

**CITY OF COSTA MESA
PUBLIC WORKS AGREEMENT FOR
CITY PROJECT NO. 23-04
FIRE STATION NO. 4 – TRAINING FACILITY (SITE IMPROVEMENTS)**

THIS PUBLIC WORKS AGREEMENT (“Agreement”), dated 5/22/2024 (“Effective Date”), is made by the CITY OF COSTA MESA, a political subdivision of the State of California (“CITY”), and Caliba, Inc., a California Corporation (“CONTRACTOR”).

WHEREAS, CITY desires to construct the public improvements described below under Paragraph 1, Scope of Work (the “Project”); and

WHEREAS, CITY has determined that CONTRACTOR is the lowest responsible bidder; and

WHEREAS, CITY now desires to contract with CONTRACTOR to furnish construction and related services for the Project; and

WHEREAS, CITY and CONTRACTOR desire to set forth their rights, duties and liabilities in connection with the services to be performed.

NOW, THEREFORE, for and in consideration of the covenants and conditions contained herein, the parties hereby agree as follows:

1. SCOPE OF WORK.

The scope of work generally consists of construction of the Fire Station No. 4 Training Facility and additional work as directed by the city engineer (the “Work”).

The Work is further described in the “Contract Documents” referred to below.

The Project is known as the Fire Station Number 4 Training Facility (Site Improvements) Project, City Project No. 23-04 (the “Project”).

2. CONTRACT DOCUMENTS.

The complete Agreement consists of the following documents relating to the Project:

- (a) This Agreement;
- (b) CONTRACTOR’s bid, attached hereto as Exhibit A and incorporated herein;
- (c) Bid package, including, but not limited to, notice inviting bids, bid addendum no. 1, bid addendum no. 2, complete plans, profiles, detailed drawings and specifications, general provisions and special provisions. The bid package

is attached hereto as Exhibit B and incorporated herein;

- (d) Faithful Performance Bond and Labor and Material Bond, including agent's Power of Attorney for each bond, attached hereto as Exhibit C;
- (e) Drug-Free Workplace Policy, attached hereto as Exhibit D and incorporated herein;
- (f) Provisions of the most current edition of The Greenbook: Standard Specifications for Public Works Construction ("The Greenbook"). Provisions of The Greenbook are incorporated by this reference as if fully set forth herein.

The documents comprising the complete Agreement will be referred to as the "Contract Documents."

All of the Contract Documents are intended to complement one another, so that any Work called for in one and not mentioned in another is to be performed as if mentioned in all documents.

In the event of an inconsistency in the Contract Documents, the terms of this Agreement shall prevail over all other Contract Documents. The order of precedence between the remaining Contract Documents shall be as set forth in The Greenbook.

The Contract Documents constitute the entire agreement between the parties and supersede any and all other writings and oral negotiations.

3. CITY'S REPRESENTATIVE.

The CITY's Representative is Hector Soriano, referred to herein as the Project Manager ("Project Manager").

4. CONTRACTOR'S PROJECT MANAGER; PERSONNEL.

(a) Project Manager. CONTRACTOR's Project Manager must be approved by City. Such approval shall be at CITY's sole discretion.

(b) Personnel. CITY has the right to review and approve any personnel who are assigned to perform work under this Agreement. CONTRACTOR shall remove personnel from performing work under this Agreement if requested to do so by CITY.

This Paragraph 4 is a material provision of the Agreement.

5. SCHEDULE.

All Work shall be performed in accordance with the schedule approved on behalf

of CITY by the Project Manager, and in accordance with the time of performance set forth in Paragraph 11 (Time of Performance).

6. EQUIPMENT - PERFORMANCE OF WORK.

CONTRACTOR shall furnish all tools, equipment, apparatus, facilities, labor and materials necessary to perform and complete the Work in a good and workmanlike manner in strict conformity with the Contract Documents.

The equipment, apparatus, facilities, labor and material shall be furnished and such Work performed and completed as required in the plans and specifications to the satisfaction of the Project Manager or his or her designee, and subject to his or her approval.

7. COMPENSATION.

CITY shall pay CONTRACTOR in accordance with the fee schedule set forth in CONTRACTOR's bid. CONTRACTOR's total compensation shall not exceed Three Million, Four Hundred Eighty-Six Thousand Dollars (\$3,486,000.00).

8. ADDITIONAL SERVICES.

CONTRACTOR shall not receive compensation for any services provided outside the scope of the Contract Documents unless such additional services, including change orders, are approved in writing by CITY prior to CONTRACTOR performing the additional services.

It is specifically understood that oral requests or approvals of such additional services, change orders or additional compensation and any approvals from CITY shall be barred and are unenforceable.

9. PAYMENTS TO CONTRACTOR.

On or before the last Monday of each and every month during the performance of the Work, CONTRACTOR shall meet with the Project Manager or his or her designee to determine the quantity of pay items incorporated into the improvement during that month. A "Progress Payment Order" will then be jointly prepared, approved, and signed by the Project Manager and the CONTRACTOR setting forth the amount to be paid and providing for a five percent (5%) retention. Upon approval of the progress payment order by the Project Manager, or his or her designee, it shall be submitted to CITY's Finance Department and processed for payment by obtaining approval from the City Council to issue a warrant.

Within three (3) days following City Council's approval to issue a warrant, CITY shall mail to CONTRACTOR a warrant for the amount specified in the progress payment order as the amount to be paid. The retained five percent (5%) shall be paid to

CONTRACTOR thirty-five (35) days after the recording of the Notice of Completion of the Work by the CITY with the Orange County Clerk-Recorder and after CONTRACTOR has furnished releases of all claims against CITY by persons who furnished labor or materials for the Work, if required by CITY.

Upon the request of CONTRACTOR and at its expense, securities equivalent to the amount withheld pursuant to the foregoing provisions may be presented to CITY for substitution for the retained funds. If CITY approves the form and amount of the offered securities it will release the retained funds and will hold the securities in lieu thereof. CONTRACTOR shall be entitled to any interest earned on the securities.

In the event that claims for property damage or bodily injury are presented to CITY arising out of CONTRACTOR's or any subcontractor's work under this Agreement, CITY shall give notice thereof to CONTRACTOR, and CONTRACTOR shall have thirty-five (35) days from the mailing of any such notice to evaluate the claim and to settle it by whole or partial payment, or to reject it, and to give notice of settlement or rejection to CITY. If CITY does not receive notice within the above-mentioned 35-day period that the claim has been settled, and if the Project Manager, after consultation with the City Attorney, determines that the claim is meritorious, CITY may pay the claim or a portion of it in exchange for an appropriate release from the claimant, and may deduct the amount of the payment from the retained funds that would otherwise be paid to CONTRACTOR upon completion of the Work; provided, however, that the maximum amount paid for any one claim pursuant to this provision shall be One Thousand Dollars (\$1,000.00), and the maximum amount for all such claims in the aggregate paid pursuant to this provision shall be Five Thousand Dollars (\$5,000.00).

10. PROMPT PAYMENT OF SUBCONTRACTORS.

CONTRACTOR agrees to pay each subcontractor under this Agreement for satisfactory performance of its contract no later than seven (7) days from the receipt of each payment the CONTRACTOR receives from CITY.

CONTRACTOR agrees further to release retainage payments to each subcontractor within thirty (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.

11. TIME OF PERFORMANCE.

CONTRACTOR shall commence Work by the date specified in CITY's Notice to Proceed, unless a later date is agreed upon in writing by the parties. The Work shall be completed within one hundred eighty (180) working days from the first day of commencement of the Work.

12. TERMINATION.

- (a) Termination for Convenience. CITY may terminate this Agreement at any time, with or without cause, by providing thirty (30) days' written notice to CONTRACTOR.
- (b) Termination for Breach of Contract.
 - (i) If CONTRACTOR refuses or fails to prosecute the Work or any severable part of it with such diligence as will ensure its timely completion, or if CONTRACTOR fails to complete the Work on time, or if CONTRACTOR, or any subcontractor, violates any of the provisions of the Contract Documents, the Project Manager may give written notice to CONTRACTOR and CONTRACTOR's sureties of the CITY's intention to terminate this Agreement; and, unless within five (5) days after the serving of that notice, such conduct shall cease and arrangements for the correction thereof be made to the satisfaction of the CITY, this Agreement may be terminated at the option of CITY effective upon CONTRACTOR's receipt of a second notice sent by the CITY indicating that the CITY has exercised its option to terminate.
 - (ii) If CONTRACTOR is adjudged bankrupt or files for any relief under the Federal Bankruptcy Code or State insolvency laws, this Agreement shall automatically terminate without any further action or notice by CITY.
 - (iii) If CONTRACTOR is in breach of any material provision of this Agreement, CITY may immediately terminate this Agreement by providing written notice to CONTRACTOR of same.

13.d LIQUIDATED DAMAGES.

In the event the Work is not completed, for any reason, within the time required including any approved extensions of time, and to the satisfaction of the Project Manager, CITY may, in addition to any other remedies, equitable and legal, including remedies authorized by Paragraph 12 (Termination) of this Agreement, charge to CONTRACTOR or its sureties, or deduct from payments or credits due CONTRACTOR, a sum equal to One thousand nine hundred (\$1,900.00) as liquidated damages for each calendar day beyond the date provided for the completion of such work.

The parties hereto agree that the amount set forth above, as liquidated damages constitutes a fair and reasonable estimate of the costs the CITY would suffer for each day that the CONTRACTOR fails to meet the performance schedule. The parties hereby agree and acknowledge that the delays in the performance schedule will cause CITY to incur costs and expenses not contemplated by this Agreement.

14. PERFORMANCE BY SURETIES.

In the event CONTRACTOR fails or refuses to perform the Work, CITY may provide CONTRACTOR with a notice of intent to terminate as provided in Paragraph 12 (Termination), of this Agreement. CITY shall immediately give written notice of such intent to terminate to CONTRACTOR and CONTRACTOR's surety or sureties, and the sureties shall have the right to take over and perform this Agreement; provided, however, that the sureties must, within five (5) days after CITY's giving notice of termination, (a) give the CITY written notice of their intention to take over the performance of this Agreement; (b) provide adequate assurances, to the satisfaction of the CITY, that the Work shall be performed diligently and in a timely manner; and (c) must commence performance thereof within five (5) days after providing notice to the CITY of their intention to take over the Work. Upon the failure of the sureties to comply with the provisions set forth above, CITY may take over the Work and complete it, at the expense of CONTRACTOR, and the CONTRACTOR and the sureties shall be liable to CITY for any excess costs or damages including those referred to in Paragraph 13 (Liquidated Damages), incurred by CITY. In such event, CITY may, without liability for so doing, take possession of such materials, equipment, tools, appliances, Contract Documents and other property belonging to CONTRACTOR as may be on the site of the Work and reasonably necessary therefor and may use them to complete the Work.

15. DISPUTES PERTAINING TO PAYMENT FOR WORK.

Should any dispute arise respecting whether any delay is excusable, or its duration, or the value of the Work done, or of any Work omitted, or of any extra Work which CONTRACTOR may be required to do, or respecting any payment to CONTRACTOR during the performance of this Agreement, such dispute shall be decided by the Project Manager, and his or her decisions shall be final and binding upon CONTRACTOR and its sureties.

16. SUPERINTENDENCE BY CONTRACTOR.

At all times during performance of the Work, CONTRACTOR shall give personal superintendence or have a competent foreman or superintendent on the worksite, with authority to act for CONTRACTOR.

17. INSPECTION BY CITY.

CONTRACTOR shall at all times maintain proper facilities and provide safe access for inspection by CITY to all parts of the Work and to all shops on or off-site where the Work or portions of the Work, are in preparation. CITY shall have the right of access to the premises for inspection at all times. However, CITY shall, at all times, comply with CONTRACTOR's safety requirements on the job site.

18. CARE OF THE WORK AND OFF-SITE AUTHORIZATION.

CONTRACTOR warrants that it has examined the site of the Work and is familiar with its topography and condition, location of property lines, easements, building lines and other physical factors and limitations affecting the performance of this Agreement. CONTRACTOR, at CONTRACTOR's sole cost and expense, shall obtain any permission, and all approvals, licenses, or easements necessary for any operations conducted off the premises owned or controlled by CITY. CONTRACTOR shall be responsible for the proper care and protection of all materials delivered to the site or stored off-site and for the Work performed until completion and final inspection and acceptance by CITY. The risk, damage or destruction of materials delivered to the site or to Work performed shall be borne by CONTRACTOR.

19. CONTRACT SECURITY AND GUARANTEE.

CONTRACTOR shall furnish, concurrently with the execution of this Agreement, the following: (1) a surety bond in an amount equal to one hundred percent (100%) of the contract price as security for the faithful performance of this Agreement, and (2) a separate surety bond in an amount equal to at least one hundred percent (100%) of the contract price as security for the payment of all persons furnishing labor or materials in connection with the Work under this Agreement. Sureties for each of the bonds and the forms thereof shall be satisfactory to CITY. In addition, such sureties must be authorized to issue bonds in California; sureties must be listed on the latest revision to the U.S. Department of the Treasury Circular 570; and must be shown to have sufficient bonding capacity to provide the bonds required by the Contract Documents.

CONTRACTOR shall provide a certified copy of the certificate of authority of the surety issued by the Insurance Commissioner; a certificate from the clerk of the county in which the court or officer is located that the certificate of authority of the surety has not been surrendered, revoked, canceled, annulled, or suspended or, in the event that it has, that renewed authority has been granted; and copies of the surety's most recent annual statement and quarterly statement filed with the Department of Insurance pursuant to Article 10 (commencing with Section 900) of Chapter 1 of Part 2 of Division 1 of the Insurance Code.

CONTRACTOR guarantees that all materials used in the Work and all labor performed shall be in conformity with the Contract Documents including, but not limited to, the standards and specifications set forth in the most current edition of The Greenbook. CONTRACTOR shall, at its own expense, make any and all repairs and replacements that shall become necessary as the result of any failure of the Work to conform to the aforementioned Contract Documents, and/or standard specifications; provided, however, that CONTRACTOR shall be obligated under this provision only to the extent of those failures or defects of which CONTRACTOR is given notice within a period of twelve (12) months from the date that the Notice of Completion is recorded.

The rights and remedies available to CITY pursuant to this provision shall be cumulative with all rights and remedies available to CITY pursuant to statutory and common law, which rights and remedies are hereby expressly reserved, and neither the

foregoing guarantee by CONTRACTOR nor its furnishing of the bonds, nor acceptance thereof by CITY, shall constitute a waiver of any rights or remedies available to CITY against CONTRACTOR.

20. INDEMNIFICATION.

CONTRACTOR agrees to protect, defend, indemnify and hold harmless CITY and its elected and appointed boards, officers, agents, and employees from any and all claims, liabilities, expenses, or damages of any nature, including attorneys' fees, for injury to or death of any person, and for injury or damage to any property, including consequential damages of any nature resulting therefrom, arising out of or in any way connected with the performance of this Agreement. The defense obligation provided for hereunder shall apply without any advance showing of negligence or wrongdoing by the CONTRACTOR, its employees, and/or authorized subcontractors, but shall be required whenever any claim, action, complaint, or suit asserts as its basis the negligence, errors, omissions or misconduct of the CONTRACTOR, its employees, and/or authorized subcontractors, and/or whenever any claim, action, complaint or suit asserts liability against the CITY, its elected officials, officers, agents and employees based upon the work performed by the CONTRACTOR, its employees, and/or authorized subcontractors under this Agreement, whether or not the CONTRACTOR, its employees, and/or authorized subcontractors are specifically named or otherwise asserted to be liable. Notwithstanding the foregoing, the CONTRACTOR shall not be liable for the defense or indemnification of the CITY for claims, actions, complaints or suits arising out of the sole active negligence or willful misconduct of the CITY. This provision shall supersede and replace all other indemnity provisions contained either in the CITY's specifications or CONTRACTOR's proposal, which shall be of no force and effect.

CONTRACTOR shall comply with all of the provisions of the Workers' Compensation insurance laws and Safety in Employment laws of the State of California, including the applicable provisions of Divisions 4 and 5 of the California Labor Code and all amendments thereto and regulations promulgated pursuant thereto, and all similar State, Federal or local laws applicable; and CONTRACTOR shall indemnify and hold harmless CITY from and against all claims, liabilities, expenses, damages, suits, actions, proceedings and judgments, of every nature and description, including attorney fees, that may be presented, brought or recovered against CITY for or on account of any liability under or failure to comply with any of said laws which may be incurred by reason of any Work performed under this Agreement by CONTRACTOR or any subcontractor or others performing on behalf of CONTRACTOR.

CITY does not, and shall not, waive any rights against CONTRACTOR which it may have by reason of the above hold harmless agreements, because of the acceptance by CITY or the deposit with CITY by CONTRACTOR of any or all of the insurance policies described in Paragraph 21 (Insurance) of this Agreement.

The hold harmless agreements by CONTRACTOR shall apply to all liabilities, expenses, claims, and damages of every kind (including but not limited to attorneys' fees)

incurred or alleged to have been incurred, by reason of the operations of CONTRACTOR or any subcontractor or others performing on behalf of CONTRACTOR, whether or not such insurance policies are applicable. CONTRACTOR shall require any and all tiers of subcontractors to afford the same degree of indemnification to the CITY OF COSTA MESA and its elected and appointed boards, officers, agents, and employees that is required of CONTRACTOR and shall incorporate identical indemnity provisions in all contracts between CONTRACTOR and all tiers of its subcontractors.

In the event that CONTRACTOR and CITY are sued by a third party for damages caused or allegedly caused by negligent or other wrongful conduct of CONTRACTOR, or by a dangerous condition of CITY's property created by CONTRACTOR or existing while the property was under the control of CONTRACTOR, CONTRACTOR shall not be relieved of its indemnity obligation to CITY by any settlement with any such third party unless that settlement includes a full release and dismissal of all claims by the third party against the CITY.

21. INSURANCE.

(a) Minimum Scope and Limits of Insurance. CONTRACTOR shall not commence work under this Agreement until it has obtained all insurance required under this Paragraph 21 and CITY has approved the insurance as to form, amount, and carrier, nor shall CONTRACTOR allow any subcontractor to commence any Work until all similar insurance required of the subcontractor has been obtained and approved.

CONTRACTOR shall obtain, maintain, and keep in full force and effect during the life of this Agreement all of the following minimum scope of insurance coverages with an insurance company admitted to do business in California, rated "A," Class X, or better in the most recent Best's Key Insurance Rating Guide, and approved by CITY:

- (i) Commercial general liability, including premises-operations, products/completed operations, broad form property damage, blanket contractual liability, independent contractors, personal injury or bodily injury with a policy limit of not less than One Million Dollars (\$1,000,000.00) per occurrence. If such insurance contains a general aggregate limit, it shall apply separately to this Agreement or shall be twice the required occurrence limit.
- (ii) Business automobile liability for owned vehicles, hired, and non-owned vehicles, with a policy limit of not less than One Million Dollars (\$1,000,000.00) combined single limit per accident for bodily injury and property damage.
- (iii) Workers' compensation insurance as required by the State of California, with Statutory Limits, and Employer's Liability insurance with a limit of not less than One Million Dollars (\$1,000,000.00) per accident for bodily injury or disease. CONTRACTOR agrees to waive, and to obtain endorsements

from its workers' compensation insurer waiving subrogation rights under its workers' compensation insurance policy against the CITY, its officers, agents, employees, and volunteers arising from work performed by CONTRACTOR for the CITY and to require each of its subcontractors, if any, to do likewise under their workers' compensation insurance policies.

- (iv) Umbrella or excess liability insurance that will provide bodily injury, personal injury and property damage liability coverage at least as broad as the primary coverages set forth above, including commercial general liability, automobile liability, and employer's liability. Such policy or policies shall include the following terms and conditions:
 - (1) A drop down feature requiring the policy to respond in the event that any primary insurance that would otherwise have applied proves to be uncollectable in whole or in part for any reason;
 - (2) Pay on behalf of wording as opposed to reimbursement;
 - (3) Concurrency of effective dates with primary policies;
 - (4) Policies shall "follow form" to underlying primary policies; and
 - (5) Insureds under primary policies shall also be insureds under the umbrella or excess policies.

(b) Endorsements. The commercial general liability insurance policy and business automobile liability policy shall contain or be endorsed to contain the following provisions:

- (i) Additional insureds: The City of Costa Mesa and its elected and appointed boards, officers, officials, agents, employees, and volunteers are additional insureds with respect to: liability arising out of activities performed by or on behalf of the CONTRACTOR pursuant to its contract with the City; products and completed operations of the CONTRACTOR; premises owned, occupied or used by the CONTRACTOR; automobiles owned, leased, hired, or borrowed by the CONTRACTOR."
- (ii) Notice: "Said policy shall not terminate, nor shall it be canceled nor the coverage reduced, until thirty (30) days after written notice is given to CITY."
- (iii) Other Insurance: "CONTRACTOR's insurance coverage shall be primary insurance as respects the City of Costa Mesa, its officers, officials, agents, employees, and volunteers. Any other insurance maintained by the City of Costa Mesa shall be excess and not contributing with the insurance provided by this policy."

(c) Reporting Provisions. Any failure of CONTRACTOR to comply with the reporting provisions of the policies shall not affect coverage provided to the City of Costa Mesa, its officers, officials, agents, employees, and volunteers.

(d) Insurance Applies Separately. CONTRACTOR's insurance shall apply separately to each insured against whom claim is made or suit is brought, except with respect to the limits of the insurer's liability.

(e) Deductible or Self-Insured Retention. If any of such policies provide for a deductible or self-insured retention to provide such coverage, the amount of such deductible or self-insured retention shall be approved in advance by CITY. No policy of insurance issued as to which the CITY is an additional insured shall contain a provision which requires that no insured except the named insured can satisfy any such deductible or self-insured retention.

(f) Proof of Insurance. Prior to commencement of the Work, CONTRACTOR shall furnish CITY, through the Project Manager, proof of compliance with the above insurance requirements in a form satisfactory to City's Risk Management.

(g) Non-Limiting. Nothing in this Paragraph 21 shall be construed as limiting in any way, the indemnification provision contained in this Agreement, or the extent to which Consultant may be held responsible for payments of damages to persons or property.

(h) Exhibit E – Insurance. All certificates of insurance shall be attached hereto as Exhibit "E" and incorporated herein by this reference.

22. PREVAILING WAGE REQUIREMENTS.

(a) Prevailing Wage Laws. CONTRACTOR is aware of the requirements of Chapter 1 (beginning at Section 1720 et seq.) of Part 7 of Division 2 of the California Labor Code, as well as Title 8, Section 16000 et seq. of the California Code of Regulations ("Prevailing Wage Laws"), which require the payment of prevailing wage rates and the performance of other requirements on "public works" and "maintenance" projects. This Project is a "public works" project and requires compliance with the Prevailing Wage Laws. CONTRACTOR shall defend, indemnify and hold the CITY, its elected officials, officers, employees and agents free and harmless from any claim or liability arising out of any failure or alleged failure to comply with the Prevailing Wage Laws.

(b) Payment of Prevailing Wages. CONTRACTOR shall pay the prevailing wage rates for all work performed under this Agreement. When any craft or classification is omitted from the general prevailing wage determinations, CONTRACTOR shall pay the wage rate of the craft or classification most closely related to the omitted classification. A copy of the general prevailing wage rate determination is on file in the Office of the City Clerk and is incorporated into this Agreement as if fully set forth herein. CONTRACTOR shall post a copy of such wage rates at all times at the project site(s).

(c) Legal Working Day. In accordance with the provisions of Labor Code Section 1810 et seq., eight (8) hours is the legal working day. CONTRACTOR and any subcontractor(s) of CONTRACTOR shall comply with the provisions of the Labor Code regarding eight (8)-hour work day and 40-hour work week requirements, and overtime,

Saturday, Sunday, and holiday work. Work performed by CONTRACTOR's or any subcontractor's employees in excess of eight (8) hours per day, and 40 hours during any one week, must include compensation for all hours worked in excess of eight (8) hours per day, or 40 hours during any one week, at not less than one and one-half times the basic rate of pay. CONTRACTOR shall forfeit as a penalty to CITY Twenty-Five Dollars (\$25.00), or any greater penalty set forth in the Labor Code, for each worker employed in the execution of the Work by CONTRACTOR or by any subcontractor(s) of CONTRACTOR, for each calendar day during which such worker is required or permitted to the work more than eight (8) hours in one calendar day or more than 40 hours in any one calendar week in violation of the Labor Code.

(d) Apprentices. CONTRACTOR shall comply with the provisions of Labor Code Section 1777.5 concerning the employment of apprentices on public works projects. CONTRACTOR shall be responsible for ensuring compliance by its subcontractors with Labor Code Section 1777.5.

(e) Payroll Records. Pursuant to Labor Code Section 1776, CONTRACTOR and any subcontractor(s) shall keep accurate payroll records, showing the name, address, social security number, work classification, straight time and overtime hours worked each day and week, and the actual per diem wages paid to each journeyman, apprentice, worker, or other employee employed by CONTRACTOR or any subcontractor in connection with this Agreement. Each payroll record shall contain or be verified by a written declaration that it is made under penalty of perjury, stating both of the following: (1) The information contained in the payroll record is true and correct; and (2) The employer has complied with the requirements of Sections 1771, 1881, and 1815 of the Labor Code for any work performed by his or her employees on this Project. The payroll records shall be certified and shall be available for inspection at all reasonable hours in accordance with the requirements of Labor Code Section 1776. CONTRACTOR shall also furnish each week to CITY's Project Administration Division a statement with respect to the wages of each of its employees during the preceding weekly payroll period.

(f) Registration with DIR. CONTRACTOR and any subcontractor(s) of CONTRACTOR shall comply with the provisions of Labor Code Section 1771 and Labor Code Section 1725.5 requiring registration with the DIR.

23. COMPLIANCE WITH ALL LAWS.

CONTRACTOR shall, at its own cost and expense, comply with all applicable local, state, and federal laws, regulations, and requirements in the performance of this Agreement, including but not limited to laws regarding health and safety, labor and employment, and wage and hours.

24. DRUG-FREE WORKPLACE POLICY.

CONTRACTOR, upon notification of the award of this Agreement, shall establish a Drug-Free Awareness Program to inform employees of the dangers of drug abuse in

the workplace, the penalties that may be imposed upon employees for drug abuse violations occurring in the workplace, and the employee assistance programs available to employees. Each employee engaged in the performance of a CITY contract must be notified of this Drug-Free Awareness Program, and must abide by its terms. CONTRACTOR shall conform to all the requirements of CITY's Policy No. 100-5, attached hereto. Failure to establish a program, notify employees, or inform the CITY of a drug-related workplace conviction will constitute a material breach of contract and cause for immediate termination of the contract by the CITY.

25. NON-DISCRIMINATION.

In performing this Agreement, CONTRACTOR will not engage in, nor permit its agents to engage in, discrimination in employment of persons because of their race, religion, color, national origin, ancestry, physical handicap, medical condition, marital status or sex, or sexual orientation, except as permitted pursuant to Section 12940 of the Government Code. Violation of this provision may result in the imposition of penalties referred to in Section 1735 of the California Labor Code.

26. PROVISIONS CUMULATIVE.

The provisions of this Agreement are cumulative and in addition to, and not in limitation of, any other rights or remedies available to CITY.

27. NOTICES.

It shall be the duty and responsibility of CONTRACTOR to notify all tiers of subcontractors and material men of the following special notice provision; namely, all preliminary 20-day notices or stop notices shall be directed only to the City Clerk and to no other department, and shall be either personally delivered or sent by certified mail, postage prepaid.

All other notices shall be in writing and delivered in person or sent by certified mail, postage prepaid. Notices required to be given to CITY pursuant to this Agreement shall be addressed as follows:

City of Costa Mesa
77 Fair Drive
Costa Mesa, CA 92626
Attn: Soriano Yang

Notices required to be given to CONTRACTOR shall be addressed as follows:

Caliba Inc.
8031 Main Street
Stanton, CA 90680
Attn: Adam Othman

Notices required to be given to CONTRACTOR's sureties shall be addressed as follows:

EMC Insurance Companies
717 Mulberry Street
P.O. Box 712
Des Moines, IA 50306-0712

28. INDEPENDENT CONTRACTOR.

The parties hereto acknowledge and agree that the relationship between CITY and CONTRACTOR is one of principal and independent contractor and no other. All personnel to be utilized by CONTRACTOR in the performance of this Agreement shall be employees of CONTRACTOR and not employees of the CITY. CONTRACTOR shall pay all salaries and wages, employer's social security taxes, unemployment insurance and similar taxes relating to employees and shall be responsible for all applicable withholding taxes. Nothing contained in this Agreement shall create or be construed as creating a partnership, joint venture, employment relations, or any other relationship except as set forth between the parties. The parties specifically acknowledge and agree that CONTRACTOR is not a partner with CITY, whether general or limited, and no activities of CITY or CONTRACTOR or statements made by CITY or CONTRACTOR shall be interpreted by any of the parties hereto as establishing any type of business relationship other than an independent contractor relationship.

29. PERS ELIGIBILITY INDEMNIFICATION.

In the event that CONTRACTOR or any employee, agent, or subcontractor of CONTRACTOR providing services under this Agreement claims or is determined by a court of competent jurisdiction or the California Public Employees' Retirement System (PERS) to be eligible for enrollment in PERS as an employee of the CITY, CONTRACTOR shall indemnify, defend, and hold harmless CITY for the payment of any employee and/or employer contributions for PERS benefits on behalf of CONTRACTOR or its employees, agents, or subcontractors, as well as for the payment of any penalties and interest on such contributions, which would otherwise be the responsibility of CITY.

Notwithstanding any other agency, state or federal policy, rule, regulation, law or ordinance to the contrary, CONTRACTOR and any of its employees, agents, and subcontractors providing service under this Agreement shall not qualify for or become entitled to, and hereby agree to waive any claims to, any compensation, benefit, or any incident of employment by CITY, including but not limited to eligibility to enroll in PERS as an employee of CITY and entitlement to any contribution to be paid by CITY for employer contribution and/or employee contributions for PERS benefits.

30. VALIDITY.

The invalidity in whole or in part of any provision of this Agreement shall not void or affect the validity of any of the other provisions of this Agreement.

31. GOVERNING LAW.

This Agreement shall be governed by and construed in accordance with the laws of the State of California. Any legal action relating to or arising out of this Agreement shall be subject to the jurisdiction of the County of Orange, California.

32. NO THIRD PARTY BENEFICIARY RIGHTS.

This Agreement is entered into for the sole benefit of the CITY and CONTRACTOR and no other parties are intended to be direct or incidental beneficiaries of this Agreement and no third party shall have any right in, under or to this Agreement.

33. ASSIGNABILITY.

This Agreement may not be transferred or assigned by either party, or by operation of law, to any other person or persons or business entity, without the other party's written permission. Any such transfer or assignment, or attempted transfer or assignment, without written permission, may be deemed by the other party to constitute a voluntary termination of this Agreement and this Agreement shall thereafter be deemed terminated and void.

34. WAIVER.

No waiver of any provision of this Agreement shall be effective unless in writing and signed by a duly authorized representative of the party against whom enforcement of a waiver is sought referring expressly to this Paragraph. The waiver of any right or remedy in respect to any occurrence or event shall not be deemed a waiver of any right or remedy in respect to any other occurrence or event, nor shall any waiver constitute a continuing waiver.

35. HEADINGS.

Section and subsection headings are not to be considered part of this Agreement, are included solely for convenience, and are not intended to modify or explain or to be a full or accurate description of the content thereof.

36. CONSTRUCTION.

The parties have participated jointly in the negotiation and drafting of this Agreement and have had an adequate opportunity to review each and every provision of the Agreement and submit the same to counsel or other consultants for review and comment. In the event an ambiguity or question of intent or interpretation arises with respect to this Agreement, this Agreement shall be construed as if drafted jointly by the parties and in accordance with its fair meaning. There shall be no presumption or burden of proof favoring or disfavoring any party by virtue of the authorship of any of the

provisions of this Agreement.

37. COUNTERPARTS.

This Agreement may be executed in one or more counterparts by the parties hereto. All counterparts shall be construed together and shall constitute one Agreement.

38. CORPORATE AUTHORITY.

The persons executing this Agreement on behalf of the parties hereto warrant that they are duly authorized to execute this Agreement on behalf of said parties and that by doing so, the parties hereto are formally bound to the provisions of this Agreement.

[Signature page follows.]

IN WITNESS WHEREOF, the parties hereto have caused this Agreement to be executed by and through their respective authorized officers, as of the date first above written.

CONTRACTOR



Adam Othman, President & CEO

Date: 7-2-24



Arleene Vargas, Corporate Secretary

Date: 7/2/2024

CITY OF COSTA MESA

A municipal corporation



Lori Ann Farrell Harrison
City Manager

Date: 7/18/2024

ATTEST:

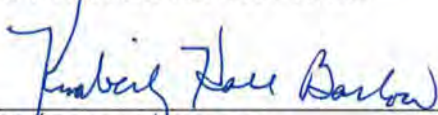


Brenda Green
City Clerk



Date: 7/22/2024

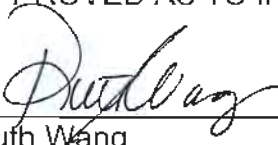
APPROVED AS TO FORM:



Kimberly Hall Barlow
City Attorney

Date: 7/16/24

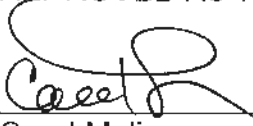
APPROVED AS TO INSURANCE:



Ruth Wang
Risk Management

Date: 7/8/24

APPROVED AS TO PURCHASING:



Carol Molina
Finance Director


Date: July 11, 2024

DEPARTMENTAL APPROVAL:



Raja Sethuraman
Public Works Director

Date: 7-3-24



Hector Soriano
Project Manager

Date: 07/03/24

EXHIBIT A
CONTRACTOR'S BID

SECTION C

PROPOSAL FOR THE FIRE STATION 4 TRAINING FACILITY (SITE IMPROVEMENTS) CITY PROJECT NO. 23-04

The Honorable City Council
City of Costa Mesa
77 Fair Drive
Costa Mesa, CA 92626

Dear Council Members:

In compliance with the NOTICE INVITING BIDS FOR THE FIRE STATION 4 – TRAINING FACILITY PROJECT (2300 PLACENTIA AVE, COSTA MESA), CITY PROJECT NO. 23-04, a copy which is hereto attached, the undersigned has carefully examined the location of the proposed Work, the Plans, Specifications and other Contract Documents and is therefore satisfied as to the conditions to be encountered, as to the character, quality and quantity of work to be performed and materials to be furnished and as to the requirements of the specifications and the Contract. It is mutually agreed that the submission of a proposal shall be considered prima facie evidence that the BIDDER has made such examination.


If awarded the Contract, the undersigned agrees to commence the Work under the Contract **WITHIN TEN (10) WORKING DAYS AFTER DATE OF CONTRACT, AND COMPLETE SAID WORK WITHIN ONE HUNDRED AND EIGHTY (180) WORKING DAYS** from the first day of commencement of such work unless legal extension is granted in accordance with the terms set forth in the specifications, and to perform and complete the Work in accordance with the Specifications and other Contract Documents, and to furnish all labor, materials, tools and equipment necessary to complete the work in-place therefor, in the manner and time herein prescribed at the following prices, to wit:

To minimize impacts on day-to-day operations of the project site, the Contractor shall submit and receive approval on proposed concrete mix design, water recirculation system, tower electrical components and solar panel system submittals, and arrange for and order all materials for the upgrades within the 22 working days following award of contract and store the materials in an exterior location as designated by the City prior to the start of construction. Contractor is responsible for protection and security of all materials.

PROPOSAL SCHEDULE				
ITEM	Description	QUANTITY	UNIT	TOTAL AMOUNT
1	Fire Station No. 4 Training Facility (Site Improvements) *	1	LS	\$ <u>3,286,000.00</u>
2	Additional Work Items as directed by the Engineer**	1	FA	\$200,000
TOTAL BID				\$ <u>3,486,000.00</u>

* Price includes all indirect costs and markups for work identified in the plans and specifications.

** Allowance is identified in Special Provisions SP-06-Allowance. Allowance as set forth in the Contract Documents is to be used as compensation for items as set forth in the Special Provisions. The Allowance amount is to be included in the total project bid.


Bidder's Initials

The CITY reserves the right to reject all Bids.

Contractor's Lawful Name Caliba Inc.


Total written amount for Bid (using words):

\$ Three Million Four Hundred Eighty Six Thousand Dollars & 00/100.- only

Total amount for Bid (using numeric format):

\$ 3,486,000.00

NOTE: A mandatory pre-bid job walk of the existing site is required. Bids will not be accepted from any contractor who does not attend the mandatory pre-bid job walk.


Bidder's Initials

**PROPOSAL BID SCHEDULE
(CONTINUED)**

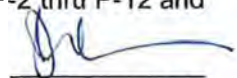
NOTES:

1. The accuracy of estimate quantities as shown is not guaranteed; the Bidder shall make his/her own estimate from the drawings and field review for verification. If the unit price and the total amount are different, the unit price will control the bid. Payment shall be based on actual work done and/or actual quantities used.
2. The City reserves the right to delete one or more bid items and/or to increase or decrease bid items' quantities, at no additional cost to the City.
3. (*) A Schedule of Values shall be submitted for review and approval before 4:00 PM on the 4th business days following the contract award. Business days exclude Saturday, Sunday, and City Holidays. Prices shall include indirect costs and markup. Upon request, the Contractor shall provide additional break down of the schedule of values.
4. (**) Allowance is for unforeseen work not included in the contract documents and to be included in the total bid amount as identified as follows. Use of the allowance will be at the sole discretion of the City and must be authorized in writing at the discretion of the City. This Bid item will cover unforeseen work that is not included in the contract documents. Any money used from the project allowance will be authorized via an Allowance Disbursement Form at the City's sole discretion. Any amount of money remaining in the Allowance line item upon completion of the Project will be deducted from the Contract by Deductive Change Order for the full amount(s) remaining therein. The Contractor has no beneficial interest in, and/or claim to, the Allowance and hereby disclaims any and all such interests.
5. (FA) designates force account. Payment shall be made on a time and materials basis, only if directed by the ENGINEER.
6. (F) Designates Final Pay Item. When an item of work is designated as "FINAL PAY ITEM" in the Specifications, the estimated quantity for that item of work shall be the final pay quantity, unless the dimensions of any portion of that item are revised by the Engineer, or the item or any portion of the item is eliminated. If the dimensions of any portion of the item are revised, and the revisions result in an increase or decrease in the estimated quantity of that item of work, the final pay quantity for the item will be revised in the amount represented by the changes in the dimensions. If a final pay item is eliminated, the estimated quantity for the item will be eliminated. If a portion of a final pay item is eliminated, the final pay quantity will be revised in the amount represented by the eliminated portion of the item of work.

The estimated quantity for each item of work designated as "FINAL PAY ITEM" in the Specifications, shall be considered as approximate only, and no guarantee is made that the quantity which can be determined by computations, based on the details and dimensions shown on the plans, will equal the estimated quantity. No allowance will be made in the event that the quantity based on computations does not equal the estimated quantity.

In case of discrepancy between the quantity shown in the Engineer's Estimate for a final pay item and the quantity or summation of quantities for the same item shown on the plans, payment will be based on the quantity shown in the Engineer's Estimate.

7. Bidder agrees to initial or notarize (if applicable) all pages on P-1, P-1a, P-1b, P-2 thru P-12 and uploaded onto PlanetBids.


Bidder's Initials

**PROPOSAL SCHEDULE
(CONTINUED)**

(Please Type or Print)

Total Amount for Bid (in written words) Three Million Four Hundred Eighty Six Thousand ^{900/100}
(\$ 3,486,000.00) in figures

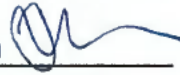
Contractor's Lawful Name: Caliba Inc.

Bidder's Name: Adam Othman Bidder's Initials: 

Contractor's License No. 657694 Expiration: 6/30/2025

Contractor's Taxpayer I.D. Number: [REDACTED]

Contractor's DIR Registration Number: 1000041461

Signature: Adam Othman  Date: 2/15/2024

Contractor's Address: 8031 Main Street
Stanton, CA 90680

Telephone Number: (714) 886-2887 Mobile No.: [REDACTED]

Fax Number: () N/A E-mail: bidding@calibainc.com

24-Hour Emergency Contacts:

Adam Othman
Name

Telephone Number: (714) 886-2887

Mobile No.: [REDACTED]

Jonathon Kliora
Name


Telephone No.: (714) 886-2887

Mobile No.: [REDACTED]

Arleene Vargas
Name

Telephone No.: (714) 886-2887

Mobile No.: [REDACTED]


Bidder's Initials

PROPOSAL SCHEDULE

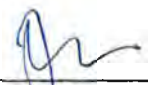
(CONTINUED)

The Contractor agrees that the City will not be held responsible if any of the approximate quantities shown in the foregoing proposal shall be found incorrect, and he shall not make any claim for damages or for loss of profits because of a difference between the quantities of the various classes of work as estimated and the work actually done. If any error, omission or misstatements shall be discovered in the estimated quantities, it shall not invalidate this contract or release the Contractor from the execution and completion of the whole or part of the work herein specified, in accordance with the specifications and the plans herein mentioned and the prices herein agreed upon and fixed therefore, or excuse him from any of the obligations or liabilities hereunder, or entitle him to any damages or compensation otherwise than as provided for in this contract.

The Contractor agrees that the City shall have the right to increase or decrease the quantity of any bid item or portion of the work or to omit portions of the work as may be deemed necessary or expedient, and that the payment for incidental items or work, not separately provided in the proposal shall be considered included in the price bid for other various items or work.

Accompanying this proposal is "Cash," "Certified Check," or "Bidder's Bond" (circle one) submitted physically to the City Clerk's Office in the amount of Ten Percent of Bid Amount (\$ 10%) equal to at least ten (10%) percent of the total bid price, payable to the City of Costa Mesa, to guarantee that within fourteen (14) days after written notice is deposited in the mail, or the bidder has received notice by telephone, the bidder will furnish proper Certificates of Insurance, and required bonds satisfactory to the City and execute a contract in accordance with the proposal and in the manner and form required by the contract documents.

The undersigned deposits the above-named security as a proposal guarantee and agrees that it shall be forfeited to the City of Costa Mesa as Liquidated Damages if the above requirements are not complied with.


Bidder's Initials
PROPOSAL

Respectfully Submitted,

Caliba Inc.
 Contractor's Business Name
8031 Main Street
 Business Address: Street
Stanton CA 90680
 City State Zip
714-886-2887
 Business Phone Number
Adam Othman President/CEO
 Name Title
Stanton CA 90680
 City State Zip

Adam Othman President/CEO
 Contractor Title
Adam Othman President/CEO
 Signed By Title
#657694 B, C10 6/30/2025
 Contractor's License No. and Classification Exp. Date
2/15/2024
 Date
 [Redacted]
 Residence: Street
 [Redacted]
 Residence phone Number

If the bid is by a corporation, state the names of the officers who can sign an agreement on behalf of the corporation and whether more than one officer must sign.

Corporation

Taxpayer I.D. Number [Redacted]

Name Adam Othman
 Name N/A
 Name N/A

Can Sign

Must Sign

If the bid is by a partnership or a joint venture, state the names and addresses of all general partners and joint ventures. N/A

Partnership or Joint Ventures

Taxpayer I.D. Number: _____

Name N/A
 Address N/A
 Name N/A
 Address N/A

If the bidder is a sole proprietorship or another entity that does business under a fictitious name, the bid shall be in the real name of the bidder with a designation following showing "DBA (the fictitious name)"; provided, however, no fictitious name shall be used unless there is a current registration with the Orange County Recorder. N/A

The full names and residences of all persons and parties interested in the foregoing proposal, as principals, are as follows:

NOTE: Give first and last names in full; in case of corporation, give names of President, Secretary, Treasurer and Manager, and affix corporate seal; in case of partnerships and joint ventures, give names of all the individual members.

Caliba Inc.
Adam Othman, President/CEO,
Treasurer, Manager

Arleene B Vargas, Secretary


 Bidder's Initials

ADDENDA

Bidder shall signify receipt of all Addenda here, if any:

<u>Addendum No.</u>	<u>Date Received</u>	<u>Bidder's Signature</u>
1	2/06/2024	Adam Othman
2	2/07/2024	Adam Othman

CONSTRUCTION PROJECT REFERENCES

In order to more fully evaluate your firm's background and experience for the project herein proposed, it is requested that you submit a list of Public Works and/or similar construction projects completed, or in progress, within the last 36 months. This information will be used to evaluate whether the bid is responsive and or responsible to the call for bids.

Project Name	Award Date	Awarding Agency	Contract Value	Agency's Contract Administrator Contact Information
COMPLETED PROJECTS				
Jean Hayman Site Ph. 2, Remodel of Bldgs. 3 & 4	6/17/2021	Lake Elsinore Unified School District	\$2,243,978.00	Francine Vaccarino, Purchasing Supervisor francine.vaccarino@leusd.k12.ca.us
MiraCosta College Building 1000 Adm. Bldg.	05/21/2021	MiraCosta Community College District	\$7,738,579.00	Amer Alhgam, Construction Manager aalhgam@eci-team.com
Leuzinger HS Athletic Fields BP-01	09/07/2021	Centinela Valley Union High School District	\$2,701,229.08	Daniel Juarez, Construction Manager djuarez@lelacu.com
OCN Strong Workforce Computer Lab Project	03/29/2021	MiraCosta Community College District	\$ 329,485.00	Amer Alhgam, Construction Manager aalhgam@eci-team.com
OCN Media Services Modular Bldg. Site Work	01/08/2021	MiraCosta Community College District	\$ 204,767.38	Amer Alhgam, Construction Manager aalhgam@eci-team.com
Whittier Central Library Remodel-BP12, Misc.Specialties	03/12/2020	City of Whittier	\$ 548,464.00	Alfredo Hernandez, City Engineer ahernandez@cityofwhittier.org
Electric Vehicle Charging Stations at Garden Grove & Santa Ana Bus Bases	06/18/2020	Orange County Transportation Authority	\$1,907,680.90	Brianna Arquette, Construction Manager barquette@octa.net

IN PROGRESS:

Suzanne MS New Music Bldg. & New Locker Bldg.	12/14/2023	Walnut Valley Unified School District	\$7,720,000.00	Suzanne Beach, Director of Purchasing sbeach@wvusd.org



Bidder's Initials

DESIGNATION OF SUBCONTRACTORS

In compliance with the "Subletting and Subcontracting Fair Practices Act" being Sections 4100-4113 of the Public Contract Code of the State of California, and any amendments thereto, each bidder shall set forth below the name and location of the place of business of each subcontractor who will perform work or labor or render service to the prime contractor in or about the construction of the work or improvement in an amount in excess of one-half (1/2) of one percent (1%) of the prime contractor's total bid or in the case of bids for the construction of streets or highways, including bridges, in excess of one-half (1/2) of one percent (1%) of the prime contractor's total bid or ten thousand (\$10,000) dollars, whichever is greater. Bidder shall further set forth the portion of the work, which will be done by each such subcontractor with its Department of Industrial Relations (DIR) registration number. Only one subcontractor for each such portion shall be listed.

If the contractor fails to specify a subcontractor for any portion of the work to be performed under the contract, he/she/it shall be deemed to have agreed to perform the balance of all work, which is not covered, and he/she/it shall not be permitted to subcontract that portion of the work except under the conditions hereinafter set forth.


Subletting or subcontracting of any portion of the work to which no subcontractor was designated in the original bid, shall only be permitted in cases of public emergency or necessity, and then only after a finding reduced to writing as a public record of the Legislative Body of the Owner.

All information must be filled out and typed. Please use additional pages in this format if needed.

Scope of Work	Name and Address of Subcontractor	State License Number	Classification
QUARTZ FLOORING	DIAMOND CRETE CONCRETE COATINGS INC. 671 E. COOLEY DR., STE 117 COLTON, CA 92324	#1067348	C15, B
APARTMENT & DEMO	NH ENVIRONMENTAL INC. 229 N. CALIFORNIA AVE. CITY OF INDUSTRY, CA 91744	#984458	C21, C22 B, A
PORCELAIN TILE	CONTINENTAL MARBLE & TILE COMPANY 2440 ANSELMO DR. CORONA, CA 92879	#394	C34
TOILET ACCESSORIES	STUMBAUGH ASSOCIATES INC. 3303 N. SAN FERNANDO BLVD. PURBANK, CA 91504	#288724	C61/D24 C61/D34

By submission of this proposal, the Bidder certifies:

1. That I/(we)/(it) is able to and will perform the balance of all work which is not covered in the above subcontractors listing.


Bidder's Initials

DESIGNATION OF SUBCONTRACTORS

In compliance with the "Subletting and Subcontracting Fair Practices Act" being Sections 4100-4113 of the Public Contract Code of the State of California, and any amendments thereto, each bidder shall set forth below the name and location of the place of business of each subcontractor who will perform work or labor or render service to the prime contractor in or about the construction of the work or improvement in an amount in excess of one-half (1/2) of one percent (1%) of the prime contractor's total bid or in the case of bids for the construction of streets or highways, including bridges, in excess of one-half (1/2) of one percent (1%) of the prime contractor's total bid or ten thousand (\$10,000) dollars, whichever is greater. Bidder shall further set forth the portion of the work, which will be done by each such subcontractor with its Department of Industrial Relations (DIR) registration number. Only one subcontractor for each such portion shall be listed.

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Subletting or subcontracting of any portion of the work to which no subcontractor was designated in the original bid, shall only be permitted in cases of public emergency or necessity, and then only after a finding reduced to writing as a public record of the Legislative Body of the Owner.

All information must be filled out and typed. Please use additional pages in this format if needed.

Scope of Work	Name and Address of Subcontractor	State License Number	Classification
PV SYSTEM	SOLAR POWER SUPPLY INC 2000 MAGNOLIA AVE. STE. 100A RIVERSIDE, CA 92503	#1008748	XS
CONCRETE, REBAR, STEEL	MEYDEN CONTRACTING 19152 SHORELINE LN. UNIT 6 HUNTINGTON BEACH, CA 92648	#1110191	XS

By submission of this proposal, the Bidder certifies:

1. That I(we)(it) is able to and will perform the balance of all work which is not covered in the above subcontractors listing.



Bidder's Initials

CONTRACT ASSURANCE

The CONTRACTOR 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 will require that the above provision is included in all subcontracts.


Bidder's Initials

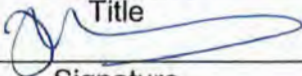
NONCOLLUSION AFFIDAVIT

The bidders, by its officers and agents or representatives present at the time of filing this bid, being duly sworn on their oaths say, that neither they nor any of them have in any way directly or indirectly entered into any arrangement or agreement with any other bidder, or with any public officer of such CITY OF COSTA MESA whereby such affiant or affiants or either of them has paid or is to pay to such bidder or public officer any sum of money, or has given or is to give to such other bidder or public officer anything of value whatever, or such affiant or affiants or either of them has not directly or indirectly, entered into any arrangement or agreement with any other bidder or bidders, which tends to or does lessen or destroy free competition in the letting of the contract sought for on the attached bids; that no bid has been accepted from any subcontractor or supplier through any bid depository, the By-Laws, Rules, or Regulations of which prohibit or prevent the Contractor from considering any bid from any subcontractor or supplier which is not processed through said bid depository, or which prevent any subcontractor or supplier from bidding to any Contractor who does not use the facilities or accept bids from or through such bid depository; that bidder has not bid as subcontractor to other bidders; that no inducement of any form or character other than that which appears upon the face of the bid will be suggested, offered, paid or delivered to any person of the contract, nor has this bidder any agreement or understanding of any kind whatsoever, with any person whomsoever to pay, deliver to, or share with any other person in any way or manner, any of the proceeds of the contracts sought by this bid.

Caliba Inc.

Contractor Firm Name
Adam Othman

Name of Principal
President/CEO

Title


Signature

Subscribed and sworn to before me by:

See attached for Notary.

This ____ day of _____, 20__.

My Commission Expires: _____

Notary Public



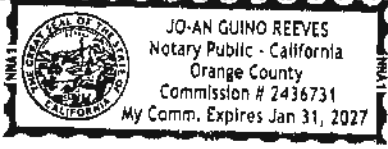
Bidder's Initials

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

State of California
County of Orange

Subscribed and sworn to (or affirmed) before me on this 12th
day of February, 2024, by Adam Othman

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




(Seal)

Signature *J Reeves*


**CONTRACTOR'S CERTIFICATION
OF
WORKERS' COMPENSATION INSURANCE REQUIREMENTS
FOR
PUBLIC WORKS PROJECTS
(Labor Code §1861)**

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

Dated: 2/15/2024

CONTRACTOR 
Adam Othman, President/CEO
Caliba Inc.
Company Name

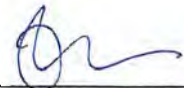
PROJECT: FIRE STATION 4 – TRAINING FACILITY (SITE IMPROVEMENTS) NO. 23-04


Bidder's Initials

DRUG-FREE WORKPLACE POLICY

CONTRACTOR, upon notification of contract award, shall establish a Drug-Free Awareness Program to inform employees of the dangers of drug abuse in the workplace, the penalties that may be imposed upon employees for drug abuse violations occurring in the workplace, and the employee assistance programs available to employees. Each employee engaged in the performance of a CITY contract must be notified of this Drug-Free Awareness Program, and must abide by its terms. Failure to establish a program, notify employees, or inform CITY of a drug-related workplace conviction will constitute a material breach of contract and cause for immediate termination of the contract by CITY.

CONTRACTOR shall conform to all the requirements of CITY'S Policy No. 100-5. A copy of this policy is attached to the sample contract agreement as an attachment in the Project Specifications.



Bidder's Initials



CITY OF COSTA MESA

P.O. BOX 12000 77 FAIR DRIVE CALIFORNIA 92628-1200

FROM THE DEPARTMENT OF PUBLIC WORKS/ ENGINEERING DIVISION

DATE: February 2, 2024

TO: ALL PROSPECTIVE BIDDERS

SUBJECT: ADDENDUM NO. 1: FIRE STATION NO. 4 - TRAINING FACILITY (SITE IMPROVEMENTS) - CITY PROJECT NO. 23-04

Please forward this addendum to the appropriate individual as soon as possible. To assist our office in confirming the delivery of this addendum, please sign acknowledging receipt herein and e-mail a copy of this sheet to Janet.Zuazo@costamesaca.com. **A COPY WILL NOT BE SENT BY MAIL.**

Received by: Adam Othman 

Company: Caliba Inc.

All bidders shall register with PlanetBids.com in order to retrieve addenda. It is the responsibility of each prospective bidder to check the City's PlanetBids.com portal at: <https://www.planetbids.com/portal/portal.cfm?CompanyID=45476> on a DAILY basis through the close of bids for any applicable addenda or updates.

This addendum, effective on this date, addresses the following items:

MANDATORY PRE-BID JOB WALK DATE: 10:30 A.M., Monday, January 23rd, 2024. **COMPLETE**

PLANET BIDS OPENING DATE: 2:00 P.M., Tuesday, February 13th, 2024. **NO CHANGE**

CLARIFICATIONS TO PROPOSAL:

The Building Approved Plans and WQMP for Fire Station No. 4 Training Facility (Site Improvements) at 2300 Placentia Av. Costa Mesa have been uploaded to Planet Bids.

Revisions and subsequent changes have been made to the Plans and WQMP as part of Addendum No. 1 dated 01/29/24.

Please acknowledge receipt of the attached Addendum #1 specification changes on the Proposal Page "P-5" in your bid submittal and by email per instruction in the first page of this addendum.

- Attachment 1: Stamped Fire Station 4_Training Facility Plans (Site Improvements)
- Attachment 2: Stamped WQMP



Hector Soriano
Associate Engineer

Janet Zuazo 2/02/24
RESENT 2/02/24



CITY OF COSTA MESA

P.O. BOX 12000 77 FAIR DRIVE CALIFORNIA 92628-1200

FROM THE DEPARTMENT OF PUBLIC WORKS/ ENGINEERING DIVISION

DATE: February 6, 2024

TO: ALL PROSPECTIVE BIDDERS

SUBJECT: ADDENDUM NO. 2: FIRE STATION NO. 4 - TRAINING FACILITY (SITE IMPROVEMENTS) - CITY PROJECT NO. 23-04

Please forward this addendum to the appropriate individual as soon as possible. To assist our office in confirming the delivery of this addendum, please sign acknowledging receipt herein and e-mail a copy of this sheet to Janet.Zuazo@costamesaca.com. **A COPY WILL NOT BE SENT BY MAIL.**

Received by: Adam Othman 

Company: Caliba Inc.

All bidders shall register with PlanetBids.com in order to retrieve addenda. It is the responsibility of each prospective bidder to check the City's PlanetBids.com portal at: <https://www.planetbids.com/portal/portal.cfm?CompanyID=45476> on a DAILY basis through the close of bids for any applicable addenda or updates.

This addendum, effective on this date, addresses the following items:

MANDATORY PRE-BID JOB WALK DATE: 10:30 A.M., Monday, January 23rd, 2024. **COMPLETE**

PLANET BIDS OPENING DATE: 4:00 P.M., Thursday, February 15th, 2024. **EXTENDED**

CLARIFICATIONS TO PROPOSAL:

Revisions, additions, and subsequent changes have been made to the Plans, Asbestos and Lead-Based Paint and Lead-Glazed Ceramic Tile Survey Report and Project Specifications as part of Addendum No. 2 dated 02/06/24. Changes for Fire Station No. 4 Training Facility (Site Improvements) at 2300 Placentia Av. Costa Mesa have been uploaded to Planet Bids and include the summary of changes below:

1. TECHNICAL SPECIFICATIONS

- 1.1 SECTION 01 33 00 – SUBMITTAL PROCEDURES
 - A. Article 1.15, Paragraph A: Change Item 1 to read "PV System".
 - B. Article 1.15, Paragraph A: Delete Items 2 and 3.
- 1.2 SECTION 02 41 16 – BUILDING DEMOLITION
 - C. Add the attached Section 02 41 16 in its entirety.
- 1.3 SECTION 02 41 19 – SELECTIVE DEMOLITION
 - A. Add the attached Section 02 41 19 in its entirety.
- 1.4 SECTION 02 80 00 – FACILITY REMEDIATION
 - A. Add the attached Section 02 80 00 in its entirety.

7
2/07/2024
Janet Zuazo
RESENT 2/08
JANET ZUAZO @
COSTAMESACA.GOV



CITY OF COSTA MESA

P.O. BOX 12000 77 FAIR DRIVE CALIFORNIA 92628-1200

FROM THE DEPARTMENT OF PUBLIC WORKS/ ENGINEERING DIVISION

DATE: February 2, 2024

TO: ALL PROSPECTIVE BIDDERS

SUBJECT: ADDENDUM NO. 1: FIRE STATION NO. 4 - TRAINING FACILITY (SITE IMPROVEMENTS) - CITY PROJECT NO. 23-04

Please forward this addendum to the appropriate individual as soon as possible. To assist our office in confirming the delivery of this addendum, please sign acknowledging receipt herein and e-mail a copy of this sheet to Janet.Zuazo@costamesaca.com. **A COPY WILL NOT BE SENT BY MAIL.**

Received by: Adam Othman 

Company: Caliba Inc.

All bidders shall register with PlanetBids.com in order to retrieve addenda. It is the responsibility of each prospective bidder to check the City's PlanetBids.com portal at: <https://www.planetbids.com/portal/portal.cfm?CompanyID=45476> on a DAILY basis through the close of bids for any applicable addenda or updates.

This addendum, effective on this date, addresses the following items:

MANDATORY PRE-BID JOB WALK DATE: 10:30 A.M., Monday, January 23rd, 2024. **COMPLETE**

PLANET BIDS OPENING DATE: 2:00 P.M., Tuesday, February 13th, 2024. **NO CHANGE**

CLARIFICATIONS TO PROPOSAL:

The Building Approved Plans and WQMP for Fire Station No. 4 Training Facility (Site Improvements) at 2300 Placentia Av. Costa Mesa have been uploaded to Planet Bids.

Revisions and subsequent changes have been made to the Plans and WQMP as part of Addendum No. 1 dated 01/29/24.

Please acknowledge receipt of the attached Addendum #1 specification changes on the Proposal Page "P-5" in your bid submittal and by email per instruction in the first page of this addendum.

Attachment 1: Stamped Fire Station 4_Training Facility Plans (Site Improvements)

Attachment 2: Stamped WQMP



Hector Soriano
Associate Engineer



CITY OF COSTA MESA

P.O. BOX 12000 77 FAIR DRIVE CALIFORNIA 92628-1200

FROM THE DEPARTMENT OF PUBLIC WORKS/ ENGINEERING DIVISION

DATE: February 6, 2024

TO: ALL PROSPECTIVE BIDDERS

SUBJECT: ADDENDUM NO. 2: FIRE STATION NO. 4 - TRAINING FACILITY (SITE IMPROVEMENTS) - CITY PROJECT NO. 23-04

Please forward this addendum to the appropriate individual as soon as possible. To assist our office in confirming the delivery of this addendum, please sign acknowledging receipt herein and e-mail a copy of this sheet to Janet.Zuazo@costamesaca.com. **A COPY WILL NOT BE SENT BY MAIL.**

Received by: Adam Othman

Company: Caliba Inc.

All bidders shall register with PlanetBids.com in order to retrieve addenda. It is the responsibility of each prospective bidder to check the City's PlanetBids.com portal at: <https://www.planetbids.com/portal/portal.cfm?CompanyID=45476> on a DAILY basis through the close of bids for any applicable addenda or updates.

This addendum, effective on this date, addresses the following items:

MANDATORY PRE-BID JOB WALK DATE: 10:30 A.M., Monday, January 23rd, 2024. **COMPLETE**

PLANET BIDS OPENING DATE: 4:00 P.M., Thursday, February 15th, 2024. **EXTENDED**

CLARIFICATIONS TO PROPOSAL:

Revisions, additions, and subsequent changes have been made to the Plans, Asbestos and Lead-Based Paint and Lead-Glazed Ceramic Tile Survey Report and Project Specifications as part of Addendum No. 2 dated 02/06/24. Changes for Fire Station No. 4 Training Facility (Site Improvements) at 2300 Placentia Av. Costa Mesa have been uploaded to Planet Bids and include the summary of changes below:

1. TECHNICAL SPECIFICATIONS

- 1.1 SECTION 01 33 00 – SUBMITTAL PROCEDURES
 - A. Article 1.15, Paragraph A: Change Item 1 to read "PV System".
 - B. Article 1.15, Paragraph A: Delete Items 2 and 3.
- 1.2 SECTION 02 41 16 – BUILDING DEMOLITION
 - C. Add the attached Section 02 41 16 in its entirety.
- 1.3 SECTION 02 41 19 – SELECTIVE DEMOLITION
 - A. Add the attached Section 02 41 19 in its entirety.
- 1.4 SECTION 02 80 00 – FACILITY REMEDIATION
 - A. Add the attached Section 02 80 00 in its entirety.

EXHIBIT B
BID PACKAGE

CITY OF COSTA MESA
ORANGE COUNTY, CALIFORNIA

NOTICE TO BIDDERS, PROPOSAL, CONTRACT PROVISIONS,
SPECIAL PROVISIONS, TECHNICAL SPECIFICATIONS AND MISCELLANEOUS
CONTRACT DOCUMENTS FOR

FIRE STATION 4 – TRAINING FACILITY (SITE IMPROVEMENTS)
(2300 PLACENTIA AVE, COSTA MESA)

CITY PROJECT NO. 23-04

PREPARED UNDER THE DIRECTION OF



Seung Yang, P.E.

City Engineer

Copy No. _____ Checked by _____

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SECTION A

CITY OF COSTA MESA
ORANGE COUNTY, CALIFORNIA
NOTICE INVITING BIDS

NOTICE IS HEREBY GIVEN that the City of Costa Mesa ("City") invites sealed bids, to be submitted electronically only, for the following project:

**FIRE STATION 4 – TRAINING FACILITY (SITE IMPROVEMENTS)
CITY PROJECT NO. 23-04**

1. **BID SUBMISSION AND OPENING**: Bids must be submitted electronically via the City of Costa Mesa's PlanetBids portal before the deadline of **2:00 P.M., Tuesday, February 13, 2024**, at which time or shortly thereafter the City Clerk will open bids electronically. The bid results will be posted online via PlanetBids. No paper bids or any other form of submittal will be accepted. Any bid received after the scheduled closing time for the receipt of bids will be rejected. The City is not responsible for and accepts no liability in the event a response is late due to any network, internet, or any other technical difficulty or interruption. It shall be the sole responsibility of the bidder to ensure that his/her/its bid is received by the deadline.

To access the bid documents and bid on this project, potential vendors and bidders must first register through the City's PlanetBids portal at:

<https://www.planetbids.com/portal/portal.cfm?CompanyID=45476>.

2. **SCOPE OF WORK AND BID DOCUMENTS**: The general scope of work includes site and ground improvements, decontamination showers and restrooms, a water recirculation system, solar panel mounted on carports among other miscellaneous improvements to the training area, and site preparation and footing excavation for the prefabricated tower and stairs.

Important Notice: The fabrication and site installation of a prefabricated tower will be performed by WHP Training Towers; therefore, the scope of this proposal requires the coordination of site operations and activities with WHP and its subcontractors within project schedule.

The plans, specifications, and bid documents for this project can be obtained via the City's PlanetBids portal at: <https://www.planetbids.com/portal/portal.cfm?CompanyID=45476>. It is the bidder's responsibility to ensure that the most current version of the solicitation, including any addenda, has been downloaded. Bids received without the applicable addenda will be rejected as incomplete

3. **PRE-BID MEETING OR JOB WALK**: A mandatory pre-bid job walk has been scheduled for Tuesday, January 23rd, 2024 at 10:30 am at Fire Station No. 4 existing training tower located at 2300 Placentia Ave, Costa Mesa, CA 92627. Access will be granted through the front entrance off of Placentia Avenue.
4. **BID CONTENTS**: All bids must be submitted on the proposal form included in the bid documents. No bid will be considered unless it is made on the proposal form furnished by the City and made in accordance with the provisions of the bid requirements.
5. **BID SECURITY**: Each bidder must submit a physical certified check, cashier's check, or a bid bond, made payable to or in favor of the City of Costa Mesa, in an amount equal to at least ten percent (10%) of the total amount of the bid, to the Costa Mesa City Clerk prior to the bid submission deadline. No bid will be considered unless such physical certified check, cashier's check, or bid bond is received by the City Clerk prior to the bid submission deadline.
6. **CONTRACTOR'S LICENSE**: A valid **California Contractor's License Class "B" (General Building Contractor)** issued by the California Contractors State License Board is required at the time the contract is awarded pursuant to California Public Contract Code section 3300. Each bidder must also be qualified as required by law at the time of the bid opening.

7. **REGISTRATION WITH THE DEPARTMENT OF INDUSTRIAL RELATIONS:** Pursuant to Labor Code sections 1725.5 and 1771.1, no contractor or subcontractor shall be qualified to bid on, be listed in a bid proposal, subject to the requirements of Section 4104 of the Public Contract Code, or engage in the performance of any contract for public work unless registered and qualified pursuant to Labor Code section 1725.5.
8. **PREVAILING WAGES:** This project is a “public work” subject to prevailing wage requirements. Pursuant to provisions of Sections 1770 et seq. of the California Labor Code, all works employed on the project shall be paid not less than the general prevailing rate of per diem wages, as determined by the Director of the Department of Industrial Relations (DIR) for work of a similar character in the locality in which the work is performed, and not less than the general prevailing rate of per diem wages for holiday and overtime work. Copies of the prevailing rate of per diem wages are on file with Costa Mesa Public Services Department and are available to any interested party upon request. The applicable State prevailing wages are also set forth on the Department of Industrial Relations’ website: <http://www.dir.ca.gov>; these rates are subject to predetermined increases. The prime contractor shall post a copy of the DIR’s determination of the prevailing rate of per diem wages at each job site. This project is subject to compliance monitoring and enforcement by the DIR.
9. **PAYMENT BOND AND PERFORMANCE BOND:** A Payment Bond and a Performance Bond, each in the amount of 100% of the contract amount, will be required of the successful bidder prior to award of the contract.
10. **RETENTION:** The City withholds five percent (5%) of each progress payment as retention. Pursuant to Public Contract Code section 22300, the successful bidder may substitute certain securities for money withheld by the City to ensure performance of the contract. At the request and expense of the contractor, securities equivalent to the amount withheld shall be deposited with the public agency, or with a state or federally chartered bank in this state as the escrow agent, who shall then pay those moneys to the contractor. Securities will be returned to the contractor upon satisfactory completion of the contract.
11. **NON-DISCRIMINATION:** The bidding process and contract are subject to State and Federal non-discrimination requirements, including but not limited to the requirement that no person or business shall discriminate on the basis of race, color, national origin, ancestry, religious creed, physical disability, mental disability, medical condition, marital status, sex, gender, gender expression, gender identity, sexual orientation, age, or military or veteran status in its solicitation, selection, hiring, or treatment of individuals or businesses in connection with the bidding process or work performed for the City in connection with the project.
12. **CITY’S RIGHT TO REJECT BIDS:** The City of Costa Mesa reserves the right, in its sole discretion, to reject any or all bids, or to waive any minor irregularities or informalities in any bid.
13. **COMMUNITY WORKFORCED AGREEMENT (CWA):** This Contract is subject to the terms and conditions contained in the Community Workforce Agreement for this Project. The CWA is attached hereto and incorporated into the Contract. Contractor agrees to comply with all terms and conditions contained in the CWA and have incorporated any and all costs associated with compliance with the CWA into the Contract Price.
14. **ADDITIONAL REQUIREMENTS:** This project is subject to local, State, and Federal regulations and requirements, as detailed in the bid documents.

For all inquiries, please contact Administrative Secretary: Janet Zuazo, Public Works Department, via e-mail at janet.zuazo@costamesaca.gov.

Brenda Green, City Clerk
City of Costa Mesa
Dated: January 11, 2024

SECTION B

INFORMATION FOR BIDDERS

1. PREPARATION OF BID FORM: The City of Costa Mesa (City) requires that bids be submitted on the proposal available on *PlanetBids* at such time and place as is stated in the Notice Inviting Bids. All information requested in the bid forms must be provided. All bids shall be submitted electronically via the City's public bidding platform, *PlanetBids* **only**. No other form of submittal shall be accepted. It is the sole responsibility of the Bidder to see that his bid is received in proper time. Any bid received after the scheduled closing time for receipt of bids will be **rejected**. Each Bidder is responsible for acknowledging all addenda.
2. QUALIFICATION OF BIDDERS: Only Licensed Contractors, authorized to do business under the laws of the State of California and that are able to meet the following criteria will be eligible to submit a bid:
 - A. Contractors bidding to the City shall have a minimum five (5) years continuous experience as prime on projects of comparable quality, size, complexity and type.
 - B. Contractors bidding to the City shall have completed as the prime three (3) projects of comparable quality, size, complexity and type.
 - C. Subcontractors shall meet the above two requirements as it pertains to their Work.
 - D. Within three (3) calendar days of request by City, Contractor shall submit evidence of compliance to the above qualifications and provide a list of all work performed, both complete and incomplete, within the previous five (5) years and include the names and phone numbers of the Clients and Architects involved.
 - E. Before a contract is awarded, the City may at its sole discretion, require from the proposed contractor evidence of their ability to faithfully, capably, and reasonably perform such proposed contract within the Contract Time and for the Contract Amount, and may consider such evidence before making a decision on the award of such proposed contract.
3. BID SECURITY / BID BOND: Each bid shall be accompanied by one of the following: cash, cashier's check made payable to the City, a certified check made payable to the City, or a Bidder's Bond executed by an admitted surety insurer, made payable to the City, in an amount not less than 10% of the maximum amount of the bid. This original bid security / bid bond must be physically submitted to the City Clerk's Office *at least one hour prior* to the bid submission deadline. Any and all **late** submittals of the bid security / bid bond **shall** be rejected, and it is the bidder's responsibility, *not* the delivery service, to ensure said bid security / bid bond is delivered timely to the City Clerk's office. The Bidder's Bond shall be signed by both, the Bidder and the Surety; and both signatures shall be notarized. The bid security shall be given as a guarantee that the Bidder, if awarded the work, shall execute the contract in conformity with the Contract Documents and shall provide the surety bond or bonds as specified therein within fourteen (14) calendar days after a written Notice of Intent to Award Contract is deposited in the mail. In the case of refusal or failure to enter into said contract, the check or bond, as the case may be, shall be forfeited to the City.
4. NONCOLLUSION AFFIDAVIT: Each bid shall be accompanied by a notarized Noncollusion Affidavit on a form which is included in the Contract Documents.
5. SIGNATURE: Via the *PlanetBids* platform, the bid must be *electronically* or *digitally* signed in the name of the Bidder and must be person or persons duly authorized to sign the bid on behalf of the Bidder.

6. CORRECTIONS: Any corrections made to the submitted bid must be made electronically via *PlanetBids*.
7. DELIVERY OF PROPOSAL: Proposals shall be submitted electronically via PlanetBids: <https://www.planetbids.com/portal/portal.cfm?CompanyID=45476>. No other form of submittal shall be accepted by the City.
8. EXAMINATION OF SITE AND CONTRACT DOCUMENTS: Each bidder shall visit the site of the proposed work and fully acquaint himself with the conditions relating to the construction and labor so that he may fully understand the facilities, difficulties, and restrictions attending the execution of the work under the contract. Bidders shall thoroughly examine and be familiar with the drawings and specifications. The failure or omission of any bidder to receive or examine any contract document, form, instrument, addendum, or other document or to visit the site and acquaint himself with conditions there existing shall in no way relieve any bidder from any obligation with respect to his bid or to the contract. The submission of a bid shall be taken as prima facie evidence of compliance with this section.
9. BID DEPOSIT RETURN: Deposits of three or more low bidders, the number being at the discretion of the City, will be held for sixty (60) calendar days or until posting by the successful bidder of the Bonds and Certificates of Insurance required and return of executed copies of the Agreement, whichever first occurs, at which time the deposits will be returned.
10. TAXES: No mention shall be made in the proposal of Sales Tax, Use Tax or any other tax, as all amounts bid will be deemed and held to include any such taxes which may be applicable.
11. WITHDRAWAL OF BIDS: Any bidder may withdraw his bid either personally, by written request, or by telegraphic request confirmed in the manner specified above at any time prior to the scheduled closing time for receipt of bids.
12. AGREEMENT AND BONDS: The Agreement form, which the successful bidder, as Contractor, will be required to execute, and the forms and amounts of surety bonds and Certificate of Insurance which he will be required to furnish prior to the execution of the Agreement, are included in the Contract Documents and should be carefully examined by the Bidder. The successful Bidder will be required to submit **THREE (3)** executed copies of the Agreement, the Performance Bond, the Payment Bond and the Certificate of Insurance. Payment and performance bonds shall be issued by a surety who is listed in the latest revision of U.S. Department of Treasury Circular 570 and Code of Civil Procedure Section 995.120. The Performance Bond and the Payment Bond shall be signed by both, the Bidder and the Surety; and both signatures shall be notarized.
13. FORFEITURE FOR FAILURE TO POST SECURITY AND EXECUTE AGREEMENT: In the event the Bidder to whom the Notice of Intent to Award Contract is given fails or refuses to post the required bonds and Certificate of Insurance and return executed copies of the Agreement within fourteen (14) calendar days after notification, the City may declare the Bidder's bid deposit or bond forfeited as damages caused by the failure of the bidder to post such security and execute such copies of the Agreement, and may give Notice of Intent to Award Contract to the next lowest responsive and responsible bidder, or may call for new bids.
14. BIDDERS INTERESTED IN MORE THAN ONE BID: No person, firm or corporation shall be allowed to make, or file or be interested in more than one bid for the same work unless alternate bids are specifically called for.

15. **INTERPRETATION OF PLANS AND DOCUMENTS:** If any Bidder contemplating submitting a bid for the proposed contract 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 and specifications, it may submit to the Engineer a written request for an interpretation or correction thereof. The Bidder submitting the Request for Interpretation (RFI) shall be responsible for its prompt delivery and on the form included within this IFB (Page B-6) Any interpretation or correction of the Contract Documents will be made only by addendum duly issued and a copy of such addendum will be published and distributed through the *PlanetBids* dashboard. No person is authorized to make any oral interpretation of any provision in the Contract Documents to any Bidder, and no Bidder is authorized to rely on any such unauthorized oral interpretation.

Work not particularly specified in the specifications or details on the contract drawings but involved in carrying out the intent, the complete and proper execution of the work, is required and shall be performed by the Contractor.

Should it appear that there is a real or apparent discrepancy between different sections of the plans or specifications concerning nature, quality or extent of the Work to be furnished, it shall be assumed that the Contractor has based his bid on the more expensive manner. Final decision shall rest with the City.

16. **ADDENDA:** The effect of all addenda to the Contract Documents shall be considered in the bid package and said addenda shall be made part of the Contract Documents and shall be returned with the bid package. Failure to submit any such addenda with the bid package may render the bid irregular and result in its rejection by the City.
17. **QUESTIONS TO THE ENGINEER:** *Pre-bid questions and requests for interpretation (RFIs) of the bid documents (i.e. Plans, Specifications, Contract Documents, Bid Forms, etc.) shall be submitted no later than 6:00 pm January 30, 2024. Any questions or RFI requests submitted after the advertised date may not receive a response. Substitution proposals will only be considered during the bidding phase.*
18. **EQUIVALENT MATERIALS:** *Requests for the use of equivalents to those specified, must be submitted to the City during the bidding phase. All substitution proposal requests shall be submitted to the City for review no later than 6:00 pm January 30, 2024. No substitution proposals will be accepted after the advertised date, and no substitutions will be considered after award. It is the sole responsibility of the successful bidder to prove to the City that a proposed substitute is truly an equivalent to what has been specified.*
19. **EVIDENCE OF RESPONSIBILITY:** Upon the request of the City, a bidder whose bid is under consideration for the award of the contract shall submit promptly to the City satisfactory evidence showing the Bidder has sufficient financial resources, construction experience, equipment, labor, managerial experience, technical experience, organization, and adequate facilities available for the performance of the contract.
20. **LEGAL RESPONSIBILITIES:** All proposals must be submitted, filed, made and executed in accordance with State and Federal laws relating to bids for contracts of this nature whether the same or expressly referred to herein or not. Any Bidder submitting a proposal shall by such action thereby agree to each and all of the terms, conditions, provisions and requirements set forth, contemplated and referred to in the Plans, Specifications and other Contract Documents, and to full compliance therewith. Additionally, any Bidder submitting a proposal shall, by such action thereby, agree to pay at least the minimum prevailing per diem wages as provided in Section 1773, et. seq. of the Labor Code for each craft, classification or type of workman required as set forth by the Director of Industrial Relations

of the State of California.

21. ANTI-DISCRIMINATION: It is the policy of the City that in connection with all work performed under contracts, there be no discrimination against any prospective or active employee engaged in the work because of race, color, ancestry, national origin, religious creed, sex, age, or marital status. The Contractor agrees to comply with applicable Federal and California laws including, but not limited to, the California Fair Employment Practice Act, beginning with Government Code Section 12900, and Labor Code Section 1735. In addition, the Contractor agrees to require like compliance by any subcontractors employed on the work by him/her.
22. DRUG-FREE WORKPLACE POLICY: Contractor, upon notification of contract award, shall establish a Drug-Free Awareness Program to inform employees of the dangers of drug abuse in the workplace, the penalties that may be imposed upon employees for drug abuse violations occurring in the workplace, and the employee assistance programs available to employees. Each employee engaged in the performance of a City contract must be notified of this Drug-Free Awareness Program, and must abide by its terms. Contractor shall conform to all the requirements of City's Policy No. 100-5. Failure to establish a program, notify employees, or inform the City of a drug-related workplace conviction will constitute a material breach of contract and cause for immediate termination of the contract by the City.
23. BID PROTEST PROCEDURES: Any bid protest must be submitted in writing before 5:00 PM of the 5th business day following bid openings. The initial protest document shall contain a complete statement of the basis for the protest. The protest shall refer to the specific portion of the document which forms the basis for the protest. The protest shall include the name, address and telephone number of the person representing the protesting party. The party filing the protest shall concurrently transmit a copy of the initial protest document and any attached documentation to all other parties with a direct financial interest which may be adversely affected by the outcome of the protest. Such parties shall include all other Bidders or proposers who appear to have a reasonable prospect of receiving an award depending upon the outcome of the protest. Upon receipt of a bid protest, the matter shall be reviewed by the Public Services Director, whose decision shall be final. This procedure supersedes the procedure of appeal outlined in City of Costa Mesa Municipal Code Section 2-303.
24. ASSEMBLY BILL 626: Assembly Bill 626 (AB 626), adds section 9204 to the Public Contract Code creating a claims resolution process applicable to any claim (as defined) by a contractor against a public entity filed in connection with a public works project. Section 9204 applies to public works contracts entered into on and after January 1, 2017. The legislation was supposed to sunset (end) on January 1, 2020, unless extended by subsequent legislation. The summary of Section 9204 is specified as follows:

In the event of any dispute or controversy with the City over any matter whatsoever, the Contractor shall not cause any delay or cessation in or of Work, but shall proceed with the performance of the Work in dispute. The Contractor shall retain any and all rights provided that pertain to the resolution of disputes and protests between the parties. The Disputed Work will be categorized as an "unresolved dispute" and payment, if any, shall be as later determined by agreement or a court of law. The Contractor shall keep accurate, detailed records of all Disputed Work, claims and other disputed matters.

All claims arising out of or related to the Contract Documents or this Project, and the consideration and payment of such claims, are subject to the Government Claims Act (Government Code Section 810 et seq.) with regard to filing claims. All such claims are also subject to the dispute procedures set forth in Public Contract Code Section 9204 and Public Contract Code Section 20104, et seq. (Article 1.5), to the extent each is applicable. This Contract hereby incorporates those provisions as through fully set forth herein. Thus, the Contractor or any Subcontractor must file a claim in accordance with the Government Claims Act as a prerequisite to filing a construction claim in compliance with Section 9204 and

Section 20104 et seq. (if applicable), and must then adhere to Section 20104, et seq. and Section 9204, as applicable, pursuant to the definition of "claim" as individually defined therein.

25. COMMUNITY WORKFORCE AGREEMENT REQUIREMENTS: This project is subject to and the Contractor shall adhere to the City's Community Workforce Agreement (CWA). This project is considered a Prime Multi-Trade Construction contract. The CWA is a pre-hire collective bargaining agreement, which establishes the labor relations policies and procedures for Contractor and all subcontractors of all tiers to follow in the crafts persons employed to complete the Work of Improvement as more fully described in the CWA. The CWA is incorporated by reference in the Public Works Agreement. A copy of the CWA may be found in Appendix B of these Special Provisions.

REQUEST FOR INTERPRETATION OF CONTRACT DOCUMENTS

Date: _____

Time: _____

Company: _____

Contact Person: _____

Address: _____

Telephone: _____	FAX: _____
-------------------------	-------------------

Plan Sheet: _____

Specification Section:

INTERPRETATION REQUESTED:

REPLY:

TO A/E: _____

SECTION C

PROPOSAL FOR THE FIRE STATION 4 TRAINING FACILITY (SITE IMPROVEMENTS) CITY PROJECT NO. 23-04

The Honorable City Council
City of Costa Mesa
77 Fair Drive
Costa Mesa, CA 92626

Dear Council Members:

In compliance with the NOTICE INVITING BIDS FOR THE FIRE STATION 4 – TRAINING FACILITY PROJECT (2300 PLACENTIA AVE, COSTA MESA), CITY PROJECT NO. 23-04, a copy which is hereto attached, the undersigned has carefully examined the location of the proposed Work, the Plans, Specifications and other Contract Documents and is therefore satisfied as to the conditions to be encountered, as to the character, quality and quantity of work to be performed and materials to be furnished and as to the requirements of the specifications and the Contract. It is mutually agreed that the submission of a proposal shall be considered prima facie evidence that the BIDDER has made such examination.

If awarded the Contract, the undersigned agrees to commence the Work under the Contract **WITHIN TEN (10) WORKING DAYS AFTER DATE OF CONTRACT, AND COMPLETE SAID WORK WITHIN ONE HUNDRED AND EIGHTY (180) WORKING DAYS** from the first day of commencement of such work unless legal extension is granted in accordance with the terms set forth in the specifications, and to perform and complete the Work in accordance with the Specifications and other Contract Documents, and to furnish all labor, materials, tools and equipment necessary to complete the work in-place therefor, in the manner and time herein prescribed at the following prices, to wit:

To minimize impacts on day-to-day operations of the project site, the Contractor shall submit and receive approval on proposed concrete mix design, water recirculation system, tower electrical components and solar panel system submittals, and arrange for and order all materials for the upgrades within the 22 working days following award of contract and store the materials in an exterior location as designated by the City prior to the start of construction. Contractor is responsible for protection and security of all materials.

PROPOSAL SCHEDULE				
ITEM	Description	QUANTITY	UNIT	TOTAL AMOUNT
1	Fire Station No. 4 Training Facility (Site Improvements) *	1	LS	\$ _____.
2	Additional Work Items as directed by the Engineer**	1	FA	\$200,000
TOTAL BID				\$ _____.

* Price includes all indirect costs and markups for work identified in the plans and specifications.

** Allowance is identified in Special Provisions SP-06-Allowance. Allowance as set forth in the Contract Documents is to be used as compensation for items as set forth in the Special Provisions. The Allowance amount is to be included in the total project bid.

Bidder's Initials

The CITY reserves the right to reject all Bids.

Contractor's Lawful Name _____

Total written amount for Bid (using words):

\$ _____

Total amount for Bid (using numeric format):

\$ _____

NOTE: A mandatory pre-bid job walk of the existing site is required. Bids will not be accepted from any contractor who does not attend the mandatory pre-bid job walk.

Bidder's Initials

**PROPOSAL BID SCHEDULE
(CONTINUED)**

NOTES:

1. The accuracy of estimate quantities as shown is not guaranteed; the Bidder shall make his/her own estimate from the drawings and field review for verification. If the unit price and the total amount are different, the unit price will control the bid. Payment shall be based on actual work done and/or actual quantities used.
2. The City reserves the right to delete one or more bid items and/or to increase or decrease bid items' quantities, at no additional cost to the City.
3. (*) A Schedule of Values shall be submitted for review and approval before 4:00 PM on the 4th business days following the contract award. Business days exclude Saturday, Sunday, and City Holidays. Prices shall include indirect costs and markup. Upon request, the Contractor shall provide additional break down of the schedule of values.
4. (**) Allowance is for unforeseen work not included in the contract documents and to be included in the total bid amount as identified as follows. Use of the allowance will be at the sole discretion of the City and must be authorized in writing at the discretion of the City. This Bid item will cover unforeseen work that is not included in the contract documents. Any money used from the project allowance will be authorized via an Allowance Disbursement Form at the City's sole discretion. Any amount of money remaining in the Allowance line item upon completion of the Project will be deducted from the Contract by Deductive Change Order for the full amount(s) remaining therein. The Contractor has no beneficial interest in, and/or claim to, the Allowance and hereby disclaims any and all such interests.
5. (FA) designates force account. Payment shall be made on a time and materials basis, only if directed by the ENGINEER.
6. (F) Designates Final Pay Item. When an item of work is designated as "FINAL PAY ITEM" in the Specifications, the estimated quantity for that item of work shall be the final pay quantity, unless the dimensions of any portion of that item are revised by the Engineer, or the item or any portion of the item is eliminated. If the dimensions of any portion of the item are revised, and the revisions result in an increase or decrease in the estimated quantity of that item of work, the final pay quantity for the item will be revised in the amount represented by the changes in the dimensions. If a final pay item is eliminated, the estimated quantity for the item will be eliminated. If a portion of a final pay item is eliminated, the final pay quantity will be revised in the amount represented by the eliminated portion of the item of work.

The estimated quantity for each item of work designated as "FINAL PAY ITEM" in the Specifications, shall be considered as approximate only, and no guarantee is made that the quantity which can be determined by computations, based on the details and dimensions shown on the plans, will equal the estimated quantity. No allowance will be made in the event that the quantity based on computations does not equal the estimated quantity.

In case of discrepancy between the quantity shown in the Engineer's Estimate for a final pay item and the quantity or summation of quantities for the same item shown on the plans, payment will be based on the quantity shown in the Engineer's Estimate.

7. Bidder agrees to initial or notarize (if applicable) all pages on P-1, P-1a, P-1b, P-2 thru P-12 and uploaded onto PlanetBids.

