engineering Design:** NV5 evaluated the field and laboratory site data and proposed site improvements and used this information to develop geotechnical engineering design recommendations for earthwork and structural improvements. Engineering judgment was used to extrapolate the observations and conclusions regarding the field and laboratory data to other areas located between and beyond the locations of the subsurface exploratory excavations.
- **Task 3 Report Preparation:** NV5 prepared this report to present the findings, conclusions and recommendations.

1.2 SITE LOCATION AND DESCRIPTION

The proposed City of Oroville Sewer Project is located along several existing streets within the City of Oroville, Butte County, California. The major portion of the planned sewer improvements will be located along Oro Dam Boulevard between 5th Avenue and Orange Avenue. A site location map is presented as Figure 1.

The *Oroville Quadrangle 7.5 Minute Series (Topographic)* map (United States Geological Survey [USGS], 1970), shows the subject improvements located in Township 19 North, Range 4 East, Sections 8, 9, 17, and 18 using the Mount Diablo geodetic datum. The center of the proposed sewer improvements is located at approximately latitude 39.5119 degrees north and longitude 121.5487 degrees west. The elevation in the area of the improvements range from approximately 160 to 300 feet above mean sea level (msl).

The areas of the proposed sewer improvements generally support existing asphalt concrete paved streets. The existing streets in the area of the proposed sewer improvements also support box culverts for drainage ditches. A portion of the proposed sewer improvements in Project 1E crosses existing railroad tracks.

1.3 PROPOSED IMPROVEMENTS

Presently, the City of Oroville Sewer Project is divided into six projects identified as 1A, 1B, 1C, 1D, 1E, and 1F. A summary of the proposed improvements per project area is presented below.

Project 1A

Project 1A consists of constructing a new approximately 10,108 lineal foot relief sewer along Oro Dam Boulevard from just south of Stanford Avenue extending southwesterly to 5th Avenue. The sewer line constructed in this area is indicated to consist of 8-inch to 21-inch diameter pipe installed at depths of approximately 3 to 15 feet below existing grades.

Project 1B

Project 1B consists of constructing approximately 1,315 lineal feet of new sewer improvements along Oro Dam Boulevard, near Stanford Avenue, and extending southeasterly along Stanford Avenue, and continuing into the existing Pleasant Valley Manufactured Home Community. The sewer line constructed in this area is indicated to consist of 12-inch to 15-inch diameter pipe installed at depths of approximately 4 to 8 feet below existing grades.

Project 1C

Project 1C consists of replacing approximately 192 lineal feet of a 6-inch sewer service extending northerly into the Grace Baptist Church property from Oro Dam Boulevard, just east of Orange Avenue. The new sewer service in this area is indicated to consist of a 10-inch diameter pipe installed at depths of approximately 6 to 11 feet below existing grades.

Project 1D

Project 1D consists of replacing two existing parallel sewer lines along Montgomery Street, east of Myers Street, with approximately 1,072 lineal feet of 18-inch sewer line. The new sewer line in this area is indicated to be installed at depths of approximately 7 to 13 feet below existing grades.

Project 1E

Project 1E consists of replacing approximately 238 lineal feet of a 6-inch sewer line extending northeasterly along the eastern side of Washington Avenue, south of Montgomery Street. The new

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sewer line is indicated to cross existing railroad tracks. The new sewer line in this area is indicated to consist of a 10-inch diameter pipe. Neither the depths of the existing sewer line or the design depth of the proposed sewer line, were known at the time of our investigation.

Project 1F

Project 1F consists of replacing approximately 2,917 feet of existing 6-inch to 10-inch sewer line along Table Mountain Boulevard from Nelson Avenue southeasterly to approximately 925 feet south of Grand Avenue. The new sewer improvements in this area are indicated to consist of 12-inch to 15-inch diameter pipe and be installed at depths of approximately 4 to 22 feet below existing grades.

Earthwork construction may include directional borings, open cut trenching, temporarily shored trenching, and dewatering to complete the utility installation.

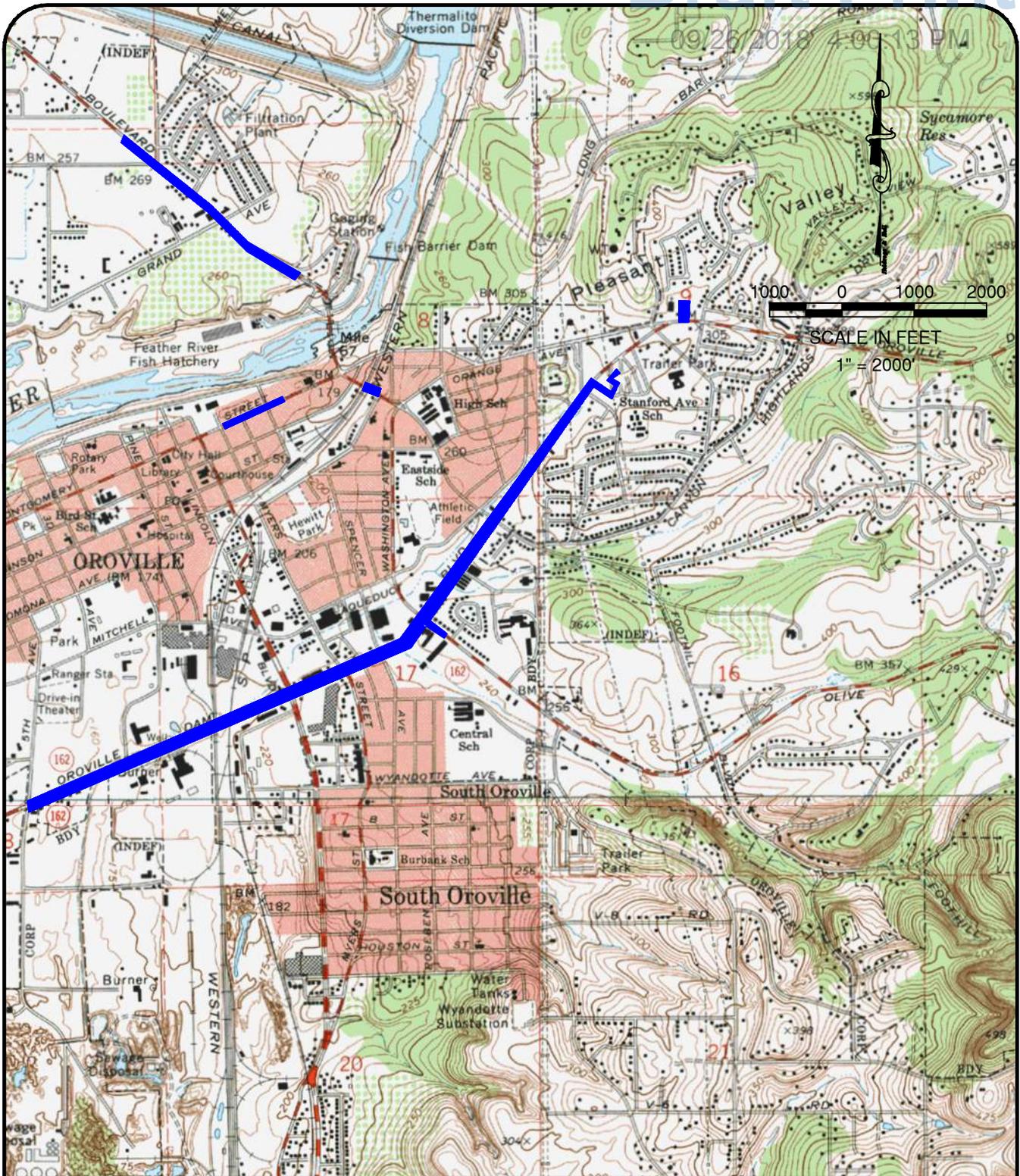
1.4 INVESTIGATION PURPOSE

The purpose of the investigation is to obtain sufficient information about the soil, rock and groundwater conditions at the site to allow NV5 to prepare geotechnical engineering design recommendations for construction of the proposed earthwork and structural improvements. NV5's scope of services for this project did not include evaluating the site for the presence of hazardous waste, mold, asbestos and methane or radon gas. Therefore, the presence and removal of these materials are not discussed in this report.

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1000 0 1000 2000
 SCALE IN FEET
 1" = 2000'

LEGEND

 SITE LOCATIONS

70744-01_FIG1

NIV5
 48 BELLARMINE COURT, 40
 CHICO, CA 95928
 (530) 894-2487 FAX 894-2437

SITE LOCATION MAP
 CITY OF OROVILLE SEWER PROJECT
 OROVILLE, BUTTE COUNTY, CALIFORNIA

PROJ NO. 70744.01
 DATE: AUGUST, 2018
 FIGURE NO. **1**

2.0 SITE INVESTIGATION

NV5 performed a site investigation to characterize the existing subsurface conditions along the alignments of the proposed City of Oroville sewer improvements to develop geotechnical engineering recommendations for earthwork and structural improvements. Each component of the site investigation is presented below.

2.1 LITERATURE REVIEW

NV5 performed a limited review of available literature that was pertinent to the project site. The following summarizes the findings:

2.1.1 Site Improvement Plan Review

The final site improvement plans were not available for review at the time this report was prepared.

2.1.2 Previous Reports

NV5 was not provided, nor located any past geotechnical or environmental reports for the subject property. However, the following previous Geotechnical Engineering Investigation Reports were reviewed:

- Holdrege & Kull, May 31, 2016, *Geotechnical Engineering Investigation and Geologic Hazards Evaluation, Oroville Hospital Addition, 2767 Olive Highway, Oroville, CA 95966.*

NV5's review of this document revealed the surface and near-surface soil conditions generally consist of alluvial sediments and interbedded volcanoclastic tuffs, identified as the Tuffs of Oroville. This investigation was done in the vicinity of the western extent of the proposed Project 1B sewer improvements. Therefore, similar subsurface soil conditions should be anticipated in the area of the planned sewer improvements located to the north of this project.

- Holdrege & Kull, May 7, 2016, *Geotechnical Engineering Investigation and Geologic Hazards Evaluation, Feather River Tribal Health, 5th Avenue, Oroville, CA 95965.*

NV5's review of this document revealed the surface and near-surface soil conditions generally consist of dredge tailings. This investigation was done in the vicinity of the western extent of the proposed Project 1A sewer improvements. Therefore, similar subsurface soil conditions and depth to groundwater should be anticipated in the area of the planned sewer improvements located to the south of this project.

2.1.3 Geologic Setting and Regional Faulting

The site of the proposed City of Oroville Sewer Project is situated in the Sacramento Valley within the Great Valley geologic province west of the boundary with the Cascade geologic province and east of the boundary of the Coast Range geologic province as shown below in the first inset figure. The Great Valley geologic province is characterized as an asymmetrical synclinal trough composed of up to

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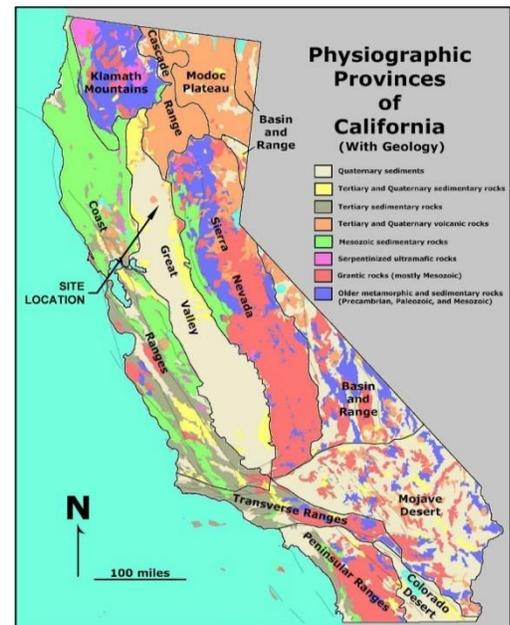
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80,000 feet of Jurassic Period (145 to 201 million years before present [mybp]) and Eocene Epoch (33.9 to 56.0 mybp) sequenced marine sedimentary units deposited during periods of inundation and Pliocene Epoch (2.6 to 5.3 mybp) to recent Holocene Epoch (present to 0.011 mybp) terrestrial sediments originating from the Sierra Nevada, Cascade, and Coast Mountain Ranges during sea recession and periods of mountain uplift. The second inset figure shows an east-west orientated cross-section that depicts an elevation view of the Pacific Plate subducting beneath the North American continental plate and the resulting ancient erosional and depositional environments described in the preceding.

The Cascade geologic province is characterized by Pliocene age volcanic sequences of lahars and lava flows that cover the pre-Cenozoic (older than 66.0 mybp) metamorphic and plutonic rocks of the northern Sierra Nevada (Wakabayashi and Sawyer, 2001). The Cascade volcanic rocks are composed of a coalescing sequence of Pliocene age andesitic lahars, and andesitic and basaltic lava flows. The volcanogenic deposits of the Late Pliocene age Tuscan Formation are well exposed in the deep stream incision of Chico Creek and Butte Creek east and southeast of the subject area. According to the *Geologic Map of the Chico Monocline and Northeastern Part of the Sacramento Valley, California* (Harwood, et al. 1981), the Tuscan Formation is a series of Pliocene lahars and interbedded tuffs, overlying Paleozoic Era (252 to 541 mybp) metamorphic, auriferous channel deposits, and marine sedimentary rocks. The Tuscan Formation is a wedge-shaped mass, which tilts and thins southwestward. Superimposed on this form are several folds and numerous faults with small to negligible offset (Lydon, 1968). The Tuscan Formation extends west into the Sacramento Valley. The Quaternary Period (present to 0.011 mybp) alluvial and fluvial deposits of the Sacramento Valley overlie the Tuscan Formation.

Based on review of the *Geologic Map of the Chico Quadrangle*, published by the California Division of Mines and Geology (Saucedo and Wagner, 1992), the geology underlying Projects 1A (west of the UPRR railroad tracks) and 1D is comprised of fluvial deposits associated with hydraulic mining in the Feather River Canyon. The sand and gravel deposits have been reworked by dredging operations leaving large tailing piles which have been spread and rough graded to generally flay lying terrain in the surrounding area. Windrows of tailing piles associated with the historical dredge mining operations are still present in southern Oroville where redevelopment has yet to take place. The fluvial sediments are poorly sorted (well graded) stream and basin deposits composed of weathered gravel, sand, and minor amounts of silt and clay.

Review of the *Geologic Map of the Chico Quadrangle* also indicates the geology underlying Projects 1A (east of UPRR), 1B, 1C, and 1E is comprised of alluvial sediments and interbedded volcanoclastic



California Geomorphic Provinces Inset

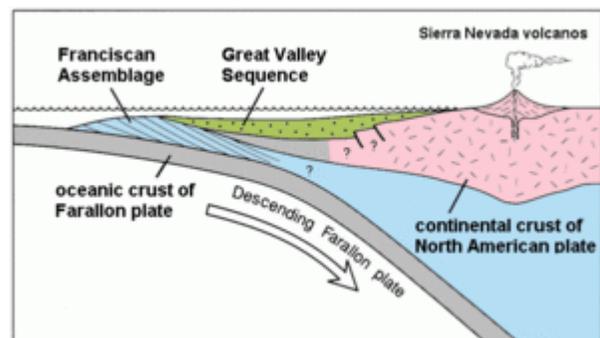


Plate Tectonics Subduction Zone Inset

tuffs, identified as the Tuffs of Oroville which were deposited during the Pliocene through Pleistocene Epoch (5.3 mybp to 11,700 years before present [ybp]). The Tuffs of Oroville are stratigraphically distinguished between an Upper Member and a Lower Member based on differing spatial distributions of fluvial lithofacies and separated by an unconformity (Unruh, 1990). These areas of sewer improvements are within the Upper Member of the Tuffs of Oroville which consists primarily of fluvial conglomerates and sandstones interbedded with numerous air-fall tephra horizons. Based on field mapping, these areas of the planned sewer improvements are underlain by an imbricated volcanic cobble conglomerate that is documented to be at least 25 feet (7 meters) thick, and the facies is interpreted to represent channel deposits of the Feather River and other streams entering the Sacramento Valley south of Oroville (Unruh, 1990).

Our review of the *Stratigraphy and late Cenozoic deformation in the Oroville area, east-central Sacramento Valley, California* (Unruh, 1990) indicates the geology underlying Project 1F is comprised of moderately to strongly weathered, reddish, imbricated cobble to boulder conglomerate, identified as the Thompson Flat Conglomerate which was deposited during the middle of the Pleistocene Epoch (780,000 ybp to 130,000 ybp). The Thompson Flat Conglomerate is distinctly thick and uniform in this area, estimated to be approximately 20 to 25 feet (6 to 7 meters) thick along the east-facing bluffs above the Feather River, which includes the area of Project 1F.

Regional faulting is associated with the northern extent of the Foothill Fault System which includes the Chico Monocline, Cohasset Ridge Fault, Paradise Fault, Magalia Fault, and the Cleveland Hill Fault. The Foothill Fault System is a broad zone of northwest trending, east dipping normal faults formed along the margin of the Great Valley and the Sierra Nevada geologic provinces on the western flank of the Sierra Nevada and southern Cascade mountain ranges. The northern part of the fault zone is split into three branches: the Melones fault zone to the east, the Cleveland Hills fault to the southeast, and Chico Monocline to the north and northeast.

NV5 reviewed the Official Maps of Earthquake Fault Zones delineated by the California Geological Survey (CGS) through December 2010, provided for public use on the internet at <http://www.quake.ca.gov/gmaps/WH/regulatorymaps.htm>. These maps are updates to Special Publication 42, Interim Revision 2007 edition *Fault Rupture Hazard Zones in California*, which describes active faults and fault zones that have had Holocene (present to 0.011 mybp) age activity, as part of the Alquist-Priolo Earthquake Fault Zoning Act. Special Publication 42 and the 2010 on-line update indicate that the site is not located within an Alquist-Priolo active fault zone. However, there is a State of California Special Studies Zone Map that includes the Cleveland Hill Fault earthquake fault zone located approximately 5 miles southeast of the proposed improvements.

According to the *Fault Activity Map of California and Adjacent Areas* (Jennings, 1994), the closest known active fault which has surface displacement within Holocene time is the Cleveland Hills Fault. The 2010 Fault Activity Map published by the California Geological Survey can be accessed on the internet (<http://www.quake.ca.gov/gmaps/FAM/faultactivitymap.html#>). Geologic Data Map No. 6 shows the nearest known active faults with surface displacement within Holocene time to be the Cleveland Hill Fault. This fault zone is located approximately 5 miles southeast of the proposed improvements and is associated with ground rupture during the Oroville earthquakes of 1975.

2.2 FIELD INVESTIGATION

NV5 performed a field investigation of the site on April 30, 2018 and May 1, 2018. The surface and subsurface soil, rock and groundwater conditions observed at the site were described by NV5's field engineer/geologist using the procedures cited in the ASTM International (ASTM), Volume 04.08, "Soil and Rock (I) D421 - D5879" and Volume 04.09, "Soil and Rock (II) D5878 - Latest" as general guidelines for the field and laboratory procedures. The field engineer/geologist described the soil color using the general guideline procedures presented in the Munsell Soil Color Chart. Engineering judgment was used to extrapolate the observed surface and subsurface soil, rock and groundwater conditions to areas located between and beyond the subsurface exploratory locations. The surface, subsurface and groundwater conditions observed during the field investigation are summarized herein.

2.2.1 Surface Conditions

NV5 observed the following surface conditions during the field investigation of the property. Figure 2 show the approximate Project areas and NV5's subsurface exploration locations on recent aerial photographs.

Projects 1A, 1D, and 1F

These project areas currently support existing asphalt concrete paved roadways. Numerous utility vaults and manholes were observed in the project areas. Utility markings painted on the roadways also indicated additional underground utilities exist in the area of the proposed sewer improvements.

Project 1B

This project area currently supports existing asphalt concrete paved roadways along approximately 750 feet of the western portion of the planned sewer improvements. Numerous utility vaults and manholes were observed in the project area. Utility markings painted on the roadways also indicated additional underground utilities exist in the area of the proposed sewer improvements. An existing seasonal drainage ditch is located along the south side of Oro Dam Boulevard and crosses Stanford Avenue within the proposed sewer improvements. As the proposed sewer alignment extends easterly from Stanford Avenue, the area supports moderate to dense vegetation and mature trees. The far eastern portion of the planned sewer line extends parallel along an existing seasonal drainage ditch within an existing mobile home park.

Project 1C

This project area currently supports an existing asphalt concrete paved roadway in the southern portion of the area. The proposed sewer alignment crosses through a major portion of Oro Dam Boulevard and extends northerly adjacent to and crosses an existing seasonal drainage ditch. Numerous utility vaults and manholes were observed in the project area. Utility markings painted on the roadways also indicated additional underground utilities exist in the area of the proposed sewer improvements. As the proposed sewer alignment extends northerly from Oro Dam Boulevard, the undeveloped area supports moderate to dense vegetation and mature trees.

Project 1E

This project area currently supports an existing asphalt concrete paved roadway in the northwestern portion of the improvement area. The proposed sewer alignment starts within Washington Avenue, just north of Bird Street, and extends southeasterly through the intersection into an undeveloped area along the east side of Washington Avenue, where it crosses under existing railroad tracks and ends at a manhole in Bridge Street. Numerous utility vaults and manholes were observed in the project area within Washington Avenue and Bridge Street. Utility markings painted on these roadways also indicated additional underground utilities exist in the area of the proposed sewer improvements.

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LEGEND ● B18-1 Exploratory Boring Location

NIVIS
 48 BELLARMINE COURT, STE 40
 CHICO, CA 95928
 530-894-2487 FAX 894-2437

BORING LOCATIONS
 CITY OF OROVILLE SEWER PROJECT
 OROVILLE, BUTTE COUNTY, CALIFORNIA

DRAWN BY: KAT
CHECKED BY: DJP
PROJECT NO. 70744.01
DATE: AUGUST, 2018

FIGURE NO.
2A

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LEGEND ● B18-3 Exploratory Boring Location

NIVIS

48 BELLARMINE COURT, STE 40
CHICO, CA 95928
530-894-2487 FAX 894-2437

BORING LOCATIONS
CITY OF OROVILLE SEWER PROJECT
OROVILLE, BUTTE COUNTY, CALIFORNIA

DRAWN BY: KAT
CHECKED BY: DJP
PROJECT NO. 70744.01
DATE: AUGUST, 2018

FIGURE NO.

2B

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LEGEND ● B18-6 Exploratory Boring Location

NIVIS
 48 BELLARMINE COURT, STE 40
 CHICO, CA 95928
 530-894-2487 FAX 894-2437

BORING LOCATIONS
 CITY OF OROVILLE SEWER PROJECT
 OROVILLE, BUTTE COUNTY, CALIFORNIA

DRAWN BY: KAT
CHECKED BY: DJP
PROJECT NO. 70744.01
DATE: AUGUST, 2018

FIGURE NO.
2C

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LEGEND ● B18-7 Exploratory Boring Location

NIVIS
 48 BELLARMINE COURT, STE 40
 CHICO, CA 95928
 530-894-2487 FAX 894-2437

BORING LOCATIONS
 CITY OF OROVILLE SEWER PROJECT
 OROVILLE, BUTTE COUNTY, CALIFORNIA

DRAWN BY: KAT
CHECKED BY: DJP
PROJECT NO. 70744.01
DATE: AUGUST, 2018

FIGURE NO.
2D

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NV5 observed during the site investigation, that the surface topography across the Project areas and surrounding near vicinity generally consists of relatively flat and gently to moderately sloping ground, with the exception of the Project 1F area that consisted of moderately to steep slope from the northwest portion to the southeast portion of the proposed work area.

2.2.2 Subsurface Soil Conditions

The subsurface soil conditions were investigated by excavating exploratory borings at the site. The subsurface information obtained from these investigation methods are described herein.

2.2.2.1 Exploratory Excavation Information

NV5 provided engineering oversight for the excavation of seven exploratory borings using a Speedstar/GEFCO SS-55 truck-mounted drill rig, equipped with 7-inch diameter hollow stem augers. Practical refusal to drilling with hollow stem augers was encountered in Borings B18-3 and B18-7, at depths of approximately 3 to 9 feet below ground surface (bgs). Borings B18-3 and B18-7 were extended to their maximum depths of 16 to 20 feet bgs, using the Odex down-hole air hammer casing advance drilling system. Figure 2 shows the approximate locations of the subsurface exploratory borings. The depths of the exploratory borings were determined following our review of the design depths of the new manholes to be constructed as part of the improvements. The seven exploratory borings were advanced to maximum depths of approximately 15.5 to 21.5 feet bgs into the undisturbed native soil. Engineering judgment was used to extrapolate the observed soil, rock and groundwater conditions to areas located between and beyond these subsurface exploratory excavations.

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NV5's field engineer/geologist logged each exploratory boring using the Unified Soils Classification System (USCS) procedure as a guideline. Representative soil samples were collected generally from 5-foot depth intervals starting below the ground surface in each boring. Relatively undisturbed soil samples were collected with a 2.5-inch inside-diameter split-spoon sampler denoted by (2.5-SS) equipped with stainless steel liner sample tubes. The 2.5-SS sampler was driven into the soil at the specified sampling depth intervals using a 140-pound slide hammer with a 30-inch free fall to the striking anvil. The liner tube samples were all sealed with labeled end-caps. Liner tube soil samples with limited recovery were generally placed in labeled, sealed plastic bags. The samples were transported to the NV5 Chico office laboratory and selected soil samples were tested to determine their engineering material properties. These soil engineering material properties are used to develop geotechnical engineering design recommendations.

Detailed descriptions of the soil, rock and groundwater conditions that were encountered in each subsurface exploratory location are presented on the exploratory boring logs included in Appendix B. The generalized soil and rock conditions underlying the property are described below. The material percentages listed are based on visual field estimates of each material's dry weight unless noted as laboratory test data. The native soil units encountered in the subsurface exploratory excavations were generally stratigraphically continuous or successive across the site with minor variations in thickness and particle size grading within the units. The soil encountered during the investigation was classified into the following distinguishable units.

- **CL, Low Plasticity Clay** : This soil unit was generally encountered from the surface to a depth of approximately 9 feet bgs and consists of the following field estimated particle size

percentages 95 percent low plasticity silt and clay, and 5 percent fine sand. This soil is predominantly dark reddish brown to yellowish brown with Munsell Color Chart designations of (2.5YR 3/4 to 10YR 6/4). This soil was soft to hard and moist at the time of the subsurface investigation.

- **GC, Clayey Gravel** : This soil unit was generally encountered from approximately 4.5 feet to 21.5 feet bgs and consists of the following field estimated particle size percentages 15 percent low plasticity silt and clay, 15 percent fine to medium sand, 50 percent gravel and 20 percent cobbles. This soil is predominantly yellowish brown with a Munsell Color Chart designation of (10YR 6/4). This soil was very dense and damp at the time of the subsurface investigation.
- **SC, Clayey Sand** : This soil unit was generally encountered from the surface to approximately 13.5 feet bgs in Borings B18-5 and B18-6 and consists of the following field estimated particle size percentages: 45 percent low plasticity silt and clay, 55 percent fine to coarse sand. This soil is predominantly dark reddish to yellowish brown with Munsel Color Chart designations of (5YR 3/3 to 10YR 6/4). This soil was stiff and damp at the time of the subsurface investigation.
- **SM, Silty Sand** : This soil unit was generally encountered from the surface to approximately 8.5 feet bgs in Boring B18-1 and consists of the following field estimated particle size percentages: 40 percent low plasticity silt and clay, 50 percent fine to medium sand, and 10 percent gravel. This soil is predominantly dark brown with a Munsel Color Chart designation of (7.5YR 3/4). This soil was dense and damp at the time of the subsurface investigation.
- **GM, Silty Gravel** : This soil unit was generally encountered at the surface to approximately 20 feet bgs (maximum target depth excavated to) in Boring B18-7. This soil consists of the following field estimated particle size percentages: 15 percent low plasticity silt and clay, 35 percent fine sand, and 50 percent fine to coarse gravel. This soil is predominantly strong brown with a Munsell Color Chart designation of (7.5YR 5/4). This soil was very dense and moist at the time of the subsurface investigation.

2.2.3 Groundwater Conditions

At the time of the subsurface investigation, NV5 encountered the local groundwater table in exploratory borings B18-1 and B18-5 at depths of approximately 13 feet and 18 feet bgs, which is at elevations of approximately 157-feet and 245-feet above msl.

NV5 reviewed the Geotracker (www.geotracker.waterboards.ca.gov) database, an online data base managed by the State Water Resources Control Board, for groundwater information on the surrounding properties. The Geotracker database included groundwater information from seven groundwater monitoring wells, within the vicinity of the proposed sewer improvements. The historical depth to groundwater data listed indicates:

- The first groundwater zone beneath the area of Boring B18-1 may be as shallow as 5 to 10 feet below ground surface.
- The first groundwater zone beneath the area of Boring B18-5 may be as shallow as 15 to 20 feet below ground surface.
- The first groundwater zone beneath the area of Boring B18-6 may be as shallow as 10 to 15 feet below ground surface.

Seasonal fluctuations in the local groundwater table are dependent upon the intensity of local rainfall, low lying elevations where surface water is present, and surface water flows and elevations occurring in the drainages situated in the vicinity of the site.

3.0 LABORATORY TESTING

NV5 performed laboratory tests on selected soil samples taken from the subsurface exploratory excavations to determine their engineering material properties. These engineering material properties were used to develop geotechnical engineering design recommendations for earthwork and structural improvements. The following laboratory tests were performed using the cited ASTM guideline procedures:

- ASTM D422 Particle Size Gradation (Sieve Only)
- ASTM D2216 Moisture Content
- ASTM D2487 Unified Soils Classification System
- ASTM D2488 Description by the Visual Manual Method
- ASTM D2850 Unconsolidated-Undrained (UU) Triaxial Compression Shear Test
- ASTM D2937 Density by Drive Tube Method
- ASTM D4318 Atterberg Indices

Table 3.1.-1 presents a summary of the laboratory test results. Appendix C presents the laboratory test data sheets.

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Table 3.1-1 Laboratory Test Results

Boring No.	Sample No.	ASTM Test Method and Results								
		Depth	D2487 D2488	D2216	D2937	D422		D4318		D2850
			USCS	Moisture Content (%)	Dry Density (pcf)	Passing No. 4 (%)	Passing No. 200 (%)	Plasticity Index (%)	Liquid Limit (%)	UU Compression (psf)
(ft.)	(sym)	(%)	(pcf)	(%)	(%)	(%)	(%)	(psf)		
B18-1	L3-2-2	10	CL			100	95.6			
B18-2	L2-1-2	5	CL	22.9	101.5	100	75.6	24	48	
B18-5	L3-2-2	10	CH	36.6	79.8	100	88.6	74	99	
B18-6	L2-1-2	5	SM			100	40.7	NP	NP	821
B18-6	L3-2-2	10	CH	21.1	106.0	100	74.5	49	66	

Notes:

ASTM ASTM International
 % percent
 ft feet
 No. Number
 NP Non Plastic
 pcf pounds per cubic foot
 psf pounds per square foot
 sym symbol
 USCS United Soils Classification System

4.0 SEISMIC SITE RESPONSE

NV5 reviewed the exploratory excavation information collected during the surface reconnaissance and subsurface investigation as well as the laboratory test data to determine seismic design parameters.

4.1 SITE CLASS

Based on the subsurface conditions encountered in the exploratory borings, and our experience with similar subsurface conditions at nearby properties, NV5 recommends classifying the property as a Site Class D (Stiff Soil Profile) in accordance with American Society of Civil Engineers (ASCE) 7-10, Section 11.4.2, Table 20.3-1.

4.2 GEOMETRIC MEAN PEAK GROUND ACCELERATION

NV5 used the United States Geological Survey, *U.S. Seismic "Design Maps" Web Application, Version 3.1.0* to determine the seismic design parameters for the site, including the geometric mean peak ground acceleration (PGA_M). The PGA_M is calculated by using the Site Coefficient ($F_{PGA} = F_a$) multiplied by the PGA mapped values found on ASCE 7-10 Figure 22-7. The geometric mean peak ground acceleration was calculated using the following equation:

$$PGA_M = F_{PGA}PGA = 1.336 \times 0.232 = 0.310 \text{ g}$$

where g = gravitational acceleration (32.2 feet/second² = 9.81 meters/second²)

The Seismic Design Parameter detailed report from the USGS analysis is included in Appendix D.

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5.0 CONCLUSIONS

The conclusions presented below are based on information developed from the field and laboratory investigations.

1. It is NV5's opinion that the site is suitable for the proposed construction improvements provided that the geotechnical engineering design recommendations presented in this report are incorporated into the earthwork and structural improvements of project plans and specifications. The use of directional drilling equipment may be difficult below a depth of approximately 4 to 6 feet bgs where stiff and dense clayey and sandy gravels were encountered in each exploratory boring.
2. Prior to construction, NV5 should be allowed to review the proposed earthwork grading and structural improvement plans and specifications to determine if these geotechnical engineering recommendations have been properly incorporated or if they need to be modified.
3. Based on the site geology, the observations made in the exploratory excavations and NV5's experience with nearby sites, NV5 concludes that the site soil profile can be modeled, according to the 2016 California Building Code (CBC), Chapter 16, and ASCE 7-10, Chapter 20, Section 20.3, Table 20.3-1 as a Site Class D (Stiff Soil Profile) designation for the purposes of establishing seismic design loads for the proposed improvements.
4. Based on the subsurface soil/rock and groundwater conditions observed during NV5's site investigation, literature review, and NV5's experience with subsurface conditions in the area, it is NV5's opinion that a low probability exists for liquefaction to occur at the site during an earthquake on a nearby fault.
5. The soil conditions observed to a maximum depth of approximately 21.5 feet below the native soil surface in the subsurface exploratory borings generally consisted of approximately 5 to 13 feet of soft to stiff, low to high plasticity clay (CL/CH) soil and dense silty sand (SM), underlain by very dense clayey gravels (GC). Auger drilling refusal was encountered at approximately 9 feet bgs in Boring B18-3 and at approximately 3 feet bgs in Boring B18-7.
6. NV5 encountered local groundwater table at a depth of approximately 13 and 18 feet bgs (approximately 157 feet and 245 feet above msl) in exploratory borings B18-1 and B18-5 at the time of the subsurface site investigation. NV5 concluded that the groundwater levels encountered in the borings are generally consistent with the historical groundwater data available on the Geotracker website. Additionally, the depth to the local groundwater table may vary at these and other on-site locations because of both seasonal rainfall fluctuations and local soil conditions.

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6.0 RECOMMENDATIONS

NV5 developed geotechnical engineering design recommendations for earthwork and structural improvements from the site-specific field and laboratory investigation data. The recommendations are presented hereafter.

6.1 EARTHWORK GRADING

NV5's earthwork grading recommendations include: demolition of existing improvements, import fill soil, temporary excavations, underground utility trenches, construction dewatering, soil corrosion potential, subsurface drainage, surface water drainage, review of construction plans, and construction quality assurance/quality control (QA/QC) monitoring. NV5's earthwork grading recommendations are presented below.

6.1.1 Demolition and Abandonment of Existing Site Improvements

NV5 does not anticipate the demolition of the existing structures, however, if existing structures are encountered in the proposed work area and the City chooses to have them removed, the demolition and abandonment should include the following described below.

1. Historical foundations, abutments, underground utilities and other existing site improvements that are called out for demolition on the Improvement Plans should be demolished and removed from the site as directed in the project specifications. These demolition materials should be disposed off-site in compliance with applicable regulatory requirements.
2. Abandonment of underground utilities within the construction area that will not interfere with the proposed site improvements should be plugged with cement grout to reduce migration of soil and/or water.
3. Backfill all depressions excavated for demolition purposes in accordance with the recommendations presented in this report.

6.1.2 Import Fill Soil

Import fill soil should meet the minimum geotechnical engineering material property requirements described in Section 6.1.4 (Underground Utility Trenches) of this report. Prior to importation to the site, the source generator should document that the import fill meets the guideline requirements set forth by the California Environmental Protection Agency (CalEPA) Department of Toxic Substances Control (DTSC) in their 2001 document entitled "Information Advisory, Clean Imported Fill Material." This advisory document represents the best practice for characterization of soil prior to import for use as engineered fill. The project geotechnical engineer should approve all proposed imported fill soil for use in constructing engineered fills at the site.

6.1.3 Temporary Excavations

All temporary excavations must comply with applicable local, state and federal safety regulations, including the current Occupational Safety and Hazards Administration (OSHA) excavation and trench safety standards. Construction site safety is the responsibility of the contractor, who is solely

responsible for the means, methods and sequencing of construction operations. Under no circumstances should the findings, conclusions and recommendations presented herein be inferred to mean that NV5 is assuming any responsibility for temporary excavations, or for the design, installation, maintenance and performance of any temporary shoring, bracing, underpinning or other similar systems. NV5 can provide recommendations for grading of temporary cut slopes, if requested.

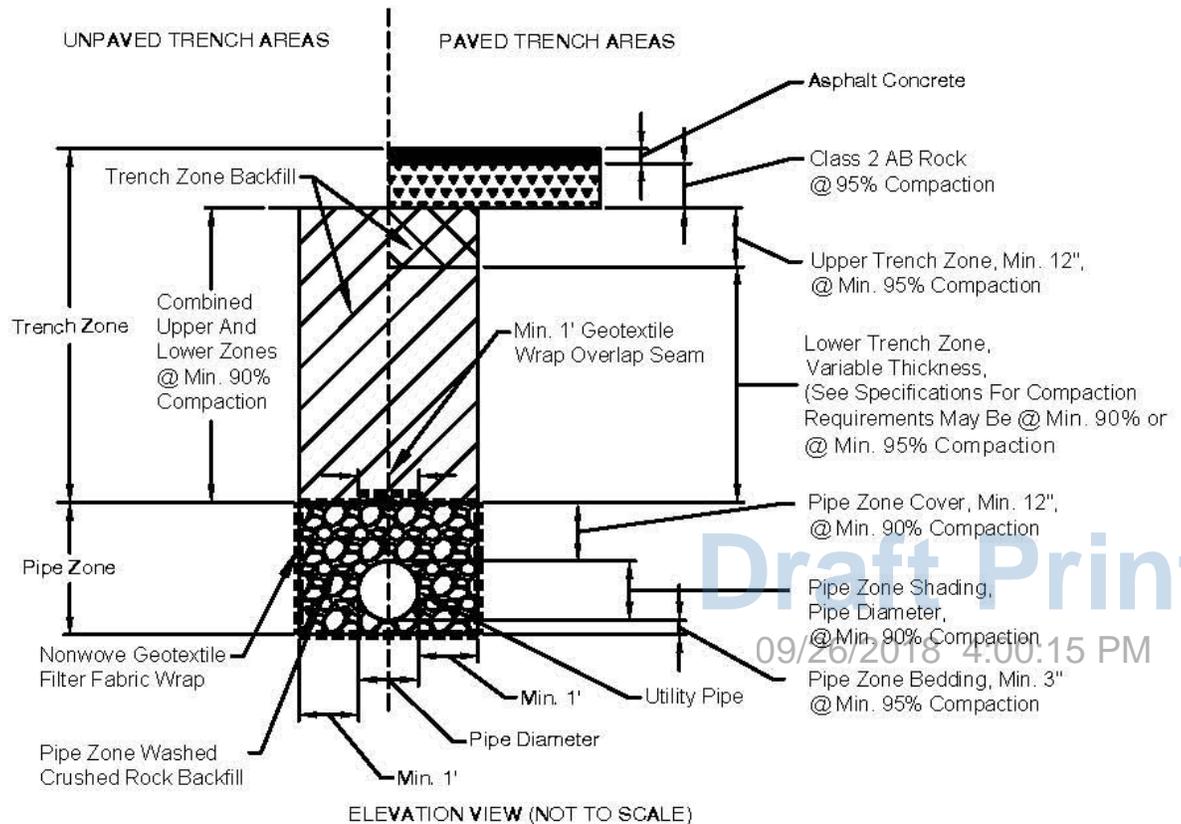
6.1.4 Underground Utility Trenches

Underground utility trenches should be excavated and backfilled as described below for each trench zone as shown in the figure below.

1. **Trench Excavation Equipment:** NV5 anticipates that the contractor should be able to excavate all underground utility trenches with a long reach excavator or equivalent. Small diameter direction drilling should be possible in the upper 4 to 6 feet bgs. Direction drilling may be difficult below this depth due to very stiff clayey gravels and cobbles. Contractor should review the boring logs in Appendix B of this report.
2. **Trench Shoring:** All utility trenches that are excavated deeper than 4 feet below the surrounding ground surface are required by the California OSHA to be shored with bracing equipment or sloped back to an appropriate slope gradient prior to being entered by any individuals.
3. **Trench Dewatering:** NV5 encountered groundwater in our exploratory borings B18-1 and B18-5 at depths of approximately 13 feet and 18 feet bgs, which is at elevations of approximately 157-feet and 245-feet above msl. Historical groundwater data indicates groundwater can be as shallow as 5 to 10 feet in the area of B18-1; as shallow as 15 to 20 feet in the area of B18-5; and, as shallow as 10 to 15 feet in the area of B18-6. Therefore, depending on the time construction takes place, shallow groundwater may be encountered within the utility excavations. The earthwork contractor may need to employ de-watering methods in order to excavate, place and compact the trench backfill materials.
4. **Pipe Zone Backfill Type and Compaction Requirements:** The backfill material type and compaction requirements for the pipe zone which includes the bedding zone, shading zone and cover zone as shown in the Detail 6.1.4-1 are described below.

Detail 6.1.4-1

TYPICAL UTILITY TRENCH BACKFILL



- Pipe Zone Backfill Material Type:** Trench backfill used within the pipe zone which includes the bedding zone, shading zone and cover zone should consist of ¾-inch minus, washed, crushed rock. The crushed rock particle size gradation should meet the following requirements (the percentages are expressed as dry weights using ASTM D422 test method): 100 percent passing the ¾-inch sieve, 80 to 100 percent passing the ½-inch sieve, 60 to 100 percent passing the 3/8-inch sieve, 0 to 30 percent passing the No. 4 sieve, 0 to 10 percent passing the No. 8 sieve, and 0 to 3 percent passing the No. 200 sieve.