Bidder's Initials

**PROPOSAL SCHEDULE
(CONTINUED)**

(Please Type or Print)

Total Amount for Bid (in written words) _____
_____ (\$ _____)
_____ in figures

Contractor's Lawful Name: _____

Bidder's Name: _____ Bidder's Initials: _____

Contractor's License No. _____ Expiration: _____

Contractor's Taxpayer I.D. Number: _____

Contractor's DIR Registration Number: _____

Signature: _____ Date: _____

Contractor's Address: _____

Telephone Number:(_____) _____ Mobile No.:(_____) _____

Fax Number: (_____) _____ E-mail: _____

24-Hour Emergency Contacts:

_____ Name Telephone Number: (_____) _____

Mobile No.: (_____) _____

_____ Name Telephone No.: (_____) _____

Mobile No.: (_____) _____

_____ Name Telephone No.: (_____) _____

Mobile No.: (_____) _____

Bidder's Initials

PROPOSAL SCHEDULE

(CONTINUED)

The Contractor agrees that the City will not be held responsible if any of the approximate quantities shown in the foregoing proposal shall be found incorrect, and he shall not make any claim for damages or for loss of profits because of a difference between the quantities of the various classes of work as estimated and the work actually done. If any error, omission or misstatements shall be discovered in the estimated quantities, it shall not invalidate this contract or release the Contractor from the execution and completion of the whole or part of the work herein specified, in accordance with the specifications and the plans herein mentioned and the prices herein agreed upon and fixed therefore, or excuse him from any of the obligations or liabilities hereunder, or entitle him to any damages or compensation otherwise than as provided for in this contract.

The Contractor agrees that the City shall have the right to increase or decrease the quantity of any bid item or portion of the work or to omit portions of the work as may be deemed necessary or expedient, and that the payment for incidental items or work, not separately provided in the proposal shall be considered included in the price bid for other various items or work.

Accompanying this proposal is "Cash," "Certified Check," or "Bidder's Bond" (circle one) submitted physically to the City Clerk's Office in the amount of

(\$ _____) equal to at least ten (10%) percent of the total bid price, payable to the City of Costa Mesa, to guarantee that within fourteen (14) days after written notice is deposited in the mail, or the bidder has received notice by telephone, the bidder will furnish proper Certificates of Insurance, and required bonds satisfactory to the City and execute a contract in accordance with the proposal and in the manner and form required by the contract documents.

The undersigned deposits the above-named security as a proposal guarantee and agrees that it shall be forfeited to the City of Costa Mesa as Liquidated Damages if the above requirements are not complied with.

Respectfully Submitted,

Contractor's Business Name

Business Address: Street

City State Zip

Business Phone Number

Name Title

City State Zip

Contractor Title

Singed By Title

Contractor's License No. and Classification Exp. Date

Date

Residence: Street

Residence phone Number

If the bid is by a corporation, state the names of the officers who can sign an agreement on behalf of the corporation and whether more than one officer must sign.

Corporation

Taxpayer I.D. Number: _____

Name _____

Name _____

Name _____

Can Sign

Must Sign

If the bid is by a partnership or a joint venture, state the names and addresses of all general partners and joint ventures.

Partnership or Joint Ventures

Taxpayer I.D. Number: _____

Name _____

Address _____

Name _____

Address _____

If the bidder is a sole proprietorship or another entity that does business under a fictitious name, the bid shall be in the real name of the bidder with a designation following showing "DBA (the fictitious name)"; provided, however, no fictitious name shall be used unless there is a current registration with the Orange County Recorder.

The full names and residences of all persons and parties interested in the foregoing proposal, as principals, are as follows:

NOTE: Give first and last names in full; in case of corporation, give names of President, Secretary, Treasurer and Manager, and affix corporate seal; in case of partnerships and joint ventures, give names of all the individual members.

Bidder's Initials

DESIGNATION OF SUBCONTRACTORS

In compliance with the "Subletting and Subcontracting Fair Practices Act" being Sections 4100-4113 of the Public Contract Code of the State of California, and any amendments thereto, each bidder shall set forth below the name and location of the place of business of each subcontractor who will perform work or labor or render service to the prime contractor in or about the construction of the work or improvement in an amount in excess of one-half (1/2) of one percent (1%) of the prime contractor's total bid or in the case of bids for the construction of streets or highways, including bridges, in excess of one-half (1/2) of one percent (1%) of the prime contractor's total bid or ten thousand (\$10,000) dollars, whichever is greater. Bidder shall further set forth the portion of the work, which will be done by each such subcontractor with its Department of Industrial Relations (DIR) registration number. Only one subcontractor for each such portion shall be listed.

If the contractor fails to specify a subcontractor for any portion of the work to be performed under the contract, he/she/it shall be deemed to have agreed to perform the balance of all work, which is not covered, and he/she/it shall not be permitted to subcontract that portion of the work except under the conditions hereinafter set forth.

Subletting or subcontracting of any portion of the work to which no subcontractor was designated in the original bid, shall only be permitted in cases of public emergency or necessity, and then only after a finding reduced to writing as a public record of the Legislative Body of the Owner.

All information must be filled out and typed. Please use additional pages in this format if needed.

<i>Scope of Work</i>	<i>Name and Address of Subcontractor</i>	<i>State License Number</i>	<i>Classification</i>

By submission of this proposal, the Bidder certifies:

1. That (I)(we)(it) is able to and will perform the balance of all work which is not covered in the above subcontractors listing.

Bidder's Initials

BIDDER'S BOND TO ACCOMPANY PROPOSAL AND SUBMITTED TO CITY CLERK

(Required if the bidder desires to submit bond instead of a certified or cashier's check.)

KNOW ALL PEOPLE BY THESE PRESENTS:

That we, _____ as principals, and _____ as surety, are held and firmly bound unto the City of Costa Mesa, a municipal corporation, organized under the laws of the State of California and situated in Orange County in the sum of _____ (\$ _____) to be paid to the City, its successors and assigns, 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 is the certain proposal of the above bounden, _____, if accepted by the City of Costa Mesa, and if the above bounden, _____, his heirs, executors, administrators, successors and assigns, shall duly enter into and execute a contract for such construction, and shall execute and deliver the CERTIFICATE OF INSURANCE and the LABOR AND MATERIAL and the FAITHFUL PERFORMANCE BONDS described within fourteen (14) days from the date of the mailing of a notice of the above bounden, _____, by and from the City, that said contract is ready for execution, then this obligation shall become null and void; otherwise it shall be and remain in full force and virtue.

IN WITNESS WHEREOF:

We hereunto set our hands and seals this _____ day of _____, 20__.

Contractor/ Principal
(Notary Acknowledgement to be attached)

Surety/Power of Attorney
(Notary Acknowledgment to be attached)

Bidder's Initials

CONTRACT ASSURANCE

The CONTRACTOR 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 will require that the above provision is included in all subcontracts.

Bidder's Initials

NONCOLLUSION AFFIDAVIT

The bidders, by its officers and agents or representatives present at the time of filing this bid, being duly sworn on their oaths say, that neither they nor any of them have in any way directly or indirectly entered into any arrangement or agreement with any other bidder, or with any public officer of such CITY OF COSTA MESA whereby such affiant or affiants or either of them has paid or is to pay to such bidder or public officer any sum of money, or has given or is to give to such other bidder or public officer anything of value whatever, or such affiant or affiants or either of them has not directly or indirectly, entered into any arrangement or agreement with any other bidder or bidders, which tends to or does lessen or destroy free competition in the letting of the contract sought for on the attached bids; that no bid has been accepted from any subcontractor or supplier through any bid depository, the By-Laws, Rules, or Regulations of which prohibit or prevent the Contractor from considering any bid from any subcontractor or supplier which is not processed through said bid depository, or which prevent any subcontractor or supplier from bidding to any Contractor who does not use the facilities or accept bids from or through such bid depository; that bidder has not bid as subcontractor to other bidders; that no inducement of any form or character other than that which appears upon the face of the bid will be suggested, offered, paid or delivered to any person of the contract, nor has this bidder any agreement or understanding of any kind whatsoever, with any person whomsoever to pay, deliver to, or share with any other person in any way or manner, any of the proceeds of the contracts sought by this bid.

Contractor Firm Name

Name of Principal

Title

Signature

Subscribed and sworn to before me by:

This ____ day of _____, 20__.

My Commission Expires: _____

Notary Public

Bidder's Initials

**CONTRACTOR'S CERTIFICATION
OF
WORKERS' COMPENSATION INSURANCE REQUIREMENTS
FOR
PUBLIC WORKS PROJECTS
(Labor Code §1861)**

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

Dated: _____

CONTRACTOR

Company Name

PROJECT: FIRE STATION 4 – TRAINING FACILITY (SITE IMPROVEMENTS) NO. 23-04

Bidder's Initials

DRUG-FREE WORKPLACE POLICY

CONTRACTOR, upon notification of contract award, shall establish a Drug-Free Awareness Program to inform employees of the dangers of drug abuse in the workplace, the penalties that may be imposed upon employees for drug abuse violations occurring in the workplace, and the employee assistance programs available to employees. Each employee engaged in the performance of a CITY contract must be notified of this Drug-Free Awareness Program, and must abide by its terms. Failure to establish a program, notify employees, or inform CITY of a drug-related workplace conviction will constitute a material breach of contract and cause for immediate termination of the contract by CITY.

CONTRACTOR shall conform to all the requirements of CITY'S Policy No. 100-5. A copy of this policy is attached to the sample contract agreement as an attachment in the Project Specifications.

Bidder's Initials

SECTION D

PART 1

GENERAL PROVISIONS

SECTION 1 – GENERAL

1-1 GENERAL

[Add the following:].

Except as hereinafter provided, the provisions of the latest edition of the Standard Specifications for Public Works Construction ("Green Book"), and all amendments thereto, adopted by the Joint Cooperative Committee of Southern California Chapter, American Public Works Association, Southern California District and Associated Contractors of California; hereinafter referred to as Standard Specifications, are adopted as the "Standard Specifications of the City of Costa Mesa" and shall be considered as a part of these specifications. Copies of the Standard Specifications are available from the publisher:

BNI Building News
1612 S. Clementine Street
Anaheim, California 92802
(714) 517-0971

Where specified in these specifications, the latest edition of the California Building Code, based on the latest edition of the International Building Code, the latest edition of the "Standard Specifications and Standard Plans of the State of California, Department of Transportation, Division of Highways," "Standard Plans of the Orange County Environmental Management Agency," and "Los Angeles County Flood Control District, Design Manual, Standard Drawings" shall apply or unless otherwise noted in these specifications or at the direction of the ENGINEER.

Where referenced in these Specifications, the latest edition of the "City of Costa Mesa Standard Drawings" and the "Work Area Traffic Control Handbook (WATCH)" published by Building News, Inc., shall also apply.

The section numbers of these General Provisions coincide with those of the said Standard Specifications. Only those sections requiring amendment, elaboration, or specifying options, are called out.

The following modifications are made to the "Standard Specifications." If there is a conflict between the "Standard Specifications" and these modifications, these modifications shall have first precedence.

1-6 BIDDING AND SUBMISSION OF THE BID

1-6.1 General

[Add the following:].

Proposal shall be made and submitted on proposal forms **P-1** through **P-12** in accordance with the Notice Inviting Bids. In addition to the required signatures in the spaces provided in the proposal forms, each BIDDER shall initial each sheet of the proposal forms at the bottom right-hand corner.

No person, firm, partnership, corporation, or combination thereof shall be allowed to make or file or be interested in more than one bid for the same work, unless alternate bids are called for. A person, firm, partnership, corporation, or combination thereof who has submitted a sub-proposal to a BIDDER or who has quoted prices on materials to a BIDDER is not thereby disqualified from submitting a sub-proposal to or quoting prices to the other bidders. If, on the opening of bids, more than one bid appears in which the same person, firm, partnership, corporation, or combination thereof is interested as a principal, all such bids shall be rejected.

Proposals with interlineations, alterations, or erasures shall be initialed by the BIDDER'S authorized agent. Alternative proposals, special conditions, or other limitations or provisions affecting the bid, except as such called for in the contract documents, will render the bid informal and may cause its rejection.

All proposals must give the prices bid for the various items of work and must be signed by the BIDDER, who shall give his address. Each bid shall have thereon the affidavit of the BIDDER that such bid is genuine and not sham nor collusive, nor made in the interest nor behalf of any other person not therein named and that the BIDDER has not directly nor indirectly induced or solicited any other BIDDER to put in a sham bid, nor induced nor solicited any person, firm, partnership, corporation, or combination thereof to refrain from bidding, and that the BIDDER has not in any manner sought by collusion to secure himself an advantage over any other BIDDER.

A contractor or subcontractor shall not be qualified to bid on, be listed in a bid proposal, subject to the requirements of Section 4104 of the Public Contract Code or engage in the performance of any contract for public work, as defined in this chapter, unless currently registered and qualified to perform public work pursuant to Section 1725.5 of the Labor Code. It is not a violation of this section for an unregistered contractor to submit a bid that is authorized by Section 7029.1 of the Business and Professions Code or by Section 10164 or 20103.5 of the Public Contract Code, provided the contractor is registered to perform public work pursuant to Section 1725.5 at the time the contract is awarded.

1-6.1.1 Request for Interpretation

If any person contemplating submitting a bid is in doubt as to the meaning of any part of the Plans, Specification, or other proposed Contract Documents, or finds discrepancies in, or omissions from the drawings or specifications, (It, he, she) may make a request to the ENGINEER, in writing, for an interpretation or correction thereof pursuant to the provisions in the Information for Bidders section of these specifications. The person

submitting such a request shall be responsible for its prompt delivery. All such interpretations of the Contract Documents will be made only by addenda duly issued, and a copy of each such addendum will be mailed or delivered to each person receiving a set of Contract Documents at (its, his, her) last address of record. The CITY will not be responsible for any other explanations or interpretations of the Contract Documents.

1-6.1.2 Soil Conditions

The BIDDER shall inspect the soil conditions before submitting a bid. By submitting a bid, the BIDDER acknowledges that he is satisfied with the quality of the work area including but not restricted to the conditions affecting, handling and storage of materials, disposal of excess materials, and the soil conditions.

1-6.1.3 Return of Bid Security

Any BIDDER may withdraw its bid, either personally, or by telegraphic or written request, at any time prior to the scheduled closing time for the receipt of bids. It is the sole responsibility of the BIDDER to see that any such telegraphic or written request is delivered to the City Clerk prior to said closing time. Bid security of such BIDDERS will be returned promptly to the BIDDER.

The bid security of the BIDDER whose bid is accepted will be held by the CITY until the contract has been executed and the accompanying insurance certificates, performance bond and labor and materials bond are approved and filed, whereupon the bid security will then be returned to the BIDDER.

The bid security of the second and third lowest BIDDERS will be retained until the contract is awarded to and executed by the BIDDER whose bid is accepted, or until 45 days after the opening of bids, whichever period is shorter. The bid security of all BIDDERS other than the three lowest will be returned promptly after the opening of bids.

If a BIDDER fails or refuses promptly to execute the agreement to do the work or fails or refuses to comply with insurance and bonding requirements, the bid security shall be forfeited to the CITY and shall be collected and paid into the General Fund of the CITY.

1-6.2 Subcontractor Listing

[Add the following:].

The ENGINEER, as duly authorized officer, may consent to subcontractor substitution requested by the Contractor subject to the limitations and notices prescribed in Section 4107 of the Public Contract Code.

1-7 AWARD AND EXECUTION OF THE CONTRACT

1-7.1 General

[Add the following:].

The award of contract, if awarded, will be to the lowest responsive and responsible bidder whose proposal complies with all requirements of the Notice Inviting Bids and Section 1-6 of these specifications. The BIDDER, upon notification as the "apparent low

bidder," shall comply with the CITY'S insurance and bonding requirements by submitting the required insurance certificates and bonds within fourteen (14) days after the mailing of a Notice of Award to the BIDDER that the contract is ready for execution. The contract will be awarded within thirty (30) days of receipt of properly approved insurance certificates and bonds pursuant to CITY requirements spelled out in these specifications. BIDDER must take particular note of "insurance requirements" contained in these specifications and sample agreement included within the contract documents and should provide that information to his insurance broker in order that a properly executed certificate is submitted. The CITY, however, reserves the right to reject any or all bids and to waive any informality in the bids received.

1-7.1.1 Execution of Agreement

The Agreement shall be signed by the successful BIDDER and returned to the CITY no later than fourteen (14) days from Notice of Award of the Contract by the CITY. Failure to comply with insurance and bonding requirements as specified in the Agreement and in Section 1-7.1 of these General Provisions shall be considered grounds for the revocation and rejection of the bid and forfeiture of bid security. No proposal shall be considered binding upon the CITY until the execution of the agreement by the CITY. In case of conflict, the agreement shall have precedence over all other written specifications.

1-7.2 Contract Bonds

[Add the following:].

The "Faithful Performance Bond" and the "Labor and Material Bond" as specified in this section shall be for one hundred percent (100%) of the Contract price. The Labor and Material Bond shall be maintained by the Contractor in full force and effect for at least seven (7) months following the filing of the Notice of Completion. The Faithful Performance Bond shall also be kept by the Contractor in full force and effect for at least one (1) year following the filing of the Notice of Completion.

CONTRACTOR shall provide the following:

A certified copy of the certificate of authority of the surety issued by the Insurance Commissioner.

A certificate from the clerk of the county in which the court or officer is located that the certificate of authority of the surety has not been surrendered, revoked, canceled, annulled, or suspended or, in the event that it has, that renewed authority has been granted.

Copies of the surety's most recent annual statement and quarterly statement filed with the Department of Insurance pursuant to Article 10 (commencing with Section 900) of Chapter 1 of Part 2 of Division 1 of the Insurance Code.

SECTION 2 – SCOPE OF THE WORK

2-1 WORK TO BE DONE

[Replace in its entirety with the following:].

The CONTRACTOR shall perform all work necessary to complete the Contract Agreement in accordance with the Contract Documents.

The CONTRACTOR shall provide and furnish all labor, materials, tools, equipment, supplies, manufactured articles, and incidentals necessary to perform and complete the Work as shown on the Plans and these Contract Documents, to the satisfaction of the ENGINEER.

Reference the Special Provisions and Technical Specifications for specific project details.

2-2 PERMITS

[Add the following:].

All permits and licenses shall be obtained in sufficient time to prevent delays to the work. Fees for permits must be paid by the Contractor and be included in the price bid for this work.

In the event that the CITY has obtained permits, licenses, or other authorizations applicable to the work, the Contractor shall comply with the provisions of said permits, licenses and other authorizations.

2-5 THE CONTRACTOR'S EQUIPMENT AND FACILITIES

2-5.1 General

[Add the following:].

The Contractor shall only use the proper construction equipment to protect the City streets from breaking up and deterioration. Haul trucks shall be limited to a gross vehicle weight of 10 tons or less.

2-5.2 Temporary Utility Services

[Add the following:].

The Contractor shall provide for his employees an adequate supply of clean, potable drinking water, which shall be dispensed through approved sanitary facilities.

If water is needed during construction, Contractor shall contact Mesa Consolidated Water District to obtain necessary permits, instructions, and meters prior to commencing work. The Contractor is required to make any and all necessary installations and connections. All water shall be metered. The Contractor shall pay for all deposits and fees involved.

2-5.4 Haul Routes

[Add the following:].

In order to protect the City streets from deterioration due to hauling of materials, the Contractor shall submit to the ENGINEER (at the pre-construction meeting) for approval, a proposed route for the hauling of materials for disposal. Upon approval, the

Contractor shall strictly adhere to that route only, unless written permission from the ENGINEER is obtained to change the route.

Where haul routes have not been established at a pre-construction meeting the Contractor shall submit to the ENGINEER for approval, a proposed haul route at least 5 working days prior to performing any work that requires hauling.

Waste Hauler Requirements

The California Green Building Standards Code, 2016 Edition, California Code of Regulations, Title 24, Part 11, impacting waste diversion as documented in the City of Costa Mesa's Municipal Code Chapter 4 of Title 8, requires that all construction and demolition related projects divert 65% of project waste generated from the landfill. Consequently, permitted building projects relating to construction and demolition, newly constructed buildings, additions, alterations, interior and exterior demolitions, etc., are required to divert a minimum of 65% of nonhazardous construction and demolition waste from the landfill by recycling, reuse, or salvage. Generally, these materials include brick, drywall, other masonry, cardboard, green waste, paper, carpet, lumber, plastic, concrete, and/or metals. Asphalt, concrete, excavated soil and land-clearing debris should be 100% diverted from disposal. The County provides a suggested list of locations that are meeting and/or exceeding the 65% diversion requirement and may be used for recycling construction and demolition material.

The City of Costa Mesa requires that all hauling activity in Costa Mesa comply with one of the waste hauling options for your construction and demolition related project:

- Use Franchise Waste Hauler
- Self-Haul Permit - <https://www.costamesaca.gov/city-hall/city-departments/public-services/waste-collection-and-recycling>

A Construction and Demolition Reporting Form as provided in the Miscellaneous Document Section of these Specifications must be completed and submitted by the Contractor to the CITY prior to the release of retention monies.

2-7 CHANGES INITIATED BY THE AGENCY

2-7.1 General

[Add the following:].

ENGINEER shall be the duly authorized officer of the CITY who may grant the changes prescribed in this section.

2-8 EXTRA WORK

[Add the following:].

The extra work as defined in this section of the Standard Specifications and any work done by the Contractor beyond the lines and grades shown on the plans shall only be performed when ordered in writing by the ENGINEER. In absence of such written order, any such work by the Contractor shall be considered unauthorized and will not be paid.

Work so done may be ordered to be removed at the Contractor's expense.

2-9 CHANGED CONDITIONS

[Add the following:].

The Contractor shall promptly act to supply all information to the ENGINEER for proper evaluation. Failure to do so shall constitute a waiver of any payment for delays suffered by the Contractor.

SECTION 3 – CONTROL OF THE WORK

3-1 ASSIGNMENT

[Replace the 1st sentence with the following:].

No contract or portion thereof may be assigned without written consent of the BOARD.

3-4 AUTHORITY OF THE BOARD AND THE ENGINEER

[Add the following:].

When any of the various units or operations of the work have been suspended, the Contractor shall give at least 24 hours advance notice of the time when he or his subcontractor will start or resume any of such units or operations. That notice is to be given during working hours, exclusive of Saturdays, Sundays or holidays, for the purpose of permitting the ENGINEER to make necessary assignments to his representative on the work.

Any work performed in conflict with said notice, without the presence or approval of the ENGINEER, or work covered up without notice, approval or consent may be rejected or ordered to be uncovered for examination at Contractor's expense and shall be removed at Contractor's expense, if so ordered by the ENGINEER or his representative on the work. Any unauthorized or defective work, defective material or workmanship or any unfaithful or imperfect work that may be discovered before the final payment and final acceptance of work shall be corrected immediately by the Contractor without extra charge even though it may have been overlooked in previous inspections and estimates or may have been caused due to failure to inspect the work.

All authorized alterations affecting the requirements and information given on the approved plans shall be in writing. No changes shall be made on any plan or drawing by the Contractor after the same has been approved by the ENGINEER, except by direction of the ENGINEER in writing. Deviations from the approved plans, as may be required by critical conditions of construction, must be authorized in writing by the ENGINEER.

All instructions, rulings and decisions of the ENGINEER shall be in writing and are binding on all parties unless a formal protest is made as provided in the following paragraph:

If the Contractor considers any work demanded of him to be outside the requirements of the contract, or if he considers any instruction, ruling or decision of the ENGINEER or

ENGINEER'S representative to be unfair, the Contractor shall, within ten (10) days after any such demand is made, or instruction, ruling or decision is given, file a written protest with the ENGINEER, stating clearly and in detail his objections and reasons therefor. Except for such protests and objections as are made of record, in the manner and within the time above stated, the Contractor shall be deemed to have waived and does hereby waive all claims for extra work, damages and extensions of time on account of demands, instructions, rulings and decisions of the ENGINEER.

Upon receipt of any such protest from the Contractor, the ENGINEER shall review the demand, instruction, ruling or decision objected to and shall promptly advise the Contractor, in writing, of his final decision, which shall be binding on all parties, unless within the ten (10) days thereafter the Contractor shall file with the BOARD a formal protest against said decision of the ENGINEER. The BOARD shall consider and render a final decision on any such protest within thirty (30) days of receipt of same. If the BOARD fails to consider and render a final decision on any such protest within thirty (30) days of receipt of the same, the protest shall be deemed denied.

3-5 INSPECTION

[Add the following:].

If the Contractor requests and receives approval from the ENGINEER to receive inspection services from the CITY outside of a normal eight (8) hour day/forty (40) hour work week or on Saturday, Sunday, or CITY holidays, the Contractor shall arrange with the CITY and ENGINEER for the special inspection services and Contractor shall pay for such special inspection services at a fee established by the ENGINEER to defray the cost for such service.

All work, which has been inspected and deemed defective in its construction or does not meet all of the requirements of the plans and/or specifications by the ENGINEER shall be remedied or removed and replaced by the Contractor in an acceptable manner, and no compensation will be allowed for such correction.

Any work done beyond the limits of the lines and grades shown on the plans or established by the ENGINEER or extra work done without written authority will be considered as unauthorized and not be paid.

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

Payment will not be made for materials wasted or disposed of in a manner not called for under the Contract. This includes rejected material not unloaded from vehicles, material rejected after is has been placed and material placed outside the limits of the project. No compensation will be allowed for disposing of rejected or excess material.

3-6 THE CONTRACTOR'S REPRESENTATIVE

[Add the following:].

Contractor shall file with the ENGINEER the addresses and telephone numbers where

its designated representative may be reached during hours when the work is not in progress.

Instructions and information given by the ENGINEER to the Contractor's authorized representative or at the address or telephone numbers filed in accordance with this section shall be considered as having been given to the Contractor.

The Contractor shall have on the work site at all times a competent English-speaking superintendent, as his agent, capable of reading and thoroughly understanding the plans and specifications and other related documents.

3-7 CONTRACT DOCUMENTS

3-7.1 General

[Add the following:].

Contractor shall, at its own expense, obtain copies of plans, general provisions, special provisions and additions to the Standard Specifications that are reasonably necessary for the execution of work.

Contractor shall, at its own expense, obtain copies of the Standard Specifications and Standard Plans and Specifications of CALTRANS, for his general use.

If after the Contract is awarded, it appears that the work to be done, or any matter relative thereto, is not sufficiently detailed or explained in the specifications and plans, the Contractor shall apply to the ENGINEER for such further explanations as may be necessary and shall conform to such explanation or interpretation as part of the Contract.

All scaled dimensions are approximate. Before proceeding with the work, the Contractor shall carefully check and verify all dimensions and quantities and shall immediately inform the ENGINEER or his representative of any discrepancies.

3-10 SURVEYING

[Replace with the following:].

3-10.1 General

The Contractor will perform and be responsible for the accuracy of setting all required survey stakes adequate for the construction of the project.

3-10.3 Line and Grade

Unless otherwise provided in the Special Provisions, lines and grades for construction shall be the responsibility of the Contractor, with the following provisions:

All work under this Contract shall be built in accordance with the lines and grades shown on the plans. Field survey for establishing the lines and grades and for the control of construction shall be the responsibility of the Contractor. All such surveys, including construction staking, shall be under the supervision of a California-licensed land surveyor or by a California-licensed civil engineer allowed by law. Staking shall be

performed on all items ordinarily requiring grade and alignment, at intervals normally accepted by the agencies and the trade involved.

The Contractor shall provide a copy of the office calculations and grade sheets to the City Inspector. The Contractor shall be responsible for any error in the finished work and shall notify the ENGINEER within one (1) working day of any discrepancies or design errors discovered during staking.

Unless a separate bid item is provided, the payment for surveying, construction staking, professional services, office calculations, furnishing all labor, materials, equipment, tools and incidentals, and for doing all work involved shall be considered as included in the various items of work, and no additional compensation will be allowed.

3-12 WORK SITE MAINTENANCE

3-12.1 General

[Replace 2nd paragraph with the following:].

Unless the construction dictates otherwise, and unless otherwise approved by the ENGINEER, Contractor shall furnish and operate a self-loading motor sweeper with a functional water spray nozzle system at least once each working day to keep paved areas in the Work zone and along all haul routes acceptably clean whenever construction, including restoration, is incomplete.

3-12.2 Air Pollution Control

[Add the following:].

Failure of the Contractor to comply with the ENGINEER'S dust control orders may result in an order to suspend work until the condition is corrected and, after giving notice to the Contractor, the ENGINEER may order the condition corrected by others. All costs thus incurred shall be deducted from the amount to be paid to Contractor. No additional compensation will be allowed as a result of such suspension.

No separate payment will be made for any work performed nor material used to control dust resulting from Contractor's performance of the work or from public traffic, either inside or outside the right-of-way. Full compensation for such dust control will be considered to be included in the prices paid for the various items of Work involved.

3-12.4.1 General

[Add the following:].

All surplus materials shall be removed from the site of the Work within five (5) days after completion of the Work causing the surplus materials.

3-12.6 Water Pollution Control

3-12.6.1 General

[Add the following:].

Discharge of storm water from construction sites that disturb land equal to or greater than one (1) acre must be in compliance with the state General Construction Activity Permit (Construction Permit). The latest permit provisions of the Construction Permit shall apply. The Contractor is required to contact the Santa Ana Regional Water Quality Control Board (Regional Board) for all information contained in the Construction Permit. In the event project construction occurs during the transition of revised Construction Permits, the Contractor shall incorporate the necessary modifications specified by the revised Construction Permit within the time period specified in the new Construction Permit.

**The Project Soil Disturbance is less than 1 acre:
No General Construction Permit required**

Construction activity subject to the Construction Permit includes clearing, grading, disturbance to the ground such as stockpiling, work area, or excavation that results in soil disturbances of at least one acre of total land area. Construction activity that results in soil disturbances of less than one acre is subject to the Construction Permit if the construction activity is a part of a larger common plan of development that encompasses one or more acres of soil disturbance or if it is determined that discharges from the project pose a significant threat to water quality.

The CONTRACTOR shall have an account with the State for SMARTS (Storm Water Multiple Application and Report Tracking System). The CONTRACTOR shall contact the CITY with their user ID so that the CITY will grant the CONTRACTOR access as a Data Submitter.

The CONTRACTOR shall complete the NOI within SMARTS <https://smarts.waterboards.ca.gov/smarts/faces/SwSmartsLogin.jsp>. The CONTRACTOR will notify the CITY when the NOI is ready for the CITY to submit to the State. The CONTRACTOR shall pay all fees associated with the NOI process. The CONTRACTOR shall also complete all required reports within SMARTS as required by the General Permit and the Project's Storm Water Pollution Prevention Plan (SWPPP).

The CONTRACTOR shall complete the Annual Report and NOT within SMARTS. Once the CITY has been notified, the CITY will review and submit to the State for processing.

A copy of the latest permit is available at:

http://www.waterboards.ca.gov/water_issues/programs/stormwater/constpermits.shtml

The CONTRACTOR is hereby directed to read the Construction Permit thoroughly and comply with the requirements as specified therein.

3-12.6.2 Best Management Practices (BMPs)

[Add the following:].

The Contractor shall install and maintain the appropriate Best Management Practices (BMPs) to protect water quality within the project limits through the duration of the Project.

The Contractor shall be responsible for any damage to any portion of the Work occasioned by failure to provide proper drainage control prior to the completion and acceptance of the Work.

Payment for furnishing, installing and maintaining BMPs inclusive of sweeping the Project site as required or directed by the ENGINEER shall be included in the other various bid items associated with the work and no additional payment will be allowed thereof.

3-12.6.3 Storm Water Pollution Prevention Plan (SWPPP)

[Add the following:].

If a General Construction Permit is required pursuant to Section 3-12.6.1 of these General Provisions, the following Storm Water Pollution Prevention Plan (SWPPP) requirements shall be adhered to:

The Contractor is responsible for the preparation and implementation of a SWPPP as required by the Construction Permit. The Contractor is responsible for completing all parts of the SWPPP including, REAPs, monitoring, sampling, rain gauge records, weather reports, submitting pictures of every third storm, non-authorized discharge reports, Ad-Hoc reports, Annual Reports, post construction BMPs and other requirements of the SWPPP.

The completed SWPPP must be signed by a QSD (Qualified SWPPP Developer). The completed SWPPP must be submitted to the resident engineer for City review and acceptance, prior to uploading to SMARTS. The Contractor will be responsible for uploading an electronic format of the SWPPP into SMARTS. The SWPPP must be signed by the City before construction begins. A copy of the SWPPP must be available at the site at all times and must be implemented and revised in accordance with the Construction Permit throughout the duration of the project.

Contractor must have QSP (Qualified SWPPP Practitioner). Contractor shall perform site inspections before and after the storm event, and once each 24-hour period during extended storm event, to identify BMP effectiveness and implement repairs or BMP modifications as soon as possible. Sampling of potential pollutant discharges shall be conducted by trained personnel and required laboratory test conducted by laboratory accredited by the California Department of Health Services Environmental Laboratory Accreditation Program.

Contractor shall be responsible for any penalties assessed against the City if the penalty assessed is due to Contractor's violation of the Construction Permit requirement, or Contractor's failure to fully implement and monitor SWPPP as required.

Erosion and Sediment Control Plans

Erosion and Sediment Control Plans shall be prepared by the Contractor as part of the SWPPP that identify adequate controls to prevent erosion and discharge of sediment off-site. Payment for the Erosion and Sediment Control Plans shall be included as part of the SWPPP.

3-12.6.4 Dewatering

[Add the following:].

Unless otherwise directed in these Special Provisions, the Contractor shall provide and maintain ample means and devices with which to promptly remove and properly dispose of water entering the excavations or other parts of the work at all times during construction. Dewatering shall be accomplished by methods which will ensure a dry excavation and preservation of the final lines and grades of the bottoms of excavations. The methods may include sump pumps, deep wells, well points, suitable rock or gravel placed below the required bedding for draining and pumping purposes, temporary pipelines, and other means.

Standby pumping equipment shall be on the job site. A minimum of one standby unit shall be available for immediate installation should any well unit fail. The design and installation of well points or deep wells shall be suitable for the accomplishment of the work. Drawings or details indicating the proposed dewatering system shall be submitted to the CITY for review.

The Contractor shall dispose of the water from the work in a suitable manner without damage to adjacent property.

Conveyance of the water shall be such as to not interfere with traffic flow or treatment facilities operations. No water shall be drained into work built or under construction without prior consent of the ENGINEER.

Water shall be disposed of in such a manner as not to be a menace to the public health and such disposal shall be performed in accordance with Environmental Protection Agency and State Water Quality Control Board standards (NPDES permit). Any testing and reports required under NPDES permit shall be performed by the Contractor and submitted to the appropriate agency for approval at no additional cost to the CITY.

3-13 COMPLETION, ACCEPTANCE, AND WARRANTY

3-13.3 Warranty

[Replace 2nd sentence of 1st paragraph with the following:].

The warranty period shall start on the date the Work is accepted by the Board.

SECTION 4 – CONTROL OF MATERIALS

4-4 TESTING

[Add the following:].

All tests of materials furnished by the Contractor shall be made in accordance with commonly recognized standards of national organizations and such special methods and tests as are prescribed in these specifications. No materials shall be used until they have been approved by the ENGINEER.

The Contractor shall at his expense furnish the CITY, in triplicate, certified copies of all required factory and mill test reports. Any materials shipped by the Contractor from a factory or mill prior to having satisfactorily passed such testing and inspection by a representative of the CITY shall not be incorporated in the work, unless the ENGINEER shall have notified the Contractor, in writing, that such testing and inspection will not be required.

At the option of the ENGINEER, the source of supply of each of the materials shall be approved by the ENGINEER before delivery is started and before such material is used in the work.

Unless otherwise provided in the Special Provisions, the CITY will complete and pay for the initial soils, compaction, and material tests. Any subsequent soil, compaction, and material tests deemed necessary due to the failure of initial tests will be at the Contractor's expense and deducted from the payment due.

SECTION 5 – LEGAL RELATIONS AND RESPOSIBILITIES

5-1 LAWS AND REGULATIONS

[Add the following:].

The Contractor shall protect and indemnify the CITY, the BOARD, the ENGINEER, and all of its or their officers, agents and servants against any claim or liability arising from or based on the violation of any existing or future State, Federal and local laws, ordinances, regulations, orders or decrees, whether by himself or his employees. If any discrepancy or inconsistency is discovered in the plans, drawings, specifications or contract for the work in relation to any such law, ordinance, regulation, order or decree, the Contractor shall forthwith report the same to the ENGINEER in writing.

5-2 SPECIAL NOTICES

[Add the following:].

In addition to the special notices requirement to be served by Personnel Delivery or Certified Mail, special notices may also be served by the utilization of FedEx or UPS express service with a confirmed delivery receipt. Service shall be effective on the date of the receipt of the delivery confirm issued by FedEx or UPS.

5-3 LABOR

5-3.3 Payroll Records

[Add the following:].

In order to verify compliance with the Labor Code, Contractor shall furnish to the ENGINEER, weekly, for the duration of the contract period, copies of his payroll statements showing wages paid to each employee during the preceding week and the employee work classification. Use of Form DH-C-347, Payroll Statement of Compliance, is an acceptable method of fulfilling the above requirement.

5-3.5 Apprentices

[Replace with the following:].

Attention is directed to the provisions of Sections 1777.5 and 1777.6 of the Labor Code concerning the employment of apprentices by the Contractor or any subcontractor under it. The Contractor and any subcontractor under it shall comply with the requirements of those Sections in the employment of apprentices.

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

5-4 INSURANCE

[Replace with the following:].

The minimum amounts and types of insurance coverages are as stated in the Agreement (sample copy attached). Prior to bid submittal the BIDDER shall keep fully informed of the latest insurance requirements of the City of Costa Mesa and shall comply with all other provisions of Section 5-4 of the Standard Specifications.

Below are approved endorsements which satisfy the basic insurance requirements contained in contracts entered into by City of Costa Mesa. These have been approved by the City Attorney's office. The terms of any specific contract with the City are controlling. Prior to the commencement of any work, the CITY requires that the ENGINEER receive Certificates of Insurance in **DUPLICATE** for liability coverage of at least \$1,000,000 combined single limit, per occurrence and in the aggregate.

Each insurance policy required by the CITY of the Contractor shall contain the following endorsements:

1. Additional Insureds

"The City of Costa Mesa and its elected and appointed boards, officers, agents, and employees are additional insureds with respect to the subject project and agreement."

2. Notice

"Said policy shall not terminate, nor shall it be canceled nor the coverage reduced, until thirty (30) days after written notice is given to City."

3. Other Insurance

"Any other insurance maintained by the City of Costa Mesa shall be excess and not contributing with the insurance provided by this policy."

If any of such policies provide for a deductible or self-insured retention to provide such coverage, the amount of such deductible or self-insured retention shall be approved in advance by City. No policy of insurance issued as to which the City is an additional insured shall contain a provision which requires that no insured except the named

insured can satisfy any such deductible or self-insured retention.

5-7 SAFETY

5-7.1 Work Site Safety

5-7.1.1 General

[Add the following:].

Material or other obstructions shall not be placed within fifteen feet (15') of fire hydrants. Fire hydrants shall be made readily accessible to the Fire Department at all times.

5-7.8 Steel Plate Covers

5-7.8.1 General

[Add the following:].

All steel plate covers utilized for the project must be slide resistant. A non-slip coating will be required on the side of the steel plate that that will be utilized for the driving or walking surface.

SECTION 6 – PROSECUTION AND PROGRESS OF THE WORK

6-1 CONSTRUCTION SCHEDULE AND COMMENCEMENT OF THE WORK

6-1.1 Construction Schedule

[Replace the 1st Paragraph with the following:].

The Contractor's proposed Construction Work Schedule shall be submitted to the ENGINEER for approval within ten (10) working days after the date of the BOARD's execution of the Contract Agreement. The Construction Work Schedule shall be supported by written statements from each supplier of materials or equipment indicating that all orders have been placed and acknowledged and setting forth the dates that each item will be delivered. The Construction Work Schedule shall provide sufficient detail to delineate the main milestones start and end dates for each activity with chronological relationships of all the activities of Work showing the number of working days required to complete the entire project within the Contract Days. The schedule shall also incorporate the requirements of Section 402-5 of the Standard Specifications to complete the Work within the Contract Days. Prior to issuing the Notice to Proceed, the ENGINEER will schedule a preconstruction meeting with the Contractor to review the proposed Construction Work Schedule, delivery dates, activity milestone dates, arrange utility coordination, discuss construction methods and staging, and clarify inspection procedures.

The Contractor shall submit progress reports to the ENGINEER by the tenth day of each month. The report shall include an updated Construction Work Schedule. All revisions shall be completed within three days after review by the ENGINEER. The Contractor shall submit requests for changes in the schedule to the CITY for approval at least three (3) working days prior to performing any work. Any deviations from the original approved Construction Work Schedule shall be explained and identified in the updated Construction Work Schedule. Progress payments will be withheld pending

receipt of any outstanding reports.

The Contractor shall furnish the ENGINEER with a 3-week look ahead-schedule in a tabular format at every weekly construction meeting. The 3-week look ahead schedule shall utilize the main milestones within the approved Baseline Construction Schedule with updates and include sub-activities.

[Add the following:].

6-1.3 Daily Report Submittal

Contractor shall submit daily reports to the CITY at the end of each working day. All forms shall be provided by the CITY. Any cost for this item shall be included in the various items of work and no other compensation will be allowed.

6-3 TIME OF COMPLETION

6-3.1 General

[Replace the 1st Sentence with the following:].

The Contractor shall submit and receive approval on proposed concrete mix design, water recirculation system components, tower electrical components and solar panel system submittals, and arrange for and order all materials for the upgrades within **twenty-two (22) Working Days** after the contract is executed.

The Contractor shall start construction work within **ten (10) Working Days** after the date the Contract is executed by CITY unless a later start date is agreed upon by the CITY and Contractor within a written Notice-to-Proceed.

The construction work shall be completed within **one hundred and eighty (180) Working Days** from the date set in the Notice-to-Proceed or the first day of commencement of Work, whichever occurs first.

Coordination with other entities: Within the previously mentioned construction period, the General Contractor shall coordinate the installation of a prefabricated tower with WHP Training Towers TM. The installation of the tower shall commence after the General Contractor prepares the site, layout and excavates the footing; after the foundation is in place, the tower installation period would be completed within approximately **15-17 weeks**. It is the responsibility of the contractor to sequence the project activities around this period, any stop of work or idle time must be included in the Contractor's bid at no extra cost to the City.

6-5 USE OF IMPROVEMENT DURING CONSTRUCTION

[Add the following:].

Should it become necessary, due to developed conditions, to occupy any portion of the Work before Contract is fully completed, such occupancy shall not constitute acceptance by the CITY of work by Contractor.

6-7 TERMINATION OF THE CONTRACT FOR DEFAULT

6-7.3 Notice of Termination for Default

[Replace the 1st Paragraph with the following:].

The ENGINEER will make the determination if the Contractor had failed to commence satisfactory corrective action within 5 working days after the receipt of the notice to cure, or to diligently continue satisfactory and timely correction of the default thereafter, and will take action as allowed by the Contract Documents.

6-7.4 Responsibilities of Surety

[Add the following:].

Within 3 working days of receipt of the written notice of termination for default, the Surety shall provide the services needed to maintain the project in accordance with the Contract Documents. The services shall maintain the existing traffic control in place and the maintenance of the project site until the Engineer's review and acceptance of the Surety's plan for course of action.

6-9 LIQUIDATED DAMAGES

[Replace the 1ST Paragraph with the following:].

The CONTRACTOR shall pay to the CITY the sum of **\$1,900** per calendar day, for each and every calendar day's delay in finishing the Work in excess of the number of Working Days prescribed within these General Provisions and the Agreement, or per the direction of the Engineer. Liquidated damages are calculated per Chapter 12 of the latest edition of the Caltrans Local Assistance Procedures Manual (LAPM).

SECTION 7 – MEASUREMENT AND PAYMENT

7-3 PAYMENT

7-3.1 General

[Replace the 1ST Paragraph with the following:].

Payment for the various items listed on the Bid Proposal, as further specified herein, shall constitute full compensation to the Contractor for furnishing all material, tools, equipment, supplies, and manufactured articles, and for all labor, operations, and incidentals appurtenant to the items of Work and as specified and shown on the drawings, including all costs for compliance with the regulations of public agencies having jurisdiction, including Safety and Health Requirements of the California Division of Industrial Safety and the Occupational Safety and Health Administration (OSHA) of the U.S. Department of Labor. No separate payment will be made for any item that is not specifically set forth in the Bid Proposal. Costs arising from violations of regulations will be paid by the offending party to the extent that there will be no additional cost to the CITY.

When no bid item is provided for work/improvement shown or indicated on the plans and specifications, payment for such work/improvement will be considered to be included in various applicable items of work.

7-3.2 Partial and Final Payment

[Replace the 1st Paragraph in its entirety with the following:].

The closure date for the purpose of making partial progress payments will be the last day of each month. The Contractor may request, in writing, that such monthly closure date be changed. The ENGINEER may approve such request when it is compatible with the CITY's payment procedure.

[Replace the 2nd Paragraph in its entirety with the following:].

Each month, the Contractor shall meet with the Engineer, a minimum of three (3) working days prior to the submittal of the progress payment to the AGENCY, to finalize and receive approval regarding the measurement of the Work performed through the closure date and the estimated value of the progress payment based on the Contract Unit Prices or as provided for in the Standard Specifications. Any progress payment submitted without such approval will be considered incomplete and returned to the Contractor and no payment shall be considered until such approval is obtained.

[Replace the 3rd Paragraph in its entirety with the following:].

The amount retained and deducted by the BOARD shall be 5% of the progress estimates for all progress payments. No reduction in the amount of retention will be allowed. However, after 50% of the work has been completed, if the BOARD finds that satisfactory progress is being made, it may make any of the remaining progress payments in full for actual work completed. The final payment of the retention amount to the Contractor shall be made thirty-five (35) days after the date of the recording of the Notice of the Completion of the work after it is accepted by the CITY. The 5% withheld from each progress payment shall not include monies withheld for stop notices or other withholding by the CITY. The monies withheld for stop notice and other withholdings shall be in addition to the 5% withheld for retention.

[Add to end of Section the following:].

Contractor shall comply with the requirements of Division 2, Part 1, Chapter 7, Section 7107 of the California Public Contract Code.

The lead time for processing invoices for the monthly progress payments approved by the ENGINEER for inclusion on the warrant list of the CITY is governed by the rules and regulations established by the Finance Department of the CITY. Monthly payments will be processed and paid in accordance with the rules and regulations established or revised by the said Finance Department.

The Contractor shall submit all weight tickets or volumes of all materials used in the construction to the ENGINEER for checking and verification prior to any payment. Failure to do so will postpone the payment to the Contractor, until the matter is resolved satisfactorily.

The weight or volume from submitted tickets must correspond to the work done in the field; if not, the City shall reject the work without compensation to the Contractor, and/or the Contractor shall be directed to replace that work at no additional costs to the City.

After completion of the Contract, the BOARD shall, upon recommendation of the ENGINEER, accept the Work as completed and authorize the Final Payment.

The Final Payment shall be the entire sum found to be due the Contractor after deducting therefrom all previous payments and all amounts to be kept and all amounts to be retained under the provisions of the Contract. All prior partial estimates and payments shall be subject to correction in the final estimate and payment.

No certificate given or payment made under the Contract, except the final certificate or Final Payment, shall be conclusive evidence of full or substantial performance of this Contract; and no payment shall be construed to be an acceptance of any defective work or improper material.

The acceptance of Final Payment by the Contractor shall release the CITY, the BOARD, and the ENGINEER from any and all claims or liabilities on account of work performed by the Contractor under the Contract or any alterations thereof.

The Contractor shall record, on the set of contract documents maintained at the job site, deviations which have been made from the Contract Documents or approved shop drawings – including buried or concealed construction and utility features which are revealed during the course of construction. Special attention shall be given to recording the horizontal and vertical location of all buried utilities that differ from the locations indicated, or which were not indicated on the Contract Documents. Said record documents shall be supplemented by detailed sketches as necessary or directed, to indicate fully the work as actually constructed.

Requests for partial payments shall not be approved until the record documents are brought up to date. Also, request for final compensation shall not be approved until all the variations between the work as constructed and as originally shown in the Contract Documents have been properly recorded and delivered to the City, after approved by the Engineer.

[Add the following:].

7-3.2.1 Prompt Progress Payment to Subcontractors

Contractor shall comply with the requirements of Division 2, Part 1, Chapter 7, Section 7200 of the California Public Code.

The CONTRACTOR agrees to pay each subcontractor under this Agreement for satisfactory performance of its contract no later than 7 days from the receipt of each payment the CONTRACTOR receives from CITY.

The CONTRACTOR agrees further to release retainage payments to each subcontractor within 7 days after the retention payment is received by the CONTRACTOR.

Any delay or postponement of payment from the above referenced time frame may occur only for good cause following written approval of the CITY. Any violation of this provision shall subject the violating prime contractor or subcontractor to the penalties, sanctions and other remedies specified in Section 7108.5 of the Business and Professions Code. This clause applies to both DBE and non-DBE prime contractors and subcontractors.

City will be strictly monitoring the Contractor for prompt payment to all subcontractors.

[Add the following:].

7-3.2.2 Prompt Pay Monitoring and Enforcement of Progress Payments

The City of Costa Mesa will use the following monitoring and enforcement mechanisms to ensure that all subcontractors, including DBE's, are promptly paid.

A. The City will strictly monitor the prime contractor or subcontractor(s) for prompt release of progress payments for all subcontracted work as follows:

1. The effective date of release is the date the City releases the check to the prime contractor by mailing or hand delivery at the City of Costa Mesa (has to be requested in writing ahead of time).
2. Prime contractor or subcontractor(s) to provide verification in writing that the subcontracts have been paid within 7 days or the time period agreed, from the effective date of release.
3. City may contact subcontractor(s) to confirm receipt of progress payment amount and if it was received within 7 days or the time period agreed from the effective date of release.

B. If the prime contractor or subcontractor(s) is found to be in default of Federal or State Codes concerning prompt payment to subcontractors, City will enforce the following besides the disciplinary action, sanctions and penalties imposed per the codes:

1. City will withhold 150% of the monies due to the subcontractor(s) from the prime contractor's next progress payment.
2. City may also elect to make the payment(s) directly to the subcontractor(s) without the prime contractor's approval for the remainder of the contract.

7-3.3 Delivered Materials

[Replace in its entirety with the following:].

The cost of materials and equipment delivered, but not incorporated in said work, will not be included in the progress payment estimate unless otherwise provided in these Specifications.

Materials delivered, but not in place, will not be classed as work done, except as

otherwise provided in these Specifications.

All materials shall be nontoxic and shall not contain asbestos and hazardous substances as established by applicable laws.

7-3.4 Mobilization

[Replace in its entirety with the following:].

Mobilization shall consist of all preparatory work and operations. It shall include, but not be limited to, the movement of personnel, equipment, materials, and incidentals to the project site necessary for work on the project. The mobilization shall include all other work and operations, which must be performed.

Mobilization shall also include the time, materials, and labor to move the necessary construction equipment to and from the job site and the project administration costs during the entire contract period.

This work shall include, but not be limited to protect-in-place and/or relocation of the facility to accommodate the construction of an improvement, including resetting curb drains through new curbing.

The Contractor shall provide supervisory personnel to keep the construction site in a safe condition and all other related work as required at all times. These requirements shall also apply to all non-working days during construction period. The Contractor is responsible for securing an adequate storage site for equipment and materials.

The Contractor shall have on the work site at all times, as his agent, a competent English-speaking superintendent capable of reading and thoroughly understanding the plans, specifications, and other related documents.

7-3.4.1 Travel Route for Trucking and Equipment

Plans indicating the travel route for the Contractor's equipment movement in and out of the work site must be submitted concurrently with the Haul Route Plan (Section 2-5.4) to the ENGINEER at the pre-construction meeting for approval prior to commencement of any work. The travel route plans, which meet the City's requirements, will be approved and returned to the Contractor; otherwise, further revisions are required until they are acceptable to the City. The approved travel plans shall be strictly adhered to by the Contractor during all phases of the construction.

Any deviation from these requirements is not permitted. All the Contractor's operations will be ceased at once if the Contractor violates any of these requirements. No further payments will be made to the Contractor until problems are resolved according to the City's requirements.

7-3.4.2 Construction Sequence/Order of Work

In order to minimize the inconvenience to adjacent buildings, businesses, and facilities that will remain in operation, the contractor shall construct the project and sequence the work in such a manner as to minimize impacts to the ongoing operation of adjacent buildings, businesses, and facilities. The proposed and subsequently approved Construction Schedule will be reflective of this requirement.

7-4 PAYMENT FOR EXTRA WORK

7-4.2 Basis for Establishing Costs.

7-4.2.1 Labor

[Add the following:].

The compensation for employer's payments of payroll taxes; workers compensation insurance; liability insurance; health and welfare; pension; vacation; apprenticeship funds; other direct costs resulting from Federal, State, or local laws; and for assessments or benefits required by lawful collective bargaining agreements to be applied to the actual cost for wages shall not exceed **23 percent** for regular time and overtime.

7-4.3 Markups**7-4.3.1 Work by the Contractor**

[Replace in its entirety with the following:].

The allowance for overhead and profit to be added to the Contractor's costs shall be as follows:

Labor:	15%
Materials:	10%
Contractor Owned Equipment	10%
Equipment Rental	10%*
Other Items and Expenditures	10%

To the sum of the costs and markups provided for in this section, 1 percent shall be added as compensation for bonding.

* Equipment Rental rates shall be based on the latest applicable Caltrans Equipment Rental Rates.

7-4.3.2 Work by a Subcontractor

[Replace in its entirety with the following:].

When all or any part of the extra work is performed by a Subcontractor, the markup established in 3-3.2.3(a) shall be applied to the Subcontractor's actual cost of such work. A markup of (5) percent on subcontracted portions of added work may be added by the Contractor.

No markups will be allowed for second tier or higher subcontractors.

[Add the following:].

7-6 SUMMARY OF PUBLIC CONTRACT CODE § 9204

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

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

Initial Review

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

Meet & Confer

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

Mediation

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

Miscellaneous Provisions

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

SECTION E

PART 1.1

SPECIAL PROVISIONS

[Add the following Section:].

101-1 GENERAL

Additions/Modifications to Standard Specifications

The following additions/modifications are made to the latest edition of the "Standard Specifications for Public Works Construction" (The "Greenbook"), and the General Provisions stated within the "Standard Specifications" of this Project. Should there be a conflict between any of these provisions; the Special Provisions shall have precedence.

All work shall be performed in conformance with the latest edition of the Uniform Building Code as adopted by the City of Costa Mesa. The electrical, plumbing, and fire codes, and other regulations as adopted by the City of Costa Mesa Building Official shall apply to this project.

Where referenced in these specifications, the latest edition of the "City of Costa Mesa Standard Drawings" and the "Work Area Traffic Control Handbook (WATCH)" published by Building News, Inc., shall also apply.

Payment for compliance with the following provisions shall be included in the various bid items of work unless otherwise modified in the special provisions section. No additional compensation will be allowed.

Payment for the various items listed on the Bid Proposal, as further specified herein, shall constitute full compensation to the Contractor for furnishing all labor, materials, tools, equipment, supplies, manufactured articles, and incidentals necessary for the completion of the work and for performing all work contemplated and embraced under the Contract, in accordance with the Plans and Contract Documents. This shall include the Contractor's costs involved with bonding, insurance, worker's compensation, overhead, financing, obtaining required permits and permit fees, mobilization, traffic control, public convenience and safety, protective barricading/fencing, sanitary facilities, storage of equipment and materials, security against theft and vandalism, project site maintenance, dust and runoff control, clean-up including all costs for compliance with the regulations of public agencies having jurisdiction, including Safety and Health Requirements of the California Division of Industrial Relations and the Occupational Safety and Health Administration (OSHA) of the U. S. Department of Labor, and all other items related to the work.

Payment for compliance with the following provisions shall be included in the various bid items of work unless otherwise modified in the special provisions section. No additional compensation will be allowed.

No separate payments will be made for any items that are not specifically set forth in the Bid Proposal. Payments for any such items are included in various bid items of work.

Costs arising from violations of regulations will be paid by the offending party to the extent that there will be no additional cost to the City.

101-2 FIRE STATION 4 – TRAINING FACILITY (SITE IMPROVEMENTS)

101-2.1 Scope of Work

The Work to be done generally consists of remodeling the Fire Station No. 4 Training Facility located at 2300 Placentia Ave, Costa Mesa. The work includes site preparation, demolition of a portion of the existing asphalt pavement and its replacement with a combination of a new concrete slab on grade, new crew parking area, miscellaneous pavement, ADA accessibility improvements and treatment of the existing asphalt surface; an attached structure with decontamination showers and restrooms for training use; an underground water recovery system that reconfigures the existing storm drain system (with pumps), a solar panel system mounted over carports, the site preparation, footing excavation and layout of a structural footing along with the installation of an lighting electrical system for a prefabricated structure (tower pre-fabrication and installation done by others), and deferred solar panel submittals for the Building Department and Fire review, approval, and permits.

Scheduling and coordinating work activities, so that the work has minimal impacts on the existing operations at the Fire Station No. 4 operations, which will remain open for emergency responses at all times and will require access along Placentia Ave, and through the back entrance of the fire station as seen on **Appendix C**. The contractor shall submit to the City a proposed solar panel electrical system and a staging layout as specified in Deferred Submittals/Approvals on page SP-8.

The Contractor shall coordinate the installation of a prefabricated tower with **WHP Training Towers TM**. The installation of the tower shall commence after the General Contractor prepares the site, layout and excavates the footing; after the foundation is in place, the tower installation period would be completed within approximately **15-17 weeks**. It is the responsibility of the contractor to sequence the project activities around this period, any stop of work or idle time generated within this period must be included in the Contractor's bid, and no extra cost shall be requested to the City.

A mandatory pre-bid job walks to verify the existing conditions inside the Fire Station 4 existing training facility shall be attended by all eligible bidders.

101-2.2 Measurement and Payment - Bid Items

BID ITEM 1 LUMP SUM FIRE STATION 4 – TRAINING FACILITY (SITE IMPROVEMENTS)

The Work consists of remodeling the Fire Station No. 4 Training Facility located at 2300 Placentia Ave, Costa Mesa. The work includes site preparation, demolition of a portion of the existing asphalt pavement and its replacement with a combination of a new concrete slab on grade, new crew parking area, miscellaneous pavement, ADA accessibility improvements and treatment of the existing asphalt surface; an attached structure with decontamination showers and restrooms for training use; an underground water recovery system that reconfigures the existing storm drain system (with pumps), a solar panel system mounted over carports, the site preparation, footing excavation and layout of a structural footing along with the installation of an lighting electrical system for a prefabricated structure (tower pre-fabrication and installation done by others), and deferred solar panel submittals for the Building Department and Fire review, approval, and permits, per the Contract Plans and Specifications.

This bid item includes full compensation for all the work as described herein, on the plans and specifications, and appurtenant required to deliver a turnkey project. Any item of work shown on the plans and/or described in the specifications, that are not specifically enumerated in a particular bid item must be included in this bid item. The work shall consist of performing, providing, installing, etc. all labor, materials, tools, equipment, appurtenances, and incidentals for a turnkey project as detailed in herein.

Contractor shall submit a schedule of values and a contract baseline schedules for review and approval prior to the start of construction. Payment to the contractor shall be made based on review of the approved contract schedule of values and the progress reflected in the approved contract baseline schedules. Payment is made for work completed and materials placed/installed. No additional compensation will be allowed.

Measurement and Payment for all line items in the schedule of values shall include permits, inspections, coordination, labor, equipment, and materials required to complete the contract work as described hereon. The prices in the approved schedule of values shall represent a balanced bid and include indirect costs and markup. No additional compensation will be allowed.

BID ITEM 2 FORCE ACCOUNT ALLOWANCE

The Contractor acknowledges that this bid item will only be used at the discretion of the ENGINEER. The allowance for this line item is as shown within the Proposal Section of these Specifications.

At the direction of the Engineer, Contractor shall provide pricing, documentation, and justification for all labor, equipment and materials for any additional work requested beyond the base Scope of Work established within these specifications.

Upon review of pricing, and at the direction of the ENGINEER, the Contractor shall provide labor, equipment, and materials for the additionally priced work beyond the base scope of work established within the Project Plans and Specifications.

The Contractor acknowledges this bid item will be used at the discretion of the Engineer for the mitigation of unforeseen circumstances.

Measurement and Payment for "Additional Work Items" shall be paid per Forced Account (F.A.) for all work performed pursuant to Section 7-4.2 of these specifications and shall include all labor, equipment and materials as required to complete the work as directed by the Engineer.

101-4 ADMINISTRATIVE ARTICLES – ADDITIONS/MODIFICATIONS

The following additions/modifications are made to the latest edition of the "Standard Specifications for Public Works Construction", and the General Provisions stated within the "Standard Specifications" of this project. Should there be a conflict between any of these provisions; the Supplement Provisions shall have precedence.

ARTICLE SP-02 – SPECIFICATIONS

A. Directed to the Contractor:

Where portions of these Specifications are written in imperative form, the imperative language is directed to the Contractor, unless specifically noted otherwise.

B. Specification Paragraphs:

- 1) Specification Paragraphs titled "Summary" or "Description of Work" are not intended to "scope" the Section nor imply a trade responsibility, but serve merely as a listing of significant items in the Section to allow the reader to quickly assess the Section content.
- 2) Similarly, specification Paragraphs titled "Related Documents" are not intended to coordinate the Contractor's work, but merely indicate where certain other significant items that may be related to the work of the Section are indicated and/or specified.

C. Specification Definitions:

Contract Sum/Price is stated in the Contract and, includes authorized adjustments pursuant to Change Orders, Partial Change Orders, and/or Construction Directives and is the total amount payable by the City to the Contractor for performance of the Work under the Contract.

Contract Time, unless otherwise provided, is the period of time, including authorized adjustments, allotted in the Contract for Completion of the Work

Days mean working days.

Drawings are graphic and pictorial portions of the Contract/Construction Documents prepared for the Project and approved changes thereto, wherever located and whenever issued, showing the design, location, and scope of the Work, generally including plans, elevations, sections, details, schedules, and diagrams as drawn or approved by the Architect.

E-builder is construction management software used to track plans, addendums, submittals, RFI(s), schedules, change orders, daily reports, photos, meeting notes, etc. The Contractor may propose an equal alternative construction management or file sharing platform in lieu of e-builder.

Emergency shall be defined as a sudden, unexpected occurrence, involving a clear and imminent danger, demanding immediate action to prevent or mitigate loss of, or damage to, life, health, property, or essential public services. Emergency includes such occurrences as fire, flood, earthquake, or other soil or geologic movements, as well as such occurrences as riot, accident, or sabotage.

Equal/Equivalent means a product, service, component or system which is demonstrated, through the submittal process, to the satisfaction and specific approval of the City or its designee to be equal to the product, service, component or system specified as set forth in these Contract.

Equipment is a general term which refers to vehicles, systems, assemblies, sub-assemblies, products, material, fittings, devices, appliances, fixtures, apparatus, supplies and the like used in the performance of a specific function or functions or Contract obligation.

Extra Work means work of which the performance or compensation thereof is not otherwise provided for in the Contract, but found by the City to be necessary or desirable to the satisfactory completion of this Contract and within its intended scope.

Furnish means to supply material or items requiring further installation.

Inspector of Record is the individual retained by the City in accordance with titles 21 and 24 of the California Code of Regulations and who will be assigned to the Project.

Install means installation and fixing into place of a furnished material or item.

Locality in which the work is performed means the City/County in which the Project is located.

Modification(s) means a written amendment to the Contract signed by parties in the form of a Change Order, a Proposed Change Order, a Construction Directive, Construction Change Notice, or a written order (Architect's Supplemental Instruction-ASI) for a minor change in the Work issued by the Architect.

Notice to Proceed means a written notice from the City to Contractor to proceed with the Work by a specified date.

Plan(s) shall mean the same as Drawings

The Project is the complete construction of the Work performed in accordance with the Contract/Construction Documents.

The Project Manual means the volume assembled for the Work which may include, without limitation, the bidding requirements, sample forms, Conditions of the Contract, Drawings and Specifications.

Provide shall include "provide complete in place," that is "furnish and install."

Project Schedule - The "Project Schedule" is the schedule produced by the General Contractor of the combined itemized CPM schedules activities to complete the scope of work within the Contract Documents. General Contractor shall staff the project sufficiently to maintain the project schedule durations and milestones. The schedule will be monitored and tracked by the General Contractor and submitted for review monthly to the City.

Reference Standards for Material, Equipment, Work, procedures or workmanship established by reference to standards or procedures published in a described reference text. Referenced Standards shall have the same force and effect as if they are physically incorporated in the Contract.

Regular Work Day consists of eight hours as required under Section 1810 of the California Labor Code.

Safety Orders are those issued by any cognizant city, county, state or federal agency.

Site refers to the grounds of the Project as defined in the Contract Documents and such adjacent lands as may be directly affected by the performance of the Work.

The Specifications are that portion of the Contract Documents consisting of the written requirements for material, equipment, construction systems, instructions, quality assurance standards, workmanship, and performance of related services.

Substantial Completion of the Work - unless defined differently in the Supplemental Conditions, the phrase means, that point in the progress of the Work where the Work is completed according to the requirements of the Contract Documents so that the City can occupy, have beneficial use of, and enjoy, the entire Project for its intended purpose; and where only minor and/or trivial defects in the Work remain that do not preclude the City occupying, having beneficial use of, or enjoying the entire Project for its intended purpose.

Standards, Rules, and Regulations referred to are recognized printed standards and shall be considered as one and a part of these specifications within limits specified. Federal, state and local regulations are incorporated into the Contract Documents by reference.

Subcontractor(s), as used herein, includes those having direct or indirect contracts with Contractor and one who furnishes labor, services, materials, products, equipment, supplies, apparatus, and the like, or one who furnishes services for a special design according to plans, drawings, and specifications of this Work. The definition includes all persons and/or entities that are entitled to file a Stop Notice on the Project under applicable law.

Surety is the person, firm, or corporation that executes as surety the Contractor's Performance Bond and Payment Bond.

Work of the Contractor or Subcontractor shall include all labor, services, materials, products, equipment, supplies, apparatus, and the like, necessary for the Contractor to fulfill all of its obligations pursuant to the Contract Documents. It shall include the initial obligation of any Contractor or Subcontractor who performs any portion of the Work, to visit the Site of the proposed Work (a continuing obligation after the commencement of the Work).

D. Addenda and Deferred Submittals/Approvals

Addenda are the changes in specifications, drawings, contract documents, and plans which have been prepared by the Architect and authorized in writing by the City and which alter, explain, or clarify the contract documents. Addenda shall govern over all other Contract Documents. Subsequent addenda issued shall govern over prior addenda unless otherwise specified in the addenda.

Deferred Submittals/Approvals. Contract Documents which require deferred approval items are meant to be for illustration purposes only. Contractor is responsible for all deferred submittal/approval requirements including engineered plans, specs, and/or shop drawings as set forth in the Contract Documents. Contractor is responsible to comply with all laws, building codes, and regulations necessary to obtain all necessary approvals, including those required from the Division of the State Architect ("DSA") and the State Fire Marshal. Contractor shall not be granted an extension of time for failure to obtain necessary approvals due to failure to comply with laws, building codes, and other regulations (including Title 24 of the California Code of Regulations). Contractor shall schedule all deferred approval items in its progress schedule pursuant to Article 3. If Contractor fails to include deferred-approval items in its schedule which results in a critical path delay, then Contractor shall be subject to the assessment of liquidated damages.

The following plans are required deferred plan submittals and approvals that shall include engineered plans, specs, and/or shop drawings:

1) **Carport Mounted Solar Panel Electrical System**

The following layouts submittals are required and approvals by the Public Works and Fire & Rescue departments:

- 1) **Project Schedule:** Must include the Tower Installation activities done by another contractor within the project milestone schedule.
- 2) **Project Stages Layout:** Must including all stages of work showing the proposed entrances for the Fire Department Emergency Vehicles and Trucks, with an access path of travel minimum width of 20 feet (Considering the turning radius), this access has to be clear of any vehicle, tool, and debris that may block the entrance of the vehicles or damage caused by debris. Contractor must consider hauling constantly any debris generated by the demolition activities and should not stockpile any excess of material within the project site. The layout must show proposed stockpile locations and all emergency and hauling routes within the project.

Coordination/communication of deferred submittals/approvals with architectural, structural, mechanical, electrical, and plumbing plans and their corresponding assigned subcontractors shall be the responsibility of the Contractor.

E. Specification Interpretation

Titles. The Specifications are separated into titled sections for convenience only and not to dictate or determine the trade or craft involved.

As Shown, Etc. Where “as shown,” “as indicated,” “as detailed,” or words of similar import are used, reference is made to the Drawings accompanying the Specifications unless otherwise stated. Where “as directed,” “as required,” “as permitted,” “as authorized,” “as accepted,” “as selected,” or words of similar import are used, the direction, requirement, permission, authorization, approval, acceptance, or selection by Architect is intended unless otherwise stated.

General Provisions. The General Provisions, and the Special Provisions if any, are a part of each and every section of the Specifications.

Abbreviations. In the interest of brevity, the Specifications are written in an abbreviated form and may not include complete sentences. Omission of words or phrases such as “Contractor shall,” “shall be,” etc., are intentional. Nevertheless, the requirements of the Specifications are mandatory. Omitted words or phrases shall be supplied by inference in the same manner as they are when a “note” occurs on the Drawings. In the interest of brevity, the Contract Documents frequently omit modifying words such as “all” and “any” and articles such as “the” and “an,” but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement.

Plural. Words in the singular shall include the plural whenever applicable or the context so indicates.

Metric. The Specifications may indicate metric units of measurement as a supplement to U.S. customary units. When indicated thus: 1” (25 mm), the U. S. customary unit is specific, and the metric unit is nonspecific. When not shown with parentheses, the unit is specific. The metric units correspond to the “International System of Units” (SI) and generally follow ASTM E 380, “Standard for Metric Practice.”

Standard Specifications. Any reference to standard specifications of any society, institute, association, or governmental authority is a reference to the organization’s standard specifications, which are in effect at the date of the Contractor’s proposal

unless directed otherwise. If applicable specifications are revised prior to completion of any part of the Work, the Contractor may, if acceptable to Architect and City, and approved by the City perform such Work in accordance with the revised specifications. The standard specifications, except as modified in the Specifications for the Project, shall have full force and effect as though printed in the Specifications. Architect will furnish, upon request, information as to how copies of the standard specifications referred to may be obtained.

F. Rules of Document Interpretation

- 1) Should the Contractor discover any conflicts, omissions, or errors in the Contract Documents, or have any question concerning interpretation or clarification of the Contract Documents, or if it appears that the Work to be done or any matters relative thereto are not sufficiently detailed or explained in the Contract Documents, then before proceeding with the work affected, the Contractor shall within 48 hours notify the City in writing through email and request interpretation, clarification, or additional detailed instructions and/or drawings concerning the work. All such questions shall be resolved and instructions to the Contractor issued by the City through email/planet bids. For bidding purposes, the Contractor shall be held to the most stringent of requirements found within the Contract Documents.
- 2) Should the Contractor and/or their subcontractors proceed with the work affected before receipt of instructions from the City it shall remove and replace or adjust any work, which is not in accordance therewith, and it shall be responsible for any resultant damage, defect, or added cost.
- 3) If any portion of the Contract Documents shall be found to be in conflict with any other portion, the various Documents comprising the Contract Documents shall govern in the following order of precedence: Permits from outside agencies required by law and applicable codes or laws, Modifications; the City/Contractor Agreement; addenda; supplemental conditions; General Conditions; other Division 0 and Division 1 documents and Sections; specifications; the drawings. As between figures given on drawings and the scaled measurements, the figures shall govern. As between large scale drawings and small-scale drawings, the larger scale shall govern. Cost of the work, Schedule of values.
- 4) In general, the Drawings will show dimensions, position, and kind of construction; And the Specifications, qualities and methods. Any work called for in the Drawings and not mentioned in the Specifications, or vice versa, shall be performed as though fully set forth in both. Work not particularly detailed, marked, or specified shall be the same as similar parts that are detailed, marked, or specified.

- 5) In case of conflict between the Drawings and Specifications, the Drawings shall govern in matters of quantity, the Specifications in matters of quality. In case of conflict within the Drawings involving quantities or within the Specifications involving quality, the greater quantity and the higher quality shall be furnished.
- 6) Should an error appear in the Drawings or Specifications, or in the work done by others affecting this work, the Contractor shall notify the City at once through e-builder. In conjunction with the Architect, the City will issue instruction as to procedure through e- Builder. If the Contractor proceeds with the work so affected without instructions from the City, he shall make good any resulting damage or defects.
- 7) The general character of the detail work is shown on the Contract Drawings. Any work executed before receipt of such details, if not in accordance with same, shall be removed and replaced, or adjusted, as directed, without expense to the City. Should any detail submitted later than the Contract Drawings is, in the opinion of the Contractor, more elaborate than the Scale Drawings and the Specifications indicated, written notice thereof shall be given to the City within three (3) days of receipt of same: The claim will then be considered, and, if justified, said detail drawings will be amended or the extra work authorized. Non receipt of such notice shall relieve the City of any claim.
- 8) Where on any Drawings a portion of the work is drawn out and the remainder is indicated in outline, the drawn out parts shall apply to all other like portions of the work. Where ornament or other detail is indicated starting only, such detail shall be continued throughout the courses or parts in which it occurs and shall also apply to other similar parts in the work, unless otherwise indicated.
- 9) When specified brands or kinds of material are called for they are mentioned merely as standards and the Contractor has the option of using any other brand of equal quality if approved by the Architect. Any materials named in the Specifications, or which may be substituted, must, if so desired by the Architect, be tested by said Architect at the expense of Contractor.
- 10) Any material specified by reference to the number, symbol, or title of a specified standard such as a Commercial Standard, a Federal Specification, a trade association standard, or other similar standards, shall comply with the requirements in the latest approved revision thereof and any amendments or supplements thereto in effect on the date of Notice to Contractors, except as limited to type, class, or grade, or modified in such reference.
- 11) The standards referred to, except as modified in the Specifications, shall have full force and effect as though printed in these Specifications. These standards are not

furnished to bidders, for the reason that the manufacturers and trades involved are assumed to be familiar with their requirements. The Architect will furnish, upon request, information as to how copies of the standards referred to may be obtained.

- 12) Where it is required in the Specifications that materials, products, processes, equipment or the like be installed or applied in accordance with manufacturers' instructions, directions, or specifications, it shall be construed to mean that said application or installation shall be in strict accordance with the printed instructions furnished by the manufacturer of the materials considered for use under conditions similar to those at the job site. Eight copies of such instructions shall be furnished to the City.
- 13) Where ever an article, device or piece of equipment is referred to in singular number, such reference applies to all such articles shown on Drawings or required to complete the installation.

ARTICLE SP-03 BUILDING PERMIT

The Building permit will be obtained and paid for by the Contractor. Required permits, electrical, mechanical, plumbing, fire, etc. are the responsibility of the Contractor. The contractor shall design, submit for review and approval, and obtain the permits.

ARTICLE SP-04 REQUEST FOR INTERPRETATION ("RFI")

A. REQUEST FOR INTERPRETATION ("RFI")

Definition. An RFI is a written request prepared by the Contractor and submitted requesting the Architect to provide additional information or interpretation necessary to clarify or amplify an item that the Contractor believes is not clearly shown or called for in the drawings or specifications, or to address problems that have arisen under field conditions.

Scope. The RFI shall reference all the applicable Contract Documents including specification section, detail, page numbers, drawing numbers, and sheet numbers, etc. The Contractor shall make suggestions on how to resolve, and interpretations of the issue raised, by the RFI. An RFI cannot modify the Contract Cost, Contract Time, or the Contract Documents.

Response Time. The Contractor must submit an RFI sufficiently in advance of when the Work related thereto is scheduled to begin in order to provide the City and the Architect with sufficient time to respond to the RFI after receiving the RFI and before such Work is then currently scheduled to be performed. If the Architect's response

results in a change in the Work, then such change shall be effectuated by a written Change Order, Proposed Change Order, or Construction Directive, if appropriate. If the Architect cannot respond to an RFI within a reasonable time, the Contractor, upon receiving a Construction Directive from the City, must commence Work immediately or the delays and costs related to failure to perform shall be the responsibility of the Contractor. Costs and/or time related to this work will be resolved initially pursuant to General Requirements. If the Architect cannot respond to the RFI within a reasonable time, not to exceed seven (7) calendar days, excluding City Observed Holidays, the Architect shall notify the Contractor, with a copy to the Inspector and the City, of the amount of time that will be required to respond as defined in the General Requirements.

ARTICLE SP-05 DOCUMENTS AND SAMPLES AT THE SITE / SUBMITTALS

A. DOCUMENTS AND SAMPLES AT THE SITE

The Contractor shall maintain at the Site for the City one current copy of the Uniform Building Code, Titles 19, 21 and 24 of the California Code of Regulations and one record copy of the Drawings, Specifications, Addenda, Change Orders, and other Modifications, in good order and marked currently to record changes and selections made during construction. In addition, the Contractor shall maintain at the Site approved Shop Drawings, Product Data, Samples, and similar required submittals. These documents shall be available to the Architect and City and shall be delivered to the City upon completion of the Work.

B. SHOP DRAWINGS, PRODUCT DATA AND SAMPLES:

- 1. Submittals defined Shop Drawings.** The term "shop drawings" as used herein means drawings, diagrams, schedules, and other data, which are prepared by Contractor, Subcontractors, manufacturers, suppliers, or distributors illustrating some portion of the Work, and includes: illustrations; fabrication, erection, layout and setting drawings; manufacturer's standard drawings; schedules; descriptive literature, instructions, catalogs, and brochures; performance and test data including charts; wiring and control diagrams; and all other drawings and descriptive data pertaining to materials, equipment, piping, duct and conduit systems, and methods of construction as may be required to show that the materials, products, equipment, or systems and their position conform to the requirements of the Contract Documents. The Contractor shall obtain and submit with shop drawings all seismic and other calculations and all product data from equipment manufacturers. "Product data" as used herein are illustrations, standard schedules, performance charts, instructions, brochures, diagrams, and other information furnished by the Contractor to illustrate a material, product, or system for some portion of the Work. As used herein, the

term “manufactured” applies to standard units’ usually mass-produced, and “fabricated” means items specifically assembled or made out of selected materials to meet individual design requirements. Shop drawings shall: establish the actual detail of all manufactured or fabricated items, indicate proper relation to adjoining work, amplify design details of mechanical and electrical systems and equipment in proper relation to physical spaces in the structure, and incorporate minor changes of design or construction to suit actual conditions.

2. **Samples.** The term “samples” as used herein are physical examples furnished by Contractor to illustrate materials, equipment, or quality and includes natural materials, fabricated items, equipment, devices, appliances, or parts thereof as called for in the Specifications, and any other samples as may be required by the Architect to determine whether the kind, quality, construction, finish, color, and other characteristics of the materials, etc., proposed by the Contractor conform to the required characteristics of the various parts of the Work. All Work shall be in accordance with the approved samples.

3. **Schedule for Submission of Shop Drawings.** Contractor shall obtain and submit all required shop drawings, samples, etc., in accordance with the Project Schedule as required in the scheduling portion of the General Conditions with such promptness as to cause no delay in its own Work or in that of any other Contractor or subcontractor but in no event later than ninety (30) days after the execution of Notice to Proceed. Contractor shall submit all shop drawings, samples, and manufacturer’s descriptive data for the review of the City and Architect through e- Builder except for physical samples which shall be submitted directly to the Architect. By submitting shop drawings, product data, samples, etc., the Contractor represents that it has determined and verified all materials, field measurements, catalog numbers, related field construction criteria, and other relevant data in connection with each such submission, and that it has checked, verified, and coordinated the information contained within such submittals with the requirements of the Work and Contract Documents. The submission of the shop drawings, product data, samples, etc., shall not deviate from the requirements of the Contract Documents including detailing and design intent which is specifically outlined in Contract Documents except as specifically authorized by the Architect or through an accepted substitution. All deviations from the Contract Documents shall be described, in a narrative format, in a transmittal accompanying the shop drawings. Shop drawings shall not be used as a means of requesting a substitution. Review by the City and Architect shall not relieve the Contractor or any Subcontractor from its responsibility in preparing and submitting proper shop drawings in accordance with the Contract Documents. Any submission, which in the City’s opinion is incomplete, contains errors, or has been checked superficially, will be returned un- reviewed by the Architect for resubmission by the Contractor. Contractor

shall stamp, sign, and date each submittal indicating its representation that the submittal meets all of the requirements of the Contract Documents and evidence Contractor's review through execution of the following stamp to be placed on each shop drawings:

"The Contractor has reviewed and approved the field dimensions and the construction criteria, and has also made written notation regarding any information in the shop drawings that does not conform to the contract documents. This shop drawing has been coordinated with all other shop drawings received to date by Contractor and this duty of coordination has not been delegated to subcontractors, material suppliers, City, Architect, or the Engineer(s) on this Project.

Signature of Contractor and Date

4. **Extent of Review.** In reviewing shop drawings, the City and Architect will not verify dimensions and field conditions. The Architect will review and approve shop drawings, product data, samples, etc., for aesthetics and for conformance with the design concept of the Work and the information in the Contract Documents. The Architect's and City's review shall neither be construed as a complete check which relieves the Contractor, Subcontractor, manufacturer, fabricator, or supplier from responsibility for any deficiency that may exist or from any departures or deviations from the requirements of the Contract Documents unless the Contractor has, in writing, called the Architect's attention to the deviations at the time of submission. The Architect's and City's review shall not relieve the Contractor or Subcontractors from responsibility for errors of any sort in shop drawings or schedules, for proper fitting of the Work, coordination of the differing subcontractor trades and shop drawings and Work which is not indicated on the shop drawings at the time of submission of shop drawings. Contractor and Subcontractors shall be solely responsible for any quantities which may be shown on the submittals or Contract Documents.

5. **Drawing and Submission Procedure - Transmittal Letter and Other Requirements.** All submittals and shop drawings shall be properly identified with the name of the Project, submittal number organized by division, dated, and each lot submitted must be accompanied by a letter of transmittal referring to the name of the Project and to the Specification section number for identification of each item clearly stating in narrative form, as well as "clouding" on the submissions, all qualifications, departures, or deviations from the Contract Documents. Shop drawings, for each section of the Work shall be numbered consecutively by division, and the numbering system shall be retained throughout all revisions. All Subcontractor submissions shall be made through the Contractor. Each drawing shall have a clear space for the stamps

of Architect and Contractor.

6. **Copies Required.** Each submittal shall be physically and electronically submitted for each drawing or schedule, table, cut sheet, etc., including fabrication, erection, layout and setting drawings, and such other drawings as required under the various sections of the Specifications, until final acceptance thereof is obtained. Upon final approval of one hard copy shall be submitted to City or Architect. Subcontractor shall submit in an amount as requested by the Contractor, of: (1) manufacturers' descriptive data for materials, equipment, and fixtures, including catalog sheets showing dimensions, performance, characteristics, and capacities; (2) wiring diagrams and controls; (3) schedules; (4) all seismic calculations and other calculations; and (5) other pertinent information as required by the City or Architect.

7. **Corrections.** The Contractor shall make all corrections required by Architect and shall resubmit within seven (7) calendar days, as required by Architect or City, corrected copies of shop drawings or new samples until approved. Contractor shall direct specific attention in writing or on resubmitted shop drawings to revisions other than the corrections required by the Architect or City on previous submissions. Professional services required for more than one
(1) re-review of required submittals of shop drawings, product data, or samples are subject to charge to the Contractor.

8. **Approval Before Commencement of Work.** No portion of the Work requiring a shop drawing or sample submission or other submittal shall be commenced until the submission has been reviewed by Contractor, City, and Architect, and approved by the Architect, unless specifically directed in writing by the Architect. All such portions of the Work shall be in accordance with approved shop drawings and samples.

9. **Sample Submissions Procedure - Samples Required.** In case a considerable range of color, graining, texture, or other characteristics are anticipated in finished products, a sufficient number of samples of the specified materials shall be furnished by the Contractor to indicate the full range of characteristics which will be present in the finished products; and products delivered or erected without submittal and approval of a full range of samples shall be subject to rejection. Except for range samples, and unless otherwise called for in the various sections of the Specifications, transmittal notification of samples shall be submitted. All samples shall be marked, tagged, or otherwise properly identified with the name of the submitting party, the name of the Project, the purpose for which the samples are submitted and the date, and shall be accompanied by a letter of transmittal containing similar information,

together with the submittal number, and Specification section number. Each tag or sticker shall have clear space for the review stamps of Contractor and Architect.

10. **Labels and Instructions.** All samples of materials shall be supplied with the manufacturer's descriptive labels and application instructions.
11. **Architect's Review.** The Architect and City will review and, if appropriate, approve submissions and will return them to the Contractor with the Architect's stamp and signature applied thereto, indicating the timing for review and appropriate action in compliance with the Architect's (or City's) standard procedures with twenty-one (21) calendar days.
12. **Record Drawings and Annotated Specifications.** The Contractor is responsible for as-built record drawings and specifications. The Contractor shall at the time of installation and no less than on a weekly basis, update a master set of as-built reproducible drawings to be maintained in the project office. In addition, an as-built set of blue line drawings shall be kept current at the project site and be clearly labeled "As-Built Progress Documents". These Documents shall be made available to for viewing by the City and the Architect at any time. The following information shall be inserted and dimensioned on said drawings and specifications, in RED, by the Contractor: the exact horizontal and vertical location of all installations in their finished condition, including but not limited to changes made by change orders, construction directives, responses to RFI's, Architect's Supplemental Instruction's, verbal confirmations, and other modifications described in these Contract Documents: Locations of Work buried under and outside the building, such as plumbing and electrical lines and conduits: Locations of significant Work concealed inside the building whose general locations have been changed from those shown on the Contract Documents: Locations of items, not necessarily concealed, which have been changed with the City or Architect's prior acceptance, from the location shown on the Contract Documents: Locations of main runs of piping, conduit, ductwork, and similar items by dimensions: Locations other items either by dimensions or in relation to spaces within the building: Record deviations from the sizes, locations, and other features of installation shown in the Contract Documents: Establish locations of underground Work by dimension to column lines or walls, locating turns, and by referenced centerline and invert elevations and rates of fall: Give sufficient information to locate Work concealed in the building. Exact dimensioned location of all utilities underground within the construction limit lines.

The Contractor shall update the drawings as work progresses. Failure to comply with the preparation and submission of as-built drawings may result in the City withholding the next month's progress payment.

13. **Equipment Manuals.** Contractor shall obtain and furnish, in the quantity described in Section: Contract Closeout of the General Requirements; complete sets of manuals containing the manufacturers' instructions for maintenance and operation of each item of equipment and apparatus furnished under the Contract Documents and any additional data specifically requested under the various sections of the Specifications for each division of the Work. The manuals shall be arranged in logical, sequential order, labeled, indexed, and placed in three-ring binders and where practical also through electronic format. At the completion of its Work, the Contractor shall certify, by endorsement thereon, that each of the manuals is complete, accurate, and covers all of its Work. Prior to submittal of Contractor's Application for Final Payment, and as a further condition to its approval by the Architect, each Subcontractor shall deliver the manuals, arranged in logical, sequential order, labeled, indexed, endorsed, and placed in three-ring binders and where practical also through electronic format via e-builder, to the Contractor, who shall assemble these manuals for all divisions of the Work, review them for completeness, and submit them to the City.
14. **City's Property.** All shop drawings, computer disks, annotated specifications, samples and other submittals shall become the City's property upon receipt by the City or Architect.
15. **Substitutions - One Product Specified.** Whenever the Contract Documents indicate any specific article, device, equipment, product, material, fixture, patented process, form, method, or type of construction or any specific name, make, trade name, or catalog number, with or without the words "or equal," such specification shall be deemed to be used for the purpose of facilitating description of the material, process, or article desired and shall be deemed to be followed by the words "or equal." The Contractor may, unless otherwise stated, offer any material, process, article, etc., which shall be materially equal or better in every respect to that so indicated or specified ("Specified Item") and will completely accomplish the purpose of the Contract Documents. Subject to the requirements specified in article SP-05 B, note 17.
16. **Products Specified Which are Commercially Unavailable.** If the Contractor fails to make a request for substitutions for products and such products subsequently become commercially unavailable, the Contractor may request a substitution for such commercially unavailable item. The decision to grant this request is solely at the City's discretion. The written approval of the City,

consistent with the procedure for Change Orders, shall be required for the use of a proposed substitute material. The City may condition its approval of the substitution upon the delivery to City of an extended warranty or other assurances of adequate performance of the substitution as well as an equitable deduction in the contract price should the substituted item cost less than the Specified Item. All risks of delay due the approval of a requested substitution by the City, or any other governmental agency having jurisdiction, shall be on the requesting party. All additional costs, all procurement and construction delays, and all costs for review by the Architect or its consultants shall be the responsibility of the Contractor and deducted via Change Order.