If groundwater is encountered within the trench during construction or if it is expected to rise during the rainy season to an elevation that will infiltrate the pipe zone within the trench, then the pipe zone material should be wrapped with a minimum 6 ounces per square yard, non-woven, geotextile filter fabric such as Mirafi® 140N manufactured by TenCate or an approved equivalent. The geotextile seam should be located along the trench centerline and have a minimum 1-foot overlap. If the utility pipes are coated with a corrosion protection material, then the pipes should be wrapped with a minimum 6 ounces per square yard, non-woven, geotextile cushion fabric such as Mirafi® 140N manufactured by TenCate or an approved equivalent. The geotextile cushion fabric should have a minimum 6-inch seam

overlap. The geotextile cushion fabric will protect the pipe from being scratched by the crushed rock backfill material.

- **Pipe Bedding Zone Compaction:** Trench backfill soil placed in the pipe bedding zone (beneath the utilities) should be a minimum 3-inches-thick, moisture conditioned to within ± 3 percentage points of the ASTM D1557 optimum moisture content and compacted to achieve a minimum relative compaction of 95 percent of the ASTM D1557 maximum dry density.
 - **Pipe Shading Zone Compaction:** Trench backfill soil placed within the pipe-shading zone (above the bedding zone and to a height of one pipe radius length above the pipe spring line) should be moisture conditioned to within ± 3 percentage points of the ASTM D1557 optimum moisture content and compacted to achieve a minimum relative compaction of 90 percent of the ASTM D1557 maximum dry density. The pipe shading zone backfill material should be shovel sliced to remove voids and to promote compaction.
 - **Pipe Cover Zone Compaction:** Trench backfill soil placed within the pipe cover zone (above the pipe shading zone to a minimum of one foot over the pipe top surface) should be moisture conditioned to within ± 3 percentage points of the ASTM D1557 optimum moisture content and compacted to achieve a minimum relative compaction of 90 percent of the ASTM D1557 maximum dry density.
5. **Trench Zone Backfill and Compaction Requirements:** The trench zone backfill materials consist of both lower and upper zones as discussed below.
- **Trench Zone Backfill Material Type:** Soil used as trench backfill within the lower and upper intermediate zones as shown on the preceding figure should consist of non-expansive soil with a plasticity index (PI) of less than or equal to $PI \leq 20$ (based on ASTM D4318) and should not contain rocks greater than 3 inches in greatest dimension.
 - **Lower Trench Zone Compaction:** Soil used to construct the lower trench zone backfills should be uniformly moisture conditioned to within 0 to 4 percentage points of the ASTM D1557 optimum moisture content, placed in maximum 12-inch-thick loose lifts (layers) prior to compacting and compacted to achieve a minimum relative compaction of 90 percent of the ASTM D1557 maximum dry density.
 - **Upper Trench Zone Compaction (Road and Parking Lot Areas):** Soil used to construct the upper trench zone backfills should be uniformly moisture conditioned to within 0 to 4 percentage points greater than the ASTM D1557 optimum moisture content, placed in maximum 8-inch-thick loose lifts (layers) prior to compacting and compacted to achieve a minimum relative compaction of 95 percent of the ASTM D1557 maximum dry density.
 - **Upper Trench Zone Compaction (Non-Road and Non Parking Lot Areas):** Soil used to construct the upper trench zone backfills should be uniformly moisture conditioned to within 0 to 4 percentage points greater than the ASTM D1557 optimum moisture content, placed in maximum 8-inch-thick loose lifts (layers) prior to compacting and compacted to achieve a minimum relative compaction of 90 percent of the ASTM D1557 maximum dry density.
6. **CQA Testing and Observation Engineering Services:** The moisture content, dry density, and relative percent compaction of all engineered utility trench backfills should be tested by the project engineer's field representative during construction to evaluate whether the compacted trench backfill materials meet or exceed the minimum compaction and moisture content requirements presented in this report. The earthwork contractor shall assist the

project engineer’s field representative by excavating test pads with the on-site earth moving equipment.

- **Compaction Testing Frequencies:** The field and laboratory construction quality assurance (CQA) tests should be performed consistent with the testing frequencies presented in Table 6.1.4-1 or as modified by the project engineer to better suit the site conditions.

Table 6.1.4-1 Minimum Testing Frequencies for Utility Trench Backfill

ASTM No.	Test Description	Minimum Test Frequency ⁽¹⁾
D1557	Modified Proctor Compaction Curve	1 per 500 CY ⁽¹⁾ Or Material Change ⁽²⁾
D6938	Nuclear Moisture Content and Density	1 per 100 LF per 24-inch Thick Compacted Backfill Layer. The maximum loose lift thickness shall not exceed 12 inches prior to compacting.
<p>Notes:</p> <p>(1) These are minimum testing frequencies that may be increased or decreased at the project engineer’s discretion on the basis of the site conditions encountered during grading.</p> <p>(2) Whichever criteria provide the greatest number of tests.</p> <p>CY = cubic yards</p> <p>LF = linear feet</p>		

- **Final Proof Rolling:** The prepared finished grade of aggregate base (AB) rock surface and/or finished subgrade soil surface of utility trench backfills should be proof rolled with a fully loaded minimum 4,000 gallon capacity water truck with the rear of the truck supported on a double-axle, tandem-wheel undercarriage or approved equivalent. The minimum tire pressure should be 65 pounds per square inch (psi). The proof rolled surface should be visually observed by the project geotechnical engineer or the project geotechnical engineer’s field representative to be firm, competent and relatively unyielding. The project geotechnical engineer or the project geotechnical engineer’s field representative may also evaluate the surface material by hand probing with a ¼-inch-diameter steel probe; however, this evaluation method should not be performed as a substitute for proof rolling as described in the preceding.

6.1.5 Construction De-watering

The earthwork contractor should be prepared to de-water the utility trench excavations and any other excavations if perched water or the groundwater table is encountered during grading. The following recommendations are preliminary and are not based on performing a groundwater flow analysis. A detailed de-watering analysis was not a part of the proposed work scope. It should be understood that it is the earthwork contractor’s sole responsibility to select and employ a satisfactory de-watering method for each excavation.

1. NV5 anticipates that de-watering of utility trenches can be performed by constructing sumps to depths below the trench bottom and removing the water with sump pumps.
2. Additional sump excavations and pumps should be added as necessary to keep the excavation bottom free of standing water and relatively dry when placing and compacting the trench backfill materials.
3. If groundwater enters the trench faster than it can be removed by the de-watering system, thereby allowing the underlying compacted soil to become unstable while compacting

successive soil lifts, then it may be necessary to remove the unstable soil and replace it with free-draining, granular drain rock. Native backfill soil can again be used after placing the granular rock to an elevation that is higher than the groundwater table.

4. If granular rock is used it should be wrapped in a non-woven geotextile fabric such as readily available Mirafi® 140N manufactured by TenCate or approved equivalent. The geotextile filter fabric should have minimum 1-foot overlap seams. The granular rock should meet or exceed the following gradation specifications (all percents are expressed as dry weights using ASTM D422 test method): 100 percent passing the ¾-inch sieve, 80 to 100 percent passing the ½-inch sieve, 60 to 100 percent passing the 3/8-inch sieve, 0 to 30 percent passing the No. 4 sieve, 0 to 10 percent passing the No. 8 sieve, and 0 to 3 percent passing the No. 200 sieve.
5. NV5 recommends that the utility trench excavations be performed as late in the summer months as possible to allow the groundwater table to reach its lowest seasonal elevation.

6.1.6 Soil Corrosion Potential

The selected materials used for constructing underground utilities should be evaluated by a corrosion engineer for compatibility with the on-site soil and groundwater conditions. The November 2012 Caltrans Corrosion Guidelines, Version 2.0 document defines a soil as corrosive if the soil and/or water it contains has the following properties: chloride concentration is ≥ 500 parts per million (ppm), sulfate concentration is $\geq 2,000$ ppm, pH is ≤ 5.5 , and an electrical resistivity of $\leq 1,000$ ohm-centimeters. NV5 did not perform a corrosion potential evaluation of the on-site soil and groundwater as part of the scope-of-services. In general, corrosive or reactive soils as defined in the preceding are not common in the Chico area. Based on the local soil type, NV5 recommends that all concrete mixes use Type II/V Portland cement.

6.1.7 Subsurface Groundwater Drainage

NV5 does anticipate encountering perched groundwater or the local groundwater table during construction of underground utilities. The contractor should consult with a de-watering professional to evaluate the level of effort and need based on the construction approach employed.

6.1.8 Final Plan Review and Construction Monitoring

Construction quality assurance includes review of plans and specifications and performing construction monitoring as described below.

1. NV5 should be allowed to review the final earthwork grading improvement plans prior to commencement of construction to determine whether the recommendations have been implemented, and if necessary, to provide additional and/or modified recommendations.
2. NV5 should be allowed to perform CQA monitoring of all earthwork grading performed by the contractor to determine whether the recommendations have been implemented, and if necessary, to provide additional and/or modified recommendations.
3. NV5's experience, and that of the geotechnical engineering profession, clearly indicate that during the construction phase of a project the risks of costly design, construction and maintenance problems can be significantly reduced by retaining a design geotechnical engineering firm to review the project plans and specifications and to provide geotechnical engineering CQA observation and testing services. Upon your request NV5 will prepare a CQA

geotechnical engineering services proposal that will present a work scope, tentative schedule and fee estimate for your consideration and authorization. If NV5 is not retained to provide geotechnical engineering CQA services during the construction phase of the project, then NV5 will not be responsible for geotechnical engineering CQA services provided by others nor any aspect of the project that fails to meet your or a third party's expectations in the future.

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The Seismic Design Parameter detailed report developed from the USGS analysis is presented in Appendix D.

6.2.2 Jacking and Receiving Pits Temporary Retaining Walls

A California-licensed civil engineer should design all jacking pit and receiving pit retaining walls situated above the groundwater table with drained backfill using the following geotechnical engineering design criteria:

1. The retaining wall recommendations for static loading conditions are based on Rankine earth pressure theory published by W.J.M. Rankine (1857). The retaining wall should be designed using the geotechnical engineering design parameters presented in Table 6.2.2-1.
2. The static lateral earth pressures exerted on the retaining walls may be assumed to be equal to an equivalent fluid pressure per foot of depth below the top of the wall. The lateral pressures presented below are ultimate values and therefore do not include a safety factor, and assumes a free draining backfill (no hydrostatic forces acting on the wall) and no surcharge loads applied within a distance of $0.40H$, where H equals the total vertical wall height.
3. The retaining wall backfill slope shall have a horizontal slope gradient for a minimum horizontal distance of $0.40H$, where H equals the total vertical wall height. If a steeper backfill slope ratio is desired, then NV5 should be notified and contracted to provide perform additional retaining wall design parameters.

Table 6.2.2-1 Design Parameters for Jacking Pit and Receiving Pit Retaining Walls 09/26/2018 4:00:15 PM

Loading Conditions	Loads On Retaining Wall With Horizontal Backfill Slope
Wall Active Condition Pressures (psf) ⁽¹⁾	45 (H) ⁽⁵⁾
Wall Passive Condition Pressures (psf) ⁽²⁾	350 (H)
Wall At-Rest Condition Pressure (psf) ⁽³⁾	65 (H)
P_{active} Force Located Above Foundation Base	0.33 (H)
$P_{passive}$ Force Located Above Foundation Base	0.33 (H)
$P_{at-rest}$ Force Located Above Foundation Base	0.33 (H)
Notes:	
(1) The active pressure condition applies to a retaining wall with an unrestrained top (deflection allowed).	
(2) The passive pressure condition applies to the retaining wall where the jacking forces are applied. NV5 recommends that the top 1.0 feet of soil weight be ignored when computing the passive bearing pressure used to resist the Jacking force.	
(3) The At-Rest pressure condition applies to a retaining wall with the top restrained (no deflection allowed).	
(4) H = The distance to a point in the backfill soil where the pressure is desired. The H distance is measured from the top of the wall for active and at-rest conditions and from one foot below the top of the wall height for the passive condition (See Note 2 for passive condition).	

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8.0 LIMITATIONS

The following limitations apply to the findings, conclusions and recommendations presented in this report:

1. NV5's professional services were performed consistent with the generally accepted geotechnical engineering principles and practices employed in northern California. No warranty is expressed or implied.
2. NV5 provided engineering services for the site project consistent with the work scope and contract agreement presented in the proposal and agreed to by the client. The findings, conclusions and recommendations presented in this report apply to the conditions existing when NV5 performed the services and are intended only for the client, purposes, locations, time frames and project parameters described herein. NV5 is not responsible for the impacts of any changes in environmental standards, practices or regulations subsequent to completing the services. NV5 does not warrant the accuracy of information supplied by others, or the use of segregated portions of this report. This report is solely for the use of the client unless noted otherwise, such as a submittal document to a regulatory agency. Any reliance on this report by a third party is at the party's sole risk.
3. If changes are made to the nature or design of the project as described in this report, then the conclusions and recommendations presented in this report should be considered invalid by all parties. The validity of the conclusions and recommendations presented in this report can only be made by NV5's geotechnical engineer, therefore, NV5 should be allowed to review all project changes and prepare written responses with regards to their impacts on the conclusions and recommendations, however, additional fieldwork and laboratory testing may be required for us to develop any modifications to the recommendations. The cost to review project changes and perform additional fieldwork and laboratory testing necessary to modify the recommendations is beyond the scope-of-services presented in this report. Any additional work will be performed only after receipt of an approved scope-of-work, budget and written authorization to proceed.
4. The analyses, conclusions and recommendations presented in this report are based on the site conditions as they existed at the time NV5 performed the surface and subsurface field investigations. NV5 has assumed that the subsurface soil and groundwater conditions encountered at the location of the exploratory excavations are generally representative of the subsurface conditions throughout the entire project site. However, if the actual subsurface conditions encountered during construction are different than those described in this report, then NV5 should be notified immediately so that we can review these differences and, if necessary, modify the recommendations.
5. The elevation or depth to the groundwater table underlying the project site may differ with time and location. Therefore, the depth to the groundwater table encountered in the exploratory trenches is only representative of the specific time and location where it was observed.
6. The project site map shows approximate locations for subsurface exploratory excavations as determined by pacing distances from identifiable site features, therefore, their locations should not be relied upon as being exact nor located with the accuracy of a California-licensed land surveyor.
7. NV5's geotechnical investigation scope-of-services did not include an evaluation of the project site for the presence of hazardous materials. Although NV5 did not observe the presence of hazardous materials at the time of the field investigation, all project personnel

should be careful and take the necessary precautions in the event hazardous materials are encountered during construction.

8. NV5's geotechnical investigation scope-of-services did not include an evaluation of the project site for the presence of mold or for the future potential development of mold at the project site. If an evaluation of the presence of mold and/or for the future potential development of mold at the site is desired, then the property owner should contact a consulting firm specializing in these types of investigations. NV5 does not perform mold evaluation investigations.
9. NV5's experience and that of the civil engineering profession clearly indicate that during the construction phase of a project the risks of costly design, construction and maintenance problems can be significantly reduced by retaining a design geotechnical engineering-of-record firm to review the project plans and specifications and to provide geotechnical engineering CQA observation and testing services. Upon your request, we will prepare a CQA geotechnical engineering services proposal that will present a work scope, tentative schedule, and fee estimate for your consideration and authorization. If NV5 is not retained to provide geotechnical engineering CQA services during the construction phase of the project, then NV5 will not be responsible for geotechnical engineering CQA services provided by others nor any aspect of the project that fails to meet your or a third party's expectations in the future.

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APPENDIX A

Important Information about This Geotechnical Engineering Report (included with permission of GBA, Copyright 2016)

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Important Information about This

Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way, clients can benefit from a lowered exposure to the subsurface problems that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed below, contact your GBA-member geotechnical engineer. Active involvement in the Geoprofessional Business Association exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.

Geotechnical-Engineering Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical-engineering study conducted for a given civil engineer will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client. *Those who rely on a geotechnical-engineering report prepared for a different client can be seriously misled.* No one except authorized client representatives should rely on this geotechnical-engineering report without first conferring with the geotechnical engineer who prepared it. *And no one – not even you – should apply this report for any purpose or project except the one originally contemplated.*

Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read it *in its entirety*. Do not rely on an executive summary. Do not read selected elements only. *Read this report in full.*

You Need to Inform Your Geotechnical Engineer about Change

Your geotechnical engineer considered unique, project-specific factors when designing the study behind this report and developing the confirmation-dependent recommendations the report conveys. A few typical factors include:

- the client's goals, objectives, budget, schedule, and risk-management preferences;
- the general nature of the structure involved, its size, configuration, and performance criteria;
- the structure's location and orientation on the site; and
- other planned or existing site improvements, such as retaining walls, access roads, parking lots, and underground utilities.

Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light-industrial plant to a refrigerated warehouse;
- the elevation, configuration, location, orientation, or weight of the proposed structure;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes – even minor ones – and request an assessment of their impact. *The geotechnical engineer who prepared this report cannot accept responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.*

This Report May Not Be Reliable

Do not rely on this report if your geotechnical engineer prepared it:

- for a different client;
- for a different project;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, that it could be unwise to rely on a geotechnical-engineering report whose reliability may have been affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If your geotechnical engineer has not indicated an "apply-by" date on the report, ask what it should be, and, in general, if you are the least bit uncertain about the continued reliability of this report, contact your geotechnical engineer before applying it.* A minor amount of additional testing or analysis – if any is required at all – could prevent major problems.

Most of the "Findings" Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site's subsurface through various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing were performed.* The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgment to form opinions about subsurface conditions throughout the site. Actual sitewide-subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team from project start to project finish, so the individual can provide informed guidance quickly, whenever needed.

This Report's Recommendations Are Confirmation-Dependent

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, *they are not final*, because the geotechnical engineer who developed them relied heavily on judgment and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* revealed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. *The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.*

This Report Could Be Misinterpreted

Other design professionals' misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a full-time member of the design team, to:

- confer with other design-team members,
- help develop specifications,
- review pertinent elements of other design professionals' plans and specifications, and
- be on hand quickly whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction observation.

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note conspicuously that you've included the material for informational purposes only*. To avoid misunderstanding, you may also want to note that "informational purposes" means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report, but they may rely on the factual data relative to the specific times, locations, and depths/elevations referenced. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only* from the design drawings and specifications. Remind constructors that they may

perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely*. Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The personnel, equipment, and techniques used to perform an environmental study – e.g., a "phase-one" or "phase-two" environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually relate any environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures*. If you have not yet obtained your own environmental information, ask your geotechnical consultant for risk-management guidance. As a general rule, *do not rely on an environmental report prepared for a different client, site, or project, or that is more than six months old*.

Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, none of the engineer's services were designed, conducted, or intended to prevent uncontrolled migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, *proper implementation of the geotechnical engineer's recommendations will not of itself be sufficient to prevent moisture infiltration*. Confront the risk of moisture infiltration by including building-envelope or mold specialists on the design team. *Geotechnical engineers are not building-envelope or mold specialists*.



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APPENDIX B

Exploratory Boring Logs

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EXPLORATORY BORING LOG

48 BELLARMINA COURT, SUITE 40, CHICO, CA., 95928
 PHONE: 530-894-2487, FAX: 530-894-2437

Boring No.

B18-1

Project Name: OROVILLE SEWER

Project No.: 70744.00

Task: 001

Start Date: 04-30-18

Location: OROVILLE, CA

Estimated Ground Surface Elevation (Ft. AMSL):

Finish Date: 04-30-18

Sheet: 1 Of 2

Logged By: CHAD BOREAN

Drilling Cmpny: PC EXPLORATION

Drill Rig Type: GEFFCO SS-55

Driller: SCOTT

Drilling Method: HOLLOW STEM AUGER (HSA)

Hammer Type: 140 POUND AUTOMATIC TRIP

Boring Dia. (In.): 6.5

Total Depth (Ft.): 21.5

Backfill or Well Casing: CUTTINGS

24 Hour Clock Time (HH:MM)	Pocket Penetrometer (TSF)	Uncorrected Blow Counts (Blows / 6-inch)	Drilling Method and/or Sampler Type	Sample Recovery (Ft./Ft.)	Sample No.	Depth B.G.S. (Ft.)	Sample Interval And Symbol	Graphic Log	Ground Water Information			
									Date	04-30-18		
									Time (24 Hour)	10:22		
			HSA			0			Soil And/Or Rock Material Descriptions			
09:29						1			(SM) SILTY SAND W/ GRAVEL; FIELD ESTIMATE: 40% LOW PLASTICITY FINES, 50% SAND, 10% GRAVEL; DARK BROWN (7.5 YR 3/4); DENSE; DAMP. ASSUMED BACKFILL TO ADJACENT CONCRETE BOX CULVERTS.			
09:32		14	2.5 SS			2						
		11		0.8/1.5	L1-2-2	3						
		10			L1-1-2	4						
			HSA			5						
09:38		9	2.5 SS			6			(CL) CLAY; FIELD ESTIMATE: 95% LOW PLASTICITY FINES, 5% VERY FINE SAND; YELLOWISH RED (5YR 4/6); SOFT; MOIST. ASSUMED BACKFILL TO ADJACENT CONCRETE BOX CULVERTS.			
		26		1.1/1.5	L2-2-2	7						
		24			L2-1-2	8						
			HSA			9						
						10						
09:44		1	2.5 SS			11						
		2		0.9/1.5	L3-2-2	12						
	0.5	3			L3-1-2	13						
			HSA			14						
						15						
						16						
09:51		5	2.5 SS			17			BECOMING SANDY CLAY WITH GRAVEL; FIELD ESTIMATE: 70% LOW PLASTICITY FINES, 20% SAND, 10% GRAVEL; DARK YELLOWISH BROWN (10YR 4/6); STIFF; WET.			
		8		0.5/1.5	L4-1-1	18						
		9				19						
			HSA			20						

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NOTES: 1. HSA : HOLLOW STEM AUGER



EXPLORATORY BORING LOG

48 BELLARMINA COURT, SUITE 40, CHICO, CA., 95928
PHONE: 530-894-2487, FAX: 530-894-2437

Boring No.

B18-1

Sheet: 2 Of 2

Project Name: OROVILLE SEWER

Project No.: 70744.00

Task: 001

Start Date: 04-30-18

Location: OROVILLE, CA

Estimated Ground Surface
Elevation (Ft. AMSL):

Finish Date: 04-30-18

Logged By: CHAD BOREAN

Drilling Cmpny: PC EXPLORATION

Drill Rig Type: GEFFCO SS-55

Driller: SCOTT

Drilling Method: HOLLOW STEM AUGER (HSA)

Hammer Type: 140 POUND AUTOMATIC TRIP

Boring Dia. (In.): 6.5

Total Depth (Ft.): 21.5

Backfill or Well Casing: CUTTINGS

24 Hour Clock Time (HH:MM)	Pocket Penetrometer (TSF)	Uncorrected Blow Counts (Blows / 6-inch)	Drilling Method and/or Sampler Type	Sample Recovery (Ft./Ft.)	Sample No.	Depth B.G.S. (Ft.)	Sample Interval And Symbol	Graphic Log	Ground Water Information				
									Date	04-30-18			
									Time (24 Hour)	10:22			
10:09		2	2.5 SS			20			Soil And/Or Rock Material Descriptions <small>SOIL: USCS Symbol; Name; Particle Size Gradation %; Munsell Color; Density/Consistency; Moisture; Odor; Organics; Cementation; Texture; Refuse; Etc. ROCK: Unit Name; Lithology; Munsell Color; Cementation; Weathering; Competency; Bedding/Foliation; Fracture/Joint Spacing & Roughness; RQD; Moisture.</small>				
		5			21								
		17		0/1.5									
						22			BORING TERMINATED AT 21.5' <div style="text-align: center; font-size: 2em; color: lightblue; opacity: 0.5;">Draft Print</div> <div style="text-align: center; font-size: 1.2em; color: gray; opacity: 0.5;">09/26/2018 4:00:16 PM</div>				
						23							
						24							
						25							
						26							
						27							
						28							
						29							
						30							
						31							
						32							
						33							
						34							
						35							
						36							
						37							
						38							
						39							
						40							

NOTES: 1. HSA : HOLLOW STEM AUGER



EXPLORATORY BORING LOG

48 BELLARMINE COURT, SUITE 40, CHICO, CA., 95928
 PHONE: 530-894-2487, FAX: 530-894-2437

Boring No.

B18-2

Project Name: OROVILLE SEWER

Project No.: 70744.00

Task: 001

Start Date: 04-30-18

Location: OROVILLE, CA

Estimated Ground Surface
 Elevation (Ft. AMSL):

Finish Date: 04-30-18

Sheet: 1 Of 1

Logged By: CHAD BOREAN

Drilling Cmpny: PC EXPLORATION

Drill Rig Type: GEFFCO SS-55

Driller: SCOTT

Drilling Method: HOLLOW STEM AUGER (HSA), ODEX

Hammer Type: 140 POUND AUTOMATIC TRIP

Boring Dia. (In.): 6.5

Total Depth (Ft.): 16.0

Backfill or Well Casing: CUTTINGS

24 Hour Clock Time (HH:MM)	Pocket Penetrometer (TSF)	Uncorrected Blow Counts (Blows / 6-inch)	Drilling Method and/or Sampler Type	Sample Recovery (Ft./Ft.)	Sample No.	Depth B.G.S. (Ft.)	Sample Interval And Symbol	Graphic Log	Ground Water Information			
									Date	04-30-18		
									Time (24 Hour)	11:47		
									Depth (Ft.)	NONE		
									Soil And/Or Rock Material Descriptions			
									SOIL: USCS Symbol; Name; Particle Size Gradation %; Munsell Color; Density/Consistency; Moisture; Odor; Organics; Cementation; Texture; Refuse; Etc. ROCK: Unit Name; Lithology; Munsell Color; Cementation; Weathering; Competency; Bedding/Foliation; Fracture/Joint Spacing & Roughness; RQD; Moisture.			
10:45			HSA			0			ASPHALT CONCRETE (AC) = 2 Inches			
						1			AGGREGATE BASE (AB) ROCK = 4 Inches			
						2			(CL) CLAY; FIELD ESTIMATE: 90% LOW PLASTICITY FINES, 10% VERY FINE SAND; DARK REDDISH BROWN (2.5 YR 3/4); VERY STIFF; DAMP.			
10:48		15	2.5 SS			3						
		11			L1-2-2							
		14		1.1/1.5	L1-1-2							
			HSA			4						
10:55		4	2.5 SS			5						
	> 4.5	7			L2-2-2							
		16		1.0/1.5	L2-1-2							
			HSA			6						
						7						
						8						
						9						
						10						
11:07		4	2.5 SS			10						
		31			L3-2-2							
		50/2		0.9/1.5	L3-1-2							
			HSA			12						
						13						
						14						
						15						
11:25		21	2.5 SS			15						
		50/4			L4-2-2							
					L4-1-2							
						16						
						17						
						18						
						19						
						20						
									BORING TERMINATED @ 16.0'			

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NOTES: 1. HSA : HOLLOW STEM AUGER



EXPLORATORY BORING LOG

48 BELLARMINE COURT, SUITE 40, CHICO, CA., 95928
 PHONE: 530-894-2487, FAX: 530-894-2437

Boring No.

B18-3

Project Name: OROVILLE SEWER		Project No.: 70744.00	Task: 001	Start Date: 04-30-18	Sheet: 1 Of 1
Location: OROVILLE, CA		Estimated Ground Surface Elevation (Ft. AMSL):		Finish Date: 04-30-18	
Logged By: CHAD BOREAN		Drilling Cmpny: PC EXPLORATION		Drill Rig Type: GEFFCO SS-55	
Driller: SCOTT		Drilling Method: HOLLOW STEM AUGER (HSA), ODEX		Hammer Type: 140 POUND AUTOMATIC TRIP	
Boring Dia. (In.): 6.5		Total Depth (Ft.): 16	Backfill of Well Casing: CUTTINGS		

24 Hour Clock Time (HH:MM)	Pocket Penetrometer (TSF)	Uncorrected Blow Counts (Blows / 6-inch)	Drilling Method and/or Sampler Type	Sample Recovery (Ft./Ft.)	Sample No.	Depth B.C.S. (Ft.)	Sample Interval And Symbol	Graphic Log	Ground Water Information			
									Date	08-13-17		
									Time (24 Hour)	13:30		
									Soil And/OR Rock Material Descriptions			
									<small>SOIL: USCS Symbol; Name; Particle Size Gradation %; Munsell Color; Density/Consistency; Moisture; Odor; Organics; Cementation; Texture; Refuse; Etc. ROCK: Unit Name; Lithology; Munsell Color; Cementation; Weathering; Competency; Bedding/Foliation; Fracture/Joint Spacing & Roughness; RGD; Moisture.</small>			
			HSA			0			ASPHALT CONCRETE (AC) = 1 Inches			
						1			AGGREGATE BASE (AB) ROCK = 4 Inches			
						2			(CL) GRAVELLY CLAY; FIELD ESTIMATE: 55% LOW PLASTICITY FINES, 20% SAND, 25% GRAVEL; YELLOWISH RED (5YR 5/6); VERY DENSE; DAMP. WEATHERED ROCK.			
12:10		24	2.5 SS			3						
		40			L1-2-2	3						
		50/4		1.1/1.4	L1-1-2	4						
			HSA			5						
12:20		27	2.5 SS		L2-2-2	5						
		50/4		0.9/0.9	L2-1-2	6						
			HSA			7						
						8						
						9			@ 9.0' AUGER REFUSAL, SWITCH TO ODEX			
12:56			ODEX			10			(GC) CLAYEY GRAVEL WITH SAND AND COBBLES; FIELD ESTIMATE: 15% LOW PLASTICITY FINES, 15% SAND, 50% GRAVEL, 20% COBBLES; LIGHT YELLOWISH BROWN (10YR 6/4); VERY DENSE; DAMP.			
						11						
						12						
						13						
						14						
13:14		27	2.5 SS		L3-2-2	15						
		50/4		0.9/0.9	L3-1-2	16						
						17			BORING TERMINATED @ 16.0'			
						18						
						19						
						20						

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NOTES: 1. HSA : HOLLOW STEM AUGER



EXPLORATORY BORING LOG

48 BELLARMINA COURT, SUITE 40, CHICO, CA., 95928
 PHONE: 530-894-2487, FAX: 530-894-2437

Boring No.

B18-4

Project Name: OROVILLE SEWER

Project No.: 70744.00

Task: 001

Start Date: 04-30-18

Location: OROVILLE, CA

Estimated Ground Surface Elevation (Ft. AMSL):

Finish Date: 04-30-18

Sheet: 1 Of 1

Logged By: CHAD BOREAN

Drilling Cmpny: PC EXPLORATION

Drill Rig Type: GEFFCO SS-55

Driller: SCOTT

Drilling Method: HOLLOW STEM AUGER (HSA), ODEX

Hammer Type: 140 POUND AUTOMATIC TRIP

Boring Dia. (In.): 6.5

Total Depth (Ft.): 15.5

Backfill or Well Casing: CUTTINGS

24 Hour Clock Time (HH:MM)	Pocket Penetrometer (TSF)	Uncorrected Blow Counts (Blows / 6-inch)	Drilling Method and/or Sampler Type	Sample Recovery (Ft./Ft.)	Sample No.	Depth B.G.S. (Ft.)	Sample Interval And Symbol	Graphic Log	Ground Water Information				
									Date	08-15-17			
									Time (24 Hour)	14:59			
									Date	08-15-17			
									Time (24 Hour)	14:59			
									Depth (Ft.)	NONE			
										Soil And/Or Rock Material Descriptions			
										SOIL: USCS Symbol; Name; Particle Size Gradation %; Munsel Color; Density/Consistency; Moisture; Odor; Organics; Cementation; Texture; Refuse; Etc.			
										ROCK: Unit Name; Lithology; Munsel Color; Cementation; Weathering; Competency; Bedding/Foliation; Fracture/Joint Spacing & Roughness; RQD; Moisture.			
14:07			HSA			0			(CL) SANDY CLAY W/ GRAVEL; FIELD ESTIMATE: 55% LOW PLASTICITY FINES, 25% SAND, 20% GRAVEL; REDDISH BROWN (5YR 4/4); STIFF, DAMP.				
						1							
						2							
14:14		7	2.5 SS			3							
		6			L1-2-2	3							
		8		1.2/1.5	L1-1-2	4							
			HSA			4							
						5							
14:18		8	2.5 SS			5			(GC) CLAYEY GRAVEL WITH SAND AND COBBLES; FIELD ESTIMATE: 15% LOW PLASTICITY FINES, 15% SAND, 50% GRAVEL, 20% COBBLES; LIGHT YELLOWISH BROWN (10YR 6/4); VERY DENSE; DAMP.				
		27			L2-2-2	6							
		27		1.0/1.5	L2-1-2	6							
			HSA			7							
						8							
						9							
						10							
14:26		7	2.5 SS			10							
		23			L3-2-2	11							
		43		1.0/1.5	L3-1-2	11							
			HSA			12							
						13							
						14							
						15							
14:37		50/5	2.5 SS	0/0.5		15			BORING TERMINATED @ 15.5'				
						16							
						17							
						18							
						19							
						20							

NOTES: 1. HSA : HOLLOW STEM AUGER

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EXPLORATORY BORING LOG

48 BELLARMINE COURT, SUITE 40, CHICO, CA., 95928
PHONE: 530-894-2487, FAX: 530-894-2437

Boring No.

B18-5

Project Name: OROVILLE SEWER

Project No.: 70744.00

Task: 001

Start Date: 05-01-18

Location: OROVILLE, CA

Estimated Ground Surface Elevation (Ft. AMSL):

Finish Date: 05-01-18

Sheet: 1 Of 2

Logged By: CHAD BOREAN

Drilling Cmpny: PC EXPLORATION

Drill Rig Type: GEFFCO SS-55

Driller: SCOTT

Drilling Method: HOLLOW STEM AUGER (HSA), ODEX

Hammer Type: 140 POUND AUTOMATIC TRIP

Boring Dia. (In.): 6.5

Total Depth (Ft.): 21.5

Backfill or Well Casing: CUTTINGS

24 Hour Clock Time (HH:MM)	Pocket Penetrometer (TSF)	Uncorrected Blow Counts (Blows / 6-inch)	Drilling Method and/or Sampler Type	Sample Recovery (Ft./Ft.)	Sample No.	Depth B.G.S. (Ft.)	Sample Interval And Symbol	Graphic Log	Ground Water Information			
									Date	05-01-18		
									Time (24 Hour)	08:37		
									Depth (Ft.)	18.5		
									Soil And/Or Rock Material Descriptions			
									SOIL: USCS Symbol; Name; Particle Size Gradation %; Munsell Color; Density/Consistency; Moisture; Odor; Organics; Cementation; Texture; Refuse; Etc. ROCK: Unit Name; Lithology; Munsell Color; Cementation; Weathering; Competency; Bedding/Foliation; Fracture/Joint Spacing & Roughness; RQD; Moisture.			
07:34			HSA			0			ASPHALT CONCRETE (AC) = 3 Inches			
						1			AGGREGATE BASE (AB) ROCK = 6 Inches			
						2						
07:38		12	2.5 SS			3						
		12			L1-2-2							
		15		1.1/1.5	L1-1-2							
			HSA			4			(SC) CLAYEY SAND WITH GRAVEL; FIELD ESTIMATE: 45% LOW PLASTICITY FINES, 55% SAND; DARK REDDISH BROWN (5 YR 3/3); VERY STIFF; DAMP.			
07:46		5	2.5 SS			5			YELLOWISH BROWN (10YR 5/4); STIFF, DAMP.			
		7			L2-2-2							
		9		0.9/1.5	L2-1-2							
			HSA			7						
						8			(CH) CLAY; FIELD ESTIMATE: 95% LOW PLASTICITY FINES, 5% VERY FINE SAND; GRAYISH BROWN (10YR 5/2); STIFF; DAMP.			
						9						
07:54		6	2.5 SS			10						
		4			L3-2-2							
		6		0.9/1.5	L3-1-2							
			HSA			12						
						13						
						14						
08:02		4	2.5 SS			15			VERY PALE BROWN (10YR 7/4); VERY STIFF; DAMP.			
		10			L4-2-2							
	>4.5	19		1.3/1.5	L4-1-2							
			HSA			17						
						18						
						19						
						20						

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NOTES: 1. HSA : HOLLOW STEM AUGER



EXPLORATORY BORING LOG

48 BELLARMINE COURT, SUITE 40, CHICO, CA., 95928
PHONE: 530-894-2487, FAX: 530-894-2437

Boring No.

B18-5

Project Name: OROVILLE SEWER

Project No.: 70744.00

Task: 001

Start Date: 05-01-18

Location: OROVILLE, CA

Estimated Ground Surface Elevation (Ft. AMSL):

Finish Date: 05-01-18

Sheet: 2 Of 2

Logged By: CHAD BOREAN

Drilling Cmpny: PC EXPLORATION

Drill Rig Type: GEFFCO SS-55

Driller: SCOTT

Drilling Method: HOLLOW STEM AUGER (HSA), ODEX

Hammer Type: 140 POUND AUTOMATIC TRIP

Boring Dia. (In.): 6.5

Total Depth (Ft.): 21.5

Backfill or Well Casing: CUTTINGS

24 Hour Clock Time (HH:MM)	Pocket Penetrometer (TSF)	Uncorrected Blow Counts (Blows / 6-inch)	Drilling Method and/or Sampler Type	Sample Recovery (Ft./Ft.)	Sample No.	Depth B.G.S. (Ft.)	Sample Interval And Symbol	Graphic Log	Ground Water Information				
									Date	05-01-18			
									Time (24 Hour)	08:37			
									Soil And/Or Rock Material Descriptions				
									SOIL: USCS Symbol; Name; Particle Size Gradation %; Munsell Color; Density/Consistency; Moisture; Odor; Organics; Cementation; Texture; Refuse; Etc. ROCK: Unit Name; Lithology; Munsell Color; Cementation; Weathering; Competency; Bedding/Foliation; Fracture/Joint Spacing & Roughness; RQD; Moisture.				
08:13		23	2.5 SS			20			GRAVELLY, YELLOWISH RED (5YR 4/6); HARD, WET.				
		35			L5-2-2	21							
		50/5		1.2/1.5	L5-1-2								
						22			BORING TERMINATED @ 21.5' GROUNDWATER REACHED @ 18.5'				
						23							
						24							
						25							
						26							
						27							
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						40							

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NOTES: 1. HSA : HOLLOW STEM AUGER



EXPLORATORY BORING LOG

48 BELLARMINE COURT, SUITE 40, CHICO, CA., 95928
PHONE: 530-894-2487, FAX: 530-894-2437

Boring No.

B18-6

Project Name: OROVILLE SEWER

Project No.: 70744.00

Task: 001

Start Date: 05-01-18

Location: OROVILLE, CA

Estimated Ground Surface Elevation (Ft. AMSL):

Finish Date: 05-01-18

Sheet: 1 Of 2

Logged By: CHAD BOREAN

Drilling Cmpny: PC EXPLORATION

Drill Rig Type: GEFFCO SS-55

Driller: SCOTT

Drilling Method: HOLLOW STEM AUGER (HSA), ODEX

Hammer Type: 140 POUND AUTOMATIC TRIP

Boring Dia. (In.): 6.5

Total Depth (Ft.): 20.5

Backfill or Well Casing: CUTTINGS

24 Hour Clock Time (HH:MM)	Pocket Penetrometer (TSF)	Uncorrected Blow Counts (Blows / 6-inch)	Drilling Method and/or Sampler Type	Sample Recovery (Ft./Ft.)	Sample No.	Depth B.G.S. (Ft.)	Sample Interval And Symbol	Graphic Log	Ground Water Information			
									Date	05-01-18		
									Time (24 Hour)	10:03		
			HSA			0			Soil And/Or Rock Material Descriptions			
						1			(CL) CLAY; FIELD ESTIMATE: 95% LOW PLASTICITY FINES, 5% SAND; LIGHT YELLOWISH BROWN (10YR 6/4); STIFF; DAMP.			
08:54		9	2.5 SS			3			(SM) SILTY SAND; FIELD ESTIMATE: 35% LOW PLASTICITY FINES, 65% FINE SAND; DARK YELLOWISH BROWN (10YR 4/6); MEDIUM DENSE; DAMP.			
		7			L1-2-2	3						
		4		0.9/1.5	L1-1-2	4			(CH) SANDY CLAY; FIELD ESTIMATE: 40% LOW PLASTICITY FINES, 55% SAND; 5% GRAVEL; DARK YELLOWISH BROWN (10YR 4/6); HARD; DAMP; WEATHERED ROCK.			
			HSA			5						
09:00		5	2.5 SS			6			(GC) CLAYEY GRAVEL WITH SAND AND COBBLES; FIELD ESTIMATE: 15% LOW PLASTICITY FINES, 15% SAND, 50% GRAVEL, 20% COBBLES; LIGHT YELLOWISH BROWN (10YR 6/4); VERY DENSE; DAMP.			
		4			L2-2-2	6						
	1.75	7		1.1/1.5	L2-1-2	7						
			HSA			8						
						9						
						10						
09:00		10	2.5 SS			11						
		20			L3-2-2	11						
	0.5	32		1.2/1.5	L3-1-2	12						
			HSA			13						
						14						
						15						
09:16		50/4	2.5 SS	0/0.35		16						
			HSA			17						
						18						
						19						
						20						

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NOTES: 1. HSA : HOLLOW STEM AUGER



EXPLORATORY BORING LOG

48 BELLARMINE COURT, SUITE 40, CHICO, CA., 95928
 PHONE: 530-894-2487, FAX: 530-894-2437

Boring No.