17. **Substitution Request Form.** Requests for substitutions of products, materials, or processes in place of the Specified Item must be in writing to the City (refer to Contract Documents)

The Request Form must be accompanied by evidence as to whether the proposed substitution:

1. Is equal in quality/service/ability to the Specified Item;
2. Will entail no changes in detail, construction, and scheduling of related work;
3. Will be acceptable in consideration of the required design and artistic effect;
4. Will provide no cost disadvantage to the City;
5. Will require no excessive or more expensive maintenance, including adequacy and availability of replacement parts; and
6. Will require no change of the construction schedule.

Only one request for substitution will be considered for each product. By completing and submitting the request for substitution the Contractor acknowledges that should the request for substitution not be approved by the City that the Contractor shall supply the specified at no addition claim for cost to the City.

Substitution proposals will only be considered during bidding phase. All substitution proposal requests shall be submitted to the City for review no later than 10 working days prior to bid opening. Failure to meet said time period shall constitute a waiver by the Contractor and an acceptance of the specified materials. Late submittals may be considered only when the City consents in writing that it is in the City's best interests.

The City and the Architect shall evaluate said request, and shall approve, deny, approve with conditions, or initiate the response to the Contractor's request via

Addenda. If the proposed substitution is rejected, the Contractor shall provide the material originally specified. Such decision shall be final.

Failure by the Contractor to identify all deviations from the Contract Documents in its request for substitution shall render any City action taken thereon null and void. The Contractor shall bear all costs resulting from any error in the request for substitution.

18. List of Manufacturers and Products Required. The Contractor shall require all Subcontractors to prepare and submit to the Contractor, within thirty (30) days of execution of the Subcontract, comprehensive lists, of the manufacturers and products proposed for the Project, including information on materials, equipment, and fixtures required by the Contract Documents, as may be required for the Contractor's or Architect's approval. Approval of such lists of products shall not be construed as a substitute for the shop drawings, manufacturer's descriptive data, and samples, required by the Contract Documents, but rather shall be considered as a base from which more detailed submittals shall be developed for final review by the Contractor, City and the Architect.

19. Deferred Approvals - Deferred approvals shall be submitted and transmittal notification of the deferred material and processed pursuant to the requirements of the Contract Documents and Specifications. All deferred approvals shall be prepared by Contractor or Contractor's agent early enough so as to not delay the Project. Contractor is aware that Title 21 California Code of Regulations section 17(g) and Title 24 California Code of Regulations section 4-317 have specific requirements for deferred approval as to governing agencies and as to the Architect and Engineer for the Project. As a result, any delay associated with the time for approval by applicable agencies or by the Architect or Architect's consultants shall be Contractor's.

ARTICLE SP-06 ALLOWANCE

Allowance to be included in the total bid amount as identified below. Use of any allowance will be at the sole discretion of the City and must be authorized in writing at the discretion of the City. Any money used from the project allowances will be authorized via an Allowance Disbursement Form at the City's sole discretion. Any amount of money remaining in any of the Allowance line items may be reallocated to another Allowance line item and upon completion of the Project will be deducted from the Contract by Deductive Change Order for the full amount(s) remaining therein. The Contractor has no beneficial interest in, and/or claim to, the Allowances and hereby disclaims any and all such interests.

Allowance – Mitigate Unforeseen Conditions..... \$200,000.00

ARTICLE SP-07 SCHEDULE OF OPERATION

- A. Time is of the essence in the performance of this Contract.
- B. The City shall issue to Contractor a Notice to Proceed designating the starting date on which Contractor shall begin work. The Contractor shall diligently prosecute the work from such date to completion within the time specified in the Contract Documents or any adjustments thereof.
- C. The Contractor shall not begin work in advance of receiving the Notice to Proceed.
- D. Construction activities shall be performed between the hours of 7:00 a.m. and 4:00 p.m. Monday through Friday. No Work shall be performed on City observed Holidays. Traffic and Pedestrian access closures must be approved by the Engineer. No work shall be performed outside the above hours without prior written authorization from the City and coordination with the Engineer.
- E. For demolition operations that may generate noise audible from off-site, the allowed window will be from 9:00 A.M. to 5:00 P.M., excluding holidays. Deviation from these hours can be permitted with prior consent of the City.

ARTICLE SP-08 CONTRACTOR COOPERATION AND COORDINATION

- A. Within the overall Project, the Contractor shall coordinate their work, as required, with the other contractors, including the installation of a prefabricated tower. The installation of the tower shall commence after the General Contractor prepares the site, layout and excavates the footing; after the foundation is in place, the tower installation period would be completed within approximately **15-17 weeks**. It is the responsibility of the contractor to sequence the project activities around this period, any stop of work or idle time must be included in the Contractor's bid at no extra cost to the City.
- B. The Contractor shall remove all debris, temporary facilities, or other items that may interfere with the other contractor's ability to perform their work.
- C. Regarding contractor logistics and site constraints:
 - 1. Logistics: prior to commencement of WORK, CONTRACTOR shall prepare and submit to the City, a detailed PROJECT specific Site Logistics Plan in legible size, setting forth CONTRACTOR plan of WORK relative to the following items:

- a) Hauling route shall be in accordance with local ordinances. A truck access route to and from PROJECT site.
- b) The identification of any overhead wire restrictions for power, lighting, signal or cable.
- c) Pedestrian walkways and ADA pathway access and closure requirements.
- d) Protection of sidewalk, walkways, pedestrians and vehicular traffic.
- e) PROJECT site fencing and access gate locations.
- f) Construction parking.
- g) Material staging or delivery areas.
- h) Material storage areas.
- i) Temporary trailer locations.
- j) Temporary service location and proposed routing of all temporary utilities.
- k) Location of temporary or accessible fire protection.
- l) Trash removal and location of dumpsters.
- m) Concrete pumping locations.
- n) Steel storing locations.
- o) Operation equipment access route.
- p) Crane locations.
- q) Location of portable sanitary facilities.
- r) Mixer truck wash-out locations.
- s) Traffic control signage.
- t) Perimeter and site lighting.
- u) Stockpile or lay down areas.
- v) Security lighting.
- w) Fire Access.
- x) Project signage locations.

- 2. Underground pipe and trenching for utility point of connections
- 3. Length of open trench at any one time to be coordinated with the City and trench plate plan to be submitted for review and approval by City.
- 4. Utilities Services Shut Downs, Tie-ins and Start-Ups.
- 5. FF&E: Upon notice and once the project has reached a substantial level of completion, the Installation of Furniture, training props, and any mechanical and electrical system, the CONTRACTOR will be required to coordinate and allow access for these items and any additional City vendors that are identified.

ARTICLE SP-09 DAMAGE TO EXISTING WORK AND WORK OF OTHER CONTRACTORS

Damage to existing construction, equipment, planting, or to work of other contractors, by the Contractor in the performance of their work, shall be replaced or repaired and restored to original condition by the Contractor at the Contractor's expense.

ARTICLE SP-10 UNDERGROUND SURVEY OF EXISTING UTILITIES

Prior to performing excavation activities, the Contractor shall contact Underground Service Alert (USA) 800-422-4133 or 811 and/or at their sole expense employ the services of a private locator to survey and ascertain the actual locations of existing underground utilities. Should the Contractor damage existing underground utilities during the prosecution of the work, they shall immediately notify the City in writing and diligently affect repairs to the damaged utility. The Contractor shall be responsible for all repairs and consequential damages resulting from utility outages cause as a result of the performance of their work.

Regional Notification Center.

Contractor, except in an emergency, shall contact the appropriate regional notification center at least two working days prior to commencing any excavation if the excavation will be conducted in an area or in a private easement which is known, or reasonably should be known, to contain subsurface installations other than the underground facilities owned or operated by the City, and obtain an inquiry identification number from that notification center. No excavation shall be commenced and carried out by the Contractor unless such an inquiry identification number has been assigned to the Contractor or any subcontractor of the Contractor and the City has been given the identification number by the Contractor. Any damages arising from failure to make appropriate regional notification shall be at the sole risk of Contractor. Any delays caused by failure to make appropriate regional notification shall be at the sole risk of Contractor and shall not be considered for extension of time.

Utilities - Removal and Restoration

The City has endeavored to determine the existence of utilities at the Site of the Work from the records of the City of known utilities in the vicinity of the Work. The positions of these utilities as derived from such records are shown in the Contract Documents.

No excavations were made to verify the locations shown for underground utilities. The service connections to these utilities may not be shown on the plans. It shall be the responsibility of the Contractor to determine the exact location of all service connections. The Contractor shall make its own investigations, including exploratory excavations, to determine the locations and type of service connections, prior to commencing work, which could result in damage to such utilities. The Contractor shall immediately notify the City as to any utility discovered by

Contractor in a different position than shown in the Contract Documents or which is not shown on the Contract Documents.

Contractor shall coordinate its Work with all utilities, including, but not limited to electricity, water, sewer, gas and telephone and meet with said utilities prior to the start of any work.

Existing Utility Lines; Removal, Relocation

The contractor has the responsibility to identify, with reasonable accuracy, all utilities necessary to complete their scope of work. The Contractor shall exercise due diligence and shall not be compensated by the City for the actual verified cost of locating, and removing, relocating, protecting or temporarily maintaining existing utility services.

1. The City will furnish an existing utility survey as-built for reference.
2. The Contractor shall hire an independent underground utility locator service company to identify and verify existing underground utilities within the scope of work. All cost and fees associated with this work shall be at the Contractor's own expense and included in the base bid.
3. Upon completion of the independent underground utility locator survey and prior to any excavations, Contractor's superintendent and subcontractor are required to conduct an onsite field verification of existing conditions, shall mark-out the utilities, and transfer all information to a working utility as-built. Contractor's utility survey as-built shall be submitted to City.
4. In the event an existing utility service is interrupted or damaged, the Contractor shall be required to make all necessary repairs within 4-hrs. The City, at their discretion, shall calculate and assess liquidated damages against the Contractor for disruption to City Operations, including but not limited to, extended loss of utility services. Contractor shall furnish to the City an on-call emergency repair contact list of contacts/companies, consisting of, but not limited to, fiber optics, communications, signal, gas, water, electric and sewer.
5. Adjustment of the Contract Amount, Milestones and/or Contract Time will be allowed to the extent the existence of such revealed conditions directly causes an increase in Contractor cost and/or time of performance of the Work shall be subject to the conditions noted above.
6. Contractor shall not be entitled to an adjustment in the Contract Amount, Milestones and/or Contract Time if: (1) Contractor was aware of the condition at the time of the bid;
(2) The existence of discovery of the condition could have been discovered as a result

of any examination, investigation, exploration, test and/or examination of the Project Site and areas adjoining the Project Site as required by the Bid Documents prior to Contractor submission of Bid.

7. Contractor failed to provide notice in accordance with the General Conditions.
8. If the Contractor believes any subsurface or physical condition uncovered, revealed or otherwise exposed at the project site is of such character and/or nature as to require a change in the Contract Documents; materially different from that shown, indicated or described in the Bid Documents; or an unusual nature materially different from conditions normally encountered and generally recognized as inherent in Work of the character provided for in the Bid Documents, then Contractor shall upon discovery notify the City writing within (1) one calendar day.

ARTICLE SP-11 TRENCHING AND EXCAVATION

In accordance with Section 7104 of the California Public Contract Code, the following provisions shall apply to any contract involving digging of trenches or other excavations that extend deeper than four (4) feet below the surface:

- A. The Contractor shall promptly, and before the following conditions are disturbed, notify the City in writing, of any:
 1. Material that the contractor believes may be material that is hazardous waste, as defined in Section 25117 of the Health and Safety Code that is required to be removed to a Class I, Class II, or Class III disposal site in accordance with provisions of existing law.
 2. Subsurface or latent physical conditions at the site differing from those indicated.
 3. Unknown physical conditions at the site of any unusual nature, different materially from those ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract.
- B. The City shall promptly investigate the conditions, and if they find that the conditions do materially so differ, or do involve hazardous waste, and cause a decrease or increase in the Contractor's cost of, or the time required for, performance of any part of the work, shall issue a change order in accordance with the provisions of the General Conditions.
- C. In the event that a dispute arises between the City and the Contractor whether the conditions materially differ, or involve hazardous waste, or cause a decrease or increase in the Contractor's cost of, or time required for, performance of any part of the work, the Contractor shall not be excused from any scheduled completion date provided for by the Contract, but shall proceed with all work to be performed under the

Contract. The Contractor shall retain any and all rights provided either by Contract or by law that pertain to the resolution of disputes and protests between the contracting parties.

ARTICLE SP-12 TRENCHES FIVE FEET OR MORE IN DEPTH

In advance of any excavation the Contractor shall submit to the City a detailed plan showing the design of shoring, bracing, sloping or other provisions to be made for worker protection from the hazard of caving ground during the excavation of any trench or trenches five feet or more in depth. A registered civil or structural engineer shall prepare the plan. As part of the plan, a note shall be included stating that the registered civil or structural engineer certifies that the plan complies with CAL-OSHA Construction Safety Orders, or stating that the registered civil or structural engineer certifies that the plan is not less effective than the shoring, bracing, sloping, or other provisions of the Safety Orders.

- A. All shoring submittals shall include surcharge loads from adjacent embankments, construction loads and spoil bank. Submittal shall indicate minimum horizontal distance from top of trench to edge of all surcharge loads for all cases of shoring and side slopes.
- B. Nothing in this Article shall relieve Contractor of the full responsibility for providing shoring, bracing sloping, or other provisions adequate for worker protection. If such plan varies from the shoring system standards established by the Construction Safety Orders, a registered civil or structural engineer shall prepare the plan. No excavation of such trench or trenches shall be commenced until said plan has been accepted by the City or the person to whom authority to accept such plan has been delegated.

ARTICLE SP-13 INCLEMENT WEATHER CONDITIONS

- A. The project Baseline Schedule shall include an inclement weather contingency activity, called "Inclement Weather Days Allowance". The duration for this activity shall be **ten working days (10)** (5 day work week calendar), and it shall be the last activity in the schedule before the Final Completion milestone, with no activities scheduled concurrently with it. Each time that rain, a windstorm, high water or other natural phenomenon occurring within the specific locality of the work, prevents work for more than fifty percent (50%) of the schedule workday on activities that are on the current critical path, that day shall be counted as an "Inclement Weather Day", and the following procedure shall be followed:
 - a) One (1) day of duration shall be deducted from the "Inclement Weather Days Allowance" activity.
 - b) A one (1) day activity shall be added to the current schedule update, named

"Inclement Weather Day, mm/dd/yy", and this activity shall be assigned successors of the specific activities that were impacted.

No allowance for weather related contract time extensions will be considered until after the entire duration of the "Inclement Weather Days" is exhausted. Once this weather contingency duration is exhausted, a contract time extension will be considered when inclement weather prevents work on critical path activities for more than fifty percent (50%) of the scheduled workday. Upon experiencing critical path schedule impacts due to inclement weather, the Contractor shall seek a time extension in accordance with the Contract Modification Procedures.

- B. The Contractor shall provide a Notice of Change and a schedule fragment submittal to the City for all time extension requests due to inclement weather in excess of the one working day assumed in the Baseline Schedule. Should the Contractor fail to provide Notice of Change and/or a schedule fragment submittal for the weather event within (3) three calendar days of the first delay day, then it is mutually agreed that the weather event has no time impact on the contract completion date and no time extension is required.

ARTICLE SP-14 TIME OF COMPLETION

Time of Completion per 6-3 of the General Provisions.

ARTICLE SP-15 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. **Critical Path Method (CPM) Schedule.** Project Schedule is provided by the Contractor. Contractor shall be required to supply the City the following: **No later than five (5) working days after Notice to Proceed, or such other time as may be set forth in the special provisions, and before commencement of work, the Contractor shall furnish to the City a critical path method (CPM) baseline schedule for the entire Project. Schedule shall include the following as minimum standards:**

1. Mobilization or start-up activities of all trades and subcontractor's that must be completed prior to starting various components of the Work.
2. Long lead procurement requirements.
3. Submittals and shop drawings required for every spec section included in this contract, using the logic required herein.
4. The Contractor's plan for completion of work in sufficient detail to allow observation and monitoring by the City.

5. Activities shall be assigned to a Work Breakdown Structure (WBS) which is broken down by building or area, by trade, subcontractor, and by observable sequence of work. All activities shall be broken down into phases two weeks or less in length.

6. Inspections required to gain approval of all work installed by this Contractor.

B. Sequence. The schedule provided must allow for completion within the durations and milestone dates established in the contract documents and overall project duration. It is the Contractor's responsibility to provide adequate labor resources and to sequence its work in a way to meet these contractual durations, and to coordinate with other City Contractors to allow their work to be completed concurrently if the schedule requires. No progress payments will be approved until schedule input has been reviewed and accepted by the City satisfying all of the criteria listed.

C. Status Reporting. The Contractor shall provide status of its activities monthly and submit the monthly update with the progress payment request.

D. Delay. In the event of a delay affecting the completion date and/or milestones of the Project, Contractor shall advise the City within (48) hours regarding significant disruption of the work sequence. It is not the City's responsibility to ensure the Contractor the ability to use "optimal" crew size throughout the Project and no adjustment of the Contract Sum will be made for minor variations in crew size or claimed loss of efficiency or disruption that result from schedule adjustments. If the Contractor contends that a schedule adjustment will cause a significant disruption of its work sequence or ability to perform work efficiently, it shall notify the City within forty-eight (48) hours of receipt of the adjustment request. Failure to provide timely notice constitutes a waiver by Contractor of any claim for compensation arising out of the schedule adjustment.

E. Time is of the essence with this agreement. The Contractor shall, to the fullest extent possible, carry on the various scopes or parts of the Work concurrently, and shall not defer construction of any portion of the Work in favor of any other portion of the Work. The Contractor shall staff the project to ensure completion of activities within original durations allowed in the approved Baseline Schedule produced by the Contractor and approved by the City. Only with prior approval of the City, the Contractor shall furnish such manpower, materials, facilities and equipment and shall work such hours, including night shifts, overtime operations, Sundays and holidays as may be necessary to insure the execution and completion of the Work in accordance with the Final Baseline schedule. If work on a critical path is seven days or more behind the currently updated schedule the Contractor will implement whatever steps it deems necessary to make up all lost time. If the actions taken are not successful, the

Contractor will make further attempts using the following sequence of events:

1. Reschedule activities to achieve maximum practical concurrence of accomplishment of activities.
2. If the above cannot be achieved then; and with the prior approval of the City, the Contractor shall increase manpower in such quantities and crafts as will substantially eliminate, the backlog of work; or increase the number of working hours, shifts per working day, working days per week or the amount of equipment or any combination of the foregoing sufficiently to substantially eliminate the backlog of work.

Failure of the Contractor to comply with the requirements of this Section shall be considered grounds for a determination by the City that the Contractor is failing to execute the Work with such diligence as will ensure its completion within the time specified.

F. General schedule requirements.

1. Requirements for CPM scheduling are included to insure adequate planning and execution of the Work and to assist the City in evaluating progress of the Work economically and chronologically.
2. The Contractor shall be solely responsible for establishing the schedule for the Work and shall be responsible for such schedule to be consistent with meeting the contract milestone, intermediate milestones, and completion dates as established by the City.
 - a. General Contractor shall prepare and submit per the time constraints identified in this section, a project schedule consisting of their scope of work, milestones, and work sequence to be incorporated into the development of the project baseline schedule. The Conditions of the contract and the other sections of Division 1 apply to this section as fully as if repeated herein.
 - b. The Contractor shall prepare and submit to the City a practicable schedule showing the order in which the Contractor proposes to perform the work, and the dates on which the Contractor contemplates starting and completing the salient features of the work (including acquiring materials and equipment).
 - c. The schedule shall be in the form of a CPM (critical path method) schedule, of suitable scale to indicate appropriately the percentage of work scheduled for completion by any given date during the period.
 - d. The scheduled completion date shall be the same as the contractual

completion date, for the initial schedule and subsequent updates. Any proposed early completion date shall show the difference between that date and the contract completion date as Float, which shall belong to both the City and Contractor.

- e. If, in the opinion of the City, the Contractor falls behind the approved schedule, the Contractor shall take steps necessary to improve its progress, without additional cost to the City. The Contractor shall submit any supplementary schedule or schedules in CPM form as the City deems necessary to demonstrate how the approved rate of progress will be regained.
- f. All schedule updates must accurately reflect the as-built schedule. There shall be no change to the Critical Path without the City's written consent.
- g. Sequencing of the scope of work shall be coordinated with the City's review, approval and consent only.

G. Quality Assurance

1. Contractor shall designate a scheduler and present that designee for City approval. Scheduler shall be trained and experienced in compiling construction scheduling data, in analyzing scheduling data by use of CPM, and in the preparation and issuance of periodic reports as required herein. The Contractor's Scheduling Representative shall have direct control and complete authority to act on behalf of the Contractor in fulfilling all project schedule requirements.
2. The CPM Progress Schedule shall be prepared based on the principles defined by the latest issue of the Construction Planning & Scheduling Manual published by the Associated General Contractors of America, except where superseded by the contract documents and this specification.
3. Software: This work shall consist of preparing, maintaining and submitting a Progress Schedule using the Critical Path Method on Oracle Primavera P6 Professional Project Management software, version 8 or newer, Microsoft Project, or Microsoft Excel, which demonstrates complete fulfillment of all work shown in the contract documents. All work to prepare, and maintain the CPM Progress Schedule shall be performed using the scheduling software application.

H. Software/ Requirements

1. The following software shall be utilized:

- a. Oracle Primavera P6 Professional Project Management, version 8 or newer, Microsoft Excel, or Microsoft Project may be used in lieu of P6 upon review and approval by the City. No other types or versions of scheduling software will be accepted.
2. The City will generally not accept Baseline or Progress Schedule files from any Contractor prior to the Contract NTP being issued. The schedule file must follow the guidelines below:
 - a. User Defined fields must not be used.
 - b. All Calendars assigned to activities must be project level Calendars not Global or Resource Calendars, and all calendars must have unique names (project specific names).
 - c. All Activity Codes shall be project level and not Global or EPS level Activity Codes, and all activity codes must have unique names (project specific names).
 - d. No Resources or Roles shall be assigned to activities,
 - e. and no Project Codes shall be assigned.
 3. Schedule Filename convention (Project ID): Contactors must use the following P6 naming convention:
 - 1) Software Settings: The "Project ID" must be set to the maximum of 20 characters. (The normal default.)
 - 2) Schedule Name
 - a) The first eight characters of the Schedule Name, (P6 ProjectID), must use the "Contract ID"
 - b) For legibility, use a "-" for the next character
 - c) Define the type of schedule with the next 5 characters
 - i. "1PREL" for Preliminary
 - ii. "2INIT" for Initial
 - iii. "3FRAG" for Fragnets
 - iv. "4RBAS" for Re-Baselined schedules
 - v. "5UP##" for monthly update, i.e. "UP01" for the first monthly

update

d) For legibility, use a "-" for the next character

e) Define the version with the next 3 characters. Use "V01" for the 1st version of the schedule, "V02" for the 2nd version of the schedule, etc.

3) Examples:

1. M2003368-1PREL-V01 – The 1st version of the Preliminary schedule for project M2003368
 2. M2002479-2INIT-V03 – The 3rd version of the Initial schedule for project M2002479
 3. M2003451-3FRAG-V02 – The 2nd Fragnet for project M2003451
 4. M2001123-4RBAS-V01 – The 1st Re-Baselined/Recovery schedule for project M2001123
 5. M2001835-5UP11-V01 – The 1st version of the 11th update for project M2001835
4. Project schedules are developed from the Contractor's knowledge of the project, and the means and methods represented in those schedules are based on the Contractor's understanding of the contract documents, and the Contractor's past experience, which are unique to the Contractor. Schedule activity data and logic are therefore the intellectual property of the Contractor and will not be made available to other Contractors.
5. Schedule Calculation mode shall be Retained Logic.

I. Interim Schedule

1. Pre-Construction Scheduling Conference: The Contractor and City shall conduct a pre-construction scheduling conference with the Contractor's Scheduler within **five (5) calendar days** of the Notice to Proceed.
2. The Contractor shall submit a general time-scaled logic diagram displaying the major activities and sequence of planned operations and shall be prepared to discuss the proposed work plan and schedule methodology that comply with the requirements of these special provisions . Contractor shall submit the alphanumeric coding structure and the activity identification system for labeling the work activities.
3. The City will review the logic diagram, coding structure, and activity identification system, and provide required baseline schedule changes to the Contractor for implementation.

4. Within five (5) calendar days after Notice to Proceed and prior to submission of the first payment request, the Contractor shall submit to the City a practical ninety (90) calendar day Interim Schedule. The Interim Schedule shall reflect the following information:
 - a. Procurement, submittals, construction drawings, shop drawings, approvals, fabrication and delivery of all major and long lead equipment and material items.
 - b. Work expected to occur within the first ninety (90) calendar days of the project, consistent with meeting all established milestone and completion dates.
 - c. The Interim Schedule shall be descriptive of the work to be performed so that the Contractor, City and PM can easily monitor progress of the work. No Activities are to be started until the City's PM has accepted the Interim Schedule, at which time it will be updated monthly until such time as the Official Contract (Baseline) Schedule is accepted.
5. Within fifteen (15) calendar days after receipt of the Interim Schedule, the City will notify the Contractor of the approval or disapproval of the Interim Schedule. In the event of disapproval, the Contractor shall resubmit the schedule within seven (7) calendar days. No progress payments will be made for work in progress or completed until the Interim Schedule is approved.

J. Official Contract Schedule (Baseline Schedule)

The Critical Path Method Schedule to be prepared by the Contractor pursuant to this section will be a part of a total system for scheduling, reporting work progress, and preparing the monthly payment application.

1. **Submission for review.** Within five (5) calendar days after the Notice to Proceed, the Contractor shall submit the complete project schedule to the City for review.
2. **Interim Schedule.** The approved Interim Schedule shall be incorporated into the final Contract Schedule and shall represent the initial ninety (90) calendar days of the Contract Schedule.
3. **Initial Submittal.** The initial submittal of the Contract Schedule shall not reflect contract changes or delays. These changes shall be added within the first Schedule Revision.
4. **Contract Completion.** Contract completion date shall not be changed by

submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.

5. **Duration.** The Official Contract Schedule shall not extend beyond the number of calendar days specified in the Contract. The baseline schedule shall have a data date of the first working day of the contract and not include any completed work to date. The baseline schedule shall not attribute negative float or negative lag to any activity.
6. **Review.** Schedule review by the City and its agents is limited to ensuring the logic of sequencing is reasonable and Contractor has demonstrated ability to meet contractual milestone and completion dates. Acceptance of schedule should not be construed as direction from the City to Contractor on how to schedule the work. City shall review and return with comments within seven (7) calendar days of receipt of the schedule submittal. The re- submittal must be returned within seven (7) calendar days from receipt of the City's request for revision to the baseline schedule. This process will continue until the baseline schedule is accepted. With each re-submittal, the contractor shall include a narrative with a brief statement for each review comment that explains how that comment was addressed. Any revisions made as a result of the review comments, shall be made by the Contractor at no additional cost to the City. The first progress payment will not be given if the Interim schedule has not been accepted.
7. **Reporting.** After Completion and Acceptance of the Official Contract Schedule: The Contractor will provide initial computer reports and weekly and monthly reports thereafter.
8. **Activity Information.** The project schedule shall be computer generated, time scaled, and critical path method (CPM) network utilizing the precedence diagram method of representation. The number of activities shall be sufficient to assure adequate planning of the project, to permit monitoring and evaluation of progress, and to do an analysis of time impacts. Schedule activities shall include the following:
 - a. **Activity Name** – Clearly and uniquely define each activity name with a description of the work that is readily identifiable to inspection staff. Each activity shall have a narrative description consisting at a minimum of a verb or work function (i.e. form, pour, excavate etc.) and object (i.e. slab, footing, wall etc.) and a location (i.e. room number, gridline, column line etc.)
 - b. **Start and finish dates**
 - c. **Construction activities shall have duration not to exceed Fifteen (15) calendar**

days. If an activity is greater than Fifteen (15) calendar days, the activity will need be split or phased.

- d. All holidays and non-working days shall be identified by way of calendar designations. Refer to General and Supplementary Conditions for recognized Designated Holidays. The schedule shall clearly indicate any work that is planned to be accomplished on a work schedule other than eight (8) hours per day and forty (40) hours per week.
- e. The schedule shall include an activity for "City / Architect punch walk & list distribution" with a two (2) calendar day duration for each area.
- f. Punch walk / Correction Activity shall not have duration longer than five (5) calendar days.
- g. At least one predecessor and one successor is required for each activity, except for the project start and finish milestones.
- h. Codes for responsibility, stage, work shifts, and location.

9. **Management Activities:** The initial submittal of the Official Contract Schedule shall include, in addition to construction activities, the following management activities:

- a. The submittal and approval of construction drawings, shop drawings and materials, the procurement, fabrication, delivery, and testing of major materials and equipment, and their installation and testing.
- b. Contract requirement dates of all or parts of the Work will be shown including all activities of the City that affect the progress of the work.
- c. Activities of completed work ready for use by next trade, etc.
- d. Activities relating to different areas of responsibility, such as sub-contracted Work which is distinctly separate from that being done by Contractor directly. Each activity shall represent the work of a single subcontractor.
- e. Different categories of Work as distinguished by craft or crew requirements.
- f. Different categories of Work as distinguished by materials.
- g. Distinct and identifiable subdivisions of Work such as structural slabs, beams, or columns. Location of Work within the project that necessitates different times or crew to perform.

- h. Outage schedules of limiting times that existing utility services may be interrupted to construct the Project.
 - i. Acquisition and installation of equipment and materials supplied and/or installed by City or separate Contractors.
 - j. Material stored on site.
10. **Major Equipment/Materials:** For all major equipment and materials fabricated or supplied for Project, including All items identified as “Deferred Submittals”, the Construction Schedule shall show a sequence of activities including:
- a. Preparation of shop drawings and sample submissions.
 - b. Time required to obtain special inspection certifications and additional permits or certifications that may be required for specific tasks and/or systems.
 - c. Review of shop drawings and samples.
 - d. Shop fabrication, delivery, and storage.
 - e. Erection or installation.
 - f. Test of equipment and materials.
 - g. Required dates of completion.
11. **Milestones:**
- a. Major Milestones
 - 1) **Notice to Proceed (NTP)**
 - 2) **Project Commencement Milestone:** (0) working days shall consist of all general requirements, including but not limited to required submittals, deferred approvals, pre-construction meetings, site walks, and long lead procurement requirements.
 - 3) **Mobilization:** Construction shall consist of the balance of construction operations, including but not limited to mobilization, fencing, utility disconnect, demolition, close-out, etc.

4) **Substantial Completion:** That point in the progress of the Work where the Work is completed according to the requirements of the Contract Documents so that the City can occupy, have beneficial use of, and enjoy, the entire Project for its intended purpose; and where only minor and/or trivial defects in the Work remain that do not preclude the City occupying, having beneficial use of, or enjoying the entire Project for its intended purpose. This shall constitute the final date for contract duration.

5) **Final Completion:** The point upon completion of all requirements outlined in the contract documents. The project along with all documentation has been turned over to and accepted by the City.

b. Interim Milestones:

Contractor shall coordinate and sequence their work with the City observed Holidays, as to not impact the critical path of the project schedule. Contractor will not be permitted to conduct work on City observed holidays noted below:

a) New Year's Day, Martin Luther King Day, President's Day, Memorial Day, Fourth of July, Labor Day, Veteran's Day, Thanksgiving Day, Day following Thanksgiving, Christmas Day.

12. **WBS and Activity Coding:** All activities in the Official Contract Schedule shall be assigned to a WBS (using Primavera P6's WBS feature) which will allow sufficient sorting and grouping capabilities by location (building, floor, area, etc.) and type of work, so as to enable a "rollup" of the activities by WBS in the form of a Summary Schedule. In addition, all activities shall have sufficient activity code structure to enable a sort by activity code, or "rollup" of the activities in the form of a Summary Schedule by activity code. The code structure will allow sufficient sorting capabilities to group by: responsibility (by subcontractor), location (building, floor, area, etc.), type (submittal, approval, change, etc.), milestones, CSI division, etc. Only project specific activity codes should be used. No global codes should be used. Activity code fields shall have project specific names.

13. **Contract Time and Sequencing:** The Official Contract Schedule shall include the entire scope of work and show how the Contractor plans to complete the work. The CPM schedule shall show the order in which the Contractor proposes to carry out the work with logical links between time-scaled work activities, and calculations made using the critical path method to determine the controlling operation(s). The Contractor is responsible for assuring that all activity sequences are logical and that each schedule shows a coordinated plan for complete performance of the work, including the work coordinated with other contractors.

- c. All analysis of time impacts shall be based upon total float. Total float shall be the difference in calendar days between the late finish date and the early finish date of an activity. Float shall be a jointly owned resource. Float shall be consumed by both the City and the Contractor on a first come first served basis.
 - d. The contract completion milestone shall represent the completion of all construction related work.
 - e. The anticipated weather-related delays as noted in "Weather Days" of this division shall be taken into consideration and included with the duration of the applicable schedule activity(s).
 - f. The Contractor shall furnish such manpower, materials, facilities and equipment and shall work such hours, including night shifts, overtime operations, Sundays and holidays as may be necessary to insure the execution and completion of the Work in accordance with the Final Baseline schedule.
14. **Relationships:** All activities and milestones shall be linked by realistic logical Finish-to-Start relationships primarily. Other type of relationships shall be permitted but shall be minimized (including start-to-start and finish-to-finish). All activities and milestones must have at least one Finish-to-Start or Finish-to-Finish logic relationship to a successor; it is not acceptable for an activity or milestone to have *only* a Start-to-Start logic relationship to a successor. The City will reject any schedule utilizing unrealistic or meaningless logic. Constraints on activities shall be kept to a minimum and only allowed with written permission of the City on a case by case basis. Negative lags will not be used without the prior written permission of the City.
15. **Critical Activities:** The schedule shall show the activities that define the critical path. Multiple critical paths will not be accepted. A total of no more than 25 percent of the baseline schedule activities shall be critical or near critical, unless otherwise authorized by the City's PM. Near critical is defined as float less than ten (10) working days.

K. Update Schedules

1. **Update Schedule:** The Contractor shall submit an Update Schedule – hard copy and electronic copy -- and meet with the City to review progress, before the first day of each month, beginning one month after the Baseline Schedule is accepted. The Contractor shall allow Seven (7) calendar days for the City to review after the update schedule and all supporting data are provided, except that the review period

shall not start until the previous month's required schedule is accepted. Contractor shall provide within five (5) calendar days a detailed schedule narrative addressing the City's comments line by line, in addition to noting any changes requested to the base line schedule.

2. **Update Schedule Information:** The Updated Schedule shall have a data date of first day of the month or other date established by the City. The updated schedule shall show the status of work actually completed to date and the work yet to be performed as planned. Actual activity start dates, percentage complete, and finish dates shall be shown. Actual Durations for work that has been completed shall be shown on the Update Schedules for when the work actually occurred, including submittal reviews and contractor re-submittal times. The update submittal scope shall contain the following information:
 - a. Actual Start and finish dates.
 - b. Physical percent complete and remaining duration.
 - c. A narrative listing and explaining changes to the record schedule, including added activities, deleted activities, changes to Original Durations, added logic, deleted logic, changes to lags, any revisions to constraints or constraint dates, and changes to calendar assignments.
 - d. A tabular listing of all activities including: Activity data, activity identifier, description, remaining duration, total float, and activity.
 - e. Narrative of manpower used verses manpower allocated in the schedule
 - f. Daily reports signed daily by the City's Representative.
 - g. Copies of confirmation letters from vendors and/or manufactures confirming material orders.
3. **Schedule Modifications:** The Contractor may include modifications such as adding or deleting activities or changing activity constraints, durations, or logic that do not: (1) alter the critical path(s) or near critical path(s), or (2) extend the schedule completion date compared to that shown on the current accepted schedule. The Contractor shall provide a narrative in writing that states the reasons for any changes to the planned work. If any propose changes in planned work will result in (1) or (2) above, then Contractor shall submit a time impact analysis as described herein.
4. **Contract Time Adjustment:** Any request for an adjustment of the Contract Time for

completion submitted by Contractor for changes or alleged delays shall be accompanied by a complete Time Impact Analysis, (TIA), which shall be submitted for review within three (3) days after the initial request for time by Contractor, or the impacting incident, whichever comes first.

5. **Narrative Reports:** Monthly Narrative Reports shall contain the following information for each monthly update:
 - a. Description of overall project status.
 - b. Description of problem areas (referenced to pending change orders as appropriate).
 - c. Current and anticipated delays not resolved by approved change order, including:
 - 1) Cause of the delay
 - 2) Corrective action and schedule adjustments to correct the delay
 - 3) Known or potential impact of the delay on other activities and milestones.
 - 4) Changes in the construction sequence
 - 5) Pending items and status thereof, including but not limited to:
 - a) Pending Change Orders
 - b) Time Extension Requests
 - c) Other Issues relating to Contract Time
 - d. Contract Completion Date status:
 - 1) If ahead of schedule, the number of calendar days ahead
 - 2) If behind schedule, the number of calendar days behind
6. **Reports:** The format for each activity for the schedule reports listed below shall contain: Activity Numbers, Activity Description, Original Duration, Remaining Duration, Early Start Date, Early Finish Date, Late Start Date, Late Finish Date, Total float. Actual Start and Actual Finish Dates shall be printed for those activities in progress or completed.
 - a. Activity Report - A list of all activities sorted according to activity number.
 - b. Logic Report - A list of Preceding and Succeeding activities for every activity in ascending order by activity number. Preceding and succeeding activities shall include all information listed above in paragraph Schedule Reports. A blank

line shall be left between each activity grouping.

- c. Total Float Report - A list of all incomplete activities sorted in ascending order of total float. Activities which have the same amount of total float shall be listed in ascending order of Early Start Dates. Completed activities shall not be shown on this report.
 - d. Network Diagram - The network diagram shall be required on the initial schedule submission and on monthly schedule update submissions. The network diagram shall depict and display the order and interdependence of activities and the sequence in which the work is to be accomplished. The City will use, but is not limited to, the following conditions to review compliance with this paragraph.
 - e. Continuous Flow - Diagrams shall show a continuous flow from left to right with no arrows from right to left. The activity number, description, duration, and estimated earned value shall be shown on the diagram.
 - f. Project Milestone Dates - Dates shall be shown on the diagram for start of project, any contract required interim completion dates, and contract completion dates.
 - g. Critical Path - The critical path shall be clearly shown.
 - h. Banding - Activities shall be grouped (by WBS) to assist in the understanding of the activity sequence. Typically, this flow will group activities by category of work, work area and/or responsibility.
7. **Three-week Window Report:** Weekly, for the progress meeting, the Contractor shall produce a three-week window of the current schedule, indicating activities scheduled for the current and following two week period. These reports must be direct output from the Official Contract Schedule.
8. **Payment Progress Reporting:** City and Contractor shall select a specified time for updating the Project schedule at the jobsite each month.
9. **Scheduling Representatives:** The City and Contractor and his/her designated scheduling representatives will attend the meeting to review the project progress.
10. **Reporting Period:** All progress and status information provided by the Contractor shall clearly define the reporting period for which the status is provided.

11. **Monthly Review:** At the monthly progress review meeting coinciding with the Pencil Draft Date/meeting (Progress Payments) the Contractor will provide "actual start" and "actual completion" dates for activities that were started or completed during the reporting period (for purposes of forecasting activities with an agreed upon completion for that period will be counted for payment application purposes only). The Contractor and the City will agree upon and assign percent complete values to activities in progress. In the event of a disagreement, the City shall make the final decision as to percent completion of each activity.
12. **Joint Review:** After joint review, City will process the Contractor's pay request based on progress from the schedule in conjunction with approved Schedule of Values associated with those progressed activities.
13. **Payments:** Payment to the Contractor shall be made from the progress reflected by the Interim 90 day Schedule or the Approved Project Baseline Contract Schedule.
14. **Non-critical Delays:** Delays of any non-critical Work shall not be the basis for an extension of Contract Time.

L. Schedule Revisions:

1. **General:** Revisions to accepted Construction Schedule must be approved in writing by the City.
2. **Requests for Revision:** Contractor shall submit requests for revision to schedule to the City together with a Time Impact Analysis (TIA) and a written rationale for revisions and description of logic for re-sequencing Work and maintaining Specific Contractual Milestone Dates listed in Contract Documents.
3. **Proposed revisions:** Proposed revisions acceptable to the City may then be incorporated into next update of Construction Schedule following their review and acceptance.
4. **Revision Acceptance:** Acceptance of revised schedule by City does not relieve Contractor of meeting contractual milestone and completion dates.

M. Recovery Schedule

1. **General:** Should updated Construction Schedule show Contractor to be Ten (10) or more calendar days behind schedule at any time during construction, Contractor will prepare Recovery Schedule displayed on CPM schedule, at no additional costs to City. Prepare Recovery Schedule to show plan for returning to original schedule as expeditiously as possible, and in a manner that complies with the contract

documents.

2. **Schedule Preparation:** Within three (3) calendar days after notice from City, prepare and submit a Recovery Schedule, incorporating best available information from Subcontractors and others which will permit return to the Approved Baseline Construction Schedule at earliest possible time. Prepare Recovery Schedule to same level of detail as Construction Schedule and for maximum duration of one (1) month.
3. **Schedule Review:** Within seven (7) calendar days after notice from City, Contractor shall participate in conference with City to review and evaluate Recovery Schedule. Submit revisions necessitated by review for City's acceptance within Three (3) calendar days of conference. Use accepted Recovery Schedule for its planned duration as basis for returning to the Approved Baseline Construction Schedule.
4. **Schedule Assessment:** Seven (7) days prior to expiration of Recovery Schedule, confer with City to assess effectiveness of Recovery Schedule. As a result of this conference, the City will direct Contractor as follows:
 - a. **Behind Schedule:** If City determines Contractor is still behind schedule, the City will direct Contractor to prepare another Recovery Schedule for subsequent pay period.
 - b. **On Schedule:** If City determines that the Contractor has successfully complied with provisions of Recovery Schedule, the City will direct Contractor to return to use of Construction Schedule.

N. Request for Time Extension

1. **Time Extension Request:** In the event the Contractor requests an extension of contract time for unavoidable delay, justification shall be submitted no later than three (3) calendar days after the initial occurrence of any such delay. When requesting time for proposed change orders, the request(s) must be submitted with the proposed change order with full justification. If the Contractor fails to submit justification he shall waive his right to a time extension at a later date. Justification must be based on the currently accepted contract schedule as updated at the time of occurrence of delay or execution of work related to any change(s) in the scope of work. The justification must include a schedule, including, but not limited to, the following :
2. **Time Impact Analysis (TIA):** The Contractor shall submit a written time impact analysis (TIA) – through e-builder with each request for adjustment of contract time, or when the Contractor or City considers that an approved or anticipated change

may impact the critical path or contract progress.

The TIA shall illustrate the impacts of each change or delay on the current schedule completion date or internal milestone, as appropriate. The analysis shall use the accepted schedule that has a data date closest to and prior to the event. If the City determines that the accepted schedule used does not appropriately represent the conditions prior to the event, the accepted schedule shall be updated to the day before the event being analyzed. The TIA shall include an impact schedule developed from incorporating the event into the accepted schedule by adding or deleting activities, or by changing durations or logic of existing activities. If the impact schedule shows that incorporating the event modifies the critical path and scheduled completion date of the Official Contract Schedule, the difference between scheduled completion dates of the two schedules shall be equal to the adjustment of contract time. The City may construct and utilize an appropriate project schedule or other recognized method to determine adjustments in contract time until the Contractor provides the TIA.

3. **Request of Time Impact Analysis:** The Contractor shall submit a TIA through e-builder within 3 calendar days of receiving a written request for a TIA from the City. The Contractor shall allow the City 14 calendar days after receipt to accept or reject the submitted TIA. All approved TIA schedule changes shall be shown on the next update schedule.
4. **Time Impact Analysis Evaluation:** If a TIA submitted by the Contractor is rejected by the City, the Contractor shall meet with the City to discuss and resolve issues related to the TIA. The Contractor shall only show actual as-built work, not unapproved changes related to the TIA, in subsequent update schedules. If agreement is reached at a later date, approved TIA schedule changes shall be shown on the next update schedule. The City will withhold remaining payment if a TIA is requested by the City and not submitted by the Contractor. The scheduled payment item will resume on the next payment application after the requested TIA is submitted. No other contract payment will be retained regarding TIA submittals.

O. Final Update Schedule

The Contractor shall submit a final as-built schedule with actual start and finish dates for the activities, within 30 calendar days after completion of the contract work. The Contractor shall provide a written statement with this submittal signed by the Contractor stating, *"To my knowledge and belief, the enclosed final update schedule reflects the actual start and finish dates the actual activities for the project contained herein."*

ARTICLE SP-16 LIQUIDATED DAMAGES

If determined by the City that the work is not complete within the time specified or any adjustments thereof, it is agreed that damage will be sustained by the City. Therefore, Contractor shall pay compensation for damage to the City as liquidated damages.

The term liquidated damages means the daily amount set forth in the contract to be deducted from the contract price to cover additional costs incurred by the city because of the contractor's failure to complete the contract work within the number of calendar days or workdays specified.

Liquidated damages are based on the estimated cost of field construction engineering. In special cases, liquidated damages greater than the estimated field construction engineering cost may be specified provided that detailed reasons, such as project related costs for delays and public inconvenience, are given to support the greater amount. In all cases, calculations should support the recommended rate.

Liquidated damages are not to be used as disincentives or incentives to encourage timely completion. If project completion time is critical, then Incentive/Disincentive (I/D) provisions should be considered to motivate the contractor to complete the work sooner, and the I/D amount and time should be documented in the project file.

The city shall use the following formula as a guideline to determine Liquidated Damages and avoid excessive, or unreasonable, liquidated damages:

$$\frac{(15\%) \times (\text{Engr. Estimate} + \text{RE Office Expense}^*)}{\text{WORKING DAYS}^{**}} = \frac{\text{Liquidated Damage}}{\text{CALANDAR DAY}}$$

* Resident Engineer office expenses for the life of the contract should be added unless the cost is already included in the Engineer's Estimate.

** Working days used to calculate liquidated damages should not include water pollution establishment or plant establishment days.

The liquidated damages should be rounded up in \$100 increments when determining the amount specified in section 6-9 of the General Provisions.

ARTICLE SP-17 CONTRACTOR'S WORKSITE STAFF

- A. Contractor's worksite staff shall give personal attention to the work, and keep work under control and in conformance with the Contract.
- B. The Contractor shall maintain sufficient on site personnel to effectively manage the work. The Contractor shall assign a minimum of two (2) different individuals, to be personally responsible for the following four (4) functions of work:

1. On-site project management (as needed and required to attend weekly progress meetings)
 2. On-site English speaking supervision of construction (full-time)
 3. On-site engineering/document control (as needed)
 4. On-site scheduling (as needed)
- C. With day to day operations and daily activities in the building continuing throughout construction the Contractor shall be required to have worksite staff for **construction cleaning** or to maintain a contract with a construction cleaning company. Construction cleaning personnel shall be available on call, within 24-hours, and shall perform **weekly cleanup** of all areas under construction and areas adjacent to construction. This extra measure of construction cleaning shall take place in addition to the **daily clean up** that will be expected of all sub-contractors and any construction personnel working in construction site areas. These extra measures of construction cleaning are intended to minimize effects of construction on the continued day to day operations inside the building and eliminate any build up of dust and debris surrounding the construction areas. All vents shall be covered and protected to avoid dust migration.

If in the opinion of the City the work is not being effectively managed the City may order the Contractor to augment or replace specific staff as necessary to ensure the successful completion of the project. Such personnel changes shall be at the sole expense of the Contractor.

ARTICLE SP-18 TEMPORARY FACILITIES

(10) **Logistics Plan.** The Contractor shall submit a project logistics plan to the City for approval within five working days from the Notice to Proceed date. The logistics plan shall define how the Contractor plans to control site processes including, but not limited to, means and methods to accommodate temporary utilities, temporary facilities and office trailers, site traffic, on-site parking, material delivery and material storage, etc.

A. Constrained Site. The Contractor is advised that the Project Site is extremely constrained and there will be limited available space for material storage / delivery, construction parking, and temporary office facilities. As a result, the Contractor shall account for the following restrictions in the preparation of their bid.

- 1) **Material Delivery/Storage:** The contractor shall coordinate "just-in-time" material deliveries with their suppliers/subcontractors so as not to unnecessarily encumber the site with stored materials. At the Contractor's option and expense they may utilize suitable off-site storage facilities and/or lay-down areas to store materials. Fees paid for such off-site storage facilities and all costs associated with transportation of materials to or from the site shall be at the sole expense of the Contractor.

Material Delivery/Storage: shall be scheduled so as to cause minimal disruption of adjacent businesses and normal traffic patterns on streets abutting the site.

Construction Parking: No construction vehicle parking is provided, nor will be allowed off site or adjacent to the site. The Contractor shall limit the number of vehicles allowed on site to those vehicles necessary to perform the Work. Construction parking will not be allowed on surface streets surrounding City Hall.

2) **Construction operations** shall be confined to the site. Operations such as crane work, placing asphalt, or placing concrete with operations that encroach onto the public right of way and day to day pedestrian path of travel are not guaranteed and shall be at the discretion of the City with at least 5 working days notice prior to said work. Such work, subject to City approval, will be limited to the hours of 7:30 am to 4:00 pm Monday through Friday. Early hour deliveries for earth moving, placement of concrete/asphalt, steel materials, equipment and similar activities shall approved by the City 72 hours in advance of the event.

B. Contractor Office. The Contractor shall include in their bid, all costs to provide separate facilities for their personnel. Including cell service, wi-fi hotspots, computers, printers, scanners, email capability, communications, and safety equipment. The location of Contractor facilities shall be reviewed and approved by the City.

C. Web based file sharing platform. Contractor shall provide a fully functional web based file sharing platform/site/software for project administration to be utilized by all parties. Trial subscriptions to web based platforms will not be considered acceptable.

D. Video and Telephone Conferencing. As part of the recent COVID-19 protocols that limit in person meetings, the Contractor shall include in their bid, all costs to provide a video and telephone conferencing service for the project. Key City staff members and Contractor staff members shall be able to schedule and invite attendees. Trial subscriptions to Video and Telephone Conferencing platforms will not be considered acceptable.

ARTICLE SP-19 PROJECT SIGNAGE

A. Contractor shall be responsible to provide, install, and maintain all required project signage per California Department of Industrial Relations. The location and content of project signage must be approved by the City prior to installation.

B. Beyond the requisite safety and traffic signage the Contractor shall include in their bid the cost to provide and install two (2) project signs, (3' x 6' minimum). The project sign shall include a rendering of the project, the project name, and the names of the City, City's Representative/Construction Manager, Architect and their Consultants, and the General Contractor. The City shall approve layout and content of the project sign.

C. Under no circumstances shall Contractor or any of their Subcontractors be allowed to install or otherwise display advertising or similar signage without the express written consent of the City.

ARTICLE SP-20 INSURANCE REQUIRED

The minimum amounts and types of insurance coverages are as stated in the agreement (sample copy attached). Prior to bid submittal the BIDDER shall keep fully informed of the latest insurance requirements of the City of Costa Mesa and shall comply with all other provisions of Section 5-4 of the General Provisions.

Below are approved endorsements which satisfy the basic insurance requirements contained in contracts entered into by City of Costa Mesa. These have been approved by the City Attorney's office. The terms of any specific contract with the City are controlling. Prior to the commencement of any work, the CITY requires that the ENGINEER receive Certificates of Insurance in DUPLICATE for liability coverage of at least \$1,000,000 combined single limit, per occurrence and in the aggregate.

Each insurance policy required by the CITY of the Contractor shall contain the following endorsements:

- 1) Additional Insureds.
"The City of Costa Mesa and its elected and appointed boards, officers, agents, and employees are additional insureds with respect to the subject project and agreement."
- 2) Notice
"Said policy shall not terminate, nor shall it be canceled nor the coverage reduced, until thirty (30) days after written notice is given to City."
- 3) Other Insurance
"Any other insurance maintained by the City of Costa Mesa shall be excess and not contributing with the insurance provided by this policy."

If any of such policies provide for a deductible or self-insured retention to provide such coverage, the amount of such deductible or self-insured retention shall be approved in advance by City. No policy of insurance issued as to which the City is an additional insured shall contain a provision which requires that no insured except the named insured can satisfy any such deductible or self-insured retention.

- 4) Builder's Risk Insurance
Upon execution of the Agreement, the Contractor shall provide a certificate(s) of insurance showing that he has obtained, for the period of the contract, Builders' Risk "All Risk" completed value insurance coverage (including flood but excluding earthquake and tidal wave) upon the entire project which is the subject of the contract and including completed work and work in progress.

ARTICLE SP-21 GENERAL WORK REQUIRED

- 1) Any haul routes to be coordinated with City operations and any city or agency requirements and ordinances, including permits.
- 2) Permits / Fees / Agency Notification / Compliance / Ordinances

- 3) Any and all other permit and/or service fees, assessments, or bonding required in conjunction with the work of this Contract shall be the responsibility of the Contractor.
- 4) All notifications with various agencies required in the performance of the work shall remain the responsibility of the Contractor.
- 5) Compliance with regulatory agency, organization, and governing body requirements having jurisdiction over Contractors scope of work.
- 6) Contractor shall provide all necessary safety measures required for each work area including but not limited to: Temporary fencing with privacy screen around the perimeter of the property, completely securing, and controlling each work area. Contractor shall move fencing as required to each area of work as required. Submit plan showing the layout of the fencing to the City for approval prior to installing temporary fencing. Temporary fencing shall be minimum 6' high relocatable fence panels (as appropriate). Fence panel bases shall be located to avoid trip hazards in all paths of travel. Barricades, traffic plates, temporary patching, temporary signage required for safely delineating all detours, road lane and pathway closures and rerouting, traffic control, safety warnings.
- 7) Contractor shall prepare and submit to the City for approval a traffic control and pedestrian pathway control plan prior to starting work in any area cover by the scope of work for review. Traffic control plan as required to be approved by the City jurisdiction.
- 8) There may be other City Contractors involved in the project. It is the responsibility of this Contractor to be aware of other operations with the coordination of the City, and be aware of all others working in order to coordinate work accordingly.
- 9) Prior to use of bobcat or any equipment involving 3rd floor, contractor is to provide engineers statement that the weight of the equipment is appropriate to use for the floor design criteria.
- 10) Contractor shall furnish to the City by noon of the following day, completed daily reports, and safety meeting reports for the previous day. Reports shall include: name of each worker performing work each day, classification for each worker employed on the project (including any sub-tier subcontractors' workers), a description of work performed, and any equipment used for each day. Contractor forms to be provided by City. Current daily reports are a condition of release of monthly payment to the Contractor.
- 11) Responsibility for storage and security of own materials and/or equipment located on and off the jobsite property. Location of staging area to be determined / approved by City. Own work shed, yard, lighting and security fence, if required for storage.
- 12) Contractor shall be responsible to provide and maintain adequate containment of existing **hazardous materials** and **dust control**, with particular control of any existing lead dust, construction dust, and construction debris during demolition operations. A specific **dust control plan** shall be submitted to the City for approval prior to the start of any demolition work. The dust control plan shall specifically identify how OSHA protection measures shall be implemented and the cleaning of all areas of work, pathways leading up to the work, public

pathways adjacent to the work, and haul routes throughout the duration of their scopes of work shall take place. These measures must be done to the satisfaction of the City and local health agencies.

- 13) Day to day operations will continue throughout construction and the Contractor shall maintain access to all office work spaces, in use, and adjacent to construction areas.
- 14) Off-loading, scaffolding, ladders, hoisting and moving of materials and/or equipment for own work.
- 15) Contractor is responsible for temporary power, portable lighting and extension cords necessary to complete the scope of work. Contractor will be responsible to provide general egress/ingress pedestrian, parking lot, walkway, safety, etc. OSHA required temporary lighting. Contractor shall provide their own task lighting, including any extension cords, generators and light stands as may be required.
- 16) Provide and maintain dewatering operation as required to eliminate ponding of water immediately after rainfall has occurred in order to allow these areas to dry out as quickly as possible. Dewatering to be done by whatever means necessary, including mechanical pumps, siphons, etc. Any SWPPP measures defeated or removed in the dewatering process shall be replaced per the posted SWPPP plan by the Contractor. Dewatering for grading operation, trenches, footings, pits, slab areas, etc., shall be done immediately by Contractor.
- 17) Contractor's construction cleaning personnel shall be available on call, within 24-hours, and shall perform **weekly cleanup** of all areas under construction and areas adjacent to construction. This extra measure of construction cleaning shall take place in addition to the **daily clean up** that will be expected of all sub-contractors and any construction personnel working in construction site areas. These extra measures of construction cleaning are intended to minimize effects of construction on the continued day to day operations inside the building and eliminate any build up of dust and debris surrounding the construction areas.
- 18) Upon failure by Contractor to provide sufficient cleanup, and after 24-hour Notice the City will perform the cleanup and assess all costs against the Contractor's Contract, which have failed to perform clean up. If lack of cleanup results in an immediate safety concern to public safety and the City shall have right to correct any situation and assess all costs against the Contractor's Contract.
- 19) Contractor is responsible for environmental conditions (i.e. temperature, moisture, etc.) affecting own work.
- 20) Provide survey, layout and field measurements for Contractor's own work.
- 21) Safety requirement for Contractor's own work, in compliance with most recent OSHA regulations and in cooperation with the City's safety requirements. Hardhats, boots, eye protection, long pants and shirts, and 100% tie off are required for all personnel at all times during construction of the Project. Failure to comply with any Safety Regulations will be grounds for removal of personnel from the jobsite. Flammable products must be continually

stored per OSHA regulations. All Contractor's on-site full time project supervision shall be required to have completed the OSHA 10- hour training prior to working on the project.

- 22) Job hazard analysis, IIPP, site specific safety plan must be submitted to City prior to commencement of work.
- 23) Contractor to comply with all ordinances regarding parking, hours of work and routing of delivery trucks to the project site, and as required by the City.
- 24) Contractors and employees will be required to park in designated areas as directed by the City. Contractor shall provide provisions as required for own employees, equipment, suppliers and sub- tier contractors.
- 25) Compliance with specified warranty and guarantee requirements, both standard and special.
- 26) Provide one qualified English speaking Superintendent and one lead foreman for the duration of own work on project, including punch list corrections at completion of project. Superintendent and/or Foreman must be on-site when work is being performed. Superintendent / Foreman may not be changed without City's approval. All Contractor's on-site full time project supervision shall be required to have completed the OSHA 10-hour training prior to working on the project. Contractor's on-site administrative personnel are required to have completed the OSHA 10-hour safety training prior to working on the project.
- 27) Attendance at jobsite coordination, scheduling and safety meetings shall be by the Contractor's Superintendent at a minimum.
- 28) Multiple move-ons to comply with the project's schedule or as required.
- 29) Provide relocation of staging area as necessary due to construction progress and as directed by City.
- 30) Contractor has primary responsibility for locating existing utilities prior to commencing underground work. Contractor must make own notification to required agencies and hold a pre-dig conference prior to starting underground work. Contractor should not rely on any representation made by anyone other than those individuals duly authorized to survey, locate and stake existing utilities. All utilities slated for removal or cap off must be potholed and exposed prior to removal of cap off. Should location of utilities differ from those shown on the contract documents contractor shall make every effort to locate said at no cost to the City.
- 31) All welding required for own work. Submit current and valid welder's certifications prior to beginning any welding installation on site for IOR and City's review.
- 32) Additional testing costs as required should initial tests fail as a result of the scope of work.
- 33) All project record documents as required per plans and specifications. Monthly updates of as-built documents on record plan set, and transfer to project as built set at end of the project as required by specifications. Update as-built drawing on a weekly basis.

34) All project record documents as required per plans and specification.

SECTION G
TECHNICAL SPECIFICATIONS

PROJECT MANUAL

FOR

COSTA MESA FIRE TRAINING CENTER

OWNER

CITY OF COSTA MESA
77 FAIR DRIVE
COSTA MESA, CA 92626

ARCHITECT

PBK
8163 ROCHESTER AVENUE
RANCHO CUCAMONGA, CA 91730
(909) 987-0909

PROJECT 230075
DECEMBER 2023

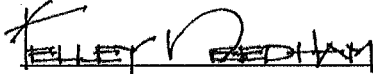
PROJECT MANUAL
FOR
COSTA MESA FIRE TRAINING CENTER

PROJECT 230075

DECEMBER 2023

CITY OF COSTA MESA
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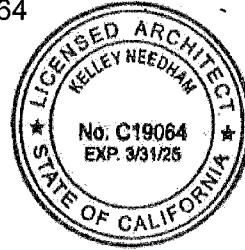
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KELLEY NEEDHAM
ARCHITECT

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Stamp



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CONTRACTING REQUIREMENTS

NOT USED

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PROCUREMENT AND CONTRACTING REQUIREMENTS

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GEOTECHNICAL DATA

1. SUMMARY

- A. This document describes geotechnical investigations conducted at the project site and the use of data from that investigation.

2. GEOTECHNICAL INVESTIGATION REPORT

- A. A Geotechnical Report, titled "Geotechnical Exploration Proposed Costa Mesa Fire Training Tower Project, Costa Mesa Fire Station No. 4, 2300 Placentia Avenue, Costa Mesa, Orange County, California", dated June 6, 2023 has been prepared for the site of the Work by Leighton Consulting, Inc., a Geotechnical Engineer selected by the Owner.
- B. The Geotechnical Report is included in Appendix I of this specifications.

3. USE OF DATA

- A. Geotechnical Report was obtained by the Owner only for the Architect's use in design and is not a part of the Contract Documents.
- B. The opinions expressed in the report are those of the Geotechnical Engineer and represent interpretations for subsoil conditions, tests, and analysis of results conducted by the Geotechnical Engineer. The Architect is not responsible for the conclusions drawn from these opinions and interpretations.
- C. The report is made available for bidders' convenience and information only and is not a warranty of subsurface conditions.
- D. Any information obtained from the report as to subsurface conditions or elevations of underlying materials is approximate only and is not a guarantee of the continuity of such conditions or elevations.
- E. Any bidder using or interpreting the information described in the report shall accept full responsibility for their use and interpretation of the information.

4. EXAMINATION OF SITE

- A. Bidders shall visit the site and acquaint themselves with existing conditions.
- B. Bidders shall decide for themselves the conditions which will affect the Work and the character of the materials to be encountered in the Work.
- C. Bidders may make, at their own expense, their own subsurface investigations to satisfy themselves as to site and subsurface conditions, but such investigations will be performed only under time schedules and arrangements reviewed in advance by the Architect.

5. QUALITY ASSURANCE

- A. A Geotechnical Engineer will be retained by the Owner to observe performance of work in connection with excavation, trenching, filling, backfilling, grading, paving, and to perform compaction tests.
- B. Duties and limitations of the Geotechnical Engineer are as specified in Section 01 45 29.
- C. Readjust work performed that does not meet requirements of the Contract Documents.
- D. Make no deviation from the Contract Documents without specific and written approval of the Architect.

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APPENDIX

APPENDIX 1 Geotechnical Report

SECTION 01 11 00

SUMMARY OF WORK

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- A. Work Included.
- B. Work under separate contracts.
- C. Work by Owner.
- D. Owner furnished products.
- E. Contractor use of site and premises.
- F. Work Sequence.
- G. Owner occupancy.
- H. Work restrictions.

1.2 WORK INCLUDED

- A. Work of this Contract comprises general construction of Costa Mesa Fire Training Center located in Costa Mesa, CA for the City Costa Mesa, Owner.
- B. Construct the work under a single lump sum contract.

1.3 WORK BY OWNER

- A. Items noted "NIC" (Not In Contract) will be furnished and installed by Owner.

1.4 OWNER FURNISHED PRODUCTS

- A. Items noted "OFCI" (Owner-Furnished Contractor Installed) will be furnished by Owner and installed by Contractor.
- B. Items noted "OFOI" (Owner-Furnished Owner Installed) will be furnished by Owner and installed by Owner.
- C. Owner's Responsibilities:
 - 1. Arrange for and deliver Owner reviewed Shop Drawings, Product Data, and Samples to Contractor.
 - 2. Arrange and pay for Product delivery to site.
 - 3. On delivery, inspect Products jointly with Contractor.
 - 4. Submit claims for transportation damage and replace damaged, defective, or deficient items.
 - 5. Arrange for manufacturer's warranties, inspections, and service.
- D. Contractor's Responsibilities:
 - 1. Review Owner reviewed Shop Drawings, Product Data, and Samples. Receive and unload Products at site; inspect for completeness or damage, jointly with Owner.

2. Handle, store, install and finish Products.
3. Repair or replace items damaged after receipt.

1.5 CONTRACTOR USE OF SITE AND PREMISES

- A. Limit use of site and premises to allow:
 1. Owner occupancy and operation.
- B. Construction Operations: Limited to area indicated on drawings.

1.6 OWNER OCCUPANCY

- A. Partial Owner Occupancy: Owner will occupy the entire site and premises during entire construction period, with the exception of areas under construction.
- B. Owner Occupancy of Completed Areas of Construction: Owner reserves the right to occupy and to place and install equipment in completed areas of building, before Substantial Completion, provided such occupancy does not interfere with completion of the Work. Such placement of equipment and partial occupancy shall not constitute acceptance of the total Work.
- C. Architect will prepare a Certificate of Substantial Completion for each specific portion of the Work to be occupied before Owner occupancy.
- D. Obtain a Certificate of Occupancy from authorities having jurisdiction before Owner occupancy.
- E. Before partial Owner occupancy, mechanical and electrical systems shall be fully operational, and required tests and inspections shall be successfully completed. On occupancy, Owner will operate and maintain mechanical and electrical systems serving occupied portions of building.
- F. On occupancy, Owner will assume responsibility for maintenance and custodial service for occupied portions of building.
- G. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage.
- H. Perform the Work so as not to interfere with Owner's day-to-day operations.
- I. Maintain existing exits, unless otherwise indicated.
- J. Provide not less than 72 hours notice to Owner of activities that will affect Owner's operations.

1.7 WORK RESTRICTIONS

- A. On-Site Work Hours: Work shall be generally performed during normal business working hours, Monday through Friday, except as otherwise indicated or required to conform to construction schedule and labor codes.
- B. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted to do so and then only after arranging to provide temporary utility services according to requirements indicated.

2. PART 2 PRODUCTS

Not Used

3. PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01 20 00

PRICE AND PAYMENT PROCEDURES

1. PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Schedule of Values.
- B. Application for Payment.
- C. Defect assessment.
- D. Non-payment for rejected work.
- E. Change procedures.
- F. Alternates.
- G. Unit prices.

1.2 SCHEDULE OF VALUES

- A. Submit Schedule of Values for approval in duplicate within fourteen days after receipt of Notice to Proceed.
- B. Format: Submit typed schedule based upon the attached Schedule of Values augmented by the Table of Contents of this Project Manual. Identify each line item with number and title of the major specification Section.
- C. Include in each line item, the amount of Allowances specified in this Section.
- D. Include within each line item, a directly proportional amount of Contractor's overhead and profit.
- E. Revise schedule to list approved Change Orders, on continuation sheet, with each Application For Payment.

1.3 APPLICATIONS FOR PAYMENT

- A. Submit six copies of each application on AIA Form G702 - Application and Certificate for Payment and AIA Form G703 Continuation Sheet.
- B. Content and Format: Utilize Schedule of Values for listing items in Application for Payment.
- C. Payment Application Times: The date for each progress payment is indicated in the General Conditions of the Contract.
- D. Payment Application Periods: The period of construction covered by each application for payment is the period indicated in the General Conditions of the Contract.
- E. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents. Architect will return incomplete applications without action.
- F. Waiver of Stop Notices: With each application for payment, submit waivers of stop notices from subcontractors for construction period covered by previous application.
- G. Final Payment: As specified in the General Conditions of the Contract and in Section 01 77 00 - Closeout Procedures.
- H. Refer to the General Conditions of the Contract for additional payment provisions.

1.4 DEFECT ASSESSMENT

- A. Replace the Work, or portions of the Work, not conforming to specified requirements.
- B. If, in the opinion of the Architect, it is not practical to remove and replace the Work, the Architect will direct one of the following remedies:
 - 1. The defective Work may remain, but the listed schedule of value will be adjusted to a new value at the discretion of the Architect.
 - 2. The defective Work will be partially repaired to the instructions and satisfaction of the Architect and the listed schedule of value will be adjusted to reflect a new value at the discretion of the Architect.

1.5 NON-PAYMENT FOR REJECTED WORK

- A. Payment will not be made for any of the following:
 - 1. Products wasted or disposed of in a manner that is not acceptable.
 - 2. Products determined to be unacceptable before or after placement.
 - 3. Products not completely unloaded from the transporting vehicle.
 - 4. Products placed beyond the lines and levels of the required work.
 - 5. Products remaining on hand after completion of the work.
 - 6. Loading, hauling and disposing of rejected products.

1.6 CHANGE PROCEDURES

- A. The Architect will advise of minor changes in the Work not involving an adjustment to Contract Sum/Price or Contract Time as authorized by General Conditions on AIA Form G710 Architect's Supplemental Instructions.
- B. The Architect may issue a Proposal Request which includes a detailed description of a proposed change with supplementary or revised Drawings and specifications. Proposal Requests are for information only and are not to be considered instructions to stop the work or to execute the proposed change. Contractor will prepare and submit a detailed estimate within 14 days.
- C. Any change in the Work which involves the adjustment to contract sum/price or contract time shall be properly certified by the Contractor as indicated in the General Conditions of the contract.
- D. The Contractor may propose a change by submitting a Change Order Request to the Architect, describing the proposed change and its full effect on the Work. Include a statement describing the reason for the change, and the effect on the Contract Sum and Contract Time with full documentation and a statement describing the effect on Work by separate or other contractors.
- E. Stipulated Sum Change Order: Based on Proposal Request and Contractor's fixed price quotation or Contractor's Change Order Request as approved by Architect.
- F. Construction Change Directive: Architect may issue a directive, signed by the Owner and Architect, instructing the Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order. Document will describe changes in the Work, and designate method of determining any change in Contract Sum or Contract Time. Promptly execute the change.
- G. Allowance Adjustment: Adjustment of allowance amounts shall be based upon a properly documented and detailed Change Order Request which substantiates distribution of allowance amounts and actual costs of work in place.
- H. Change Order Forms: AIA G701 Change Order.

- I. Execution of Change Orders: Architect will issue Change Orders for signatures of parties as provided in the General Conditions of the Contract.
- J. Promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as a separate line item and adjust the Contract Sum.
- K. Promptly revise progress schedules to reflect any changes in Contract Time, revise sub-schedules to adjust times for other items of work affected by the change and resubmit.
- L. Promptly enter changes in Project Record Documents.

2. PART 2 PRODUCTS

Not Used

3. PART 3 EXECUTION

Not Used

END OF SECTION

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SCHEDULE OF VALUES FORMAT*

Project: Costa Mesa Fire Training Center
Contractor: _____
Date: _____

Item Description	Amount
1. Mobilization and initial expenses	
2. General Conditions	
Temporary Utilities	
Engineering Layout	
Temporary Construction/Dust Control	
General Clean Up/Trash Removal	
Project Manager/Supervision/Truck	
Rental Equipment	
3. Bonds and Insurance	
4. SITE WORK	
Demolition/Removal	
Site	
Building(s)	
Site Preparation	
General Brush and Tree Clearing	
Earthwork	
Site Improvements	
Termite/Weed Treatment	
AC Paving/Base/Striping	
Concrete Curb/Gutters	
Concrete Retaining Walls	
Concrete Paving	
Concrete Site Stairs	
Masonry Garden Walls	
Chain Link Fences/Gates	
Wrought Iron Fences/Gates	
Irrigation	
Planting	
Site Equipment (misc)	
Site Utilities	
Fire Hydrants	
Fire Lines	
Storm Drainage	
Site Water	
Site Gas	
Site Sewer	
Electrical Site Service/Lighting	

Item Description

Amount

- Off-site Work
 - AC Paving/Base
 - Concrete Curb/Gutters
 - Irrigation
 - Planting
 - Fire Hydrants
 - Fire Lines
 - Storm Drainage
 - Site Water
 - Site Gas
 - Site Sewer
 - Street Lights
- Other

5. FOUNDATIONS

- Wall Foundations
- Column Foundations
- Special Foundations
- Other

6. SUBSTRUCTURE

- Slab on Grade
- Trenches/pits/bases
- Basement Excavation/Walls
- Subgrade Moisture Protection
- Other

7. SUPERSTRUCTURE

- Columns and Beams
 - Concrete Columns/Beams
 - Masonry Columns
 - Steel Columns/Beams
 - Wood Columns/Beams
 - Glue Laminated Beams
- Structural Walls
 - Concrete Walls
 - Masonry Walls
 - Wood Framed Walls
- Floor Construction
 - Concrete Cast in Place
 - Steel Deck/Framing
 - Trusses
 - Wood Framed Floors
- Roof Construction
 - Concrete Cast in Place
 - Steel Deck/Framing
- Trusses
 - Wood Framed Roofs
- Stairs
- Other

Item Description

Amount

8. EXTERIOR CLOSURE

- Exterior Walls/Soffits
 - Sandblast Concrete Seal/Paint
 - Sandblast Masonry Seal/Paint
 - Glass Block
 - Metal Studs
 - Wood Studs
 - Exterior Plaster
 - Exterior Insulation
- Windows/Frames/Glazing
 - Steel Windows/Glazing
 - Aluminum Windows/Glazing
 - Store Front/Glazing
- Doors
 - Metal Doors/Frames
 - Wood Doors/Frames
 - Aluminum Doors/Frames/Glazing
 - Sectional Doors/Frames
 - Roll Up Doors/Frames
 - Store Front
- Frames
- Hardware
- Insulation
 - Thermal Wall
 - Sound Wall
- Sealants/Caulking
- Other

9. ROOFING

- Roof Coverings and Flashing
 - Built Up Roofing
 - Single Ply
 - Preformed Metal
 - Asphalt Shingle
 - Clay/Concrete Tile
 - Roof Walkway System
- Roof Insulation and Fill
 - Lightweight Concrete
 - Insulating Concrete Fill
 - Rigid Insulation
- Flashing and Trim
- Roof Openings
 - Roof Hatches
 - Smoke Hatches
 - Skylights
 - Skyroofs/Walls
 - Ladders to Roof
- Other

Item Description**Amount****10. INTERIOR CONSTRUCTION**

- Fixed Partitions
 - Metal Studs
 - Wood Studs
 - Gypsum Board
 - Interior Plaster
- Movable Partitions
- Compartments & Cubicles
- Toilet Partitions
- Interior Doors
 - Wood Doors
 - Metal Doors
 - Aluminum Doors
 - Roll Up Doors
 - Special Doors
- Frames
- Interior Finishes
 - Painting
 - Walls
 - Ceiling
 - Vinyl Wall Coverings
 - Ceramic Tile
 - Fiberglass Reinforced Panels
 - Concrete Sealer
 - Vinyl Sheet/Tile
 - Rubber Flooring
 - Carpet
 - Wood Flooring
 - Suspended Acoustical Ceiling System
 - Suspended Gypsum Ceiling System
- Specialties
 - Chalkboard/Markerboard/Tackboards
 - Cabinets
 - Toilet Room Accessories
 - Graphics and Signage
 - Other

11. CONVEYING SYSTEMS

- Elevators
- Moving Stairs and Walks
- Pneumatic Tube Systems
- Lifts, Hoists, and Cranes
 - Wheel Chair Lift
 - Dock Leveler/Bumpers
 - Automotive Hoists (single)
 - Two Post Hoist (twin)
- Other

Item Description

Amount

12. EQUIPMENT

- Library
 - Book Theft System
 - Fixed Book Shelves
 - Rolling Book Shelves
- Multipurpose/Stage
 - Fireproof Curtain
 - Projection Screen(s)
 - Folding Tables/Benches
- Athletic
 - Steel Athletic Lockers
 - Basketball Backstops
 - Bleachers
 - Pool
- Classroom
 - Window Coverings
 - Book Lockers
- Food Service
 - Kitchen Equipment
 - Walk in Freezer/Refrigerator
- Other

13. MECHANICAL

- Plumbing
 - Supply Service
 - Disposal Service
 - Rainwater Service
 - Gas Service
 - Finish Fixtures
- Fire Protection
 - Sprinklers
 - Fire Extinguishers
- HVAC System
 - Equipment
 - Ductwork/Distribution
 - System Controls
 - Testing and Balancing
- Other

14. ELECTRICAL

- Distribution
- Lighting and Power
- Special Systems
 - Alarm System
 - Communications
 - Emergency System
- Other

Item Description **Amount**

15. SPECIAL CONSTRUCTION

Miscellaneous Special Construction

TOTAL COST \$ _____

*The above categories may be subdivided and items added if the overall order remains the same and the subtotal cost for each category complies with the format as shown. Items not applicable to a particular job may be deleted from this list. Overhead and profit shall be a combined mark up and added proportionally to each line item.

SECTION 01 25 13

PRODUCT SUBSTITUTION PROCEDURES

1. PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Product options.
- B. Substitution procedures.

1.2 DEFINITIONS

- A. Requests for changes in products, materials, or equipment required by Contract Documents proposed by the Contractor prior to and after award of the Contract are considered requests for substitutions. The following are not considered substitutions:
 - 1. Revisions to Contract Documents requested by the Owner or Architect.
 - 2. Specified options of products, materials, and equipment included in Contract Documents.

1.3 PRODUCT OPTIONS

- A. Products Specified by Reference Standards or by Description Only: Any product meeting those standards or description.
- B. Products Specified by Naming One or More Manufacturers with Provision for Substitution: Products of manufacturers named and meeting specifications with substitution of products or manufacturer only when submitted under provisions of this section.
- C. Products Specified by Naming One or More Manufacturers without Provision for Substitution: No substitution allowed.

1.4 LIMITATIONS ON SUBSTITUTIONS SUBMITTED PRIOR TO THE RECEIPT OF BIDS

- A. The Bid shall be based upon the standards of quality established by those items of equipment and/or materials which are specifically identified in the Contract Documents.
- B. Architect may consider requests for substitutions of specified equipment and/or materials only when requests are received by Architect two weeks prior to the date established for the receipt of bids as stipulated in Document 00 21 13 - Instructions to Bidders.
- C. Consideration by Architect of a substitution request will be made only if request is made in strict conformance with provisions of this section.
- D. Burden of proof of merit of requested substitution is the responsibility of the entity requesting the substitution.
- E. It is the sole responsibility of the entity requesting the substitution to establish proper content of submittal for requests for substitutions. Incomplete submittals will be rejected.
- F. Architect's decision on substitution requests are final and do not require documentation or justification.
- G. When substitution is not accepted, provide specified product.
- H. Substitute products shall not be included within the bid without written acceptance by Addendum.

1.5 LIMITATIONS ON SUBSTITUTIONS SUBMITTED AFTER THE AWARD OF THE CONTRACT

- A. The Contract is based upon the standards of quality established by those items of equipment and/or materials which are specifically identified in the Contract Documents.
- B. Consideration by Architect of substitution requests received after the established date of the receipt of bids or contract award will only be made when one or more of the following conditions are met and documented:
 - 1. Specified item fails to comply with regulatory requirements.
 - 2. Specified item has been discontinued.
 - 3. Specified item, through no fault of the Contractor, is unavailable in the time frame required to meet project schedule.
 - 4. Specified item, through subsequent information disclosure, will not perform properly or fit in designated space.
 - 5. Manufacturer declares specified product to be unsuitable for use intended or refuses to warrant installation of product.
 - 6. Substitution would be, in the sole judgement of the Architect, a substantial benefit to the Owner in terms of cost, time, energy conservation, or other consideration of merit.
- C. Notwithstanding the provisions of Article 1.4 of this section and the above, the Architect may consider a substitution request after the date of the receipt of bids or contract award, if in the sole discretion of the Architect, there appears to be just cause for such a request. The acceptance of such a late request does not waive any other requirement as stated herein.
- D. Consideration by Architect of a substitution request will be made only if request is made in strict conformance with provisions of this section.
- E. Substitutions will not be considered when they are indicated or implied on shop drawings or product data submittals without separate written request as required by provisions of this section.
- F. Review of shop drawings does not constitute acceptance of substitutions indicated or implied on shop drawings.
- G. Substitutions will not be considered when requested or submitted directly by subcontractor or supplier.
- H. Substitutions will not be considered as a result of the failure to pursue the work promptly or coordinate activities properly.
- I. Burden of proof of merit of requested substitution is the responsibility of the Contractor.
- J. It is the sole responsibility of the Contractor to establish proper content of submittal for requests for substitutions. Incomplete submittals will be rejected.
- K. Owner shall receive full benefit of any cost reduction as a result of any request for substitution.
- L. Architect's decision on substitution requests is final and does not require documentation or justification.
- M. When substitution is not accepted, provide specified product.
- N. Substitute products shall not be ordered or installed without written acceptance.

1.6 REGULATORY REQUIREMENTS

- A. It shall be the responsibility of the entity requesting the substitution to obtain all regulatory approvals required for proposed substitutions.

- B. All regulatory approvals shall be obtained for proposed substitutions prior to submittal of substitution request to Architect.
- C. All costs incurred by the Owner in obtaining regulatory approvals for proposed substitutions to include the costs of the Architect and any authority having jurisdiction over the project shall be reimbursed to the Owner. Costs of these services shall be reimbursed regardless of final acceptance or rejection of substitution.

1.7 SUBSTITUTION REPRESENTATION

- A. In submitting a request for substitution, the entity requesting the substitution makes the representation that he or she:
 - 1. Has investigated the proposed substitution and has determined that it meets or exceeds the quality level of the specified product.
 - 2. Will provide the same warranty or guarantee for the substitution as for the specified product.
 - 3. Will coordinate installation and make changes to other work which may be required for the work to be completed with no additional cost to the Owner.
 - 4. Waives claims for additional cost or time extension which may subsequently become apparent.
 - 5. Will reimburse Owner for the cost of Architect's review or redesign services associated with substitution request.

1.8 SUBMITTAL PROCEDURE

- A. Submit six copies of each request.
- B. Submit request with Architect's Substitution Request Form. Form may be obtained at the office of the Architect. Substitution requests received without request form will be returned unreviewed.
- C. Limit each request to one proposed substitution.
- D. Request to include sufficient data so that direct comparison of proposed substitution can be made.
- E. Provide complete documentation for each request. Documentation shall include the following information, as appropriate, as a minimum:
 - 1. Statement of cause for substitution request.
 - 2. Identify product by specification section and article number.
 - 3. Provide manufacturer's name, address, and phone number. List fabricators, suppliers, and installers as appropriate.
 - 4. List similar projects where proposed substitution has been used, dates of installation and names of Architect and Owner.
 - 5. List availability of maintenance services and replacement materials.
 - 6. Documented or confirmation of regulatory approval.
 - 7. Product data, including drawings and descriptions of products.
 - 8. Fabrication and installation procedures.
 - 9. Samples of proposed substitutions.

10. Itemized comparison of significant qualities of the proposed substitution with those of the product specified. Significant qualities may include size, weight, durability, performance requirements and visual effects.
 11. Coordination information, including a list of changes or modifications needed to other items of work that will become necessary to accommodate proposed substitution.
 12. Statement on the substitutions effect on the construction schedule.
 13. Cost information including a proposal of the net change, if any, in the Contract sum if the substitution is submitted after the receipt of bids or contract award.
 14. Certification that the substitution is equal to or better in every respect to that required by the Contract Documents and that substitution will perform adequately in the application intended.
 15. Waiver of right to additional payment or time that may subsequently become necessary because of failure of substitution to perform adequately.
- F. Inadequate warranty, vagueness of submittal, failure to meet specified requirements, or submittal of insufficient data will be cause for rejection of substitution request.

1.9 ARCHITECT'S REVIEW

- A. Within 14 days of receipt of request for substitution, the Architect will accept or reject proposed substitution.
- B. If a decision on a substitution cannot be made within the time allocated, the product specified shall be used.
- C. There shall be no claim for additional time for review of proposed substitutions.
- D. Final acceptance of a substitution submitted prior to the date established for the receipt of bids will be in the form of an addendum.
- E. Final acceptance of a substitution submitted after the award of the contract will be in the form of a Change Order.

2. PART 2 PRODUCTS

Not Used

3. PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01 31 00

PROJECT MANAGEMENT AND COORDINATION

1. PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Coordination.
- B. Preconstruction conference.
- C. Progress meetings.
- D. Request for Information (RFIs).
- E. Preinstallation conferences.
- F. Commissioning.
- G. Post construction dedication.

1.2 DEFINITIONS

- A. RFI - Request from Contractor seeking additional information, interpretation or clarification of the Contract Documents.

1.3 COORDINATION

- A. Coordinate scheduling, submittals, and Work of the various Sections of Specifications to assure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.
- B. Coordinate construction operations of the different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work.
- C. Prior to commencement of a particular type or kind of work examine relevant information, contract documents and subsequent data issued to the project.
- D. Verify that utility requirement characteristics of operating equipment are compatible with building utilities. Coordinate work of various Sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.
- E. Coordinate space requirements and installation of mechanical and electrical work which are indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with line of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
- F. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.
- G. In locations where several elements of mechanical and electrical work must be sequenced and positioned with precision in order to fit into available space, prepare coordination drawings showing the actual conditions required for the installation. Prepare coordination drawings prior to purchasing, fabricating or installing any of the elements required to be coordinated.
- H. Closing up of walls, partitions or furred spaces, backfilling and other covering up operations shall not proceed until all enclosed or covered work and inspections have been completed. Verify before proceeding.
- I. Coordinate completion and clean up of Work of separate sections in preparation for Substantial Completion.

- J. After Owner occupancy of premises, coordinate access to site for correction of defective Work and Work not in accordance with Contract Documents, to minimize disruption of Owner's activities.
- K. Coordinate all utility company work in accordance with the General Conditions.
- L. Coordinate field engineering with the provisions of Section 01 73 00.

1.4 PRECONSTRUCTION CONFERENCE

- A. Architect will schedule a conference immediately after receipt of fully executed contract documents prior to project mobilization.
- B. Mandatory Attendance: Owner, Owner's Resident Inspector, Owner's Testing Laboratory Representative, Architect, Contractor, Contractor's Project Manager and Contractor's Job Superintendent.
- C. Optional Attendance: Architect's consultants, subcontractors and utility company representatives.
- D. Architect will preside at conference, record minutes and distribute copies.
- E. Agenda:
 - 1. Execution of Owner-Contractor Agreement.
 - 2. Issue Notice to Proceed.
 - 3. Submission of executed bonds and insurance certificates.
 - 4. Distribution of Contract Documents.
 - 5. Federal and State labor law requirements applicable to Contract.
 - 6. Submission of list of Subcontractors, list of Products, schedule of values, and progress schedule.
 - 7. Designation of responsible personnel representing the parties.
 - 8. Procedures and processing of RFIs, field decisions, submittals, substitutions, applications for payments, proposal requests, Change Orders and Contract closeout procedures.
 - 9. Procedures for testing and inspection.
 - 10. Scheduling.
 - 11. Critical work sequence and long lead items.
 - 12. Work restrictions and working hours.
 - 13. Progress meetings.
 - 14. Use of site.
 - 15. Storage.
 - 16. Authorities having jurisdiction over project.
 - 17. Owner occupancy requirements.
 - 18. Owner-Furnished equipment.
 - 19. Separate contracts.
 - 20. Commissioning.

21. Construction waste management.
22. SWPPP requirements.
23. Preparation of Record Drawings.
24. Security.
25. Parking availability.

1.5 PROGRESS MEETINGS

- A. Architect will schedule and administer meetings throughout progress of the Work at two week intervals.
- B. Architect will make arrangements for meetings, prepare agenda, preside at meetings, record minutes (Field Reports), and distribute copies.
- C. Attendance Required: Job superintendent, major Subcontractors and suppliers, Owner, Owner's Inspector, and Architect, as appropriate to agenda topics for each meeting.
- D. Agenda:
 1. Review minutes of previous meetings. (Field Reports)
 2. Review of Work progress.
 3. Field observations, problems, and decisions.
 4. Identification of problems which impede planned progress.
 5. Review of submittals schedule and status of submittals.
 6. Requests For Information (RFIs).
 7. Status of Proposal Requests (PRs).
 8. Status of Change Order Requests (CORs).
 9. Status of Change Orders (COs).
 10. Review of off-site fabrication and delivery schedules.
 11. Maintenance of construction schedule.
 12. Corrective measures to regain projected schedules.
 13. Planned progress during succeeding work period.
 14. Coordination of projected progress.
 15. Maintenance of quality and work standards.
 16. Effect of proposed changes on progress schedule and coordination.
 17. Commissioning activities.
 18. Other business relating to Work.