B18-6

Project Name: OROVILLE SEWER

Project No.: 70744.00

Task: 001

Start Date: 05-01-18

Location: OROVILLE, CA

Estimated Ground Surface Elevation (Ft. AMSL):

Finish Date: 05-01-18

Sheet: 2 Of 2

Logged By: CHAD BOREAN

Drilling Cmpny: PC EXPLORATION

Drill Rig Type: GEFFCO SS-55

Driller: SCOTT

Drilling Method: HOLLOW STEM AUGER (HSA), ODEX

Hammer Type: 140 POUND AUTOMATIC TRIP

Boring Dia. (In.): 6.5

Total Depth (Ft.): 20.5

Backfill or Well Casing: CUTTINGS

24 Hour Clock Time (HH:MM)	Pocket Penetrometer (TSF)	Uncorrected Blow Counts (Blows / 6-inch)	Drilling Method and/or Sampler Type	Sample Recovery (Ft./Ft.)	Sample No.	Depth B.C.S. (Ft.)	Sample Interval And Symbol	Graphic Log	Ground Water Information				
									Date	05-01-18			
									Time (24 Hour)	10:03			
									Depth (Ft.)	NONE			
Soil And/Or Rock Material Descriptions													
<small>SOIL: USCS Symbol; Name; Particle Size Gradation %; Munsell Color; Density/Consistency; Moisture; Odor; Organics; Cementation; Texture; Refuse; Etc. ROCK: Unit Name; Lithology; Munsell Color; Cementation; Weathering; Competency; Bedding/Foliation; Fracture/Joint Spacing & Roughness; RQD; Moisture.</small>													
09:30		50/4	2.5 SS	0.35/0.35	B1-1-1	20			<p>BORING TERMINATED @ 20.5'</p> <p style="font-size: 2em; color: lightblue; text-align: center;">Draft Print</p> <p style="text-align: center;">09/26/2018 4:00:17 PM</p>				
						21							
						22							
						23							
						24							
						25							
						26							
						27							
						28							
						29							
						30							
						31							
						32							
						33							
						34							
						35							
						36							
						37							
						38							
						39							
						40							

NOTES: 1. HSA : HOLLOW STEM AUGER

EXPLORATORY BORING LOG

48 BELLARMINA COURT, SUITE 40, CHICO, CA., 95928
 PHONE: 530-894-2487, FAX: 530-894-2437

Boring No.

B18-7

Project Name: OROVILLE SEWER

Project No.: 70744.00

Task: 001

Start Date: 05-01-18

Location: OROVILLE, CA

Estimated Ground Surface
 Elevation (Ft. AMSL):

Finish Date: 05-01-18

Sheet: 1 Of 1

Logged By: CHAD BOREAN

Drilling Cmpny: PC EXPLORATION

Drill Rig Type: GEFFCO SS-55

Driller: SCOTT

Drilling Method: HOLLOW STEM AUGER (HSA), ODEX, ODEX

Hammer Type: 140 POUND AUTOMATIC TRIP

Boring Dia. (In.): 6.5

Total Depth (Ft.): 20.0

Backfill or Well Casing: CUTTINGS

24 Hour Clock Time (HH:MM)	Pocket Penetrometer (TSF)	Uncorrected Blow Counts (Blows / 6-inch)	Drilling Method and/or Sampler Type	Sample Recovery (Ft./Ft.)	Sample No.	Depth B.G.S. (Ft.)	Sample Interval And Symbol	Graphic Log	Ground Water Information			
									Date	05-01-18		
									Time (24 Hour)	11:28		
		Depth (Ft.)	NONE			Soil And/Or Rock Material Descriptions						
<small>SOIL: USCS Symbol; Name; Particle Size Gradation %; Munsell Color; Density/Consistency; Moisture; Odor; Organics; Cementation; Texture; Refuse; Etc. ROCK: Unit Name; Lithology; Munsell Color; Cementation; Weathering; Competency; Bedding/Foliation; Fracture/Joint Spacing & Roughness; RQD; Moisture.</small>												
			HSA			0			(GC) CLAYEY GRAVEL; FIELD ESTIMATE: 50% FINE TO COARSE GRAVEL AND COBBLE, 20% LOW PLASTICITY SILT AND CLAY FINES, AND 30% FINE SAND; STRONG BROWN (7.5YR 5/4) DENSE, MOIST, AND MODERATELY TO STRONGLY CEMENTED. NATIVE.			
						1						
						2						
10:07		50/3	2.5 SS	0/0.25	B1-1-1	3			@ 3' AUGER REFUSAL - SWITCH TO ODEX			
			ODEX			4						
						5						
10:39					L2-2-2	6						
						7						
						8						
10:44					B2-1-1	9						
10:49						10						
						11						
10:54					B3-1-1	15						
10:58						16						
						17						
						18						
						19						
						20						

NOTES: 1. HSA : HOLLOW STEM AUGER

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APPENDIX C

Soil Laboratory Test Sheets

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DSA LEA No. 284

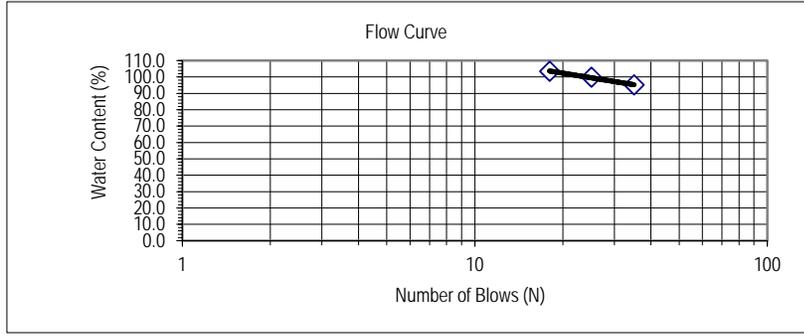
DSA File No. n/a
 DSA App No. n/a

Project No.	70744	Project Name	City of Oroville - Sanitary Sewer Project	Date:	05/03/18	
Sample No.	L3-2-2	Boring/Trench	B18-5	Depth, (ft.):	10	
Description:	Grayish brown, silty clay (CL)				Tested By:	LGH
Sample Location:					Checked By:	DJP
					Lab. No.	C18-055

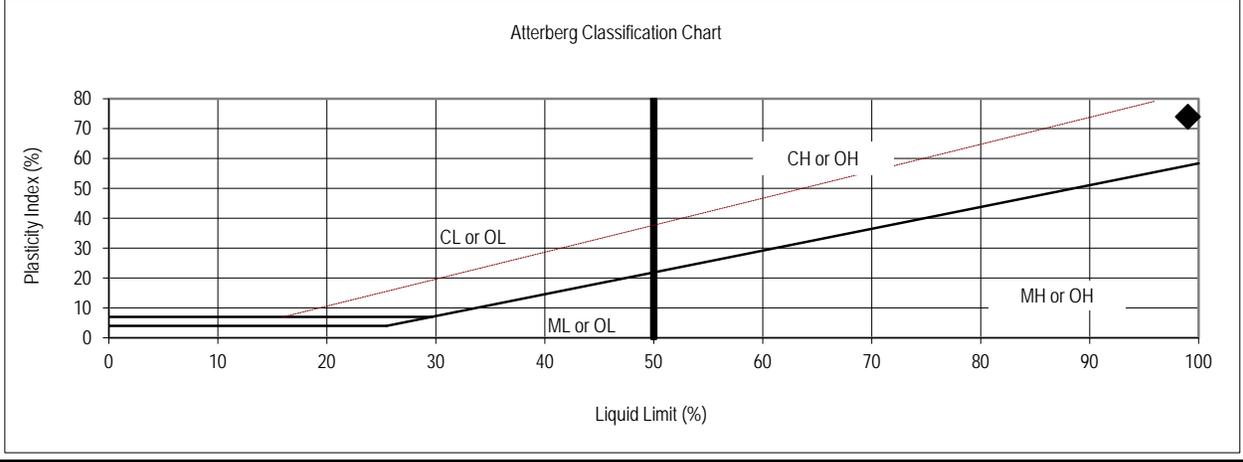
Estimated % of Sample Retained on No. 40 Sieve: Sample Air Dried: yes
 Test Method A or B: A

LIQUID LIMIT:						PLASTIC LIMIT:		
Sample No.:	1	2	3	4	5	1	2	3
Pan ID:	A	Y	W			X	Z	
Wt. Pan (gr)	38.45	37.11	37.77			38.21	37.43	
Wt. Wet Soil + Pan	47.99	47.42	47.17			45.02	43.01	
Wt. Dry Soil + Pan (g)	43.34	42.27	42.39			43.67	41.91	
Wt. Water (gr)	4.65	5.15	4.78			1.35	1.10	
Wt. Dry Soil (gr)	4.89	5.16	4.62			5.46	4.48	
Water Content (%)	95.1	99.8	103.5			24.7	24.6	
Number of Blows, N	35	25	18					

LIQUID LIMIT = 99 PLASTIC LIMIT = 25



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 Plasticity Index = 74
 Group Symbol = CH





PARTICLE SIZE DISTRIBUTION TEST WORK SHEET

ASTM D422, C136

DSA File No. n/a

DSA App No. n/a

DSA LEA No. 284

Sieve Only Analysis Worksheet			
Project No.	70744	Project Name:	City of Oroville - Sanitary Sewer Project
Sample No.	L3-2-2	Boring/Trench:	B18-5
		Depth, (ft.):	10
Description:	Grayish brown, silty clay (CL)		Date:
Sample Location:		Checked By:	DJP
		Lab. No.	C18-055

Moisture Content Data:		Total Material Sample Data:	
Pan ID		Pan ID	
Pan Weight	(gm)	Pan Weight	180.90 (gm)
Wet Soil + Pan	(gm)	Wet Soil + Pan Wt.	495.20 (gm)
Dry Soil + Pan	(gm)	Total Wet Weight	314.30 (gm)
Water Weight	(gm)	Total Dry Weight	314.30 (gm)
Dry Soil Weight	(gm)	Total Dry Wt. >#4 Sieve	(gm)
Moisture Content	(%)	Total Dry Wt. <#4 Sieve	314.30 (gm)
		Total Dry Wt. <#200 Sieve	278.60 (gm)
		Total Percent <#200 Sieve	88.64 (%)

GRAVEL PORTION SIEVE ANALYSIS (Portion Retained On > #4 Sieve)							
Sieve Size	Particle Diameter		Wet Weight Retained On Sieve (gm)	Dry Weight			
	Inches (in.)	Millimeter (mm)		Retained On Sieve (gm)	Accum. On Sieve (gm)	Passing Sieve (gm)	Percent Passing (%)
6 Inch	6.0000	152.40				314.30	100.0
3 Inch	3.0000	76.20				314.30	100.0
2 Inch	2.0000	50.80				314.30	100.0
1.5 Inch	1.5000	38.10				314.30	100.0
1.0 Inch	1.0000	25.40				314.30	100.0
3/4 Inch	0.7500	19.05				314.30	100.0
1/2 Inch	0.5000	12.70				314.30	100.0
3/8 Inch	0.3750	9.53				314.30	100.0
#4	0.1875	4.75				314.30	100.0
PAN			314.30	314.30			

SAND PORTION SIEVE ANALYSIS (Portion Retained On < #4 Sieves)

Representative Sample Data:				#200 Wash Data:			
Pan ID	C-7			Portion >#200 Sieve:	35.70	(gm)	
Pan Weight	180.90	(gm)		Portion <#200 Sieve:	278.60	(gm)	
Wet Soil + Pan	495.20	(gm)		Percent <#200 Sieve	88.64	(%)	
Wet Soil	314.30	(gm)		Total Wt. <#200 Sieve	278.60	(gm)	
Dry Soil	314.30	(gm)					

Sieve Size	Particle Diameter		Dry Weight Rep. Sample		Total Sample Weight Retained (gm)	Accum. Grand Total On Sieve (gm)	Total Percent Passing (%)
	Inches (in.)	Millimeter (mm)	Retained On Sieve (gm)	Percent Retained (%)			
#10	0.079	2.000	9.3	2.96	9.30	9.30	97.0
#20	0.033	0.850	3.10	0.99	3.10	12.40	96.1
#40	0.017	0.425	3.20	1.02	3.20	15.60	95.0
#60	0.010	0.250	4.10	1.30	4.10	19.70	93.7
#100	0.006	0.150	6.00	1.91	6.00	25.70	91.8
#200	0.003	0.075	10.00	3.18	10.00	35.70	88.6
PAN			Discard				

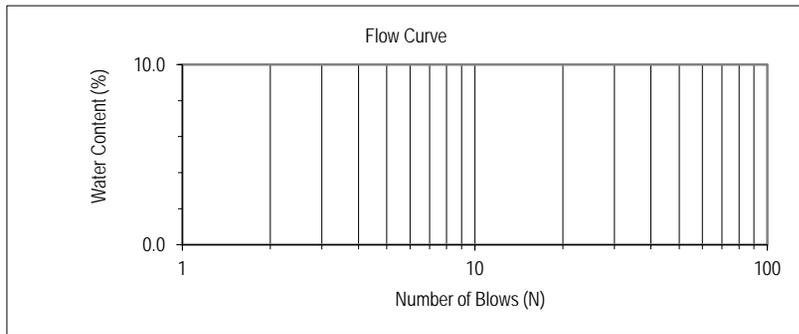
DSA LEA No. 284

DSA File No. n/a
 DSA App No. n/a

Project No.	70744	Project Name	City of Oroville - Sanitary Sewer Project	Date:	05/03/18	
Sample No.	L2-1-2	Boring/Trench	B18-6	Depth, (ft.):	5	
Description:	Yellowish brown sand with silt (SM)				Tested By:	LGH
Sample Location:					Checked By:	DJP
					Lab. No.	C18-055

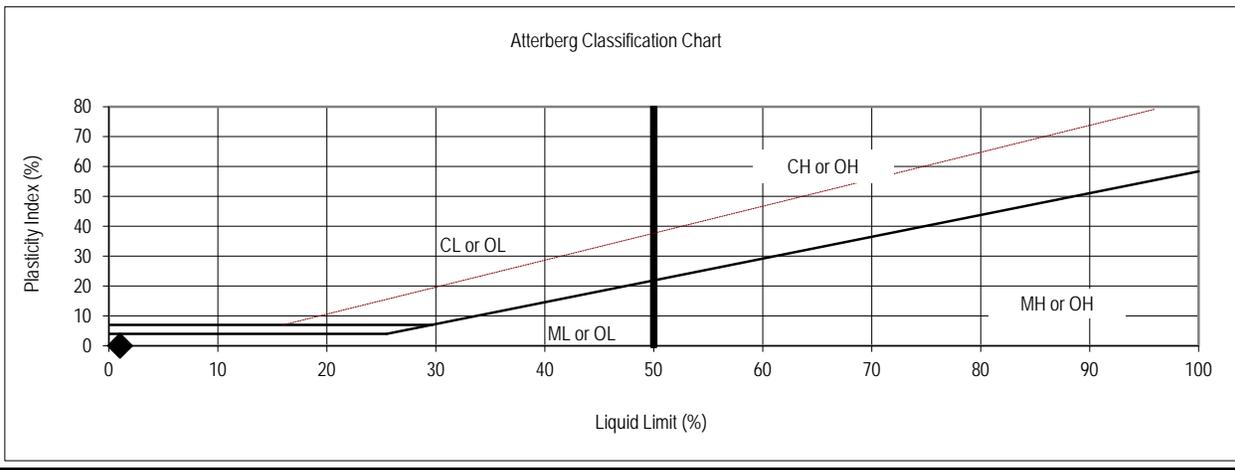
Estimated % of Sample Retained on No. 40 Sieve: Sample Air Dried: yes
 Test Method A or B: A

LIQUID LIMIT:						PLASTIC LIMIT:		
Sample No.:	1	2	3	4	5	1	2	3
Pan ID:								
Wt. Pan (gr)								
Wt. Wet Soil + Pan (gr)								
Wt. Dry Soil + Pan (gr)								
Wt. Water (gr)								
Wt. Dry Soil (gr)								
Water Content (%)								
Number of Blows, N								
LIQUID LIMIT = NP						PLASTIC LIMIT = #VALUE!		



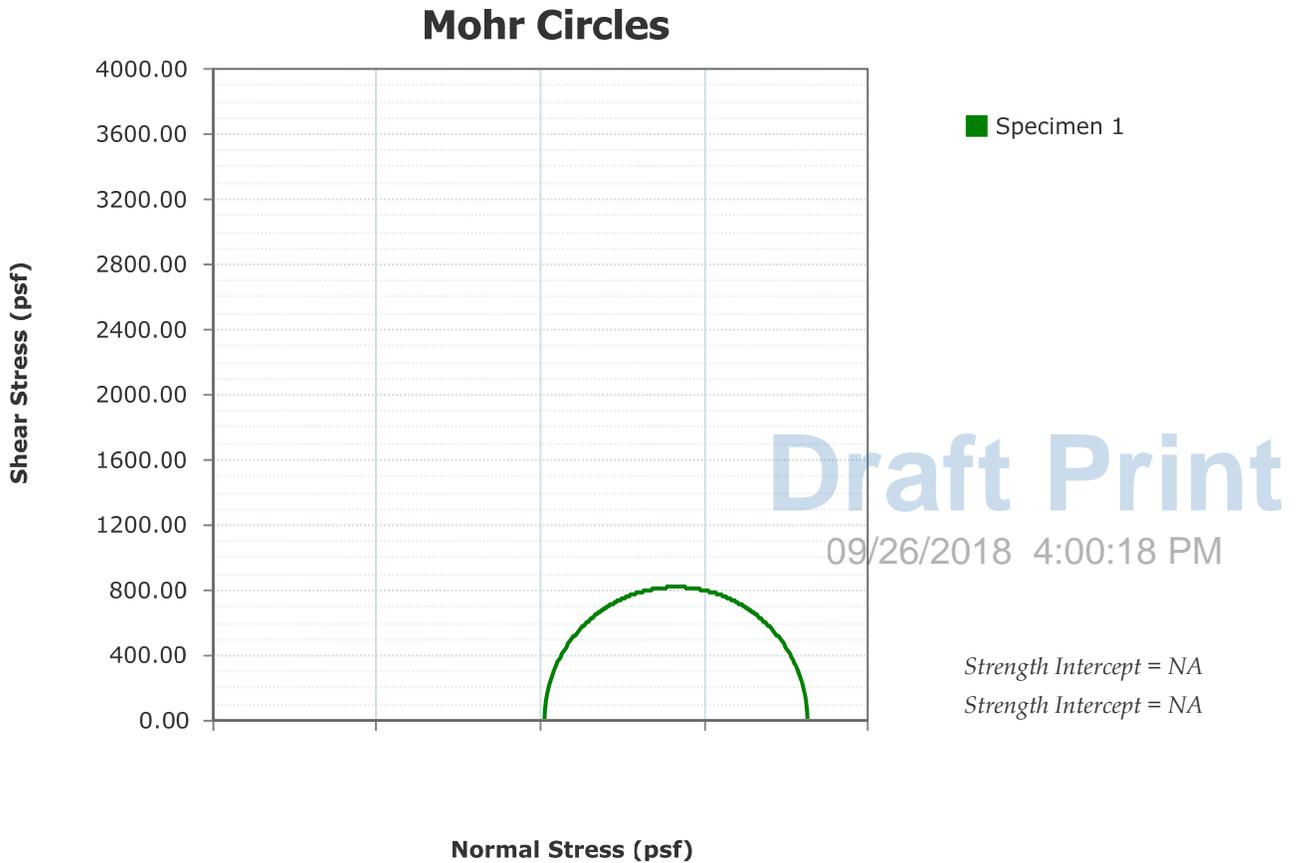
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Plasticity Index = **#VALUE!**
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 Group Symbol = **Non Plastic**



Unconsolidated Undrained Test

ASTM D2850



Normal Stress (psf)

Project:	City of Oroville - Sanitary Sewer Project
Project Number:	70744.00
Sampling Date:	
Sample Number:	L2-1-2
Sample Depth:	5
Location:	
Client Name:	Bennett Engineering
Remarks:	



Unconsolidated Undrained Test

ASTM D2850

Before Test	Specimen Number							
	1	2	3	4	5	6	7	8
Membrane Thickness (in)	0.001							
Initial Cell Pressure (psi)	56.0							
Height (in)	5.472							
Diameter (in)	2.376							
Water Content (%)	0.0							
Wet Density (Units)	0.0							
Dry Density (pcf)	0.0							
Degree of Saturation (%)	0.0							
Void Ratio	0.000							
Height To Diameter Ratio	2.303							
Test Data	1	2	3	4	5	6	7	8
Comp. Strength at Failure (psf)	1640.87							
σ_1 at Failure (psf)	9704.87							
σ_3 at Failure (psf)	8064.00							
Rate of Strain (in/min)	0.054720							
Axial Strain at Failure (%)	15.20							
After Test	1	2	3	4	5	6	7	8
Final Water Content (%)	0.0							

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Project:	City of Oroville - Sanitary Sewer Project
Project Number:	70744.00
Sampling Date:	
Sample Number:	L2-1-2
Sample Depth:	5
Location:	
Client Name:	Bennett Engineering
Project Remarks:	

Specimen 1	Specimen 2	Specimen 3	Specimen 4	Specimen 5	Specimen 6	Specimen 7	Specimen 8
Failure Sketch							

N | V | 5

Unconsolidated Undrained Test

ASTM D2850

Specimen 1

Test Description: D2850 UU Triax	
Other Associated Tests:	
Device Details:	
Test Specification:	
Test Time: 7/12/2018	
Technician:	Sampling Method:
Specimen Code:	Specimen Lab #:
Specimen Description:	
Specific Gravity: 2.700	
Plastic Limit: 0	Liquid Limit: 0
Height (in): 5.472	Diameter (in): 2.376
Area (in ²): 4.434	Volume (in ³): 24.26
Large Particle:	
Moisture Material:	
Moist Weight (g): 0.0	
Test Remarks:	

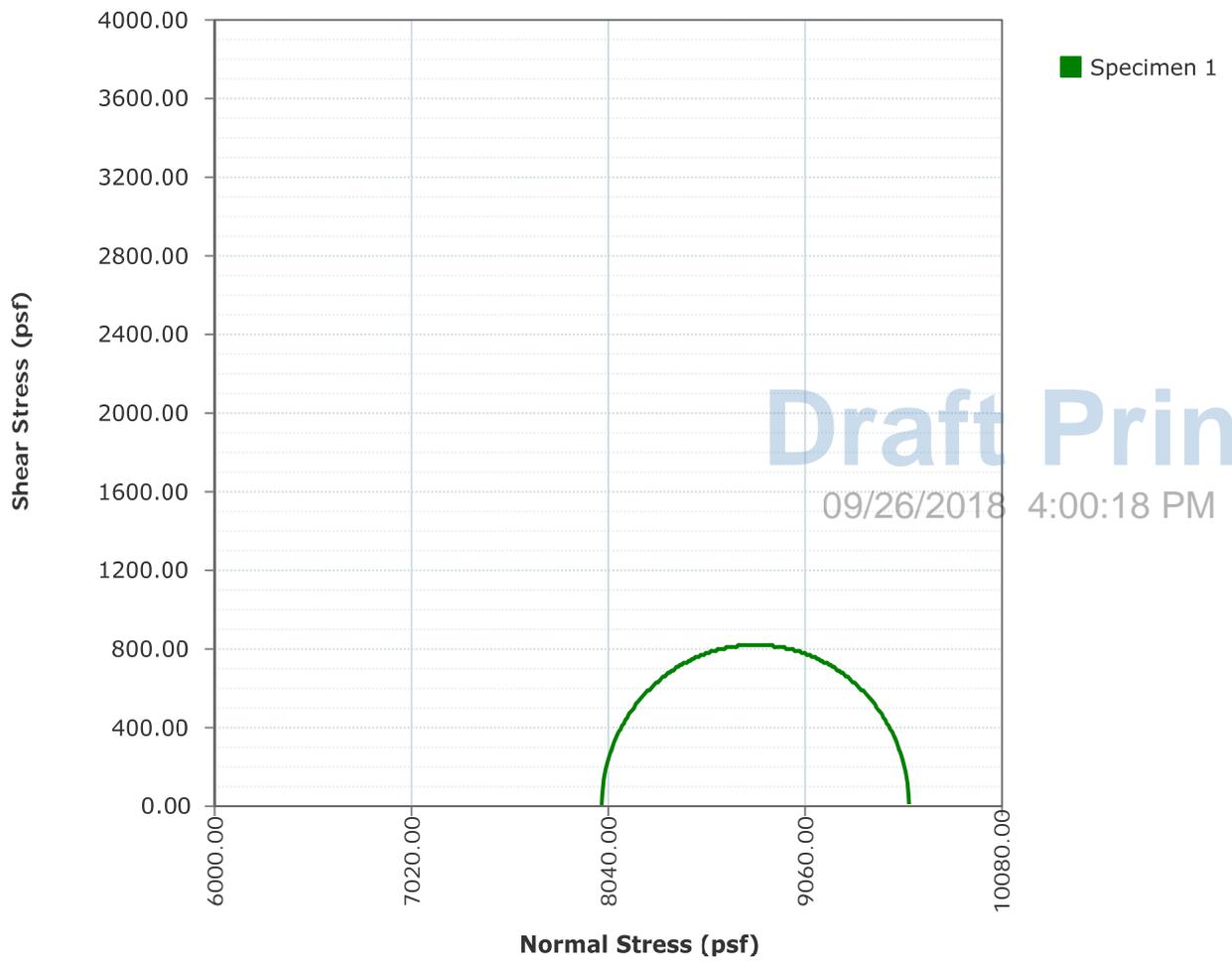
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N | V | 5

Mohr Circles (Total Stress) Graph

ASTM D2850



Tangent Results	
Strength Intercept (psi)	NA
Friction Angle (°)	NA

NV5

Stress-Strain Graph

ASTM D2850



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Unconsolidated Undrained Test - Tabulated Data - Specimen 1

ASTM D2850

Index	Elapsed Time (hh:mm:ss)	Load (Lbf)	Disp. (in)	Corrected			Axial Strain (%)	Stress (psf)	Corrected Compressive Stress (psf)		σ_1 (psf)	σ_3 (psf)	$\frac{\sigma_1}{\sigma_3}$	p (psf)	q (psf)
				Load (Lbf)	Disp. (in)	Area (in ²)			σ_1 (psf)	σ_3 (psf)					
0	00:00:00	0.2	0.0000	0.0	0.000	4.434	0.0	0.00	0.00	8,064.00	8,064.00	1.000	8,064.00	0.00	
1	00:00:10	15.5	0.0089	15.3	0.009	4.441	0.2	497.34	496.45	8,560.45	8,064.00	1.062	8,312.23	248.23	
2	00:00:20	20.6	0.0184	20.4	0.018	4.449	0.3	661.68	659.30	8,723.30	8,064.00	1.082	8,393.65	329.65	
3	00:00:30	22.3	0.0275	22.1	0.027	4.456	0.5	717.86	714.02	8,778.02	8,064.00	1.089	8,421.01	357.01	
4	00:00:40	23.4	0.0365	23.3	0.036	4.464	0.7	755.50	750.14	8,814.14	8,064.00	1.093	8,439.07	375.07	
5	00:00:50	24.4	0.0457	24.2	0.046	4.471	0.8	786.72	779.75	8,843.75	8,064.00	1.097	8,453.87	389.87	
6	00:01:00	25.2	0.0548	25.0	0.055	4.479	1.0	813.13	804.50	8,868.50	8,064.00	1.100	8,466.25	402.25	
7	00:01:10	26.0	0.0640	25.8	0.064	4.486	1.2	837.30	826.93	8,890.94	8,064.00	1.103	8,477.47	413.47	
8	00:01:20	26.7	0.0735	26.5	0.073	4.494	1.3	859.72	847.53	8,911.53	8,064.00	1.105	8,487.76	423.76	
9	00:01:30	27.3	0.0827	27.1	0.083	4.502	1.5	880.80	866.76	8,930.76	8,064.00	1.107	8,497.38	433.38	
10	00:01:40	27.9	0.0924	27.7	0.092	4.510	1.7	899.98	883.97	8,947.97	8,064.00	1.110	8,505.99	441.99	
11	00:01:50	28.5	0.1017	28.3	0.102	4.518	1.9	918.23	900.27	8,964.27	8,064.00	1.112	8,514.13	450.13	
12	00:02:00	29.0	0.1110	28.8	0.111	4.526	2.0	935.67	915.72	8,979.72	8,064.00	1.114	8,521.86	457.86	
13	00:02:10	29.5	0.1201	29.3	0.120	4.533	2.2	952.19	930.24	8,994.24	8,064.00	1.115	8,529.12	465.12	
14	00:02:20	30.0	0.1293	29.8	0.129	4.541	2.4	967.22	944.37	9,008.37	8,064.00	1.117	8,536.18	472.18	
15	00:02:30	30.5	0.1384	30.3	0.138	4.549	2.5	983.50	958.62	9,022.62	8,064.00	1.119	8,543.31	479.31	
16	00:02:40	31.0	0.1475	30.8	0.147	4.557	2.7	999.28	972.35	9,036.35	8,064.00	1.121	8,550.18	486.18	
17	00:02:50	31.4	0.1564	31.2	0.156	4.564	2.9	1,013.52	984.56	9,048.56	8,064.00	1.122	8,556.28	492.28	
18	00:03:00	31.8	0.1652	31.6	0.165	4.572	3.0	1,027.87	996.84	9,060.84	8,064.00	1.124	8,562.42	498.42	
19	00:03:10	32.3	0.1745	32.1	0.174	4.580	3.2	1,041.54	1,008.32	9,072.32	8,064.00	1.125	8,568.16	504.16	
20	00:03:20	32.7	0.1834	32.5	0.183	4.588	3.4	1,056.05	1,020.66	9,084.65	8,064.00	1.127	8,574.33	510.33	
21	00:03:30	33.2	0.1923	33.0	0.192	4.595	3.5	1,071.12	1,033.48	9,097.48	8,064.00	1.128	8,580.74	516.74	
22	00:03:40	33.6	0.2015	33.4	0.201	4.603	3.7	1,084.99	1,045.04	9,109.04	8,064.00	1.130	8,586.52	522.52	

Unconsolidated Undrained Test - Tabulated Data - Specimen 1

ASTM D2850

Index	Elapsed Time (hh:mm:ss)	Load (Lbf)	Disp. (in)	Corrected			Axial Strain (%)	Stress (psf)	Corrected Compressive		σ_1 (psf)	σ_3 (psf)	$\frac{\sigma_1}{\sigma_3}$	p (psf)	q (psf)
				Load (Lbf)	Disp. (in)	Area (in ²)			Stress (psf)	Stress (psf)					
23	00:03:50	34.0	0.2106	33.9	0.211	4.611	3.8	1,099.77	1,057.44	9,121.44	8,064.00	1.131	8,592.72	528.72	
24	00:04:00	34.5	0.2198	34.3	0.220	4.619	4.0	1,115.13	1,070.34	9,134.34	8,064.00	1.133	8,599.17	535.17	
25	00:04:10	34.9	0.2289	34.8	0.229	4.627	4.2	1,128.75	1,081.53	9,145.53	8,064.00	1.134	8,604.77	540.77	
26	00:04:20	35.4	0.2379	35.2	0.238	4.635	4.3	1,143.51	1,093.79	9,157.79	8,064.00	1.136	8,610.90	546.90	
27	00:04:30	35.8	0.2473	35.7	0.247	4.644	4.5	1,158.01	1,105.69	9,169.69	8,064.00	1.137	8,616.84	552.84	
28	00:04:40	36.3	0.2566	36.1	0.257	4.652	4.7	1,172.76	1,117.77	9,181.77	8,064.00	1.139	8,622.89	558.89	
29	00:04:50	36.8	0.2657	36.6	0.266	4.660	4.9	1,188.00	1,130.32	9,194.32	8,064.00	1.140	8,629.16	565.16	
30	00:05:00	37.3	0.2751	37.1	0.275	4.669	5.0	1,203.85	1,143.33	9,207.33	8,064.00	1.142	8,635.67	571.67	
31	00:05:10	37.8	0.2845	37.6	0.284	4.677	5.2	1,222.25	1,158.71	9,222.71	8,064.00	1.144	8,643.35	579.35	
32	00:05:20	38.3	0.2939	38.1	0.294	4.685	5.4	1,238.96	1,172.43	9,236.43	8,064.00	1.145	8,650.22	586.22	
33	00:05:30	38.9	0.3033	38.8	0.303	4.694	5.5	1,258.59	1,188.82	9,252.82	8,064.00	1.147	8,658.41	594.41	
34	00:05:40	39.5	0.3126	39.3	0.313	4.702	5.7	1,276.24	1,203.34	9,267.34	8,064.00	1.149	8,665.67	601.67	
35	00:05:50	40.0	0.3217	39.8	0.322	4.711	5.9	1,291.95	1,216.00	9,280.00	8,064.00	1.151	8,672.00	608.00	
36	00:06:00	40.5	0.3309	40.3	0.331	4.719	6.0	1,308.94	1,229.78	9,293.78	8,064.00	1.153	8,678.89	614.89	
37	00:06:10	41.0	0.3399	40.8	0.340	4.728	6.2	1,324.75	1,242.46	9,306.46	8,064.00	1.154	8,685.23	621.23	
38	00:06:20	41.5	0.3490	41.3	0.349	4.736	6.4	1,340.19	1,254.72	9,318.72	8,064.00	1.156	8,691.36	627.36	
39	00:06:30	41.9	0.3578	41.7	0.358	4.744	6.5	1,353.35	1,264.87	9,328.87	8,064.00	1.157	8,696.44	632.44	
40	00:06:40	42.2	0.3668	42.0	0.367	4.752	6.7	1,364.15	1,272.70	9,336.70	8,064.00	1.158	8,700.35	636.35	
41	00:06:50	42.5	0.3759	42.4	0.376	4.761	6.9	1,375.53	1,281.05	9,345.05	8,064.00	1.159	8,704.52	640.52	
42	00:07:00	42.9	0.3846	42.7	0.385	4.769	7.0	1,386.63	1,289.16	9,353.16	8,064.00	1.160	8,708.58	644.58	
43	00:07:10	43.3	0.3937	43.1	0.394	4.778	7.2	1,399.02	1,298.37	9,362.37	8,064.00	1.161	8,713.19	649.19	
44	00:07:20	43.7	0.4029	43.5	0.403	4.786	7.4	1,413.46	1,309.40	9,373.40	8,064.00	1.162	8,718.70	654.70	
45	00:07:30	44.1	0.4120	43.9	0.412	4.795	7.5	1,425.49	1,318.17	9,382.17	8,064.00	1.163	8,723.08	659.08	

Unconsolidated Undrained Test - Tabulated Data - Specimen 1

ASTM D2850

Index	Elapsed Time (hh:mm:ss)	Load (Lbf)	Disp. (in)	Corrected			Axial Strain (%)	Stress (psf)	Corrected Compressive Stress		σ_1 (psf)	σ_3 (psf)	$\frac{\sigma_1}{\sigma_3}$	p (psf)	q (psf)
				Load (Lbf)	Disp. (in)	Area (in ²)			Stress (psf)	σ_1 (psf)					
46	00:07:40	44.4	0.4211	44.3	0.421	4.804	7.7	1,437.15	1,326.54	9,390.54	8,064.00	1.165	8,727.27	663.27	
47	00:07:50	44.7	0.4303	44.5	0.430	4.812	7.9	1,445.37	1,331.71	9,395.71	8,064.00	1.165	8,729.86	665.86	
48	00:08:00	44.9	0.4392	44.7	0.439	4.821	8.0	1,452.99	1,336.37	9,400.37	8,064.00	1.166	8,732.18	668.18	
49	00:08:10	45.3	0.4486	45.1	0.449	4.830	8.2	1,464.57	1,344.50	9,408.50	8,064.00	1.167	8,736.25	672.25	
50	00:08:20	45.6	0.4578	45.5	0.458	4.839	8.4	1,476.46	1,352.94	9,416.94	8,064.00	1.168	8,740.47	676.47	
51	00:08:30	46.0	0.4670	45.8	0.467	4.848	8.5	1,488.91	1,361.84	9,425.84	8,064.00	1.169	8,744.92	680.92	
52	00:08:40	46.4	0.4763	46.3	0.476	4.857	8.7	1,502.33	1,371.57	9,435.57	8,064.00	1.170	8,749.79	685.79	
53	00:08:50	46.9	0.4856	46.7	0.486	4.866	8.9	1,517.57	1,382.90	9,446.90	8,064.00	1.171	8,755.45	691.45	
54	00:09:00	47.5	0.4950	47.3	0.495	4.875	9.0	1,535.53	1,396.62	9,460.62	8,064.00	1.173	8,762.31	698.31	
55	00:09:10	47.9	0.5044	47.7	0.504	4.884	9.2	1,549.29	1,406.48	9,470.48	8,064.00	1.174	8,767.24	703.24	
56	00:09:20	48.3	0.5135	48.1	0.513	4.893	9.4	1,563.38	1,416.68	9,480.68	8,064.00	1.176	8,772.34	708.34	
57	00:09:30	48.9	0.5229	48.7	0.523	4.902	9.6	1,581.41	1,430.31	9,494.31	8,064.00	1.177	8,779.15	715.15	
58	00:09:40	49.4	0.5320	49.2	0.532	4.911	9.7	1,597.34	1,442.05	9,506.06	8,064.00	1.179	8,785.03	721.03	
59	00:09:50	49.8	0.5409	49.6	0.541	4.920	9.9	1,609.85	1,450.70	9,514.70	8,064.00	1.180	8,789.35	725.35	
60	00:10:00	50.1	0.5499	49.9	0.550	4.929	10.0	1,620.58	1,457.73	9,521.73	8,064.00	1.181	8,792.86	728.86	
61	00:10:10	50.4	0.5589	50.2	0.559	4.938	10.2	1,630.17	1,463.69	9,527.69	8,064.00	1.182	8,795.84	731.84	
62	00:10:20	50.6	0.5679	50.5	0.568	4.947	10.4	1,638.52	1,468.47	9,532.47	8,064.00	1.182	8,798.23	734.23	
63	00:10:30	50.9	0.5768	50.7	0.577	4.956	10.5	1,647.90	1,474.20	9,538.20	8,064.00	1.183	8,801.10	737.10	
64	00:10:40	51.3	0.5857	51.1	0.586	4.965	10.7	1,658.68	1,481.14	9,545.14	8,064.00	1.184	8,804.57	740.57	
65	00:10:50	51.7	0.5947	51.5	0.595	4.974	10.9	1,674.03	1,492.10	9,556.10	8,064.00	1.185	8,810.05	746.05	
66	00:11:00	52.1	0.6038	51.9	0.604	4.984	11.0	1,686.80	1,500.68	9,564.68	8,064.00	1.186	8,814.34	750.34	
67	00:11:10	52.3	0.6129	52.1	0.613	4.993	11.2	1,693.48	1,503.82	9,567.82	8,064.00	1.186	8,815.91	751.91	
68	00:11:20	52.6	0.6220	52.4	0.622	5.002	11.4	1,702.20	1,508.72	9,572.72	8,064.00	1.187	8,818.36	754.36	

Unconsolidated Undrained Test - Tabulated Data - Specimen 1

ASTM D2850

Index	Elapsed Time (hh:mm:ss)	Load (Lbf)	Disp. (in)	Corrected			Axial Strain (%)	Stress (psf)	Corrected Compressive Stress		$\sigma_1 - \sigma_3$ (psf)	p (psf)	q (psf)	
				Load (Lbf)	Disp. (in)	Area (in ²)			σ_1 (psf)	σ_3 (psf)				
69	00:11:30	52.8	0.6310	52.6	0.631	5.012	11.5	1,708.27	1,511.28	9,575.28	8,064.00	1.187	8,819.64	755.64
70	00:11:40	52.9	0.6403	52.8	0.640	5.021	11.7	1,713.55	1,513.04	9,577.04	8,064.00	1.188	8,820.52	756.52
71	00:11:50	53.2	0.6495	53.0	0.650	5.031	11.9	1,721.69	1,517.33	9,581.33	8,064.00	1.188	8,822.66	758.66
72	00:12:00	53.5	0.6588	53.3	0.659	5.041	12.0	1,732.59	1,524.01	9,588.01	8,064.00	1.189	8,826.00	762.00
73	00:12:10	53.9	0.6679	53.7	0.668	5.050	12.2	1,745.41	1,532.38	9,596.38	8,064.00	1.190	8,830.19	766.19
74	00:12:20	54.3	0.6771	54.1	0.677	5.060	12.4	1,756.44	1,539.11	9,603.11	8,064.00	1.191	8,833.55	769.55
75	00:12:30	54.6	0.6865	54.5	0.686	5.070	12.5	1,768.50	1,546.63	9,610.63	8,064.00	1.192	8,837.32	773.32
76	00:12:40	55.2	0.6959	55.0	0.696	5.080	12.7	1,786.67	1,559.45	9,623.45	8,064.00	1.193	8,843.73	779.73
77	00:12:50	55.7	0.7052	55.5	0.705	5.090	12.9	1,801.39	1,569.23	9,633.23	8,064.00	1.195	8,848.61	784.61
78	00:13:00	56.0	0.7144	55.8	0.714	5.100	13.1	1,813.76	1,576.96	9,640.97	8,064.00	1.196	8,852.48	788.48
79	00:13:10	56.4	0.7236	56.2	0.724	5.110	13.2	1,824.99	1,583.67	9,647.66	8,064.00	1.196	8,855.83	791.83
80	00:13:20	56.7	0.7326	56.5	0.733	5.119	13.4	1,835.42	1,589.70	9,653.70	8,064.00	1.197	8,858.85	794.85
81	00:13:30	56.9	0.7417	56.7	0.742	5.129	13.6	1,842.58	1,592.84	9,656.84	8,064.00	1.198	8,860.42	796.42
82	00:13:40	57.2	0.7505	57.0	0.750	5.139	13.7	1,852.67	1,598.57	9,662.57	8,064.00	1.198	8,863.29	799.29
83	00:13:50	57.5	0.7595	57.3	0.760	5.148	13.9	1,860.92	1,602.62	9,666.62	8,064.00	1.199	8,865.31	801.31
84	00:14:00	57.8	0.7685	57.6	0.769	5.158	14.0	1,870.46	1,607.77	9,671.77	8,064.00	1.199	8,867.88	803.88
85	00:14:10	58.1	0.7775	57.9	0.777	5.168	14.2	1,881.44	1,614.13	9,678.13	8,064.00	1.200	8,871.06	807.06
86	00:14:20	58.4	0.7864	58.2	0.786	5.178	14.4	1,891.59	1,619.77	9,683.77	8,064.00	1.201	8,873.88	809.88
87	00:14:30	58.7	0.7952	58.5	0.795	5.188	14.5	1,900.46	1,624.28	9,688.27	8,064.00	1.201	8,876.14	812.14
88	00:14:40	59.0	0.8043	58.9	0.804	5.198	14.7	1,911.68	1,630.69	9,694.69	8,064.00	1.202	8,879.35	815.34
89	00:14:50	59.3	0.8135	59.1	0.814	5.208	14.9	1,920.27	1,634.78	9,698.78	8,064.00	1.203	8,881.39	817.39
90	00:15:00	59.5	0.8226	59.3	0.823	5.218	15.0	1,927.40	1,637.65	9,701.65	8,064.00	1.203	8,882.82	818.82
91	00:15:10	59.8	0.8318	59.6	0.832	5.229	15.2	1,935.03	1,640.87	9,704.87	8,064.00	1.203	8,884.43	820.43