1.6 REQUEST FOR INFORMATION (RFI'S)

- A. Procedure: Immediately on discovery of the need for additional information, interpretation of the Contract Documents, and if not possible to request interpretation at Progress Meeting, prepare and submit an RFI in the form specified.
1. RFIs shall originate with Contractor. RFIs submitted by entities other than Contractor will be returned with no response.
 2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
 3. Each RFI shall address only one subject matter.
- B. Content of the RFI: Include a detailed, legible description of item needing interpretation and the following:
1. Date.
 2. Project name.
 3. Owner's name.
 4. Name of Contractor.
 5. Name of Architect.
 6. RFI number, numbered sequentially.
 7. Specification Section number and title and related paragraphs, as appropriate.
 8. Drawing number and detail references, as appropriate.
 9. Field dimensions and conditions, as appropriate.
 10. Contractor's suggested solution(s). If Contractor's solution(s) impact the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
 11. Contractor's signature.
 12. Attachments: Include drawings, descriptions, measurements, photos, Product Data, Shop Drawings, and other information necessary to fully describe items needing interpretation. Supplementary drawings prepared by Contractor shall include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments.
- C. Hard-Copy RFIs: Identify each page of attachments with the RFI number and sequential page number.
- D. Software-Generated RFIs: Software-generated form with substantially the same content as indicated above. Attachments shall be electronic files in a format that will allow electronic editing by the Architect.
- E. Architect's Action: Architect will review each RFI, determine action required, and return it. Allow fifteen days for Architect's response for each RFI. RFIs received after 1:00 p.m. will be considered as received the following working day. If the RFI is required to be forwarded to a consultant, subconsultant, or Owner for a response, the response time will be twenty five days.
1. The following RFIs will be returned without action:
 - (a) Requests for approval of submittals.
 - (b) Requests for approval of substitutions.
 - (c) Requests for information already indicated in the Contract Documents.

- (d) Requests for coordination information which is the responsibility of the Contractor.
 - (e) Requests for adjustments in the Contract Time or the Contract Sum.
 - (f) Requests for interpretation of Architect's actions on submittals and substitutions.
 - (g) Incomplete RFIs or RFIs with numerous errors.
2. Architect's action may include a request for additional information, in which case Architect's allowable time for response will start again.
 3. Architect's review of or response to RFIs shall not constitute an approval, direction, or procedure related to construction means, methods, techniques, sequences, or procedures of Contractor.
 4. Architect's review of or response to RFIs shall not constitute an approval, direction, or procedure related to the construction site safety precautions, procedures or methodology of Contractor.
 5. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Order Request according to Division 01 Section 01 20 00 - Price and Payment Procedures.
 - (a) If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within five days of receipt of the RFI response.
 - (b) Under no circumstances is the Architect's review of or response to RFIs to be considered an authorization to depart from the Contract Documents or an authorization to perform extra work.
- F. On receipt of Architect's action immediately distribute the RFI response to affected parties.
 - G. Review response and notify Architect within three days if Contractor disagrees with response.

1.7 COMMISSIONING

- A. This project will have selected building systems commissioned.
- B. The equipment and systems to be commissioned are specified in Section 01 91 13 - General Commissioning Requirements.
- C. The commissioning process will be directed by a commissioning authority whose services will be provided by the Owner.

1.8 PREINSTALLATION CONFERENCES

- A. When required in individual specification Section, convene a preinstallation conference prior to commencing work of the Section. Refer to individual specification section for timing requirements of conference.
- B. Require attendance of parties directly affecting, or affected by, work of the specific Section.
- C. Notify Architect a minimum of seven days in advance of meeting date.
- D. Preinstallation conference to coincide with regularly scheduled progress meeting.
- E. Prepare agenda, preside at conference, record minutes, and distribute copies within two days after conference to participants.
- F. Agenda:
 1. Review of Contract Documents.
 2. Manufacturer's recommendations.

3. Status of submittals.
4. Schedule of work activities.
5. Deliveries of materials and equipment.
6. Sequence of operation.
7. Interface requirements.
8. Access.
9. Site utilization.
10. Tests and inspections.
11. Temporary facilities and controls.
12. Quality and work standards.

1.9 POST CONSTRUCTION DEDICATION

- A. Attendance Required: Project superintendent, project manager, major subcontractors, Owner and Architect.
- B. Preparation prior to Dedication:
 1. Assist Owner in operation of mechanical systems.
 2. Verify operation and adjust controls for communication systems.
 3. Assist Owner in operation of lighting systems.

2. PART 2 PRODUCTS

Not Used

3. PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01 32 16

CONSTRUCTION SCHEDULE - NETWORK ANALYSIS

1. PART 1 GENERAL

1.1 SECTION INCLUDES

- A. References.
- B. Performance requirements.
- C. Quality assurance.
- D. Qualifications.
- E. Project record documents.
- F. Submittals.
- G. Review and evaluation.
- H. Format.
- I. Cost and schedule reports.
- J. Early work schedule.
- K. Construction schedule.
- L. Short interval schedule.
- M. Requested time adjustment schedule.
- N. Recovery schedule.
- O. Updating schedules.
- P. Distribution.

1.2 REFERENCES

- A. Construction Planning and Scheduling Manual - A Manual for General Contractors and the Construction Industry, The Associated General Contractors of America (AGC).
- B. CSI - Construction Specifications Institute MP-2-1 Master Format.
- C. National Weather Service - Local Climatological Data.

1.3 PERFORMANCE REQUIREMENTS

- A. Ensure adequate scheduling during construction activities so work may be prosecuted in an orderly and expeditious manner within stipulated Contract Time.
- B. Ensure coordination of Contractor and subcontractors at all levels.
- C. Ensure coordination of submittals, fabrication, delivery, erection, installation, and testing of materials and equipment.
- D. Ensure on-time delivery of Owner furnished materials and equipment.

- E. Ensure coordination of jurisdictional reviews.
- F. Assist in preparation and evaluation of applications for payment.
- G. Assist in monitoring progress of work.
- H. Assist in evaluation of proposed changes to Contract Time.
- I. Assist in evaluation of proposed changes to Construction Schedule.
- J. Assist in detection of schedule delays and identification of corrective actions.

1.4 QUALITY ASSURANCE

- A. Perform work in accordance with Construction Planning and Scheduling Manual published by the AGC.
- B. Maintain one copy of document on site.
- C. In the event of discrepancy between the AGC publication and this section, provisions of this section shall govern.

1.5 QUALIFICATIONS

- A. Scheduler: Personnel or specialist consultant with 5 years minimum experience in scheduling construction work of a complexity and size comparable to this Project.
- B. Administrative Personnel: 5 years minimum experience in using and monitoring schedules on comparable projects.

1.6 PROJECT RECORD DOCUMENTS

- A. Submit record documents under provisions of Section 01 77 00.
- B. Submit one electronic file and three copies of final Record Construction Schedule which reflects actual construction of this Project.
- C. Record schedule shall be certified for compliance with actual way project was constructed.
- D. Receipt of Record Construction Schedule shall be a condition precedent to any retainage release or final payment.

1.7 SUBMITTALS

- A. Submit under provisions of Section 01 33 00.
- B. Within 7 days from the Notice of Award submit proposed Early Work Schedule and preliminary Cost Report defining activities for first 60 days of Work.
- C. Within 45 days from Notice of Award submit proposed Construction Schedule and final Cost Report.
- D. Submit updated Construction Schedule at least 10 days prior to each Application for Payment.
- E. Submit Short Interval Schedule at each Construction Progress Meeting.
- F. Submit Time Adjustment Schedule within 10 days of commencement of a claimed delay.
- G. Submit Recovery Schedules as required by completion of work.
- H. Submit one electronic file and three copies of each schedule and cost report.

1.8 REVIEW AND EVALUATION

- A. Early Work Schedule shall be reviewed during Preconstruction Conference with Owner and Architect.
- B. Within 5 days of receipt of Owner and Architect's comments provide satisfactory revision to Early Work Schedule or adequate justification for activities in question.
- C. Acceptance by Owner of corrected Early Work Schedule shall be a condition precedent to making any progress payments for first 60 days of Contract.
- D. Cost loaded values of Early Work Schedule shall be basis for determining progress payments during first 60 days of Contract.
- E. Participate in joint review of Construction Schedule and Reports with Owner and Architect.
- F. Within 7 days of receipt of Owner and Architect's comments provide satisfactory revision to Construction Schedule or adequate justification for activities in question.
- G. In the event that an activity or element of work is not detected by Owner or Architect review, such omission or error shall be corrected by next scheduled update and shall not affect Contract Time.
- H. Acceptance by Owner of corrected Construction Schedule shall be a condition precedent to making any progress payments after first 60 days of Contract.
- I. Cost-loaded values of Construction Schedule shall be basis for determining progress payments.
- J. Review and acceptance by Owner and Architect of Early Work Schedule or Construction Schedule does not constitute responsibility whatsoever for accuracy or feasibility of schedules nor does such acceptance expressly or impliedly warrant, acknowledge or admit reasonableness of activities, logic, duration, manpower, cost or equipment loading stated or implied on schedules.

1.9 FORMAT

- A. Prepare diagrams and supporting mathematical analyses using Precedence Diagramming Method, under concepts and methods outlined in AGC Construction Planning and Scheduling Manual.
- B. Listings: Reading from left to right, in ascending order for each activity.
- C. Diagram Size: 42 inches maximum height x width required.
- D. Scale and Spacing: To allow for legible notations and revisions.
- E. Illustrate order and interdependence of activities and sequence of work.
- F. Illustrate complete sequence of construction by activity.
- G. Provide legend of symbols and abbreviations used.

1.10 COST AND SCHEDULE REPORTS

- A. Activity Analysis: Tabulate each activity of network diagram and identify for each activity:
 - 1. Description.
 - 2. Interface with outside contractors or agencies.
 - 3. Number.
 - 4. Preceding and following number.
 - 5. Duration.

6. Earliest start date.
 7. Earliest finish date.
 8. Actual start date.
 9. Actual finish date.
 10. Latest start date.
 11. Latest finish date.
 12. Total and free float.
 13. Identification of critical path activity.
 14. Monetary value keyed to Schedule of Values.
 15. Manpower requirements.
 16. Responsibility.
 17. Percentage complete.
 18. Variance positive or negative.
- B. Cost Report: Tabulate each activity of network diagram and identify for each activity:
1. Description.
 2. Number.
 3. Total cost.
 4. Percentage complete.
 5. Value prior to current period.
 6. Value this period.
 7. Value to date.
- C. Required Sorts: List activities in sorts or groups:
1. By activity number.
 2. By amount of float time in order of early start.
 3. By responsibility in order of earliest start date.
 4. In order of latest start dates.
 5. In order of latest finish dates.
 6. Application for payment sorted by Schedule of Values.
 7. Listing of activities on critical path.
 8. Listing of basic input data which generates schedule.

1.11 EARLY WORK SCHEDULE

- A. Shall establish scope of work to be performed during first 60 days of Contract.
- B. Shall designate critical path or paths.
- C. Shall contain the following phases and activities:
 - 1. Procurement activities to include mobilization, shop drawings and sample submittals.
 - 2. Identification of key and long-lead elements and realistic delivery dates.
 - 3. Construction activities in units of whole days limited to 14 days for each activity except non-construction activities for procurement and delivery.
 - 4. Approximate cost and duration of each activity.
- D. Shall contain seasonal weather considerations. Seasonal rainfall shall be 10 year average for the month as evidenced by Local Climatological Data obtained from U.S. National Weather Service.
- E. Activities shall be incorporated into Construction Schedule.
- F. No application for payment will be evaluated or processed until Early Work Schedule has been submitted and reviewed.
- G. Shall be updated on a monthly basis while Construction Schedule is being developed.
- H. Failure to submit an adequate or accurate Early Work Schedule or failure to submit on established dates will be considered a substantial breach of Contract.

1.12 CONSTRUCTION SCHEDULE

- A. Include Early Work Schedule as first 60 days of Construction Schedule.
- B. Shall be a computer generated time scaled network diagram of activities.
- C. Indicate a completion date for project that is no later than required completion date subject to any time extensions processed as part of a change order.
- D. Conform to mandatory dates specified in the Contract Documents.
- E. Should schedule indicate a completion date earlier than any required completion date, Owner or Architect shall not be liable for any costs should project be unable to be completed by such date.
- F. Seasonal weather shall be considered in planning and scheduling of all work. Seasonal rainfall shall be 10 year average for the month as evidenced by Local Climatological Data obtained from U.S. National Weather Service.
- G. Level of detail shall correspond to complexity of work involved.
- H. Indicate procurement activities, delivery, and installation of Owner furnished material and equipment.
- I. Designate critical path or paths.
- J. Subcontractor work at all levels shall be included in schedule.
- K. As developed shall show sequence and interdependence of activities required for complete performance of Work.
- L. Shall be logical and show a coordinated plan of Work.

- M. Show order of activities and major points of interface, including specific dates of completion.
- N. Duration of activities shall be coordinated with subcontractors and suppliers and shall be best estimate of time required.
- O. Shall show description, duration and float for each activity.
- P. Failure to include any activity shall not be an excuse for completing all work by required completion date.
- Q. No activity shall have a duration longer than 14 days or a value over \$20,000.00 except non-construction activities for procurement and delivery.
- R. An activity shall meet the following criteria:
 - 1. Any portion or element of work, action, or reaction that is precisely described, readily identifiable, and is a function of a logical sequential process.
 - 2. Descriptions shall be clear and concise. Beginning and end shall be readily verifiable. Starts and finishes shall be scheduled by logical restraints.
 - 3. Responsibility shall be identified with a single performing entity.
 - 4. Additional codes shall identify building, floor, bid item and CSI classification.
 - 5. Assigned dollar value (cost-loading) of each activity shall cumulatively equal total contract amount. Mobilization, bond and insurance costs shall be separate. General requirement costs, overhead, profit, shall be prorated throughout all activities. Activity costs shall correlate with Schedule of Values.
 - 6. Each activity shall have manpower-loading assigned.
 - 7. Major construction equipment shall be assigned to each activity.
 - 8. Activities labeled start, continue or completion are not allowed.
- S. For major equipment and materials show a sequence of activities including:
 - 1. Preparation of shop drawings and sample submissions.
 - 2. Review of shop drawings and samples.
 - 3. Finish and color selection.
 - 4. Fabrication and delivery.
 - 5. Erection or installation.
 - 6. Testing.
- T. Include a minimum of 15 days prior to completion date for punch lists and clean up. No other activities shall be scheduled during this period.

1.13 SHORT INTERVAL SCHEDULE

- A. Shall be fully developed horizontal bar-chart-type schedule directly derived from Construction Schedule.
- B. Prepare schedule on sheet of sufficient width to clearly show data.
- C. Provide continuous heavy vertical line identifying first day of week.
- D. Provide continuous subordinate vertical line identifying each day of week.

- E. Identify activities by same activity number and description as Construction Schedule.
- F. Show each activity in proper sequence.
- G. Indicate graphically sequences necessary for related activities.
- H. Indicate activities completed or in progress for previous 2 week period.
- I. Indicate activities scheduled for succeeding 2 week period.
- J. Further detail may be added if necessary to monitor schedule.

1.14 REQUESTED TIME ADJUSTMENT SCHEDULE

- A. Updated Construction Schedule shall not show a completion date later than the Contract Time, subject to any time extensions processed as part of a Change Order.
- B. If an extension of time is requested, a separate schedule entitled "Requested Time Adjustment Schedule" shall be submitted to Owner and Architect.
- C. Indicate requested adjustments in Contract Time which are due to changes or delays in completion of work.
- D. Extension request shall include forecast of project completion date and actual achievement of any dates listed in Agreement.
- E. To the extent that any requests are pending at time of any Construction Schedule update, Time Adjustment Schedule shall also be updated.
- F. Schedule shall be a time-scaled network analysis.
- G. Accompany schedule with formal written time extension request and detailed impact analysis justifying extension.
- H. Time impact analysis shall demonstrate time impact based upon date of delay, and status of construction at that time and event time computation of all affected activities. Event times shall be those as shown in latest Construction Schedule.
- I. Activity delays shall not automatically constitute an extension of Contract Time.
- J. Failure of subcontractors shall not be justification for an extension of time.
- K. Float is not for the exclusive use or benefit of any single party. Float time shall be apportioned according to needs of project.
- L. Float suppression techniques such as preferential sequencing, special lead/lag logic restraints, extended activity durations, or imposed dates shall be apportioned according to benefit of project.
- M. Extensions will be granted only to extent that time adjustments to activities exceed total positive float of the critical path and extends Contract completion date.
- N. Owner shall not have an obligation to consider any time extension request unless requirements of Contract Documents, and specifically, but not limited to these requirements are complied with.
- O. Owner shall not be responsible or liable for any construction acceleration due to failure of Owner to grant time extensions under Contract Documents should requested adjustments in Contract Time not substantially comply with submission and justification requirements of Contract for time extension requests.
- P. In the event a Requested Time Adjustment Schedule and Time Impact Analysis are not submitted within 10 days after commencement of a delay it is mutually agreed that delay does not require a Contract time extension.

1.15 RECOVERY SCHEDULE

- A. When activities are behind Construction Schedule a supplementary Recovery Schedule shall be submitted.
- B. Form and detail shall be sufficient to explain and display how activities will be rescheduled to regain compliance with Construction Schedule.
- C. Maximum duration shall be one month and shall coincide with payment period.
- D. Ten days prior to expiration of Recovery Schedule verification to determine if activities have regained compliance with Construction Schedule will be made. Based upon this verification the following will occur:
 - 1. Supplemental Recovery Schedule will be submitted to address subsequent payment period.
 - 2. Construction Schedule will be resumed.

1.16 UPDATING SCHEDULES

- A. Review and update schedule at least 10 days prior to submitting an Application for Payment.
- B. Maintain schedule to record actual prosecution and progress.
- C. Approved change orders which affect schedule shall be identified as separate new activities.
- D. Change orders of less than \$20,000.00 value or less than 3 days duration need not be shown unless critical path is affected.
- E. No other revisions shall be made to schedule unless authorized by Owner.
- F. Provide narrative Progress Report at time of schedule update which details the following:
 - 1. Activities or portions of activities completed during previous reporting period.
 - 2. Actual start dates for activities currently in progress.
 - 3. Deviations from critical path in days ahead or behind.
 - 4. List of major construction equipment used during reporting period and any equipment idle.
 - 5. Number of personnel by craft engaged on Work during reporting period.
 - 6. Progress analysis describing problem areas.
 - 7. Current and anticipated delay factors and their impact.
 - 8. Proposed corrective actions and logic revisions for Recovery Schedule.
 - 9. Proposed modifications, additions, deletions and changes in logic of Construction Schedule.
- G. Schedule update will form basis upon which progress payments will be made.
- H. Owner will not be obligated to review or process Application for Payment until schedule and Progress Report have been submitted.

1.17 DISTRIBUTION

- A. Following joint review and acceptance of updated schedules distribute copies to Owner, Architect, and all other concerned parties.
- B. Instruct recipients to promptly report in writing any problem anticipated by projections shown in schedule.

2. PART 2 PRODUCTS

Not Used

3. PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01 33 00
SUBMITTAL PROCEDURES

1. PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Related submittals.
- B. Architect's digital data files.
- C. Proposed products list.
- D. Processing time.
- E. Submittal review.
- F. Submittal procedures - paper submittals.
- G. Shop drawings - paper submittals.
- H. Submittal procedures - electronic submittals.
- I. Shop drawings - electronic submittals.
- J. Product data.
- K. Samples.
- L. Manufacturers' instructions.
- M. Manufacturers' certificates.
- N. Deferred approval requirements.
- O. Submittal schedule.

1.2 RELATED SUBMITTALS

- A. Progress Payments: Section 01 20 00- Price and Payment Procedures.
- B. Schedule of Values: Section 01 20 00- Price and Payment Procedures.
- C. Substitutions: Section 01 25 13 – Product Substitution Procedures.
- D. Coordination Drawings: Section 01 31 00 - Project Management and Coordination.
- E. Construction Schedule: Section 01 32 16 - Construction Schedule - Network Analysis.
- F. Tests and Inspections: Section 01 45 29 – Testing Laboratory Services.
- G. Certified Final Property Survey: Section 01 73 00 – Execution Requirements.
- H. Waste Reduction Progress Reports: Section 01 74 19 - Construction Waste Management and Disposal.
- I. Closeout Procedures: Section 01 77 00 – Closeout Procedures.
- J. The General Conditions set forth additional requirements for submittals.

1.3 ARCHITECT'S DIGITAL DATA FILES

- A. Upon written request, Architect's electronic CAD files will be provided for use in connection with preparation of shop drawings subject to the acceptance of the Architect's standard terms and conditions for electronic file transfer.

1.4 PROPOSED PRODUCTS LIST

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

1.5 PROCESSING TIME

- A. Time period for review of submittals will commence upon receipt of submittal by Architect.
- B. Initial Review: Allow ten working days for each submittal.
- C. Resubmittal Review: Allow ten working days for each resubmittal.
- D. Sequential Review: Allow fifteen working days for initial and resubmittal review of each submittal where review is required by Architect's consultant's, Owner or other parties indicated.
- E. Deferred Approval Review: Allow a minimum of ninety calendar days for each submittal and any subsequent resubmittal review by authority having jurisdiction.

1.6 SUBMITTAL REVIEW

- A. The Architect's review is only for general conformance with design concept and Contract requirements. Contractor is responsible for compliance with Contract Documents, dimensions, quantities, fit and coordination with other Work. Review does not authorize substitutions, exclusions and limitations to Contract requirements unless specifically requested by Contractor and acknowledged by Architect.
- B. Definitions for submittal review:
 - 1. Review Completed - Do Not Resubmit: The Work covered by the submittal has been reviewed by the Architect and may proceed provided it complies with the Contract Documents. Final acceptance will depend on that compliance.
 - 2. Revise as Noted - Do Not Resubmit: The Work covered by the submittal has been reviewed by the Architect and may proceed provided it complies both with Architect's notations and corrections on the submittal and the Contract Documents. Final acceptance will depend on that compliance.
 - 3. Revise as Noted - Resubmit for Record: The Work covered by the submittal has been reviewed by the Architect and the submittal is to be revised according to the Architect's notations and corrections and a new submittal is to be made. Do not proceed with the Work covered by the submittal. Once the revised submittal is received it will be reviewed again by the Architect and retained as the record submittal. Once reviewed, the Work may proceed provided it complies with the Contract Documents. Final acceptance will depend on that compliance.
 - 4. Not Acceptable - Make New Submittal: Do not proceed with the Work covered by the submittal. Prepare a new submittal that complies with the Contract Documents. Once the revised submittal is received it will be reviewed again by the Architect. Once reviewed, the Work may proceed provided it complies with the Contract Documents. Final acceptance will depend on that compliance.
 - 5. Comment Box / Line: This line is for the Architect to take other action as may be appropriate for the actual submittal made. Notations may include a request for additional items or a statement regarding the submittal. This area can also be used in conjunction with other boxes that have been marked.

1.7 SUBMITTAL PROCEDURES - PAPER SUBMITTALS

- A. Transmit each submittal in conformance with requirements of this section.
- B. Sequentially number the transmittal forms. Resubmittals to have original number with an alphanumeric suffix.
- C. Identify Project and Architect's project number, Contractor, Subcontractor or supplier; pertinent Drawing and detail number(s), and specification Section number, as appropriate.
- D. Apply Contractor's stamp, signed or initialed certifying that review, 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. Submittals without Contractor's stamp and signature will be returned without review.
- E. Schedule submittals to expedite the Project, and deliver to Architect at 8163 Rochester Avenue, Suite 100, Rancho Cucamonga, CA 91730. Coordinate submission of related items.
- F. Make submittals in groups containing associated and related items to make sure that information is available for checking each item when it is received.
- G. Submittals for all items requiring color selection must be received before any will be selected.
- H. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until all related submittals are received.
- I. Make submittals in advance of scheduled dates for installation to allow specified time for review, revisions, and resubmission prior to final review and subsequent placement of orders.
- J. No extension of Contract Time will be authorized because of failure to transmit submittals to the Architect sufficiently in advance of the Work to permit proper processing.
- K. Identify variations from Contract Documents and Product or system limitations which may be detrimental to successful performance of the completed Work.
- L. Provide space for Contractor and Architect review stamps.
- M. Revise and resubmit submittals as required, identify all changes made since previous submittal.
- N. Distribute copies of reviewed submittals to concerned parties. Instruct parties to promptly report any inability to comply with provisions.
- O. Partial submittals will be considered non responsive and will be returned without review.
- P. Submittals not requested will not be recognized or processed. Submittals not requested will be returned without review.
- Q. Architect will not review submittals that contain material data safety sheets (MSDS) and will return them for resubmittal.
- R. Substitutions will not be considered when they are indicated or implied on submittals without separate written request as required by provisions of Section 01 25 13 - Product Substitution Procedures.

1.8 SHOP DRAWINGS - PAPER SUBMITTALS

- A. Submit six prints of each drawing. Four copies will be retained by Architect.
- B. Review comments will be shown on returned print. Contractor will make and distribute copies as required for his purpose.
- C. After review, distribute in accordance with article on procedures stated above and provide copies for Record Documents described in Section 01 77 00 - Closeout Procedures.

- D. Do not reproduce Contract Documents or copy standard information and submit as shop drawings.
- E. Standard information prepared without specific reference to project requirements will not be considered a shop drawing.
- F. Do not use or allow others to use shop drawings which have been submitted and have been rejected.

1.9 SUBMITTAL PROCEDURES - ELECTRONIC SUBMITTALS

- A. Transmit each electronic submittal in conformance with requirements of this section.
- B. Submittals for all items requiring color selections will not be accepted as an electronic submittal.
- C. Assemble complete submittal package into a single indexed Portable Document Format (PDF) file for each specification section. File format licensed by Adobe Systems. Piecemeal or multiple file submittals will be rejected.
- D. Transmit electronic submittals as PDF files via Architect's Project Collaboration Site address or designated e mail address.
- E. Transmittal form for submittals shall be an electronic form acceptable to the Architect which identifies the Project, the Architect's project number, the Contractor, the Subcontractor or material supplier; pertinent Drawing and detail number(s), and specification Sections, as appropriate.
- F. Provide links enabling navigation to each item of submittal package.
- G. Name electronic submittal file with consistent project identifier composed of Architect's project number, Architect's alpha numeric file designation, and specification section number followed by sequential number. (e.g., 0920800-56-SUB - 06412-01.pdf)
- H. Resubmittals shall include an alphabetic suffix after initial point number. (e.g., 0920800-56-SUB – 06412-01-A.pdf)
- I. Resubmittals shall identify all changes made since previous submittal.
- J. Insert Contractor's review stamp to permanently record Contractor's action.
- K. Contractor's stamp shall be signed or initialed certifying that review, verification of Products required, field dimensions, adjacent work, and coordination of information is in accordance with the requirements of the Work and Contract Documents.
- L. Submittals without Contractor's stamp and signature will be returned without review.
- M. Provide space for Architect's electronic review stamp.
- N. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until all related submittals are received.
- O. Make submittals in advance of scheduled dates for installation to allow specified time for review, revisions, and resubmission prior to final review and subsequent placement of orders.
- P. No extension of Contract Time will be authorized because of failure to transmit submittals to the Architect sufficiently in advance of the Work to permit proper processing.
- Q. Identify variations from Contract Documents and Product or system limitations which may be detrimental to successful performance of the completed Work.
- R. Contractor shall reproduce and distribute copies of reviewed submittals to concerned parties. Instruct parties to promptly report any inability to comply with provisions.
- S. Partial submittals will be considered non responsive and will be returned without review.

- T. Submittals not requested will not be recognized or processed. Submittals not requested will be returned without review.
- U. Architect will not review submittals that contain material data safety sheets (MSDS) and will return them for resubmittal.
- V. Substitutions will not be considered when they are indicated or implied on submittals without separate written request as required by provisions of Section 01 25 13 - Product Substitution Procedures.

1.10 SHOP DRAWINGS - ELECTRONIC SUBMITTALS

- A. Submit electronic copy of shop drawings in PDF format as specified in this section.
- B. Review comments will be indicated on reviewed document.
- C. After review, distribute in accordance with article on procedures stated above and provide copies for Record Documents described in Section 01 77 00 - Closeout Procedures.
- D. Do not reproduce Contract Documents or copy standard information and submit as shop drawings.
- E. Standard information prepared without specific reference to project requirements will not be considered a shop drawing.
- F. Do not use or allow others to use shop drawings which have been submitted and have been rejected.

1.11 PRODUCT DATA

- A. When specified in individual specification sections, submit copies of data for each product which Contractor requires.
- B. Submit six copies of product data made in paper format. Four copies will be retained by Architect.
- C. Electronic submittals for product data will comply with Article for electronic submittal procedures stated in this section.
- D. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturer's standard data to provide information unique to this Project.
- E. Manufacturer's standard product data or catalogs that do not indicate materials or products that are specific to project will be returned without review.
- F. After review, distribute in accordance with article on procedures stated above and provide copies for Record Documents described in Section 01 77 00 - Closeout Procedures.

1.12 SAMPLES

- A. Submit samples to illustrate functional and aesthetic characteristics of the Product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
- B. Include identification on each sample, with full Project information.
- C. Submit the number of samples which Contractor requires, plus two which will be retained by Architect.
- D. Reviewed samples which may be used in the Work are indicated in individual specification Sections.
- E. Submittals for all items requiring color selection must be received before any will be selected.
- F. If a variation in color, pattern, texture or other characteristic is inherent within the material or product submitted, sample shall approximate limits of variation.

1.13 MANUFACTURER'S INSTRUCTIONS

- A. When specified in individual specification Sections, submit manufacturer's printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, in quantities specified for Product Data.
- B. Identify conflicts between manufacturer's instructions and Contract Documents.

1.14 MANUFACTURER'S CERTIFICATES

- A. When specified in individual specification Sections, submit manufacturer's certificate to Architect for review, 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 Architect.

1.15 DEFERRED APPROVAL REQUIREMENTS

- A. Installation of deferred approval items shall not be started until detailed plans, specifications, and engineering calculations have been accepted and signed by the Architect or Engineer in general responsible charge of design and signed by a California registered Architect or professional engineer who has been delegated responsibility covering the work shown on a particular plan or specification and approved by the authority having jurisdiction. Deferred approval items for this project are the following items:
 - 1. Automatic Fire Sprinkler System
 - 2. Fire Service Line.
 - 3. Fire Alarm System.
- B. Deferred approval drawings and specifications become part of the approved documents for the project when they are submitted to and approved by the Division of the State Architect.
- C. Deferred approval items shall be submitted no later than 60 days after Notice to Proceed.
- D. Submit four prints of each drawing.
- E. Submit four copies of calculations, product data and test reports.
- F. Identify and specify all supports, fasteners, spacing, penetrations, etc., for each of the deferred approval items, including calculations for each and all fasteners.
- G. Submit documents to Architect for review.
- H. Documents shall bear the stamp and signature of the Structural, Mechanical, or Electrical Engineer licensed in the State of California who is responsible for the work shown on the documents.
- I. Architect will forward submittal to project Structural, Mechanical, and Electrical Engineer.
- J. Review of project Architect, Structural, Mechanical, and Electrical Engineer is only for conformance with design concept shown on the documents.
- K. After review by Architect/Engineer, Architect will forward two copies of submittal to the Division of the State Architect for approval.
- L. Respond to review comments made by the Division of the State Architect and revise and resubmit submittal for final approval.
- M. Architect will forward two copies of final revised submittal to the Division of the State Architect for approval.

- N. The Division of the State Architect will return one copy of final submittal to the Architect.
- O. Architect will forward one copy of evidence of submittal approval by the Division of the State Architect for final distribution by the Contractor.

2. PART 2 PRODUCTS

Not Used

3. PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01 42 19

REFERENCE STANDARDS

1. PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Definitions.
- B. Specification format and content.
- C. Industry standards.
- D. Codes and standards.
- E. Governing regulations/authorities.

1.2 DEFINITIONS

- A. General: Basic contract definitions are included in the General Conditions.
- B. Regulations: Includes laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the construction industry that control performance of the work.

1.3 SPECIFICATION FORMAT AND CONTENT

- A. Specifications are organized into Divisions and Sections based on the Construction Specifications Institute's 50-Division Master Format 2018 numbering system.
- B. The sections are placed in the Project Manual in numeric sequence; however, this sequence is not complete and the Table of Contents of the specifications must be consulted to determine the total listing of sections.
- C. The section title is not intended to limit the meaning or content of the section, nor to be fully descriptive of the requirements specified therein.
- D. The organization of the specifications shall not control the division of the work among subcontractors or establish the extent of work to be performed by any trade.
- E. Specifications use certain conventions regarding style of language and the intended meaning of certain terms, words, and phrases when used in particular situations or circumstances. These conventions are:
 - 1. Language used in Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words that are implied, but not stated, shall be interpolated as the sense requires. Singular words shall be interpreted as plural and plural words interpreted as singular where applicable to maintain the context of the Contract Document indicated.
 - 2. Imperative and streamlined language is generally used in the Specifications. Requirements expressed in the imperative mood are to be performed by the Contractor. Subjective language is used for clarity to describe responsibilities that must be fulfilled indirectly by the Contractor, or by others when so noted.
 - 3. The words "shall be" are implied wherever a colon (:) is used within a sentence or phrase.

1.4 INDUSTRY STANDARDS

- A. Except where Contract Documents include more stringent requirements, applicable construction industry standards shall apply as if bound into the Contract Documents to the extent referenced. Such standards are made part of Contract Documents by reference.
- B. Conform to reference standard by date of issue current on date for receiving bids except when a specific date is indicated.
- C. Where compliance with 2 or more standards is specified and where standards may establish different or conflicting requirements for quantities or quality levels, the more stringent, higher quality and greater quantity of work shall apply.
- D. The quantity or quality level shown or specified shall be the minimum provided or performed. Indicated numeric values are minimum or maximum, as appropriate, for the context of the requirements.
- E. Each entity engaged in construction of the work is required to be familiar with industry standards applicable to its construction activity.
- F. Copies of applicable standards are not bound with the Contract Documents. Where copies of standards are needed to perform a required activity, Contractor shall obtain copies directly from publication source.
- G. Trade associations names and titles of general standards are frequently abbreviated. Where such abbreviations are used in the Specifications or other Contract Documents, they shall mean the recognized trade association, standards-generating organization, authority having jurisdiction, or other entity applicable to the content of the text provision. Refer to the "Encyclopedia of Associations", published by Gale Research Co., available in most libraries.
- H. Refer to individual specification sections and related drawings for names and abbreviations of trade associations and standards applicable to specific portions of the work. In particular, refer to Division 23 for names and abbreviations applicable to mechanical work, and refer to Division 26 for names and abbreviations applicable to electrical work.
- I. The contractual relationship of the parties to the Contract shall not be altered from the Contract Documents by mention or inference otherwise in any reference document.

1.5 CODES AND STANDARDS

- A. Latest edition of pertaining ordinances, laws, rules, codes, regulations, standards, and others of public agencies having jurisdiction of the work are intended wherever reference is made in either the singular or plural to Code or Building Code except as otherwise specified, including but not limited to latest edition of those in the following listing.
 - 1. 2022 California Building Standards Administrative Code (CBSAC), California Code of Regulations (CCR), Title 24, Part 1
 - 2. 2022 California Building Code (CBC) California Code of Regulations (CCR) Title 24, Part 2 (2021 International Building Code (IBC) with California amendments)
 - 3. 2022 California Electrical Code (CEC) California Code of Regulations (CCR) Title 24, Part 3 (2020 National Electric Code (NEC) with California amendments)
 - 4. 2022 California Mechanical Code (CMC) California Code of Regulations (CCR) Title 24, Part 4 (2021 Uniform Mechanical Code (UMC) with California amendments)
 - 5. 2022 California Plumbing Code (CPC) California Code of Regulations (CCR) Title 24, Part 5 (2021 Uniform Plumbing Code (UPC) with California amendments)

6. 2022 California Energy Code, California Code of Regulations (CCR) Title 24, Part 6
7. 2022 California Fire Code (CFC) California Code of Regulations (CCR) Title 24, Part 9 (2021 International Fire Code (IFC) with California Amendments)
8. 1990 State Fire Marshal Regulations California Code of Regulations (CCR) Title 19 (As amended to date)
9. 2022 California Existing Building Code (CEBC) California Code of Regulations (CCR) Title 24, Part 10 (2021) International Existing Building Code (IEBC) with California Amendments)
10. 2022 State Referenced Standards Code (CRSC) California Code of Regulations (CCR) Title 24, Part 12
11. California Elevator Safety Code, California Code of Regulations (CCR) Title 8. (As amended to date)
12. 2010 Americans with Disabilities Act (ADA) Standards for Accessible Design. (ADAS)

1.6 GOVERNING REGULATIONS/AUTHORITIES

- A. Authorities having jurisdiction have been contacted where necessary to obtain information for preparation of Contract Documents. Contact authorities having jurisdiction directly for information having a bearing on the work.
- B. Comply with all federal, state and local laws, ordinances, rules and regulations indicated and which bear on the conduct of the work.

2. PART 2 PRODUCTS

Not Used

3. PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01 43 00

QUALITY ASSURANCE

1. PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Interpretation of requirements.
- B. Quality assurance and control of installation.
- C. Tolerances.
- D. Field samples.
- E. Mock-up.
- F. Manufacturers' field services and reports.

1.2 INTERPRETATION OF REQUIREMENTS

- A. If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement.
- B. The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation shall comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits.
- C. Where codes or specified standards indicate higher standards, more stringent tolerances or more precise workmanship than levels shown or specified, comply with most stringent requirements.
- D. Refer uncertainties and requirements that are different, but apparently equal, to Architect for a decision before proceeding.

1.3 QUALITY ASSURANCE/CONTROL OF INSTALLATION

- A. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this project, whose work has resulted in construction with a record of successful in-service performance.
- B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- D. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and - control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
- E. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.
- F. Comply fully with manufacturers' instructions, including each step in sequence.
- G. Should manufacturers' instructions conflict with Contract Documents, request clarification from Architect before proceeding.

- H. Secure Products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion or disfigurement.

1.4 TOLERANCES

- A. Monitor tolerance control of installed products to produce acceptable Work. Do not permit tolerances to accumulate.
- B. Comply with manufacturer's tolerances. Should manufacturer's tolerance conflict with Contract Documents, request clarification from Architect before proceeding.
- C. Adjust products to appropriate dimensions; position before securing products in place.

1.5 FIELD SAMPLES

- A. Install field samples at the site as required by individual specifications sections for review.
- B. Acceptable samples represent a quality level for the Work.
- C. Where field sample is specified in individual sections to be removed, clear area after field sample has been reviewed by Architect.

1.6 MOCK-UP

- A. Mock-up will be performed under provisions identified in this section and identified in the respective product specification sections.
- B. Assemble and erect specified items, with specified attachment and anchorage devices, flashings, seals and finishes.
- C. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
- D. Where mock-up is specified in individual Sections to be removed, clear area after mock-up has been reviewed by Architect.

1.7 MANUFACTURERS' FIELD SERVICES AND REPORTS

- A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust, and balance of equipment and other field services as applicable, and to initiate instructions when necessary.
- B. Individuals to report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.
- C. Submit report in duplicate within 15 days of observation to Architect for review.

2. PART 2 PRODUCTS

Not Used

3. PART 3 EXECUTION

3.1 GENERAL INSTALLATION

- A. Comply with requirements specified in Section 01 73 00.

3.2 EXAMINATION

- A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent Work. Beginning new Work means acceptance of existing conditions.
- B. Verify that existing substrate is capable of structural support or attachment of new Work being applied or attached.
- C. Examine and verify specific conditions described in individual specification sections.
- D. Verify that utility services are available, of the correct characteristics, and in the correct locations.

3.3 PREPARATION

- A. Clean substrate surfaces prior to applying next material or substance.
- B. Seal cracks or openings of substrate prior to applying next material or substance.
- C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

END OF SECTION

SECTION 01 45 29

TESTING LABORATORY SERVICES

1. PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Selection and payment.
- B. Contractor submittals.
- C. Laboratory responsibilities.
- D. Laboratory reports.
- E. Limits on testing laboratory authority.
- F. Contractor responsibilities.
- G. Schedule of inspections and tests.
- H. Test and inspection form.

1.2 REFERENCES

- A. ASTM C140 - Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units.
- B. ASTM D3740 - Practice for Evaluation of Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.
- C. ASTM E329 - Recommended Practice for Inspection and Testing Agencies for Concrete, Steel, and Bituminous Materials as Used in Construction.
- D. CBC - California Building Code, Title 24, Part 2 of the California Code of Regulations (CCR).

1.3 SELECTION AND PAYMENT

- A. Owner will employ and pay for services of an independent testing laboratory to perform specified inspection and testing as specified by Owner's testing laboratory.
- B. Owner will pay cost of testing and inspection except the following for which the Contractor shall reimburse the Owner through deductive change order:
 - 1. Any retesting and sampling required due to failure of original test.
 - 2. Any testing and inspection required to be performed that requires testing laboratory or agency to perform services outside the state of California.
 - 3. Concrete design mix.
 - 4. Additional testing expenses caused by failure of the Contractor to adhere to construction schedule or caused by failure of the Contractor to give proper advanced notice or caused by Contractor delay.
- C. Contractor shall employ and pay for services required to perform specified inspection and testing specified as Contractor responsibility.
- D. Employment of testing laboratory shall in no way relieve Contractor of obligation to perform work in accordance with requirements of Contract Documents.

1.4 QUALITY ASSURANCE

- A. Comply with requirements of ASTM E329 and ASTM D3740.
- B. Laboratory Staff: Maintain a full time registered engineer on staff to review services.
- C. Testing Equipment: Capable of performing tests required calibrated at reasonable intervals with devices acceptable to the National Bureau of Standards.

1.5 OWNER'S TESTING LABORATORY RESPONSIBILITIES

- A. Test samples of mixes submitted by Inspector.
- B. Provide qualified personnel at site. Cooperate with Architect and Contractor in performance of services.
- C. Perform specified inspection, sampling, and testing of products in accordance with specified standards.
- D. Ascertain compliance of materials and mixes with requirements of Contract Documents.
- E. Promptly notify Architect and Contractor of observed irregularities or non-conformance of Work or products.
- F. Perform additional inspections and tests required by Architect.
- G. Attend preconstruction conferences and progress meetings when requested by Architect.

1.6 LABORATORY REPORTS

- A. After each inspection and test, promptly submit within no more than 14 days of the date of the inspection or test one copy of laboratory report to Architect, Engineer, Owner's Resident Inspector, and to Contractor. Reports of test results of materials and inspections found not to be in compliance with the requirements of the Contract Documents shall be forwarded immediately to the Architect, Engineer, Owner's Resident Inspector, and the Contractor.
- B. Include:
 - 1. Date issued.
 - 2. Project title and number.
 - 3. Name of inspector.
 - 4. Date and time of sampling or inspection.
 - 5. Identification of product and Specifications section.
 - 6. Location in the Project.
 - 7. Type of inspection or test.
 - 8. Date of test.
 - 9. Ambient conditions at time of test or sample-taking.
 - 10. Results of tests and interpretation of test results.
 - 11. Professional opinion as to whether tested work is in conformance with Contract Documents.
 - 12. Recommendations on retesting.

- C. Verification of Test Reports: Each testing agency shall submit to the Architect a verified report in duplicate covering all of the tests which were required to be made by that agency during the progress of the project. Such report shall be furnished each time that work on the project is suspended, covering the tests up to that time and at the completion of the project, covering all tests.

1.7 LIMITS ON TESTING LABORATORY AUTHORITY

- A. Laboratory may not release, revoke, alter, or enlarge on requirements of Contract Documents.
- B. Laboratory may not approve or accept any portion of the Work.
- C. Laboratory may not assume any duties of Contractor.
- D. Laboratory has no authority to stop the Work.

1.8 CONTRACTOR RESPONSIBILITIES

- A. Submit proposed mix designs to Architect for review in accordance with Section 03 30 00.
- B. Cooperate with laboratory personnel, and provide access to the Work and to manufacturer's facilities.
- C. Notify Architect, Owner's Resident Inspector, and testing laboratory 48 hours prior to expected time for operations requiring inspection and testing services.
 - 1. When tests or inspections cannot be performed after such notice, reimburse Owner for laboratory personnel and travel expenses incurred due to the Contractor's negligence.
 - 2. The Contractor shall notify the Owner's representative a sufficient time in advance of the manufacture of material to be supplied by him under the Contract Documents, which must by terms of the Contract be tested, in order that the Owner may arrange for the testing of same at the source of supply.
 - 3. Any material shipped by the Contractor from the source of supply prior to having satisfactorily passed such testing and inspection or prior to the receipt of notice from said representative that such testing and inspection will not be required shall not be incorporated in the job.
- D. Employ and pay for services of Owner's testing laboratory to perform additional inspections, sampling and testing required when initial tests indicate work does not comply with contract documents.

1.9 SCHEDULE OF INSPECTIONS AND TESTS BY OWNER'S TESTING LABORATORY

- A. Perform tests and inspections for the following in conformance with the (CBC) California Building Code (International Building Code with State of California Amendments), Title 24, Part 2, of the California Code of Regulations (CCR).
 - 1. Structural Tests and Special Inspections
 - (a) General - 1701A
 - (b) Approvals - 1703A
 - (c) Special Inspections - 1704A
 - (1) Structural Steel - 1705A.2 and Table 1705A.2.1
 - (2) Welding - 1705A.2.5 and Table 1705A.2.1.
 - (3) Concrete - 1705A.3 and Table 1705A.3
 - (4) Glass Unit Masonry - 1705.4.1
 - (5) Masonry Veneer - 1705A.4.1

- (6) Wood - 1705A.5
- (7) Soils - 1705A.6 and Table 1705A.6
- (8) Pile Foundation - 1705A.7 and Table 1705A.7
- (9) Pier Foundation - 1705A.8 and Table 1705A.8
- (10) Sprayed Fire-Resistant Materials - 1705A.14
- (11) Mastic and Intumescent Fire-Resistant Coatings - 1705A.17.1, 1705A.17.2
- (12) Exterior Insulation and Finish Systems - 1705A.16
- (13) Water-Resistive Barrier - 1705A.16.1
- (14) Penetration Fire Stops and Joints - 1705A.17.1, 1705A.17.2
- (15) Smoke Control Systems - 1705A.18
- (16) Shotcrete - 1705A.19, 1908A.5, 1908A.10
- (17) Reinforced Gypsum Concrete - 2514
- (18) Composition Construction Cores - 1910A.4
- (19) Prestressed Concrete - 1705A.3.4
- (d) Special Inspections for Seismic Resistance - Section 1705A.12
 - (1) Structural Steel - Continuous Inspection, Welding - 1705A.12.1, 1705A.2.1, 1705.A.2.5
 - (2) Structural Wood - Continuous and Periodic Inspection - 1705A.11.1
 - (3) Cold-Formed Steel Framing - Periodic Inspection- 1705A.11.2
 - (4) Storage Racks and Access Floors - Periodic Inspection - 1705A.12.7
 - (5) Architectural Components - Periodic Inspection - 1705A.12.5
 - (6) Mechanical and Electrical Components - Periodic Inspection - 1705A.12.6
 - (7) Designated Seismic Systems - Verification - 1705A.13.3
 - (8) Seismic Isolation Systems - Continuous Inspection - 1705A.12.8
- 2. Foundations (Chapter 18A)
 - (a) Earth fill compaction - 1803A.5.8
 - (b) Observation of Driven Pile Installation - 1705A.7.1
 - (c) Observation of Caissons - Table 1705A.8
- 3. Concrete (Chapter 19A)
 - (a) Concrete Inspection
 - (1) Portland Cement Tests - 1910A.1
 - (2) Gunite/Shotcrete - 1908A.5, 1908A.10

- (3) Reinforcing Bars Table - 1705A.2.1, 1910A.2
 - (4) Waiver of Reinforcing Bar Tests - 1910A.2
 - (5) Prestressing Steel & Anchorage - 1910A.3
 - (6) Batch Plant Inspection - 1705A.3.3
 - (7) Waiver of Batch Plant Inspection - 1705A.3.3.1, 1705A3.3.2
 - (8) Frequency of Tests for Concrete - 1905A.1.16
 - (b) Concrete Quality
 - (1) Proportions of Concrete - 1903A, 1904A, 1905A
 - (c) Job Site Inspection
 - (1) Site Placement Inspection - 1705A.3.5
 - (d) Anchors in Concrete
 - (1) Drilled-In-Expansion Bolts or Epoxy-Type Anchors in Concrete - 1910A.5
4. Masonry (Chapter 21A)
- (a) Materials
 - (1) Masonry Units - 2103A.1
 - (2) Mortar - 2103A.2
 - (3) Grout - 2103A.3
 - (4) Grout Aggregates - 2103A.3.1
 - (5) Reinforcing Bars - 2103A.4
 - (b) Masonry Quality
 - (1) Masonry Tests - 2105A.2
 - (2) Mortar and Grout - 2105A.3
 - (3) Masonry Core Tests -2105A.4
 - (4) Mandatory Tests - DSA IR 21-4
 - a) Measurements - ASTM C140, Section 6
 - b) Compressive Strength - ASTM C140, Section 7
 - c) Absorption - ASTM C140, Section 8
 - d) Reporting - ASTM C140, Section 10

5. Structural Steel (Chapter 22A)

(a) Materials

- (1) Material Identification - 2203A
 - a) Anchor Bolt - DSA IR 17-11
- (2) Inspection and Tests of Structural Steel 1705A.2
- (3) Tests of H.S. Bolts, Nuts, Washers - 2213A.1
- (4) Tests of End Welded Studs - 2213A.2
- (5) Steel Joist Tests - 1705A.2.3
- (6) Shop Fabrication Inspection - 1704A.2.5
- (7) High Strength Bolt Inspection - 1705A.2.1 - Table 1705A2.1, 2213A.1
- (8) Welding Inspection - 1705A.2.5
- (9) Nelson Stud Welding - 2213A.2
- (10) Non-Destructive Weld Testing - DSA IR 17-2

6. Wood (Chapter 23)

(a) Materials

- (1) Lumber and Plywood Grading - 2303
- (2) Pre-Fabricated Wood I-Joists - 2303.1.2
- (3) Glued-Laminated Members - 2303.1.3
- (4) Wood Structural Panels - 2303.1.5
- (5) Fiberboard - 2303.1.6
- (6) Hardboard - 2303.1.7
- (7) Particleboard - 2303.1.8
- (8) Floor Underlayment - 2303.1.8.1
- (9) Preservative Treatment - 2303.1.9
- (10) Structural Composite Lumber - 2303.1.10
- (11) Fire-Retardant Treated Wood - 2303.2

(b) Wood Inspection

- (1) Timber Connectors - 1705A.5.6
- (2) Plate Connected Wood Trusses - 1705A.5.5
- (3) Glu-Laminated Fabrication - 1705A.5.4

7. Veneer (Chapter 14)
 - (a) Materials
 - (1) Masonry Units - 1404.4, 2103A
 - (2) Precast Concrete Units - 1404.6
 - (3) Mortar and Grout 2103A, 2103A.2.4
 - (4) Bond and Shear Tests - 1411.2.1
 - (b) Inspection of Veneer
 - (1) Veneer Inspection - 1705A.4.1
8. Roof Covering (Chapter 15)
 - (a) Installation
 - (1) Roof Tile - 1507.3.10, 1513
9. Aluminum (Chapter 20)
 - (a) Materials
 - (1) General - 2002.1
 - (b) Inspection
 - (1) Testing and Inspection - 2003.1
10. Remotely Fabricated Construction Elements
 - (a) Testing and Inspection - DSA IR A-15
- B. Special Inspection - 1704 - As indicated on the drawings.
- C. Perform additional test required by individual Specification Sections.

1.10 SCHEDULE OF INSPECTIONS AND TESTS BY CONTRACTOR

- A. Contractor Responsibility:
 1. Statement of Responsibility - 1704A.4 Refer to listed special inspections under Article 1.9.
- B. Planting and Irrigation:
 1. Testing as specified in Division 32 including, but not limited to; soils analysis and irrigation pressure testing.
- C. Plumbing:
 1. Testing as specified in Division 22 including, but not limited to: Sterilization, soil waste and vent, water piping, source of water, gas piping, downspouts and storm drains.
- D. Automatic Fire Sprinklers:
 1. Testing as specified in Division 21 shall include, but not be limited to: hydrostatic pressure.

E. Heating, Ventilating and Air Conditioning:

1. Testing as specified in Division 21 shall include, but not be limited to: Ductwork tests, cooling tower tests, boiler tests, controls testing, piping tests, water and air systems, and test and balance of heating and air conditioning systems.

F. Electrical

1. Testing as specified in Division 26 including, but not limited to: Equipment testing, all electrical system operations, grounding system and checking insulation after cable is pulled.

1.11 INSPECTION BY THE OWNER

- A. An Inspector employed by the Owner in accordance with the requirements of the California Code of Regulations Title 24, Part 1 will be assigned to the work. His duties are specifically defined in Section 4-342 of Title 24, Part 1.
- B. The Owner and his representatives shall at all times have access for the purpose of inspection to all parts of the work and to the shops wherein the work is in preparation, and the Contractor shall at all times maintain proper facilities and provide safe access for such inspection.
- C. The work of construction in all stages of progress shall be subject to the personal continuous observation of the Inspector. He shall have free access to any or all parts of the work at any time. The Contractor shall furnish the Inspector reasonable facilities for obtaining such information as may be necessary to keep him fully informed respecting the progress and manner of the work and the character of the materials. Inspection of the work shall not relieve the Contractor from any obligation to fulfill this Contract. The presence of an Inspector shall in no way change, mitigate or alleviate the responsibility of the Contractor.
- D. The Inspector is not authorized to change, revoke, alter, enlarge or decrease in any way any requirement of the Contract Documents, drawings, specifications or subsequent change orders.
- E. Whenever there is insufficient evidence of compliance with any of the provisions of Title 24, Part 2 of the California Code of Regulations or evidence that any material or construction does not conform to the requirements of Title 24, Part 2 of the California Code of Regulations, the Division of the State Architect may require tests as proof of compliance. Test methods shall be as specified herein or by other recognized and accepted test methods determined by the Division of the State Architect. All tests shall be performed by a testing laboratory accepted by the Division of the State Architect.

2. PART 2 PRODUCTS

Not Used

3. PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01 50 00

TEMPORARY FACILITIES AND CONTROLS

1. PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Temporary Utilities: Electricity, lighting, heat, ventilation, telephone service, communication service, water, and sanitary facilities.
- B. Temporary Controls: Barriers, enclosures and fencing. Water, erosion, pollution, noise and fire protection control.
- C. Construction Facilities: Access roads, parking, progress cleaning, project signage, and temporary buildings.

1.2 SUBMITTALS

- A. Moisture-Protection Plan:
 - 1. Submit Moisture - Protection Plan under provisions of Section 01 33 00.
 - 2. Describe procedures and controls for protecting materials and construction from moisture absorption and damage, including delivery, handling, and storage provisions for materials subject to moisture absorption or moisture damage, discarding moisture-damaged materials, protocols for mitigating moisture intrusion into completed Work, and replacing moisture damaged Work.
 - 3. Indicate sequencing of work that requires water, such as sprayed fire-resistive materials, plastering, sawing and grinding, and describe plans for dealing with water and moisture from these operations.
 - 4. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.

1.3 TEMPORARY ELECTRICITY

- A. Provide and pay for power service required from Utility source.
- B. Provide power outlets for construction operations, with branch wiring and distribution boxes. Provide flexible power cords as required.
- C. Provide main service disconnect and over current protection at convenient location.
- D. Comply with NECA, NEMA, and UL standards and regulations for temporary electric service.
- E. Permanent convenience receptacles may be utilized during construction.

1.4 TEMPORARY LIGHTING

- A. Provide and maintain lighting for construction operations, observations, inspections, and traffic conditions.
- B. Provide branch wiring from power source to distribution boxes with lighting conductors, pigtails, and lamps as required.
- C. Maintain lighting and provide routine repairs.
- D. Permanent building lighting may not be utilized during construction.

1.5 TEMPORARY HEATING/COOLING

- A. Provide and pay for devices as required to maintain specified thermal conditions for construction operations.

- B. Only electric or indirect fired combustion heaters shall be used. No direct fired space heaters will be allowed.
- C. Heaters will be equipped with controls to automatically turn off heater if airflow is interrupted or internal temperature exceeds design temperature.
- D. Do not use permanent equipment for temporary purposes.
- E. Maintain minimum ambient temperature of 50 degrees F and maximum ambient temperature of 80 degrees F in areas where construction is in progress, unless indicated otherwise in specifications.
- F. Maintain temperature above dew point of enclosed space based upon relative humidity of enclosed area.
- G. Continuously monitor temperature of enclosed space(s) using an electronic monitoring device (s). Place devices in locations that will record average temperature of building(s). Provide print out to Architect upon request.

1.6 TEMPORARY VENTILATION

- A. Ventilate enclosed areas to assist cure of materials and to prevent accumulation of dust, fumes, vapors, or gases.
- B. Do not use permanent equipment for temporary ventilation purposes.
- C. Ventilate enclosed spaces to dissipate humidity. Maintain a maximum relative humidity level of less than 60 percent. Avoid pockets of high humidity.
- D. Continuously monitor humidity of enclosed space(s) using an electronic monitoring device(s). Place devices in locations that will record average humidity of building(s). Provide print out to Architect upon request.

1.7 TEMPORARY HUMIDITY CONTROL

- A. Provide temporary ventilation during construction activities to protect installed construction from adverse effects of high humidity and moisture.
- B. Select equipment that will not have a harmful effect on completed installations or elements being installed.
- C. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.
- D. Provide dehumidification systems when required to reduce substrate moisture levels to level required to allow installation or application of finishes.
- E. Measure moisture content of materials that have been exposed to moisture during construction operations or after installation. Record daily readings over a forty-eight hour period. Identify materials containing moisture levels higher than allowed. Report findings in writing to Architect.

1.8 TELEPHONE SERVICE

- A. Provide, maintain and pay for telephone service to field office and Owner's/Inspector's field office at time of project mobilization. Inspector's office to have separate telephone line.
- B. Provide mobile telephone service for project superintendent for use when away from field office.
- C. Provide, maintain and pay for Facsimile machine in field office. Provide separate dedicated telephone line for machine.

1.9 ELECTRONIC COMMUNICATION SERVICE

- A. Provide minimum DSL electronic communication service, including electronic mail, in primary field office.

1.10 TEMPORARY WATER SERVICE

- A. Provide, maintain and pay for suitable quality water service required for construction operations. Contractor may obtain water from existing fire hydrant if appropriate clearances are acquired and fees paid.
- B. Extend branch piping with outlets located so water is available by hoses with threaded connections.

1.11 TEMPORARY SANITARY FACILITIES

- A. Provide temporary chemical type toilet facilities and enclosures.
- B. Maintain temporary toilet facilities in a sanitary manner.
- C. Existing facilities shall not be used.
- D. Facilities shall comply with the accessibility requirements of the CBC - California Building Code, (CCR) California Code of Regulations, Title 24, Part 2, Section 11B-201.4.

1.12 BARRIERS

- A. Provide barriers to prevent unauthorized entry to construction areas and to protect existing facilities and adjacent properties from damage from construction operations.
- B. Provide protection for plant life and trees designated to remain and for soft and hardscape areas adjacent to work, replace damaged materials in kind.
- C. Protect non-owned vehicular traffic, stored materials, site and structures from damage.

1.13 FENCING

- A. Construction: Commercial grade chain link fence.
- B. Provide 6 foot high fence around construction site; equip with vehicular and pedestrian gates with locks. Post fences and gates with no trespassing signs.

1.14 WATER CONTROL

- A. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.
- B. Provide water barriers as required to protect site from running water.

1.15 EROSION AND SEDIMENT CONTROL

- A. Conform to Best Management Practices for erosion and sediment control and non-storm water management as defined in Sections 3 and 4 of the Construction Activity Handbook published by the Storm Water Quality Association.
- B. Plan and execute construction by methods to control surface drainage from cuts and fills, from borrow and waste disposal areas. Prevent erosion and sedimentation.
- C. Minimize amount of bare soil exposed at one time.
- D. Provide temporary measures such as berms, dikes, and drains, to prevent water flow.
- E. Construct fill and waste areas by selective placement to avoid erosive surface silts or clays.
- F. Coordinate construction activities with control procedures established in the Storm Water Pollution Prevention Plan (SWPPP).

1.16 TEMPORARY FIRE PROTECTION

- A. Maintain temporary fire protection facilities of the types needed until permanent facilities are installed.
- B. Comply with NFPA 10 "Standard for Portable Fire Extinguishers" and NFPA 241 "Standard for Safeguarding Construction, Alterations, and Demolition Operations".
- C. Fire safety during construction shall comply with CFC - California Fire Code (CCR) California Code of Regulations, Title 24, Part 9, Chapter 33.
- D. Store combustible materials in containers in fire-safe locations.
- E. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire-protection facilities, stairways, and other access routes.
- F. Provide supervision of welding operations, combustion-type temporary heating units, and similar sources of fire ignition.

1.17 NOISE CONTROL

- A. Provide methods, means, and facilities to minimize noise produced by construction operations.

1.18 POLLUTION CONTROL

- A. Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations.
- B. Conform to Best Management Practices for waste management and material controls as defined in Section 4 of the Construction Activity Handbook published by the Storm Water Quality Association.
- C. Coordinate construction activities with control procedures established in the Storm Water Pollution Prevention Plan (SWPPP).

1.19 EXTERIOR ENCLOSURES

- A. Provide temporary weather-tight closure of exterior openings to accommodate acceptable working conditions and protection for materials, to allow for temporary heating and maintenance of required ambient temperatures identified in individual specification Sections, and to prevent entry of unauthorized persons.
- B. Provide access doors with self-closing hardware and locks.

1.20 SECURITY

- A. Provide security and facilities to protect Work from unauthorized entry, vandalism, or theft.
- B. Coordinate with Owner's security program.

1.21 ACCESS ROADS

- A. Construct and maintain temporary roads accessing public thoroughfares to serve construction area. Extend and relocate as Work progress requires. Provide detours necessary for unimpeded traffic flow.
- B. Stabilize temporary vehicle transportation routes and construction entrances to prevent erosion and control dust immediately after grading in accordance with best management practice techniques defined in Section 3 of the Construction Activity Handbook published by the Storm Water Quality Association.
- C. Maintain stabilization techniques as work progresses.
- D. Provide and maintain access to fire hydrants, free of obstructions.

1.22 PARKING

- A. Provide temporary surface parking areas to accommodate construction personnel.
- B. Stabilize temporary surface parking areas immediately after grading to prevent erosion and control dust in accordance with Best Management practice techniques defined in Section 3 of the Construction Activity Handbook published by the storm Water Quality Association.
- C. Maintain stabilization techniques as work progresses.

1.23 TRAFFIC CONTROL

- A. Comply with requirements of authorities having jurisdiction.
- B. Obtain all permits, provide all materials and maintain controls as required of authorities having jurisdiction.
- C. Maintain access for fire-fighting equipment and access to hydrants.

1.24 PROGRESS CLEANING

- A. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.
- B. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.
- C. Provide walk-off mats at each building entry.

1.25 WASTE DISPOSAL

- A. Waste Management: In compliance with Section 01 74 19 - Construction Waste Management and Disposal.
- B. Maintain building areas free of waste materials, debris, and rubbish.
- C. Remove waste materials, debris, and rubbish from site periodically and legally dispose of off site.
- D. Maintain site area in a clean and orderly condition.

1.26 PROJECT IDENTIFICATION

- A. Provide 8 x 4 foot project sign of exterior grade plywood and wood frame construction, painted, with exhibit lettering by professional sign painter to Architect's design and colors.
- B. List title of Project, names of Owner, Architect and Contractor.
- C. Erect on site at location established by Architect.
- D. Sign to remain in place through construction period and shall be removed only after dedication of the project.
- E. Provide temporary directional signs for construction personnel and visitors.
- F. No other signs are allowed except those required by law.

1.27 FIELD OFFICES

- A. Office: Weather-tight, with lighting, electrical outlets, heating, cooling and ventilating equipment, and equipped with sturdy furniture drawing rack and drawing display table.
- B. Maintain daily janitorial service for offices. Maintain approach to office free of mud and water.
- C. Provide space for Project meetings, with table and chairs to accommodate 10 persons.

- D. When permanent facilities are enclosed with operable utilities, relocate offices into building, with written agreement of Owner, and remove temporary buildings.
- E. Facilities shall comply with the accessibility requirements of the CBC - California Building Code, (CCR) California Code of Regulations, Title 24, Part 2, Section 11B-201.4.

1.28 STORAGE AREAS AND SHEDS

- A. Size to storage requirements for products of individual Sections. Allow for access and orderly provision for maintenance and for inspection of products.

1.29 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

- A. Maintain temporary equipment, facilities and controls until Substantial Completion or when use is no longer required.
- B. Remove temporary above grade or buried utilities, equipment, facilities, materials, prior to Substantial Completion review.
- C. Remove underground installations to a minimum depth of 2 feet. Grade site as indicated.
- D. Clean and repair damage caused by installation or use of temporary work.
- E. Materials and facilities that constitute temporary facilities are property of the Contractor.
- F. Restore existing facilities used during construction to original condition.
- G. Restore permanent facilities used during construction to specified condition.
- H. Replace construction that cannot be satisfactorily restored.

2. PART 2 PRODUCTS

Not Used

3. PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01 61 00

PRODUCT REQUIREMENTS

1. PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Products.
- B. Transportation and handling.
- C. Storage and protection.
- D. Damage and restoration.

1.2 PRODUCTS

- A. Products: Means new material, machinery, components, equipment, fixtures, and systems forming the Work. Does not include machinery and equipment used for preparation, fabrication, conveying and erection of the Work.
- B. Products specified or recycled from other projects are not considered new products.
- C. Provide interchangeable components of the same manufacturer, for similar components.
- D. Provide products that comply with the Contract Documents, that are undamaged and are unused at the time of installation.
- E. Provide products complete with all accessories, trim, finish, safety guards and other devices and detail needed for a complete installation and for the intended use and effect.
- F. Where a specific manufacturer's product is specified as the basis of design, the designation shall establish the qualities relating to type, function, dimension, in-service performance, physical properties, appearance and other characteristics for comparable products of other named manufacturers.
- G. Where products are specified by name or by manufacturer provide the product or manufacturer specified. No substitutions will be permitted unless made under the provisions of Section 01 25 13.
- H. Where specifications only describe a product or assembly by listing exact characteristics required, provide a product or assembly that provides the characteristics.
- I. Where specifications only require compliance with performance requirements, provide products that comply with those requirements.
- J. Where the specifications only require compliance with an imposed code, standard or regulation, provide a product that complies with the standards, codes or regulations specified.
- K. Where specifications require review and acceptance of a sample, the Architect's decision will be final on whether a proposed product sample is acceptable or not.
- L. Provide materials and products specified in the full range of color, texture and pattern for selection by Architect. Architect may select from any color range at no additional cost to Owner.

1.3 TRANSPORTATION AND HANDLING

- A. Transport and handle products in accordance with manufacturer's instructions.
- B. Schedule delivery to minimize long-term storage at site to prevent overcrowding of construction spaces.

- C. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft and other losses.
- D. Deliver products in manufacturer's original sealed container or packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
- E. Promptly inspect shipments to assure that products comply with requirements, quantities are correct, and products are undamaged.
- F. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.

1.4 STORAGE

- A. Store products in accordance with manufacturer's instructions, with seals and labels intact and legible.
- B. Store sensitive products in weather-tight, climate controlled enclosures.
- C. Store products in a manner that will not damage or overload project structure.
- D. For exterior storage of fabricated products, place on sloped supports, above ground.
- E. Provide off-site storage when site does not permit on-site storage .
- F. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to avoid condensation.
- G. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.
- H. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
- I. Arrange storage of products to permit access for inspection. Periodically inspect to assure products are undamaged and are maintained under specified conditions.
- J. Prevent the discharge of pollutants to storm water from storage of materials on-site using best management practice techniques defined in Chapter 4 of the Construction Activity Handbook published by the Storm Water Quality Task Force.

1.5 PROTECTION

- A. Protect installed Work and provide special protection where specified in individual specification Sections.
- B. Provide temporary and removable protection for installed Products. Control activity in immediate work area to minimize damage.
- C. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.
- D. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects.
- E. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.
- F. Provide humidity and temperature control for installed products as recommended by materials manufacturer.
- G. Prohibit traffic from landscaped areas.

1.6 DAMAGE AND RESTORATIONS

- A. Damage to existing or new work whether accidental or not shall be restored or replaced as specified or directed by Architect.
- B. Restoration shall be equal to structural performance of original work.
- C. Finish shall match appearance of existing adjacent work.
- D. Work not properly restored or where not capable of being restored shall be removed and replaced.

2. PART 2 PRODUCTS

Not Used

3. PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01 73 00
EXECUTION REQUIREMENTS

1. PART 1 GENERAL

1.1 SECTION INCLUDES

- A. General procedural requirements governing execution of the Work.
 - 1. Construction layout.
 - 2. Field engineering and surveying.
 - 3. General installation of products.

1.2 SUBMITTALS

- A. Certificates: Submit certificate signed by land surveyor certifying that location and elevation of improvements comply with requirements.
- B. Certified Surveys: Submit two copies signed by land surveyor.
- C. Final Property Survey: Submit 2 copies showing the Work performed and record survey data.

2. PART 2 PRODUCTS

Not Used

3. PART 3 EXECUTION

3.1 EXAMINATION

- A. Existing Conditions: Existence and location of site improvements and other construction indicated as existing are not guaranteed. Before beginning work, investigate and verify existence and location of construction affecting the Work.
- B. Existing Utilities: Existence and location of underground and other utilities indicated as existing are not guaranteed. Before beginning work, investigate and verify existence and location of underground utilities affecting the Work.
 - 1. Before construction, verify location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; and electrical services.
 - 2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.
- C. Acceptance of Conditions: Examine substrates, areas, and conditions, with Installer or Applicator present for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
 - 1. Written Report: Where conditions detrimental to performance of the Work are encountered, provide a written report listing the following:
 - (a) Description of the Work.
 - (b) List of detrimental conditions, including substrates.

- (c) List of unacceptable installation tolerances.
 - (d) Recommended corrections.
2. Verify compatibility with and suitability of substrates, including compatibility of existing finishes or primers.
 3. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
 4. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
 5. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Existing Utility Information: Furnish information to Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.
- B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- D. Review of Contract Documents and Field Conditions: Immediately on discovery of need for clarification of Contract Documents, submit a Request For Information (RFI) to Architect. Include a detailed description of problem encountered, together with recommendations for resolution of the item discovered.

3.3 CONSTRUCTION LAYOUT

- A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect promptly.
- B. General: Engage a land surveyor, registered in the state of California to lay out the Work using accepted surveying practices.
 1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
 2. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
 3. Inform installers of lines and levels to which they must comply.
 4. Check the location, level and plumb, of every major element as the Work progresses.
 5. Notify Architect when deviations from required lines and levels exceed allowable tolerances.
 6. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.
- C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and invert elevations.

- D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.
- E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect.

3.4 FIELD ENGINEERING

- A. Identification: Control datum for survey is that established by Owner provided survey.
- B. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.
 - 1. Do not change or relocate existing benchmarks or control points without prior written approval of Architect. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Architect before proceeding.
 - 2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.
- C. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points.
 - 1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
 - 2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.
 - 3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.
- D. Certified Survey: On completion of foundation walls, major site improvements, and other work requiring field-engineering services, prepare a certified survey showing dimensions, locations, angles, and elevations of construction and sitework.
- E. Final Property Survey: Prepare a final property survey showing significant features (real property) for Project. Include on the survey a certification, signed by land surveyor that principal metes, bounds, lines, and levels of Project are accurately positioned as shown on the survey.
 - 1. Show boundary lines, monuments, streets, site improvements and utilities, existing improvements and significant vegetation, adjoining properties, acreage, grade contours, and the distance and bearing from a site corner to a legal point.

3.5 INSTALLATION

- A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
 - 1. Make vertical work plumb and make horizontal work level.
 - 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
 - 3. Conceal pipes, ducts, and wiring in finished areas, unless otherwise indicated.
 - 4. Maintain maximum headroom clearance in spaces without a suspended ceiling.

- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.
- F. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- G. Anchors and Fasteners: Provide anchors and fasteners as required to anchor each component securely in place, accurately located and aligned with other portions of the Work.
 - 1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
 - 2. Allow for building movement, including thermal expansion and contraction.
 - 3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- H. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
- I. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

END OF SECTION

SECTION 01 73 29
CUTTING AND PATCHING

1. PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Requirements and limitations for cutting and patching of Work.

1.2 DEFINITIONS

- A. Cutting: Removal of in-place construction necessary to permit installation or performance of other work.
- B. Patching: Fitting and repair work required to restore surfaces to original or specified conditions after installation of other work.

1.3 REGULATORY REQUIREMENTS

- A. Unless specifically shown on the drawings, no structural member shall be cut, drilled, or notched without prior written authorization from the Architect.

1.4 SUBMITTALS

- A. Submit written request in advance of cutting or patching which affects:

- 1. Structural integrity of any element of Project.
- 2. Integrity of weather-exposed or moisture-resistant element.
- 3. Efficiency, maintenance, or safety of any operational element.
- 4. Visual qualities of sight exposed elements.
- 5. Work of Owner or separate contractor.

- B. Include in request:

- 1. Identification of Project.
- 2. Location and description of affected work.
- 3. Necessity for cutting or patching.
- 4. Description of proposed work, and Products to be used.
- 5. Alternatives to cutting and patching.
- 6. Effect on work of Owner or separate contractor.
- 7. Written permission of affected separate contractor.
- 8. Date and time work will be executed.

1.5 QUALITY ASSURANCE

- A. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio.

- B. Do not cut or patch operating elements that would reduce their capacity to perform or that would result in increased maintenance or decreased operational life or safety.
- C. Do not cut or patch construction that would result in visual evidence of cutting or patching.
- D. Remove and replace construction that has been cut or patched in a visually unsatisfactory manner.

2. PART 2 PRODUCTS

2.1 MATERIALS

- A. Primary Products: Those required for original installation.
- B. Substitutions: Under provisions of Section 01 25 13.

3. PART 3 EXECUTION

3.1 EXAMINATION

- A. Inspect existing conditions prior to commencing Work, including elements subject to damage or movement during cutting and patching.
- B. After uncovering existing Work, inspect conditions affecting performance of work.
- C. Beginning of cutting or patching means acceptance of existing conditions.

3.2 PREPARATION

- A. Provide temporary supports to ensure structural integrity of the Work. Provide devices and methods to protect other portions of Project from damage.
- B. Provide protection from elements for areas which may be exposed by uncovering work.

3.3 CUTTING AND PATCHING

- A. Execute cutting, fitting, and patching to complete Work.
- B. Fit Products together, to integrate with other work.
- C. Uncover work to install ill timed work.
- D. Remove and replace defective or non-conforming work.
- E. Remove samples of installed work for testing when requested.
- F. Provide openings in the Work for penetration of mechanical and electrical work.
- G. Cut rigid materials using saw or drill. Pneumatic tools not allowed without prior approval.

3.4 PERFORMANCE

- A. Execute work by methods to avoid damage to other Work, and which will provide appropriate surfaces to receive patching and finishing.
- B. Employ skilled and experienced installer to perform cutting and patching.
- C. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.
- D. Restore work with new Products in accordance with requirements of Contract Documents.
- E. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

- F. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material, to full thickness of the penetrated element.
- G. Refinish surfaces to match adjacent finish. For continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.

3.5 CLEANING

- A. Clean areas and spaces where cutting and patching was performed.
- B. Completely remove paint, mortar, oils, sealant, and similar materials.

END OF SECTION

SECTION 01 74 19

CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

1. PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Administrative and procedural requirements for the following:
 - 1. Recycling nonhazardous construction waste.
 - 2. Disposing of nonhazardous construction waste.

1.2 DEFINITIONS

- A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction operations. Construction waste includes packaging.
- B. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.
- C. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.
- D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.
- E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.
- F. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.3 PERFORMANCE REQUIREMENTS

- A. General: Develop waste management plan that results in end-of-Project rates for salvage/recycling of 50 percent by weight of total waste generated by the Work.
- B. Recycle Requirements: Recycle as much nonhazardous construction waste as possible including the following materials:
 - 1. Construction Waste:
 - (a) Site-clearing waste.
 - (b) Masonry and CMU.
 - (c) Lumber.
 - (d) Wood sheet materials.
 - (e) Wood trim.
 - (f) Metals.
 - (g) Roofing.
 - (h) Insulation.
 - (i) Carpet and pad.
 - (j) Gypsum board.
 - (k) Piping.
 - (l) Electrical conduit.
 - (m) Packaging: Regardless of recycle goal indicated above, recycle 100 percent of the following uncontaminated packaging materials:
 - (1) Paper.
 - (2) Cardboard.
 - (3) Boxes.
 - (4) Plastic sheet and film.
 - (5) Polystyrene packaging.
 - (6) Wood crates.
 - (7) Plastic pails.

1.4 SUBMITTALS

- A. Submit waste management plan and progress reports under the provisions of Section 01 33 00.
- B. Waste Management Plan: Submit plan within 14 days of date established for the Notice of Award.
- C. Waste Reduction Progress Reports: Concurrent with each Application for Payment, submit reports. Include separate reports for demolition and construction waste. Include the following information:
 - 1. Material category.
 - 2. Generation point of waste.
 - 3. Total quantity of waste in tons.
 - 4. Quantity of waste salvaged, both estimated and actual in tons.
 - 5. Quantity of waste recycled, both estimated and actual in tons.
 - 6. Total quantity of waste recovered (salvaged plus recycled) in tons.
 - 7. Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste.
- D. Forms: Prepare waste reduction progress reports on forms included at end of Part 3.
- E. Waste Reduction Calculations: Before request for Substantial Completion, submit calculated end-of-Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.
- F. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.
- G. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.
- H. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
- I. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

1.5 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.
- B. Waste Management Conference: Conduct conference at Project site to comply with requirements in Division 01 Section 01 31 00 - Project Management and Coordination. Review methods and procedures related to waste management including, but not limited to, the following:
 - 1. Review and discuss waste management plan.
 - 2. Review requirements for documenting quantities of each type of waste and its disposition.
 - 3. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
 - 4. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
 - 5. Review waste management requirements for each trade.

1.6 WASTE MANAGEMENT PLAN

- A. General: Develop plan consisting of waste identification, waste reduction work plan, and cost/revenue analysis. Include separate sections in plan for demolition and construction waste. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.
- B. Waste Identification: Indicate anticipated types and quantities of site-clearing and construction waste generated by the Work. Include estimated quantities and assumptions for estimates.

- C. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.
 - 1. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
 - 2. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
 - 3. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location on Project site where materials separation will be located.
- D. Cost/Revenue Analysis: Indicate total cost of waste disposal as if there was no waste management plan and net additional cost or net savings resulting from implementing waste management plan. Include the following:
 - 1. Total quantity of waste.
 - 2. Estimated cost of disposal (cost per unit). Include hauling and tipping fees and cost of collection containers for each type of waste.
 - 3. Total cost of disposal (with no waste management).
 - 4. Revenue from salvaged materials.
 - 5. Revenue from recycled materials.
 - 6. Savings in hauling and tipping fees by donating materials.
 - 7. Savings in hauling and tipping fees that are avoided.
 - 8. Handling and transportation costs. Include cost of collection containers for each type of waste.
 - 9. Net additional cost or net savings from waste management plan.
- E. Forms: Prepare waste management plan on forms included at end of Part 3.

2. PART 2 PRODUCTS

Not Used

3. PART 3 EXECUTION

3.1 PLAN IMPLEMENTATION

- A. General: Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.
- B. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work occurring at Project site.
 - 1. Distribute waste management plan to everyone concerned within 3 days of submittal return.
 - 2. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.
- C. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
 - 1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.
 - 2. Comply with Division 01 Section 01 50 00 - Temporary Facilities and Controls, for controlling dust and dirt, environmental protection, and noise control.

3.2 RECYCLING CONSTRUCTION WASTE, GENERAL

- A. General: Recycle paper and beverage containers used by on-site workers.
- B. Recycling Receivers and Processors: Licensed entity normally engaged in the business of receiving, recycling, and processing waste materials with a minimum of 5 years of documented experience with the types of waste products to be processed under the provisions of this section.
- C. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall be shared equally by Owner and Contractor.
- D. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical.
 - 1. Provide appropriately marked containers or bins for controlling recyclable waste until they are removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.
 - 2. Inspect containers and bins for contamination and remove contaminated materials if found.
 - 3. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
 - 4. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
 - 5. Store components off the ground and protect from the weather.
 - 6. Remove recyclable waste off Owner's property and transport to recycling receiver or processor.

3.3 RECYCLING CONSTRUCTION WASTE

- A. Packaging:
 - 1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
 - 2. Polystyrene Packaging: Separate and bag materials.
 - 3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.
 - 4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.
- B. Site-Clearing Wastes: Chip brush, branches, and trees on-site.
 - 1. Comply with requirements in Division 32 Section 32 90 00 - Planting for use of chipped organic waste as organic mulch. A minimum of 100 percent of site clearing waste to be recycled.
- C. Wood Materials:
 - 1. Clean Cut-Offs of Lumber: Grind or chip into small pieces.
 - 2. Clean Sawdust: Bag sawdust that does not contain painted or treated wood.
 - (a) Comply with requirements in Division 32 Section 32 90 00 - Planting for use of clean sawdust as organic mulch.
- D. Gypsum Board: Stack large clean pieces on wood pallets and store in a dry location.
 - 1. Clean Gypsum Board: Grind scraps of clean gypsum board using small mobile chipper or hammer mill. Screen out paper after grinding.
 - (a) Comply with requirements in Division 32 Section 32 90 00 - Planting for use of clean ground gypsum board as inorganic soil amendment.

3.4 DISPOSAL OF WASTE

- A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.

- B. Do not allow waste materials that are to be disposed of accumulate on-site. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- C. Burning: Do not burn waste materials.
- D. Disposal: Transport waste materials off Owner's property and legally dispose of them.

3.5 FORMS

- A. Waste Management Plan Forms Attached:
 - 1. Construction Waste Reduction Progress Report.
 - 2. Demolition Waste Reduction Progress Report.
 - 3. Construction Waste Identification.
 - 4. Demolition Waste Identification.
 - 5. Construction Waste Reduction Work Plan.
 - 6. Demolition Waste Reduction Work Plan.
 - 7. Cost/Revenue Analysis of Construction Waste Reduction Work Plan.
 - 8. Cost/Revenue Analysis of Demolition Waste Reduction Work Plan.

END OF SECTION

CONSTRUCTION WASTE REDUCTION PROGRESS REPORT

MATERIAL CATEGORY	GENERATION POINT	TOTAL QUANTITY OF WASTE TONS (A)	QUANTITY OF WASTE SALVAGED		QUANTITY OF WASTE RECYCLED		TOTAL QUANTITY OF WASTE RECOVERED TONS (D = B + C)	TOTAL QUANTITY OF WASTE RECOVERED % (D/Ax100)
			ESTIMATED TONS	ACTUAL TONS (B)	ESTIMATED TONS	ACTUAL TONS (C)		
Packaging: Cardboard								
Packaging: Boxes								
Packaging: Plastic Sheet or Film								
Packaging: Polystyrene								
Packaging: Pallets or Skids								
Packaging: Crates								
Packaging: Paint Cans								
Packaging: Plastic Pails								
Site-Clearing Waste								
Masonry or CMU								
Lumber: Cut-Offs								
Lumber: Warped Pieces								
Plywood or OSB (scraps)								
Wood Forms								
Wood Waste Chutes								
Wood Trim (cut-offs)								
Metals								
Insulation								
Roofing								
Joint Sealant Tubes								
Gypsum Board (scraps)								
Carpet and Pad (scraps)								
Piping								
Electrical Conduit								
Other:								

DEMOLITION WASTE REDUCTION PROGRESS REPORT

MATERIAL CATEGORY	GENERATION POINT	TOTAL QUANTITY OF WASTE TONS (A)	QUANTITY OF WASTE SALVAGED		QUANTITY OF WASTE RECYCLED		TOTAL QUANTITY OF WASTE RECOVERED TONS (D=B+C)	TOTAL QUANTITY OF WASTE RECOVERED % (D/Ax100)
			ESTIMATED TONS	ACTUAL TONS (B)	ESTIMATED TONS	ACTUAL TONS (C)		
Asphaltic Concrete Paving								
Concrete								
Brick								
CMU								
Lumber								
Plywood and OSB								
Wood Paneling								
Wood Trim								
Miscellaneous Metals								
Structural Steel								
Rough Hardware								
Insulation								
Roofing								
Doors and Frames								
Door Hardware								
Windows								
Glazing								
Acoustical Tile								
Carpet								
Carpet Pad								
Demountable Partitions								
Equipment								
Cabinets								
Plumbing Fixtures								
Piping								
Supports and Hangers								
Valves								
Sprinklers								
Mechanical Equipment								
Electrical Conduit								
Copper Wiring								
Light Fixtures								
Lamps								
Lighting Ballasts								
Electrical Devices								
Switchgear and Panel boards								
Transformers								
Other:								

CONSTRUCTION WASTE IDENTIFICATION							
MATERIAL CATEGORY	GENERATION POINT	EST. QUANTITY OF MATERIALS RECEIVED (A)	EST. WASTE - % (B)	TOTAL EST. QUANTITY OF WASTE* (C=AxB)	EST. VOLUME CY	EST. WEIGHT TONS	REMARKS AND ASSUMPTIONS
Packaging: Cardboard							
Packaging: Boxes							
Packaging: Plastic Sheet or Film							
Packaging: Polystyrene							
Packaging: Pallets or Skids							
Packaging: Crates							
Packaging: Paint Cans							
Packaging: Plastic Pails							
Site-Clearing Waste							
Masonry or CMU							
Lumber: Cut-Offs							
Lumber: Warped Pieces							
Plywood or OSB (scraps)							
Wood Forms							
Wood Waste Chutes							
Wood Trim (cut-offs)							
Metals							
Insulation							
Roofing							
Joint Sealant Tubes							
Gypsum Board (scraps)							
Carpet and Pad (scraps)							
Piping							
Electrical Conduit							
Other:							

* Insert units of measure.