DSA LEA No. 284

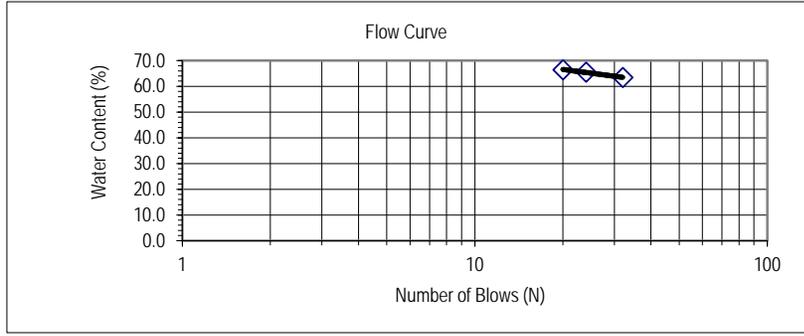
DSA File No. n/a
 DSA App No. n/a

Project No.	70744	Project Name	City of Oroville - Sanitary Sewer Project	Date:	05/03/18
Sample No.	L3-2-2	Boring/Trench	B18-6	Depth, (ft.):	10
Description:	Grayish/Reddish brown, silty clay (CH)			Tested By:	LGH
Sample Location:				Checked By:	DJP
				Lab. No.	C18-055

Estimated % of Sample Retained on No. 40 Sieve: Sample Air Dried: yes
 Test Method A or B: A

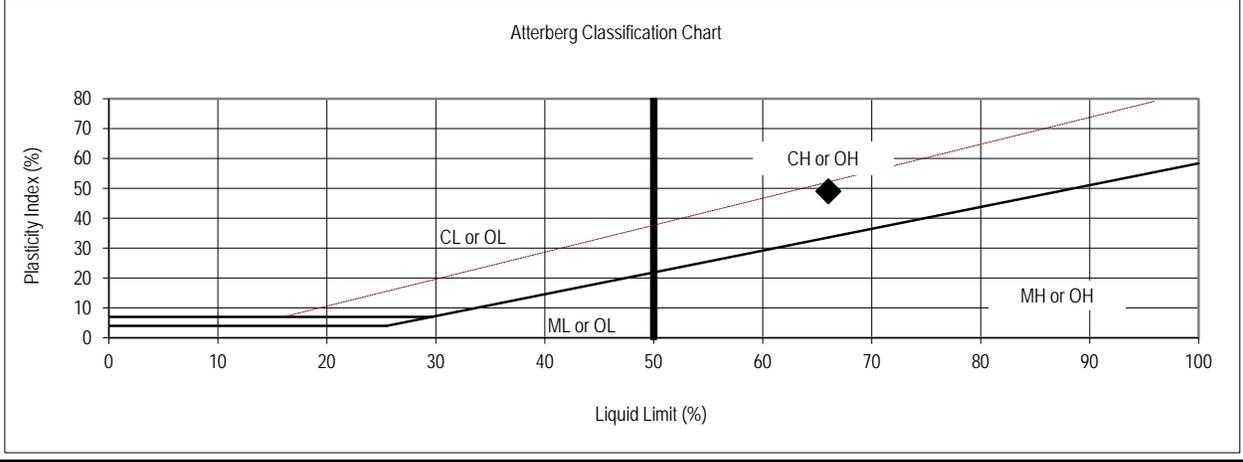
Sample No.:	LIQUID LIMIT:					PLASTIC LIMIT:		
	1	2	3	4	5	1	2	3
Pan ID:	Z	V	Y			W	X	
Wt. Pan (gr)	37.44	37.35	37.11			37.78	38.20	
Wt. Wet Soil + Pan	48.03	46.57	46.83			43.53	44.54	
Wt. Dry Soil + Pan (g)	43.92	42.92	42.95			42.66	43.66	
Wt. Water (gr)	4.11	3.65	3.88			0.87	0.88	
Wt. Dry Soil (gr)	6.48	5.57	5.84			4.88	5.46	
Water Content (%)	63.4	65.5	66.4			17.8	16.1	
Number of Blows, N	32	24	20					

LIQUID LIMIT = 66 PLASTIC LIMIT = 17



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Plasticity Index = 49
 Group Symbol = CH





PARTICLE SIZE DISTRIBUTION TEST WORK SHEET

ASTM D422, C136

DSA File No. n/a
DSA App No. n/a

DSA LEA No. 284

Sieve Only Analysis Worksheet			
Project No.	70744	Project Name:	City of Oroville - Sanitary Sewer Project
Sample No.	L3-2-2	Boring/Trench:	B18-6
		Depth, (ft.):	10
Description:	Grayish/Reddish brown, silty clay (CH)		Date:
Sample Location:		Tested By:	LGH
		Checked By:	DJP
		Lab. No.	C18-055

Moisture Content Data:		Total Material Sample Data:	
Pan ID		Pan ID	
Pan Weight	(gm)	Pan Weight	(gm)
Wet Soil + Pan	(gm)	Wet Soil + Pan Wt.	303.10 (gm)
Dry Soil + Pan	(gm)	Total Wet Weight	303.10 (gm)
Water Weight	(gm)	Total Dry Weight	303.10 (gm)
Dry Soil Weight	(gm)	Total Dry Wt. >#4 Sieve	(gm)
Moisture Content	(%)	Total Dry Wt. <#4 Sieve	303.10 (gm)
		Total Dry Wt. <#200 Sieve	225.70 (gm)
		Total Percent <#200 Sieve	74.46 (%)

GRAVEL PORTION SIEVE ANALYSIS (Portion Retained On > #4 Sieve)							
Sieve Size	Particle Diameter		Wet Weight Retained On Sieve (gm)	Dry Weight			
	Inches (in.)	Millimeter (mm)		Retained On Sieve (gm)	Accum. On Sieve (gm)	Passing Sieve (gm)	Percent Passing (%)
6 Inch	6.0000	152.40				303.10	100.0
3 Inch	3.0000	76.20				303.10	100.0
2 Inch	2.0000	50.80				303.10	100.0
1.5 Inch	1.5000	38.10				303.10	100.0
1.0 Inch	1.0000	25.40				303.10	100.0
3/4 Inch	0.7500	19.05				303.10	100.0
1/2 Inch	0.5000	12.70				303.10	100.0
3/8 Inch	0.3750	9.53				303.10	100.0
#4	0.1875	4.75				303.10	100.0
PAN			303.10	303.10			

SAND PORTION SIEVE ANALYSIS (Portion Retained On < #4 Sieves)

Representative Sample Data:				#200 Wash Data:			
Pan ID				Portion >#200 Sieve:	77.40	(gm)	
Pan Weight	(gm)			Portion <#200 Sieve:	225.70	(gm)	
Wet Soil + Pan	303.10	(gm)		Percent <#200 Sieve	74.46	(%)	
Wet Soil	303.10	(gm)		Total Wt. <#200 Sieve	225.70	(gm)	
Dry Soil	303.10	(gm)					

Sieve Size	Particle Diameter		Dry Weight Rep. Sample		Total Sample Weight Retained (gm)	Accum. Grand Total On Sieve (gm)	Total Percent Passing (%)
	Inches (in.)	Millimeter (mm)	Retained On Sieve (gm)	Percent Retained (%)			
#10	0.079	2.000	17	5.61	17.00	17.00	94.4
#20	0.033	0.850	9.00	2.97	9.00	26.00	91.4
#40	0.017	0.425	11.50	3.79	11.50	37.50	87.6
#60	0.010	0.250	7.50	2.47	7.50	45.00	85.2
#100	0.006	0.150	12.10	3.99	12.10	57.10	81.2
#200	0.003	0.075	20.30	6.70	20.30	77.40	74.5
PAN			Discard				



MOISTURE & DENSITY

ASTM D2216, D2937, C566

DSA LEA No. 284

DSA File No. n/a
DSA App No. n/a

Project No. 70744 Project Name: City of Oroville-Sanitary sewer project Date: 05/03/18
 Tested By: LGH
 Checked By: DJP
 Lab. No. C18-055

SAMPLE LOCATION DATA

Boring/Trench No.	Units	B18-2	B18-5	B18-6					
Sample No.		L2-1-2	L3-2-2	L3-2-2					
Depth Interval	(ft.)	5	10	10					
Sample Description		Red clay with sand	Grayish brown, silty clay	Grayish/Reddish brown, silty clay					
USCS Symbol		CL	CL	CH					

SAMPLE DIMENSION AND WEIGHT DATA

Sample Length	(in)	5.927	5.468	5.967					
Sample Diameter	(in)	2.366	2.390	2.390					
Sample Volume	(cf)	0.0151	0.0142	0.0155					
Wet Soil + Tube Wt.	(gr)	1129.00	976.20	1178.00					
Tube Wt.	(gr)	275.80	274.60	276.40					
Wet Soil Wt.	(gr)	853.20	701.60	901.60					

MOISTURE CONTENT DATA

Tare No.		G-8	G-4	G-1					
Tare Wt.	(gr)	764.20	765.90	762.80					
Wet Soil + Tare Wt.	(gr)	1616.50	1465.20	1657.50					
Dry Soil + Tare Wt.	(gr)	1457.50	1278.00	1501.60					
Water Wt.	(gr)	159.00	187.20	155.90					
Dry Soil Wt.	(gr)	693.30	512.10	738.80					
Moisture Content	(%)	22.9	36.6	21.1					

TEST RESULTS

Wet Unit Wt.	(pcf)	124.7	109.0	128.3					
Moisture Content	(%)	22.9	36.6	21.1					
Dry Unit Wt.	(pcf)	101.5	79.8	106.0					

MOISTURE CORRECTION DATA

Gauge Moisture	(%)								
K Value Correction Factor									

COMPACTION CURVE DATA (ASTM D698, ASTM D1557, or CAL216)

Test Method									
Curve No.									
Max Wet Unit Wt.	(pcf)								
Max Dry Unit Wt.	(pcf)								
Optimum Moisture	(%)								
Wet Relative Comp.	(%)								
Dry Relative Comp.	(%)								

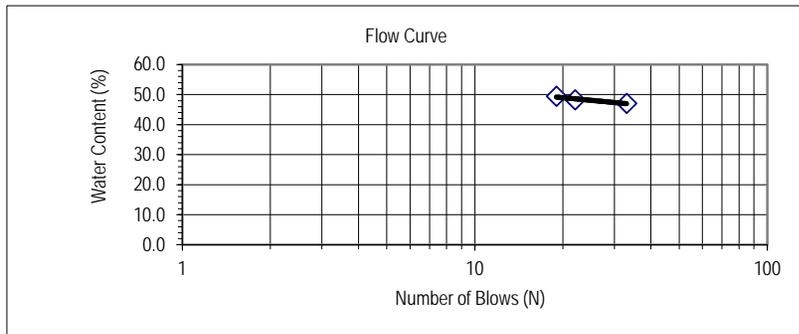
DSA LEA No. 284

DSA File No. n/a
 DSA App No. n/a

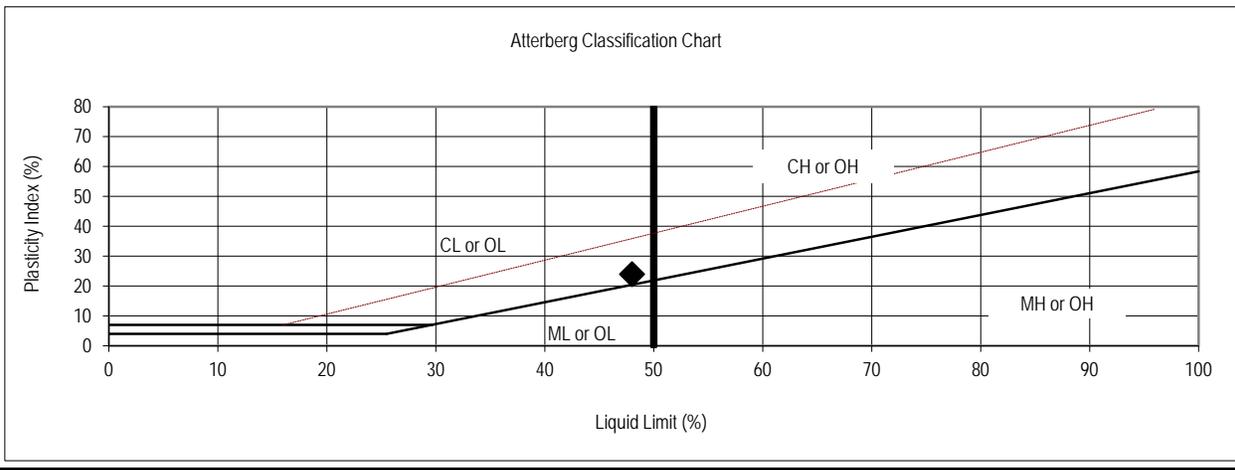
Project No.	70744	Project Name	City of Oroville - Sanitary Sewer Project	Date:	05/03/18	
Sample No.	L2-1-2	Boring/Trench	B18-2	Depth, (ft.):	5	
Description:	(CL) clay with sand Red (2.5YR 4/8)				Tested By:	LGH
Sample Location:					Checked By:	DJP
					Lab. No.	C18-055

Estimated % of Sample Retained on No. 40 Sieve: Sample Air Dried: yes
 Test Method A or B: A

LIQUID LIMIT:						PLASTIC LIMIT:		
Sample No.:	1	2	3	4	5	1	2	3
Pan ID:	E	C	V			X	Z	
Wt. Pan (gr)	36.45	38.46	37.34			38.20	37.43	
Wt. Wet Soil + Pan	46.01	49.25	48.46			46.06	44.68	
Wt. Dry Soil + Pan (g)	42.95	45.74	44.78			44.51	43.26	
Wt. Water (gr)	3.06	3.51	3.68			1.55	1.42	
Wt. Dry Soil (gr)	6.50	7.28	7.44			6.31	5.83	
Water Content (%)	47.1	48.2	49.5			24.6	24.4	
Number of Blows, N	33	22	19					
LIQUID LIMIT =						PLASTIC LIMIT =		
48						24		



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 Plasticity Index = 24
 Group Symbol = CL





PARTICLE SIZE DISTRIBUTION TEST WORK SHEET

ASTM D422, C136

DSA File No. n/a

DSA App No. n/a

DSA LEA No. 284

Sieve Only Analysis Worksheet			
Project No.	70744	Project Name:	City of Oroville - Sanitary Sewer Project
Sample No.	L2-1-2	Boring/Trench:	B18-2
		Depth, (ft.):	5
Description:	(CL) clay with sand Red (2.5YR 4/8)		Date: 05/03/18
Sample Location:		Tested By:	LGH
		Checked By:	DJP
		Lab. No.	C18-055

Moisture Content Data:		Total Material Sample Data:	
Pan ID		Pan ID	
Pan Weight	(gm)	Pan Weight	177.90 (gm)
Wet Soil + Pan	(gm)	Wet Soil + Pan Wt.	507.40 (gm)
Dry Soil + Pan	(gm)	Total Wet Weight	329.50 (gm)
Water Weight	(gm)	Total Dry Weight	329.50 (gm)
Dry Soil Weight	(gm)	Total Dry Wt. >#4 Sieve	(gm)
Moisture Content	(%)	Total Dry Wt. <#4 Sieve	329.50 (gm)
		Total Dry Wt. <#200 Sieve	249.10 (gm)
		Total Percent <#200 Sieve	75.60 (%)

GRAVEL PORTION SIEVE ANALYSIS (Portion Retained On > #4 Sieve)							
Sieve Size	Particle Diameter		Wet Weight Retained On Sieve (gm)	Dry Weight			
	Inches (in.)	Millimeter (mm)		Retained On Sieve (gm)	Accum. On Sieve (gm)	Passing Sieve (gm)	Percent Passing (%)
6 Inch	6.0000	152.40				329.50	100.0
3 Inch	3.0000	76.20				329.50	100.0
2 Inch	2.0000	50.80				329.50	100.0
1.5 Inch	1.5000	38.10				329.50	100.0
1.0 Inch	1.0000	25.40				329.50	100.0
3/4 Inch	0.7500	19.05				329.50	100.0
1/2 Inch	0.5000	12.70				329.50	100.0
3/8 Inch	0.3750	9.53				329.50	100.0
#4	0.1875	4.75				329.50	100.0
PAN			329.50	329.50			

SAND PORTION SIEVE ANALYSIS (Portion Retained On < #4 Sieves)

Representative Sample Data:				#200 Wash Data:			
Pan ID	C-4			Portion >#200 Sieve:	80.40	(gm)	
Pan Weight	177.90	(gm)		Portion <#200 Sieve:	249.10	(gm)	
Wet Soil + Pan	507.40	(gm)		Percent <#200 Sieve	75.60	(%)	
Wet Soil	329.50	(gm)		Total Wt. <#200 Sieve	249.10	(gm)	
Dry Soil	329.50	(gm)					

Sieve Size	Particle Diameter		Dry Weight Rep. Sample		Total Sample Weight Retained (gm)	Accum. Grand Total On Sieve (gm)	Total Percent Passing (%)
	Inches (in.)	Millimeter (mm)	Retained On Sieve (gm)	Percent Retained (%)			
#10	0.079	2.000	16.3	4.95	16.30	16.30	95.1
#20	0.033	0.850	8.00	2.43	8.00	24.30	92.6
#40	0.017	0.425	9.00	2.73	9.00	33.30	89.9
#60	0.010	0.250	10.60	3.22	10.60	43.90	86.7
#100	0.006	0.150	15.70	4.76	15.70	59.60	81.9
#200	0.003	0.075	20.80	6.31	20.80	80.40	75.6
PAN			Discard				

APPENDIX D

Seismic Design Map Reports

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USGS Design Maps Summary Report

User-Specified Input

Building Code Reference Document ASCE 7-10 Standard
(which utilizes USGS hazard data available in 2008)

Site Coordinates 39.5119°N, 121.5487°W

Site Soil Classification Site Class D – “Stiff Soil”

Risk Category I/II/III



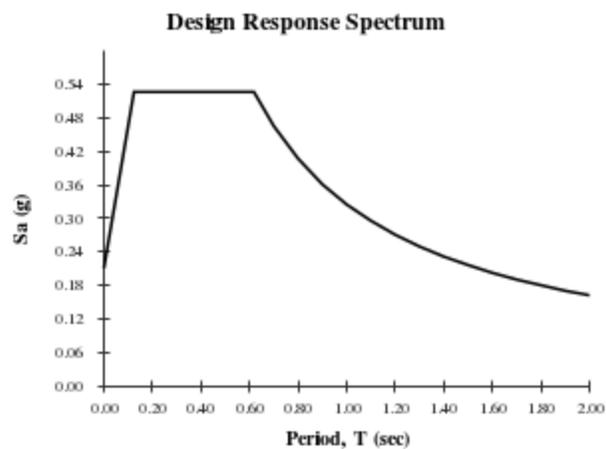
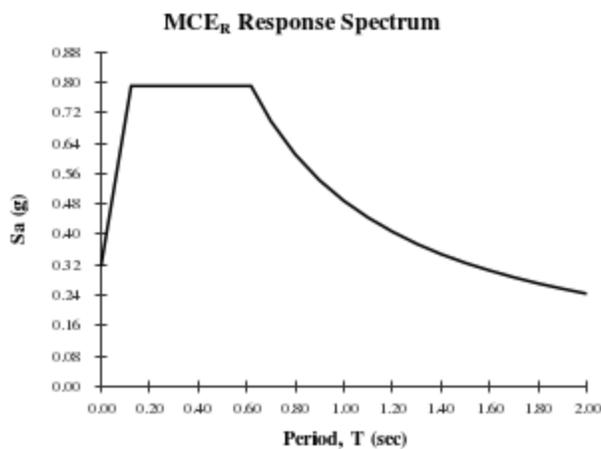
USGS-Provided Output

$S_S = 0.597 \text{ g}$ $S_{MS} = 0.790 \text{ g}$ $S_{DS} = 0.526 \text{ g}$
 $S_1 = 0.259 \text{ g}$ $S_{M1} = 0.488 \text{ g}$ $S_{D1} = 0.325 \text{ g}$

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For information on how the S_S and S_1 values above have been calculated from probabilistic (risk-targeted) and deterministic ground motions in the direction of maximum horizontal response, please return to the application and select the “2009 NEHRP” building code reference document.



For PGA_M , T_L , C_{RS} , and C_{R1} values, please [view the detailed report](#).

Although this information is a product of the U.S. Geological Survey, we provide no warranty, expressed or implied, as to the accuracy of the data contained therein. This tool is not a substitute for technical subject-matter knowledge.