DEMOLITION WASTE IDENTIFICATION				
MATERIAL DESCRIPTION	EST. QUANTITY	EST. VOLUME CY	EST. WEIGHT TONS	REMARKS AND ASSUMPTIONS
Asphaltic Concrete Paving				
Concrete				
Brick				
CMU				
Lumber				
Plywood and OSB				
Wood Paneling				
Wood Trim				
Miscellaneous Metals				
Structural Steel				
Rough Hardware				
Insulation				
Roofing				
Doors and Frames				
Door Hardware				
Windows				
Glazing				
Acoustical Tile				
Carpet				
Carpet Pad				
Demountable Partitions				
Equipment				
Cabinets				
Plumbing Fixtures				
Piping				
Piping Supports and Hangers				
Valves				
Sprinklers				
Mechanical Equipment				
Electrical Conduit				
Copper Wiring				
Light Fixtures				
Lamps				
Lighting Ballasts				
Electrical Devices				
Switchgear and Panelboards				
Transformers				
Other:				

CONSTRUCTION WASTE REDUCTION WORK PLAN						
MATERIAL CATEGORY	GENERATION POINT	TOTAL EST. QUANTITY OF WASTE TONS	DISPOSAL METHOD AND QUANTITY			HANDLING AND TRANSPORTATION PROCEDURES
			EST. AMOUNT SALVAGED TONS	EST. AMOUNT RECYCLED TONS	EST. AMOUNT DISPOSED TO LANDFILL TONS	
Packaging: Cardboard						
Packaging: Boxes						
Packaging: Plastic Sheet or Film						
Packaging: Polystyrene						
Packaging: Pallets or Skids						
Packaging: Crates						
Packaging: Paint Cans						
Packaging: Plastic Pails						
Site-Clearing Waste						
Masonry or CMU						
Lumber: Cut-Offs						
Lumber: Warped Pieces						
Plywood or OSB (scraps)						
Wood Forms						
Wood Waste Chutes						
Wood Trim (cut-offs)						
Metals						
Insulation						
Roofing						
Joint Sealant Tubes						
Gypsum Board (scraps)						
Carpet and Pad (scraps)						
Piping						
Electrical Conduit						
Other:						

DEMOLITION WASTE REDUCTION WORK PLAN

MATERIAL CATEGORY	GENERATION POINT	TOTAL EST. QUANTITY OF WASTE TONS	DISPOSAL METHOD AND QUANTITY			HANDLING & TRANSPORTION PROCEDURES
			EST. AMOUNT SALVAGED TONS	EST. AMOUNT RECYCLED TONS	EST. AMOUNT DISPOSED TO LANDFILL TONS	
Asphaltic Concrete Paving						
Concrete						
Brick						
CMU						
Lumber						
Plywood and OSB						
Wood Paneling						
Wood Trim						
Miscellaneous Metals						
Structural Steel						
Rough Hardware						
Insulation						
Roofing						
Doors and Frames						
Door Hardware						
Windows						
Glazing						
Acoustical Tile						
Carpet						
Carpet Pad						
Demountable Partitions						
Equipment						
Cabinets						
Plumbing Fixtures						
Piping						
Supports and Hangers						
Valves						
Sprinklers						
Mechanical Equipment						
Electrical Conduit						
Copper Wiring						
Light Fixtures						
Lamps						
Lighting Ballasts						
Electrical Devices						
Switchgear and Panelboards						
Transformers						
Other:						

COST/REVENUE ANALYSIS OF CONSTRUCTION WASTE REDUCTION WORK PLAN

MATERIALS	TOTAL QUANTITY OF MATERIALS (VOL. OR WEIGHT) (A)	EST. COST OF DISPOSAL (B)	TOTAL EST. COST OF DISPOSAL (C = A x B)	REVENUE FROM SALVAGED MATERIALS (D)	REVENUE FROM RECYCLED MATERIALS (E)	LANDFILL TIPPING FEES AVOIDED (F)	HANDLING AND TRANSPORTATION COSTS AVOIDED (G)	NET COST SAVINGS OF WORK PLAN (H = D+E+F+G)
Packaging: Cardboard								
Packaging: Boxes								
Packaging: Plastic Sheet or Film								
Packaging: Polystyrene								
Packaging: Pallets or Skids								
Packaging: Crates								
Packaging: Paint Cans								
Packaging: Plastic Pails								
Site-Clearing Waste								
Masonry or CMU								
Lumber: Cut-Offs								
Lumber: Warped Pieces or OSB								
Wood Forms								
Wood Waste Chutes								
Wood Trim (cut-offs)								
Metals								
Insulation								
Roofing								
Joint Sealant Tubes								
Gypsum Board (scraps)								
Carpet and Pad (scraps)								
Piping								
Electrical Conduit								
Other:								

COST/REVENUE ANALYSIS OF DEMOLITION WASTE REDUCTION WORK PLAN

MATERIALS	TOTAL QUANTITY OF MATERIALS (VOL. OR WEIGHT) (A)	EST. COST OF DISPOSAL (B)	TOTAL EST. COST OF DISPOSAL (C= A x B)	REVENUE FROM SALVAGED MATERIALS (D)	REVENUE FROM RECYCLED MATERIALS (E)	LANDFILL TIPPING FEES AVOIDED (F)	HANDLING AND TRANSPORTATION COSTS AVOIDED (G)	NET COST SAVINGS OF WORK PLAN (H = D+E+F+G)
Asphaltic Concrete Paving								
Concrete								
Brick								
CMU								
Lumber								
Plywood and OSB								
Wood Paneling								
Wood Trim								
Miscellaneous Metals								
Structural Steel								
Rough Hardware								
Insulation								
Roofing								
Doors and Frames								
Door Hardware								
Windows								
Glazing								
Acoustical Tile								
Carpet								
Carpet Pad								
Demountable Partitions								
Equipment								
Cabinets								
Plumbing Fixtures								
Piping								
Supports and Hangers								
Valves								
Sprinklers								
Mech. Equipment								
Electrical Conduit								
Conner Wiring								
Light Fixtures								
Lamps								
Lighting Ballasts								
Electrical Devices								
Switchgear and Panelboards								
Transformers								
Other:								

SECTION 01 77 00
CLOSEOUT PROCEDURES

1. PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Closeout Procedures.
- B. Final Cleaning.
- C. Pest Control.
- D. Adjusting.
- E. Demonstration and Instructions.
- F. Project Record Documents.
- G. Operation and Maintenance Data.
- H. Warranties.
- I. Spare Parts and Maintenance Materials.
- J. Commissioning.

1.2 CLOSEOUT PROCEDURES

- A. Submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for Architect's review.
- B. Prepare and submit to Architect a list of items to be completed or corrected, the value of the items on the list, and reasons why the Work is not complete.
- C. Submit written request to Architect for review of Work.
- D. Submit warranties, bonds, service agreements, certifications, record documents, maintenance manuals, receipt of spare parts and similar closeout documents.
- E. Make final changeover of permanent locks and deliver keys to Owner.
- F. Terminate and remove temporary facilities from Project site.
- G. Advise Owner of change over in heat and other utilities.
- H. Submit final Application for Payment identifying total adjusted Contract Sum, previous payments, and sum remaining due.
- I. Submit affidavit of payment of debts and claims, AIA Document G706.
- J. Submit affidavit of release of liens, AIA Document G706A.
- K. Submit consent of contractors surety to final payment, AIA Document G707.
- L. Owner will occupy all of the building as specified in Section 01 11 00.

1.3 REGULATORY REQUIREMENTS

- A. Provide submittals to Architect that are required by governing or other authority.

1.4 FINAL CLEANING

- A. Execute final cleaning prior to final review by Architect.
- B. Employ experienced professional cleaners for final cleaning.
- C. Clean interior and exterior glass and surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces.
- D. Vacuum carpeted and soft surfaces. Shampoo if visible stains exist.
- E. Clean equipment and plumbing fixtures to a sanitary condition.
- F. Clean exposed surfaces of grilles, registers and diffusers.
- G. Replace filters of operating mechanical equipment.
- H. Clean debris from roofs, gutters, downspouts, and drainage systems.
- I. Clean site; sweep paved areas, rake clean landscaped surfaces.
- J. Remove waste and surplus materials, rubbish, and construction facilities from the site.
- K. Clean light fixtures and replace burned out lamps and bulbs.
- L. Relamp all lamps and bulbs in lighting fixtures.
- M. Replace defective and noisy ballasts and starters in fluorescent fixtures.
- N. Leave project clean and ready for occupancy by Owner.

1.5 PEST CONTROL

- A. Engage an experienced, licensed exterminator to make final inspection and rid Project of rodents, insects, and other pests. Submit final report to Architect.

1.6 ADJUSTING

- A. Adjust operating Products and equipment to ensure smooth and unhindered operation.

1.7 DEMONSTRATION AND INSTRUCTIONS

- A. Demonstrate operation and maintenance of products, systems, and equipment to Owner's personnel two weeks prior to date of final review.
- B. For each demonstration submit list of participants in attendance.
- C. Provide two copies of video tape of each demonstration and instructions session.
- D. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.
- E. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with Owner's personnel in detail to explain all aspects of operation and maintenance.
- F. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at agreed-upon times, at equipment location.

- G. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.

1.8 PROJECT RECORD DOCUMENTS

- A. Maintain on site, one set of the following record documents; record actual revisions to the Work in contrasting color.
 - 1. Contract Drawings.
 - 2. Specifications.
 - 3. Addenda.
 - 4. Change Orders and other Modifications to the Contract.
 - 5. Reviewed shop drawings, product data, and samples.
- B. Store Record Documents separate from documents used for construction.
- C. Record information concurrent with construction progress.
- D. Specifications: Legibly mark and record at each Product Section in contrasting color ink, description of actual Products installed, including the following:
 - 1. Manufacturer's name and product model and number.
 - 2. Supplier and installer's name and contact information.
 - 3. Changes made by Addenda and Modifications.
- E. Contract Drawings and Shop Drawings: Legibly mark each item in contrasting color ink to record actual construction including:
 - 1. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
 - 2. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
 - 3. Field changes of dimension and detail.
 - 4. Details not on original Contract Drawings.
 - 5. Revisions to electrical circuitry and locations of electrical devices and equipment.
 - 6. Note change orders, alternate numbers, and similar information, where applicable.
 - 7. Identify each record drawing with the written designation of "RECORD DRAWING" located in prominent location.
- F. Record Digital Data Files: Immediately before inspection for Substantial Completion, review marked-up record prints with Architect and Construction Manager. When authorized, prepare a full set of corrected digital data files of the Contract Drawings, as follows:
 - 1. Format: Annotated PDF electronic file with comment function enabled.
 - 2. Incorporate changes and additional information previously marked on record prints. Delete, redraw, and add details and notations where applicable.

3. Refer instances of uncertainty to Architect for resolution.
- G. Final Property Survey: Under the provisions of Section 01 73 00.
- H. Record Construction Schedule: Under the provisions of Sections 01 32 16 and 01 32 17.
- I. Submit documents to Architect at time of Substantial Completion.

1.9 OPERATION AND MAINTENANCE DATA

- A. Summary:
 1. Organize operation and maintenance data with directory.
 2. Provide operation and maintenance manuals for products, systems, subsystems, and equipment.
 3. Refer to Divisions 02 thru 49 for specific operation and maintenance manual requirements for the Work in those Divisions.
- B. Submit two sets prior to final review, bound in 8-1/2 inch x 11 inch, three ring D size binders with durable vinyl covers.
- C. Prepare binder covers with printed title "OPERATION AND MAINTENANCE INSTRUCTIONS", title of project, and subject matter of binder when multiple binders are required.
- D. Internally subdivide the binder contents with permanent page dividers, logically organized as described below; with laminated plastic tabs.
- E. Part 1: Directory, listing names, addresses, and telephone numbers of Architect, Engineers, Contractor, subcontractors, and major equipment suppliers and manufacturers.
- F. Part 2: Operation and maintenance instructions, arranged by specification section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Identify the following:
 1. Performance and design criteria.
 2. List of equipment.
 3. Parts list for each component.
 4. Start-up procedures.
 5. Shutdown instructions.
 6. Normal operating instructions.
 7. Wiring diagrams.
 8. Control diagrams.
 9. Maintenance instructions for equipment and systems.
 10. Maintenance instructions for finishes, including recommended cleaning methods and materials.
- G. Part 3: Project documents and certificates, including the following:
 1. Shop drawings and product data.
 2. Air and water balance reports.
 3. Certificates.

4. Warranties.

- H. Refer to Section 01 91 13 - General Commissioning Requirements, for additional requirements.

1.10 WARRANTIES

- A. Commencement of warranties shall be date of Substantial Completion.
- B. For items of Work delayed beyond date of Substantial Completion, provide updated submittal within ten days after acceptance, listing date of acceptance as start of warranty period.
- C. Provide duplicate notarized copies in operation and maintenance manuals.
- D. Execute and assemble documents from subcontractors, suppliers, and manufacturers.
- E. Provide Table of Contents and assemble in binder with durable plastic cover.
- F. Submit prior to final Application for Payment.
- G. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of warranty on the work that incorporates the products.
- H. Manufacturer's disclaimer and limitations on product warranties do not relieve suppliers, manufacturer's, and subcontractors required to countersign special warranties with Contractor.
- I. When correcting failed or damaged warranted construction, remove and replace construction that has been damaged as a result of such failure or must be removed and replaced to provide access for correction of warranted construction.
- J. When work covered by warranty has failed and has been corrected, reinstate warranty by written endorsement. Reinstated warranty shall be equal to original warranty with equitable adjustment for depreciation.
- K. Upon determination that Work covered by warranty has failed, replace or repair Work to an acceptable condition complying with requirements of the Contract Documents.

1.11 SPARE PARTS AND MAINTENANCE MATERIALS

- A. Provide products, spare parts, maintenance and extra materials in quantities specified in individual specification Sections.
- B. Deliver to Project site and place in location as directed.
- C. Obtain signed receipt for delivery of materials and submit prior to request for final review by Architect.

1.12 COMMISSIONING

- A. All commissioning work as specified in Section 01 91 13 must be complete prior to Substantial Completion.
- B. Exceptions to commissioning work being complete prior to Substantial Completion are planned control system training performed after occupancy and any required seasonal testing or deferred testing.
- C. Commissioning activities are non-compensable and cannot be a cause for a delay claim.

2. PART 2 PRODUCTS

Not Used

3. PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 03 11 00

CONCRETE FORMWORK

1. PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Formwork for cast-in-place concrete, with shoring, bracing, and anchorage.
- B. Openings for other affected work.
- C. Form accessories.
- D. Stripping forms.

1.2 REFERENCES

- A. CBC - California Building Code, (CCR) California Code of Regulations, Title 24, Part 2, Chapter 19.
- B. ACI 301 - Specifications for Structural Concrete.
- C. PS 1-09 - Structural Plywood.

1.3 SYSTEM DESCRIPTION

- A. Design, engineer, and construct formwork, shoring, and bracing to meet design and code requirements, so that resultant concrete conforms to required shapes, lines, and dimensions.

1.4 QUALITY ASSURANCE

- A. Construct and erect concrete formwork in accordance with ACI 301.

1.5 REGULATORY REQUIREMENTS

- A. Conform to CBC - California Building Code, (CCR) California Code of Regulations, Title 24, Part 2.

2. PART 2 PRODUCTS

2.1 FORM MATERIALS

- A. Plywood: PS1-09, BB Plyform grade, Class I, Exterior classification.
- B. Lumber: Douglas Fir species; construction grade; with grade stamp clearly visible.
- C. Tubular Column: Round, of spirally wound laminated fiber; surface treated with release agent; of size required.

2.2 FORMWORK ACCESSORIES

- A. Form Ties: Snap-off metal of adjustable length; cone type; 1 inch break back dimension; free of defects that will leave holes no larger than one inch diameter in concrete surface.
- B. Form Release Agent: Colorless material which will not stain concrete, absorb moisture, or impair natural bonding or color characteristics of coating intended for use on concrete.
- C. Fillets for Chamfered Corners: Wood strips type; 3/4 x 3/4 inch size; maximum possible lengths.
- D. Dovetail Anchor Slots: Minimum 22 gage galvanized steel; foam filled; release tape sealed slots; bent tab anchors; securable to concrete formwork; manufactured by Heckmann Building Products Co., www.heckmannbuildingprods.com.

- E. Flashing Reglets: 26 gage thick galvanized steel; longest possible lengths; release tape sealed slots; with alignment splines for joints; securable to concrete formwork; Type CO reglet manufactured by Fry Reglet www.fryreglet.com.
- F. Nails, Spikes, Lag Bolts, Through Bolts, Anchorages: Sized as required; of strength and character to maintain formwork in place while placing concrete.

3. PART 3 EXECUTION

3.1 INSPECTION

- A. Verify lines, levels, and measurements before proceeding with formwork.

3.2 PREPARATION

- A. Obtain Architect's approval for use of earth forms for footings.
- B. Minimize form joints. Symmetrically align joints and make watertight to prevent leakage of mortar.
- C. Arrange and assemble formwork to permit stripping, so that concrete is not damaged during its removal.
- D. Arrange forms to allow stripping without removal of principal shores, where required to remain in place.

3.3 ERECTION

- A. Erect formwork, shoring and bracing to achieve design requirements, in accordance with requirements of ACI 301.
- B. Provide bracing to ensure stability of formwork. Strengthen formwork liable to be overstressed by construction loads.
- C. Provide chamfer strips on external corners of walls.
- D. Obtain approval before framing openings in structural members which are not indicated on Drawings.
- E. Do not displace or damage vapor barrier placed by Section 03 30 00.
- F. Construct formwork to maintain tolerances in accordance with ACI 301.

3.4 APPLICATION OF FORM RELEASE AGENT

- A. Apply form release agent on formwork in accordance with manufacturer's instructions. Apply prior to placing reinforcing steel, anchoring devices, and embedded items.
- B. Do not apply form release agent where concrete surfaces are scheduled to receive applied coverings which may be affected by agent. Soak contact surfaces of untreated forms with clean water. Keep surfaces wet prior to placing concrete.

3.5 INSERTS, EMBEDDED PARTS, AND OPENINGS

- A. Provide formed openings where required for work embedded in or passing through concrete.
- B. Coordinate work of other Sections in forming and setting openings, slots, recesses, chases, sleeves, bolts, anchors, and other inserts.
- C. Install accessories in accordance with manufacturer's instructions, level and plumb. Ensure items are not disturbed during concrete placement.

3.6 FORM REMOVAL

- A. Do not remove forms and bracing until concrete has sufficient strength to support its own weight and imposed loads.
- B. Do not damage concrete surfaces during form removal.
- C. Store reusable forms for exposed architectural concrete to prevent damage to contact surfaces.

3.7 CLEANING

- A. Clean forms to remove foreign matter as erection proceeds.
- B. Ensure that water and debris drain to exterior through clean-out ports.

3.8 EARTH FORMS

- A. Construct wood edge strips at top sides of excavations as indicated on drawings.
- B. Provide forms for footings and foundation walls wherever concrete cannot be placed against solid earth.
- C. Remove loose dirt and debris from form area prior to concrete placement.
- D. Concrete for foundations may be placed directly into neat excavations provided the foundation trench walls are stable as determined by the Architect (Structural Engineer).
- E. When earth formed foundations are used, the minimum formwork shown on the drawings is mandatory to insure clean excavations prior to and during concrete placement.
- F. Provide 3-1/2 inch high starter wall for all concrete and masonry walls below grade.

END OF SECTION

SECTION 03 20 00

CONCRETE REINFORCING

1. PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Reinforcing steel bars, welded steel wire fabric, for fabricated steel bar or rod mats for cast-in-place concrete.
- B. Support chairs, bolsters, bar supports, and spacers, for supporting reinforcement.
- C. Fibrous secondary reinforcement for site concrete paving.

1.2 REFERENCES

- A. CBC - California Building Code, (CCR) California Code of Regulations, Title 24, Part 2, Chapter 19 (ACI 318).
- B. ACI 301 - Specifications for Structural Concrete.
- C. ACI 315R (MNL-66) Guide to Presenting Reinforcing Steel Design Details.
- D. ACI 318 - Building Code Requirements for Structural Concrete.
- E. ASTM A615 - Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
- F. ASTM A706 - Standard Specification for Low Alloy Steel Deformed Bars for Concrete Reinforcement.
- G. ASTM C1116 - Specification for Fiber-Reinforced Concrete and Shotcrete.
- H. AWS D1.4 - Structural Welding Code Reinforcing Steel.
- I. CRSI - Manual of Practice.
- J. CRSI - Placing Reinforcing Bars.

1.3 QUALITY ASSURANCE

- A. Perform concrete reinforcement work in accordance with CRSI Manual of Standard Practice.
- B. Conform to ACI 301 and ACI 315R (MNL-66).
- C. Conform to CBC California Building Code, (CCR) California Code of Regulations, Title 24, Part 2.

1.4 SUBMITTALS

- A. Submit under provisions of Section 01 33 00: Submittal Procedures.
- B. Shop Drawings:
 - 1. Comply with requirements of ACI MNL-66. Include the following:
 - (a) Complete bar layout.
 - (b) Representative sections.
 - (c) Details for congested conditions.
 - (d) Proposed layout where vertical and horizontal bars intersect.

- (e) Bar schedules.
 - (f) Typical bending diagrams and offsets.
 - (g) Shapes of bent bars.
 - (h) Spacing of bars.
 - (i) Splice lengths and locations.
- C. Where welding is proposed:
- 1. Detail welding to conform to AWS D1.4.
 - 2. Submit copies of welding operator's certificate.
 - 3. Where reinforcement complying with ASTM A615 is to be welded, chemical tests shall be performed to determine the weldability in accordance with ACI 318.
 - 4. Weld procedure specifications (WPS):
 - (a) All WPS's shall be submitted to the Structural Engineer of Record (SEOR) for review and approval prior to use.
 - (b) For WPS's that have been qualified by test, the supporting Procedure Qualification Record (PQR) shall be submitted to the SEOR for review and approval.
 - (c) Included shall be WPS for repair welds.
- D. Reports: Submit mill test certificates of supplied concrete reinforcing, indicating physical and chemical analysis.

2. PART 2 PRODUCTS

2.1 MATERIALS

- A. Reinforcing Steel: ASTM A615, Grade 40 for No. 4 bars and smaller, Grade 60 for No. 5 bars and larger. Billet-steel deformed bars, uncoated finish.
- B. Welded Reinforcement: ASTM A706, Grade 60, deformed bars, unfinished.
- C. Welded Steel Wire Fabric: ASTM A1064 plain type; coiled rolls; uncoated finish.
- D. Fibrous Reinforcement:
 - 1. Collated, fibrillated, polypropylene fibers with length varying from 1-1/2 to 2 inches; nylon filamentized fibers of 3/4 inch length; cellulose fibers of 1/8 inch length; cellulose fibers of 1/8 inch length meeting requirements of ASTM C1116, Type III.
 - 2. Manufacturers:
 - (a) Forta Mono or Forta, Forta Corp., www.fortacorp.com.
 - (b) Fibermix or Fibermesh, SI Concrete Corp., www.fibermesh.com.
 - (c) Nycon, Nycon, Inc., www.nycon.com.
 - (d) Grace Fibers or Micro Fibers, W.R. Grace and Co., www.graceconstruction.com.
 - (e) Buckeye Building Fibers, www.ultrafiber500.com.

3. Substitutions: Under provisions of Section 01 25 13.

2.2 ACCESSORY MATERIALS

- A. Tie Wire: Minimum 16 gage annealed type.
- B. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for strength and support of reinforcement during installation and placement of concrete including load bearing pad on bottom to prevent vapor barrier puncture.

2.3 FABRICATION

- A. Fabricate in accordance with ACI 315R (MNL-66), providing concrete cover specified in Section 03 30 00.
- B. Locate reinforcing splices not indicated on Drawings at points of minimum stress.
- C. Weld reinforcing bars in accordance with AWS D1.4.

3. PART 3 EXECUTION

3.1 INSTALLATION

- A. Before placing concrete, clean reinforcement of foreign particles or coatings.
- B. Place, support, and secure reinforcement against displacement. Do not deviate from alignment or measurement.
- C. Mix fibrous reinforcement into concrete material according to Section 03 30 00.
- D. Do not displace or damage vapor barrier required by Section 03 30 00.

3.2 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed under provisions of Section 01 45 29.

END OF SECTION

SECTION 03 30 00

CAST-IN-PLACE CONCRETE

1. PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Cast-in-place concrete foundation walls, and footings.
- B. Floors and slabs on vapor barrier.
- C. Control, expansion, and contraction joint devices associated with concrete work.
- D. Light pole bases.

1.2 REFERENCES

- A. The 2010 Americans with Disabilities Act (ADA) Standards for Accessible Design.
- B. CBC - California Building Code, (CCR) California Code of Regulations Title 24, Part 2, Chapter 19.
- C. CBC - California Building Code, (CCR) California Code of Regulations, Title 24, Part 2, California State Accessibility Standards.
- D. ACI 301 - Specifications for Structural Concrete.
- E. ACI 302.1R - Guide for Concrete Floor and Slab Construction.
- F. ACI 305.1 - Specification for Hot Weather Concreting.
- G. ACI 306.1 - Standard Specification for Cold Weather Concreting.
- H. ACI 318 - Building Code Requirements for Structural Concrete.
- I. ASTM C33 - Concrete Aggregates.
- J. ASTM C94 - Ready-Mixed Concrete.
- K. ASTM C109 - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars.
- L. ASTM C150 - Portland Cement.
- M. ASTM C289 - Potential Reactivity of Aggregate.
- N. ASTM C309 - Liquid Membrane Forming Compound.
- O. ASTM C494 - Standard Specifications for Chemical Admixtures for Concrete.
- P. ASTM C618- Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
- Q. ASTM C932 - Surface-Applied Bonding Agents.

- R. ASTM C1315 - Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete.
- S. ASTM C1602 - Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete.
- T. ASTM D226 - Asphalt Saturated Organic Felt used in Roofing and Waterproofing.
- U. ASTM D1751 - Preformed Expansion Joint Filler for Concrete Paving and Structural Construction.
- V. ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials.
- W. ASTM E154 - Standard Test Methods for Water Vapor Retardants used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover.
- X. ASTM E1643 - Installation of Water Vapor Retarders used in Contact with Earth or Granular Fill Under Concrete Slab.
- Y. ASTM E1155 - Determining Floor Flatness and Levelness Using the F-Number System.
- Z. ASTM E1745 - Standard Specifications for Plastic Water Vapor Retarders Used in Contact with Soil Or Granular Fill Under Concrete Slabs.
- AA. ASTM F1249 - Standard Test Method for Water Vapor Transmission Rate Through Plastic Film and Sheeting Using a Modulated Infrared Sensor.
- BB. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
- CC. National Ready Mix Concrete Association - Plant Certification Program.
- DD. Stormwater Best Management Practice Handbook (BMP Handbook), Construction Edition, as published by the California Storm Water Quality Association.

1.3 QUALITY ASSURANCE

- A. Perform work in accordance with ACI 301.
- B. Installation of vapor barrier shall be in accordance with ASTM E1643 and manufacturer's installation guides and recommendations. Provide Architect written site reports from manufacturer's field service representative, indicating observation of vapor barrier installation prior to concrete placement.
- C. Obtain concrete materials from same source throughout the Work.

1.4 QUALIFICATIONS

- A. Manufacturer: Manufacturer of ready-mix concrete products complying with ASTM C94 requirements for production facilities and equipment. Certified according to National Ready Mix Concrete Associates Plant Certification Program.

1.5 DESIGN MIX

- A. Submit design mix for each class of concrete, prepared by a California Registered Civil Engineer, to Testing Laboratory and Architect for review.

1.6 REGULATORY REQUIREMENTS

- A. Conform to CBC - California Building Code, (CCR) California Code of Regulations, Title 24, Part 2.
- B. Conform to CBC - California Building Code, (CCR) California Code of Regulations, Title 24, Part 2, and the 2010 ADA Standards for Accessible Design for access requirements for individuals with disabilities.

1.7 SUBMITTALS

- A. Provide fifteen year warranty from curing, hardening and vapor barrier compound manufacturer under provisions of Section 01 77 00.
- B. Warranty: Include coverage for removal and replacement of finish floor materials and delaminated from interior floor slabs due to moisture migration and excessive vapor emissions or due to presence of efflorescence and alkali contaminants.
 - 1. Subfloor Moisture Conditions: Moisture emission rate of no more than 3lb / 1000 sq. ft./24 hours when tested by Quantitative Anhydrous Calcium Chloride Test, ASTM F1869, with subfloor temperature not less than 65 degrees f.
 - 2. Subfloor Alkalinity Conditions: A pH range of between 5 to 9 when subfloor is wetted with potable water and Phdrion paper is applied.
 - 3. Warranty to be supported by \$1,000,000.00 product liability insurance policy issued directly to the Owner.
- C. Submit product data and manufacturer's instructions for all accessories under provisions of Section 01 33 00.

1.8 WARRANTY

- A. Provide warranty from vapor barrier manufacturer that products meet the current requirements of ASTM E1745 and will be free from material defects for the life of the building.

1.9 ENVIRONMENTAL REQUIREMENTS

- A. Provide concrete curing, finishing, and waste management techniques as defined in Section 4 of the Storm Water Best Management Practice Handbook, (BMP Handbook) Construction Edition.

2. PART 2 PRODUCTS

2.1 FORMWORK

- A. As specified in Section 03 11 00.

2.2 REINFORCEMENT

- A. Reinforcing steel as specified in Section 03 20 00.

2.3 CONCRETE MATERIALS

- A. Cement: ASTM C150, Type II or Type V Portland type; low alkali; grey color.
- B. Fine and Coarse Aggregates Normal Weight Concrete: ASTM C33, non reactive when tested in accordance with ASTM C289 and Appendix X-1 of ASTM C33.

- C. Water: ASTM C1602, clean and not detrimental to concrete.

2.4 ADMIXTURES

- A. Fly Ash: ASTM C618, Class F.
- B. Water Reducing Admixture: ASTM C494, Type A.
- C. Calcium chloride, or any other admixtures not allowable.

2.5 VAPOR BARRIER

- A. Polyethylene vapor barrier film having all the following qualities:
 - 1. Maintain permeance of less than 0.01 Perms grains/(ft² x hr x inHg) as tested in accordance with mandatory conditioning tests per ASTM E1745 Section 7.1 (7.1.1-7.1.5).
 - 2. Other performance criteria:
 - (a) Strength: ASTM E1745 Class A.
 - (b) Thickness: 15 mils minimum.
- B. ACCESSORIES
 - 1. Seams: Tape by vapor barrier manufacturer.
 - 2. Sealing Penetrations of Vapor barrier:
 - (a) Mastic product approved by vapor barrier manufacturer.
 - (b) Tape approved by vapor barrier manufacturer.
 - 3. Perimeter/terminated edge seal:
 - (a) Stego Crete Claw (textured tape) by Stego Industries or equal product approved by vapor barrier manufacturer.
 - (b) Stego Term Bar by Stego Industries or equal product approved by vapor barrier manufacturer.
 - (c) StegoTack Tape (double-sided sealant tape) by Stego Industries or equal product approved by vapor barrier manufacturer.
 - (d) One-sided seaming tape is not a recommended method of sealing at the terminated edge.
 - 4. Penetration Prevention:
 - (a) Beast Foot by Stego Industries or equal product approved by vapor barrier manufacturer.
- C. Manufacturers:
 - 1. Fortifiber Building Products, www.fortifiber.com.
 - 2. Poly-America, www.yellowguard.com.

3. Reef Industries, www.reefindustries.com.
4. Stego Industries, www.stegoindustries.com.
5. Substitutions: Under Provisions of Section 01 25 13.

2.6 ACCESSORIES

- A. Underlayment: ASTM D226, Type I (No. 15) asphalt saturated roofing felt.
- B. Bonding Agent: ASTM C932; Weld-Crete as manufactured by Larsen Products Corp., www.larsenproducts.com.
- C. Non-shrink Grout: Premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents; capable of developing minimum compressive strength of 7000 psi in 28 days.
- D. Joint Filler: ASTM D1751, 1/2 inch thick.
- E. Sand Fill: Manufactured "crusher run" sand free of silt, clay, loam, friable or soluble materials or organic matters, all passing the No. 4 sieve and only 5 percent passing the No. 200 sieve.
- F. Curing, Hardening and Vapor Barrier Compound: ASTM C1315, Type I, Class A and ASTM C309, Type 1, Class A, with maximum volatile organic compound (VOC) content rating as required to suit regulatory requirements. Material to have no less than 34 percent penetrating solids, have no visible sheen and be compatible with floor finish materials and overlays. Provide the following:
 1. PMC 3300 Penetrating Sealer manufactured by Curranseal, www.curranseal.com or VC-5 penetrating sealer manufactured by Sinak, www.sinak.com.
- G. Slip Resistant Aggregate: 95 percent minimum fused homogeneous aluminum oxide.
- H. Concrete Floor Slab, Saw Cut, Joint, Crack, Repair Material: Cement-based, polymer-modified product that can be feathered at edges to match adjacent floor elevations. Compressive strength not less than 4,200 psi at 28 days when tested according to ASTM C109. Equivalent to ARDEX SD-F Feather Finish, www.ardex.com. Epoxy base to be equivalent to W. R. Meadows Rezi-Weld Flex semi-rigid epoxy, www.wrmeadows.com.
- I. Substitutions: Under provisions of Section 01 25 13.

2.7 CONCRETE MIX

- A. Mix concrete in accordance with ASTM C94 ACI 318, Section 26.4.4.
- B. Footings: Proportion normal-weight concrete mixture as follows:
 1. Minimum Compressive Strength: 4,000 psi at 28 days.
 2. Maximum Water-Cement Materials Ratio: 0.60.
 3. Aggregate Size: 1-1/2 inch maximum.
 4. Slump Limit: 4 inch minimum, 6 inch maximum.
 5. Fly Ash: Maximum 25 percent by weight.

- C. Slabs-On-Grade: Proportion normal-weight concrete mixture as follows:
 - 1. Minimum Compressive Strength: 4,000 psi at 28 days.
 - 2. Minimum Cement Materials Content: 540 lb./cu. yd.
 - 3. Maximum Water-Cement Materials Ratio: 0.45.
 - 4. Aggregate Size: 1 inch maximum.
 - 5. Slump Limit: 3 inch minimum, 5 inch maximum.
 - 6. Fly Ash: Maximum 25 percent by weight.

- D. Pump Test Pit Walls and Foundation Walls: Proportion normal weight concrete mixture as follows:
 - 1. Minimum Compressive Strength: 4,500 psi at 28 days.
 - 2. Maximum Water-Cement Materials Ratio: 0.60.
 - 3. Aggregate Size: 1-1/2 inch maximum.
 - 4. Slump Limit: 4 inch minimum, 6 inch maximum.
 - 5. Fly Ash: Maximum 25 percent by weight.

3. PART 3 EXECUTION

3.1 INSPECTION

- A. Verify anchors, seats, plates, reinforcement, and other items to be cast into concrete are accurately placed, held securely, and will not cause difficulty in placing concrete.

3.2 PREPARATION

- A. At locations where new concrete is dowelled to existing work, drill holes in existing concrete, insert steel dowels, and pack solid with non-shrink grout.
- B. Place 2 inch thick sand fill over subgrade.
- C. Compact sand fill as specified in Section 31 20 00.
- D. Install underlayment over wood subfloor. Lap joints 6 inches. Fasten in place.

3.3 VAPOR BARRIER INSTALLATION

- A. Install vapor barrier in compliance with ASTM E1643 under interior slabs and over sand subgrade.
 - 1. Unroll vapor barrier with the longest dimension parallel with the direction of the concrete placement and face laps away from the expected direction of the placement whenever possible.
 - 2. Extend vapor barrier to the perimeter of the slab. Terminate and seal vapor barrier to the foundation wall or grade beam.

- (a) Seal vapor barrier to the entire slab perimeter using manufacturer's textured tape with a surface that creates a mechanical seal to freshly placed concrete, per manufacturer's instructions.

OR

- (b) Seal vapor barrier to the entire perimeter wall or footing/grade beam with manufacturer's double-sided tape, or both termination bar and double-sided tape, per manufacturer's instructions. Ensure the concrete is clean and dry prior to adhering tape.
- 3. Overlap joints 6 inches and seal with manufacturer's seam tape.
 - 4. Apply seam tape/textured tape/double-sided tape to a clean and dry vapor barrier.
 - 5. Seal all penetrations (including pipes) per manufacturer's instructions.
 - 6. Avoid the use of stakes driven through vapor barrier by utilizing screed and forming systems that will not puncture the vapor barrier.
 - 7. Repair damaged areas with vapor barrier material of similar (or better) permeance, puncture and tensile properties.
 - 8. Utilize vapor barrier sealing accessories from the same manufacturer as the vapor barrier membrane or other manufacturer products approved by vapor barrier manufacturer.
- B. Install vapor barrier to exterior surface of below grade building foundation walls and grade beams. Seal to vertical surface of foundation wall with pressure sensitive tape and termination bar at an elevation consistent with the top of the adjacent finish grade.

3.4 PLACING CONCRETE

- A. Notify Architect minimum 24 hours prior to commencement of concreting operations.
- B. Place concrete in accordance with ACI 301.
- C. Hot Weather Placement: ACI 305.1.
 - 1. Maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water.
 - 2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete in hot weather. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.
- D. Cold Weather Placement: ACI 306.1.
 - 1. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 306.1
- E. Ensure reinforcement, inserts, embedded parts and formed joints are not disturbed during concrete placement.
- F. Do not disturb or damage vapor barrier while placing concrete. Repair damage as required to maintain integrity of barrier.

- G. Place concrete continuously between predetermined construction and control joints. Do not break or interrupt successive pours such that cold joints occur.
- H. Place interior floor slabs on fill in a strip sequence pattern.
- I. Excessive honeycomb or embedded debris in concrete is not acceptable.

3.5 JOINTS

- A. Saw cut control joints at an optimum time after finishing. Use 3/16 inch thick blade, cutting 1/3 into depth of slab thickness.
- B. Review locations of joints when indicated and make recommendations for any additional joints or suggestions for new locations. Lack of joints or misplacement of joints will not constitute justification of slab cracking.
- C. Provide control joints at 15 feet on center unless otherwise indicated.
- D. Where indicated on the drawings, separate slabs from vertical surfaces with joint filler. Extend joint filler from bottom of slab to within 1/4 inch of finished slab surface.

3.6 FLOOR SLAB JOINT FILLING AND CRACK REPAIR

- A. Prepare, clean, and install joint repair material according to manufacturer's written instructions.
- B. Defer joint filling and crack repair until concrete has aged a minimum of 60 days.
- C. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.
- D. Mechanically V-groove as necessary all saw cuts, joints and cracks, to a minimum width of 1/4 inch and a minimum depth of 5/8 inch.
- E. Fill bottom of joint at slab on grade locations to a depth of at least 3/16 inch with semi-rigid epoxy. Omit semi-rigid epoxy at above grade slab locations.
- F. Place silica sand over epoxy filler.
- G. Prepare and prime joint substrate as recommended by joint repair material manufacturer.
- H. Fill all saw cuts, joints, and cracks with cement based joint repair material to top of concrete surface.
- I. Steel trowel edges of joint repair material to a feather edge to match adjacent floor elevation.

3.7 FINISHING OF FORMED SURFACES

- A. Rough form finish:
 - 1. Leave surfaces with the texture imparted by forms, except patch tie holes and defects.
 - 2. Remove fins exceeding 1/4 inch in height.
 - 3. Use for below grade foundation walls and concealed spaces.

B. Grout cleaned finish:

1. Do not start cleaning operations until all contiguous surfaces to be cleaned are completed and accessible.
2. Do not permit cleaning as the work progresses.
3. Mix one part Portland cement and 1-1/2 parts fine sand with sufficient water to produce a grout having the consistency of thick paint.
4. Wet the surface of the concrete sufficiently to prevent absorption of water from the grout and apply the grout uniformly with brushes or spray gun.
5. Immediately after applying the grout, scrub the surface vigorously with a cork float or stone to coat the surface and fill all air bubbles and holes.
6. While the grout is still plastic, remove all excess grout by working the surface with a rubber float, sack, or other means.
7. After the surface whites from drying (about 30 minutes at normal temperatures), rub vigorously with clean burlap.
8. Keep the surface damp for at least 36 hours after final rubbing.

3.8 FINISHING SLABS

- A. Uniformly spread, screed and consolidate concrete. Do not spread concrete by vibration.
- B. Float Finish: Float with hand float or with a powered disc float. High spots to be cut down and low spots to be filled. Use as preparation for further finishing.
- C. Scratched Finish: Mechanically float surfaces. Roughen with stiff brushes before final set. Use for porcelain tile with full bed setting systems and where indicated.
- D. Troweled Finish: After floating, steel trowel to smooth, mark free surface. Use for exposed floors and slabs to receive epoxy coating and where indicated. Do not over trowel or burnish surface.
- E. Fine Broom Finish: After floating and while the surface is still plastic, provide a fine textured finish by drawing a fine fiber bristle broom uniformly over the surface in one direction only. Use for exposed floors and slabs to receive porcelain tile using the thin set setting method or where indicated.

3.9 SLAB TOLERANCES

- A. Maintain slab tolerance as defined in ACI 302.1R of (SOV) F_p35 and F_L25 and (MLV) F_p24 and F_L17 as measured by ASTM E1155 for slabs on grade.
- B. Correct the slab surface if the actual F_p/F_L number for the floor installation measures less than required.
- C. After correction of slab surface to specified tolerance, apply curing, hardening and vapor barrier over corrected surface.
- D. In areas of floor drains, maintain floor levels at the walls and slope surface uniformly to drains at 1/8 inch per foot.

3.10 CURING

- A. Apply curing, hardening and vapor barrier compound on all floor slabs that are scheduled to receive porcelain floor tiles and indicated to be sealed.
- B. Cure concrete surfaces in accordance with ACI 301.
- C. Spray apply curing, hardening and vapor barrier compound on finished slab surfaces located below grade, at grade, and above grade in two "wet on wet" flood coats at the total rate of 200 sq. ft./gallon in accordance with manufacturer's instructions.
- D. Application of compound shall be by a trained applicator acceptable to compound manufacturer.
- E. After application of curing, hardening, and vapor barrier compound, moist cure concrete using the following method:
 - 1. Spraying: Fog spray clean, potable water over floor slab areas and maintain moist for 10 days.
 - 2. Polyethylene Film: Spread over floor slab areas, lap edges and sides, maintain in place for 10 days.

3.11 PATCHING

- A. Notify Architect immediately upon removal of forms to determine areas that will require patching.
- B. Surface defects shall include color and texture irregularities, stains, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections and discolorations in the surface that cannot be removed by cleaning.
- C. Patch imperfections in accordance with ACI 301.

3.12 DEFECTIVE CONCRETE

- A. Modify or replace concrete not conforming to required levels and lines, details, and elevations.
- B. Repair or replace concrete not properly placed or of the specified type.

3.13 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed under provisions of Section 01 45 29.
- B. Owner's Inspector will take cylinders and perform slump, air entrainment, temperatures, density, and compressive strength cylinder tests per ACI 301. Preparing compressive strength test cylinder shall be per ACI 301 and the number of cylinders for a valid 28-day compressive strength test shall be determined in accordance with ACI 318, Item 26.12.1 (a). Project Inspector will arrange for pickup by Testing Laboratory.
- C. Three cylinders will be taken for every 50 yards, or fraction thereof, for each class of concrete for each day.
- D. Tests of cement and aggregates will be performed by Testing Laboratory to ensure conformance with requirements stated herein.
- E. Slab tolerance as measured by ASTM E1155 shall be performed within 72 hours of floor slab installation.
- F. Maintain records of placed concrete items. Record date, location of pour, quantity, air temperature, and test samples taken.

3.14 PROTECTION

- A. Protect finished work under provisions of Section 01 61 00.
- B. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.
- C. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.

END OF SECTION

SECTION 05 12 00

STRUCTURAL STEEL FRAMING

1. PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Structural steel framing members and support members.
- B. Baseplates, and anchor bolts.
- C. Grouting under baseplates.

1.2 REFERENCES

- A. CBC - California Building Code, (CCR) California Code of Regulations, Title 24, Part 2.
- B. ASTM A36 - Carbon Structural Steel.
- C. ASTM A53 - Pipe, Steel, Black and Hot-Dipped, Zinc Coated, Welded and Seamless.
- D. ASTM A108 - Steel Bars, Carbon, Cold-Finished, Standard Quality.
- E. ASTM A307 - Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength
- F. ASTM A325 - High Strength Bolts for Structural Steel Joints.
- G. ASTM A490 - Structural Bolts, alloy Steel, Heat Treated, 150 ksi Minimum Tensile Strength.
- H. ASTM A500 - Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Round and Shapes.
- I. ASTM A992 - Standard Specification for Steel for Structural Shapes for Use in Building Framing.
- J. ASTM C1107 - Packaged Dry, Hydraulic Cement Grout (non shrink).
- K. ASTM F1554 - Standard Specification for Anchor Bolts, Steel, 36, 55, and 105 KSI Yield Strength.
- L. AWS A2.4 - Standard Welding Symbols.
- M. AWS D1.1 - Structural Welding Code - Steel.
- N. ANSI / ASCE 360 - Specification for the Design, Fabrication and Erection of Structural Steel for Buildings.
- O. ANSI / ASCE 303 - Specification for Architectural Exposed Structural Steel.
- P. SSPC - The Society for Protective Coatings.

1.3 SUBMITTALS

- A. Submit under provisions of Section 01 33 00.
- B. Shop Drawings:
 - 1. Indicate profiles, sizes, spacing, and locations of structural members, connections, cambers and loads.
 - 2. Indicate welded connections with AWS A2.4 welding symbols. Indicate net weld lengths.
- C. Manufacturer's Mill Certificate: Submit under provisions of Section 01 33 00 certifying that products meet or exceed specified requirements.

- D. Mill Test Reports: Submit under provisions of Section 01 33 00 Manufacturer's Certificates, indicating structural strength and destructive and non-destructive test analysis.
- E. Welders' Certificates: Submit under provisions of Section 01 33 00, certifying welders employed on the Work, verifying AWS qualification within the previous 12 months.

1.4 QUALITY ASSURANCE

- A. Fabricate structural steel members in accordance with AISC-Specification for the Design, Fabrication and Erection of Structural Steel for Buildings.

1.5 QUALIFICATIONS

- A. Design connections not detailed on the Drawings under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the State of California.
- B. Design connections in accordance with CBC California Building Code, (CCR) California Code of Regulations, Title 24, Part 2, Chapter 22.

2. PART 2 PRODUCTS

2.1 MATERIALS

- A. Structural Steel Members: ASTM A36. W and WT shapes, ASTM A992.
- B. Structural Tubing: ASTM A500, Grade C.
- C. Steel Pipe: ASTM A53, Grade B.
- D. Shear Stud Connectors: ASTM A108, Grade 1015, forged steel, headed, unfinished.
- E. High Strength Threaded Bolts, Nuts, and Washers: ASTM A325.
- F. Common Threaded Bolts: A307 Grade A, Nuts: A563, Washers: F436.
- G. Anchor Bolts: ASTM A307. ASTM F1554 if over 9-1/2 inches long.
- H. Welding Materials: AWS D1.1; type required for materials being welded.
- I. Grout: ASTM C1107, non-shrink type, pre-mixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing additives, capable of developing a minimum compressive strength of 7,000 psi at 28 days.

2.2 FABRICATION

- A. Fabricate structural steel members in accordance with AISC Specification.
- B. Continuously seal joined members by continuous welds. Grind exposed welds smooth.

2.3 FINISH

- A. Prepare structural component surfaces in accordance with SSPC SP-2.
- B. Shop and Touch-Up Primer: SSPC 15, Type 1, Red Oxide.
- C. Shop prime structural steel members. Do not prime surfaces that will be fireproofed, field welded or in contact with concrete or masonry.
- D. Finish: Site paint exposed to view structural steel members under provisions of Section 09 90 00.

2.4 SOURCE QUALITY CONTROL AND TESTS

- A. Testing and analysis of components will be performed under provisions of Section 01 45 29.

3. PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.
- B. Beginning of installation means erector accepts existing conditions.

3.2 ERECTION

- A. Allow for erection loads, and for sufficient temporary bracing to maintain structure safe, plumb, and in true alignment until completion of erection and installation of permanent bracing.
- B. Field weld components indicated on Drawings.
- C. Field connect members with threaded fasteners indicated; torque to required resistance.
- D. Do not field cut or alter structural members without approval of Architect.
- E. After erection, prime welds, abrasions, and surfaces not shop primed, except surfaces to be in contact with concrete.

3.3 GROUTING

- A. Clean concrete on masonry bearing surfaces.
- B. Roughen bearing surface prior to setting base and bearing plates.
- C. Set base and bearing plates on wedges, shims, or setting nuts.
- D. Tighten anchor bolts after members are positioned and plumb.
- E. Cut off protruding wedges or shims flush with edge of base or bearing plate.
- F. Pack grout solidly between bearing surfaces and plates so no voids remain.
- G. Finish exposed surfaces, protect installed materials, and allow to cure.

3.4 ERECTION TOLERANCES

- A. Erect structural steel members in accordance with AISC Specification.

3.5 RECYCLING CONSTRUCTION WASTE

- A. Recycle excess materials waste under the provisions of Section 01 74 19.

3.6 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed under provisions of Section 01 45 29.

END OF SECTION

SECTION 05 50 00
METAL FABRICATIONS

1. PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Shop fabricated ferrous metal items, galvanized and prime painted.
- B. Schedule of metal fabrications.

1.2 REFERENCES

- A. ASTM A36 - Structural Steel.
- B. ASTM A53 - Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
- C. ASTM A123 - Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- D. ASTM A153 - Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
- E. ASTM A307 - Carbon Steel Externally Threaded Standard Fasteners.
- F. ASTM A500 - Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
- G. ASTM A780 - Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
- H. AWS A2.4 - Standard Welding Symbols.
- I. AWS D1.1 - Structural Welding Code - Steel.
- J. SSPC - The Society for Protective Coatings.

1.3 SUBMITTALS

- A. Submit under provisions of Section 01 33 00.
- B. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.
- C. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.

1.4 QUALIFICATIONS

- A. Welders' Certificates: Submit under provisions of Section 01 33 00, certifying welders employed on the Work, verifying AWS qualification within the previous 12 months.

1.5 FIELD MEASUREMENTS

- A. Verify that field measurements are as indicated on Drawings.

2. PART 2 PRODUCTS

2.1 MATERIALS

- A. Steel Sections: ASTM A36.
- B. Steel Tubing: ASTM A500, Grade B.

- C. Plates: ASTM A36.
- D. Pipe: ASTM A53, Grade B, Schedule 40.
- E. Bolts, Nuts, and Washers: ASTM A307 galvanized to ASTM A153 for galvanized components.
- F. Welding Materials: AWS D1.1; type required for materials being welded.
- G. Shop and Touch Up Primer: SSPC 15, Type 1, red oxide.
- H. Touch-Up Primer for Galvanized Surfaces: SSPC 20.

2.2 FABRICATION, GENERAL

- A. Fit and shop assemble in largest practical sections, for delivery to site.
- B. Fabricate items with joints tightly fitted and secured.
- C. Continuously seal joined members by continuous welds unless indicated otherwise.
- D. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
- E. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.
- F. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.3 FINISHES

- A. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
- B. Do not prime surfaces in direct contact with concrete or where field welding is required.
- C. Prime paint items with one coat.
- D. Galvanize assembled items to minimum 1.25 oz/sq ft zinc coating in accordance with ASTM A123.
- E. Repair damaged galvanized surfaces in accordance with ASTM A780 Method A2.
- F. Finish: Site paint exposed to view prime painted and galvanized items under provisions of Section 09 90 00.

3. PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.
- B. Beginning of installation means erector accepts existing conditions.

3.2 PREPARATION

- A. Clean and strip primed steel items to bare metal where site welding is required.
- B. Supply items required to be cast into concrete or embedded in masonry with setting templates, to appropriate sections.

3.3 INSTALLATION

- A. Install items plumb and level, accurately fitted, free from distortion or defects.
- B. Allow for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- C. Field weld components indicated on Drawings.
- D. Perform field welding in accordance with AWS D1.1.
- E. Obtain Architect approval prior to site cutting or making adjustments not scheduled.
- F. After erection, prime welds, abrasions, and surfaces not shop primed, except surfaces to be in contact with concrete.

3.4 SCHEDULE

- A. The Schedule is a list of principal items only. Refer to Drawing details for items not specifically scheduled.
- B. Miscellaneous Framing and Supports: Steel not a part of structural steel framework as required to complete work; galvanized finish.
- C. Bollards: Galvanized steel pipe, concrete filled, crowned cap, as detailed; prime and field paint finish.
- D. Joist Hangers: Joist strap anchors, galvanized finish.
- E. Ledge and Shelf Angles, Channels and Plates Not Attached to Structural Framing: For support of metal decking, joists, masonry, and galvanized finish.
- F. Carport Structure: Galvanized welded structural steel and corrugated decking as detailed. Prime and field paint all steel members and decking.
- G. Aluminum Push Plates and Kick Plates: Aluminum diamond tread plate, available from Joseph T. Ryerson & Son, Inc., (213) 268-7100, 1/8 inch thick, as detailed on the drawings, natural bright finish. Push plate, kick plate, and mounting hardware are to be provided to the hardware installer for installation under the provisions of Specification Section 08 71 00.

END OF SECTION

SECTION 06 10 00

ROUGH CARPENTRY

1. PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Structural floor, wall, and roof framing.
- B. Built-up structural beams.
- C. Floor, wall, and roof sheathing.
- D. Wood furring, backing and grounds.
- E. Preservative treatment of wood.

1.2 REFERENCES

- A. CBC - California Building Code, (CCR) California Code of Regulations Title 24, Part 2.
- B. ALSC - American Lumber Standards Committee: Softwood Lumber Standards.
- C. ANSI/AF & PA NDS-12 - National Design Specifications for Wood Construction.
- D. ANSI/SDPWS - Special Design Provisions for Wind and Seismic.
- E. APA - The Engineered Wood Association.
- F. ASTM D6109 – Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastic Lumber.
- G. ASTM E84 - Standard Test Method for Surface burning Characteristics of Building Materials.
- H. AWPA - American Wood Preservers' Association: Book of Standards.
- I. FSC – Forest Stewardship Council.
- J. MS MIL-L-19140 - Fire Retardant Wood Preservative Chemicals.
- K. National Bureau of Standards - Product Standard PS-1-09 for Construction and Industrial Plywood.
- L. WCLIB - West Coast Lumber Inspection Bureau: Standard Grading Rules for West Coast Lumber.
- M. WWPA - Western Wood Products Association.

1.3 QUALITY ASSURANCE

- A. Lumber Grading Agency: Certified by ALSC.
- B. Plywood Grading Agency: Certified by APA.

1.4 REGULATORY REQUIREMENTS

- A. Conform to CBC, California Building Code, (CCR) California Code of Regulations, Title 24, Part 2, Chapter 23.
- B. Allowable stress design values shall be in compliance with the CBC, California Building Code, (CCR) California Code of Regulations, Title 24, Part 2, Section 2306, ANSI/AF & PA NDS-12 - National Design Specifications for Wood Construction, and ANSI/SDPWS - Special Design Provisions for Wind and Seismic.

1.5 SUBMITTALS

- A. Submit product data under provisions of Section 01 33 00.
- B. Provide technical data on wood preservative materials and application instructions.
- C. In lieu of grade stamping exposed-to-view lumber and plywood, submit manufacturer's certificate under provisions of Section 01 33 00 that products meet or exceed specified requirements.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store and protect products under provisions of Section 01 61 00.
- B. Deliver materials free from pest infestation. Protect materials on site to prevent termite, beetle or other wood boring insect attacks.
- C. Stack lumber flat, off grade, with spacers between each bundle to promote air circulation. Provide for air circulation around and under coverings.

2. PART 2 PRODUCTS

2.1 LUMBER MATERIALS

- A. Lumber Grading Rules: WCLIB and WWP. Lumber shall bear WCLIB grade stamp.
- B. Beam Framing: Douglas Fir species, Select Structural grade.
- C. Joist Framing: Douglas Fir species, No. 1 grade.
- D. Rafter Framing: Douglas Fir species, No. 1 grade.
- E. Structural Framing, Studs, Plate and Blocking: Douglas Fir Species, No. 1 grade.
- F. Non-structural Light Framing Studs, Plate and Blocking: Douglas Fir species, construction grade.
- G. Plank and Decking: Douglas Fir species, Com Dex.

2.2 MOISTURE CONTENT

- A. 2x and 3x material, 19 percent moisture content, S-Dry. Structural and non structural framing, beam, rafters, joists, studs, plates and blocking.
- B. 4x and 6x material, 19 percent moisture content at time of application of Architectural finishes. 22 percent maximum moisture content at time of delivery to project site. Materials to be air dried as required to achieve 22 percent moisture content prior to delivery to site. Structural and non structural framing, beam, rafters, joists, studs, plates and blocking.
- C. Lumber materials with a moisture content above 19 percent and less than 22 percent at the time of installation shall be tested for moisture content prior to covering with Architectural finishes. Moisture tests shall be performed under the provisions of Section 01 45 29.
- D. No lumber shall be covered with an Architectural finish until the moisture content of the lumber is 19 percent or below.

2.3 PLYWOOD MATERIALS

- A. Roof Sheathing: APA Structural I, Grade C-D, Exposure 1 minimum 5-ply construction, meeting product Standard PS-1-09.
- B. Wall Sheathing: APA Structural I, Grade C-D, Exposure 1 minimum 5-ply construction, meeting product standard PS-1-09.

- C. Telephone and Electrical Panel Boards: APA Grade C-D with exterior glue, minimum 5 ply, 3/4 inch thick, meeting PS-1-09.

2.4 ORIENTED STRAND BOARD (OSB)

- A. Roof Sheathing: APA rated sheathing, Exposure 1, Structural 1, meeting PS-2 and PRP-108 with radiant aluminum foil barrier. Nominal thickness not less than 15/32 inch. Span rating of 32/16.
- B. Wall Sheathing: APA rated sheathing, Exposure 1, Structural 1, meeting PS-2 and PRP-108. Nominal thickness not less than 15/32 inch. Span rating of 32/16.

2.5 ACCESSORIES

- A. Fasteners: Hot-dipped galvanized steel for exterior, high humidity, and treated wood locations; plain finish elsewhere; size and type to suit condition.
- B. Connectors: As indicated.
- C. Joist Hangers: Galvanized steel, sized to suit joists and framing conditions; manufactured by Simpson, USP Connectors or KC Metals.
- D. Anchors: Thru bolt or anchor bolt to concrete or masonry unless otherwise noted. Bolt for anchorage to steel unless otherwise noted.
- E. Building Paper: No. 15 asphalt felt. Plain untreated cellulosic building paper.

2.6 WOOD TREATMENT

- A. Preservative Treatment: Where lumber or plywood is indicated as treated or is specified herein to be treated, comply with applicable requirements of AWWA Standards C2 (Lumber) and C9 (Plywood).
- B. Pressure treat all lumber in contact with ground. After treatment kiln-dry lumber to a maximum moisture content of 19 percent.
- C. Pressure treat above ground items as indicated. After treatment, kiln-dry lumber and plywood to a maximum moisture content, respectively, of 19 percent and 15 percent. Treat indicated items and the following:
 - 1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping and similar members in connection with roofing, flashing, vapor barriers and waterproofing.
 - 2. Horizontal wood sills, sleepers, blocking, furring, stripping and similar concealed members in contact with masonry or concrete.
 - 3. Horizontal wood framing members less than 18 inches above grade.
 - 4. Wood floor plates installed over concrete slabs directly in contact with earth.
 - 5. Ends of wood girders entering masonry or concrete walls.
 - 6. Framing members used in exterior door, window, or louver openings.
- D. Complete fabrication of treated items prior to treatment, where possible. If cut or drilled after treatment, coat cut or drilled surfaces with heavy brush coat of same chemical used for treatment and to comply with AWWA M4. Inspect each piece of lumber or plywood after drying and discard damaged or defective pieces.

3. PART 3 EXECUTION

3.1 FRAMING

- A. Erect wood framing members level and plumb.
- B. Place horizontal members laid flat, crown side-up.
- C. Construct framing members full length without splices.
- D. Double members at openings over 1 sq ft. Space short studs over and under opening to stud spacing.
- E. Construct double joist headers at floor and ceiling openings. Frame rigidly into joists.
- F. Construct double joists under wall studding.
- G. Bridge joists in excess of 8 feet span at mid-span members. Fit solid blocking at ends of members.
- H. Coordinate installation of plywood web joists. Engineered Laminated Veneer Lumber (LVL).

3.2 FURRING, BLOCKING AND GROUNDS

- A. Provide wherever shown and where required for attachment of other work. Coordinate with work of other sections.
- B. Item locations include but are not limited to toilet accessories, toilet partitions, door frames, window frames, hardware, access doors and ladders, cabinetry, miscellaneous equipment locations and mechanical, plumbing and electrical item locations and all other locations of wall mounted items.
- C. Install plywood backboards for telephone, data and other electrical equipment.
- D. Form to shapes as shown and cut as required for true line and level of work to be attached. Coordinate location with other work involved.
- E. Attach to substrates as required to support applied loading. Countersink bolts and nuts flush with surfaces, unless otherwise indicated.
- F. Build into masonry during installation of masonry work. Where possible, anchor to formwork before concrete placement.
- G. Install plumb and level with closure strips at edges and openings. Shim with wood as required for tolerance of finished work.
- H. Firestop all concealed spaces of wood stud walls, ceilings and floor levels at 10 foot intervals both vertically and horizontally.
- I. Firestop all concealed vertical and horizontal spaces as occur at soffits, vents, stair stringers, pipes and similar openings in compliance with CBC, (CCR) Title 24, Part 2, Section 718.
- J. Firestopping shall consist of closely fitted wood blocks of 2 inch nominal thickness lumber of same width as framing members.

3.3 SHEATHING

- A. Secure roof sheathing perpendicular to framing members with ends staggered. Secure sheet edges over firm bearing. Provide solid edge blocking between sheets. Space panels 1/8 inch apart at ends and edges. Install radiant barrier towards interior of roof.
- B. Secure wall sheathing perpendicular to wall studs, with ends staggered, over firm bearing.

- C. Install telephone and electrical panel back boards where required. Size of backboards to be 12 inches beyond size of electrical panel boards.

3.4 RECYCLING CONSTRUCTION WASTE

- A. Recycle lumber waste under the provisions of Section 01 74 19.

3.5 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed under provisions of Section 01 45 29.
- B. Lumber materials will be inspected for compliance with material grading rules, limitations for moisture content and pest infestation prior to any materials being concealed from view or being covered with an architectural finish.

3.6 TOLERANCES

- A. Framing Members: 1/4 inch maximum from true position.
- B. Surface Flatness of Floor: 1/4 inch in 10 feet maximum.

END OF SECTION

SECTION 06 17 33

WOOD I-JOISTS

1. PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Wood chord and wood web joists for roof framing.
- B. Bridging, bracing, and anchorage.
- C. Framing for openings.

1.2 REFERENCES

- A. ALSC - American Lumber Standards Committee: Softwood Lumber Standards.
- B. APA - The Engineered Wood Association.
- C. ASTM D2559 - Adhesives for Structural Laminated Wood Products for use Under Exterior Exposure Conditions.
- D. ASTM D5055 - Standard Specification for Establishing and Monitoring Capabilities of Pre-Fabricated Wood I - Joists.
- E. CBC - California Building Code, (CCR) California Code of Regulations, Title 24, Part 2.
- F. FSC - Forest Stewardship Council.
- G. ICC - (International Code Council) Evaluation Service, Inc.
- H. National Bureau of Standards - Product Standard PS-1-95 for Construction and Industrial Plywood.

1.3 QUALITY ASSURANCE

- A. Manufacturer: Company specializing in manufacture of plywood web joists with five years minimum experience.
- B. Design joists under direct supervision of a Civil or Structural Engineer experienced in structural framing design registered in State of California. Where joists support mechanical equipment, include weight in joist design.
- C. Perform work in accordance with the following agencies:
 - 1. Lumber grading agency: Certified by ALSC.
 - 2. Plywood grading agency: Certified by APA.

1.4 REGULATORY REQUIREMENTS

- A. Conform to CBC - California Building Code, (CCR) California Code of Regulations, Title 24, Part 2, for loads, seismic zoning, and other governing criteria.
- B. Conform to ICC/ES Report from manufacturer for fire and sound ratings indicated.

1.5 SUBMITTALS

- A. Submit shop drawings under provisions of Section 01 33 00.

- B. Indicate framing system, sizes and spacing of joists, loads and joist cambers, bearing and anchor details, bridging and bracing, and framed openings.
- C. Submit manufacturer's installation instructions under provisions of Section 01 33 00.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products to site under provisions of Section 01 61 00.
- B. Transport and store joists in vertical position resting on bearing ends.
- C. Protect joists from moisture, warpage, and distortion during transit and when site stored.

2. PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Boise Engineered Wood Products, BCI Joists, ICC/ES No. ESR-1336, www.boisebuilding.com.
- B. Red Built, Inc., Red-I Joist, ICC/ES No. 2994, www.redbuilt.com
- C. Weyerhaeuser, iLevel, TJI Series, ICC No. ESR1153, www.ilevel.com.

2.2 MATERIALS

- A. Lumber Grading Rules: ALSC.
- B. Wood Chord Members: Top and bottom chord members shall be microllam laminated veneer lumber (LVL) NER-481.
- C. Composite Web: 7/16 inch thick Performance Plus OSB conforming to PS2-92, Exposure 1.
- D. Joist Bridging: Type, size and spacing as indicated on the drawings.

2.3 ACCESSORIES

- A. Provide all web stiffeners, blocking panels, connections, etc., as required for a complete installation.
- B. Fasteners: Galvanized steel, type to suit application.
- C. Glue: ASTM D2559; For wet condition of service.
- D. Joist hangers and hardware shall be as indicated.

2.4 FABRICATION

- A. Fabricate joists to achieve structural requirements specified.
- B. Verify dimensions and site conditions prior to fabrication.

3. PART 3 EXECUTION

3.1 INSPECTION

- A. Verify that supports and openings are ready to receive joists.
- B. Verify sufficient end bearing area.
- C. Beginning of installation means acceptance of existing conditions.

3.2 PREPARATION

- A. Coordinate placement of bearing items.

3.3 INSTALLATION

- A. Install joists in accordance with manufacturer's instructions.
- B. Place joists true to line and level.
- C. Provide temporary bracing to position joists in place until permanently secured.
- D. Place permanent bridging, bracing, and anchors to maintain joists straight and in correct position before installation of decking or inducing loads.
- E. Place headers and supports to frame openings required.
- F. Frame openings between joists with lumber in accordance with Section 06 10 00.
- G. Coordinate placement of decking with work of this Section.

3.4 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed under provisions of Section 01 45 29.

3.5 TOLERANCES

- A. Framing Members: 1/2 inch maximum from true position.

3.6 RECYCLING CONSTRUCTION WASTE

- A. Recycle lumber waste under the provisions of Section 01 74 19.

END OF SECTION

SECTION 07 13 53

ELASTOMERIC SHEET WATERPROOFING

1. PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Membrane waterproofing.
- B. Protection board.
- C. Application Schedule.

1.2 REFERENCES

- A. ASTM C578 - Preformed, Cellular Polystyrene Thermal Insulation.
- B. ASTM D412 - Rubber Properties in Tension.
- C. ASTM D570 - Method for Water Absorption of Plastics.
- D. ASTM D1970 - Specification for Self Adhering Polymer Modified Bituminous Sheet Materials.
- E. ASTM E96 - Water Vapor Transmission of Materials in Sheet Form.
- F. ASTM E154 - Water Vapor Retarders Used in Contact with Earth, Under Concrete Slabs, on Walls, or as Ground Cover.

1.3 SYSTEM DESCRIPTION

- A. Waterproofing System: Sheet membrane capable of resisting water head of 200 feet and preventing moisture migration to interior.

1.4 SUBMITTALS

- A. Submit shop drawings under provisions of Section 01 33 00.
- B. Submit shop drawings indicating special joint or termination conditions and special conditions of interface with other materials.
- C. Submit product data under provisions of Section 01 33 00.
- D. Submit samples under provisions of Section 01 33 00.
- E. Submit two samples 6 x 6 inches in size of sheet membrane and protection board.
- F. Submit manufacturer's installation instructions under provisions of Section 01 33 00.
- G. Submit manufacturer's inspection reports under provisions of Section 01 33 00.

1.5 QUALITY ASSURANCE

- A. Perform work in accordance with manufacturer's recommendations.
- B. Maintain one copy of document on site.

1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in the manufacture of products specified in this Section with minimum five years documented experience.
- B. Applicator: Company specializing in applying the work of this Section with minimum three years documented experience and approved by manufacturer.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store and protect products to site under provisions of Section 01 61 00.

1.8 REGULATORY REQUIREMENTS

- A. Comply with all current federal, state, and local volatile organic compound (VOC) regulations.
- B. Do not use solvent based primers containing 1-1-1 trichloroethane or asphalt emulsions.

1.9 ENVIRONMENTAL REQUIREMENTS

- A. Do not apply products when surface or ambient temperature is below 25 degrees F.
- B. Do not apply to damp or frozen surfaces or during inclement weather.

1.10 SEQUENCING AND SCHEDULING

- A. Coordinate work under the provisions of Section 01 31 00.
- B. Coordinate work of this Section with foundation and backfilling requirements.

1.11 WARRANTY

- A. Provide 5 year warranty under provisions of Section 01 77 00.
- B. Furnish manufacturer's warranty that materials will be free of defects in manufacture.
- C. Furnish applicator's warranty that the installation of materials will provide a leak free system.

2. PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. GCP Applied Technologies; Product - Bituthene System 3000, www.gcpat.com.
- B. Pecora Corporation; Product - Duramem 700-SM, www.pecora.com.
- C. Carlisle Inc; Product - CCW Miradri 860, www.carlisleccw.com.
- D. MAPEI Corporation; Product - Mapethene HT, www.mapei.com.
- E. Polyguard Products, Inc.; Product-Polyguard 650, www.polyguardproducts.com.
- F. W.R. Meadows, Inc.; Product - Mel-Rol., www.wrmeadows.com.
- G. Tamko Products, Inc.; Product-TW-60, www.tamko.com.
- H. Substitutions: Under provisions of Section 01 25 13.

2.2 MEMBRANE MATERIALS

- A. Self-adhesive, cold-applied waterproofing sheet membrane consisting of a cross-laminated polyethylene film and rubberized asphalt of a thickness of .060 inches (60 mils) by 36 inch wide rolls, inter-wound with a disposable silicone-coated release sheet; conforming to the following:

<u>Properties</u>	<u>Test</u>	<u>Results</u>
Pliability, 180 degrees bend over 1 inch mandrel at - 45 degrees F	ASTM D1970	Unaffected
Tensile Strength (membrane)	ASTM D412	250 psi
Tensile Strength (film)	ASTM D412	5000 psi
Elongation	ASTM D412	300 percent
Puncture Resistance (membrane)	ASTM E154	40 lb
Permeance	ASTM E96 (Method B)	0.05 grains/sq. ft./ hr./in Hg
Water Absorption	ASTM D570	0.1 percent

2.3 ACCESSORIES

- A. Surface Conditioner: Acrylic latex diluted with water.
- B. Mastic: Rubberized asphaltic type recommended by membrane manufacturer.
- C. Liquid Membrane: Two component elastomeric, mastic grade.
- D. Cement Mortar: Epoxy or latex modified cementitious composition acceptable to membrane manufacturer.
- E. Concrete Patching Compound: Fast setting, non-shrinking patching compound, of type acceptable to membrane manufacturer.
- F. Tape: 2 sided adhesive tape acceptable to membrane manufacturer.

2.4 PROTECTION BOARD

- A. Polystyrene Protection Board: ASTM C578 expanded polystyrene board, 1 inch minimum thickness, for vertical application.
- B. Protection Board Adhesive: Type recommended by board manufacturer and compatible with membrane.
- C. Drainage Panel: Prefabricated drainage composite.
1. Hydroduct 220 by GCP Applied Technologies, www.gcpat.com.
 2. Mappedrain 25 by MAPEI Corp., www.mapei.com.
 3. Mel-Drain 5035 by W.R. Meadows, Inc., www.wrmeadows.com.
 4. Miradrain 6200 by Carlisle, Inc., www.carlisleccw.com.
 5. J-D Rain by JDR Enterprises, www.j-drain.com.

6. Dura Drain by Pecora Corp., www.pecora.com
7. Substitutions: Under provisions of Section 01 25 13.

3. PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine surfaces for conditions that would adversely affect execution. Do not proceed until unsatisfactory conditions are corrected. Beginning of installation constitutes acceptance of conditions.
- B. Ensure surfaces are reasonably smooth and free of holes, cracks or projections which might be detrimental to successful installation.
- C. Verify that items penetrating waterproofing system are securely installed.
- D. Verify that concrete surfaces have cured a period of time acceptable to membrane manufacturer.
- E. Verify that masonry joints are struck flush with face of unit or that a parge coat of mortar has been applied to face of masonry.

3.2 PREPARATION

- A. Protect adjacent surfaces not designated to receive waterproofing.
- B. Clean and prepare surfaces in accordance with manufacturer's instructions.
- C. Seal cracks and joints in accordance with manufacturer's instructions. Use proper depth-width ratio recommended by sealant manufacturer.
- D. Remove sharp projections, fins, and loose material. Remove form ties to 3/4 inch minimum behind face of wall. Fill holes, voids, and honeycomb areas flush with concrete patching compound or cement mortar.
- E. Seal penetrations in accordance with manufacturer's instructions.
- F. Provide fillet or cant at junction of vertical and horizontal surfaces using liquid membrane. Extend liquid membrane 6 inches each way from corner at a minimum 90 mil thickness.

3.3 WATERPROOFING INSTALLATION

- A. Install products in accordance with manufacturer's printed instructions.
- B. Extend membrane onto footing except terminate at point 12 inches below floor slab of protected space where footings are at greater depth.
- C. Apply latex surface conditioner at rate indicated by manufacturer. Condition only as much area as can be covered in same day.
- D. Prior to placing full membrane, install minimum 3/4 inch cant of liquid membrane, extending 6 inches each way at a minimum 90 mil thickness. Provide membrane strips at inside corners, outside corners, and working joints. Center strips along axis of corner and/or joint.
- E. Install sheets with edges and ends overlapped at dimensions recommended by manufacturer.
- F. Remove release paper layer. Roll out surface with mechanical roller to encourage full contact bond.
- G. Completely bond sheet to substrate, except those areas directly over or within 3 inches of working cracks or expansion joints.

- H. Extend membrane vertically up wall surfaces adjacent to deck surfaces a minimum of 6 inches. Extend into floor drains.
- I. Place uniform bead of mastic to joint edges at locations recommended by manufacturer.
- J. Seal perimeter ends and edges to adjoining surfaces.
- K. Seal items penetrating membrane with flashing membrane material and liquid membrane, ensuring positive seal with membrane and penetrating member.

3.4 PROTECTION BOARD INSTALLATION

- A. Install polystyrene protection board system over membrane and retain in place with adhesive in accordance with manufacturer's instructions.
- B. Install drainage panel system over membrane with spots of adhesive in accordance with manufacturer's instructions.
- C. Place panel system with fabric facing out.
- D. Overlap flanges of adjacent drain cores.

3.5 FIELD QUALITY CONTROL

- A. Manufacturer's Field Services: Notify manufacturer prior to start of work and make arrangements for manufacturer's technical representative to be present during work to verify work is being conducted in accordance with their recommendations. Submit reports.

3.6 PROTECTION AND CLEANING

- A. Protect adjacent surfaces from damages and stains. Clean materials from surfaces where inadvertently applied.

END OF SECTION

SECTION 07 21 16

BLANKET INSULATION

1. PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Batt insulation and vapor barrier in exterior wall and roof construction.
- B. Batt insulation for filling perimeter window and door shim spaces, crevices in exterior wall, and roof.
- C. Batt sound insulation in interior walls and partitions and above ceiling.

1.2 REFERENCES

- A. ASTM C665 - Mineral Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
- B. ASTM C1320 - Installation of Mineral Fiber Batt and Thermal Insulation for Light Frame Construction.
- C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
- D. CBC - California Building Code, (CCR) California Code of Regulations, Title 24, Part 6.
- E. Business and Professions Code.

1.3 PERFORMANCE REQUIREMENTS

- A. Materials of this Section shall provide continuity of thermal and moisture barrier at building enclosure elements.
- B. Materials of this Section shall provide continuity of sound control where indicated or scheduled.

1.4 REGULATORY REQUIREMENTS

- A. Installation of insulation may only commence if insulation meets mandatory manufacturer certification to the California Energy Commission required by Title 24, Part 6, Section 110.8 of the CBC - California Building Code, (CCR) California Code of Regulations that insulation complies with Title 24, Part 12, Chapter 12-13, Article 3 of the California Quality Standards for Insulating Materials.
- B. Insulation products shall comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- C. Insulation materials to be certified in compliance with Business and Professions Code Section 19165.
- D. Insulation manufacturer to be licensed by the California Department of Consumer Affairs, Bureau of Home Furnishing and Thermal Insulation according to Business and Professions Code, Section 19059.7.

1.5 SUBMITTALS

- A. Submit manufacturer's certificates under provisions of Section 01 33 00 that materials meet or exceed specified regulatory requirements.

2. PART 2 PRODUCTS

2.1 MANUFACTURERS - INSULATION MATERIALS

- A. Certain Teed Corp., www.certainteed.com.

- B. Johns Manville Corp., www.jm.com.
- C. Knauf Insulation, www.knaufinsulation.us.
- D. Owens-Corning Fiberglass Corporation, www.owenscorning.com.
- E. Substitutions: Under provisions of Section 01 25 13.

2.2 MATERIALS

- A. Thermal Batt Insulation: ASTM C665 preformed glass fiber batt, Type III, Class A, with reflective membrane faced surface with a flame spread of 25 or less, and a smoke density of 50 or less when tested in accordance with ASTM E-84. Category 1 with stapling flanges for attachment of blanket to applicable construction. Equivalent continuous roll membrane facing may be utilized in lieu of individual faced glass fiber batts. Provide R30 at ceilings and roofs, R19 at walls.
- B. Acoustical Batt Sound Insulation, Walls: Un-faced, Slag-Wool-Fiber/Rock-Wool-Fiber Blanket Insulation: ASTM C665, Type I (blankets without membrane facing); consisting of fibers; with maximum flame spread and smoke developed indexes of 25 and 50, respectively; passing ASTM E136 for combustion characteristics. Provide 6-1/2 inch min. thickness.
- C. Acoustical Batt Sound Insulation, Ceiling: Faced, Slag-Wool-Fiber/Rock-Wool-Fiber Blanket Insulation: ASTM C665, Type III (blankets with reflective membrane facing), Class A (membrane faced surface with a flame spread index of 25 or less); Category 1 (membrane is a vapor barrier), faced with foil scrim draft, foil scrim, or foil scrim polyethylene vapor retarder membrane on one face. Category 2. Provide 6-1/2 inch min. thickness.
- D. Insulation to be formaldehyde-free.
- E. Nails or Staples: Steel wire; electroplated; type and size to suit application.
- F. Tape: Bright aluminum self-adhering type, mesh reinforced, 2 inch wide.
- G. Support Wire: 16 gauge steel wire.
- H. Support Rods: 13 gauge, pointed spring steel length as required for stud spacing.

3. PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that substrate, adjacent materials, and insulation are dry and ready to receive insulation.
- B. Verify that enclosed spaces are ventilated to dissipate humidity.
- C. Maximum relative humidity level of less than 50 percent shall be maintained during installation of insulation.

3.2 INSTALLATION

- A. Install insulation in accordance with insulation manufacturer's instructions and ASTM C1320.
- B. Install batt insulation in exterior walls and roof spaces without gaps or voids.
- C. Fill any small spaces around door frames, window frames, skylight frames, and other wall or roof openings with insulation.
- D. Fill hollow space of steel door frame, steel window frame and other wall or roof frame with insulation.
- E. Fill hollow space created by wall or roof framed headers and jamb spaces with insulation.
- F. Install batt sound insulation in interior walls full height of wall.

- G. Install batt sound insulation above ceilings in all toilet and shower areas. Extend a minimum of 4'-0" beyond face of vertical dividing partitions of space to be insulated where partition terminates at ceiling.
- H. Install batt sound insulation at underside of floor decking between adjacent floor levels.
- I. Trim insulation neatly to fit spaces.
- J. Fit insulation tight in spaces and tight to exterior side of mechanical and electrical services within the plane of insulation. Leave no gaps or voids.
- K. Install with factory applied membrane facing warm side of building spaces.
- L. Lap ends and side flanges of vapor barrier membrane over face of framing members.
- M. Extend vapor barrier on to any adjacent construction and tape seal edge of vapor barrier.
- N. Seal butt ends, lapped flanges, and tears or cuts in membrane with tape or another layer of membrane.
- O. Seal joints in vapor barrier caused by pipes, conduits, electrical boxes, and similar items penetrating vapor barrier.
- P. Face staple flange over flange of adjacent blanket to wood studs at maximum 6 inches oc.
- Q. Friction fit sound insulation between studs and fill as required to completely fill space between the wall finishes.
- R. Where wall finish does not occur, use support rods spaced not-to-exceed 16 inches oc vertically at wood studs.
- S. Retain unsupported roof insulation to metal or concrete substrate with spindle fasteners at 24 inches on center.

END OF SECTION

SECTION 07 54 19

POLYVINYL-CHLORIDE ROOFING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Fully adhered felt backed single ply polyvinyl- chloride (PVC) membrane roofing system.
- B. Protection board.
- C. Rigid foam insulation.
- D. Vapor barrier.
- E. Polyvinyl-chloride (PVC) clad metal flashing.
- F. Flexible membrane base flashings.
- G. Roofing membrane expansion joints.
- H. Walkway surfaces.
- I. Adhesives
- J. Mechanical fasteners.

1.2 REFERENCES

- A. ASTM C209 – Standard Test Method for Cellulosic Fiber Insulating Board.
- B. ASTM C1177 – Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
- C. ASTM C1289 – Standard Specification for Rigid Cellular Thermal Insulation.
- D. ASTM C1303 – Standard Test Method for Predicting Long-Term Thermal Resistance of Closed-Cell Foam Insulation.
- E. ASTM D570 – Standard Test Method for Water Absorption of Plastics.
- F. ASTM D751 – Standard Test Methods for Coated Fabrics.
- G. ASTM D1004 - Standard Test Method for Tear Resistance (Graves Tear) of Plastic Film and Sheeting.
- H. ASTM D1079 – Standard Terminology Relating to Roofing and Waterproofing.
- I. ASTM D1204 - Standard Test Method for Linear Dimensional Changes of Nonrigid Thermoplastic Sheeting or Film at Elevated Temperature.
- J. ASTM C1289 – Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.
- K. ASTM D1622 – Standard Test Method for Apparent Density of Rigid Cellular Plastics.
- L. ASTM D2565 – Standard Practice for Xenon-Arc Exposure of Plastics Intended for Outdoor Applications.

- M. ASTM D3045 – Standard Practice for Heat Aging of Plastics Without Load.
- N. ASTM D4263 – Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method.
- O. ASTM D4434 – Standard Specification for Poly (Vinyl Chloride) Roofing.
- P. ASTM D5602- Standard Test Method for Static Puncture Resistance of Roofing Membrane Specimens.
- Q. ASTM D5635 – Standard Test Method for Dynamic Puncture Resistance of Roofing Membrane Specimens.
- R. ASTM E84 – Standard Test Methods for Surface Burning Characteristics of Building Materials.
- S. ASTM E108 – Standard Test Methods for Fire Test of Roof Coverings.
- T. CBC – California Building Code, (CCR) California Code of Regulations, Title 24, Part 6.
- U. CRRC – Cool Roof Rating Council – Product Rating Program CRRC-1.

- V. FM – FM Global – FM 1.28, FM 1.29 and FM 1.49– Loss Prevention Data Sheets.
- W. LTTR – Long Term Thermal Resistance using techniques from CAN/ULC S770 based upon ASTM C1303.
- X. NRCA – National Roofing Contractors Association: The NRCA Roofing and Waterproofing Manual.
- Y. SCAQMD – South Coast Air Quality Management District Rule 1168.
- Z. SMACNA – Sheet Metal and Air Conditioning Contractors National Association, Inc., Architectural Sheet Metal Manual.
- AA. UL – Underwriters Laboratories Inc., - UL 790 – Test for Fire Resistance of Roof Covering Materials.

1.3 DEFINITIONS

- A. Roofing Terminology: ASTM D1079 and the glossary of the NRCA Roofing and Waterproofing Manual for definitions of roofing terms related to this section.

1.4 SYSTEM DESCRIPTION

- A. Poly Vinyl- Chloride (PVC) Membrane Roofing System: Felt backed single ply membrane roofing system, fully adhered, with heat welded seams, installed over adhesive applied protection board, mechanically attached rigid roof insulation and vapor barrier.

1.5 PERFORMANCE REQUIREMENTS

- A. General: Provide installed roofing membrane and base flashings that remain watertight; resist specified uplift pressure and resist exposure to weather without failure.
- B. Compatibility: Provide materials that are compatible with one another under conditions of service and required application.
- C. Conform to UL and FM for roof assembly requirements for fire hazard classification and wind uplift rating.
- D. Fire Hazard Classification: Class A according to UL 790 or ASTM E108.
- E. Wind Uplift Rating: I-90 according to FM Construction Bulletin 1-28.

1.6 REGULATORY REQUIREMENTS

- A. Conform to CBC – California Building Code, (CCR) California Code of Regulations, Title 24, Part 6 requirements for a Cool Roof under the Product Rating Program CRRC-1 of the Cool Roof Rating Council.

1.7 SUBMITTALS

- A. Submit product data, samples and instructions under the provisions of Section 01 33 00.
- B. Product Data: Submit characteristics on membrane, insulation, adhesives, seaming material, fasteners and flashings.
- C. Samples: Submit samples of membrane, insulation, flashings and accessories.
- D. Manufacturers Installation Instructions: Submit manufacturers printed instructions for installation of roof membrane, insulation, flashing and accessories.
- E. Submit shop drawings under provisions of Section 01 33 00.
- F. Shop drawings shall show layout, detail of construction and identification of materials. Roofing materials manufacturer's standard installation details are acceptable when location of detail is properly referenced. Shop drawings shall be stamped and approved by the manufacturer.
- G. Installer Certificates: Certificate, signed by roofing materials manufacturer, that installer is approved or licensed by the manufacturer to install roofing systems.
- H. Manufacturers Certificate: Certificate, signed by roofing materials manufacturer, that all roofing system components comply with specified requirements.
- I. Insulation Certificate: Manufacturers certificate that HCFC Free " Green" Polyiso materials meet Zero ODP (Ozone Depletion Potential) and Zero GWP (Global Warming Potential).
- J. Qualification Data: For installer and manufacturer.

- K. Product Test Reports: Reports on components of roofing system of comprehensive test performed by qualified testing agency.
- L. Maintenance Data: Included in maintenance manual for roofing systems.
- M. Warranties: Warranties as specified in this Section.
- N. Inspection Reports: Roofing system manufacturer's inspection reports of startup, in progress and final completed roofing installation.

1.8 QUALITY ASSURANCE

- A. Quality Assurance: Under provisions of Section 01 43 00.
- B. Perform roofing Work in accordance with NRCA Roofing and Waterproofing Manual and roofing materials manufacturers printed guidelines.
- C. Perform flashing Work in accordance with the SMACNA Architectural Sheet Metal Manual and roofing materials manufacturer's printed guidelines.
- D. Inspections: Roofing materials manufacturer representative shall provide start up, in progress and a comprehensive final inspection of the completed roofing systems. Provide inspection reports to Architect.

1.9 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum of ten years documented experience.
- B. Installer: Company specializing in performing Work specified in this section with minimum of five years documented experience, factory trained and approved by manufacturer of roofing materials.
- C. Source Limitations: Obtain components for roofing system from source approved by roofing membrane manufacturer.

1.10 PRE-INSTALLATION MEETING

- A. Convene a conference two weeks prior to commencing Work of this section under provisions of Section 01 31 00.
- B. Require attendance of parties directly affecting the Work of this Section.
- C. Review preparation and installation procedures and coordinate scheduling required with relative Work.
- D. Review installation requirements for base flashings, roofing details, roof drainage, roof penetrations, equipment curbs, and conditions of other construction that affects roofing system.
- E. Review structural loading limitations of roof deck during and after roofing installation.
- F. Review temporary protection requirements for roofing system during and after installation.
- G. Review manufacturer's written instructions and manufacturer's start up and in-progress inspection reporting.

1.11 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store and protect products to site under provisions of Section 01 61 00.
- B. Deliver products in manufacturer's original containers, dry, undamaged, with seals and labels intact.
- C. Store products to protect from environment, clear of ground and moisture.
- D. Store products in a manner to avoid significant or permanent deflection of roof deck.

1.12 ENVIRONMENTAL REQUIREMENTS

- A. Do not install roofing system materials or components when temperature or weather conditions are detrimental to successful installation.
- B. Do not apply roofing membrane to damp deck surface or when precipitation is expected or occurring.
- C. Do not expose roofing system material or components vulnerable to water or sun damage in quantities greater than can be weatherproofed during same day.

1.13 SEQUENCING AND SCHEDULING

- A. Sequence work under the provisions of Section 01 11 00.
- B. Schedule work under the provisions of Section 01 32 16.

1.14 COORDINATION

- A. Coordinate work under provisions of Section 01 31 00.
- B. Coordinate work with installation of associate roof penetrations and metal flashings as Work of this section proceeds.
- C. Notify roofing materials manufacture 72 hours prior to commencing work to arrange for inspection of roof application.

1.15 WARRANTY

- A. Provide roofing material manufacturer's 20 year warranty under provisions of Section 01 77 00.
- B. Manufactures Warranty: Non-prorated No Dollar Limit Warranty covering roofing membrane, base flashings, roofing accessories, insulation, protection board, vapor barrier, walkways, fasteners, flashings, sealants and other components of roofing system, including labor. Warranty shall include repair of roofing membrane damage due to windstorms according to wind uplift ratings specified.
- C. Manufacturer's warranty shall not exclude ponding water and no time limit shall be assigned to any such ponding water during the warranty period.
- D. Provide 2-year roofing installers warranty under provisions of Section 01 77 00.
- E. Roofing Installers Warranty: Warranty shall cover Work of this section, including installation of all components of roofing system to include roofing membrane, base flashing, insulation, protection board, walkways, fasteners, flashings, coatings, sealants and all penetrations of roofing membrane.

1.16 INSPECTION SERVICE

- A. Manufacturer of the roofing materials shall provide the following inspection services under the provisions of Section 01 43 00:
 - 1. Installation start-up inspection of roofing system.
 - 2. Certification of materials used and their application.
 - 3. Periodic inspections during installation of materials and products. A minimum of 5 in progress inspections will be conducted.
 - 4. Final roofing inspection.

2. PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with requirements of this section, provide products and materials by the manufactures specified.
- B. KEE and other like-type membrane products will not be approved for use on this project.
- C. Membrane shall be certified by the manufacture to be within 2 mils of the specified membrane thickness.
- D. Membrane shall have a minimum 27 mils of waterproofing polymers above the reinforcement.

2.2 POLY-VINYL CHLORIDE (PVC) ROOFING MEMBRANE

- A. Basis of Design: ASTM D4434, Type II, fiberglass reinforced membrane with felt backing.
 - 1. Product: Sarnafil, G410-15, manufactured by Sika – Sarnafil Inc., www.usa.sika.com.
 - 2. Thickness: 60 mils nominal with 9oz. felt backing.
 - 3. Color: Energy Smart White.
 - 4. Energy Characteristics: Initial solar reflectance of 0.85, emittance of 0.86, and solar reflective index (SRI) of 107. Energy Star listed. CRRP Product ID 0674-0002a.
- B. Physical Properties:
 - 1. Reinforcing material: Fiberglass.
 - 2. Overall Thickness: ASTM D751, 0.060 inches.
 - 3. Breaking Strength, lbf (N): ASTM D751, 80(356).
 - 4. Elongation at Break, Percent, M.D. and C.M.D.: ATM D751, 250 and 220.
 - 5. Seam Strength, Percent of Original: ASTM D751, Pass.

6. Retention of Properties After Heat Aging According to ASTM D3045
 - a) Breaking Strength, Percent of Original: ASTM D751, Pass.
 - b) Elongation, Percent of Original: ASTM D751, Pass.
7. Tearing Resistance, lbf (N): ASTM D1004, 17.5, (78).
8. Accelerated Weathering Test (Xenon Arc): ASTM D2565, 10,000 hours.
 - a) Cracking (7x magnification): None
 - b) Discoloration (by observation): Negligible.
 - c) Cracking (7x magnification): None
9. Linear Dimensional Change, Percent: ASTM D1204, -0.01 percent.
10. Weight Change After Immersion in Water, Percent: ASTM D570, 1.9 percent.
11. Static Puncture Resistance, lbf (kg): ASTM D5602, Pass
12. Dynamic Puncture Resistance ft-lbf (J): ASTM D5635, Pass.

C. Other Acceptable Manufacturers

1. GAF, www.gaf.com.
2. Johns Manville Corp., www.jm.com.
3. Carlisle, www.carlisesyntec.com

D. Substitutions: Under provisions of Section 01 25 13.

2.3 AUXILIARY MATERIAL

- A. General: Material shall be recommended by roofing system manufacturer for intended use and compatible with membrane roofing.
- B. Liquid Materials: As recommended by roofing materials manufacturer. Shall meet VOC limits of the SCAQMD Rule #1168 and must meet or exceed the requirements of the Bay Area Air Quality Management District Regulation 8, Rule 5.
- C. Sheet Flashing: Manufacturer's standard un-reinforced PVC thermoplastic sheet flashing, minimum 60 mils thick, of same color as PVC sheet membrane.
- D. Bonding Adhesive: Manufacturer's standard water-based bonding adhesive for membrane-solvent based bonding adhesive for base flashings.
- E. Metal Termination Bars: Manufacturer's standard predrilled stainless-steel or aluminum bars, approximately 1- inch wide by 1/8-inch-thick, with anchors.
- F. Metal Battens: Manufacturer's aluminum-zinc-alloy-coated or zinc coated steel sheet, approximately 1-inch wide x 0.05 inch thick, pre-punched.
- G. Fasteners: Factory-coated steel fasteners and metal plates approved by Factory Mutual. Designed for fastening membrane to substrate and acceptable to roofing materials manufacturer.
- H. Clad Metal: PVC-coated, heat-weldable sheet metal capable of being formed into a variety of shapes and profiles. 0.0249-inch-thick, G90 galvanized metal sheet with a 20 mill unsupported membrane laminated to one side.
- I. Counterflashing: Galvanized sheet metal, as specified in Section 07 62 00.
- J. Copper Sheet: ASTM B370, Temper H00 of H01, cold-rolled copper sheet, 16 oz. / sq. ft.
- K. Prefabricated Control and Expansion Joint Flashing: PVC membrane over polypropylene foam backing rod sized 1.5 x joint width.
- L. Miscellaneous Accessories: Provide pourable sealers, vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, termination reglets, cover strips, and other accessories. All pipe penetrations are to be field welded only, prefabricated cones are not to be used.

2.4 VAPOR BARRIER

- A. 10 mil thick polyethylene vapor / air retarder, equivalent to Sarnafil PE10.
- B. Tape: Pressure sensitive tape of type recommended by manufacturer.
- C. Adhesive: Manufactures' standard lap adhesive approved for vapor-retarder application.

2.5 WOOD NAILERS

- A. Treated wood nailers as specified in Section 06 10 00.
- B. Thickness of nailers to match roof insulation thickness to achieve a smooth transition.
- C. Wood nailers shall be treated for fire and rot resistance (wolmanized or osmose treated) and be #2 quality or better. Creosote or asphalt treated wood is not acceptable.
- D. Wood nailers to conform to Factory Mutual Loss Prevention Data Sheet 1-49. All wood shall have a maximum moisture content of 19 percent by weight on a dry weight basis at the time of installation.

2.6 INSULATION MATERIALS

- A. Rigid Foam Roof Insulation Board: ASTM C1289, Type II, Class 1, Grade 3 closed-cell HCFC Free " Green " polyisocyanurate foam core conforming to the following:
 - 1. Manufacturer: Acceptable to roofing membrane manufacturer.
 - 2. Board Density: ASTM D1622, 2.0 lb/cu ft.
 - 3. Board Size: 48x48 inch.
 - 4. Board Thickness: 1-inch, single layer.
 - 5. Facing: Factory applied skin of fiberglass on both faces.
 - 6. Thermal Resistance: LTTR, ASTM C1303, Aged R of 5.7 / inch.
 - 7. Board Edges: Square.
 - 8. Water Absorption: ASTM C209, less than 1 percent by volume maximum.
 - 9. Flame / Smoke Properties: ASTM E84, 25 / 450.
 - 10. Tapered Edge Strips, Saddles and Crickets: Preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.

2.7 PROTECTION BOARD

- A. Horizontal Glass Matt Gypsum Protection Board for Roof Insulation: ASTM C1177, glass matt faced gypsum board both sides with non-asphaltic heat cured coating one side, conforming to the following:
 - 1. Board Material: Similar to Dens-Deck Prime as manufactured by G-P Gypsum Co., www.gp.com.
 - 2. Board Thickness: 1 / 4 inch.
 - 3. Board Size: 48 x 96 inch or 48 x 48 inch.
 - 4. Board Edge: Square.
 - 5. Thermal Resistance: R value of 0.28.
 - 6. Flame / Smoke Properties: ASTM E84, 0/0.
- B. Vertical Glass Matt Gypsum Protection Board for Parapets: ASTM C1177, glass matt faced gypsum board both sides, conforming to the following:
 - 1. Board Material: Similar to Dens-Deck Duraguard as manufactured by G-P Gypsum Co., www.gp.com.
 - 2. Board Thickness: 1 / 2 inch.
 - 3. Board Size: 48 x 96 inch or 48 x 48 inch.
 - 4. Board Edge: Square.
 - 5. Thermal Resistance: R value of 0.56.
 - 6. Flame / Smoke Properties: ASTM E84, 15/0.

2.8 INSULATION AND PROTECTION BOARD ACCESSORIES

- A. General: Roof accessories recommended by insulation manufacturer for intended use and compatible with membrane roofing.
- B. Fasteners: Factory coated steel fasteners, metal plates and termination bars approved by Factory Mutual. Designed for fastening roof insulation to substrate. Acceptable to roofing system manufacturer.
- C. Roofing Adhesive: Single component polyurethane adhesive. Approved for application by Factory Mutual. Similar to Insta-Stik as manufactured by the Dow Chemical Company, www.dow.com.

2.9 FLEXIBLE WALKWAY TREADS

- A. Polyester reinforced, 0.096 inch thick, weldable membrane with slip-resisting, surface texture embossment similar to a chevron pattern. 39 inches wide and 50 feet long.

2.10 SUBSTITUTIONS

- A. Under provision of Section 01 25 13.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify project conditions under provisions of Section 01 31 00.
- B. Examine substrates, area, and project conditions with installer and roofing material manufacturer, for compliance with the following requirements and other conditions affecting performance of roofing system.
 - 1. Verify roof openings and penetrations are in place and set and braced and that roof drains can be securely clamped in place.
 - 2. Ensure general rigidity and proper slope to drain.
 - 3. Verify that deck is securely fastened with no projecting fasteners and with no adjacent units in excess of 1/16 inch out of plane to adjoining deck.
 - 4. Verify that wood deck is visibly dry and free of moisture according to manufacturers approved method.
 - 5. Verify that wood deck has ability to provide minimum fastener pull-out resistance.
 - 6. Proceed with installation only after unsatisfactory conditions have been corrected.
 - 7. Beginning of installation means installer accepts existing conditions.

3.2 PREPARATION

- A. Clean substrate of dust, debris, moisture and other substances detrimental to roofing installation according to roofing systems manufacturer's written instructions. Remove sharp objects.
- B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof drain plugs when no work is taking place or when rain is forecast.

2.3 VAPOR BARRIER INSTALLATION

- A. Vapor barrier shall be laid directly over the deck with all side and end joints sealed in accordance with roofing materials manufacturer's instructions.
- B. The vapor barrier shall be adhered with an adhesive supplied or recommended by the roofing materials manufacturer.
- C. Overlap side and end laps of each sheet a minimum of 6 inches. Continuously seal side and end laps with tape.
- D. Completely seal vapor retarder at terminations, obstructions, and penetrations to prevent air movement into membrane roofing system.

2.4 WOOD NAILER INSTALLATION

- A. Install continuous wood nailers at the perimeter of the entire roof and around roof projections, penetrations and expansion joints.
- B. Thickness shall match height of insulation to allow a smooth transition.
- C. Anchor nailer to resist a minimum force of 300 pounds per lineal foot in any direction.
- D. Nailer anchor spacing shall be 12 inches on center or 16 inches on center to match roof framing.
- E. Fasteners shall be staggered 1/3 the nailer width and 6 inches from each end.
- F. 2 fasteners shall be installed at end of nailers.
- G. Individual nailer lengths shall be a minimum of 3 feet long.
- H. Nailer attachment shall comply with FM Loss Prevention Data Sheet 1-49.

2.5 ROOF INSULATION INSTALLATION

- A. Coordinate installing membrane roofing system components, so insulation is not exposed to precipitation or left exposed at the end of the workday.
- B. Comply with roofing materials manufacturers written instructions for installing roof insulation.
- C. Place insulation in straight lines, perpendicular to roof slope with end joints staggered between rows.
- D. Lay insulation with edges in moderate contact without forcing.
- E. Cut insulation neatly around penetrations through roof.
- F. Cut and fit insulation tight to protrusions or interruptions to insulation plane.
- G. Trim insulation at roof drains to required slope to form a one-inch deep sump area with a diameter of 4 feet.
- H. Mechanically fasten insulation to deck with no less than one fastener for every two square feet of board area in compliance with spacing required by FM 1.29 for the Windstorm Resistance Classification specified.
- I. Fasteners are to have a minimum penetration into structural deck required by FM for Windstorm Resistance Classification specified.

2.6 PROTECTION BOARD INSTALLATION

- A. Lay protection board over rigid insulation with joints staggered.
- B. Install protection board in continuous beads of roofing adhesive applied by mechanical applicator as required by FM Windstorm Resistance Classification specified. Provide additional adhesive at edges of all roof penetrations.
- C. Trim surface board where necessary at roof drains to conform to sump configuration and so completed surface is flush.
- D. Mechanically attach protection board over vertical walls with fasteners recommended by roofing materials manufacture at a spacing of not less than 1 fastener for every 2 square feet of surface area. Fasteners to be flush with surface of protection board.

2.7 SADDLES, CRICKETS AND EDGE STRIP INSTALLATION

- A. Install crickets and saddles in roofing adhesive to configuration as indicated on drawings.
- B. Install tapered edge strips, 1-1/2 inch-thick x 24 inch wide, in roofing adhesive at all roof penetrations and at intersections of roof with vertical surfaces.
- C. Trim crickets and saddles that occur at roof drains to conform to sump configuration and so completed surface is flush.

2.8 ROOFING MEMBRANE INSTALLATION

- A. Install roofing membrane over area to receive roofing according to membrane manufacturer's written instructions.
- B. Unroll roofing membrane and allow to relax before installing.
- C. Start installation of roofing membrane in presence of membrane manufacturer's technical personnel.
- D. Accurately align roofing membrane and maintain uniform side and end laps of minimum dimensions required by membrane manufacturer.
- E. Spread adhesive using notched 1 / 4 inch x 1 / 4 inch x 1 / 4 inch rubber squeegee at rate required by membrane manufacturer.
- F. Do not allow adhesive to skin-over or surface-dry prior to installation of membrane.
- G. After application of adhesive immediately install roofing membrane.
- H. Adjacent rolls shall overlap previous rolls by 3 inches
- I. Immediately after application of membrane the bonded sheet membrane shall be broomed into place to work out any air bubbles.
- J. After brooming press membrane firmly in place with a minimum 100 lb. steel membrane roller by rolling in two directions.
- K. Do not apply bonding adhesive to splice and seam area of roofing membrane.
- L. Adhesively fasten roofing membrane securely at terminations, penetrations, and perimeter of roofing.
- M. Apply roofing membrane with side laps shingled with slope of roof deck where possible.
- N. Spread sealant over deck drain flange at deck drains and securely seal roofing membrane in place with clamping ring.

- O. In addition to adhering membrane, mechanically fasten roofing membrane securely at terminations, penetrations, and perimeter of roof.
- P. Install perimeter bar at 4 foot and 8 foot spacing with cover strip throughout building perimeter to satisfy wind uplift requirement. Hot air weld cover strip over perimeter bar.

2.9 SEAM INSTALLATION

- A. Clean seam areas, overlapping roofing membrane, and hot-air weld side and end laps of roofing membrane according to membrane manufacturer's written instructions.
- B. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of roofing membrane.
- C. Verify field strength of seams a minimum of 3 times daily and repair seam sample areas.
- D. Repair tears, voids, and lapped seams in roofing membrane that do not meet requirements.

2.10 BASE FLASHING INSTALLATION

- A. Install sheet flashings and preformed flashing accessories and consistently adhere to substrates according to membrane manufacturers written instructions.
- B. All flashings shall extend a minimum of 8 inches above roof level.
- C. Apply solvent-based bonding adhesive to substrate and underside of sheet flashing at required rate and allow to partially dry.
- D. Do not apply bonding adhesive to seam area of flashing.
- E. Flash penetrations and field-formed inside and outside corners with sheet flashing.
- F. Clean seam areas and overlap and firmly roll sheet flashings into wet adhesive. Weld side and end laps to ensure a watertight seam installation.
- G. Extend membrane vertically up and over inside parapet walls and terminate under exterior face of metal copings. Install termination bar for each 30 inches of vertical height. Hot air weld cover strip over termination bar.

2.11 METAL FLASHING AND ACCESSORIES INSTALLATION

- A. Coated metal flashings shall be formed in accordance with construction details, shop drawings and SMACNA guidelines.
- B. Metal counter flashings shall be formed in accordance with construction details, shop drawings, SMACNA guidelines and Section 07 62 00.
- C. All metal flashings shall be fastened into solid wood nailers.
- D. Install roof control joints to isolate roof into areas as indicated on Drawings. Seam to roof membrane. Make joints watertight.
- E. Coordinate installation of roof drains and related flashings.
- F. Install a 30-inch square copper flashing pan at roof drain mechanically attached at 12 inches on center. Seal membrane to flashing pan. Seal flashing pan to roof drain with sealing mastic.

2.12 WALKWAY TREAD INSTALLATION

- A. Install walkway treads at roof access points, roof mounted equipment, and related roof traffic patterns as indicated on Drawings.
- B. Clean roof membrane in areas of walkway tread installation.
- C. Install walkway tread in adhesive and roll in two directions/
- D. Install walkway treads with 2-inch-wide joints to permit drainage.
- E. Place treads in maximum lengths between field seams of membrane.
- F. Heat weld perimeter of walkway tread to substrate according to roofing membrane manufacturer's written instructions.
- G. Do not place walkway tread over cover strips.
- H. Apply seam sealant at all welded edges.

2.13 TEMPORARY CUT-OFF

- A. Flashings shall be installed concurrently with the roof membrane to maintain a watertight condition as the Work progresses.
- B. Temporary water stops shall be constructed to provide a 100 percent watertight seal.
- C. Insulation joints shall be staggered even when installing partial panels of insulation. New membrane shall be carried into the water stop.
- D. Water stops shall be sealed to the deck and or substrate to prevent water traveling under the new or existing roofing.
- E. Edge of membrane shall be sealed in a continuous heavy application of sealant as specified.
- F. When the Work continues, contaminated membrane shall be cut out.
- G. Sealant, contaminated membrane, insulation, fillers, etc. shall be removed from the Work area and properly disposed of off-site. None of these materials shall be used in any new Work.
- H. When inclement weather occurs while a temporary water stop is in place, Applicator shall provide labor necessary to monitor situation and maintain watertight condition.
- I. If any water enters under newly completed Work, the affected area shall be removed and replaced at Applicator's expense.

2.14 FIELD QUALITY CONTROL

- A. Require site attendance of roofing materials' manufacture during installation of the Work at required inspection intervals.
- B. Notify Architect 48 hours in advance of date and time of inspection.
- C. Provide all in-progress reports to Architect.
- D. Test heat welds a minimum of 3 times per day.
- E. Perform pull test on test strip to ensure full-width heat weld.
- F. Repair or remove and replace components of membrane roofing system where tests and inspections indicate that they do not comply with specified requirements.
- G. Flashings at walls and curbs must be inspected and approved by manufacturer for proper membrane termination prior to installation of coping materials, mechanical, plumbing and electrical systems.

2.15 CLEANING

- A. Perform final cleaning under the provisions of Section 01 77 00 – Execution Requirements: Final Cleaning.
- B. Clean finished roof surfaces after completion. Ensure drainage ways and roof drains are clear and unobstructed.
- C. In areas where other finished surfaces are soiled by Work of this section, consult manufacturer of surfaces for cleaning advice and conform to their documented instructions.
- D. Repair or replace defaced or disfigured finishes caused by Work of this section.
- E. Clean and restore all damaged surfaces to their original condition.
- F. Dispose of all excess materials in a manner conforming to current EPA requirements.

2.16 PROTECTION OF INSTALLED WORK

- A. Protect completed membrane roofing where traffic and other work must continue over surface.

END OF SECTION

SECTION 07 62 00

SHEET METAL FLASHING AND TRIM

1. PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Pre-coated coping parapet and cap flashings.
- B. Fascias.
- C. Counter flashing at piping penetrations, vent pipes, and conduits.
- D. Counterflashings over bituminous base flashings.
- E. Counterflashings at roof mounted equipment, curbs and supports.
- F. Counterflashings for roof hatches and skylights.

1.2 REFERENCES

- A. ANSI / SPRI ES-1 Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems.
- B. ASTM A653 - Steel Sheet, Zinc-Coated, (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- C. ASTM A755 - Steel Sheet, Metallic Coated by the Hot-Dip Process and Prepainted by the Coil-Coating Process for Exterior Exposed Building Products.
- D. ASTM A792 – Steel Sheet, Aluminum-Zinc Alloy. Coated by the Hot-Dip Process, General Requirements.
- E. ASTM A924 - General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process.
- F. ASTM B32 - Solder Metal.
- G. ASTM B101 - Standard Specifications for Lead-Coated Copper Sheet and Strip for Building Construction.
- H. ASTM D4586 - Asphalt Roof Cement, Asbestos Free.
- I. SMACNA - Architectural Sheet Metal Manual.

1.3 SYSTEM DESCRIPTION

- A. Work of this Section is to physically protect membrane roofing and base flashings from damage that would permit water leakage to building interior.

1.4 QUALITY ASSURANCE

- A. Applicator: Company specializing in sheet metal flashing work with five years minimum experience.
- B. Perform work in accordance with SMACNA standard details and requirements.
- C. Copings and roof edge flashings shall conform to SPRI ES-1 testing and shall be in compliance with SMACNA Technical Resource Bulletin #5-09.
- D. SPRI Wind Design Standard: Manufacture and install copings and roof edge flashings capable of resisting an ultimate design wind speed of 115 miles per hour.

1.5 SUBMITTALS

- A. Submit shop drawings, product data, and samples under provisions of Section 01 33 00.
- B. Submit shop drawings of sheet metal items indicating profiles, jointing, terminations and installation details. Indicate type and spacing of fasteners.
- C. Submittal of specific plates from the SMACNA Architectural Sheet Metal Manual constitutes acceptable documentation of installation details.
- D. Submit product data for pre-coated galvanized steel.
- E. Submit two samples, 4 x 4 inch in size illustrating metal finish color for pre-coated steel.
- F. Submit product data for flashing accessories.
- G. Submit warranty for water tightness.
- H. Submit warranty for metal finish.

1.6 STORAGE AND HANDLING

- A. Store products under provisions of Section 01 61 00.
- B. Stack preformed material to prevent twisting, bending, or abrasion, and to provide ventilation.
- C. Prevent contact with materials during storage which may cause discoloration, staining, or damage.

1.7 WARRANTY

- A. Provide warranty under provisions of Section 01 77 00.
- B. Provide 2-year warranty coverage for degradation of water tightness and integrity of seals.
- C. Provide 20-year warranty coverage for metal finish from all defects.

2. PART 2 PRODUCTS

2.1 SHEET MATERIALS

- A. Flashing and Trim: Aluminum: ASTM AB209, Alloy 3003 H14 or 3105 H14, 0.05 inch thick.

2.2 ACCESSORIES

- A. Lead-Coated Copper: ASTM B101, Temper H00 and H01, cold-rolled copper sheet, coated both sides with lead weighing not less than 12 lb/100 sq. ft. or more than 15 lb./100 sq. ft. total weight of copper sheet with lead applied to both sides.
- B. Fastener: Galvanized steel or stainless steel with soft neoprene washers at exposed fasteners. Finish exposed fasteners the same as pre-coated metal.
- C. Underlayment: Spunbound reinforced polypropylene coated fabric sheet.
 - 1. Premium Grade Feltex as manufactured by SystemComponents Corp., www.systemcomponents.net.
 - 2. Premium Summit 180 Synthetic Underlayment as manufactured by Atlas Roofing Corp., www.atlasroofing.com.
 - 3. Roof Top Guard II Underlayment as manufactured by Underlayment Specialties Plus, www.uspunderlayment.com.

- 4. Substitutions: Under provisions of Section 01 25 13.
- D. Metal Primer: As specified in Section 09 90 00.
- E. Protective Backing Paint: Zinc chromate alkyd.
- F. Slip Sheet: 0.05 lb./sq. ft., rosin sized building paper.
- G. Sealant: Type specified in Section 07 92 00.
- H. Bedding Compound: Rubber-asphalt type.
- I. Plastic Cement: ASTM D4586, Type I.
- J. Metal Flashing System: Two piece aluminum similar to Springlok Flashing System, manufactured by Fry Reglet, www.fryreglet.com, type as indicated. Include fabricated end closures and mitered corners.
- K. Solder for Lead-Coated Copper: ASTM B32, Grade SN 60 percent tin, 40 percent lead.

2.3 FABRICATION

- A. Form sections true to shape, accurate in size, square, and free from distortion or defects.
- B. Fabricate concealed cleats of galvanized steel, ASTM A653, Grade 33, G90 zinc coating, 0.0478 inch thickness, interlockable with sheet.
- C. Fabricate exposed cleats and coverplates of same material as sheet, interlockable with sheet.
- D. Form pieces in longest practical lengths.
- E. Hem exposed edges on underside 1/2 inch. Miter and seam corners.
- F. Form material with flat lock seam.
- G. Solder and seal metal joints. After soldering, remove flux. Wipe and wash solder joints clean.
- H. Fabricate corners from one piece with minimum 18 inch long legs; seam for rigidity, seal with sealant.
- I. Fabricate vertical faces with bottom edge formed outward 1/4 inch and hemmed to form drip.
- J. Fabricate flashings to allow toe to extend 2 inches over roofing surface. Return and brake edges.
- K. Fabricate vent pipe and roof penetration flashings of lead-coated copper with clamping ring.

2.4 FINISH

- A. Kynar 500 or Hylar 5000 shop pre-coated finish with 0.2 mil baked on primer and 0.8 mil baked on topcoat for a 1.0 mil dry film thickness. Custom color to be selected by Architect. Up to three custom colors to be selected for use in varying amounts at all exposed to view flashing and fascia locations.

3. PART 3 EXECUTION

3.1 INSPECTION

- A. Verify roof openings, curbs, pipes, sleeves, ducts, or vents through roof are solidly set, cant strips and reglets are in place, and nailing strips located.
- B. Verify membrane termination and base flashings are in place, sealed, and secure.
- C. Beginning of installation means acceptance of existing conditions.

3.2 PREPARATION

- A. Field measure site conditions prior to fabricating work.
- B. Install starter and edge strips, and cleats before starting installation.
- C. Install surface mounted reglets true to line and level. Seal top with sealant.
- D. Install underlayment with protective slip sheet over parapets, caps, copings, gravel stops and curbs.

3.3 INSTALLATION

- A. Conform to indicated details on the drawings and the recommendations included in the SMACNA Architectural Sheet Metal Manual.
- B. Provide for thermal expansion of exposed sheet metal work. Space movement joints at 10 feet - 0 inches o.c. maximum with no joints within 2 feet - 0 inches of corners.
- C. Form expansion joints of intermeshing hooked flanges filled with sealant.
- D. Insert flashings into reglets to form tight fit. Secure in place with lead wedges at maximum 12 inches on center. Pack remaining spaces with lead wool. Seal flashings into reglets with sealant.
- E. Secure flashings in place using concealed fasteners. Use exposed fasteners only where indicated.
- F. Lap, lock, seam and seal all joints.
- G. Apply plastic cement compound between metal flashings and felt flashings. Apply bituminous coating between dissimilar metals where occurs.
- H. Fit flashings tight in place. Make corners square, surfaces true and straight in planes, and lines accurate to profiles.
- I. Roof-Penetration, Vent Pipe Flashing: Turn lead flashing down inside vent piping. Clamp flashing to other pipes penetrating roof except for vent piping. Seal with elastomeric sealant.
- J. Seal metal joints watertight.

3.4 FIELD QUALITY CONTROL

- A. Conform to SMACNA Architectural Sheet Metal Manual.
- B. Field observation will involve surveillance of Work during installation to ascertain compliance with specified requirements.

END OF SECTION

SECTION 07 71 23

MANUFACTURED GUTTERS AND DOWNSPOUTS

1. PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Galvanized steel gutters.
- B. Steel pipe downspouts.
- C. Precast concrete splash blocks and sheet metal splash pans.

1.2 REFERENCES

- A. ASTM A53 - Pipe, Steel, Black and Hot-Dipped Zinc-Coated Welded and Seamless.
- B. ASTM A123 - Zinc (Hot-Dip Galvanized) Coating on Iron and Steel Products.
- C. ASTM A653 - Steel Sheet, Zinc Coated, (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- D. ASTM A755 - Steel Sheet, Metallic Coated by the Hot-Dip Process and Prepainted by the Coil-Coating Process for Exterior Exposed Building Products.
- E. ASTM A792 - Steel Sheet, Aluminum-Zinc Alloy. Coated by the Hot-Dip Process, General Requirements.
- F. ASTM A924 - General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process.
- G. SMACNA - Architectural Sheet Metal Manual.

1.3 SUBMITTALS

- A. Submit shop drawings, product data, and samples under provisions of Section 01 33 00.
- B. Submit shop drawings of metal items indicating profiles, jointing, terminations, and installation details. Indicate type and spacing of fasteners.
- C. Submittal of specific plates from the SMACNA Architectural Sheet Metal Manual constitutes acceptable documentation of installation details.
- D. Submit product data for pre-coated galvanized steel.
- E. Submit two samples 4 x 4 inch in size illustrating metal finish color for pre-coated steel.
- F. Submit warranty for metal finish.

1.4 QUALITY ASSURANCE

- A. Applicator: Company specializing in sheet metal work with five years minimum experience.
- B. Perform work in accordance with SMACNA standard details and requirements.

1.5 STORAGE AND HANDLING

- A. Store products under provisions of Section 01 61 00.
- B. Stack preformed material to prevent twisting, bending, or abrasion and to provide ventilation.
- C. Prevent contact with materials during storage which may cause discoloration, staining or damage.

1.6 WARRANTY

- A. Provide warranty under provisions of Section 01 77 00.
- B. Provide 20-year warranty coverage for metal finish from all defects.

2. PART 2 PRODUCTS

2.1 MATERIALS

- A. Galvanized Steel: ASTM A653, Grade 33, G90 zinc-coating in accordance with ASTM A924; thickness as specified.
- B. Pre-coated Galvanized Steel: ASTM A755 on zinc-coated galvanized substrate, ASTM A653, Grade 33, G90 zinc coating in accordance with ASTM A924, or ASTM A792, Grade 50, AZ55 aluminum zinc coating. thickness as specified.

2.2 COMPONENTS

- A. Gutters: 0.0299 inch thick.
- B. Downspouts: ASTM A53, Grade B, Schedule 40 steel pipe, standard weight, Type S, one piece without joints, galvanized according to ASTM A53; 1.8 oz./sq. ft.
- C. Splash Blocks: Precast concrete type, of sizes and profiles indicated; minimum 3000 psi at 28 days, with minimum 5 percent air entrainment.
- D. Splash Pans: Same metal as for gutters.

2.3 ACCESSORIES

- A. Anchorage Devices: Meet SMACNA requirements.
- B. End Caps, Downspout Outlets and Strainers, Rain Diverters, Straps, Support Brackets, Joint Fasteners. Profiled to suit gutters and downspouts.
- C. Sealant: Silicone type as specified in Section 07 92 00.

2.4 FABRICATION

- A. Form gutters and downspouts of profiles and sizes indicated.
- B. Field measure site conditions prior to fabricating work.
- C. Fabricate with required connection pieces.
- D. Form sections square, true, and accurate in size, in maximum possible lengths and free of distortion or defects detrimental to appearance or performance.
- E. Hem exposed edges of metal.
- F. Seal metal joints.
- G. Fabricate gutter and downspout accessories; seal watertight.
- H. Form splash pans to size as detailed with rolled edges.

2.5 FINISHING

- A. Shop prepare and prime exposed ferrous metal surfaces.

- B. Back-paint concealed metal surfaces with protective backing paint to a minimum dry film thickness of 15 mils.
- C. Site paint exposed to view steel pipe downspouts metal surfaces under provisions of Section 09 90 00.
- D. Kynar 500 or Hylar 5000 shop pre-coated finish on flat sheet metal stock. Finish with 0.2 mil baked on primer and 0.80 mil baked on topcoat for a 1.0 mil dry film thickness. Custom color to be selected by Architect.

3. PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that surfaces are ready to receive work.
- B. Beginning of installation means acceptance of existing conditions.

3.2 INSTALLATION

- A. Install gutters, downspouts, and accessories in accordance with SMACNA requirements.
- B. Join lengths with seams sealed watertight. Flash and seal gutters to downspouts and accessories.
- C. Seal metal joints watertight.
- D. Set splash blocks and pans under downspouts.

END OF SECTION

SECTION 07 92 00

JOINT SEALANTS

1. PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Preparing sealant substrate surfaces.
- B. Sealant and backing.

1.2 SUMMARY OF SEALANT LOCATIONS

- A. Joints in horizontal surfaces.
 - 1. Expansion and isolation joints in cast-in-place concrete slabs.
 - 2. Expansion and isolation joints in masonry paving.
 - 3. Joints in precast concrete paving units.
 - 4. Joints in stone paving units.
 - 5. Control and expansion joints in ceramic and quarry tile.
 - 6. Control and expansion joints in soffits, ceilings and overhead surfaces.
 - 7. Joints on underside of precast beams and planks.
 - 8. Perimeter joints in exterior openings.
 - 9. Joints between ceiling surfaces and frames for doors and windows.
 - 10. Joints in flashing and sheet metal.
 - 11. Perimeter joints of plumbing fixtures.
 - 12. Acoustical isolation joints between head and sill of walls and floor and ceiling surfaces.
 - 13. Joints between countertops and wall surfaces.
 - 14. Joints in skylights and framing.
 - 15. Joints between thresholds and floors.
 - 16. Isolation joints in plaster soffits and ceilings.
 - 17. Joints between dissimilar materials and those listed above.
 - 18. Other joints as indicated.
- B. Joints in vertical surfaces:
 - 1. Expansion and isolation joints in cast-in-place concrete.
 - 2. Expansion and isolation joints in masonry.
 - 3. Joints in precast concrete.
 - 4. Expansion and isolation joints in stonework.

5. Control and expansion joints in ceramic and quarry tile.
6. Perimeter joints in exterior openings.
7. Joints in flashing and sheet metal.
8. Perimeter joints of plumbing fixtures.
9. Acoustical isolation joints of walls.
10. Joints between cabinets and walls.
11. Joints between wall surfaces and door and window frames.
12. Joints in skylights and framing.
13. Isolation joints in plaster walls.
14. Joints between dissimilar materials and those listed above.
15. Other joints as indicated.

1.3 REFERENCES

- A. ASTM C834 - Latex Sealing Compounds.
- B. ASTM C919 - Practices for Use of Sealants in Acoustical Applications.
- C. ASTM C920 - Elastomeric Joint Sealants.
- D. ASTM C1193 - Standard Guide for Use of Joint Sealants.
- E. ASTM D1056 - Flexible Cellular Materials - Sponge or Expanded Rubber.
- F. FS TT-S-001657 - Sealing Compound, Single Component, Butyl Rubber Based, Solvent Release Type.
- G. SWRI - (Sealant, Waterproofing and Restoration Institute) - Sealant and Caulking Guide Specification.

1.4 SUBMITTALS

- A. Submit product data under provisions of Section 01 33 00.
- B. Submit product data indicating sealant chemical characteristics, performance criteria, limitations, and color availability.
- C. Submit samples under provisions of Section 01 33 00.
- D. Submit two samples 4 inches long in size illustrating colors selected.

1.5 QUALITY ASSURANCE

- A. Manufacturer: Company specializing in manufacturing the products specified in this Section with minimum five years documented experience.
- B. Applicator: Company specializing in applying the Work of this Section with minimum three years documented experience, approved by sealant manufacturer.
- C. Conform to Sealant, Waterproofing, and Restoration Institute (SWRI) requirements for materials and installation.
- D. Perform Work in accordance with ASTM C1193.

- E. Perform acoustical sealant application work to provide maximum STC values in accordance with ASTM C919.

1.6 ENVIRONMENTAL REQUIREMENTS

- A. Do not install solvent curing sealants in enclosed building spaces.
- B. Do not install sealant when temperature is less than 40 degrees F.
- C. Maintain temperature and humidity recommended by the sealant manufacturer during and after installation.

1.7 OPERATION AND MAINTENANCE DATA

- A. Submit maintenance data under the provisions of Section 01 77 00.
- B. Submit recommended inspection intervals for sealant joints.
- C. Submit instructions for repairing and replacing failed sealant joints.

1.8 WARRANTY

- A. Provide 5 year warranty under provisions of Section 01 77 00.
- B. Include coverage for installed sealants and accessories which fail to achieve air and water seal and exhibit loss of adhesion or cohesion or do not cure.

2. PART 2 PRODUCTS

2.1 MATERIALS

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer, based on testing and field experience.
- B. VOC Content of Interior Sealants: Provide interior sealants and sealant primers that comply with the following limits for VOC content limits when calculated according to South Coast Air Quality Management District (SCAQMD) Rule 1168, and must meet or exceed the requirements for the Bay Area Quality Management District Regulation 8, Rule 5.
 - 1. Sealants: 250 g/L.
 - 2. Sealant Primers for Nonporous Substrates: 250 g/L.
 - 3. Sealant Primers for Porous Substrates: 775 g/L.

2.2 MANUFACTURERS

- A. Manufacturers and their products are listed for each type of sealant. Acceptable manufacturers include the following:
 - 1. Dow Consumer Solutions, www.consumer.dow.com.
 - 2. General Electric Co., www.gesealants.com.
 - 3. Pecora Corp., www.pecora.com.
 - 4. Sika Corp., www.sikausa.com.
 - 5. Sonneborn/ChemRex, www.chemrex.com.
 - 6. Tremco, Inc., www.tremcosealants.com.

7. United States Gypsum Co., www.usg.com.

8. W.R. Meadows, Inc., www.wrmeadows.com.

B. Substitutions: Under provisions of Section 01 25 13.

2.3 SEALANTS

A. Type A - Acrylic Latex: One-part, non-sag, mildew resistant acrylic emulsion compound complying with ASTM C834, Type S, Grade NS, formulated to be paintable.

1. Tremco, Inc., Acrylic Latex Caulk.

2. Pecora Corporation, AC-20.

3. Sonneborn, Chemrex, Sonolac.

B. Type B - Butyl Sealant: One-part, non-sag solvent-release-curing sealant complying with FS TT-S-001657 for Type 1 and formulated with a minimum of 75 percent solids.

1. Tremco, Inc., Tremco Butyl Sealant.

Pecora Corporation, BC-158.

2. Sonneborn, Chemrex, Multi-Purpose Sealant.

C. Type C - Silicone Sealant: One-part nonacid-curing silicone sealant complying with ASTM C920, Type S, Grade NS, Class 25.

1. Dow Consumer Solutions, Dowsil 790.

2. General Electric Co., Silpruf.

3. Tremco, Inc., Spectrem 1.

4. Pecora Corp., 864 or 890.

5. Sonneborn/Chemrex, Omniseal.

D. Type E - Neutral-Curing Silicone Sealant: One part medium modulus neutral-curing silicone sealant complying with ASTM C920, Type S, Grade NS, Class 25.

1. Dow Consumer Solutions, Dowsil 795.

2. General Electric Co., Ultraglaze 4000.

3. Tremco, Inc., Spectrum 3.

4. Pecora Corp., 895.

E. Type F - One-Part Mildew-Resistant Silicone Sealant: Complying with ASTM C920, Type S, Grade NS, Class 25.

1. Dow Consumer Solutions, Dowsil 786.

2. General Electric Co., Sanitary 1700.

3. Tremco, Inc., Tremsil 200.

4. Pecora Corp., 863 or 898 White.

- F. Type G - Multi-Part Pourable Sealant: Complying with ASTM C920, Type M, Grade P, Class 25. Shore A hardness +40.
 - 1. Tremco, Inc., THC900/901.
 - 2. Pecora Corp., Dynatred or Urexpan NR-200.
 - 3. Sika Corporation, Sikaflex 2c NS TG.
 - 4. W.R. Meadows, Pourthane NS/SL.
- G. Type H - Acoustical Sealant: Nondrying, nonhardening permanently flexible conforming to ASTM C834.
 - 1. Pecora Corp., AIS-919 Acoustical Sealant.
 - 2. Tremco, Inc., Tremco Acoustical Sealant.
 - 3. United States Gypsum Co., Sheetrock Acoustical Sealant.

2.4 ACCESSORIES

- A. Primer: Non-staining type, recommended by sealant manufacturer to suit application.
- B. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.
- C. Joint Backing: ASTM D1056; round, closed cell polyethylene foam rod; oversized 30 to 50 percent larger than joint width.
- D. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.

3. PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that joint openings are ready to receive Work and field measurements are as shown on Drawings and recommended by the manufacturer.
- B. Beginning of installation means installer accepts existing substrate.

3.2 PREPARATION

- A. Clean and prime joints in accordance with manufacturer's instructions. Prime if recommended by manufacturer.
- B. Remove loose materials and foreign matter which might impair adhesion of sealant.
- C. Verify that joint backing and release tapes are compatible with sealant.
- D. Perform preparation in accordance with ASTM C1193.
- E. Protect elements surrounding the Work of this Section from damage or disfiguration.

3.3 INSTALLATION

- A. Install sealant in accordance with manufacturer's instructions.
- B. Measure joint dimensions and size materials to achieve required width/depth ratios.
- C. Install joint backing to achieve a neck dimension no greater than 1/3 the joint width.

- D. Install bond breaker where joint backing is not used.
- E. Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.
- F. Install sealant free of air pockets, foreign embedded matter, ridges, and sags.
- G. Tool joints concave unless otherwise detailed.

3.4 CLEANING AND REPAIRING

- A. Clean work under provisions of Section 01 77 00.
- B. Clean adjacent soiled surfaces.
- C. Repair or replace defaced or disfigured finishes caused by Work of this Section.

3.5 PROTECTION OF FINISHED WORK

- A. Protect sealants until cured.
- B. Sprinkler fine silica sand on sealant of exterior concrete paving joints to reduce tracking of sealant.

3.6 SCHEDULE

<u>Type</u>	<u>Location</u>	<u>Color</u>
A. Type A - Acrylic Latex Cure	All interior joints not otherwise scheduled	To match adjacent surfaces
B. Type B - Butyl	Under thresholds	Black
C. Type C - One-Part Nonacid Curing Silicone	Exterior door, entrance and window frames. Exterior and Interior vertical joints in natural colored concrete and integral colored masonry prefinished metal flashing.	To match adjacent material.
D. Type E - Neutral-Curing Silicone	Joints within skylight framing system, aluminum window system, glass and glazing.	To match adjacent material.
E. Type F - Mildew-Resistant Silicone	Interior joints in ceramic tile and at plumbing fixtures.	White
F. Type G - Multi-part Pourable Urethane	Exterior and interior joints in horizontal surfaces of concrete.	To match adjacent material.
G. Type H - Acoustical Sealant	Interior walls between stud track/runner and adjacent construction. Between outlet boxes and gypsum board.	White

END OF SECTION

SECTION 08 11 13

HOLLOW METAL DOORS AND FRAMES

1. PART 1 GENERAL

1.1 WORK INCLUDED

- A. Non-rated and fire rated rolled steel doors and frames.
- B. Exterior light frames.
- C. Louvers.

1.2 REFERENCES

- A. ANSI A250.8 - Recommended Specification for Standard Steel Doors and Frames.
- B. ANSI A250.3 - Test Procedure and Acceptance Criteria for Factory-Applied Finish Painted Steel Surfaces for Steel Doors and Frames.
- C. ANSI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames.
- D. ASTM A653 - Steel Sheet, Zinc Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- E. ASTM A924 - General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process.
- F. CEC - California Energy Commission.
- G. NFPA 80 - Fire Doors and Windows.
- H. SDI-105 - Recommended Erection Instructions for Steel Frames.
- I. DHI - Door and Hardware Institute.
- J. CBC - California Building Code, (CCR) California Code of Regulations, Title 24, Part 2 and Part 6.
- K. UL 9 - Fire Tests of Window Assemblies.
- L. UL 10C - Fire Tests of Door Assemblies.

1.3 QUALITY ASSURANCE

- A. Conform to requirements of ANSI A250.8.
- B. Fire rated door and frame construction to conform to UL 9 and UL 10C.
- C. Installed frame and door assembly to conform to NFPA 80 for fire rated class indicated on Drawings.
- D. Installed exterior frame and door assembly to be weather tight.
- E. Manufacturer shall have both fabrication and assembly plant located within the continental United States or Canada. Products that are either fabricated or assembled outside the continental United States or Canada are not acceptable.

1.4 PERFORMANCE REQUIREMENTS

- A. Thermal Performance: Glazed exterior borrowed lite, sidelite and transom lite frames shall have an overall minimum U-value of 0.71 as rated in accordance with the default table method approved by the California Energy Commission (CEC). Provide Certificate NRCC-ENV-05-E, from the Nonresidential Compliance Manual documenting compliance with the CBC, California Building Code, (CCR) California Code of Regulations, Title 24, Part 6, Section 110, Table 110.6-A.
- B. Solar Heat Gain Coefficient: Glazed exterior borrowed lite, sidelite and transom lite frames shall have an overall maximum solar heat gain coefficient of 0.73 as rated in accordance with default table method approved by the California Energy Commission (CEC). Provide Certificate NRCC-ENV-05-E, from the Nonresidential Compliance Manual documenting compliance with the CBC, California Building Code, (CCR) California Code of Regulations, Title 24, Part 6, Section 110, Table 110.6-B.

1.5 REGULATORY REQUIREMENTS

- A. Conform to CBC, California Building Code, (CCR) California Code of Regulations, Title 24, Part 2 for fire rated frames and doors.
- B. Conform to CBC, California Building Code, (CCR) California Code of Regulations, Title 24, Part 6, for U-value and solar heat gain coefficient.

1.6 SUBMITTALS

- A. Submit shop drawings and product data under provisions of Section 01 33 00.
- B. Indicate frame configuration, anchor types and spacings, location of cutouts for hardware, reinforcement, and finish.
- C. Indicate door elevations, internal reinforcement, closure method, and cut outs for glazing and louvers.
- D. Submit two samples of exterior frame profile at mullion intersection.
- E. Submit Certificate NRCC-ENV-05-E, from the Nonresidential Compliance Manual documenting compliance with the CBC, California Building Code, (CCR) California Code of Regulations, Title 24, Part 6, Section 110, Table 110.6-A and 110.6-B.

1.7 DELIVERY, STORAGE AND PROTECTION

- A. Deliver, store, protect, and handle products under provisions of Section 01 61 00.
- B. Store products on site under cover.
- C. Place products on at least 4 inch wood sills to prevent rust and damage.
- D. Protect doors and frames with resilient packaging.

1.8 SEQUENCING AND SCHEDULING

- A. Sequence Work under the provisions of Section 01 11 00.
- B. Schedule Work under the provisions of Section 01 32 16.
- C. Schedule delivery of all doors and frames so as not to delay progress of other trades.

2. PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Curries Mfg., Inc., www.curries.com.

- B. DCI Hollow Metal, www.dcihollowmetal.com.
- C. Fleming, www.flemingdoor.com.
- D. Krieger Steel Products Company, www.kriegersteel.com.
- E. Republic Builders Products Corporation, www.republicdoor.com.
- F. Security Metal Products, www.secmet.com.
- G. Steelcraft, www.steelcraft.com.
- H. Stiles Custom Metal, Inc., www.hollowmetal.com.
- I. Titan Metal Products, Inc., www.titanmetalinc.com.
- J. Substitutions: Under provisions of Section 01 25 13.

2.2 DOORS AND FRAMES

- A. Provide reinforcing steel with a minimum post-consumer recycled content of 50 percent.
- B. Exterior Doors: ANSI A250.8, Level 3, extra heavy-duty, Model 2, continuous welded seam, beveled edges, minimum 0.053 inch thick faces.
- C. Interior Doors: ANSI A250.8, Level 2 heavy duty, Model 1, beveled edges, minimum 0.042 inch thick faces.
- D. Exterior Frames: ANSI A250.8, Level 3, 0.067 inch thick material, core thickness.
- E. Interior Frames: ANSI A250.8, Level 2, 0.053 inch thick material, core thickness.

2.3 DOOR CORE

- A. Exterior Core: Polystyrene insulation.
- B. Interior Door Core: Impregnated cardboard honeycomb.

2.4 ACCESSORIES

- A. Louvers: Roll formed steel, prime coated, inverted 'Y' blade, sightproof, with countersink, tamperproof fasteners.
- B. Rubber Silencers: Resilient rubber as supplied by Section 08 71 00.
- C. Glazing Stops: Rolled steel channel shape, mitered corners; prepared for countersink style tamperproof screws at door installations, square butt at light frames.

2.5 FRAME ANCHORS

- A. Masonry Anchors: Adjustable T-strap, 0.053 inch thick steel, corrugated, 2 inch x 10 inch size. Fire rated frames to have UL listed perforated strap anchor permanently anchored to frame.
- B. Metal Stud Anchor: Z type anchor, welded to frame, 0.053 inch thick steel, UL listed as required for fire rating.
- C. Wood Stud Anchor: U-shaped anchor, welded to frame, 1 inch wide, 0.053 inch thick steel, with 2 pre-punched holes in nailing flange. UL listed as required for fire rating.
- D. Existing Wall Anchor: 0.053 inch thick pipe spacer with 2 inch x 0.053 inch thick steel plate sized to accommodate a 3/8 diameter countersunk flathead expansion anchor. UL listed as required for fire rating.

- E. Floor Clip: Angle anchor, full width of frame, 0.067 inch thick steel.

2.6 PROTECTIVE COATINGS

- A. Rubberized Coating: Corrosion proofing and sound deadener compound. Equivalent to Rust-Oleum Professional Grade Rubberized Undercoating, www.rustoleum.com.
- B. Primer: Clean and treat with three stage iron phosphate process. Provide baked-on shop coat of EPA compliant gray synthetic rust - inhibitive enamel primer meeting acceptance criteria of ANSI 250.10.
- C. The frame underneath the glazing stops and the inside of the glazing stop area shall be treated for maximum paint adhesion and prime painted with a rust inhibitive primer prior to installation of the frame.

2.7 HARDWARE REINFORCEMENT

- A. Fabricate frames and doors with hardware reinforcement plates welded in place.
- B. Hinge reinforcing shall be full width of frame profile.
- C. Provide spacers for all thru-bolted hardware.
- D. Reinforcement components shall be the following minimum thickness:

1. Hinge (door and frame)	3/16 inch
2. Mortise Lock or Deadbolt	0.093 inch
3. Bored Lock or Deadbolt	0.093 inch
4. Flush Bolt Front	0.093 inch
5. Surface Bolt	0.093 inch
6. Surface Applied Closer	0.093 inch
7. Hold Open Arm	0.093 inch
8. Pull Plates and Bars	0.067 inch
9. Surface Exit Device	0.093 inch
10. Floor Checking Hinge	0.167 inch
11. Pivot Hinge	0.167 inch

2.8 FABRICATION

- A. When shipping limitations so dictate, frames for large openings shall be fabricated in sections designed for splicing.
- B. All spliced joints shall occur on the interior side of exterior frames.
- C. Fabricate frames as full profile welded units.
- D. All face, rabbet and soffit joints between abutting members shall be continuously welded and finished smooth when exposed to exterior.
- E. Corner joints shall have all contact edges closed tight, with faces mitered and continuously welded.

- F. Frames with multiple openings shall have mullion members fabricated with no visible seams or joints. All face, rabbet and soffit joints between abutted members shall be continuously welded and finished smooth when exposed to exterior.
- G. Provide 3/8 inch back bend return on frames where gypsum board wall material occurs whether on one or both sides.
- H. Mullions for Double Doors: Removable type supplied by Section 08 71 00.
- I. Dust cover boxes or mortar guards of 0.016 inch thick steel shall be provided at all hardware mortises on frames.
- J. Reinforce frames wider than 48 inches with roll formed, 0.093 inch thick steel channels fitted tightly and welded into frame head, inverted U-shape profile.
- K. Prepare frame for silencers except for frames which receive weatherstripping. Provide three single rubber silencers for single doors on strike side, and two single silencers on frame head at double doors without mullions.
- L. Provide steel spreader temporarily attached to feet of both jambs as a brace during shipping and handling. Spreader is not to be used for installation purposes.
- M. Attach fire rated label to each frame and door unit.
- N. Close top edge of exterior door flush with inverted steel channel closure. Weld all joints watertight.

2.9 MANUFACTURING TOLERANCE

- A. Manufacturing tolerance shall be maintained within the following limits:

1. Frame width	+1/16 inch -1/32 inch
2. Frame height	+/-3/64 inch
3. Frame face	+/-1/32 inch
4. Frame stop	+/-1/32 inch
5. Frame rabbet	+/-1/64 inch
6. Frame depth	+/-1/32 inch
7. Frame throat	+/-1/16 inch
8. Door width and height	+/-3/64 inch
9. Door thickness	+/-1/16 inch
10. Hardware location	+/-1/32 inch
11. Door flatness	+/-1/16 inch

2.10 FINISH

- A. Primer: Baked on rust-inhibitive enamel.
- B. Finish: Site paint under provisions of Section 09 90 00.
- C. Coat inside of frame profile with rubberized undercoating to a thickness of 1/16 inch. Coating may be factory or site applied. Do not apply coating to fire rated frames.

3. PART 3 EXECUTION

3.1 INSTALLATION

- A. Install frames in accordance with SDI-105.
- B. Install doors in accordance with DHI.
- C. Install fire doors and frames in accordance with NFPA 80.
- D. Installation of exterior doors and frames to be weathertight and waterproof.
- E. Seal penetration of all surface applied screws on exterior face of frames at glass stops and hardware attachments.
- F. Coordinate with wall construction and details for anchor placement. Provide anchors as follows:
 - 1. Frames up to 7'-6" height - 4 anchors each jamb.
 - 2. Frames 7'-6" to 8'-0" height - 5 anchors each jamb. Plus an additional anchor for each 2' or fraction thereof over 8'-0".
 - 3. Frames for Double Doors: Minimum of 2 anchors in head approximately 12 inches from each jamb.
 - 4. Borrowed Lite Frames: 2 anchors each jamb plus 1 for each 18 inches or fraction thereof over 3'-0". Minimum 2 anchors in head and sill approximately 12 inches from each jamb plus 1 for each 30 inches of length or fraction thereof.
 - 5. Floor anchors - 1 anchor each jamb. Where wall construction will not allow placement of floor anchor, provide one additional jamb anchor as close to floor as possible. At exterior doors set frames 2 inches into blocked out recess and grout flush with floor.
 - 6. Existing wall anchors shall be welded to provide non-removable condition. Welded bolt head to be ground, dressed and finished smooth.
- G. Frames installed in masonry walls to be fully grouted with masonry grout.
- H. Exposed field welds to be finished smooth and touched up.
- I. Primed or painted surfaces which are scratched or marred shall be touched up.
- J. Hardware to be applied in accordance with hardware manufacturer's templates and instructions.
- K. Coordinate installation of glass and glazing.
- L. Install door louvers.
- M. Install roll formed steel reinforcement channels between two abutting frames. Anchor to structure and floor.

3.2 INSTALLATION TOLERANCES

A. Edge clearance for swinging doors shall not exceed the following:

- | | |
|--|----------|
| 1. Between door and frame at head and jamb | 1/8 inch |
| 2. Between edge of pair of doors | 1/8 inch |
| 3. At door sill with threshold (From bottom of door to top of threshold) | 3/8 inch |
| 4. At door sill with no threshold | 1/2 inch |
| 5. At door bottom and rigid floor covering per NFPA 80 | 1/2 inch |
| 6. At door bottom and nominal floor covering per NFPA 80 | 5/8 inch |

B. Frame installation tolerance shall not exceed the following:

- | | |
|------------------------|--------------|
| 1. Squareness | +/-1/16 inch |
| 2. Alignment | +/-1/16 inch |
| 3. Plumbness | +/-1/16 inch |
| 4. Diagonal Distortion | +/-1/32 inch |

1

END OF SECTION

SECTION 08 31 00

ACCESS DOORS AND FRAMES

1. PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Fire resistive rated and non-rated access doors and frames.
- B. Wall and ceiling locations.
- C. Installation schedule.

1.2 REFERENCES

- A. UL - Underwriters Laboratories.

1.3 QUALITY ASSURANCE

- A. Manufacture fire rated access doors and frames to conform to UL requirements.
- B. Provide labels indicating rating.

1.4 SUBMITTALS

- A. Submit product data under provisions of Section 01 33 00.
- B. Include sizes, types, finishes, scheduled locations, and details of adjoining work.

2. PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Elmdor Manufacturing Co., www.elmdorstoneman.com.
- B. Karp Associates Inc., www.karpinc.com.
- C. J.L. Industries, www.jlindustries.com.
- D. MIFAB, www.mifab.com.
- E. Milcor Incorporated, www.milcorinc.com.
- F. Nystrom Incorporated, www.nystrom.com.
- G. Substitutions: Under provisions of Section 01 25 13.

2.2 ACCESS UNITS

- A. Fire Rated Wall and Ceiling Units: Equivalent to Milcor Flush Panel Universal Fire Rated access door, Model UFR, with sandwich type door panel with 1-1/2 hour B label fire rating.
- B. Non-Rated Wall Units: Equivalent to Milcor Flush Panel Style MS.
- C. Non-Rated Gypsum Board Ceiling Units: Equivalent to Williams Bros. WB GY3000. 30" x 30".
- D. Size: As required for proper access.

2.3 FABRICATION

- A. Fire Rated Units: Fabricate frame of 0.0538 inch thick steel and door panels 0.0329 inch thick steel pans insulated with non-combustible filler.
- B. Non-Rated Units: Fabricate frames of 0.0538 inch thick steel and door panels of 0.0329 inch thick steel.
- C. Weld, fill, and grind joints to assure flush and square unit.
- D. Hardware: Continuous type steel hinges with stainless steel pin, screw driver slot, quarter turn cam lock.
- E. Anchors: Provide masonry anchors where required for wall construction.

2.4 FINISH

- A. Prime coat units with baked on electrostatic primer.
- B. Wall Units: Stainless steel.
- C. Ceiling Units: Site paint primed metal surfaces under provision of Section 09 90 00.

3. PART 3 EXECUTION

3.1 INSPECTION

- A. Verify rough openings for door and frame are correctly sized and located.
- B. Beginning of installation means acceptance of existing conditions.

3.2 INSTALLATION

- A. Install frame plumb, level, and flush in wall and ceiling openings.
- B. Position to provide convenient access to concealed work requiring access.
- C. Secure rigidly in place in accordance with manufacturer's instructions.
- D. Install sealant material around units as specified in Section 07 92 00.

3.3 INSTALLATION SCHEDULE

- A. Provide access doors in locations and in sizes required for all mechanical, plumbing and electrical equipment for proper adjustment, maintenance and general access required by code.

END OF SECTION

SECTION 08 71 00

DOOR HARDWARE

1. PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Hardware for doors.
- B. Thresholds.
- C. Gasketting.
- D. Keying.

1.2 REFERENCES

- A. ADA - Americans with Disabilities Act Standards for Accessible Design.
- B. ANSI - American National Standards Institute.
- C. BHMA - Builders' Hardware Manufacturers Association.
- D. CBC - California Building Code, (CCR) California Code of Regulations, Title 24, Part 2, California State Accessibility Standards.
- E. DHI - Door and Hardware Institute.
- F. NFPA 80 - Fire Doors and Windows.
- G. UL - Underwriters Laboratories.

1.3 COORDINATION

- A. Coordinate work of this Section with other directly affected Sections involving manufacturer of any internal reinforcement for door hardware.

1.4 QUALITY ASSURANCE

- A. Manufacturers: Companies specializing in manufacturing door hardware with minimum five years experience. Obtain each kind of hardware from only one manufacturer.
- B. Hardware Supplier: Company specializing in supplying commercial door hardware with five years documented experience.
- C. Hardware Installer: Company specializing in the installation of commercial door hardware with five years documented experience.
- D. Hardware Supplier Personnel: Employ an Architectural Hardware Consultant (AHC) to assist in the work of this Section.

1.5 REGULATORY REQUIREMENTS

- A. Fire-Rated Openings: Comply with CBC Section 716 and NFPA Standard No. 80. Provide only hardware tested and listed by UL for the type and size of each door required, which complies with the requirements of the door and frame labels.
 - 1. Where exit devices are required on fire-rated doors, provide supplementary marking on door UL label indicating "Fire Door to be Equipped with Fire Exit Hardware", and provide UL Label on exit device indicating "Fire Exit Hardware".
 - 2. Exit device touchpad shall be compliant with State Fire Marshall Standard 12-10-3, Section 12-10-302.
- B. Conform to applicable requirements of the Americans with Disabilities Act Standards for Accessible Design regarding accessibility requirements for door and entrance hardware.
- C. Doors and doorways that are part of an accessible route shall comply with CBC Sections 11B-404.
- D. The clear opening width for a door shall be 32 inches minimum. For a swinging door it shall be measured between the face of the door and the stop, with the door open 90 degrees. There shall be no projections into the opening below 34 inches and 4 inches maximum projections into the opening between 34 inches and 80 inches above the finish floor or ground. Door closers and stops shall be permitted to be 78 inches minimum above the finish floor or ground. CBC Section 11B-404.2.3.
- E. Handles, pulls, latches, locks, and other operable parts on accessible doors shall comply with CBC Section 11B-309.4 and shall be operable with one hand and not require tight grasping, pinching, or twisting of the wrist. Operable parts of such hardware shall be 34 inches minimum and 44 inches maximum above the finish floor or ground. Where sliding doors are in the fully open position, operating hardware shall be exposed and usable from both sides. CBC Section 11B-404.2.7.
- F. The force for pushing or pulling open a door shall be as follows: CBC Section 11B-404.2.9.
 - 1. Interior hinged doors, sliding or folding doors, and exterior hinged doors: 5 lbs. (22.2N) maximum.
 - 2. Required fire doors: the minimum opening force allowable by the Authority having Jurisdiction, not to exceed 15 lbs. (66.7N). These forces do not apply to the force required to retract latch bolts or disengage other devices that hold the door in a closed position.
 - 3. The force required for activating any operable parts, such as lever hardware, or disengaging other devices shall be 5 lbs. (22.2N) maximum to comply with CBC Section 11B-309.4.
- G. Door closing speeds shall be as follows: CBC Section 11B-404.2.8.
 - 1. Closer shall be adjusted so that the required time to move a door from an open position of 90 degrees to a position of 12 degrees from the latch is 5 seconds minimum.
 - 2. Spring hinges shall be adjusted so that the required time to move a door from an open position of 70 degrees to the closed position is 1.5 seconds minimum.
- H. Thresholds shall comply with CBC Section 11B-404.2.5.
- I. Pair of doors: Limit swing of one leaf to 90 degrees so that a clear floor space is provided beyond the arc of the swing for the wall-mounted tactile sign. CBC Section 11B-703.4.2.1.

1.6 SUBMITTALS

- A. Submit schedule under provisions of Section 01 33 00.
- B. Submit schedule at earliest possible date along with essential product data where acceptance of hardware schedule must precede fabrication of other work.

- C. Organize hardware schedule into "hardware sets" indicating complete designations of every item required for each door or opening. Include the following:
 - 1. Type, style, function, size and finish of each hardware item. Use BHMA finish codes as per ANSI A156.18.
 - 2. Name and manufacturer of each item.
 - 3. Fastenings and other pertinent information.
 - 4. Location of hardware set cross-referenced to indications on Drawings both on floor plans and in door and frame schedule.
 - 5. Explanation of all abbreviations, symbols, codes, etc., contained in schedule.
 - 6. Mounting locations for hardware.
 - 7. Door and frame sizes and materials.
- D. Provide product data on specified hardware.
- E. Keying Schedule: Submit separate detailed schedule indicating clearly how the Owner's final instructions on keying of locks has been fulfilled.
- F. Furnish hardware templates to each fabricator of doors, frames, and other work to be factory-prepared for the installation of hardware.

1.7 OPERATION AND MAINTENANCE DATA

- A. Submit operation and maintenance data under provisions of Section 01 77 00.
- B. Include data on operating hardware, lubrication requirements, and inspection procedures related to preventative maintenance.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site and to other Sections under provisions of Section 01 61 00.
- B. Store and protect products under provisions of Section 01 61 00.
- C. Package hardware items individually; label and identify package with door opening code to match hardware schedule.
- D. Deliver keys to Owner by security shipment direct from hardware supplier.

1.9 WARRANTY

- A. Provide five year warranty for closers, two year warranty for all other hardware under provisions of Section 01 77 00.

1.10 MAINTENANCE MATERIALS

- A. Provide special wrenches and tools applicable to each different or special hardware component.
- B. Provide maintenance tools and accessories supplied by hardware component manufacturer.

2. PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

<u>Item</u>	<u>Manufacturer</u>	<u>Acceptable Substitute</u>	
A. Butt Hinges	Hager	McKinney	Stanley
B. Locksets	Schlage	Corbin-Russwin	Marks
C. Cylinders	Corbin-Russwin	None	
D. Surface Closers	LCN	Corbin-Russwin	Stanley
E. Cylinder Guards	Keedex	Corbin-Russwin	Marks
F. Protection Plates	Trimco	Rockwood	Ives
G. Stops and Holders	Trimco	Rockwood	Ives
H. Thresholds/Sweeps/Seals	Pemko	Reese	NGP

2.2 MATERIALS

- A. Locksets: Mortise type. 16 gage curved steel, bronze or brass strikes with 2 inch deep box construction, with curved lips of sufficient length to clear trim and protect clothing.
1. Comply with requirements of local security ordinances.
 2. Locks shall be of such construction that when locked, the door may be opened from within by using lever and without the use of a key or special knowledge.
 3. Lock series and design: Schlage L series 03N lever.
- B. Butt Hinges: Outswinging exterior doors shall have non-removable (NRP) pin. Hinge open widths shall be minimum, but of sufficient size to permit door to swing 180 degrees. Furnish hinges with stainless steel pins and ball bearings.
1. Furnish 3 hinges per leaf to 7'-5" height. Add one for each additional 2 foot height.
 2. Provide 5 inch heavy weight hinges on doors over 3'-4" width.
- C. Surface Door Closers: Full rack and pinion type with removable non-ferrous case. Provide closers with sex bolts and grommets at wood doors. Place closers inside building, stairs, rooms, etc. Closers shall be non-handed, non-sized and adjustable. Closers shall be installed to permit door to swing 180 degrees.
1. Flush transom offset brackets shall be used where parallel arm closers are listed for doors with fixed panels over.
 2. Provide drop brackets, shoe supports, and blade stop spacers as required at narrow top rails.
- D. Protection Plates: Fabricate kick or mop plates with diamond plate as shown in detail 19/A-5.1. Furnish with countersunk stainless steel machine screws to match other hardware.
- E. Floor Stops: Floor mounted door stops are prohibited where located in the path of travel. Where provided, install maximum 4 inches from wall surface.
- F. Seals: Solid neoprene to be MIL Spec. R6855-CL III, Grade 40. Sponge neoprene to be MIL Spec. R6130, Type II, Group C. UL label shall be applied on all rated doors.
- G. Silencers: Furnish silencers for interior hollow metal frames, 3 for single doors, 2 for pairs of doors. Omit where sound or light seals occur, or for fire-resistive-rated door assemblies.
- H. Thresholds: Change in level between 1/4 inch and 1/2 inch shall be beveled with a slope no greater than 1 unit vertical to 2 units horizontal (50 percent slope). The floor or landing shall not be more than 1/2 inch lower than the threshold of the doorway.

2.3 KEYING

- A. Contact the Facilities Department with the City of Costa Mesa for keying requirements. Keying system shall be coordinated with the Owner and approved by Owner's representative in writing. Furnish construction key system in accordance with lock manufacturers' standard. Where interchangeable core systems are used, provide temporary cores for construction keying.
- B. Key system shall be Corbin-Russwin I/C core cylinder.
- C. For protection of the Owner, cylinders shall be keyed at the factory of the cylinder manufacturer where permanent records are maintained. Permanently inscribe each key cylinder with number that identifies cylinder manufacturer key symbol, and notation "DO NOT DUPLICATE".
- D. Deliver permanent keys and cylinder cores directly to Owner by registered security shipment direct from hardware manufacturer. Hardware supplier shall not cut keys.

2.4 LOCK BOX

- A. Model No. 3200 lock box manufactured by the Knox Company, www.knoxbox.com.
- B. Surface or recess mounted as required.
- C. Polyester powder coated finish in black color.
- D. UL listed tamper switch.

2.5 FINISHES

- A. Generally to be BHMA 626 Satin Chromium.
- B. Areas using BHMA 626 shall have push, pulls and kick plates of BHMA 630, Satin Stainless Steel, unless otherwise noted.
- C. Factory paint door closers to match other hardware, unless otherwise noted.
- D. Aluminum items to be finished AL unless otherwise noted.

2.6 FASTENERS

- A. Screws for strikes, face plates and similar items shall be flathead, countersunk type; provide machine screws for metal and standard wood screws for wood.
- B. Screws for butt hinges shall be flathead, countersunk, full-thread type.
- C. Fastening of closer bases or closer shoes to doors shall be by means of sex bolts and spray painted to match closer finish.
- D. Provide expansion anchors for attaching hardware items to concrete or masonry.
- E. All exposed fasteners shall have a phillips head.
- F. Finish of exposed screws to match surface finish of hardware or other adjacent work.

2.7 OTHER MATERIAL

- A. All other materials not specifically described, but required for a complete and proper finish hardware installation shall be selected by Architect as required at no additional cost.

3. PART 3 EXECUTION

3.1 INSPECTION

- A. Verify that doors and frames are ready to receive work and dimensions are as instructed by the manufacturer.
- B. Beginning of installation means acceptance of existing conditions.

3.2 INSTALLATION

- A. Pre-Installation Meetings: Initiate and conduct with supplier, installer, and related trades, coordinate materials and techniques, and sequence complex hardware items and systems installation. Include manufacturers' representatives of locks, panic hardware, and door closers in the meetings. Convene at least one week prior to commencement of related work.
- B. Install hardware in accordance with manufacturer's instructions and requirements of DHI.
- C. Wherever cutting and fitting is required to install hardware onto or into surfaces which are later to be painted or finished in another way, coordinate removal, storage and reinstallation or application of surface protection with finishing work specified in Division 9. Do not install surface-mounted items until finishes have been completed on the substrate.
- D. Set units level, plumb and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.
- E. Drill and countersink units which are not factory-prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.
- F. Set exterior door thresholds with full-width bead of elastomeric sealant on each point of contact with floor, providing a continuous weather seal. Anchor thresholds with stainless steel countersunk screws.
- G. If handle of door is changed during construction, make necessary changes in hardware at no additional cost.
- H. Mount lock box in accordance with manufacturers' instructions. Connect to building security system. Mount at 4'-0" from finished grade to center of box.

3.3 ADJUST AND CLEAN

- A. Adjust and check each operating item of hardware and each door, to ensure proper operation or function of every unit. Replace units which cannot be adjusted to operate freely and smoothly as intended for the application made.
- B. Clean adjacent surfaces soiled by hardware installation.
- C. Final Adjustment: Wherever hardware installation is made more than one month prior to acceptance or occupancy of a space or area, return to the work during the week prior to acceptance or occupancy, and make final check and adjustment of all hardware items in such space or area. Clean operating items as necessary to restore proper function and finish of hardware and doors. Adjust door control devices to compensate for final operation of heating and ventilating equipment.
- D. Instruct Owner's Personnel in proper adjustment and maintenance of hardware finishes, during the final adjustment of hardware.
- E. Continued Maintenance Service: Approximately six months after the completion of the project, the Contractor, accompanied by the Finish Hardware Installer, shall return to the project and re-adjust every item of hardware to restore proper function of doors and hardware. Consult with and instruct Owner's personnel in recommended additions to the maintenance procedures. Replace hardware items which have deteriorated or failed due to faulty design, materials or installation of hardware units. Prepare a written report of current and predictable problems (of substantial nature) in the performance of the hardware.

3.4 HARDWARE LOCATIONS

- A. Lockset: 34 to 44 inches above finished floor. Verify manufacturers' template with door design.
- B. Conform to CBC, CCR, Title 24, Part 2, and ADA regarding positioning requirements for accessibility.

3.5 FIELD QUALITY CONTROL

- A. Architectural Hardware Consultant (AHC) to inspect installation and certify that hardware and its installation have been furnished and installed in accordance with manufacturer's instructions and as specified herein.

3.6 SCHEDULE

- A. Legend of listed manufacturers. The last column in the Schedule of Door Hardware refers to the manufacturer listed in the following schedule:

COR	Corbin-Russwin
HAG	Hager
KEE	Keedex
LCN	LCN
PEM	Pemko
SCH	Schlage
TRM	Trimco

- B. The items listed in the following schedule shall conform to the requirements of the foregoing specification.
- C. The Door Schedule on the Drawings indicates which hardware set is used with each door.
- D. Schedule of Door Hardware:

HW-1

Each single door to have

3	HINGE	AB800 - 4.5 x 4.5 x NRP	630	HAG
1	LOCKSET	L9456T x 03N x L583-363 x L283-722	626	SCH
1	PERMANENT CORE	8000	626	COR
1	CYLINDER GUARD	K-24	626	KEE
1	LOCK ASTRAGAL	5000-T	626	TRM
1	SURFACE CLOSER	4040XP-SCUSH x SRI	689	LCN
1	KICK PLATE	K0125 - 10 x 2 LDW x DIAMOND x RC	628	TRM
1 SET	DOOR SEALS	2893V HEAD & JAMBS	628	PEM
1	DOOR SWEEP	57V	628	PEM
1	THRESHOLD	PER SILL DETAIL	628	PEM

Note: Install door seals before closer

HW-2

Each single door to have

3	HINGE	AB800 - 4.5 x 4.5	630	HAG
1	PRIVACY	L9440 x 03N x L583-363 x L283-722	626	SCH
1	SURFACE CLOSER	4040XP-REG x SRI	689	LCN
1	KICK PLATE	K0125 - 10 x 2 LDW x DIAMOND x RC	628	TRM
1	MOP PLATE	K0125 - 6 x 1 LDW x DIAMOND x RC	628	TRM
1	WALL BUMPER	1270WV	630	TRM
3	SILENCERS	1229A	GRY	TRM
1	THRESHOLD	MARBLE BY OTHERS	----	----

HW-3

Each single door to have

3	HINGE	AB800 - 4.5 x 4.5 x NRP	630	HAG
1	LOCKSET	L9080T x 03N	626	SCH
1	PERMANENT CORE	8000	626	cor
1	CYLINDER GUARD	K-24	626	KEE
1	LOCK ASTRAGAL	5000-T	626	TRM
1	DOOR HOLDER	PAH-60	689	LCN
1	KICK PLATE	K0125 - 10 x 2 LDW x DIAMOND x RC	628	TRM
1 SET	DOOR SEALS	2893V HEAD & JAMBS	628	PEM
1	DOOR SWEEP	57V	628	PEM
1	THRESHOLD	PER SILL DETAIL	628	PEM

Note: Install door seals before holder

HW-4

Each single door to have

3	HINGE	AB800 - 4.5 x 4.5 x NRP	630	HAG
1	LOCKSET	L9080T x 03N	626	SCH
1	PERMANENT CORE	8000	626	cor
1	CYLINDER GUARD	K-24	626	KEE
1	LOCK ASTRAGAL	5000-T	626	TRM
1	DOOR HOLDER	PAH-60	689	LCN
1	KICK PLATE	K0125 - 10 x 2 LDW x DIAMOND x RC	628	TRM
1	WALL BUMPER	1270WV	630	TRM
1 SET	DOOR SEALS	2893V HEAD & JAMBS	628	PEM
1	DOOR SWEEP	57V	628	PEM
1	THRESHOLD	PER SILL DETAIL	628	PEM

Note: Install door seals before holder

END OF SECTION

SECTION 09 21 16

GYP SUM BOARD ASSEMBLIES

1. PART 1 GENERAL

1.1 WORK INCLUDED

- A. Gypsum board.
- B. Glass mat gypsum sheathing.
- C. Shaft wall coreboard.
- D. Abuse/Impact resistant gypsum board.
- E. Acoustically enhanced gypsum board.
- F. Taped and sanded joint treatment.
- G. Surface primer.
- H. Resilient furring channels.
- I. Metal channel ceiling framing.

1.2 REFERENCES

- A. ASTM A641 - Zinc-Coated (Galvanized) Carbon Steel Wire.
- B. ASTM C11 - Standard Terminology Relating to Gypsum and Related Building Materials and Systems.
- C. ASTM C79 - Standard Specification for Treated Core and Nontreated Core Gypsum Sheathing Board.
- D. ASTM C475 - Joint Treatment Materials for Gypsum Wallboard Construction.
- E. ASTM C514 - Nails for the Application of Gypsum Wallboard.
- F. ASTM C557 - Adhesives for Fastening Gypsum Wallboard to Wood Framing.
- G. ASTM C645 - Non-Load (Axial) Bearing Steel Studs, Runners (Track), and Rigid Furring Channels for Screw Application of Gypsum Board.
- H. ASTM C754 - Installation of Steel Framing Members to Receive Screw Attached Gypsum Wallboard, Backing Board, or Water Resistant Backing Board.
- I. ASTM C840 - Application and Finishing of Gypsum Board.
- J. ASTM C919 - Use of Sealants in Acoustical Applications.
- K. ASTM C1002 - Steel Drill Screws for the Application of Gypsum Board.
- L. ASTM C1177 - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
- M. ASTM C1396 - Standard Specification for Gypsum Board.
- N. ASTM C1629 - Standard Specification for the Abuse-Resistant Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels.
- O. ASTM D226 - Asphalt-Saturated Felt Used in Roofing and Waterproofing.

- P. ASTM D1037 - Test Methods for Evaluating Properties of Wood-Based Fiber and Particle Panel Materials.
- Q. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.
- R. ASTM D3274 - Standard Test Method for Evaluating Degree of Surface Disfiguration of Paint Films in Fungal or Algal Growth, or Soil and Dirt Accumulation.
- S. ASTM D4977 - Standard Test Method for Granular Adhesion to Mineral Surfaced Roofing by abrasion (modified).
- T. ASTM D5420 - Standard Test Method for Impact Resistance of Flat, Rigid Plastic Specimen by Means of a Striker Impacted by a Falling Weight (Gardner Impact).
- U. ASTM E90 - Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions.
- V. ASTM E695 - Standard Method of Measuring Relative Resistance of Wall, Floor, and Roof Construction to Impact Loading.
- W. CBC - California Building Code, (CCR) California Code of Regulations, Title 24, Part 2.
- X. GA 201 - Using Gypsum Board for Walls and Ceilings.
- Y. GA 214 - Levels of Gypsum Board Finish.
- Z. GA 216 - Application and Finishing of Gypsum Board.
- AA. GA 253 - Application of Gypsum Sheathing.
- BB. GA 600 - Fire Resistance Design Manual.
- CC. ISO 14040 - Environmental Management - Life cycle assessment - Principals and Framework.
- DD. UL - Underwriters Laboratories.

1.3 QUALITY ASSURANCE

- A. Applicator: Company specializing in gypsum board systems work with five years documented experience.

1.4 REGULATORY REQUIREMENTS

- A. Conform to CBC, California Building Code, (CCR) California Code of Regulations, Title 24, Part 2, Chapter 7, and UL and GA requirements for fire rated assemblies as indicated on the drawings
- B. Conform to UL No. 2079 for cyclical design at head of fire rated walls.

1.5 ACOUSTICAL PERFORMANCE

- A. Acoustical Attenuation for Identified Interior Partitions: 50 STC minimum in accordance with ASTM E90.

1.6 ENVIRONMENTAL REQUIREMENTS

- A. Maintain uniform temperature of minimum 60 degrees F and humidity of 30 to 50 percent prior to, during, and after installation of the Work of this Section.

1.7 DEFINITIONS

- A. Refer to ASTM C11 for definitions of terms related to gypsum board assemblies.

1.8 FIELD SAMPLES

- A. Provide field samples under provisions of Section 01 33 00.
- B. On wall and ceiling surface duplicate specified texture finish on at least 100 sq.ft. of surface area.
- C. Provide complete finish including surface primer.
- D. Simulate finished lighting conditions for review of field sample.
- E. After surface texture is accepted, the accepted surface will remain as part of the Work and will be used to evaluate subsequent applications of finish texture.

2. PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS - GYPSUM BOARD SYSTEM

- A. American Gypsum Corp., www.americangypsum.com.
- B. Certainteed, www.certainteed.com.
- C. Georgia Pacific Corp., www.gp.com.
- D. National Gypsum Co., www.nationalgypsum.com.
- E. PABCO Gypsum, www.pabcogypsum.com.
- F. United States Gypsum Co., www.usg.com.
- G. Substitutions: Under provisions of Section 01 25 13.

2.2 FRAMING MATERIALS

- A. Metal Furring: ASTM C645, hat-shaped, 7/8 inch deep, 0.0329 inch thick.
- B. Resilient Furring Channel: Manufacturer's standard product designed to reduce sound transmission, complying with ASTM C645 for material, finish and widths of face and fastening flange; 1/2 inch deep x 0.0179 inch thick asymmetric-shaped channel with face connected to single flange by slotted leg (web).
- C. Furring Channel: ASTM C754, 1-1/2 inch x 0.475 lb./ft. channel.
- D. Fasteners: ASTM C1002.
- E. Hanger Wire: ASTM A641, Class 1 coating (galvanized) soft temper, 9 gauge.
- F. Tie Wire: ASTM A641, Class 1 coating (galvanized) soft temper, 16 and 18 gauge.
- G. Adhesive: ASTM C557.

2.3 GYPSUM BOARD MATERIALS

- A. Fire Rated Gypsum Board: ASTM C1396; fire resistive type, UL rated; 5/8 inch thick unless otherwise indicated, maximum permissible length; ends square cut, tapered and beveled edges. Similar to Sheetrock Brand EcoSmart Panels manufactured by United States Gypsum Company
- B. Fire Rated Acoustically Enhanced Gypsum Board: ASTM C1396; fire resistive type, UL rated; 5/8 inch thick multilayer product constructed of two layers of gypsum board sandwiching a viscoelastic sound-absorbing polymer core; maximum permissible length; ends square cut, tapered and beveled edges, similar to Sound Break as manufactured by National Gypsum Company.

- C. Shaftwall Coredboard: ASTM C1396; fire resistive type, UL rated; 1 inch thick; water resistant core; mold, mildew, and water resistant paper on front, back and long edges; maximum permissible length; ends square cut, beveled edges.
- D. Glass-Mat Gypsum Sheathing Board: ASTM C1177; 1/2 inch thick, similar to Dens-Glass Gold manufactured by Georgia Pacific Corp.
- E. Fire Rated Abuse/Impact Resistant Gypsum Board: ASTM C1629; fire resistive type, UL rated; 5/8 inch thick, maximum permissible lengths; ends square cut, tapered and beveled edges; with additives and fiberglass mat facings to enhance indentation resistance, abrasion, and impact resistance. Similar to Sheetrock Brand VHI Firecode X Panels manufactured by United States Gypsum Company meeting the following characteristics:
 - 1. Surface Abrasion: ASTM C1629 / D 4977, Level 2.
 - 2. Indentation Resistance: ASTM C1629 / D5420, Level 1.
 - 3. Soft-Body Impact: ASTM C1629 / E695, Level 3.
 - 4. Hard-Body Impact: ASTM C1629, Level 3.
 - 5. Mold / Mildew Resistance: ASTM D3273, with a score of 10.
- F. Fire Rated Flexible Gypsum Board: ASTM C1396; fire resistive type, UL rated, 1/4 inch thick, maximum permissible lengths; ends square cut, slightly tapered edges.

2.4 ACCESSORIES

- A. Acoustical Sealant: Non-hardening, non-skinning, for use in conjunction with gypsum board: As specified in Section 07 92 00.
- B. Fire Rated Sealant and Fiber Stuffing: As specified in Section 07 84 00.
- C. Corner Beads: Metal, hot dip galvanized.
- D. Edge Trim: GA 201 and GA 216; Type LC bead, unless otherwise indicated.
- E. Control Joints: Roll-formed zinc, Type USG No. 093.
- F. Aluminum Trim and Reveal Moldings: Extruded accessories of profiles and dimensions indicated. Alloy 6063-T5, clear anodic finish. Similar to products manufactured by Fry Reglet Co., www.fryreglet.com.
- G. Curved-Edge Cornerbead: Vinyl type with notched or flexible flanges.
- H. Spot Grout: ASTM C475, setting-type joint compound.
- I. Joint Materials Interior: ASTM C475; reinforcing tape, joint compound, adhesive, water, and fasteners. Use tapes and compound recommended by gypsum board manufacturer for the use intended. Use ready mixed, drying type compounds. Use taping compound for embedding tape and first coat over fasteners and flanges of corner beads and trim. Use topping compound for fill and finish coats.
- J. Joint Materials, Exterior:
 - 1. Glass-Mat Gypsum Sheathing: 2 inch wide 10 x 10 self-adhering fiberglass joint tape recommended by manufacturer.
- K. Primer: Flat latex basecoat paint equivalent to First Coat manufactured by United States Gypsum Company.
- L. Primer-Surfacer: Not permitted.
- M. Membrane: ASTM D226; No. 15 asphalt saturated roofing felt.

3. PART 3 EXECUTION

3.1 INSPECTION

- A. Verify that site conditions are ready to receive Work.
- B. Beginning of installation means acceptance of substrate.

3.2 WALL FURRING INSTALLATION

- A. Erect wall furring for direct attachment to masonry and concrete walls.
- B. Erect metal furring vertically at 16, 24 inches o.c. Secure in place on alternate channel flanges at maximum 24 inches o.c.

3.3 ACOUSTICAL ACCESSORIES INSTALLATION

- A. Space resilient furring channels horizontally at maximum 16, 24 inches o.c., not more than 2 inches from floor and ceiling lines.
- B. Locate nested joints over framing members.
- C. Install acoustical sealant within partitions in accordance with manufacturer's instructions and ASTM C919.
- D. Seal perimeter, joints, openings and penetrations on each face of partition.

3.4 CEILING FRAMING INSTALLATION

- A. Install in accordance with ASTM C754 and CBC, California Building Code, (CCR) California Code of Regulations, Title 24, Part 2, Chapter 25.
- B. Coordinate locations of hangers with other Work.
- C. Install ceiling framing independent of walls and columns.
- D. Space 9 gauge hanger wires 3'-0" o.c. along 1-1/2 inch furring channels and within 6 inches of end of furring channel.
- E. Install 1-1/2 inch furring channels at 4'-0" o.c. and within 6 inches of parallel walls. Provide 1 inch clearance between end of channels and abutting walls.
- F. Position furring channels for proper ceiling height, level, and secure with hanger wire saddle-tied along channel.
- G. At channel splices, interlock flanges, overlap ends 12 inches and secure each end with double-strand of 16 gauge tie wire.
- H. Erect metal furring at right angles to 1-1/2 inch furring channels. Space metal furring 16 inches o.c.
- I. Install metal furring within 6 inches of parallel walls. Provide 1 inch clearance between end of furring and abutting wall.
- J. Secure metal furring to furring channel with clips or saddle tie with double strand of 18 gauge tie wire.
- K. At splices of metal furring nest furring at least 8 inches and securely wire-tie each end with double strand of 16 gauge tie-wire.
- L. Reinforce openings in ceiling suspension system which interrupt main furring channels or metal furring with lateral channel bracing. Extend bracing minimum 24 inches past each end of openings.

3.5 MEMBRANE INSTALLATION

- A. Install membrane over wall studding where moisture resistant gypsum board or gypsum tile backer board is to be installed.
- B. Install membrane over substrate; weatherlap horizontal edges 4 inches and vertical edges 6 inches.

3.6 GYPSUM BOARD INSTALLATION

- A. Install gypsum board in accordance with ASTM C840 and manufacturer's instructions.
- B. Erect single layer standard gypsum board in most economical direction, with ends and edges occurring over firm bearing except those ends and edges which are perpendicular to framing.
- C. Erect single layer fire rated gypsum board vertically, with edges and ends occurring over firm bearing except those ends and edges which are perpendicular to framing members. Comply with required UL, CBC, or GA fire rated assembly.
- D. Erect double layer gypsum board with standard gypsum board for first layer placed in most economical direction with second layer placed parallel to face layer with adhesive and supplementary fasteners. Off-set joints of second layer from joints of first layer by at least 12 inches.
- E. Erect double layer fire rated gypsum board in accordance with required UL, CBC, or GA fire rated assembly.
- F. Use screws when fastening gypsum board to metal furring.
- G. Use screws when fastening gypsum board to wood furring or framing except where nails are required for UL or UBC fire rated assembly.
- H. Install fire stop sealant and fiber stuffing at wall penetrations and terminations in accordance with required UL, CBC, or GA fire rated assembly in accordance with Section 07 84 00.
- I. Install acoustical sealant at wall penetrations and terminations as specified in this section and in accordance with Section 07 92 00.
- J. Isolate perimeter of gypsum board applied to non-load bearing partitions at structural abutments. Provide ½ inch wide space and trim with metal edge. Seal joint between metal edge and structural surface with acoustical sealant.
- K. Where partitions intersect structural members projecting below underside of floor / roof slabs and decks, cut gypsum panels to fit profile formed by structural member. Allow ½ inch wide space and install acoustical sealant.
- L. Treat cut edges and holes in moisture resistant gypsum board with sealant.
- M. Install gypsum board with mold and mildew-resistant core and paper facing at exterior locations on the interior face of all exterior walls.
- N. Place control joints as indicated on the drawings and not to exceed 30 feet maximum in either direction for partitions and ceilings. Provide adequate seal or safing insulation behind control joints to maintain sound or fire ratings.
- O. Place corner beads at external corners. Use longest practical length. Place edge trim where gypsum board abuts dissimilar materials.
- P. Spot grout metal door frames. Apply spot grout at each jamb anchor clip just before inserting board into frame.