Design Maps Detailed Report

ASCE 7-10 Standard (39.5119°N, 121.5487°W)

Site Class D – “Stiff Soil”, Risk Category I/II/III

Section 11.4.1 — Mapped Acceleration Parameters

Note: Ground motion values provided below are for the direction of maximum horizontal spectral response acceleration. They have been converted from corresponding geometric mean ground motions computed by the USGS by applying factors of 1.1 (to obtain S_s) and 1.3 (to obtain S_1). Maps in the 2010 ASCE-7 Standard are provided for Site Class B. Adjustments for other Site Classes are made, as needed, in Section 11.4.3.

From [Figure 22-1](#) ^[1]

$$S_s = 0.597 \text{ g}$$

From [Figure 22-2](#) ^[2]

$$S_1 = 0.259 \text{ g}$$

Section 11.4.2 — Site Class

The authority having jurisdiction (not the USGS), site-specific geotechnical data, and/or the default has classified the site as Site Class D, based on the site soil properties in accordance with Chapter 20.

Table 20.3–1 Site Classification

Site Class	\bar{v}_s	\bar{N} or \bar{N}_{ch}	\bar{s}_u
A. Hard Rock	>5,000 ft/s	N/A	N/A
B. Rock	2,500 to 5,000 ft/s	N/A	N/A
C. Very dense soil and soft rock	1,200 to 2,500 ft/s	>50	>2,000 psf
D. Stiff Soil	600 to 1,200 ft/s	15 to 50	1,000 to 2,000 psf
E. Soft clay soil	<600 ft/s	<15	<1,000 psf
Any profile with more than 10 ft of soil having the characteristics:			
<ul style="list-style-type: none"> • Plasticity index $PI > 20$, • Moisture content $w \geq 40\%$, and • Undrained shear strength $\bar{s}_u < 500$ psf 			
F. Soils requiring site response analysis in accordance with Section 21.1	See Section 20.3.1		

For SI: 1ft/s = 0.3048 m/s 1lb/ft² = 0.0479 kN/m²

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Section 11.4.3 — Site Coefficients and Risk-Targeted Maximum Considered Earthquake (MCE_R) Spectral Response Acceleration Parameters

Table 11.4-1: Site Coefficient F_a

Site Class	Mapped MCE_R Spectral Response Acceleration Parameter at Short Period				
	$S_s \leq 0.25$	$S_s = 0.50$	$S_s = 0.75$	$S_s = 1.00$	$S_s \geq 1.25$
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.2	1.2	1.1	1.0	1.0
D	1.6	1.4	1.2	1.1	1.0
E	2.5	1.7	1.2	0.9	0.9
F	See Section 11.4.7 of ASCE 7				

Note: Use straight-line interpolation for intermediate values of S_s

For Site Class = D and $S_s = 0.597$ g, $F_a = 1.322$

Table 11.4-2: Site Coefficient F_v

Site Class	Mapped MCE_R Spectral Response Acceleration Parameter at 1-s Period				
	$S_1 \leq 0.10$	$S_1 = 0.20$	$S_1 = 0.30$	$S_1 = 0.40$	$S_1 \geq 0.50$
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.7	1.6	1.5	1.4	1.3
D	2.4	2.0	1.8	1.6	1.5
E	3.5	3.2	2.8	2.4	2.4
F	See Section 11.4.7 of ASCE 7				

Note: Use straight-line interpolation for intermediate values of S_1

For Site Class = D and $S_1 = 0.259$ g, $F_v = 1.881$

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Equation (11.4-1):

$$S_{MS} = F_a S_s = 1.322 \times 0.597 = 0.790 \text{ g}$$

Equation (11.4-2):

$$S_{M1} = F_v S_1 = 1.881 \times 0.259 = 0.488 \text{ g}$$

Section 11.4.4 — Design Spectral Acceleration Parameters

Equation (11.4-3):

$$S_{DS} = \frac{2}{3} S_{MS} = \frac{2}{3} \times 0.790 = 0.526 \text{ g}$$

Equation (11.4-4):

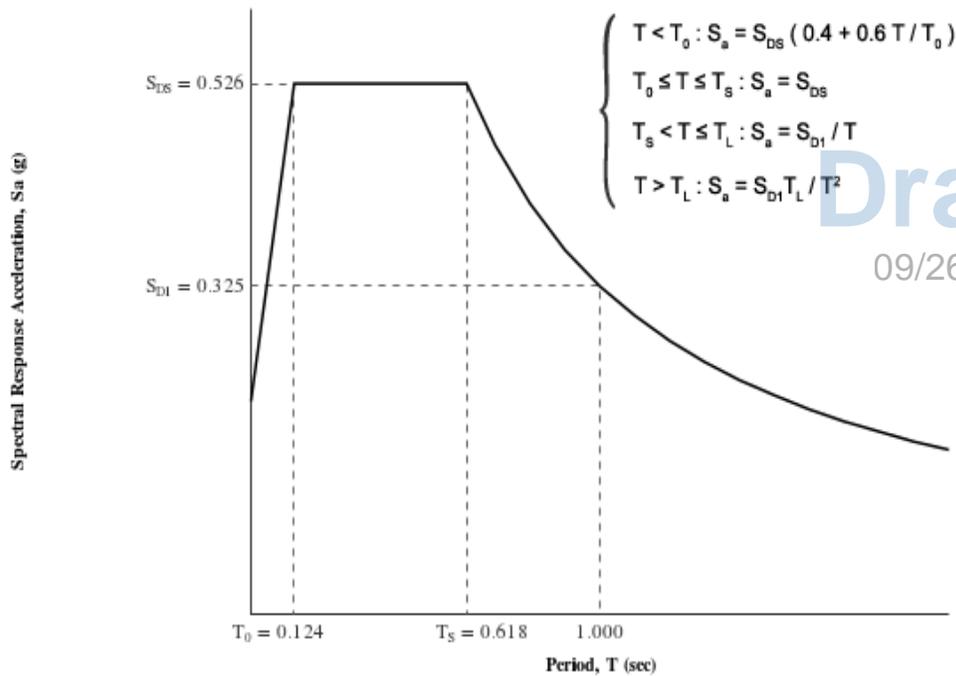
$$S_{D1} = \frac{2}{3} S_{M1} = \frac{2}{3} \times 0.488 = 0.325 \text{ g}$$

Section 11.4.5 — Design Response Spectrum

From [Figure 22-12](#) ^[3]

$$T_L = 16 \text{ seconds}$$

Figure 11.4-1: Design Response Spectrum

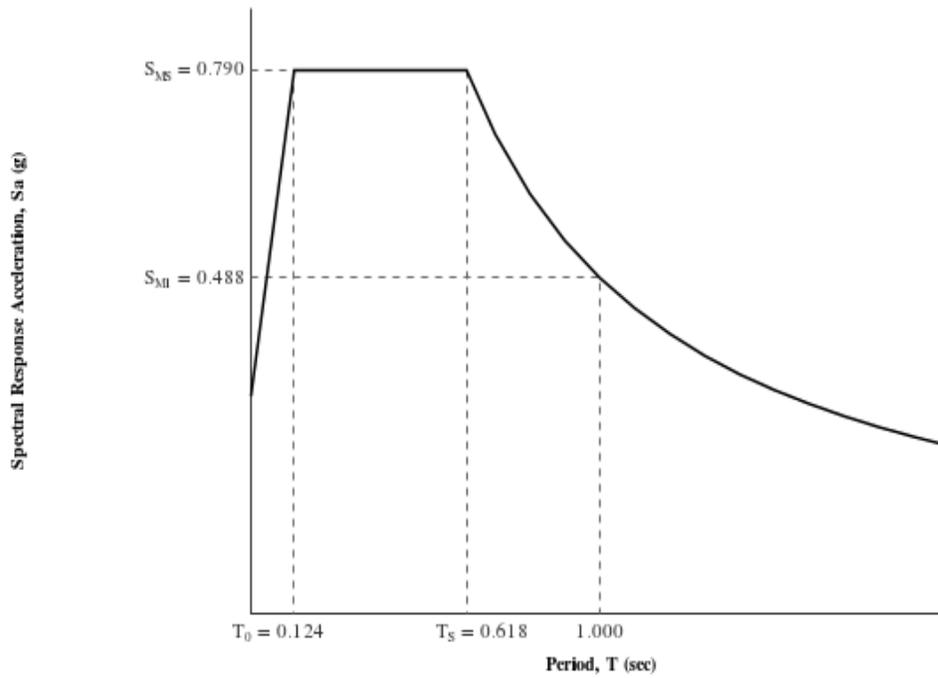


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Section 11.4.6 — Risk-Targeted Maximum Considered Earthquake (MCE_R) Response Spectrum

The MCE_R Response Spectrum is determined by multiplying the design response spectrum above by 1.5.



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Section 11.8.3 — Additional Geotechnical Investigation Report Requirements for Seismic Design Categories D through F

From [Figure 22-7](#) ^[4]

$$PGA = 0.232$$

Equation (11.8-1):

$$PGA_M = F_{PGA} PGA = 1.336 \times 0.232 = 0.31 \text{ g}$$

Table 11.8-1: Site Coefficient F_{PGA}

Site Class	Mapped MCE Geometric Mean Peak Ground Acceleration, PGA				
	PGA ≤ 0.10	PGA = 0.20	PGA = 0.30	PGA = 0.40	PGA ≥ 0.50
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.2	1.2	1.1	1.0	1.0
D	1.6	1.4	1.2	1.1	1.0
E	2.5	1.7	1.2	0.9	0.9
F	See Section 11.4.7 of ASCE 7				

Note: Use straight-line interpolation for intermediate values of PGA

For Site Class = D and PGA = 0.232 g, $F_{PGA} = 1.336$

Section 21.2.1.1 — Method 1 (from Chapter 21 – Site-Specific Ground Motion Procedures for Seismic Design)

From [Figure 22-17](#) ^[5]

$$C_{RS} = 1.009$$

From [Figure 22-18](#) ^[6]

$$C_{R1} = 1.035$$

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Section 11.6 — Seismic Design Category

Table 11.6-1 Seismic Design Category Based on Short Period Response Acceleration Parameter

VALUE OF S_{DS}	RISK CATEGORY		
	I or II	III	IV
$S_{DS} < 0.167g$	A	A	A
$0.167g \leq S_{DS} < 0.33g$	B	B	C
$0.33g \leq S_{DS} < 0.50g$	C	C	D
$0.50g \leq S_{DS}$	D	D	D

For Risk Category = I and $S_{DS} = 0.526 g$, Seismic Design Category = D

Table 11.6-2 Seismic Design Category Based on 1-S Period Response Acceleration Parameter

VALUE OF S_{D1}	RISK CATEGORY		
	I or II	III	IV
$S_{D1} < 0.067g$	A	A	A
$0.067g \leq S_{D1} < 0.133g$	B	B	C
$0.133g \leq S_{D1} < 0.20g$	C	C	D
$0.20g \leq S_{D1}$	D	D	D

For Risk Category = I and $S_{D1} = 0.325 g$, Seismic Design Category = D

Note: When S_1 is greater than or equal to 0.75g, the Seismic Design Category is **E** for buildings in Risk Categories I, II, and III, and **F** for those in Risk Category IV, irrespective of the above.

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Seismic Design Category \equiv "the more severe design category in accordance with Table 11.6-1 or 11.6-2" = D

Note: See Section 11.6 for alternative approaches to calculating Seismic Design Category.

References

1. Figure 22-1: https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-1.pdf
2. Figure 22-2: https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-2.pdf
3. Figure 22-12: https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-12.pdf
4. Figure 22-7: https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-7.pdf
5. Figure 22-17: https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-17.pdf
6. Figure 22-18: https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-18.pdf

APPENDIX B

TABLE MOUNTAIN AND GRAND SIGNAL AND LIGHTING PLANS AS-BUILTS

GENERAL NOTES

- TRAFFIC SIGNAL AND HIGHWAY SAFETY LIGHTING SYSTEMS PER CALTRANS STANDARD PLANS, AND STANDARD SPECIFICATIONS DATED JANUARY, 1988, AS SHOWN HEREON AND IN THE SPECIAL PROVISIONS.
- TRAFFIC SIGNS, STRIPES, AND LEGENDS PER CALTRANS TRAFFIC SIGN SPECIFICATIONS, TRAFFIC MANUAL, MAINTENANCE MANUAL, AND STANDARD SPECIFICATIONS. ALL SIGNS, STRIPES, AND LEGENDS SHALL BE REFLECTORIZED.
- IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO LOCATE ALL SUBSTRUCTURES, WHETHER SHOWN HEREON OR NOT, AND TO PROTECT THEM FROM DAMAGE. THE EXPENSE OR REPAIR OF SAID SUBSTRUCTURES SHALL BE BORNE BY THE CONTRACTOR. THE CONTRACTOR SHALL CONTACT UNDERGROUND SERVICE ALERT, (800) 642-2444, PRIOR TO CONSTRUCTION.
- SIGNAL STANDARDS, CONTROLLERS, CONDUIT, PULL BOXES, AND LOOP DETECTOR LOCATIONS ARE APPROXIMATE ONLY. ACTUAL LOCATIONS WILL BE DETERMINED BY THE ENGINEER IN THE FIELD.
- ALL TRAFFIC SIGNAL HEADS SHALL BE METALLIC AND SUPPLIED WITH GLASS LENSES AND ALZAK REFLECTORS. ALL SIGNAL HEADS SHALL HAVE METALLIC BACKPLATES.
- ALL CONDUCTORS AND THEIR TERMINATIONS SHALL BE CLEARLY MARKED.
- PULL BOXES SHALL BE NO. 5, UNLESS OTHERWISE SPECIFIED. ALL PULL BOXES SHALL BE CONCRETE.
- ALL LUMINAIRES SHALL BE HIGH PRESSURE SODIUM, CUTOFF WITH I.E.S. TYPE III LIGHT DISTRIBUTION, UNLESS OTHERWISE SPECIFIED.
- ALL STREET TRENCHING FOR CONDUIT INSTALLATIONS SHALL BE AS DIRECTED BY THE ENGINEER.
- ALL PEDESTRIAN SIGNALS SHALL BE TYPE "A" WITH INTERNATIONAL SYMBOLS.
- THE CONTRACTOR SHALL LAYOUT AND "CAT TRACK" THE PROPOSED STRIPING A MINIMUM OF 1 DAY PRIOR TO THE INSTALLATION OF LOOP DETECTORS.

CONSTRUCTION NOTES

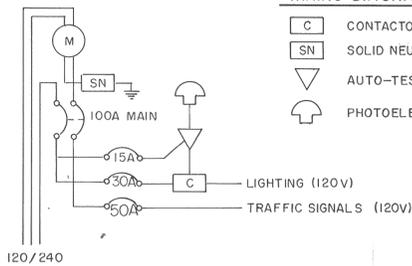
- INSTALL TYPE III - AF ELECTRICAL SERVICE PER P.G.&E REQUIREMENTS.
- INSTALL TYPE B DETECTOR HANDHOLE
- 6X6 DETECTORS TO BE TYPE A
- PLACE TWO DETECTORS AT THIS LOCATION TO AVOID EXISTING MANHOLE.
- TYPE C LOOP DETECTORS SHALL BE 6' X 50' UNLESS OTHERWISE NOTED

APPLICABLE CAL-TRANS STANDARD PLANS

A-10A	ES-3C	ES-5E
A-10B	ES-3D	ES-6A
A-20A	ES-3E	ES-6Q
ES-1A	ES-4A	ES-6S
ES-1B	ES-4B	ES-6T
ES-2A	ES-4C	ES-8
ES-2C	ES-5A	ES-10
ES-3A	ES-5B	ES-11
ES-3B	ES-5C	ES-13

WIRING DIAGRAM LEGEND

- CONTACTOR (LIGHTING)
- SOLID NEUTRAL BUS
- AUTO-TEST SWITCH
- PHOTOELECTRIC UNIT



WIRING DIAGRAM
METERED / UNMETERED

SERVICE EQUIPMENT SCHEDULE

EQUIPMENT SERVICE NUMBER	VOLTAGE
	120 / 240
SERVICE #	M & U
TYPE SERVICE	III - AF
MAIN BREAKER	100A 2P
SUB. (LIGHTING)	30A 1P
SUB. (SIGNALS)	50A 1P
SUB. (P.E. CONTROL)	15A 1P
AUX. CONTACTOR	30A 1P
CONTACTOR COIL VOLT	120V

* M = METERED U = UNMETERED

CONDUCTOR SCHEDULE

AWG	CIRCUIT	RUNS								
		1	2	3	4	5	6	7	8	9
#14	Ø1 SIGNALS	3	3	-	-	-	-	3	3	-
	Ø2 SIGNALS	6	6	3	3	3	-	3	3	-
	Ø3 SIGNALS	3	3	3	-	-	-	-	-	-
	Ø4 SIGNALS	6	6	-	-	-	-	3	3	3
	Ø5 SIGNALS	3	3	3	3	3	-	-	-	-
	Ø6 SIGNALS	6	6	3	3	-	-	3	-	-
	Ø7 SIGNALS	6	6	3	3	3	3	3	3	3
	Ø8 SIGNALS	3	3	3	3	3	3	-	-	-
#10	Ø2 PED	4	4	2	2	2	-	2	2	-
	Ø4 PED	2	2	-	-	-	-	2	2	2
	Ø6 PED	4	4	2	2	-	-	2	-	-
	Ø8 PED	2	2	2	2	2	2	-	-	-
	Ø2 PPB	2	2	1	1	1	1	1	1	1
	Ø4 PPB	1	1	-	-	-	-	1	1	-
DLC	Ø6 PPB	1	1	1	-	-	-	-	-	-
	Ø8 PPB	1	1	1	1	1	-	-	-	-
	PPB NEUTRAL	2	2	1	1	1	1	1	1	1
	P E C	-	3	-	-	-	-	3	-	-
	SPARES	6	6	3	3	3	3	3	3	3
	TOTAL	61	64	31	27	22	13	30	22	13
#6	SIGNAL COMMON	2	2	1	1	1	1	1	1	1
	LIGHTING	-	4	2	2	-	2	2	2	2
DLC	TOTAL	2	6	3	3	3	1	3	3	3
	SIGNAL SERVICE	2	-	-	-	-	-	-	-	-
	Ø1 DETECTORS	1	1	1	1	-	-	-	-	-
	Ø2 DETECTORS	4	4	-	-	-	-	4	4	-
	Ø3 DETECTORS	1	1	1	1	1	1	-	-	-
	Ø4 DETECTORS	3	3	-	-	-	-	-	-	-
	Ø5 DETECTORS	1	1	-	-	-	-	1	1	-
	Ø6 DETECTORS	4	4	4	4	-	-	-	-	-
Ø7 DETECTORS	1	1	-	-	-	-	-	-	-	
Ø8 DETECTORS	4	4	4	4	4	4	-	-	-	
TOTAL	19	19	10	10	5	5	5	5	-	
MINIMUM CONDUIT SIZE		2-3.5"	2-3.5"	2-3"	2-3"	1-3"	1-2.5"	1-3"	1-3"	1-2"



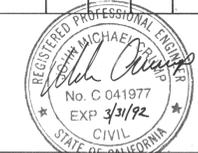
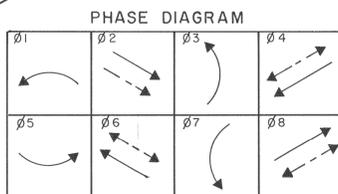
SCALE 1"=20'

POLE SCHEDULE

LOC	TYPE	HGT	SIG	LUM	LUMINAIRE	R S N S	SIGNAL MOUNTING			P P B	REMARKS	
							MAS	MAS	VEHICLE			
(A)	19-3-70	30'	30'	15'	200W HPS	Grand Ave.	MAS	MAS	SV-1-T	SP-1-T	Ø4 RT	INSTALL TYPE II PEU
(B)	1-B	10'	-	-	-	-	-	-	TV-2-T	SP-1-T	Ø6 LT	
(C)	19-3-70	30'	30'	12'	200W HPS	Table Mountain Blvd.	MAS	MAS	SV-1-T	SP-1-T	Ø6 RT	
(D)	1-B	10'	-	-	-	-	-	-	TV-2-T	SP-1-T	Ø8 RT	
(E)	26-3-70	30'	40'	15'	200W HPS	Grand Ave.	MAS	MAS	SV-1-T	SP-1-T	Ø8 LT	
(F)	1-B	10'	-	-	-	-	-	-	TV-2-T	SP-1-T	Ø2 RT	
(G)	26-3-70	30'	40'	15'	200W HPS	Table Mountain Blvd.	MAS	MAS	SV-1-T	SP-1-T	Ø2 LT	
(H)	1-B	10'	-	-	-	-	-	-	TV-2-T	SP-1-T	Ø4 LT	

(I) INSTALL MODEL 170 CONTROLLER IN TYPE 332 CABINET

R S N S = REFLECTORIZED STREET NAME SIGN, INSTALL ON SIGNAL MAST ARM.



CITY OF OROVILLE

GRAND AVENUE AND TABLE MOUNTAIN BLVD.
SIGNAL AND LIGHTING PLANS

APPROVED BY <i>Michael J. Camp</i> PUBLIC WORKS DIRECTOR RCE 21762	DESIGNED BY J.J. DRAWN BY T.F. CHECKED BY J.J.	DRAWING NO. 2 SHEET OF 12
--	---	--



DATE	NO.	REVISION	BY	APP'D