3.7 CURVED PARTITIONS

- A. Install panels horizontally and unbroken across curved surface.
- B. Wet gypsum panels on surface that will become compressed.
- C. On convex side of partition, begin installation at one end of curved surface and fasten panels to studs as they are wrapped around curve.
- D. On concave side of partition, start fastening panels at center of curve and work outward to panel ends.
- E. Allow wetted panels to dry before applying joint treatment.

3.8 CEILING INSTALLATION

- A. Apply gypsum soffit board panels perpendicular to supports with end joints staggered and located over supports.
- B. Install panels with 1/4 inch open space where panels abut other construction or penetrations.
- C. Fasten with corrosion-resistant screws.

3.9 GLASS MAT GYPSUM SHEATHING INSTALLATION

- A. Install glass mat gypsum sheathing in accordance with manufacturer's instructions and in accordance with GA-253.
- B. Install glass mat gypsum sheathing with gold side out.
- C. Install glass mat gypsum parapet sheathing with blue low-perm side out.
- D. Install glass mat gypsum sheathing with long dimension parallel to framing members.
- E. Fasten with corrosion-resistant screws.
- F. Install fire rated glass mat gypsum sheathing in accordance with listed assembly indicated from UL, CBC or GA.

3.10 SHAFT WALL ASSEMBLY INSTALLATION

- A. Shaft wall assemblies shall be installed to comply with requirements of fire-resistance-rated assemblies indicated from UL, CBC or GA.
- B. Do not bridge building expansion joints with shaft-wall assemblies. Frame both sides of joint with furring and other supports.
- C. At penetrations in shaft wall, maintain fire-resistive rating by installing supplemental fire protection behind boxes, elevator call buttons, elevator floor indicators and similar items.
- D. Isolate gypsum finish panels from building structure to prevent cracking while maintaining continuity of fire-rated construction.
- E. Seal gypsum board shaft walls with fire rated sealant at perimeter of assembly where it abuts other work and at joints and penetrations.
- F. Where shaft wall assemblies cannot be positioned within 2 inches of the shaft wall face of structural beams, floor edges and similar projections into shaft, install 5/8 inch thick gypsum board cants covering tops of projections.
- G. Install multiple layers of gypsum board materials as specified for double layer installation.

3.11 JOINT TREATMENT

- A. Tape, fill, and sand joints, edges, and corners in accordance with GA-214.
- B. Feather successive coats a minimum of 2 inches onto adjoining surfaces for each coat.
- C. Where fire resistance rating is required, detail of joint treatment shall meet fire rating requirement.
- D. Level 1 Treatment:
 - 1. All joints and angles shall have tape embedded in joint compound.
 - 2. Surface shall be free of excess joint compound.
 - 3. Tool marks and ridges are acceptable.
 - 4. Use for plenum areas above ceiling, in areas that are generally concealed and other areas not normally open to view.
- E. Level 2 Treatment:
 - 1. All joints and angles shall have tape embedded in joint compound and one separate coat of joint compound shall be applied over all fastener heads and accessories.
 - 2. Surface shall be free of excess joint compound.
 - 3. Tool marks and ridges are acceptable.
 - 4. Use where surface is substrate to ceramic tile, acoustic tile, or tackable wallboard system.
- F. Level 3 Treatment:
 - 1. Not used.
- G. Level 4 Treatment:
 - 1. Not used.
- H. Level 5 Treatment:
 - 1. All joints and angles shall have tape embedded in joint compound with three separate coats of topping compound applied over all joints, fasteners, and accessories.
 - 2. Apply two thin skim coats of topping compound over entire surface.
 - 3. All compound shall be smooth and free of tool marks and ridges.
 - 4. Sand lightly between coats.
 - 5. Use for all surfaces that are scheduled to receive a painted finish.
- I. Glass-Mat Gypsum Sheathing Board: Apply self-adhering fiberglass joint tape over joints and embed in bead of acrylic latex sealant applied into board joint.

3.12 FINISHING

- A. Roller apply surface primer to all gypsum board surfaces scheduled to receive a painted finish prior to application of paint or texture finish.

3.13 TOLERANCES

- A. Maximum Variation from True Flatness: 1/8 inch in 10 feet in any direction.

3.14 RECYCLING CONSTRUCTION WASTE

- A. Recycle gypsum board waste under the provisions of Section 01 74 19.

3.15 PROTECTION

- A. Protect adjacent surfaces from joint compound. Promptly remove from floors and other surfaces. Repair stained and marred surfaces damaged during gypsum board application.
- B. Protect work of this section from weather, condensation, direct sunlight, and other detrimental causes during the construction period.
- C. Remove and replace gypsum panels that become wet, moisture damaged and mold damaged.

END OF SECTION

SECTION 09 24 00

CEMENT PLASTERING

1. PART 1 GENERAL

1.1 WORK INCLUDED

- A. Metal lathing.
- B. Portland cement plaster system.
- C. Acrylic based finish coat.
- D. Plaster application schedule.

1.2 REFERENCES

- A. ASTM A641 - Zinc-Coated (Galvanized) Carbon Steel Wire.
- B. ASTM C150 - Portland Cement.
- C. ASTM C206 - Finishing Hydrated Lime.
- D. ASTM C847 - Standard Specifications for Metal Lath.
- E. ASTM C897 - Aggregate for Job-Mixed Portland Cement-Based Plasters.
- F. ASTM C926 - Application of Portland Cement-Based Plaster.
- G. ASTM C932 - Surface-Applied Bonding Agents for Exterior Plaster.
- H. ASTM C954 - Steel Drill Screws for the Application of Gypsum Board or Metal Plaster Bases to Steel Studs from 0.033 inches to 0.112 inches in thickness.
- I. ASTM C1002 - Steel Drill Screws for the Application of Gypsum Board or Metal Plaster Bases.
- J. ASTM C1063 - Installation of Lathing and Furring for Portland Cement Based Plaster.
- K. NAAMM Standard ML/SFA 920 - Guide Specifications for Metal Lathing and Furring.
- L. Lathing and Plaster Systems Manual - Third Edition.
- M. Military Specification MIL-B-19235 - Bonding Agents.
- N. PCA (Portland Cement Association) - Portland Cement Plaster (Stucco) Manual.
- O. CBC - California Building Code, (CCR) California Code of Regulations, Title 24, Part 2.
- P. ICC - International Code Council.
- Q. TSIB - Technical Services Information Bureau.

1.3 QUALITY ASSURANCE

- A. Applicator: Company specializing in cement plaster work with five years documented experience.
- B. At the completion of lathing and prior to the application of scratch coat of plaster, contact the Technical Services Information Bureau, www.tsib.org, and arrange for inspection of lathing and accessories installation. Provide Architect a written report of the results of the inspection.

- C. Installation of underlayment and penetration flashing shall be in accordance with manufacturer's installation guidelines and recommendations. Provide site reports from manufacturer's field service representative, indicating observation of underlayment and flashing installation.

1.4 REGULATORY REQUIREMENTS

- A. Conform to CBC, California Building Code, (CCR) California Code of Regulations, Title 24, Part 2, Chapter 7, for fire rated assemblies as indicated on drawings.
- B. Conform to CBC, California Building Code, (CCR) California Code of Regulations, Title 24, Part 2, Chapter 25 for materials and their installation.
- C. Obtain approval of enforcement agency for installation of self furring metal lath.

1.5 SUBMITTALS

- A. Submit product data under provisions of Section 01 33 00.
- B. Provide product data on plaster materials, characteristics and limitations of products specified.
- C. Submit samples of integral color and texture for plaster finish.
- D. Provide underlayment manufacturer's written installation instructions.

1.6 FIELD SAMPLES

- A. Provide sample panel under provisions of Section 01 33 00.
- B. Construct field sample panel, minimum 96 inches long by 96 inches wide, illustrating lath installation, base coat installation, surface texture, and color of finish coat.
- C. Locate where directed.
- D. Accepted sample may remain as part of the Work.

1.7 PRE-INSTALLATION CONFERENCE

- A. Convene a conference two weeks prior to commencing work of this Section under the provisions of Section 01 31 00.
- B. Require the attendance of parties directly affecting the Work of this Section.
- C. Review requirements for installation of all materials specified in this Section for sequencing, proper installation, integration and protection.

1.8 ENVIRONMENTAL REQUIREMENTS

- A. Do not apply plaster when substrate or ambient air temperature is less than 40 degrees F or more than 90 degrees F.
- B. Maintain minimum ambient temperature of 40 degrees F during and after installation of plaster.
- C. Protect portland cement plaster from uneven and excessive evaporation during dry weather and from strong blasts of dry air.

1.9 WARRANTY

- A. Provide ten year warranty for underlayment and flashings under provisions of Section 01 77 00.
- B. Warranty: Include coverage for published water infiltration properties of underlayment and flashings installed for exterior walls and openings.

2. PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Lathing Materials:

1. Amico-West, www.amico-lath.com.
2. ClarkDietrich Building Systems, www.clarkdietrich.com.
3. CEMCO, www.cemcosteel.com.

B. Accessories:

1. ClarkDietrich Building Systems, www.clarkdietrich.com.
2. Flannery, Inc., www.flannerytrim.com.
3. Fry Reglet Corp., www.fryreglet.com.
4. Metalex Corp., www.metlx.com.
5. M.M. Systems Corporation, www.mmsystemscorp.com.
6. CEMCO, www.cemcosteel.com.
7. Amico-West, www.amico-lath.com.
8. Stockton Wire Products, www.stocktonproducts.com.

C. Acrylic Based Level Coat:

1. Omega Stucco, AkroFlex Base Primer, FoamTek, or CI-Base www.omega-products.com.

D. Acrylic-Based Finish Coat:

1. BASF, Master Builders, Master Protect HB 400 Acrylic Finish, www.master-builders-solutions.basf.us.com.
2. Omega Stucco, AkroFlex MultiTex, www.omega-products.com.

E. Underlayment:

1. Underlayment: Tyvek as manufactured by E.I. DuPont de Nemours, www.tyvek.com
 - (a) First layer: Commercial Wrap D.
 - (b) Second layer: Commercial Wrap.
2. Other acceptable underlayment: Dryline Building Wrap CP and Rain Drain as manufactured by National Shelter Products, Inc., www.drylinewrap.com.

F. Substitutions: Under provisions of Section 01 25 13.

2.2 PLASTER BASE COAT MATERIALS

- A. Cement: ASTM C150, Normal - Type I, Portland.
- B. Lime: ASTM C206, Type S.
- C. Aggregate: In accordance with ASTM C897 and PCA Plaster (Stucco) Manual.

- D. Water: Clean, fresh, potable and free of mineral or organic matter which can affect plaster.
- E. Bonding Agent: ASTM C932; type recommended for bonding plaster to concrete and concrete masonry surfaces. Larsen Products Corp. - Weld-Crete, www.larsenproducts.com.
- F. Plaster Mix Reinforcement: Glass fibers, 1/2 inch nominal length, alkali resistant.
- G. Substitutions: Under provisions of Section 01 25 13.

2.3 PLASTER FINISH COAT MATERIALS

- A. Acrylic Finish Coat: Factory-mixed formulation of acrylic emulsion, colorfast mineral pigments and fine aggregates for use over portland cement plaster base coats. Integral pre-mixed color in custom color as selected by Architect. Up to four (4) different colors will be selected for use in varying amounts at all plaster locations.

2.4 METAL LATHING

- A. Metal Lath for Vertical Surfaces: ASTM C847, 3.4 lb/sq.yd. expanded metal, galvanized, self furring type with "V" shaped continuous groove.
- B. Metal Lath for Horizontal Surfaces: ASTM C847, 3.4 lb./sq.yd. expanded metal, galvanized, with factory applied kraft paper backing.

2.5 ACCESSORIES

- A. Corner Mesh: Formed steel, minimum 0.0179 inch thick; expanded flanges shaped to permit complete embedding in plaster; minimum 2 inches wide; galvanized finish. Equivalent to Clark Dietrich, CEMCO, or Cornerite.
- B. Corner Reinforcement: Equivalent to Western Metal, 0.0179 inch Stucco-Lok or 18 gage Stockton Corneraid for straight corners. Stockton Bullnose Regular for rounded corners, galvanized finish.
- C. Strip Mesh: Metal lath, 3.4 lb/sq. yd. expanded metal, galvanized, 6 inches wide x 18 inches long.
- D. Vent Screed: Equivalent to Stockton SVR, minimum 0.0179 inch thick; depth governed by plaster thickness, minimum 4 inch width, double "V" profile with perforated expanse between "V's" of longest possible lengths; galvanized finish.
- E. Casing Bead: Formed steel; minimum 0.0179 inch thick; thickness governed by plaster thickness; maximum possible lengths; with square edges; galvanized finish.
- F. Curved Casing Bead: Square-edged style fabricated from aluminum, preformed into curve or radius indicated.
- G. Weep Screed: Equivalent to Stockton W-S#7, minimum 0.0179 inch thick; depth governed by plaster thickness, minimum 3-1/2 inch high flange, "V" shaped, of longest possible lengths; galvanized finish.
- H. Drip Screed: Equivalent to Stockton SDC or BSS No. 10 drip mould as indicated on drawings, minimum 0.0179 inch thick; depth governed by plaster thickness, minimum 3-1/2 inch high flange, of longest possible lengths; galvanized finish.
- I. Window/Door Drip Screed: Equivalent to Stockton WTP, minimum 0.0179 inch thick; depth governed by plaster thickness, minimum 3-1/2 inch high flange, of longest possible lengths; galvanized finish.
- J. Control and Expansion Joints: Equivalent to Western XJ 15-3, depth to conform to plaster thickness, maximum practical lengths, galvanized finish.
- K. Single Point Screed: Equivalent to Stockton PBS, minimum 0.0179 inch thick; depth governed by plaster thickness, maximum practical lengths; galvanized finish.

- L. Interior Corner Joints: Equivalent to Western No. 30, depth to conform to plaster thickness, maximum practical lengths, galvanized finish.
- M. Anchorages: Nails, staples, or other approved metal supports, of type and size to suit application, galvanized to rigidly secure lath and associated metal accessories in place.
- N. Screws: ASTM C954 or ASTM C1002, self drilling.
- O. Penetration Flashing: Tyvek flashing system. Straight flash for jambs, FlexWrap for head and sills. Equivalent as manufactured by The Polymer Group, Inc. or National Shelter Products, Inc.
- P. Polyethylene Sheet: Clear, 6 mil thick.
- Q. Wire: ASTM A641, Class 1 coating (galvanized), soft temper.
- R. Powder Activated Fastener: 0.157 inch diameter X-U premium nail with washer as manufactured by Hilti, Inc., www.us.hilti.com, ICC/ES Report No. ESR-2269.
- S. Tape: Acrylic adhesive backed oriented polypropylene, 3 inch in width.

2.6 CEMENT PLASTER MIXES

- A. Mix and proportion cement plaster in accordance with ASTM C926 and PCA Plaster (Stucco) Manual.
- B. Scratch Coat and Brown Coat: One part cement, minimum 3-1/2 and maximum 5 parts aggregate, and 0-3/4 parts hydrated lime. Alkali resistant glass fibers at a rate of 1 lb. per sack of cement in brown coat only.
- C. Factory-Prepared Portland Cement Finish Coats: Add water only; comply with finish coat manufacturer's direction.
- D. Mix only as much plaster as can be used in 1 hour.
- E. Mix materials dry, to uniform color and consistency, before adding water.
- F. Protect mixtures from frost, contamination, and evaporation.
- G. Do not retemper mixes after initial set has occurred.

3. PART 3 EXECUTION

3.1 INSPECTION

- A. Verify that surfaces and site conditions are ready to receive Work. Notify Architect in writing of all unsatisfactory surfaces and conditions.
- B. Masonry: Verify joints are cut flush and surface is ready to receive Work of this Section. Verify no bituminous or water repellent coatings exist on masonry surface.
- C. Concrete: Verify surfaces are flat, honeycomb is filled flush, and surface is ready to receive work of this Section. Verify no bituminous, water repellent, or form release agents exist on concrete surface that are detrimental to plaster.
- D. Grounds and Blocking: Verify items within walls for other Sections of Work have been installed.
- E. Mechanical and Electrical: Verify services within walls have been tested and approved.
- F. Beginning of installation means acceptance of existing conditions.

3.2 PREPARATION

- A. Remove existing plaster as necessary to install metal lathing and accessories as specified herein and as per manufacturer's instructions.
- B. Protect surfaces near the Work of this Section from damage, disfiguration, and overspray. Mask off all ventilation screeds occurring in plastered areas.
- C. Clean masonry surfaces of foreign matter. Clean surfaces using acid solutions, solvents, or detergents. Wash surfaces with clean water.
- D. Roughen smooth concrete surfaces.
- E. Apply bonding agent in accordance with manufacturer's instructions.

3.3 INSTALLATION - LATHING MATERIALS

- A. Install metal lathing in accordance with ML/SFA 920, ASTM C1063 and as specified herein.
- B. On vertical surfaces apply 2 layers of underlayment over substrate; weatherlap horizontal edges 6 inches, vertical edges 6 inches. Fasten in place at 12 inches on center vertically over stud. Tape seal all joints and penetrations on base layer. Installation to conform to Single "Separate" Layer Method in accordance with TSIB Bulletin 60.220.
- C. Install penetration flashing around all openings and penetrations in exterior walls in compliance with underlayment manufacturer's recommendations and in conformance with recommendations contained in Plaster and Lathing Systems Manual and ML/SFA 920. Turn sill flashing up 6 inches at jambs. Extend flashing back onto sill, jamb, and head of all openings.
- D. Apply metal lath taut, with long dimension perpendicular to supports.
- E. Lap ends minimum 1 inch. Secure end laps with tie wire where they occur between supports.
- F. Lap sides of expanded metal lath a minimum 1-1/2 inches.
- G. Furr out metal lath from vertical supports or backing not less than 1/4 inch. Furring of metal lath on vertical supports having a bearing surface width of 1-5/8 inches or less is not required.
- H. Attach metal lath to vertical metal supports with tie wires or No. 8 self drilling screws with 3/8 inch diameter wafer head capable of penetrating metal supports by not less than 1/4 inch or 3 full threads. Maximum spacing 6 inches on center.
- I. Attach metal lath to horizontal metal supports with tie wires or No. 8 self drilling screws with 3/8 inch diameter wafer head fitted with 1 inch O.D. x 1/4 inch I.D. x 16 gage galvanized cut washers capable of penetrating metal supports by not less than 1/4 inch or 3 full threads. Maximum spacing 6 inch on center.
- J. Attach metal lath to masonry using powder actuated fastener with washers with minimum 1-1/4 inch penetration into substrate. Space at maximum 8 inches on center horizontally and 12 inches on center vertically. Securely wire tie side laps.
- K. Continuously reinforce internal angles with corner mesh, except where corner joint No. 30 is shown. Fasten at perimeter edges only.
- L. Place beaded external angle with mesh at corners. Fasten at outer edges only.
- M. Place strip mesh diagonally at corners of lathed openings. Secure rigidly in place.
- N. Place 6 inch wide strips of metal lath centered over junctions of dissimilar backing materials. Secure rigidly in place.
- O. Place window/door drip screed at head of all windows and door openings in exterior walls.

- P. Place weep screed at base of all vertical plaster applications at foundation line not less than 4 inches above earth or 2 inches above paved surfaces. Underlayment and lath shall cover and terminate on the attachment flange of the screed.
- Q. Place drip screed at base of all vertical plaster applications which do not terminate at framed wall openings or at foundation line.
- R. Place vent screed in soffit areas indicated.
- S. Place casing beads at all terminations of plaster finish not otherwise indicated to have screeds installed and at all intersections with dissimilar materials. Butt and align ends. Secure rigidly in place.
- T. Install accessories to lines and levels.

3.4 CONTROL AND EXPANSION JOINTS

- A. Locate interior control and expansion joints as indicated on the drawings, but not to exceed 20'-0" o.c. horizontally or vertically.
- B. Locate exterior control and expansion joints as indicated on drawings but not to exceed 12'-0" o.c. horizontally or vertically.
- C. Establish control and expansion joints with specified joint device.
- D. Attach control and expansion joints to metal lath with wire ties.
- E. Install expansion joint over 3 inch wide strip of polypropylene tape to assist with air seal continuity.
- F. Cut metal lath behind expansion joints.
- G. Coordinate joint placement with other related Work.

3.5 COATED FOAM SHAPES INSTALLATION

- A. Cover both brown coat of plaster and foam shape with adhesive.
- B. Press foam shape onto brown coat and secure in place until adhesive has set.
- C. Apply 2 inch wide fiberglass mesh set in adhesive at all joints of foam.
- D. Apply 4 inch wide fiberglass mesh set in adhesive at all joints between foam and brown coat. Extend mesh 2 inches onto surface of brown coat.

3.6 PLASTERING

- A. Apply plaster in accordance with ASTM C926 and PCA Portland Cement Plaster (Stucco) Manual.
- B. Three Coat Application: At metal lathed surfaces, apply scratch coat to a nominal thickness of 3/8 inch, brown coat to a nominal thickness of 3/8 inch, and finish coat to a nominal thickness of 1/8 inch.
- C. Moisture Curing: Moist cure plaster surfaces using a fine fog spray to assure continuous hydration of cementations materials. Where hot, dry and windy conditions exist, plaster surfaces shall be moistened and covered with a single sheet of polyethylene plastic to prevent water loss thru evaporation.
- D. Moist cure scratch and brown coats. Do not apply brown coat sooner than 48 hours following scratch coat.
- E. After curing, dampen base coat prior to applying finish coat. Do not apply finish coat sooner than 7 days following brown coat.
- F. Apply acrylic based level coat to a nominal thickness of 1/8 inch to achieve a level surface.

- G. Apply acrylic-based finish coat as factory packaged; do not add other ingredients; comply with manufacturer's written instructions. Apply in two coat application with steel or chrome finishing trowel. Apply first coat to achieve fine finish. Apply second coat to achieve smoothest look.

3.7 FINISH COAT TEXTURE

- A. Fine Sand Float as defined by photographs and application procedures in the Plaster Texture Brochure published by the Technical Services and Information Bureau, www.tsib.org.
- B. Apply finish coat over new and existing plaster surfaces.

3.8 TOLERANCES

- A. Maximum Variation from True Flatness: 1/8 inch in 10 feet.

3.9 CLEANING

- A. Remove protective maskings.
- B. Remove any overspray from surrounding materials.
- C. Clean adjacent affected surfaces.

3.10 PLASTER APPLICATION SCHEDULE

- A. Exterior Vertical Surface of Framed Walls: Three coat plaster over metal lath and underlayment.
- B. Exterior Horizontal Framed Surfaces: Three coat plaster over metal lath.

END OF SECTION

SECTION 09 30 14

PORCELAIN TILE FLOOR FINISHING

1. PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Porcelain tile floor finish using the thinset and full bed application method.
- B. Porcelain tile base.
- C. Threshold at door opening.

1.2 REFERENCES

- A. ANSI/TCNA A108.5 - Ceramic Tile Installed with Dry-Set Portland Cement Mortar or Latex Portland Cement Mortar.
- B. ANSI/TCNA A118.1 - Dry-Set Portland Cement Mortar.
- C. ANSI/TCNA A118.4 - Latex-Portland Cement Mortar.
- D. ANSI/TCNA A118.7 - Polymer Modified Ceramic Tile Grouts.
- E. ANSI/TCNA A118.12 - Crack Isolation Membranes for Thin-Set Ceramic Tile and Dimension Stone Installation.
- F. ANSI/TCNA A118.15 - Improved Modified Dry-Set Cement Mortar.
- G. ANSI/TCNA A137.1 - Specifications for Ceramic Tile.
- H. ASTM A1064 - Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.
- I. ASTM D4551 - Poly (Vinyl Chloride) (PVC) Plastic Flexible Concealed Water-Containment Membrane.
- J. MIA - Marble Institute of America.
- K. TCNA (Tile Council of North America) - Handbook for Ceramic, Glass and Stone Tile Installation.

1.3 SUBMITTALS

- A. Submit samples under provisions of Section 01 33 00.
- B. Submit 4 samples of each tile, to indicate pattern and color variations.
- C. Submit manufacturer's installation instructions under provisions of Section 01 33 00.
- D. Submit manufacturer's certificate under provisions of Section 01 33 00 that products meet or exceed ANSI/TCNA A137.1.
- E. Submit maintenance data under provisions of Section 01 77 00.
- F. Include recommended cleaning and stain removal methods, and cleaning materials.

1.4 QUALITY ASSURANCE

- A. Conform to ANSI/TCNA A137.1 for tile material.
- B. Conform to ANSI/TCNA A137.1 DCOF AcuTest for coefficient of friction.

- C. Conform to ANSI/TCNA Standards and TCNA Handbook for tile installation.

1.5 QUALIFICATIONS

- A. Manufacturer: Company specializing in the manufacture of products specified in this Section with minimum five years documented experience.
- B. Installer: Company specializing in applying the work of this Section with minimum five years documented experience.

1.6 ENVIRONMENTAL REQUIREMENTS

- A. Maintain 50 degrees F during installation of mortar materials.

1.7 EXTRA MATERIALS

- A. Provide extra quantity of full size tile and trim shape units to Owner under provisions of Section 01 77 00.
- B. Provide quantity equal to 10 percent of units installed of each shape and color.

2. PART 2 PRODUCTS

2.1 MANUFACTURERS - TILE

- A. Caesar, www.caesar.it
- B. Crossville Ceramics, www.crossvilleinc.com.
- C. Dal-Tile Corp., www.daltile.com.
- D. Emser Tile, www.emser.fiandre.com.
- E. Graniti Fiandre, www.granitifiandre.com.
- F. Imola Ceramica, www.imolaceramica.com.
- G. Interceramic, www.interceramic.com.
- H. Iris Ceramics, www.irisfmg.com.
- I. Portobello America, Inc., www.portobelloamerica.com.
- J. Pantheon Tile, www.pantheontile.com.
- K. Shaw Commercial, www.shawinc.com.
- L. Substitutions: Under provisions of Section 01 25 13.

2.2 TILE MATERIAL

- A. 12 x 12 inch Tiles: Equivalent to Volumn, Harmonst, or Haut Monde, Series by Dal-Tile Corporation. A maximum of two different colors will be selected from all price ranges for use in varying amounts at all porcelain floor tile locations.
- B. 2 x 2 inch Porcelain Mosaic Tile: Equivalent to Fabrique, Linden Point, or Kimona Silk Series by Dal-Tile Corporation. A maximum of two (2) different colors will be selected from all price ranges for use in varying amounts at all porcelain floor tile locations.
- C. Bullnose Wall Base: Color and pattern to match floor tiles.

2.3 MANUFACTURERS - MORTAR AND GROUT

- A. C-Cure, www.c-cure.com.
- B. Custom Building Products, www.custombuildingproducts.com.
- C. H.B. Fuller Company, www.hbfuller.com.
- D. Hydromet, www.bostikfindley-usa.com.
- E. Laticrete International, Inc., www.laticrete.com.
- F. W.R. Bonsal Company, www.bonsal.com.
- G. MAPEI, www.mapei.com.
- H. Substitutions: Under provisions of Section 01 25 13.

2.4 MORTAR MATERIALS

- A. Portland Cement Mortar Materials: ANSI/TCNA A118.1.
- B. Latex-Portland Cement Mortar: ANSI/TCNA A118.4 and the following:
 - 1. Acrylic resin latex additive.
 - 2. Dry mortar mix supplied by latex manufacturer.

2.5 GROUT MATERIALS

- A. Portland Cement Grout Materials : ANSI/TCNA A118.7.
- B. Latex-Portland Cement Grout: ANSI/TCNA A118.7 of color selected and the following:
 - 1. Acrylic resin latex additive.
 - 2. Microban antimicrobial addative, www.microban.com.
 - 3. Dry mortar mix supplied by latex manufacturer.

2.6 ACCESSORIES

- A. Thin Load Bearing Direct Bond Membrane: Chlorinated polyethylene elastomer sheet material laminated with fabric on both sides meeting requirements of ANSI A118.12.
 - 1. Dal-Tile Corp., Dal Seal TS, www.daltile.com.
 - 2. Compotite Corp., Composeal Gold, www.compotite.com.
 - 3. NAC Products, Inc., ECB Membrane, www.nac-anti-fracture.com.
 - 4. Noble Company, Noble Seal TS, www.nobelcompany.com.
 - 5. Pasco Manufacturing, Inc., Baseline, www.pascospecialty.com.
 - 6. Substitutions: Under provisions of Section 01 25 13.
- B. Waterproof Membrane: ASTM D4551, Grade 40, polyvinyl chloride sheet.
 - 1. Compotite Corporation, www.compotite.com.

2. Dal-Tile Corp., www.daltile.com.
 3. Pasco Manufacturing Inc., www.pascospecialty.com.
 4. Noble Company, www.noblecompany.com.
 5. Substitutions: Under provisions of Section 01 25 13.
- C. Reinforcing Mesh: ASTM A1064, 2 x 2 inch size, of WO.5/WO.5 wire size; welded fabric, galvanized.
- D. Thresholds: Marble complying with Group A of the Marble Institute of America (MIA), color selected by Architect; profile as indicated or selected from manufacturer's standard shapes.
- E. Sealant: Type specified in Section 07 92 00.

2.7 MORTAR MIX AND GROUT MIX

- A. Mix and proportion pre-mix setting bed bond coat and grout materials in accordance with manufacturer's instructions, and referenced standards.

2.8 SEALER

- A. Tile and Grout Sealer: Aqua Mix Penetrating Sealer manufactured by Aqua Mix, Inc., www.aquamix.com.

3. PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that surfaces are ready to receive work.
- B. Beginning of installation means installer accepts condition of existing surfaces.

3.2 PREPARATION

- A. Protect surrounding work from damage or disfiguration.
- B. Vacuum clean existing surfaces and damp clean.
- C. Seal substrate surface cracks with filler. Level existing substrate surfaces to acceptable flatness tolerances.
- D. Blend tiles before installation to produce an even range of color and finish.

3.3 INSTALLATION - THINSET METHOD

- A. Install mortar, bond coat, tile, and grout in accordance with ANSI/TCA 108.5 and applicable tile installation standards of the TCNA Handbook.
- B. Set marble thresholds at interior door openings.
- C. Install thin load bearing direct bond membrane.
- D. Apply bond coat.
- E. Lay tile to pattern indicated on Drawings or if not indicated, request pattern from Architect. Do not interrupt tile pattern through openings.
- F. Cut and fit tile tight to penetrations through tile. Form corners and bases neatly. Align floor, base, and wall joints.
- G. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make joints watertight, without voids, cracks, excess mortar, or excess grout.

- H. Sound tile after setting. Replace hollow sounding units.
- I. Allow tile to set for a minimum of 48 hours prior to grouting.
- J. Grout tile joints.
- K. Apply sealant to junction of tile and dissimilar materials and junction of dissimilar planes.

3.4 INSTALLATION - FULL MORTAR BED METHOD

- A. Install mortar bed, tile, and grout in accordance with ANSI/TCNA 108.5 and applicable tile installation standards of the TCNA Handbook.
- B. Install waterproof membrane material. Extend vertically up wall a minimum of 6 inches. Extend into floor drain. Use recommended solvent cement to weld joints when pan dimensions exceed maximum width of material.
- C. Set marble thresholds at interior door openings.
- D. Apply mortar bed over surfaces to a thickness of 1-1/2 inch and to slopes as shown.
- E. Install reinforcing mesh in middle of mortar bed.
- F. Install thin load bearing direct bond membrane in bond coat. Extend vertically up wall a minimum of 6 inches. Extend into floor drains. Use recommended solvent cement to weld joints when membrane dimensions exceed maximum width of material.
- G. Apply bond coat.
- H. Lay tile to pattern indicated on Drawings, or if not indicated, request from Architect. Do not interrupt tile pattern through openings.
- I. Cut and fit tile tight to penetrations through tile. Form corners and bases neatly. Align floor, base, and wall joints.
- J. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make joints watertight without voids, cracks, excess mortar, or excess grout.
- K. Sound tile after setting. Replace hollow sounding units.
- L. Allow tile to set for a minimum of 48 hours prior to grouting.
- M. Grout tile joints.
- N. Apply sealant to junction of tile and dissimilar materials and junction of dissimilar planes.

3.5 CLEANING

- A. Clean work under provisions of Section 01 77 00.
- B. Clean tile surfaces.

3.6 SEALING

- A. Install sealer on all surfaces in accordance with manufacturer's recommendations.

3.7 PROTECTION

- A. Protect finished installation under provisions of Section 01 61 00.

- B. Do not permit traffic over finished floor surface for a minimum of 48 hours. After 48 hours and until 72 hours, cover area with 3/8 inch plywood panels if traffic is required.

END OF SECTION

SECTION 09 30 15

PORCELAIN TILE WALL FINISHING

1. PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Porcelain tile wall and wainscot finish using the thinset and full bed application method.
- B. Porcelain tile base.

1.2 REFERENCES

- A. ANSI/TCNA A108.5 - Ceramic Tile Installed with Dry-Set Portland Cement Mortar or Latex Portland Cement Mortar.
- B. ANSI/TCNA A118.1 - Dry-Set Portland Cement Mortar.
- C. ANSI/TCNA A118.4 - Latex-Portland Cement Mortar.
- D. ANSI/TCNA A118.7 - Polymer Modified Ceramic Tile Grouts.
- E. ANSI/TCNA A118.15 - Modified Improved Dry-Set Cement Mortar.
- F. ANSI/TCNA A137.1 - Specifications for Ceramic Tile.
- G. ASTM C847 - Standard Specifications for Metal Lath.
- H. ASTM D226 - Asphalt-Saturated Felt Used in Roofing and Waterproofing.
- I. TCNA (Tile Council of North America) - Handbook for Ceramic Tile Installation.

1.3 SUBMITTALS

- A. Submit samples under provisions of Section 01 33 00.
- B. Submit 4 samples of each tile, representative of pattern and color variations.
- C. Submit manufacturer's installation instructions under provisions of Section 01 33 00.
- D. Submit maintenance data under provisions of Section 01 77 00.
- E. Include recommended cleaning and stain removal methods, and cleaning materials.

1.4 QUALITY ASSURANCE

- A. Conform to ANSI/TCNA A137.1 for tile material.
- B. Conform to ANSI/TCNA Standards and TCNA Handbook for Ceramic, Glass, and Stone Tile installation.

1.5 QUALIFICATIONS

- A. Manufacturer: Company specializing in the manufacture of products specified in this Section with minimum five years documented experience.
- B. Installer: Company specializing in applying the work of this Section with minimum five years documented experience.

1.6 ENVIRONMENTAL REQUIREMENTS

- A. Maintain 50 degrees F during installation of mortar materials.

1.7 EXTRA MATERIALS

- A. Provide extra quantity of full size tile and trim shape units to Owner under provisions of Section 01 77 00.
- B. Provide quantity equal to 10 percent of units installed of each shape and color.

2. PART 2 PRODUCTS

2.1 MANUFACTURERS - TILE

- A. Caesar, www.caesar.it.
- B. Crossville Ceramics, www.crossvilleinc.com.
- C. Dal-Tile Corp., www.daltile.com.
- D. Emser Tile, www.emser.com.
- E. Graniti Fiandre, www.granitifiandre.com.
- F. Imola Ceramica, www.imolaceramica.com.
- G. Interceramic, www.interceramic.com.
- H. Iris Ceramics, www.irisfmg.com.
- I. Portobello America, Inc., www.portobelloamerica.com.
- J. Pantheon Tile, www.pantheontile.com.
- K. Shaw Commercial, www.shawinc.com.
- L. Substitutions: Under provisions of Section 01 25 13.

2.2 TILE MATERIAL

- A. 12 x 24 inch Porcelain Wall Tile: Equivalent to Santino, Unity, Neoconcrete, or Spark Series by Dal-Tile Corporation: Neoconcrete or Method by American Olean. A maximum of two (2) different colors will be selected from all price ranges for use in carrying amounts at all porcelain wall tile locations.
- B. 6 x 24 inch Porcelain Wall Tile: Equivalent to Santino, Unity, Neoconcrete, or Spark Series by Dal-Tile Corporation: Neoconcrete or Method by American Olean. A maximum of Two (2) different colors will be selected from all price ranges for use in varying amounts at all porcelain wall tile locations.

2.3 MANUFACTURERS - MORTAR AND GROUT

- A. C-Cure, www.c-cure.com.
- B. Custom Building Products, www.custombuildingproducts.com.
- C. H.B. Fuller Company, www.hbfuller.com.
- D. Hydromet, www.bostikfindley.com.
- E. Laticrete International, Inc., www.laticrete.com.
- F. MAPEI, www.mapei.com.

- G. W.R. Bonsal Company, www.bonsal.com.
- H. Substitutions: Under provisions of Section 01 25 13.

2.4 MORTAR MATERIALS

- A. Portland Cement Mortar Materials: ANSI/TCNA A118.1.
- B. Modified Improved Dry-Set Cement Mortar: ANSI/TCNA A118.15, Ultraflex LFT as manufactured by MAPEI.

2.5 GROUT MATERIALS

- A. Full Mortar Bed Portland Cement Grout Materials: ANSI/TCNA A118.7.
- B. Setting Mortar Latex-Portland Cement Grout: ANSI/TCNA A118.7 of color selected and the following:
 - 1. Acrylic resin latex additive.
 - 2. Microban antimicrobial additive, www.microban.com.
 - 3. Dry mortar mix supplied by latex manufacturer.

2.6 ACCESSORIES

- A. Membrane: ASTM D226; No. 15 asphalt saturated roofing felt.
- B. Waterproof Membrane: Noble Seal TS manufactured by Noble Company.
- C. Reinforcing Mesh: ASTM C847; 3.4 lb./sq.yd. expanded metal, galvanized, self-furring type.
- D. Backing Board: Type specified in Section 09 21 16.
- E. Finishing Metal Trim: Schluter "Quadec", "Designline", satin nickel anodized aluminum.
- F. Sealant: Type specified in Section 07 92 00.

2.7 MORTAR MIX AND GROUT MIX

- A. Mix and proportion pre-mix setting bed and grout materials in accordance with manufacturer's instructions and referenced standards.

2.8 SEALER

- A. Tile and Grout Sealer: Aqua Mix Penetrating Sealer manufactured by Aqua Mix, Inc., www.aquamix.com, or Ultra Care manufactured by MAPEI.

3. PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that surfaces are ready to receive work.
- B. Beginning of installation means installer accepts condition of existing surfaces.

3.2 PREPARATION

- A. Protect surrounding work from damage or disfiguration.
- B. Vacuum clean existing surfaces and damp clean.
- C. Seal substrate surface cracks with filler. Level existing substrate surfaces to acceptable flatness tolerances.

- D. Blend tiles before installation to produce an even range of color and finish.

3.3 INSTALLATION - THINSET METHOD

- A. Install mortar, tile, and grout in accordance with ANSI/TCNA 108.5 and applicable tile installation standards of the TCNA Handbook.
- B. Lay tile to pattern indicated. If not indicated, request from Architect. Do not interrupt tile pattern around openings.
- C. Cut and fit tile tight to penetrations through tile. Form corners and bases neatly. Align wall, base, and floor joints.
- D. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make joints watertight, without voids, cracks, excess mortar or excess grout.
- E. Form internal angles square and external angles bullnosed.
- F. Sound tile after setting. Replace hollow sounding units.
- G. Allow tile to set for a minimum of 48 hours prior to grouting.
- H. Grout tile joints.
- I. Apply sealant to junction of tile and dissimilar materials and junction of dissimilar planes.

3.4 INSTALLATION - FULL MORTAR BED METHOD

- A. Install mortar bed, tile, and grout in accordance with applicable ANSI/TCNA 108.5 and applicable tile installation standards of the TCNA Handbook.
- B. Install membrane and reinforcing mesh.
- C. Apply mortar bed over surfaces to a thickness of 3/4 inch.
- D. Install waterproof membrane over mortar bed per manufacturer's instruction.
- E. Lay tile to pattern indicated. If not indicated request from Architect. Do not interrupt tile pattern around openings.
- F. Cut and fit tile tight to penetrations through tile. Form corners and bases neatly. Align wall, base, and floor joints.
- G. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make joints watertight without voids, cracks, excess mortar or excess grout.
- H. Form internal angles square and external angles square.
- I. Sound tile after setting. Replace hollow sounding units.
- J. Keep control joints free of mortar or grout. Apply sealant to joints.
- K. Allow tile to set for a minimum of 48 hours prior to grouting.
- L. Grout tile joints.
- M. Apply sealant to junction of tile and dissimilar materials and junction of dissimilar planes.

3.5 CLEANING

- A. Clean work under provisions of Section 01 77 00.
- B. Clean tile surfaces.

3.6 SEALING

- A. Install sealer on all surfaces in accordance with manufacturer's instructions.

END OF SECTION

SECTION 09 67 26

QUARTZ FLOORING

1. PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Fluid applied epoxy flooring and base with epoxy top coat.
- B. Quartz chip aggregate.
- C. Base cap edging and divider strips.

1.2 REFERENCES

- A. 2010 Americans with Disabilities Act (ADA) Standards for Accessible Design.
- B. CBC - California Building Code, (CCR) California Code of Regulations, Title 24, Part 2, California State Accessibility Standards.
- C. ASTM C307 - Standard Test Method for Tensile Strength of Chemical-Resistant Mortar, Grouts, and Monolithic Surfacing.
- D. ASTM C580 - Standard Test Method for Flexural Strength and Modulus of Elasticity of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes.
- E. ASTM D413 - Standard Test Method for Rubber Property - Adhesion to Flexible Substrate.
- F. ASTM D579 - Standard Specification for Greige Woven Glass Fabrics.
- G. ASTM D635 - Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position.
- H. ASTM D648 - Standard Test Method for Deflection Temperature of Plastics Under Flexural Load in the Edgewise Position.
- I. ASTM D790 - Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
- J. ASTM D1004 - Standard Test Method for Initial Tear Resistance of Plastic Film and Sheeting.
- K. ASTM D2047 - Standard Test Method for Static Coefficient of Friction of Polish-Coated Floor Surfaces as Measured by the James Machine.
- L. ASTM D2240 - Standard Test Method for Rubber Property - Durometer Hardness.
- M. ASTM F710 - Practice for Preparing Concrete Floors and other Monolithic Floors to Receive Resilient Flooring.
- N. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
- O. ASTM F2170 - Determining Relative Humidity in Concrete Floor Slabs Using In Situ Probe.
- P. ACI Committee No. 503.1PP - Bond Strength.
- Q. MIL - D - 3134F - Indentation.
- R. UL - Underwriters' Laboratories.

1.3 QUALIFICATIONS

- A. Applicator: Company specializing in epoxy matrix floor applications with five years documented experience.
- B. Supervisor: Trained by product manufacturer.

1.4 REGULATORY REQUIREMENTS

- A. Conform to applicable codes for flooring flame/fuel/smoke ratings in accordance with UL.
- B. Products supplied for flooring installation shall comply with regulations controlling use of volatile organic compounds (VOC).
- C. Flooring shall have a coefficient of friction when tested according to ASTM D2047 of 0.60 for flat floors and 0.80 for ramped surfaces.
- D. Conform to CBC, California Building Code, (CCR) Title 24, Part 2, and the 2010 ADA Standards for Accessible Design for accessibility requirements.

1.5 SUBMITTALS

- A. Submit product data under provisions of Section 01 33 00.
- B. Submit product data for base cap.
- C. Submit samples under provisions of Section 01 33 00.
- D. Submit two samples 4 x 4 inch in size illustrating color, chip size and variation, and matrix color.

1.6 OPERATION AND MAINTENANCE DATA

- A. Submit cleaning and maintenance data under provisions of Section 01 77 00.
- B. Include procedures for stain removal, repairing surface, and cleaning.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and protect products under provisions of Section 01 61 00.
- B. Store materials in a dry, secure area.
- C. Maintain temperature of 55 degrees F.
- D. Keep products away from fire or open flame.

1.8 ENVIRONMENTAL REQUIREMENTS

- A. Do not install flooring when temperature is below 60 degrees F or above 90 degrees F.
- B. Maintain this temperature range, 24 hours before, during, and 72 hours after installation of flooring.
- C. Ventilate area where flooring is being installed. Post and enforce NO SMOKING or OPEN FLAME signs until flooring has cured.
- D. Provide uniform lighting of 50 fc in area of installation.
- E. Restrict traffic from area where flooring is being installed or is curing.

- F. Moisture Testing: Perform tests as recommended by flooring materials manufacturer and as follows. Proceed with installation only after substrates pass testing.
1. Subfloor Moisture Conditions: Moisture emission rate of no more than 3 lb/1000 sq. ft./24 hours when tested by the Quantitative Anhydrous Calcium Chloride Test, ASTM F1869, with subfloor temperature not less than 65 degrees F.
 2. Subfloor Humidity Conditions: Relative humidity level of no more than 75 percent when tested by in situ drilled probes according to ASTM F2170.
 3. Subfloor Alkalinity Conditions: pH range of between 5 to 9 when subfloor is wetted with potable water and pHdrion paper is applied.

1.9 WARRANTY

- A. Provide one year warranty under provisions of Section 01 77 00.
- B. Warranty: Include coverage for delamination of floor and base materials from substrate, degradation of surface finish.

2. PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Stonhard Inc., Stoneshield HRI, www.stonhard.com.
- B. General Polymers Corporation, TPM No. 115 Upgraded, www.generalpolymers.com.
- C. Crossfield Products Corp., (Dex-O-Tex) Cheminert CFS, K-D, www.dex-o-tex.com.
- D. Dudick, Inc., Steri-Quartz B, www.dudick.com.
- E. Dur-A-Flex, Inc., Dura-A-Quartz, www.dur-a-flex.com.
- F. RBC Industries, Inc., HE1484, www.rbcepoxy.com.
- G. Sunbelt Flooring, Inc., Flooring No. 1100, www.sunbeltflooring.com.
- H. Tenemec, Series 201-223-284, www.stratashield.com.
- I. Westcoat, EC Mortar Quartz, www.westcoat.com.
- J. Substitutions: Under provisions of Section 01 25 13.

2.2 PERFORMANCE REQUIREMENTS

- A. Conform to the following:

<u>Property</u>	<u>Test</u>	<u>Result</u>
Tensile Strength	ASTM C307	1,650 psi
Compressive Strength (7 days)	ASTM D579	10,000 psi
Flexural Strength	ASTM C580	4,300 psi
Flexural Modulus of Elasticity	ASTM D790	2.0 x 10 ⁶ psi
Hardness	ASTM D2240	85-90 Shore Durometer
Indentation	MIL-D3134F	No Indentation

<u>Property</u>	<u>Test</u>	<u>Result</u>
Coefficient of Friction	ASTM D2047	0.7
Heat Deflection Temperature	ASTM D648	100 degrees F/ 38 degrees C
Water Absorption	ASTM D413	0.10 percent
Fire Resistance	ASTM D635	Self Extinguishing. Extent of Burning, .25 inches maximum
Bond Strength	ACI 503.1	400 psi minimum
Abrasion Resistance	ASTM D1004	Maximum weight loss of 0.10 gm/1000 cycles

2.3 MATERIALS

- A. Primer: A two-component, penetrating, moisture tolerant, epoxy primer.
- B. Base: A three-component, integral troweled mortar base consisting of epoxy resin, curing agent and finely graded silica aggregate.
- C. Undercoat: A two-component, thixotropic epoxy undercoat sealer.
- D. Aggregate: Brightly colored, quartz aggregate broadcast onto the surface.
- E. Sealer: A high performance, two-component, clear UV resistant epoxy sealer.

2.4 ACCESSORIES

- A. Subfloor Filler: White premix Portland Cement latex type as recommended by flooring material manufacturer.
- B. Divider Strips: 0.0478 inch thick zinc T and L shaped strips with perforated flanges as manufactured by the Manhattan American Strip Company, www.ntma.com.
- C. Base Cap: 0.0478 inch thick zinc L shaped strip with perforated flange as manufactured by the Manhattan American Strip Company, www.ntma.com.

2.5 COLORS

- A. Resin and Aggregate: Color as selected by Architect from manufacturer's entire color range.

3. PART 3 EXECUTION

3.1 EXAMINATION

- A. Do not begin work until concrete substrate has cured 90 days minimum.
- B. Verify that substrate is ready to receive work, and that subfloor surface is clean, dry, and free of substances which could affect bond.
- C. Verify that concrete slabs comply with ASTM F710 and are as specified herein.
- D. Verify concrete floors exhibit acceptable moisture emission rate and humidity level; and exhibit negative alkalinity, carbonization, or dusting.
- E. Verify that surfaces are smooth and flat and are ready to receive Work.
- F. Beginning of installation means acceptance of existing substrate and site conditions.

3.2 PROTECTION

- A. Protect elements surrounding the work of this Section from damage or disfiguration.

3.3 PREPARATION

- A. Prepare concrete substrate according to ASTM F710.
- B. Remove sub-floor ridges and bumps. Fill low spots, cracks, joints, holes, and other defects with subfloor filler.
- C. Apply, trowel, and float filler to leave a smooth, flat, hard surface.
- D. Clean substrate surface free of foreign matter and scrub with manufacturer supplied detergent.
- E. Control, expansion joints and cracks in concrete floor substrate shall be routed out and filled with resilient sealant and reinforced with 20 x 20 fiberglass mesh.
- F. Prohibit traffic from area until filler is cured.
- G. Vacuum clean substrate.

3.4 INSTALLATION - ACCESSORIES

- A. Install strips straight and level to locations indicated.
- B. Install terminating cap strip at top of base; attach securely to wall substrate.

3.5 INSTALLATION - FLOORING

- A. Apply primer to concrete slab surfaces.
- B. Apply flooring in accordance with manufacturer's instructions.
- C. Apply to a minimum thickness of 1/4 inch.
- D. Finish to smooth level surface sloped to drains.
- E. Provide 3/8 inch cove fillet at vertical surfaces.
- F. Extend up vertical surface to form base.
- G. Apply final sealer in two coats.

3.6 TOLERANCES

- A. Maximum Variation from Flat Surface: 1/8 inch in 10 feet.

3.7 PROTECTION

- A. Protect finished installation under provisions of Section 01 61 00.
- B. Do not permit traffic over finished floor surfaces.

END OF SECTION

SECTION 09 90 00

PAINING

1. PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Surface preparation.
- B. Products and application.
- C. Surface finish schedule.

1.2 SUMMARY OF PAINTED SUBSTRATES

- A. Section includes the application of paint systems on the following interior substrates:
 - 1. Primed or unprimed steel.
 - 2. Galvanized metal.
 - 3. Steel lintels and shelf angles.
 - 4. Steel doors, frames and lights.
 - 5. Glass frames in steel and wood doors.
 - 6. Access doors and frames.
 - 7. Four-fold door frames.
 - 8. Rolled steel windows.
 - 9. Wood.
 - 10. Horizontal and vertical gypsum board.
 - 11. Non-prefinished wall louvers.
 - 12. Electrical panel board covers.
 - 13. Exposed mechanical ductwork.
 - 14. Exposed fire sprinkler lines.
- B. Section includes the application of paint systems on the following exterior substrates:
 - 1. Primed or unprimed steel.
 - 2. Galvanized metal.
 - 3. Hose tower if not prefinished.
 - 4. Non-prefinished steel deck.
 - 5. Steel lintels and shelf angles.
 - 6. Decorative metal fencing.
 - 7. Bollards.

8. Fence and gates.
 9. Steel pipe downspouts.
 10. Steel doors, frames and lights.
 11. Glass frames in steel and wood doors.
 12. Access doors and frames.
 13. Rolled steel windows.
 14. Wood.
 15. Non-prefinished wall louvers.
 16. Electrical panel board covers.
- C. Substrate listings are for principal surfaces only. Refer to drawings, details and individual specification sections for items, surfaces, and substrates not specifically listed.

1.3 REFERENCES

- A. ASTM D16 - Definitions of Terms Relating to Paint, Varnish, Lacquer, and Related Products.
- B. SSPC - The Society for Protective Coatings.

1.4 SYSTEM DESCRIPTION

- A. Preparation of all surfaces to receive final finish.
- B. Painting and finishing work of this section using coating systems of materials including primers, sealers, fillers, and other applied materials whether used as prime, intermediate, or finish coats.
- C. Surface preparation, priming, and finish coats specified in this Section are in addition to shop-priming and surface treatment specified under other Sections.
- D. Painting and finishing all exterior and interior surfaces of materials including structural, mechanical, and electrical work on site, in building spaces, and above or on the roof.
- E. Paint exposed surfaces except where a surface or material is specifically indicated not to be painted or is to remain natural. Where an item or surface is not specifically mentioned, paint the same as similar adjacent materials or surfaces.

1.5 DEFINITIONS

- A. Conform to ASTM D16 for interpretation of terms used in this Section.

1.6 QUALITY ASSURANCE

- A. Product Manufacturer: Company specializing in manufacturing quality paint and finish products with five years experience.
- B. Applicator: Company specializing in commercial painting and finishing with five years documented experience.
- C. Coats: The number of coats specified is the minimum number acceptable. If full coverage is not obtained with the specified number of coats, apply such additional coats as are necessary to produce the required finish.
- D. Employ coats and undercoats for all types of finishes in strict accordance with the recommendations of the paint manufacturer.

- E. Provide primers and undercoat paint produced by the same manufacturer as the finish coat.
- F. The minimum dry film thickness of each coat of paint shall comply with the manufacturer's recommendations for each type of paint used.

1.7 REGULATORY REQUIREMENTS

- A. Comply with applicable codes and regulations of governmental agencies having jurisdiction including those having jurisdiction over airborne emissions and industrial waste disposal. Where those requirements conflict with this specification, comply with the more stringent provisions.
- B. Comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA).
- C. Comply with South Coast Air Quality Management District (SCAQMD) Rule 1113. A copy of this regulation can be obtained from <http://www.aqmd.gov/rules/reg/reg11/r1113.pdf>.
- D. In the South Coast Air Quality Management District (SCAQMD), where lower VOC contents are specified for a number of categories, certain products may be covered under the manufacturer's SCAQMD - approved Averaging Program. As a result, certain products may be fully compliant with SCAQMD Rule 1113, despite having VOC contents higher than specified limits.

1.8 SUBMITTALS

- A. Submit product data under provisions of Section 01 33 00.
- B. Provide manufacturer's technical information and instructions for application of each material proposed for use by catalog number.
- C. List each material by catalog number and cross-reference specific coating with specified finish system.
- D. Provide manufacturer's certificate that products proposed meet or exceed specified materials.
- E. Submit samples under provisions of Section 01 33 00.
- F. Submit two samples 8-1/2 x 11 inch in size of each paint color and texture applied to cardboard. Resubmit samples until acceptable color, sheen and texture is obtained.
- G. On same species and quality of wood to be installed, submit two 4 x 8 inch samples showing system to be used.

1.9 FIELD SAMPLES

- A. Provide field samples under provisions of Section 01 33 00.
- B. On wall surfaces and other exterior and interior components, duplicate specified finishes on at least 100 sq. ft. of surface area.
- C. Provide full-coat finishes until required coverage, sheen, color and texture are obtained.
- D. Simulate finished lighting conditions for review of field samples.
- E. After finishes are accepted, the accepted surface may remain as part of the work and will be used to evaluate subsequent coating systems applications of a similar nature.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site and store and protect under provisions of Section 01 61 00.
- B. Deliver products to site in sealed and labeled containers; inspect to verify acceptance.

- C. Container labeling to include manufacturer's name, type of paint, brand name, brand code, coverage, surface preparation, drying time, cleanup, color designation, and instructions for mixing and reducing. Paint containers not displaying product identification will not be acceptable.
- D. Store paint materials at minimum ambient temperature of 50 degrees F and a maximum of 90 degrees F, in well ventilated area, unless required otherwise by manufacturer's instructions.
- E. Take precautionary measures to prevent fire hazards and spontaneous combustion.

1.11 ENVIRONMENTAL REQUIREMENTS

- A. Provide continuous ventilation and heating facilities to maintain interior surface and ambient temperatures above 50 degrees F with a maximum humidity level of 50 percent for 24 hours before, during, and 48 hours after application of finishes, unless required otherwise by manufacturer's instructions.
- B. Do not apply exterior coatings during rain or snow, or when relative humidity is above 50 percent, unless required otherwise by manufacturer's instructions.
- C. Minimum Application Temperatures for Latex Paints: 50 degrees F for interiors; 50 degrees F for exterior; unless required otherwise by manufacturer's instructions.
- D. Minimum Application Temperature for Varnish and Urethane Finishes: 65 degrees F for interior or exterior, unless required otherwise by manufacturer's instructions.
- E. Provide lighting level of 80 foot candles measured mid-height at substrate surface.

1.12 EXTRA MATERIAL

- A. Provide a five gallon unopened container of each color and surface texture to Owner.
- B. Label each container with color, texture, and room locations in addition to the manufacturer's label.

2. PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS - PAINT

- A. Unless specifically identified otherwise, product designations included in this section are those of the Dunn-Edwards Corporation, www.dunnedwards.com and shall serve as the basis of design standard for kind, quality, performance and function.
- B. Subject to full compliance with specified requirements, other manufacturers offering equivalent products are:
 - 1. Behr Process Corp., www.behrpaint.com.
 - 2. Benjamin Moore Paints, www.benjaminmoore.com.
 - 3. Glidden Professional, www.gliddenprofessional.com.
 - 4. Kelly-Moore Paint Company, www.kellymoore.com.
 - 5. Pittsburgh Paints, www.ppg.com.
 - 6. Sherwin Williams, www.sherwin-williams.com.
 - 7. Tnemec Company, Inc., www.tnemec.com.
 - 8. Vista Paint Corporation, www.vistapaint.com.
- C. Substitutions: Under provisions of Section 01 25 13.

2.2 MATERIALS

- A. Ready mixed, except field catalyzed coatings. Process pigments to a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating.
- B. Good flow and brushing properties; capable of drying or curing free of streaks or sags.
- C. "Deep Tone" colors to be composed of 100 percent acrylic pigments with a colored base.
- D. Accessory Materials: Linseed oil, shellac, turpentine, paint thinners and other materials not specifically indicated but required to achieve the finishes specified, of commercial quality.
- E. Chemical Components of Interior Paints and Coatings: Shall not exceed the limitations of Green Seal's Standard GS-11 and SCAQMD Rule 1113 averaging method for VOC content and the following restrictions:
 - 1. Flat Paints and Coatings: VOC content of not more than 50 g/L.
 - 2. Non-Flat Paints and Coatings: VOC content of not more than 50 g/L.
 - 3. Anticorrosive Coatings: VOC content of not more than 100 g/L.
 - 4. Varnishes and Sanding Sealers: VOC content of not more than 275 g/L.
 - 5. Stains: VOC content of not more than 250 g/L.
 - 6. Aromatic Compounds: Paints and coatings shall not contain more than 1.0 percent by weight of total aromatic compounds (hydrocarbon compounds containing one or more benzene rings).
 - 7. Restricted Components: Paints and coatings shall not contain any of the following:
 - (a) Acrolein.
 - (b) Acrylonitrile.
 - (c) Antimony.
 - (d) Benzene.
 - (e) Butyl benzyl phthalate.
 - (f) Cadmium.
 - (g) Di (2-ethylhexyl) phthalate.
 - (h) Di-n-butyl phthalate.
 - (i) Di-n-octyl phthalate.
 - (j) 1,2-dichlorobenzene.
 - (k) Diethyl phthalate.
 - (l) Dimethyl phthalate.
 - (m) Ethylbenzene.
 - (n) Ethylene Glycol.
 - (o) Formaldehyde.
 - (p) Hexavalent chromium.

- (q) Isophorone.
- (r) Lead.
- (s) Mercury.
- (t) Methyl ethyl ketone.
- (u) Methyl isobutyl ketone.
- (v) Methylene chloride.
- (w) Naphthalene.
- (x) Toluene (methylbenzene).
- (y) 1,1,1-trichloroethane.
- (z) Vinyl chloride.

2.3 FINISHES

- A. Refer to schedule at end of Section for surface finish schedule.

3. PART 3 EXECUTION

3.1 INSPECTION

- A. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
- B. Examine surfaces to be finished prior to commencement of work. Report any condition that may potentially affect proper application.
- C. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:

1. Plaster and Gypsum Wallboard	:	12 percent.
2. Masonry, Concrete, and Concrete Unit Masonry	:	12 percent.
3. Interior Located Wood	:	15 percent.
4. Exterior Located Wood	:	15 percent.
- D. Beginning of installation means acceptance of existing surfaces.

3.2 SURFACE PREPARATION - GENERAL

- A. Remove electrical plates, hardware, light fixture trim, and fittings prior to preparing surfaces or finishing.
- B. Remove all finish hardware from doors and frames prior to preparing surfaces or finishing.
- C. Correct minor defects and clean surfaces which affect work of this Section.
- D. Shellac and seal marks which may bleed through surface finishes.
- E. Impervious Surfaces: Remove mildew by scrubbing with solution of tri-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
- F. Aluminum Surfaces: Remove surface contamination by steam or high pressure water. Remove oxidation with acid etch and solvent washing. Apply etching primer immediately following cleaning.

- G. Insulated Coverings: Remove dirt, grease, and oil from canvas and cotton.
- H. Concrete Floors: Remove contamination, acid etch, and rinse floors with clear water. Verify required acid-alkali balance is achieved. Allow to dry.
- I. Gypsum Board: Repair all voids, nicks, cracks and dents with patching materials and finish flush with adjacent surface. Latex fill minor defects. Spot prime defects after repair.
- J. Galvanized Surfaces: Remove surface contamination and oils and wash with solvent. Pretreat with phosphoric acid etch or vinyl wash. Apply coat of etching primer the same day as pretreatment is applied.
- K. Concrete and Unit Masonry: Remove dirt, loose mortar, scale, salt or alkali powder, and other foreign matter. Remove oil and grease with a solution of tri-sodium phosphate; rinse well and allow to dry. Remove stains caused by weathering of corroding metals with a solution of sodium metasilicate after thoroughly wetting with water. Allow to dry.
- L. Plaster: Fill hairline cracks, small holes, and imperfections with latex patching plaster. Make smooth and flush with adjacent surfaces. Wash and neutralize high alkali surfaces.
- M. Uncoated Steel and Iron: Remove grease, scale, dirt, and rust. Where heavy coatings of scale are evident, remove by wire brushing or sandblasting; clean by washing with solvent. Apply a treatment of phosphoric acid solution, ensuring weld joints, bolts, and nuts are similarly cleaned. Prime paint after repairs.
- N. Shop Primed Steel: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime paint steel surfaces.
- O. Interior Wood: Wipe off dust and grit prior to priming. Seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after primer has dried; sand between coats.
- P. Exterior Wood: Remove dust, grit, and foreign matter. Seal knots, pitch streaks, and sappy sections. Fill nail holes with tinted exterior caulking compound after prime coat has been applied.
- Q. Glue-Laminated Beams: Prior to finishing, wash surfaces with solvent, remove grease and dirt.
- R. Wood Doors: Seal top and bottom edges with 2 coats of spar varnish sealer.
- S. Existing surfaces to be recoated shall be thoroughly cleaned and deglossed by sanding or other means prior to painting. Patched and bare areas shall be spot primed with same primer as specified for new work.

3.3 PROTECTION OF ADJACENT WORK

- A. Protect elements surrounding the work of this Section from damage or disfiguration.
- B. Repair damage to other surfaces caused by work of this Section.
- C. Furnish drop cloths, shields, and protective methods to prevent spray or droppings from disfiguring other surfaces.
- D. Remove empty paint containers from site.

3.4 WORK NOT TO BE PAINTED

- A. Painting is not required on surfaces in concealed and inaccessible areas such as furred spaces, foundation spaces, utility tunnels, pipe spaces and duct shafts.
- B. Do not paint metal surfaces such as stainless steel, chromium plate, brass, bronze, and similar finished metal surfaces.
- C. Do not paint anodized aluminum or other surfaces which are specified to be factory pre-finished.
- D. Do not paint sandblasted or architecturally finished concrete surfaces.

- E. Do not paint prefinished acoustic materials or acoustic suspension systems.
- F. Do not paint over Underwriters Laboratories, Factory Mutual or other code-required labels or identifications.

3.5 APPLICATION

- A. Apply products in accordance with manufacturer's instructions.
- B. Do not apply finishes to surfaces that are not dry.
- C. Apply prime coat to surfaces which are to be painted or finished.
- D. Apply each coat to uniform finish.
- E. Apply each coat of paint slightly darker than preceding coat unless otherwise approved.
- F. Sand lightly between coats to achieve required finish.
- G. Allow applied coat to dry before next coat is applied.
- H. The number of coats specified is the minimum that shall be applied. Apply additional coats when undercoats, stains or other conditions show through final paint coat, until paint film is of uniform finish, color and appearance.
- I. Where clear finishes are required, tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface.
- J. Prime back surfaces of interior and exterior woodwork with primer paint.
- K. Prime back surfaces of interior woodwork scheduled to receive stain or varnish finish with gloss varnish reduced 25 percent with mineral spirits.
- L. Paint mill finished door seals to match door or frame.
- M. Paint primed steel glazing stops in doors to match door or frame.
- N. Cloudiness, spotting, lap marks, brush marks, runs, sags, spikes and other surface imperfections will not be acceptable.
- O. Where spray application is used, apply each coat of the required thickness. Do not double back to build up film thickness of two coats in one pass.
- P. Where roller application is used, roll and redistribute paint to an even and fine texture. Leave no evidence of roller laps, irregularity of texture, skid marks, or other surface imperfections.

3.6 FINISHING MECHANICAL AND ELECTRICAL EQUIPMENT

- A. Paint shop primed equipment. Do not paint shop prefinished items.
- B. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
- C. Prime and paint insulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, except where items are prefinished.
- D. Replace identification markings on mechanical or electrical equipment when painted accidentally.
- E. Paint interior surfaces of air ducts, and connector and baseboard heating cabinets that are visible through grilles and louvers with one coat of flat black paint, to limit of sight line. Paint dampers exposed behind louvers, grilles, and connector and baseboard cabinets to match face panels.

- F. Paint exposed conduit and electrical equipment occurring in finished areas.
- G. Paint both sides and edges of plywood backboards for electrical and telephone equipment before installing equipment.
- H. Replace electrical plates, hardware, light fixture trim, and fittings removed prior to finishing.
- I. Paint grilles, registers, and diffusers which do not match color of adjacent surface.
- J. Paint all mechanical and electrical equipment, vents, fans, and the like occurring on roof.
- K. Do not paint moving parts of operating units; mechanical or electrical parts such as valve operators; linkages; sensing devices; and motor shafts.
- L. Do not paint over labels or equipment identification markings.
- M. Do not paint mechanical room specialties such as compressors, boilers, pumps, control panels, etc.
- N. Do not paint switch plates, light fixtures, and fixture lenses.

3.7 CLEANING

- A. As Work proceeds, promptly remove paint where spilled, splashed, or spattered.
- B. During progress of Work maintain premises free of unnecessary accumulation of tools, equipment, surplus materials, and debris.
- C. Collect cotton waste, cloths, and material which may constitute a fire hazard, place in closed metal containers and remove daily from site.

3.8 PROTECTION OF COMPLETED WORK

- A. Protect finished installation under provisions of Section 01 61 00.
- B. Erect barriers and post warning signs. Maintain in place until coatings are fully dry.
- C. Confirm that no dust generating activities will occur following application of coatings.

3.9 PATCHING

- A. After completion of painting in any one room or area, repair surfaces damaged by other trades.
- B. Touch-up or re-finish as required to produce intended appearance.

3.10 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed under provisions of Section 01 45 29.
- B. The Owner reserves the right to invoke the following test procedure at any time and as often as the Owner deems necessary.
- C. The Owner will engage the services of an independent testing agency to sample paint material being used.
- D. Samples of material delivered to the Project will be taken, identified, sealed, and certified in the presence of the Contractor.
- E. The testing agency will perform appropriate quantitative materials analysis and other characteristic testing of materials as required by the Owner.

- F. If test results show materials being used and their installation do not comply with specified requirements or manufacturer's recommendations, the Contractor may be directed to stop painting, remove noncomplying paint, pay for testing and repaint surfaces to acceptable condition.

3.11 COLOR SCHEDULE

- A. Paint and finish colors shall be selected by the Architect from manufacturer's entire range of standard and custom color selections and special colors selected to match or compliment the colors of other materials, equipment, or components which comprise the work.
- B. Access doors, registers, exposed piping, electrical conduit and mechanical/electrical panels: Generally the same color as adjacent walls.
- C. Exterior and interior steel doors, frames and trim: Generally a contrasting color to adjacent walls.
- D. Doors generally are all the same color, but of a contrasting color from frame and trim.
- E. Exterior and interior steel fabrications: Generally a contrasting color to adjacent walls.
- F. Exposed interior mechanical/ductwork: Generally a contrasting color to adjacent walls or ceiling.
- G. Ceilings are generally to be painted a different color than walls.
- H. Three different color schemes for painting of walls.
- I. Approximately 20 percent of overall painting work will be required to be "Deep Tone" colors. This work will require one additional coat of paint beyond that as specified.

3.12 SCHEDULE - EXTERIOR SURFACES

- A. Wood - Semi-Transparent
 - 1st coat: OKN-19-OKON Weather Pro St Wood Stain
 - 2nd coat: SSSL50 Spartashield
 - 3rd coat: SSSL50 Spartashield
- B. Steel - Primed or Unprimed (Semi-Gloss Urethane Alkyd Enamel)
 - 1st coat: BRPR00 Bloc-Rust Premium
 - 2nd coat: ASHL50 Aristoshield
 - 3rd coat: ASHL50 Aristoshield
- C. Steel - Galvanized (Semi-Gloss Urethane Alkyd Enamel)
 - 1st coat: Supreme Chemical Metal Clean and Etch SCME-01
 - 2nd coat: Ultrashield Galvanized Metal Primer
 - 3rd coat: ASHL50 Aristoshield
 - 4th coat: ASHL50 Aristoshield
- D. Cement Plaster (Flat Elastomeric)
 - 1st coat: FPSL00 Flex Prime Select
 - 2nd coat: EDLX10 Enduralastic 10
 - 3rd coat: EDLX10 Enduralastic 10

3.13 SCHEDULE - INTERIOR SURFACES

- A. Wood-Transparent (Stain-Semi-Gloss Lacquer)
 - 1st coat: Valspar Stainseal V-QYB and V-QYR
 - 2nd coat: Contractors Edge CE-275PROSS
 - 3rd coat: Contractors Edge CE-275PRO60
 - 4th coat: Contractors Edge CE-275PRO60
- B. Steel - Primed or Unprimed (Semi-Gloss Urethane Alkyd Enamel)
 - 1st coat: BRPR00 Bloc-Rust Premium
 - 2nd coat: ASHL50 Aristoshield
 - 3rd coat: ASHL50 Aristoshield
- C. Steel - Galvanized (Semi-Gloss Urethane Alkyd Enamel)
 - 1st coat: ULGM00 Ultrashield Galvanized Metal Primer
 - 2nd coat: ASHL50 Aristoshield
 - 3rd coat: ASHL50 Aristoshield
- D. Gypsum Board (Eggshell Acrylic) - Everywhere except for wet areas.
 - 1st coat: VNPROO Vinylastic Premium
 - 2nd coat: SPMA30 Suprema
 - 3rd coat: SPMA30 Suprema
- E. Gypsum Board (Semi-Gloss Acrylic) - At wet areas (Restrooms, Water Heater Room, Custodial Room)
 - 1st coat: VNPROO Vinylastic Premium
 - 2nd coat: SPMA50 Suprema
 - 3rd coat: SPMA50 Suprema

END OF SECTION

SECTION 10 14 00

SIGNAGE

1. PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Plastic/acrylic signs.
- B. Metal signs.
- C. Letters and numbers.
- D. Cast metal plaques.
- E. Fire wall barrier identification signs.
- F. Precast Concrete Monument Sign.

1.2 REFERENCES

- A. CBC - California Building Code, (CCR) California Code of Regulations, Title 24, Part 2.
- B. 2010 Americans with Disabilities Act (ADA) Standards for Accessible Design.

1.3 SUBMITTALS

- A. Submit shop drawings under provisions of Section 01 33 00.
- B. Submit shop drawings listing sign styles, lettering and locations, spacing and installation method.
- C. Submit samples under provisions of Section 01 33 00.
- D. Submit two samples illustrating full size sample sign, of type, style and color specified including method of attachment.
- E. Submit manufacturer's installation instructions under provisions of Section 01 33 00.
- F. Include installation templates and hardware.

1.4 REGULATORY REQUIREMENTS

- A. Conform to CBC - California Building Code, (CCR), Title 24, Part 2 and the 2010 Americans with Disabilities Act (ADA) Standards for Accessible Design for accessibility requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and protect products to site under provisions of Section 01 61 00.
- B. Package signs, labeled in name groups.

1.6 ENVIRONMENTAL REQUIREMENTS

- A. Do not install adhesive mounted signs when ambient temperature is below 70 degrees F. Maintain this minimum during and after installation of signs.

2. PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acrylic Signs:

1. Architectural Sign Identity, www.architecturalsignidentity.com.
2. ASI - Sign Systems, www.asisignage.com.
3. Best Manufacturing, www.bestsigns.com.
4. Bravo Sign and Design, www.bravosign.com.
5. CA Signs, www.casigns.com.
6. Mohawk Sign Systems, www.mohawksign.com.
7. Neiman and Company, www.neimanandco.com.
8. Signs and Lucite Products, Inc., www.adesignscalifornia.com
9. Signtec, www.signtec.com.
10. Southwell Company, www.southwellco.com.
11. Vomar Products, Inc., www.vomarproducts.com.
12. Substitutions: Under provisions of Section 01 25 13.

2.2 MANUFACTURED UNITS

- A. Exterior Room Control Signage: Mohawk Sign Systems, Format D Sand Carved Process, with 1/32 inch raised border and letters with integral California round top contracted Grade 2 braille dots with dot spacing in compliance with CBC Table 11B-703.3.1 raised a minimum of 1/40 inch. Material shall be 1/8 inch thick x 6 inch high MP plastic plate of length required with 1 inch high helvetica medium lettering; adhesive and mechanical mounting with copy centered on plate. Allow for sixteen letters and three numerals for each sign. Signage to be in compliance with the requirements of Article 703 of the 2010 ADA Standards for Accessible Design and CBC, California Building Code (CCR), Title 24, Part 2, Section 11B-703. Provide three signs. Install at locations as instructed by Architect.
- B. Interior Room Control Signage: Mohawk Sign Systems, Curved Frame Series, satin frame with brushed silver end caps, M-202-9, with 1/32 inch raised border and letters with integral California round top contracted Grade 2 braille dots with dot spacing in compliance with CBC Table 11B-703.3.1 raised a minimum of 1/40 inch. 6 inch high of length required with 1 inch high helvetica medium lettering; adhesive and mechanical mounting with copy centered on plate. Allow for sixteen letters and three numerals for each sign. Signage to be in compliance with the requirements of Article 703 of the 2010 ADA Standards for Accessible Design and CBC, California Building Code (CCR), Title 24, Part 2, Section 11B-703. Provide 30 signs. Install at locations as instructed by Architect.
- C. Pictorial Symbol Signage: Mohawk Sign Systems, Series 200A, Format D Sand Carved Process, with 1/32 inch raised border and letters with integral California round top contracted Grade 2 braille dots with dot spacing in compliance with CBC Table 11B-703.3.1 raised a minimum of 1/40 inch. Material shall be 1/8 inch thick MP plastic plate of size indicated with lettering and symbols as indicated; adhesive and mechanical mounting with copy centered on plate. Provide sign in locations shown on the drawings. Signage to be in compliance with the requirements of Article 703 of the 2010 ADA Standards for Accessible Design and CBC, California Building Code (CCR), Title 24, Part 2, Section 11B-703.

D. Entrance and Restroom Signage:

1. Restroom Doors: Acrylic plastic signs equivalent to that as detailed on the drawings; 12 inch circle and triangle with international symbol of accessibility in accordance with CBC, California Building Code, (CCR), Title 24, Part 2, Section 11B-216.8 and 11B-703.7.2.6.
2. Building Entrance: Equivalent to 6 inch square, reflective plastic accessible sign in accordance with CBC, California Building Code (CCR), Title 24, Part 2, Section 11B-216.6 and 11B-703.7.2.1.

3. PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that surfaces are ready to receive work.
- B. Beginning of installation means installer accepts existing surfaces.

3.2 INSTALLATION - GENERAL

- A. Install in accordance with manufacturer's instructions.
- B. Install true, plumb, level and adequately secured to substrate.
- C. Clean and polish.

3.3 INSTALLATION - FIRE BARRIER

- A. Install fire wall barrier identification signs on fire walls in accessible concealed floor, floor-ceiling or attic space above accessible ceilings.
- B. Install at intervals not exceeding a 30' - 0" horizontal spacing.
- C. Install at maximum 15' - 0" from end of wall.

END OF SECTION

SECTION 10 28 13

TOILET ACCESSORIES

1. PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Toilet and shower, washroom accessories.
- B. Framed mirror units.
- C. Concealed anchor devices and backing plate reinforcements furnished to other Sections.
- D. Attachment hardware.

1.2 REFERENCES

- A. 2010 Americans with Disabilities Act (ADA) Standards for Accessible Design.
- B. CBC - California Building Code, (CCR) California Code of Regulations, Title 24, Part 2, California State Accessibility Standards.
- C. ASTM A123 - Zinc (Hot-Dip Galvanized) Coatings on Products Fabricated from Rolled, Pressed, and Forged Steel Shapes, Plates, Bars and Strips.
- D. ASTM A167 - Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip.
- E. ASTM A366 - Steel, Carbon, Cold-Rolled Sheet, Commercial Quality.
- F. ASTM A386 - Zinc Coating (Hot-Dip) on Assembled Steel Products.
- G. ASTM B456 - Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium.
- H. ASTM A269 - Seamless and Welded Austenitic Stainless Steel Tubing for General Service.

1.3 SUBMITTALS

- A. Submit product data under provisions of Section 01 33 00.
- B. Provide product data on accessories describing size, finish, details of function, attachment methods.
- C. Submit manufacturer's installation instructions under provisions of Section 01 33 00.

1.4 KEYING

- A. Supply two keys for each accessory to Owner.
- B. Master key all accessories.

1.5 REGULATORY REQUIREMENTS

- A. Conform to CBC, California Building Code, (CCR) Title 24, Part 2, the 2010 Americans with Disabilities Act (ADA) Standards for Accessible Design and for accessibility requirements.
- B. Structural strength of grab bars, shower seats, fasteners and mounting devices shall conform to requirements of the CBC, California Building Code, (CCR) Title 24, Part 2, Section 11B-609, 11B-610 and shall withstand the application of a 250 lb. point load.

1.6 COORDINATION

- A. Coordinate the work of this Section under provisions of Section 01 31 00.
- B. Coordinate the work of this Section with the placement of internal wall reinforcement and reinforcement of toilet partitions to receive anchor attachments.

2. PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Bobrick Washroom Equipment, Inc., www.bobrick.com.
- B. American Specialties, Inc. (ASI), www.americanspecialties.com.
- C. Bradley Corporation, www.bradleycorp.com.
- D. Substitutions: Under provisions of Section 01 25 13.

2.2 MATERIALS

- A. Sheet Steel: ASTM A366.
- B. Stainless Steel Sheet: ASTM A167, Type 304.
- C. Tubing: ASTM A269, stainless steel, Type 304.

2.3 ACCESSORIES

- A. Adhesive: Two component epoxy type waterproof.
- B. Fasteners, Screws, and Bolts: Hot dip galvanized, tamperproof.
- C. Expansion Shields: Fiber, lead, or rubber as recommended by accessory manufacturer for component and substrate.

2.4 FABRICATION

- A. Weld and grind smooth joints of fabricated components.
- B. Form exposed surfaces from single sheet of stock, free of joints.
- C. Form surfaces flat without distortion. Maintain flat surfaces without scratches or dents.
- D. Back paint components where contact is made with building finishes to prevent electrolysis.
- E. Shop assemble components and package complete with anchors and fittings.
- F. Provide steel anchor plates, adapters, and anchor components for installation.
- G. Hot dip galvanize exposed and painted ferrous metal and fastening devices.
- H. Toilet tissue dispensers located in accessible toilet rooms or stalls shall not have their flow restricted and shall be capable of continuous flow.

2.5 FACTORY FINISHING

- A. Galvanizing: ASTM A123 to 1.25 oz/sq yd.
- B. Shop Primed Ferrous Metals: Pretreat and clean, spray apply one coat primer and bake.

- C. Enamel: Pretreat to clean condition, apply one coat primer and minimum two coats electrostatic baked enamel.
- D. Chrome/Nickel Plating: ASTM B456, Type SC 2 polished finish.
- E. Stainless Steel: No. 4 satin luster finish.
- F. Mirror Glass: FS DD-G-451 Type I, Class 1, Quality of 2, 1/4 inch thick with silver coating, copper protective coating and non metallic paint coating complying with FS DD-M-411.
- G. Stainless Steel Mirror: Type 430, 20 gage, bright annealed stainless steel.

3. PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that site conditions are ready to receive work and dimensions are as instructed by the manufacturer.
- B. Beginning of installation means acceptance of existing conditions.

3.2 PREPARATION

- A. Deliver inserts and rough-in frames to site at appropriate time for building-in.
- B. Provide templates and rough-in measurements as required.
- C. Verify exact location of accessories for installation.

3.3 INSTALLATION

- A. Install fixtures, accessories and items in accordance with manufacturers' instructions.
- B. Install plumb and level, securely and rigidly anchored to substrate.
- C. Accessories required to be accessible shall be mounted at heights according to CBC Section 11B-603.5 and as indicated on the drawings.
- D. Toilet paper dispensers and feminine napkin dispensers located on the grab bar side of an accessible toilet room or stall shall not project more than 3 inches from the finished surface of the wall nor be located closer than 1-1/2 inches clear of the tangent point of the grab bar.

3.4 SCHEDULE

Not Used

END OF SECTION

SECTION 10 44 00

FIRE PROTECTION SPECIALTIES

1. PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Fire extinguishers.
- B. Non-rated cabinets.
- C. Accessories.

1.2 REFERENCES

- A. ASTM E814 - Fire Tests of Through-Penetration Fire Stops.
- B. NFPA 10 - Portable Fire Extinguishers.
- C. CFC - California Fire Code, (CCR) California Code of Regulations, Title 24, Part 9.
- D. Title 19, State Fire Marshal Regulations.

1.3 QUALITY ASSURANCE

- A. Conform to NFPA 10 requirements.

1.4 REGULATORY REQUIREMENTS

- A. Conform to requirements of the CFC, Section 906, and Title 19 - State Fire Marshal Regulations, Chapter 3.

1.5 SUBMITTALS

- A. Submit product data under provisions of Section 01 33 00.
- B. Include physical dimensions, operational features, color and finish, mounting and anchorage details, rough-in measurements, location, and details.
- C. Submit manufacturer's installation instructions under provisions of Section 01 33 00.

1.6 OPERATION AND MAINTENANCE DATA

- A. Submit manufacturer's operation and maintenance data under provisions of Section 01 77 00.
- B. Include test, refill or recharge schedules, procedures, and re-certification requirements.

1.7 ENVIRONMENTAL REQUIREMENTS

- A. Do not install extinguishers when ambient temperatures may cause freezing.

2. PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Amerex Corporation, www.amerex-fire.com.
- B. J. L. Industries, www.jlindustries.com.
- C. Larsen's Mfg. Co., www.larsensmfg.com.

- D. Potter-Roemer, Inc., www.potterroemer.com.
- E. Substitutions: Under provisions of Section 01 25 13.

2.2 EXTINGUISHERS

- A. Dry Chemical Type: Equivalent to J.L. Industries Cosmic Model 5E, UL 2A: 10B: C nominal capacity with multi-purpose chemical agent and inert material in enameled-steel container, with pressure-indicating gage.

2.3 CABINETS

- A. Non-rated cabinets equivalent to J.L. Industries Panorama Model No. 1036P48 with custom polished finish, stainless steel and mill-finish Futura embossed handle. Provide three at locations as directed by Architect.

2.4 FABRICATION

- A. Form body of cabinet with tight inside corners and seams.
- B. Fabricate body of fire rated cabinet of double wall construction filled with a 5/8 inch thick layer of protective fire barrier insulation.
- C. Predrill holes for anchorage.
- D. Form perimeter trim by welding, filling, and grinding smooth.
- E. Hinge doors for 180 degree opening with continuous piano hinge. Provide nylon catch with pull handle.

2.5 ACCESSORIES

- A. Steel Cable Theft Device: Model STI 6200 as manufactured by STI Inc., www.sti-usa.com.

2.6 FINISHES

- A. Extinguisher: Red enamel.
- B. Cabinet Trim and Door: Custom polished finish.

3. PART 3 EXECUTION

3.1 INSPECTION

- A. Verify rough openings for cabinet are correctly sized and located.
- B. Beginning of installation means acceptance of existing conditions.

3.2 INSTALLATION

- A. Install cabinets plumb and level in wall openings.
- B. Secure rigidly in place in accordance with manufacturer's instructions.
- C. Install fire rated cabinets in strict conformance with manufacturer's instructions and listing requirements of Warnock-Hersey.
- D. Attach steel cable theft device to each extinguisher. Locate inside cabinet.

END OF SECTION

SECTION 22 05 17

SLEEVES AND SLEEVE SEALS FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Sleeves.
 - 2. Sleeve-seal systems.
 - 3. Grout.

1.3 WORK INCLUDED

- A. Furnish all labor, materials, services, testing, transportation and equipment necessary for the completion of all plumbing work as indicated on drawings and specified herein. Work materials and equipment not indicated or specified which is necessary for the complete and proper operation of the work of this Section in accordance with the true intent and meaning of the contract documents shall be provided and incorporated at no additional cost to the Owner.

1.4 QUALITY ASSURANCE

- A. Code Requirements: All work covered by this Section shall conform to the latest requirements of the following regulations:
 - 1. C.C.R., Title 24, Part 5 (2022 CPC).
 - 2. 2022 California Plumbing Code.
 - 3. SMACNA Seismic Restraint Manual Guidelines for Mechanical Systems.
 - 4. National Fire Protection Association.
 - 5. California State Division of Industrial Safety.
 - 6. County Health Department.
 - 7. Any other legally constituted body-having jurisdiction thereof.

- B. Nothing in the specifications or drawings shall be construed to permit deviation from the requirements of governing codes unless approval for said deviation has been obtained from the legally constituted authorities having jurisdiction and from the Owner's representative.

1.5 DRAWINGS

- A. Because of the small-scale drawings, it is not possible to indicate all offsets, fittings and accessories which may be required. The Contractor shall carefully investigate the conditions surrounding installation of his work, furnishing the necessary piping, fittings, valves, traps, and other devices which may be required to complete the installation.

- B. The general arrangement indicated on the drawings shall be followed as closely as possible. Coordinate with the Architectural, Structural, Mechanical and Electrical Drawings and the work of other trades prior to installation of piping fixtures and equipment to verify adequate space available for installation of the work shown. In the event a field condition arises which makes it impossible to install the work as indicated, submit, in writing, the proposed departures to the Architect for his approval. Only when Architect's approval is given, in writing, shall Contractor proceed with installation of the work.
- C. Special Note: Should the Contractor make changes in the installation differing from what is indicated on the contract drawings and not necessitated due to field conditions as indicated hereinabove, the Contractor shall be required to re-install the work to comply with what has been indicated on the contract drawings. Should it be impossible to re-install the work and the installation is in accordance with all governing authorities, the architect may permit the installation to remain. However, all costs incurred to revise the contract drawings by the engineer for resubmittal to the building department indicating the as-installed condition shall become the responsibility of the Contractor.
- D. In case of a difference in the specifications or between the specifications and the drawings, the Contractor shall figure the most expensive alternate and after award of contract, shall secure direction from the Architect.

1.6 PERMITS, INSPECTIONS AND LICENSES

- A. All permits, inspections and licenses required by the legally constituted authorities for installation of the work according to the plans and specifications shall be obtained and paid as a part of the work of this section.

1.7 EXAMINATION OF PREMISES

- A. Before bidding on this work, Contractors shall make a careful examination of the premises and shall thoroughly familiarize themselves with the requirements of the contract. By the act of submitting a proposal for the work included in this contract, the Contractor shall be deemed to have made such study and examination, and that he is familiar with and accepts all conditions of the site.

1.8 PROTECTION

- A. All work, equipment and materials shall be protected at all times. Contractor shall make good all damage caused either directly or indirectly by his own workmen. Contractor shall also protect his own work from damage. He shall close all pipe openings with caps or plugs during installation. He shall protect all his equipment and materials against dirt, water, chemical and mechanical injury. Upon completion, all work shall be thoroughly cleaned and delivered in a new condition.
- B. Contractor shall be held responsible for all damage to equipment and materials until he has received written notice from the Architect or Engineer that his work has been accepted.

1.9 LOCATIONS

- A. The locations of apparatus, piping and equipment indicated on the drawings are approximate. Piping and equipment shall be installed in such a manner as to avoid all obstruction, preserve headroom, and keep openings and passages clear. The locations of and mounting heights of all fixtures shall be coordinated with the architectural plans and room elevations.
- B. Clearances and Openings: Contractor shall cooperate and coordinate his work with all other trades to avoid conflict and permit for a neat and orderly appearance of the entire installation. The Contractor shall, in advance of the work, furnish instructions to the General Contractor as to his requirements for equipment and material installation of any kind, whether or not specifically mentioned on drawings or in the specifications, and shall include recesses, chases in walls, and all required openings in the structure. Should furnishing this information be neglected, delayed or incorrect and additional cuttings are found to be required, the cost of the same shall be charged to this Contractor.
- C. Contractor shall verify and coordinate pipe routing with location of all electrical rooms, elevator equipment rooms, telecom/data rooms, and other rooms dedicated to the housing of switchgear, panels, or other electrical equipment. In no case shall piping be installed within or above the ceiling of such rooms.

1.10 SUBMITTAL DATA

A. Submittal Requirements:

- 1. Furnish, all at one time, prior to any installation, within the time noted below, six (6) copies of valid submittal data on all fixtures, material, equipment and devices. Each submitted item shall be indexed and referenced to these specifications and to identification numbers on fixtures and equipment schedules.
- 2. Manufacturers' submittal literature and shop drawings are required on all items to ensure the latest and most complete manufacturer's data is available for review. Requirements of the submittals and Engineer's submittal notes are a part of the work of this Division except that Engineer's notes may not be used as a means of increasing the scope of work of this Division.
- 3. Submittals will be checked for general conformance with the design concept of the project but the review does not guarantee quantities shown and does not supersede requirements of this Division to properly install work.
- 4. To be valid, all submittals must:
 - a. Be delivered to the Architect's office within thirty-five (35) days of award of the contract. Contractor shall make time allowance for Engineer's review, return of comments, if any, and resubmittal if required. Corrections or changes in submittals returned as inadequate or incomplete shall be accomplished within this time limit.
 - b. Clearly indicate and label as such any items proposed as substitution for that specified or shown on plans.
 - c. Include all pertinent construction, installation, performance and technical data.
 - d. Have all product data sheets clearly labeled to indicate the individual items being submitted. In addition, all required options and accessories shall be clearly marked.
 - 1) Product data sheets corresponding to items indicated on plans shall be clearly labeled with the corresponding fixture or equipment tag number.

- 2) Product data sheets corresponding to items indicated in specifications shall be clearly labeled with the specification section, page and item numbers.
- e. Include, for every item which differs in size, configuration, connections, service, accessibility or any other significant way, a drawing to the same (or larger) scale as to the pertinent portions of the contract drawings. In this drawing show a complete layout of the system except that which is identical to the contract drawings, unless the unchanged portions must be shown to indicate such things as clearances. This drawing, together with the contract design drawings must show the complete system as revised to accommodate the proposed alternate.

B. Substitution Requirements:

1. Any items included in submittals and proposed by the Contractor as substitution for that specified or shown on plans shall be submitted within thirty five (35) days of award of the contract. After such time, proposed substitutions shall not be accepted for review, and the Contractor shall submit all items as specified or shown on plans.
 - a. For each item proposed as substitution for that specified or shown on plans, copies of product data sheets for the specified item shall be placed side by side with product data sheets for the proposed substitution item within the submittal.
 - 1) In addition to the Submittal Requirements for labeling listed above, product data sheets for the specified item shall be clearly labeled "SPECIFIED ITEM, NOT SUBMITTED". Product data sheets for the corresponding proposed substitution item shall be clearly labeled "PROPOSED SUBSTITUTION".
 - b. Provide calculations and other detailed data justifying how any items proposed as substitution were selected for proposal. Data must be complete enough to permit detailed comparison of every significant characteristic for which the specified item was analyzed during design.
2. It shall be the Contractor's responsibility to provide sufficient information to allow the Engineer to analyze any proposed alternate. If inadequate information is provided, the proposal will not be approved and resubmittal will not be allowed.
3. The Contractor shall provide or perform tests required by Engineer for purpose of judging acceptability of proposed substitutions.
4. The Contractor assumes full responsibility that alternate items and procedures will meet the job requirements and is responsible for cost of redesign and of modifications to this and other parts of work caused by alternate items furnished under work in this Section. In view of these responsibilities, it is the purpose of these specifications to establish procedures to ensure that the Contractor has considered all the ramifications of proposed alternates before submitting them for review. Submittals which do not comply with the requirements of these specifications or which indicate proposed alternates that were selected without proper regard to the requirements of the job will not be approved. No more than one proposed alternate will be considered for each item.
5. Alternate items installed without Engineer's approval will be replaced with specified items at Contractor's expense.
6. The Architect or his authorized representative shall be the sole judge as to the quality and suitability of proposed alternate equipment, fixtures or materials. Decisions of the Architect or that of his representative shall be final and conclusive.

1.11 UNINSPECTED WORK

- A. The Contractor shall not allow or cause any of his work to be covered up or closed in until it has been inspected, tested, approved by all authorities have jurisdiction, and until Project Record drawings have been properly annotated.
- B. Should any of his work be covered up or closed in before such inspection, he shall, at his own expense, uncover the work to the satisfaction of the inspection party. All related repair work cost shall be borne by the Contractor.

1.12 RECORD DRAWINGS

- A. Contractor shall provide and keep up-to-date a complete "as-built" record set of blueline prints which shall show every change from the original drawings and the exact "as-built" locations and sizes of the work provided under this Section of the specifications. This set shall include locations, dimensions, depth of buried piping, cleanouts, shut-off valves, sewer invert locations, plugged wyes, tees, etc. On completion of the work, the Contractor shall incorporate all as-built information on a set of reproducible tracings provided by the Architect and this set of reproducibles shall be delivered to the Architect.

1.13 GUARANTEES

- A. Contractor shall guarantee the entire plumbing and piping systems unconditionally for a period of one (1) year after final acceptance. If, during this period, any materials, equipment, or any part of the systems fail to function properly, the Contractor shall make good the defects promptly and without any expense to the Owner.
- B. Contractor shall be responsible for all damage to any part of the premises caused by leaks in pipelines or equipment furnished and installed under this Section for a period of one (1) year after date of acceptance of his work.
- C. All equipment and fixtures shall carry manufacturer's warranty against defective parts or poor workmanship for not less than one (1) year. See specific equipment specifications for extended warranty requirements.

PART 2 - PRODUCTS

- 2.1 SLEEVES: Shall be plastic or galvanized steel where pipes pass through concrete walls or floor slabs.
 - A. Isolate pipes through ground floor slabs with Kraft paper, plastic tape or similar materials unless conduit is specified or indicated.
 - B. Sleeves for pipes through exterior walls shall be non-metallic with minimum 2" weep ring as manufactured by Link Seal. Pipe shall be sealed with Link Seal modular seal with EPDM seal elements.
 - C. Sleeves in or through fire rated walls shall be per U.L. Fire Resistance System No. WL1146 for drywall construction, and U.L. Fire Resistance System No. CAJ1044 for concrete construction. See architectural plans for all locations of rated walls.

- D. Galvanized-Steel Wall Pipes: ASTM A 53/A 53M, Schedule 40, with plain ends and welded steel collar; zinc coated.
- E. Galvanized-Steel-Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, with plain ends.
- F. Molded-PE or -PP Sleeves: Removable, tapered-cup shaped, and smooth outer surface with nailing flange for attaching to wooden forms.

2.2 SLEEVE-SEAL SYSTEMS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Advance Products & Systems, Inc.
 - 2. Metraflex Company (The).
 - 3. Pipeline Seal and Insulator, Inc.
- B. Description: Modular sealing-element unit, designed for field assembly, for filling annular space between piping and sleeve.
 - 1. Sealing Elements: EPDM-rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
 - 2. Pressure Plates: Stainless steel.
 - 3. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements.

2.3 GROUT

- A. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.
- B. Characteristics: Nonshrink; recommended for interior and exterior applications.
- C. Design Mix: 5000-psi, 28-day compressive strength.
- D. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION

- A. Install sleeves for piping passing through penetrations in floors, partitions, roofs, and walls.
- B. For sleeves that will have sleeve-seal system installed, select sleeves of size large enough to provide 1-inch annular clear space between piping and concrete slabs and walls.
 - 1. Sleeves are not required for core-drilled holes.

- C. Install sleeves in concrete floors, concrete roof slabs, and concrete walls as new slabs and walls are constructed.
 - 1. Permanent sleeves are not required for holes in slabs formed by molded-PE or -PP sleeves.
 - 2. Cut sleeves to length for mounting flush with both surfaces.
 - 3. Using grout, seal the space outside of sleeves in slabs and walls without sleeve-seal system.

- D. Install sleeves for pipes passing through interior partitions.
 - 1. Cut sleeves to length for mounting flush with both surfaces.
 - 2. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation.
 - 3. Seal annular space between sleeve and piping or piping insulation; use joint sealants appropriate for size, depth, and location of joint. Comply with requirements for sealants specified in Section 079200 "Joint Sealants."

- E. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements for firestopping specified in Section 078413 "Penetration Firestopping."

3.2 SLEEVE-SEAL-SYSTEM INSTALLATION

- A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at service piping entries into building.

- B. Select type, size, and number of sealing elements required for piping material and size and for sleeve ID or hole size. Position piping in center of sleeve. Center piping in penetration, assemble sleeve-seal system components, and install in annular space between piping and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make a watertight seal.

3.3 SLEEVE AND SLEEVE-SEAL SCHEDULE

- A. Use sleeves and sleeve seals for the following piping-penetration applications:
 - 1. Exterior Concrete Walls below Grade:
 - a. Piping Smaller Than NPS 6: Galvanized-steel wall sleeves with sleeve-seal system.
 - 1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.

 - 2. Concrete Slabs-on-Grade:
 - a. Piping Smaller Than NPS 6: Galvanized-steel wall sleeves with sleeve-seal system.
 - 1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.

3. Concrete Slabs above Grade:
 - a. Piping Smaller Than NPS 6: Galvanized-steel-pipe sleeves.
4. Interior Partitions:
 - a. Piping Smaller Than NPS 6: Galvanized-steel-pipe sleeves.

END OF SECTION 22 05 17

SECTION 22 05 18

ESCUTCHEONS FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Escutcheons.
 - 2. Floor plates.

1.3 WORK INCLUDED

- A. Furnish all labor, materials, services, testing, transportation and equipment necessary for the completion of all plumbing work as indicated on drawings and specified herein. Work materials and equipment not indicated or specified which is necessary for the complete and proper operation of the work of this Section in accordance with the true intent and meaning of the contract documents shall be provided and incorporated at no additional cost to the Owner.

1.4 QUALITY ASSURANCE

- A. Code Requirements: All work covered by this Section shall conform to the latest requirements of the following regulations:
 - 1. C.C.R., Title 24, Part 5 (2022 CPC).
 - 2. 2022 California Plumbing Code.
 - 3. SMACNA Seismic Restraint Manual Guidelines for Mechanical Systems.
 - 4. National Fire Protection Association.
 - 5. California State Division of Industrial Safety.
 - 6. County Health Department.
 - 7. Any other legally constituted body-having jurisdiction thereof.

- B. Nothing in the specifications or drawings shall be construed to permit deviation from the requirements of governing codes unless approval for said deviation has been obtained from the legally constituted authorities having jurisdiction and from the Owner's representative.

1.5 DRAWINGS

- A. Because of the small-scale drawings, it is not possible to indicate all offsets, fittings and accessories which may be required. The Contractor shall carefully investigate the conditions surrounding installation of his work, furnishing the necessary piping, fittings, valves, traps, and other devices which may be required to complete the installation.

- B. The general arrangement indicated on the drawings shall be followed as closely as possible. Coordinate with the Architectural, Structural, Mechanical and Electrical Drawings and the work of other trades prior to installation of piping fixtures and equipment to verify adequate space available for installation of the work shown. In the event a field condition arises which makes it impossible to install the work as indicated, submit, in writing, the proposed departures to the Architect for his approval. Only when Architect's approval is given, in writing, shall Contractor proceed with installation of the work.
- C. Special Note: Should the Contractor make changes in the installation differing from what is indicated on the contract drawings and not necessitated due to field conditions as indicated hereinabove, the Contractor shall be required to re-install the work to comply with what has been indicated on the contract drawings. Should it be impossible to re-install the work and the installation is in accordance with all governing authorities, the architect may permit the installation to remain. However, all costs incurred to revise the contract drawings by the engineer for resubmittal to the building department indicating the as-installed condition shall become the responsibility of the Contractor.
- D. In case of a difference in the specifications or between the specifications and the drawings, the Contractor shall figure the most expensive alternate and after award of contract, shall secure direction from the Architect.

1.6 PERMITS, INSPECTIONS AND LICENSES

- A. All permits, inspections and licenses required by the legally constituted authorities for installation of the work according to the plans and specifications shall be obtained and paid as a part of the work of this section.

1.7 EXAMINATION OF PREMISES

- A. Before bidding on this work, Contractors shall make a careful examination of the premises and shall thoroughly familiarize themselves with the requirements of the contract. By the act of submitting a proposal for the work included in this contract, the Contractor shall be deemed to have made such study and examination, and that he is familiar with and accepts all conditions of the site.

1.8 PROTECTION

- A. All work, equipment and materials shall be protected at all times. Contractor shall make good all damage caused either directly or indirectly by his own workmen. Contractor shall also protect his own work from damage. He shall close all pipe openings with caps or plugs during installation. He shall protect all his equipment and materials against dirt, water, chemical and mechanical injury. Upon completion, all work shall be thoroughly cleaned and delivered in a new condition.
- B. Contractor shall be held responsible for all damage to equipment and materials until he has received written notice from the Architect or Engineer that his work has been accepted.

1.9 LOCATIONS

- A. The locations of apparatus, piping and equipment indicated on the drawings are approximate. Piping and equipment shall be installed in such a manner as to avoid all obstruction, preserve headroom, and keep openings and passages clear. The locations of and mounting heights of all fixtures shall be coordinated with the architectural plans and room elevations.
- B. Clearances and Openings: Contractor shall cooperate and coordinate his work with all other trades to avoid conflict and permit for a neat and orderly appearance of the entire installation. The Contractor shall, in advance of the work, furnish instructions to the General Contractor as to his requirements for equipment and material installation of any kind, whether or not specifically mentioned on drawings or in the specifications, and shall include recesses, chases in walls, and all required openings in the structure. Should furnishing this information be neglected, delayed or incorrect and additional cuttings are found to be required, the cost of the same shall be charged to this Contractor.
- C. Contractor shall verify and coordinate pipe routing with location of all electrical rooms, elevator equipment rooms, telecom/data rooms, and other rooms dedicated to the housing of switchgear, panels, or other electrical equipment. In no case shall piping be installed within or above the ceiling of such rooms.

1.10 SUBMITTAL DATA

A. Submittal Requirements:

- 1. Furnish, all at one time, prior to any installation, within the time noted below, six (6) copies of valid submittal data on all fixtures, material, equipment and devices. Each submitted item shall be indexed and referenced to these specifications and to identification numbers on fixtures and equipment schedules.
- 2. Manufacturers' submittal literature and shop drawings are required on all items to ensure the latest and most complete manufacturer's data is available for review. Requirements of the submittals and Engineer's submittal notes are a part of the work of this Division except that Engineer's notes may not be used as a means of increasing the scope of work of this Division.
- 3. Submittals will be checked for general conformance with the design concept of the project but the review does not guarantee quantities shown and does not supersede requirements of this Division to properly install work.
- 4. To be valid, all submittals must:
 - a. Be delivered to the Architect's office within thirty-five (35) days of award of the contract. Contractor shall make time allowance for Engineer's review, return of comments, if any, and resubmittal if required. Corrections or changes in submittals returned as inadequate or incomplete shall be accomplished within this time limit.
 - b. Clearly indicate and label as such any items proposed as substitution for that specified or shown on plans.
 - c. Include all pertinent construction, installation, performance and technical data.
 - d. Have all product data sheets clearly labeled to indicate the individual items being submitted. In addition, all required options and accessories shall be clearly marked.
 - 1) Product data sheets corresponding to items indicated on plans shall be clearly labeled with the corresponding fixture or equipment tag number.

- 2) Product data sheets corresponding to items indicated in specifications shall be clearly labeled with the specification section, page and item numbers.
- e. Include, for every item which differs in size, configuration, connections, service, accessibility or any other significant way, a drawing to the same (or larger) scale as to the pertinent portions of the contract drawings. In this drawing show a complete layout of the system except that which is identical to the contract drawings, unless the unchanged portions must be shown to indicate such things as clearances. This drawing, together with the contract design drawings must show the complete system as revised to accommodate the proposed alternate.

B. Substitution Requirements:

1. Any items included in submittals and proposed by the Contractor as substitution for that specified or shown on plans shall be submitted within thirty five (35) days of award of the contract. After such time, proposed substitutions shall not be accepted for review, and the Contractor shall submit all items as specified or shown on plans.
 - a. For each item proposed as substitution for that specified or shown on plans, copies of product data sheets for the specified item shall be placed side by side with product data sheets for the proposed substitution item within the submittal.
 - 1) In addition to the Submittal Requirements for labeling listed above, product data sheets for the specified item shall be clearly labeled "SPECIFIED ITEM, NOT SUBMITTED". Product data sheets for the corresponding proposed substitution item shall be clearly labeled "PROPOSED SUBSTITUTION".
 - b. Provide calculations and other detailed data justifying how any items proposed as substitution were selected for proposal. Data must be complete enough to permit detailed comparison of every significant characteristic for which the specified item was analyzed during design.
2. It shall be the Contractor's responsibility to provide sufficient information to allow the Engineer to analyze any proposed alternate. If inadequate information is provided, the proposal will not be approved and resubmittal will not be allowed.
3. The Contractor shall provide or perform tests required by Engineer for purpose of judging acceptability of proposed substitutions.
4. The Contractor assumes full responsibility that alternate items and procedures will meet the job requirements and is responsible for cost of redesign and of modifications to this and other parts of work caused by alternate items furnished under work in this Section. In view of these responsibilities, it is the purpose of these specifications to establish procedures to ensure that the Contractor has considered all the ramifications of proposed alternates before submitting them for review. Submittals which do not comply with the requirements of these specifications or which indicate proposed alternates that were selected without proper regard to the requirements of the job will not be approved. No more than one proposed alternate will be considered for each item.
5. Alternate items installed without Engineer's approval will be replaced with specified items at Contractor's expense.
6. The Architect or his authorized representative shall be the sole judge as to the quality and suitability of proposed alternate equipment, fixtures or materials. Decisions of the Architect or that of his representative shall be final and conclusive.

1.11 UNINSPECTED WORK

- A. The Contractor shall not allow or cause any of his work to be covered up or closed in until it has been inspected, tested, approved by all authorities have jurisdiction, and until Project Record drawings have been properly annotated.
- B. Should any of his work be covered up or closed in before such inspection, he shall, at his own expense, uncover the work to the satisfaction of the inspection party. All related repair work cost shall be borne by the Contractor.

1.12 RECORD DRAWINGS

- A. Contractor shall provide and keep up-to-date a complete "as-built" record set of blueline prints which shall show every change from the original drawings and the exact "as-built" locations and sizes of the work provided under this Section of the specifications. This set shall include locations, dimensions, depth of buried piping, cleanouts, shut-off valves, sewer invert locations, plugged wyes, tees, etc. On completion of the work, the Contractor shall incorporate all as-built information on a set of reproducible tracings provided by the Architect and this set of reproducibles shall be delivered to the Architect.

1.13 GUARANTEES

- A. Contractor shall guarantee the entire plumbing and piping systems unconditionally for a period of one (1) year after final acceptance. If, during this period, any materials, equipment, or any part of the systems fail to function properly, the Contractor shall make good the defects promptly and without any expense to the Owner.
- B. Contractor shall be responsible for all damage to any part of the premises caused by leaks in pipelines or equipment furnished and installed under this Section for a period of one (1) year after date of acceptance of his work.
- C. All equipment and fixtures shall carry manufacturer's warranty against defective parts or poor workmanship for not less than one (1) year. See specific equipment specifications for extended warranty requirements.

PART 2 - PRODUCTS

2.1 ESCUTCHEONS

- A. One-Piece, Cast-Brass Type: With polished, chrome-plated and rough-brass finish and setscrew fastener.
- B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with chrome-plated finish and spring-clip fasteners.

2.2 FLOOR PLATES

- A. One-Piece Floor Plates: Cast-iron flange with holes for fasteners.
- B. Split-Casting Floor Plates: Cast brass with concealed hinge.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install escutcheons for piping penetrations of walls, ceilings, and finished floors.
- B. Install escutcheons with ID to closely fit around pipe, tube, and insulation of insulated piping and with OD that completely covers opening.
 - 1. Escutcheons for New Piping:
 - a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.
 - b. Chrome-Plated Piping: One-piece, cast-brass type with polished, chrome-plated finish.
 - c. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, cast-brass type with polished, chrome-plated finish.
 - d. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece, cast-brass type with polished, chrome-plated finish.
 - e. Bare Piping in Unfinished Service Spaces: One-piece, cast-brass type with polished, chrome-plated or rough-brass finish.
 - f. Bare Piping in Equipment Rooms: One-piece, cast-brass type with polished, chrome-plated or rough-brass finish.
- C. Install floor plates for piping penetrations of equipment-room floors.
- D. Install floor plates with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.
 - 1. New Piping: One-piece, floor-plate type.
 - 2. Existing Piping: Split-casting, floor-plate type.

3.2 FIELD QUALITY CONTROL

- A. Replace broken and damaged escutcheons and floor plates using new materials.

END OF SECTION 22 05 18

SECTION 22 05 23

GENERAL-DUTY VALVES FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:

1. Bronze ball valves.
2. Ductile-iron, single-flange butterfly valves.
3. Bronze lift check valves.
4. Bronze swing check valves.
5. Bronze gate valves.
6. Iron gate valves
7. Manual circuit balancing valves.
8. Gas shut-off cocks.
9. LPG shut-off cocks.

- B. Related Sections:

1. Division 2 water distribution piping Sections for general-duty and specialty valves for site construction piping.
2. Division 15 plumbing piping Sections for specialty valves applicable to those Sections only.
3. Division 15 Section "Identification for Plumbing Piping and Equipment" for valve tags and schedules.

1.3 DEFINITIONS

- A. CWP: Cold working pressure.
- B. EPDM: Ethylene propylene diene terpolymer rubber.
- C. NBR: Acrylonitrile-butadiene, Buna-N, or nitrile rubber.
- D. NRS: Nonrising stem.
- E. OS&Y: Outside screw and yoke.
- F. RS: Rising stem.
- G. SWP: Steam working pressure.

1.4 WORK INCLUDED

- A. Furnish all labor, materials, services, testing, transportation and equipment necessary for the completion of all plumbing work as indicated on drawings and specified herein. Work materials and equipment not indicated or specified which is necessary for the complete and proper operation of the work of this Section in accordance with the true intent and meaning of the contract documents shall be provided and incorporated at no additional cost to the Owner.

1.5 QUALITY ASSURANCE

- A. Code Requirements: All work covered by this Section shall conform to the latest requirements of the following regulations:
 - 1. C.C.R., Title 24, Part 5 (2022 CPC).
 - 2. 2022 California Plumbing Code.
 - 3. SMACNA Seismic Restraint Manual Guidelines for Mechanical Systems.
 - 4. National Fire Protection Association.
 - 5. California State Division of Industrial Safety.
 - 6. County Health Department.
 - 7. Any other legally constituted body-having jurisdiction thereof.
- B. Nothing in the specifications or drawings shall be construed to permit deviation from the requirements of governing codes unless approval for said deviation has been obtained from the legally constituted authorities having jurisdiction and from the Owner's representative.

1.6 DRAWINGS

- A. Because of the small-scale drawings, it is not possible to indicate all offsets, fittings and accessories which may be required. The Contractor shall carefully investigate the conditions surrounding installation of his work, furnishing the necessary piping, fittings, valves, traps, and other devices which may be required to complete the installation.
- B. The general arrangement indicated on the drawings shall be followed as closely as possible. Coordinate with the Architectural, Structural, Mechanical and Electrical Drawings and the work of other trades prior to installation of piping fixtures and equipment to verify adequate space available for installation of the work shown. In the event a field condition arises which makes it impossible to install the work as indicated, submit, in writing, the proposed departures to the Architect for his approval. Only when Architect's approval is given, in writing, shall Contractor proceed with installation of the work.
- C. Special Note: Should the Contractor make changes in the installation differing from what is indicated on the contract drawings and not necessitated due to field conditions as indicated hereinabove, the Contractor shall be required to re-install the work to comply with what has been indicated on the contract drawings. Should it be impossible to re-install the work and the installation is in accordance with all governing authorities, the architect may permit the installation to remain. However, all costs incurred to revise the contract drawings by the engineer for resubmittal to the building department indicating the as-installed condition shall become the responsibility of the Contractor.
- D. In case of a difference in the specifications or between the specifications and the drawings, the Contractor shall figure the most expensive alternate and after award of contract, shall secure direction from the Architect.

1.7 PERMITS, INSPECTIONS AND LICENSES

- A. All permits, inspections and licenses required by the legally constituted authorities for installation of the work according to the plans and specifications shall be obtained and paid as a part of the work of this section.

1.8 EXAMINATION OF PREMISES

- A. Before bidding on this work, Contractors shall make a careful examination of the premises and shall thoroughly familiarize themselves with the requirements of the contract. By the act of submitting a proposal for the work included in this contract, the Contractor shall be deemed to have made such study and examination, and that he is familiar with and accepts all conditions of the site.

1.9 PROTECTION

- A. All work, equipment and materials shall be protected at all times. Contractor shall make good all damage caused either directly or indirectly by his own workmen. Contractor shall also protect his own work from damage. He shall close all pipe openings with caps or plugs during installation. He shall protect all his equipment and materials against dirt, water, chemical and mechanical injury. Upon completion, all work shall be thoroughly cleaned and delivered in a new condition.
- B. Contractor shall be held responsible for all damage to equipment and materials until he has received written notice from the Architect or Engineer that his work has been accepted.

1.10 LOCATIONS

- A. The locations of apparatus, piping and equipment indicated on the drawings are approximate. Piping and equipment shall be installed in such a manner as to avoid all obstruction, preserve headroom, and keep openings and passages clear. The locations of and mounting heights of all fixtures shall be coordinated with the architectural plans and room elevations.
- B. Clearances and Openings: Contractor shall cooperate and coordinate his work with all other trades to avoid conflict and permit for a neat and orderly appearance of the entire installation. The Contractor shall, in advance of the work, furnish instructions to the General Contractor as to his requirements for equipment and material installation of any kind, whether or not specifically mentioned on drawings or in the specifications, and shall include recesses, chases in walls, and all required openings in the structure. Should furnishing this information be neglected, delayed or incorrect and additional cuttings are found to be required, the cost of the same shall be charged to this Contractor.
- C. Contractor shall verify and coordinate pipe routing with location of all electrical rooms, elevator equipment rooms, telecom/data rooms, and other rooms dedicated to the housing of switchgear, panels, or other electrical equipment. In no case shall piping be installed within or above the ceiling of such rooms.

1.11 SUBMITTAL DATA

A. Submittal Requirements:

1. Furnish, all at one time, prior to any installation, within the time noted below, six (6) copies of valid submittal data on all fixtures, material, equipment and devices. Each submitted item shall be indexed and referenced to these specifications and to identification numbers on fixtures and equipment schedules.
2. Manufacturers' submittal literature and shop drawings are required on all items to ensure the latest and most complete manufacturer's data is available for review. Requirements of the submittals and Engineer's submittal notes are a part of the work of this Division except that Engineer's notes may not be used as a means of increasing the scope of work of this Division.
3. Submittals will be checked for general conformance with the design concept of the project but the review does not guarantee quantities shown and does not supersede requirements of this Division to properly install work.
4. To be valid, all submittals must:
 - a. Be delivered to the Architect's office within thirty-five (35) days of award of the contract. Contractor shall make time allowance for Engineer's review, return of comments, if any, and resubmittal if required. Corrections or changes in submittals returned as inadequate or incomplete shall be accomplished within this time limit.
 - b. Clearly indicate and label as such any items proposed as substitution for that specified or shown on plans.
 - c. Include all pertinent construction, installation, performance and technical data.
 - d. Have all product data sheets clearly labeled to indicate the individual items being submitted. In addition, all required options and accessories shall be clearly marked.
 - 1) Product data sheets corresponding to items indicated on plans shall be clearly labeled with the corresponding fixture or equipment tag number.
 - 2) Product data sheets corresponding to items indicated in specifications shall be clearly labeled with the specification section, page and item numbers.
 - e. Include, for every item which differs in size, configuration, connections, service, accessibility or any other significant way, a drawing to the same (or larger) scale as to the pertinent portions of the contract drawings. In this drawing show a complete layout of the system except that which is identical to the contract drawings, unless the unchanged portions must be shown to indicate such things as clearances. This drawing, together with the contract design drawings must show the complete system as revised to accommodate the proposed alternate.

B. Substitution Requirements:

1. Any items included in submittals and proposed by the Contractor as substitution for that specified or shown on plans shall be submitted within thirty five (35) days of award of the contract. After such time, proposed substitutions shall not be accepted for review, and the Contractor shall submit all items as specified or shown on plans.
 - a. For each item proposed as substitution for that specified or shown on plans, copies of product data sheets for the specified item shall be placed side by side with product data sheets for the proposed substitution item within the submittal.

- 1) In addition to the Submittal Requirements for labeling listed above, product data sheets for the specified item shall be clearly labeled "SPECIFIED ITEM, NOT SUBMITTED". Product data sheets for the corresponding proposed substitution item shall be clearly labeled "PROPOSED SUBSTITUTION".
 - b. Provide calculations and other detailed data justifying how any items proposed as substitution were selected for proposal. Data must be complete enough to permit detailed comparison of every significant characteristic for which the specified item was analyzed during design.
2. It shall be the Contractor's responsibility to provide sufficient information to allow the Engineer to analyze any proposed alternate. If inadequate information is provided, the proposal will not be approved and resubmittal will not be allowed.
3. The Contractor shall provide or perform tests required by Engineer for purpose of judging acceptability of proposed substitutions.
4. The Contractor assumes full responsibility that alternate items and procedures will meet the job requirements and is responsible for cost of redesign and of modifications to this and other parts of work caused by alternate items furnished under work in this Section. In view of these responsibilities, it is the purpose of these specifications to establish procedures to ensure that the Contractor has considered all the ramifications of proposed alternates before submitting them for review. Submittals which do not comply with the requirements of these specifications or which indicate proposed alternates that were selected without proper regard to the requirements of the job will not be approved. No more than one proposed alternate will be considered for each item.
5. Alternate items installed without Engineer's approval will be replaced with specified items at Contractor's expense.
6. The Architect or his authorized representative shall be the sole judge as to the quality and suitability of proposed alternate equipment, fixtures or materials. Decisions of the Architect or that of his representative shall be final and conclusive.

1.12 QUALITY ASSURANCE

- A. Source Limitations for Valves: Obtain each type of valve from single source from single manufacturer.
- B. ASME Compliance:
 1. ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.
 2. ASME B31.1 for power piping valves.
 3. ASME B31.9 for building services piping valves.
- C. NSF Compliance: NSF 61-G and NSF-372 for valve materials for potable-water service.
 1. Valves for domestic water must comply with the Federal Reduction of Lead in Drinking Water Act.
 - a. "Lead Free" refers to the wetted surface of pipe, fittings and fixtures in potable water systems that have a weighted average lead content $\leq 0.25\%$.
 - b. All valves must be 3rd party certified.
 - c. Bronze valves shall be made of dezincification-resistant material.

1.13 DELIVERY, STORAGE, AND HANDLING

A. Prepare valves for shipping as follows:

1. Protect internal parts against rust and corrosion.
2. Protect threads, flange faces, grooves, and weld ends.
3. Set angle, gate, and globe valves closed to prevent rattling.
4. Set ball and plug valves open to minimize exposure of functional surfaces.
5. Set butterfly valves closed or slightly open.
6. Block check valves in either closed or open position.

B. Use the following precautions during storage:

1. Maintain valve end protection.
2. Store valves indoors and maintain at higher than ambient dew point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.

C. Use sling to handle large valves; rig sling to avoid damage to exposed parts. Do not use handwheels or stems as lifting or rigging points.

1.14 UNINSPECTED WORK

A. The Contractor shall not allow or cause any of his work to be covered up or closed in until it has been inspected, tested, approved by all authorities have jurisdiction, and until Project Record drawings have been properly annotated.

B. Should any of his work be covered up or closed in before such inspection, he shall, at his own expense, uncover the work to the satisfaction of the inspection party. All related repair work cost shall be borne by the Contractor.

1.15 RECORD DRAWINGS

A. Contractor shall provide and keep up-to-date a complete "as-built" record set of blueline prints which shall show every change from the original drawings and the exact "as-built" locations and sizes of the work provided under this Section of the specifications. This set shall include locations, dimensions, depth of buried piping, cleanouts, shut-off valves, sewer invert locations, plugged wyes, tees, etc. On completion of the work, the Contractor shall incorporate all as-built information on a set of reproducible tracings provided by the Architect and this set of reproducibles shall be delivered to the Architect.

1.16 GUARANTEES

A. Contractor shall guarantee the entire plumbing and piping systems unconditionally for a period of one (1) year after final acceptance. If, during this period, any materials, equipment, or any part of the systems fail to function properly, the Contractor shall make good the defects promptly and without any expense to the Owner.

B. Contractor shall be responsible for all damage to any part of the premises caused by leaks in pipelines or equipment furnished and installed under this Section for a period of one (1) year after date of acceptance of his work.

- C. All equipment and fixtures shall carry manufacturer's warranty against defective parts or poor workmanship for not less than one (1) year. See specific equipment specifications for extended warranty requirements.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR VALVES

- A. Refer to valve schedule articles for applications of valves.
- B. Piping systems shall be supplied with valves arranged so as to give complete and regulating control of each building and piping systems throughout the building, and located so all parts are easily accessible and maintained.
 - 1. Valve Design: Rising stem or outside screw and yoke stems. Non-rising stem valves may be used where space conditions prevent full extension of rising stems.
 - 2. Sizes: Same size as upstream pipe, unless otherwise indicated.
 - 3. Extended stems: Where piping insulation is indicated or specified, valves shall be equipped with 2" extended handles of non-thermal conductive material. Also provide a protective sleeve that allows operation of the valve without breaking the vapor seal or disturbing the insulation. Supply with memory stops, which are fully adjustable after insulation is applied.
 - 4. End Connection: 2 inch and under shall be threaded, 2-1/2 inches and larger shall be flanged or full lug style.
- C. Valves for Potable Water must comply with California Lead Free Law, effective January 1, 2010.
 - 1. "Lead Free" refers to the wetted surface of pipe, fittings and fixtures in potable water systems that have a weighted average lead content $\leq 0.25\%$. Source: California Health & Safety Code (116875).
 - 2. All valves must be 3rd party certified.
 - 3. Bronze valves shall be made with dezincification-resistant material.
- D. Where possible, valves of one manufacturer shall be used.
- E. Provide Class 150 valves meeting the valve specifications where Class 125 valves are specified but are not available.
- F. Bronze valves shall be made with dezincification-resistant materials, (Bronze ASTM B62, B61, or B584 Alloy C87850). This includes body, ball, stem and / or trim.
- G. Bronze Valves: NPS 2 and smaller with threaded ends, unless otherwise indicated.
- H. Ferrous Valves: NPS 2-1/2 and larger with flanged ends, unless otherwise indicated.
- I. Valve Pressure and Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.
- J. Valve Sizes: Same as upstream piping unless otherwise indicated.
- K. Valve Actuator Types:
 - 1. Hand-wheel: For valves other than quarter-turn types.
 - 2. Hand-lever: For quarter-turn valves NPS 6 and smaller.

- L. Valves in Insulated Piping: With 2-inch stem extensions and the following features:
1. Ball Valves: With extended operating handle of non-thermal-conductive material, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation and memory stops that are fully adjustable after insulation is applied.
 - a. Basis-of-Design Product: Subject to compliance with requirements, provide NIBCO Nib-seal handle extension or comparable product by one of the following:
 - b. General valves:
 - 1) NIBCO
 - 2) Hammond
 - 3) Milwaukee
 - c. Below grade domestic water shut-off valves (gate valves) 2" and larger:
 - 1) NIBCO.
 - 2) Clow.
 - 3) Mueller.
 - d. Butterfly Valves:
 - 1) NIBCO.
 - 2) Demco.
 - 3) Dezuric.
 - e. Plug Valves:
 - 1) Hammond.
 - 2) Milwaukee.
 - f. Check valves, lift type:
 - 1) Hammond.
 - 2) Milwaukee.
 - g. Below grade backwater valve isolation valves:
 - 1) NIBCO.
 - 2) Clow.
 - 3) Mueller.
 2. Butterfly Valves: With extended neck.
- M. Valve-End Connections:
1. Flanged: With flanges according to ASME B16.1 for iron valves, ASME B16.5 for steel valves.
 2. Grooved: With grooves according to AWWA C606.
 3. Solder Joint: With sockets according to ASME B16.18.
 4. Threaded: With threads according to ASME B1.20.1.
- N. Valve Bypass and Drain Connections: MSS SP-45.

2.2 BRONZE BALL VALVES

A. Three-Piece, Full-Port, Bronze Ball Valves with Stainless-Steel Trim & Nib-Seal Handle:

1. Basis-of-Design Product: Subject to compliance with requirements, provide NIBCO Model S-595-Y-66-LF or T-595-Y-66-LF or a comparable product by one of the following,
 - a. Milwaukee Valve Company.
 - b. Apollo.
2. Description:
 - c. Standard: MSS SP-110, NSF 61-G.
 - d. CWP Rating: 600 psig.
 - e. Body Design: Three piece with threaded body packnut design (no threaded stem designs allowed) with adjustable stem packing.
 - f. Body Material: Bronze ASTM B 584 Alloy C87850 or C87600.
 - g. Ends: Threaded or Solder.
 - h. Seats: PTFE or TFE.
 - i. Stem: 316 Stainless steel.
 - j. Ball: 316 Stainless steel, vented.
 - k. Port: Full.

B. Two-Piece, Full-Port, Bronze Ball Valves with Stainless-Steel Trim & Nib-Seal Handle:

1. Basis-of-Design Product: Subject to compliance with requirements, provide NIBCO Model S-585-66-LF or T-585-66-LF or a comparable product by one of the following:
 - a. Conbraco Industries, Inc.; Apollo Div.
 - b. Milwaukee Valve Company.
2. Description:
 - a. Standard: MSS SP-110, NSF 61-G.
 - b. CWP Rating: 600 psig.
 - c. Body Design: Two piece with threaded body packnut design (no threaded stem designs allowed) with adjustable stem packing.
 - d. Body Material: Bronze ASTM B 584 Alloy C87600.
 - e. Ends: Threaded or Solder.
 - f. Seats: PTFE or TFE.
 - g. Stem: 316 Stainless steel.
 - h. Ball: 316 Stainless steel, vented.
 - i. Port: Full.

C. 200 CWP, Sizes 2-1/2" – 24", Ductile Iron, Single-Flange Butterfly Valves with EPDM Seat and Aluminum-Bronze Disc:

1. Basis-of-Design Product: Subject to compliance with requirements, provide NIBCO Model LD-2000-3/5, or a comparable product by one of the following:
 - a. Cooper Cameron Corp.; Cooper Cameron Valves Div.
 - b. Tyco International, Ltd.; Tyco Valves & Controls
2. Description:

- a. Standard: MSS SP-67, Type I, IAPMO.
- b. NPS 24 (DN 300) and Smaller CWP Rating: 200 psig (1380 kPa).
- c. Body Design: Full Lug type; Bubble tight shutoff, suitable for bidirectional dead-end service at rated pressure without use of downstream flange.
- d. Body Material: ASTM A 536, ductile iron.
- e. Seat: EPDM.
- f. Stem: One- or two-piece stainless steel.
- g. Disc: Aluminum bronze

D. Retain one or more of six paragraphs in this article if iron, single-flange butterfly valves are required. MSS SP-67 covers iron, single-flange butterfly valves NPS 1-1/2 to NPS 72.

2.3 BRONZE LIFT CHECK VALVES

A. Class 125, Lift Check Valves with Nonmetallic TFE Disc:

1. Basis-of-Design Product: Subject to compliance with requirements, provide NIBCO Model S-480-Y-LF or T-480-Y-LF or a comparable product by one of the following:

- a. Hammond.
- b. Milwaukee.

2. Description:

- a. Standard: MSS SP-80, Type 2, NSF 61-G.
- b. CWP Rating: 200 psig.
- c. Body Design: Vertical flow.
- d. Body Material: ASTM B 584 Alloy C87850, lead free bronze.
- e. Ends: Threaded or Solder.
- f. Disc: PTFE, or TFE.

2.4 BRONZE SWING CHECK VALVES

A. Class 125, Bronze Swing Check Valves with Nonmetallic TFE Disc:

1. Basis-of-Design Product: Subject to compliance with requirements, provide NIBCO Model S-413-Y-LF or T-413-Y-LF or a comparable product by one of the following:
 - a. Crane Co.; Crane Valve Group; Crane Valves.
 - b. Powell Valves.
2. Description:
 - a. Standard: MSS SP-80, Type 4, NSF 61-G.
 - b. CWP Rating: 200 psig.
 - c. Body Design: Y-pattern Horizontal flow.
 - d. Body Material: ASTM B 584 Alloy C87850, lead free bronze.
 - e. Ends: Threaded or Solder.
 - f. Disc: PTFE or TFE.

2.5 BRONZE GATE VALVES

A. NRS Bronze Gate Valves:

1. Basis-of-Design Product: Subject to compliance with requirements, provide NIBCO Model S-113-LF or T-113-LF or a comparable product by one of the following:
 - a. Crane Co.; Crane Valve Group; Crane Valves.
 - b. Powell Valves.
2. Description:
 - a. Standard: MSS SP-139, Type 2, NSF 61-G.
 - b. CWP Rating: 200 psig.
 - c. Body Material: ASTM B 584, dezincification-resistant bronze with integral seat and threaded bonnet.
 - d. Ends: Threaded or Solder.
 - e. Stem: Lead free Silicon Bronze.
 - f. Disc: Solid wedge; lead free bronze.
 - g. Packing: Asbestos free.
 - h. Handwheel: Malleable iron.

B. RS Bronze Gate Valves:

1. Basis-of-Design Product: Subject to compliance with requirements, provide NIBCO Model S-111-LF or T-111-LF or a comparable product by one of the following:
 - a. Crane Co.; Crane Valve Group; Crane Valves.
 - b. Powell Valves.
2. Description:
 - a. Standard: MSS SP-80, Type 2, NSF 61-G.
 - b. CWP Rating: 200 psig.

- c. Body Material: ASTM B584 C87850 dezincification resistant bronze with integral seat and threaded bonnet.
- d. Ends: Threaded or Solder.
- e. Stem: Lead free silicon bronze.
- f. Disc: Solid wedge, lead free bronze.
- g. Packing: Asbestos free.
- h. Handwheel: Malleable iron.

2.6 IRON GATE VALVES

A. Class 125, Ductile-Iron Resilient Wedge Gate Valves:

1. Basis-of-Design Product: Subject to compliance with requirements, provide NIBCO Model F-619-RWS (NRS) or F-607-RWS (OS&Y) or a comparable product by one of the following:
 - a. Clow
 - b. Mueller
2. Description:
 - a. Standard: AWWA C-509 and C-515,
 - b. CWP Rating: 300 psig.
 - c. Body Material: ASTM A-536 ductile iron, fusion-bonded epoxy coating inside and out.
 - d. Ends: Flanged.
 - e. Trim: stainless steel.
 - f. Disc: Rubber encapsulated ductile iron wedge.
 - g. Packing and Gasket: Asbestos free.

2.7 MANUAL CIRCUIT BALANCING VALVES

A. Bronze, Fixed Orifice, Balancing Valves (2" and smaller):

1. Basis-of-Design Product: Subject to compliance with requirements, provide NIBCO Model T/S-1810-LF or a comparable product by one of the following:
 - a. Or approved equal
2. Description:
 - a. CWP Rating: 300 psig
 - b. Maximum Operating Temperature: 260°F.
 - c. Body Material: Bronze or dezincification-resistant brass, lead free, Y-pattern globe type with fixed orifice (venture) for precise regulation and control. **NO QUARTER TURN VALVES WILL BE ACCEPTED.**
 - d. Plug: Bronze or dezincification-resistant brass with EPDM O-Rings.
 - e. Seat: Bronze or dezincification-resistant brass.
 - f. Ends: Threaded or Solder.
 - g. Pressure Gage Connections: Shall have two metering test ports with internal check and protective caps for use with portable differential pressure metering stations.
 - h. Handle Style: Calibrated hand wheel equipped with visual position readout and hidden memory stops for repeatable regulation and control.

B. Cast-Iron or Steel, Calibrated-Orifice, Balancing Valves (2-1/2" and larger):

1. Basis-of-Design Product: Subject to compliance with requirements, provide NIBCO Model F/G 737A or a comparable product by one of the following:
 - a. Tour & Andersson
2. Description:
 - a. CWP Rating: 240 psig
 - b. Maximum Operating Temperature: 250°F.
 - c. Body Material: Cast-iron or steel body, globe pattern with calibrated orifice. NO BUTTERFLY VALVES.
 - d. Stem Seals: EPDM O-Rings
 - e. Disc: EPDM coated cast-iron disc.
 - f. Seat: Bronze or dezincification brass.
 - g. Ends: Flanged or grooved.
 - h. Pressure Gage Connection: Integral seals for portable differential pressure meter.
 - i. Handle Style: Calibrated hand wheel equipped with visual position readout and concealed memory stops for repeatable regulation and control.

2.8 GAS SHUT-OFF COCKS:

A. Gas Shut-Off Cocks, Above Grade (4" and smaller):

1. Basis-of-Design Product: Subject to compliance with requirements, provide NIBCO Model T-FP-600-A or a comparable product by one of the following:
 - a. Or approved equal.
2. Description:
 - a. Standard: MSS SP-110
 - b. CWP Rating: 600 psig.
 - c. SWP Rating: 150 psig.
 - d. Gas Rating: CSA certified and UL/FM listed.
 - e. Body Design: Two piece with threaded body pack nut design (no threaded stem designs allowed) with adjustable stem packing.
 - f. Body Material: Dezincification-resistant brass.
 - g. Seats: PTFE
 - h. Ball: Chrome-plated brass
 - i. Ends: Threaded
 - j. Port: Full

B. Gas Shut-Off Cocks, Below Grade:

1. Basis-of-Design Product: Subject to compliance with requirements, provide Nordstom "Poly-Gas" or comparable product by one of the following:
 - a. Or approved equal.

2. Description:

- a. Standards: ASTM D-2513 and ANSI B16.40
- b. Valve boxes: cast iron tops marked "GAS", high-impact heavy-duty ABS valve can as manufactured by C.O. Test Services-VALVCO, Inc. or equal.

2.9 LPG SHUT-OFF COCKS:

A. LPG Shut-Off Cocks, Above Grade (3" and smaller):

1. Basis-of-Design Product: Subject to compliance with requirements, provide NIBCO Model T-585-70-UL (1/2" – 1") and T-580-70-UL (1-1/4" – 3") or a comparable product by one of the following:

- a. Or approved equal.

2. Description:

- a. Standard: MSS SP-110, CSA certified and UL/FM listed.
- b. CWP Rating: 600 psig.
- c. SWP Rating: 150 psig.
- d. Gas Rating: 250 psi non-shock LP gas per UL842.
- e. Body Design: Two piece with threaded body pack nut design (no threaded stem designs allowed) with adjustable stem packing.
- f. Body Material: Dezincification-resistant brass.
- g. Seats: PTFE
- h. Ball: Chrome-plated brass
- i. Ends: Threaded
- j. Port: Full port (1/2" – 1"), conventional port (1-1/4" – 3")

B. LPG Shut-Off Cocks, Below Grade:

1. Basis-of-Design Product: Subject to compliance with requirements, provide Nordstom "Poly-Gas" or comparable product by one of the following:

- a. Or approved equal.

2. Description:

- a. Standards: ASTM D-2513 and ANSI B16.40
- b. Valve boxes: cast iron tops marked "GAS", high-impact heavy-duty ABS valve can as manufactured by C.O. Test Services-VALVCO, Inc. or equal.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine valve interior for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.

- B. Operate valves in positions from fully open to fully closed. Examine guides and seats made accessible by such operations.
- C. Examine threads on valve and mating pipe for form and cleanliness.
- D. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Verify that gasket is of proper size, that its material composition is suitable for service, and that it is free from defects and damage.
- E. Do not attempt to repair defective valves; replace with new valves.

3.2 VALVE INSTALLATION

- A. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.
- B. Locate valves for easy access and provide separate support where necessary.
- C. Install valves in horizontal piping with stem at or above center of pipe.
- D. Install valves in position to allow full stem movement.
- E. Install check valves for proper direction of flow and as follows:
 - 1. Swing Check Valves: In horizontal position with hinge pin level.
 - 2. Check Valves: In horizontal or vertical position, between flanges.
 - 3. Lift Check Valves: With stem upright and plumb.

3.3 ADJUSTING

- A. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

3.4 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS

- A. If valve applications are not indicated, use the following:
 - 1. Shutoff Service: Ball, butterfly valves.
 - 2. Butterfly Valve Dead-End Service: Single-flange (lug) type.
 - 3. Throttling Service: Ball or Butterfly valves.
- B. If valves with specified SWP classes or CWP ratings are not available, the same types of valves with higher SWP classes or CWP ratings may be substituted.
- C. Select valves, except wafer types, with the following end connections:
 - 1. For Copper Tubing, NPS 2 and Smaller: Threaded ends.
 - 2. For Copper Tubing, NPS 2-1/2 to NPS 4: Flanged ends.
 - 3. For Steel Piping, NPS 2 and Smaller: Threaded ends.
 - 4. For Steel Piping, NPS 2-1/2 to NPS 4: Flanged ends.

3.5 DOMESTIC, HOT- AND COLD-WATER VALVE SCHEDULE

- A. Pipe NPS 2 and Smaller:
 - 1. Bronze Valves: Threaded ends.
 - 2. Ball Valves: Two piece, full port, bronze with stainless-steel trim.
 - 3. Bronze Lift Check Valves: Class 125, nonmetallic TFE disc.
 - 4. Bronze Swing Check Valves: Class 150, nonmetallic TFE disc.
 - 5. Bronze Gate Valves: Class 150, RS.
- B. Pipe NPS 2-1/2 and Larger:
 - 1. Ductile-Iron, Single-Flange Butterfly Valves: 200 CWP, EPDM seat, aluminum-bronze disc.

END OF SECTION 22 05 23

SECTION 22 05 29

HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:

1. Metal pipe hangers and supports.
2. Trapeze pipe hangers.
3. Thermal-hanger shield inserts.
4. Fastener systems.

- B. Related Sections:

1. Section 055000 "Metal Fabrications" for structural-steel shapes and plates for trapeze hangers for pipe and equipment supports.

1.3 DEFINITIONS

- A. MSS: Manufacturers Standardization Society of The Valve and Fittings Industry Inc.

1.4 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design trapeze pipe hangers and equipment supports, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

- B. Structural Performance: Hangers and supports for plumbing piping and equipment shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.

1. Design supports for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents, and test water.
2. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
3. Design seismic-restraint hangers and supports for piping and equipment and obtain approval from authorities having jurisdiction.

1.5 WORK INCLUDED

- A. Furnish all labor, materials, services, testing, transportation and equipment necessary for the completion of all plumbing work as indicated on drawings and specified herein. Work materials and equipment not indicated or specified which is necessary for the complete and proper operation of the work of this Section in accordance with the true intent and meaning of the contract documents shall be provided and incorporated at no additional cost to the Owner.

1.6 QUALITY ASSURANCE

- A. Code Requirements: All work covered by this Section shall conform to the latest requirements of the following regulations:
 - 1. C.C.R., Title 24, Part 5 (2022 CPC).
 - 2. 2022 California Plumbing Code.
 - 3. SMACNA Seismic Restraint Manual Guidelines for Mechanical Systems.
 - 4. National Fire Protection Association.
 - 5. California State Division of Industrial Safety.
 - 6. County Health Department.
 - 7. Any other legally constituted body-having jurisdiction thereof.
- B. Nothing in the specifications or drawings shall be construed to permit deviation from the requirements of governing codes unless approval for said deviation has been obtained from the legally constituted authorities having jurisdiction and from the Owner's representative.

1.7 DRAWINGS

- A. Because of the small-scale drawings, it is not possible to indicate all offsets, fittings and accessories which may be required. The Contractor shall carefully investigate the conditions surrounding installation of his work, furnishing the necessary piping, fittings, valves, traps, and other devices which may be required to complete the installation.
- B. The general arrangement indicated on the drawings shall be followed as closely as possible. Coordinate with the Architectural, Structural, Mechanical and Electrical Drawings and the work of other trades prior to installation of piping fixtures and equipment to verify adequate space available for installation of the work shown. In the event a field condition arises which makes it impossible to install the work as indicated, submit, in writing, the proposed departures to the Architect for his approval. Only when Architect's approval is given, in writing, shall Contractor proceed with installation of the work.
- C. Special Note: Should the Contractor make changes in the installation differing from what is indicated on the contract drawings and not necessitated due to field conditions as indicated hereinabove, the Contractor shall be required to re-install the work to comply with what has been indicated on the contract drawings. Should it be impossible to re-install the work and the installation is in accordance with all governing authorities, the architect may permit the installation to remain. However, all costs incurred to revise the contract drawings by the engineer for resubmittal to the building department indicating the as-installed condition shall become the responsibility of the Contractor.
- D. In case of a difference in the specifications or between the specifications and the drawings, the Contractor shall figure the most expensive alternate and after award of contract, shall secure direction from the Architect.

1.8 PERMITS, INSPECTIONS AND LICENSES

- A. All permits, inspections and licenses required by the legally constituted authorities for installation of the work according to the plans and specifications shall be obtained and paid as a part of the work of this section.

1.9 EXAMINATION OF PREMISES

- A. Before bidding on this work, Contractors shall make a careful examination of the premises and shall thoroughly familiarize themselves with the requirements of the contract. By the act of submitting a proposal for the work included in this contract, the Contractor shall be deemed to have made such study and examination, and that he is familiar with and accepts all conditions of the site.

1.10 PROTECTION

- A. All work, equipment and materials shall be protected at all times. Contractor shall make good all damage caused either directly or indirectly by his own workmen. Contractor shall also protect his own work from damage. He shall close all pipe openings with caps or plugs during installation. He shall protect all his equipment and materials against dirt, water, chemical and mechanical injury. Upon completion, all work shall be thoroughly cleaned and delivered in a new condition.
- B. Contractor shall be held responsible for all damage to equipment and materials until he has received written notice from the Architect or Engineer that his work has been accepted.

1.11 LOCATIONS

- A. The locations of apparatus, piping and equipment indicated on the drawings are approximate. Piping and equipment shall be installed in such a manner as to avoid all obstruction, preserve headroom, and keep openings and passages clear. The locations of and mounting heights of all fixtures shall be coordinated with the architectural plans and room elevations.
- B. Clearances and Openings: Contractor shall cooperate and coordinate his work with all other trades to avoid conflict and permit for a neat and orderly appearance of the entire installation. The Contractor shall, in advance of the work, furnish instructions to the General Contractor as to his requirements for equipment and material installation of any kind, whether or not specifically mentioned on drawings or in the specifications, and shall include recesses, chases in walls, and all required openings in the structure. Should furnishing this information be neglected, delayed or incorrect and additional cuttings are found to be required, the cost of the same shall be charged to this Contractor.
- C. Contractor shall verify and coordinate pipe routing with location of all electrical rooms, elevator equipment rooms, telecom/data rooms, and other rooms dedicated to the housing of switchgear, panels, or other electrical equipment. In no case shall piping be installed within or above the ceiling of such rooms.

1.12 SUBMITTAL DATA

A. Submittal Requirements:

1. Furnish, all at one time, prior to any installation, within the time noted below, six (6) copies of valid submittal data on all fixtures, material, equipment and devices. Each submitted item shall be indexed and referenced to these specifications and to identification numbers on fixtures and equipment schedules.
2. Manufacturers' submittal literature and shop drawings are required on all items to ensure the latest and most complete manufacturer's data is available for review. Requirements of the submittals and Engineer's submittal notes are a part of the work of this Division except that Engineer's notes may not be used as a means of increasing the scope of work of this Division.
3. Submittals will be checked for general conformance with the design concept of the project but the review does not guarantee quantities shown and does not supersede requirements of this Division to properly install work.
4. To be valid, all submittals must:
 - a. Be delivered to the Architect's office within thirty-five (35) days of award of the contract. Contractor shall make time allowance for Engineer's review, return of comments, if any, and resubmittal if required. Corrections or changes in submittals returned as inadequate or incomplete shall be accomplished within this time limit.
 - b. Clearly indicate and label as such any items proposed as substitution for that specified or shown on plans.
 - c. Include all pertinent construction, installation, performance and technical data.
 - d. Have all product data sheets clearly labeled to indicate the individual items being submitted. In addition, all required options and accessories shall be clearly marked.
 - 1) Product data sheets corresponding to items indicated on plans shall be clearly labeled with the corresponding fixture or equipment tag number.
 - 2) Product data sheets corresponding to items indicated in specifications shall be clearly labeled with the specification section, page and item numbers.
 - e. Include, for every item which differs in size, configuration, connections, service, accessibility or any other significant way, a drawing to the same (or larger) scale as to the pertinent portions of the contract drawings. In this drawing show a complete layout of the system except that which is identical to the contract drawings, unless the unchanged portions must be shown to indicate such things as clearances. This drawing, together with the contract design drawings must show the complete system as revised to accommodate the proposed alternate.

B. Substitution Requirements:

1. Any items included in submittals and proposed by the Contractor as substitution for that specified or shown on plans shall be submitted within thirty five (35) days of award of the contract. After such time, proposed substitutions shall not be accepted for review, and the Contractor shall submit all items as specified or shown on plans.
 - a. For each item proposed as substitution for that specified or shown on plans, copies of product data sheets for the specified item shall be placed side by side with product data sheets for the proposed substitution item within the submittal.

- 1) In addition to the Submittal Requirements for labeling listed above, product data sheets for the specified item shall be clearly labeled "SPECIFIED ITEM, NOT SUBMITTED". Product data sheets for the corresponding proposed substitution item shall be clearly labeled "PROPOSED SUBSTITUTION".
 - b. Provide calculations and other detailed data justifying how any items proposed as substitution were selected for proposal. Data must be complete enough to permit detailed comparison of every significant characteristic for which the specified item was analyzed during design.
2. It shall be the Contractor's responsibility to provide sufficient information to allow the Engineer to analyze any proposed alternate. If inadequate information is provided, the proposal will not be approved and resubmittal will not be allowed.
3. The Contractor shall provide or perform tests required by Engineer for purpose of judging acceptability of proposed substitutions.
4. The Contractor assumes full responsibility that alternate items and procedures will meet the job requirements and is responsible for cost of redesign and of modifications to this and other parts of work caused by alternate items furnished under work in this Section. In view of these responsibilities, it is the purpose of these specifications to establish procedures to ensure that the Contractor has considered all the ramifications of proposed alternates before submitting them for review. Submittals which do not comply with the requirements of these specifications or which indicate proposed alternates that were selected without proper regard to the requirements of the job will not be approved. No more than one proposed alternate will be considered for each item.
5. Alternate items installed without Engineer's approval will be replaced with specified items at Contractor's expense.
6. The Architect or his authorized representative shall be the sole judge as to the quality and suitability of proposed alternate equipment, fixtures or materials. Decisions of the Architect or that of his representative shall be final and conclusive.

1.13 QUALITY ASSURANCE

- A. Structural Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1.14 UNINSPECTED WORK

- A. The Contractor shall not allow or cause any of his work to be covered up or closed in until it has been inspected, tested, approved by all authorities have jurisdiction, and until Project Record drawings have been properly annotated.
- B. Should any of his work be covered up or closed in before such inspection, he shall, at his own expense, uncover the work to the satisfaction of the inspection party. All related repair work cost shall be borne by the Contractor.

1.15 RECORD DRAWINGS

- A. Contractor shall provide and keep up-to-date a complete "as-built" record set of blue-line prints which shall show every change from the original drawings and the exact "as-built" locations and sizes of the work provided under this Section of the specifications. This set shall include locations, dimensions, depth of buried piping, cleanouts, shut-off valves, sewer invert locations,

plugged wyes, tees, etc. On completion of the work, the Contractor shall incorporate all as-built information on a set of reproducible tracings provided by the Architect and this set of reproducibles shall be delivered to the Architect.

1.16 GUARANTEES

- A. Contractor shall guarantee the entire plumbing and piping systems unconditionally for a period of one (1) year after final acceptance. If, during this period, any materials, equipment, or any part of the systems fail to function properly, the Contractor shall make good the defects promptly and without any expense to the Owner.
- B. Contractor shall be responsible for all damage to any part of the premises caused by leaks in pipelines or equipment furnished and installed under this Section for a period of one (1) year after date of acceptance of his work.
- C. All equipment and fixtures shall carry manufacturer's warranty against defective parts or poor workmanship for not less than one (1) year. See specific equipment specifications for extended warranty requirements.

PART 2 - PRODUCTS

2.1 Pipe Supports: Unless otherwise indicated on the drawings, shall be as follows:

- A. The Contractor shall furnish and install all miscellaneous iron work including angles, channels, etc., required to appropriately support the various piping systems. Hanger spacing and location shall conform to 2016 California Plumbing Code Table 313.1.
- B. All horizontal runs of piping within the building to be supported from the structural framing with steel rods and split ring hangers, B-Line, Grinnell Company, Tolco, or approved equal. Steel rods shall be secured to overhead framing with side beam connectors. Where necessary, install angle iron between framing to accommodate hanger rods. Where several pipes are running together, Unistrut, B-Line or Powerstrut channels with clamps may be used in lieu of individual pipe hangers, and supported from structure as herein specified. Submit test data for type of hanger supports to be provided. For support conditions other than specified herein, the Contractor shall submit method of support for approval prior to any installation.
- C. Horizontal Piping Hangers and Supports:
 - 1. General: Provide factory fabricated horizontal hangers and supports complying with one of the following MSS types listed to suit horizontal-piping systems, in accordance with MSS SP-69 and manufacturer's published product information. Select size of hangers and supports to exactly fit pipe size for bare piping, and to exactly fit around piping insulation with saddle or shield for insulated piping. Provide copper-plated hangers and supports for copper-piping systems.
 - a. Adjustable Steel Clevis Hangers: (MSS Type 1.) B-Line B 3100
 - b. Adjustable Swivel Pipe Rings: (MSS Type 5) B-Line B3690
- D. Vertical-Piping Clamps:
 - 1. General: Provide factory fabricated vertical-piping clamps complying with the following types listed, to suit vertical piping systems, in accordance with MSS SP-69 and

manufacturer's published product information. Select size of vertical piping clamps to exactly fit pipe size of bare pipe. Provide copper-plated clamps for copper-piping systems.

2. Two-Bolt Riser Clamps: (MSS Type 8) B-Line B3373

E. Hanger-Rod Attachments:

1. General: Provide factory fabricated hanger-rod attachments B-Line, Tolco or approved equal, selected by Installer to suit horizontal-piping hangers and building attachments, in accordance with MSS SP-58 and manufacturer's published product information. Select size of hanger-rod attachment to suit hanger rods. Provide copper-plated hanger-rod attachments for copper-piping systems.
2. Side beam eye socket, Tolco Fig. #57 for rod sizes 3/8" dia. and Tolco Fig. #25-30-251 for rod sizes 1/2" dia.

F. Building Attachments:

1. General: Provide factory fabricated building attachments, selected by Installer to suit building structural framing conditions, in accordance with MSS SP-69 and manufacturer's published product information. Select size of building attachments to suit hanger rods. Provide copper-plated building attachments for copper-piping systems.

G. Hanger Rods and Spacing shall conform to the following table:

<u>Pipe Sizes</u>	<u>Spacing</u>	<u>Rods</u>
2 Inch and Smaller	6 Feet	3/8 Inch
2-1/2 Inch to 3 Inch	8 Feet	1/2 Inch
4 Inch and larger	8 Feet	5/8 Inch

- H. Hangers and Supports shall be adequate to maintain alignment and prevent sagging and shall be placed within 18 inches of joint. Support shall be provided at each horizontal branch connection.
- I. Provide lateral bracing as manufactured by B-Line or approved equal for all piping to prevent swaying or movement in accordance with SMACNA "Guidelines for Seismic Restraints of Piping Systems". Piping smaller than indicated in the guidelines shall be provided with bracing as specified for the smallest size indicated. The entire water distribution system shall be properly braced and will not move due to the action of quick closing of valves.
- J. Miscellaneous Supports, Wall Brackets, Etc.: Provide where required in accordance with the best standard practices of the trade. Submit shop drawings for all fabricated supports.

2.2 Isolators. All piping which is not isolated from contact with the building by its insulation shall be installed with a manufactured type isolator. Isolators shall be B-Line vibra clamp and cushion, Super Strut, Stoneman "Trisolator", or approved equal. Piping shall be installed and supported in a manner to provide for expansion without strains. Guides shall be properly installed to ensure this requirement.

2.3 Shields:

A. General: Provide shields at piping hangers and supports, factory-fabricated, for all insulated piping as manufactured by Pipeshields Incorporated or approved equal. Size shields for exact fit to mate with pipe insulation.

1. Protection Shields: MSS Type 40; provide high density insert of same thickness of insulation or equal 100-psi average compressive strength, waterproofed calcium silicate, encased with a sheet metal shield. Insert and shield shall cover entire circumference of the pipe and shall be of length indicated by manufacturer for pipe size and thickness of insulation.

2.4 METAL PIPE HANGERS AND SUPPORTS

A. Carbon-Steel Pipe Hangers and Supports:

1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
2. Galvanized Metallic Coatings: Pregalvanized or hot dipped.
3. Nonmetallic Coatings: Plastic coating, jacket, or liner.
4. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
5. Hanger Rods: Continuous-thread rod, nuts, and washer made of stainless steel.

B. Stainless-Steel Pipe Hangers and Supports:

1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
2. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
3. Hanger Rods: Continuous-thread rod, nuts, and washer made of stainless steel.

C. Copper Pipe Hangers:

1. Description: MSS SP-58, Types 1 through 58, copper-coated-steel, factory-fabricated components.
2. Hanger Rods: Continuous-thread rod, nuts, and washer made of stainless steel.

2.5 TRAPEZE PIPE HANGERS

A. Description: MSS SP-69, Type 59, shop- or field-fabricated pipe-support assembly made from structural carbon-steel shapes with MSS SP-58 carbon-steel hanger rods, nuts, saddles, and U-bolts.

2.6 THERMAL-HANGER SHIELD INSERTS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. ERICO International Corporation.
 - 2. PHS Industries, Inc.
 - 3. Pipe Shields, Inc.; a subsidiary of Piping Technology & Products, Inc.
 - 4. Piping Technology & Products, Inc.
- B. Insulation-Insert Material for Hot Piping: Water-repellent treated, ASTM C 533, Type I calcium silicate with 100-psig ASTM C 552 or Type II cellular glass with 100-psig minimum compressive strength.
- C. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.
- D. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.
- E. Insert Length: Extend 2 inches beyond sheet metal shield for piping operating below ambient air temperature.

2.7 FASTENER SYSTEMS

- A. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.
- B. Mechanical-Expansion Anchors: Insert-wedge-type, stainless- steel anchors, for use in hardened portland cement concrete; with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

2.8 MISCELLANEOUS MATERIALS

- A. Structural Steel: ASTM A 36/A 36M, carbon-steel plates, shapes, and bars; black and galvanized.
- B. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.
 - 1. Properties: Nonstaining, noncorrosive, and nongaseous.
 - 2. Design Mix: 5000-psi, 28-day compressive strength.

PART 3 - EXECUTION

3.1 HANGER AND SUPPORT INSTALLATION

- A. Metal Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from the building structure.

- B. Metal Trapeze Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Arrange for grouping of parallel runs of horizontal piping, and support together on field-fabricated trapeze pipe hangers.
1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified for individual pipe hangers.
 2. Field fabricate from ASTM A 36/A 36M, carbon-steel shapes selected for loads being supported. Weld steel according to AWS D1.1/D1.1M.
- C. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.
- D. Fastener System Installation:
1. Install powder-actuated fasteners for use in lightweight concrete or concrete slabs less than 4 inches thick in concrete after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual.
 2. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.
- E. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.
- F. Equipment Support Installation: Fabricate from welded-structural-steel shapes.
- G. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.
- H. Install lateral bracing with pipe hangers and supports to prevent swaying.
- I. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.
- J. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.
- K. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.
- L. Insulated Piping:
1. Attach clamps and spacers to piping.
 - a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
 - b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
 - c. Do not exceed pipe stress limits allowed by ASME B31.9 for building services piping.

2. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.
 - a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.
3. Shield Dimensions for Pipe: Not less than the following:
 - a. NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.
 - b. NPS 4: 12 inches long and 0.06 inch thick.
4. Pipes NPS 8 and Larger: Include wood or reinforced calcium-silicate-insulation inserts of length at least as long as protective shield.
5. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

3.2 EQUIPMENT SUPPORTS

- A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.
- B. Grouting: Place grout under supports for equipment and make bearing surface smooth.
- C. Provide lateral bracing, to prevent swaying, for equipment supports.

3.3 METAL FABRICATIONS

- A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers.
- B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.
- C. Field Welding: Comply with AWS D1.1/D1.1M procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work; and with the following:
 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 2. Obtain fusion without undercut or overlap.
 3. Remove welding flux immediately.
 4. Finish welds at exposed connections so no roughness shows after finishing and so contours of welded surfaces match adjacent contours.

3.4 ADJUSTING

- A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.
- B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches.

3.5 PAINTING

- A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
 - 1. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils.
- B. Touchup: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal are specified in Section 099123 "Interior Painting."
- C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

3.6 HANGER AND SUPPORT SCHEDULE

- A. Specific hanger and support requirements are in Sections specifying piping systems and equipment.
- B. Comply with MSS SP-69 for pipe-hanger selections and applications that are not specified in piping system Sections.
- C. Use hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finish.
- D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.
- E. Use carbon-steel pipe hangers and supports metal trapeze pipe hangers and attachments for general service applications.
- F. Use stainless-steel pipe hangers and stainless-steel attachments for hostile environment applications.
- G. Use copper-plated pipe hangers and copper or stainless-steel attachments for copper piping and tubing.
- H. Use thermal-hanger shield inserts for insulated piping and tubing.
- I. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
 - 1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated, stationary pipes NPS 1/2 to NPS 30.
 - 2. Pipe Hangers (MSS Type 5): For suspension of pipes NPS 1/2 to NPS 4, to allow off-center closure for hanger installation before pipe erection.
- J. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
 - 1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers NPS 3/4 to NPS 24.

- K. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches for heavy loads.
 2. Steel Clevises (MSS Type 14): For 120 to 450 deg F piping installations.
 3. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.
 4. Steel Weldless Eye Nuts (MSS Type 17): For 120 to 450 deg F piping installations.
- L. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
 2. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joint construction, to attach to top flange of structural shape.
 3. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
 4. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
 5. C-Clamps (MSS Type 23): For structural shapes.
 6. Top-Beam Clamps (MSS Type 25): For top of beams if hanger rod is required tangent to flange edge.
 7. Side-Beam Clamps (MSS Type 27): For bottom of steel I-beams.
 8. Steel-Beam Clamps with Eye Nuts (MSS Type 28): For attaching to bottom of steel I-beams for heavy loads. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.
 9. Horizontal Travelers (MSS Type 58): For supporting piping systems subject to linear horizontal movement where headroom is limited.
- M. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
 2. Thermal-Hanger Shield Inserts: For supporting insulated pipe.
- N. Comply with MSS SP-69 for trapeze pipe-hanger selections and applications that are not specified in piping system Sections.
- O. Use powder-actuated fasteners or mechanical-expansion anchors instead of building attachments where required in concrete construction.

END OF SECTION 22 05 29

SECTION 22 05 53

IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Equipment labels.
 - 2. Warning signs and labels.
 - 3. Pipe labels.
 - 4. Valve tags.
 - 5. Warning tags.

1.3 WORK INCLUDED

- A. Furnish all labor, materials, services, testing, transportation and equipment necessary for the completion of all plumbing work as indicated on drawings and specified herein. Work materials and equipment not indicated or specified which is necessary for the complete and proper operation of the work of this Section in accordance with the true intent and meaning of the contract documents shall be provided and incorporated at no additional cost to the Owner.

1.4 QUALITY ASSURANCE

- A. Code Requirements: All work covered by this Section shall conform to the latest requirements of the following regulations:
 - 1. C.C.R., Title 24, Part 5 (2022 CPC).
 - 2. 2022 California Plumbing Code.
 - 3. SMACNA Seismic Restraint Manual Guidelines for Mechanical Systems.
 - 4. National Fire Protection Association.
 - 5. California State Division of Industrial Safety.
 - 6. County Health Department.
 - 7. Any other legally constituted body-having jurisdiction thereof.
- B. Nothing in the specifications or drawings shall be construed to permit deviation from the requirements of governing codes unless approval for said deviation has been obtained from the legally constituted authorities having jurisdiction and from the Owner's representative.

1.5 DRAWINGS

- A. Because of the small-scale drawings, it is not possible to indicate all offsets, fittings and accessories which may be required. The Contractor shall carefully investigate the conditions surrounding installation of his work, furnishing the necessary piping, fittings, valves, traps, and other devices which may be required to complete the installation.
- B. The general arrangement indicated on the drawings shall be followed as closely as possible. Coordinate with the Architectural, Structural, Mechanical and Electrical Drawings and the work of other trades prior to installation of piping fixtures and equipment to verify adequate space available for installation of the work shown. In the event a field condition arises which makes it impossible to install the work as indicated, submit, in writing, the proposed departures to the Architect for his approval. Only when Architect's approval is given, in writing, shall Contractor proceed with installation of the work.
- C. Special Note: Should the Contractor make changes in the installation differing from what is indicated on the contract drawings and not necessitated due to field conditions as indicated hereinabove, the Contractor shall be required to re-install the work to comply with what has been indicated on the contract drawings. Should it be impossible to re-install the work and the installation is in accordance with all governing authorities, the architect may permit the installation to remain. However, all costs incurred to revise the contract drawings by the engineer for resubmittal to the building department indicating the as-installed condition shall become the responsibility of the Contractor.
- D. In case of a difference in the specifications or between the specifications and the drawings, the Contractor shall figure the most expensive alternate and after award of contract, shall secure direction from the Architect.

1.6 PERMITS, INSPECTIONS AND LICENSES

- A. All permits, inspections and licenses required by the legally constituted authorities for installation of the work according to the plans and specifications shall be obtained and paid as a part of the work of this section.

1.7 EXAMINATION OF PREMISES

- A. Before bidding on this work, Contractors shall make a careful examination of the premises and shall thoroughly familiarize themselves with the requirements of the contract. By the act of submitting a proposal for the work included in this contract, the Contractor shall be deemed to have made such study and examination, and that he is familiar with and accepts all conditions of the site.

1.8 PROTECTION

- A. All work, equipment and materials shall be protected at all times. Contractor shall make good all damage caused either directly or indirectly by his own workmen. Contractor shall also protect his own work from damage. He shall close all pipe openings with caps or plugs during installation. He shall protect all his equipment and materials against dirt, water, chemical and mechanical injury. Upon completion, all work shall be thoroughly cleaned and delivered in a new condition.

- B. Contractor shall be held responsible for all damage to equipment and materials until he has received written notice from the Architect or Engineer that his work has been accepted.

1.9 LOCATIONS

- A. The locations of apparatus, piping and equipment indicated on the drawings are approximate. Piping and equipment shall be installed in such a manner as to avoid all obstruction, preserve headroom, and keep openings and passages clear. The locations of and mounting heights of all fixtures shall be coordinated with the architectural plans and room elevations.
- B. Clearances and Openings: Contractor shall cooperate and coordinate his work with all other trades to avoid conflict and permit for a neat and orderly appearance of the entire installation. The Contractor shall, in advance of the work, furnish instructions to the General Contractor as to his requirements for equipment and material installation of any kind, whether or not specifically mentioned on drawings or in the specifications, and shall include recesses, chases in walls, and all required openings in the structure. Should furnishing this information be neglected, delayed or incorrect and additional cuttings are found to be required, the cost of the same shall be charged to this Contractor.
- C. Contractor shall verify and coordinate pipe routing with location of all electrical rooms, elevator equipment rooms, telecom/data rooms, and other rooms dedicated to the housing of switchgear, panels, or other electrical equipment. In no case shall piping be installed within or above the ceiling of such rooms.

1.10 SUBMITTAL DATA

- A. Product Data: For each type of product indicated.
- B. Samples: For color, letter style, and graphic representation required for each identification material and device.
- C. Equipment Label Schedule: Include a listing of all equipment to be labeled with the proposed content for each label.
- D. Valve numbering scheme.
- E. Valve Schedules: For each piping system to include in maintenance manuals.
- F. Submittal Requirements:
 - 1. Furnish, all at one time, prior to any installation, within the time noted below, six (6) copies of valid submittal data on all fixtures, material, equipment and devices. Each submitted item shall be indexed and referenced to these specifications and to identification numbers on fixtures and equipment schedules.
 - 2. Manufacturers' submittal literature and shop drawings are required on all items to ensure the latest and most complete manufacturer's data is available for review. Requirements of the submittals and Engineer's submittal notes are a part of the work of this Division except that Engineer's notes may not be used as a means of increasing the scope of work of this Division.
 - 3. Submittals will be checked for general conformance with the design concept of the project but the review does not guarantee quantities shown and does not supersede requirements of this Division to properly install work.

4. To be valid, all submittals must:
- a. Be delivered to the Architect's office within thirty-five (35) days of award of the contract. Contractor shall make time allowance for Engineer's review, return of comments, if any, and resubmittal if required. Corrections or changes in submittals returned as inadequate or incomplete shall be accomplished within this time limit.
 - b. Clearly indicate and label as such any items proposed as substitution for that specified or shown on plans.
 - c. Include all pertinent construction, installation, performance and technical data.
 - d. Have all product data sheets clearly labeled to indicate the individual items being submitted. In addition, all required options and accessories shall be clearly marked.
 - 1) Product data sheets corresponding to items indicated on plans shall be clearly labeled with the corresponding fixture or equipment tag number.
 - 2) Product data sheets corresponding to items indicated in specifications shall be clearly labeled with the specification section, page and item numbers.
 - e. Include, for every item which differs in size, configuration, connections, service, accessibility or any other significant way, a drawing to the same (or larger) scale as to the pertinent portions of the contract drawings. In this drawing show a complete layout of the system except that which is identical to the contract drawings, unless the unchanged portions must be shown to indicate such things as clearances. This drawing, together with the contract design drawings must show the complete system as revised to accommodate the proposed alternate.

G. Substitution Requirements:

- 1. Any items included in submittals and proposed by the Contractor as substitution for that specified or shown on plans shall be submitted within thirty five (35) days of award of the contract. After such time, proposed substitutions shall not be accepted for review, and the Contractor shall submit all items as specified or shown on plans.
 - a. For each item proposed as substitution for that specified or shown on plans, copies of product data sheets for the specified item shall be placed side by side with product data sheets for the proposed substitution item within the submittal.
 - 1) In addition to the Submittal Requirements for labeling listed above, product data sheets for the specified item shall be clearly labeled "SPECIFIED ITEM, NOT SUBMITTED". Product data sheets for the corresponding proposed substitution item shall be clearly labeled "PROPOSED SUBSTITUTION".
 - b. Provide calculations and other detailed data justifying how any items proposed as substitution were selected for proposal. Data must be complete enough to permit detailed comparison of every significant characteristic for which the specified item was analyzed during design.
- 2. It shall be the Contractor's responsibility to provide sufficient information to allow the Engineer to analyze any proposed alternate. If inadequate information is provided, the proposal will not be approved and resubmittal will not be allowed.
- 3. The Contractor shall provide or perform tests required by Engineer for purpose of judging acceptability of proposed substitutions.

4. The Contractor assumes full responsibility that alternate items and procedures will meet the job requirements and is responsible for cost of redesign and of modifications to this and other parts of work caused by alternate items furnished under work in this Section. In view of these responsibilities, it is the purpose of these specifications to establish procedures to ensure that the Contractor has considered all the ramifications of proposed alternates before submitting them for review. Submittals which do not comply with the requirements of these specifications or which indicate proposed alternates that were selected without proper regard to the requirements of the job will not be approved. No more than one proposed alternate will be considered for each item.
5. Alternate items installed without Engineer's approval will be replaced with specified items at Contractor's expense.
6. The Architect or his authorized representative shall be the sole judge as to the quality and suitability of proposed alternate equipment, fixtures or materials. Decisions of the Architect or that of his representative shall be final and conclusive.

1.11 COORDINATION

- A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- B. Coordinate installation of identifying devices with locations of access panels and doors.
- C. Install identifying devices before installing acoustical ceilings and similar concealment.

1.12 UNINSPECTED WORK

- A. The Contractor shall not allow or cause any of his work to be covered up or closed in until it has been inspected, tested, approved by all authorities have jurisdiction, and until Project Record drawings have been properly annotated.
- B. Should any of his work be covered up or closed in before such inspection, he shall, at his own expense, uncover the work to the satisfaction of the inspection party. All related repair work cost shall be borne by the Contractor.

1.13 RECORD DRAWINGS (Also see General Conditions)

- A. Contractor shall provide and keep up-to-date a complete "as-built" record set of blue-line prints which shall show every change from the original drawings and the exact "as-built" locations and sizes of the work provided under this Section of the specifications. This set shall include locations, dimensions, depth of buried piping, cleanouts, shut-off valves, sewer invert locations, plugged wyes, tees, etc. On completion of the work, the Contractor shall incorporate all as-built information on a set of reproducible tracings provided by the Architect and this set of reproducible tracings shall be delivered to the Architect.

1.14 GUARANTEES

- A. Contractor shall guarantee the entire plumbing and piping systems unconditionally for a period of one (1) year after final acceptance. If, during this period, any materials, equipment, or any part of the systems fail to function properly, the Contractor shall make good the defects promptly and without any expense to the Owner.

- B. Contractor shall be responsible for all damage to any part of the premises caused by leaks in pipelines or equipment furnished and installed under this Section for a period of one (1) year after date of acceptance of his work.
- C. All equipment and fixtures shall carry manufacturer's warranty against defective parts or poor workmanship for not less than one (1) year. See specific equipment specifications for extended warranty requirements.

PART 2 - PRODUCTS

2.1 EQUIPMENT LABELS

- A. Metal Labels for Equipment:
 - 1. Material and Thickness: Brass, 0.032-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.
 - 2. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
 - 3. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
 - 4. Fasteners: Stainless-steel rivets or self-tapping screws.
 - 5. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- B. Label Content: Include equipment's Drawing designation or unique equipment number, Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified.
- C. Equipment Label Schedule: For each item of equipment to be labeled, on 8-1/2-by-11-inch bond paper. Tabulate equipment identification number and identify Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.

2.2 WARNING SIGNS AND LABELS

- A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.
- B. Letter Color: Black.
- C. Background Color: White.
- D. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
- E. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.

- F. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
- G. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- H. Label Content: Include caution and warning information, plus emergency notification instructions.

2.3 PIPE LABELS

- A. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction.
- B. Pretensioned Pipe Labels: Precoiled, semirigid plastic formed to cover full circumference of pipe and to attach to pipe without fasteners or adhesive.
- C. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.
- D. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings, pipe size, and an arrow indicating flow direction.
 - 1. Flow-Direction Arrows: Integral with piping system service lettering to accommodate both directions, or as separate unit on each pipe label to indicate flow direction.
 - 2. Lettering Size: At least 1-1/2 incheshigh.

2.4 VALVE TAGS

- A. Valve Tags: Stamped or engraved with 1/4-inch letters for piping system abbreviation and 1/2-inch numbers.
 - 1. Tag Material: Brass, 0.032-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.
 - 2. Fasteners: Brass wire-link or beaded chain; or S-hook.
- B. Valve Schedules: For each piping system, on 8-1/2-by-11-inch bond paper. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal-operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.
 - 1. Valve-tag schedule shall be included in operation and maintenance data.

2.5 WARNING TAGS

- A. Warning Tags: Preprinted or partially preprinted, accident-prevention tags, of plasticized card stock with matte finish suitable for writing.
 - 1. Size: 3 by 5-1/4 inches minimum.
 - 2. Fasteners: Brass grommet and wire.

3. Nomenclature: Large-size primary caption such as "DANGER," "CAUTION," or "DO NOT OPERATE."
4. Color: Yellow background with black lettering.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

3.2 EQUIPMENT LABEL INSTALLATION

- A. Install or permanently fasten labels on each major item of mechanical equipment.
- B. Locate equipment labels where accessible and visible.

3.3 PIPE LABEL INSTALLATION

- A. Piping Color-Coding: Painting of piping is specified in Section 099123 "Interior Painting."
- B. Stenciled Pipe Label Option: Stenciled labels may be provided instead of manufactured pipe labels, at Installer's option. Install stenciled pipe labels with painted, color-coded bands or rectangles on each piping system.
 1. Identification Paint: Use for contrasting background.
 2. Stencil Paint: Use for pipe marking.
- C. Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:
 1. Near each valve and control device.
 2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
 3. Near penetrations through walls, floors, ceilings, and inaccessible enclosures.
 4. At access doors, manholes, and similar access points that permit view of concealed piping.
 5. Near major equipment items and other points of origination and termination.
 6. Spaced at maximum intervals of 50 feet along each run. Reduce intervals to 25 feet in areas of congested piping and equipment.
 7. On piping above removable acoustical ceilings. Omit intermediately spaced labels.
- D. Pipe Label Color Schedule:
 1. Domestic Water Piping:
 - a. Background Color: White.
 - b. Letter Color: Black.

2. Sanitary Waste and Storm Drainage Piping:

- a. Background Color: White.
- b. Letter Color: Black.

3.4 VALVE-TAG INSTALLATION

- A. Install tags on valves and control devices in piping systems, except check valves; valves within factory-fabricated equipment units; shutoff valves; faucets; convenience and lawn-watering hose connections; and similar roughing-in connections of end-use fixtures and units. List tagged valves in a valve schedule.
- B. Valve-Tag Application Schedule: Tag valves according to size, shape, and color scheme and with captions similar to those indicated in the following subparagraphs:
 - 1. Valve-Tag Size and Shape:
 - a. Cold Water: 1-1/2 inches, round.
 - b. Hot Water: 1-1/2 inches, round.
 - 2. Valve-Tag Color:
 - a. Cold Water: Natural.
 - b. Hot Water: Natural.
 - 3. Letter Color:
 - a. Cold Water: Black.
 - b. Hot Water: Black.

3.5 WARNING-TAG INSTALLATION

- A. Write required message on, and attach warning tags to, equipment and other items where required.

END OF SECTION 22 05 53

SECTION 22 07 19

PLUMBING PIPING INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes insulating the following plumbing piping services:
 - 1. Domestic cold-water piping.
 - 2. Domestic hot-water piping.
 - 3. Supplies and drains for handicap-accessible lavatories and sinks.
- B. Related Sections:
 - 1. Section 220716 "Plumbing Equipment Insulation."

1.3 WORK INCLUDED

- A. Furnish all labor, materials, services, testing, transportation and equipment necessary for the completion of all plumbing work as indicated on drawings and specified herein. Work materials and equipment not indicated or specified which is necessary for the complete and proper operation of the work of this Section in accordance with the true intent and meaning of the contract documents shall be provided and incorporated at no additional cost to the Owner.

1.4 QUALITY ASSURANCE

- A. Code Requirements: All work covered by this Section shall conform to the latest requirements of the following regulations:
 - 1. C.C.R., Title 24, Part 5 (2022 CPC).
 - 2. 2022 California Plumbing Code.
 - 3. SMACNA Seismic Restraint Manual Guidelines for Mechanical Systems.
 - 4. National Fire Protection Association.
 - 5. California State Division of Industrial Safety.
 - 6. County Health Department.
 - 7. Any other legally constituted body-having jurisdiction thereof.
- B. Nothing in the specifications or drawings shall be construed to permit deviation from the requirements of governing codes unless approval for said deviation has been obtained from the legally constituted authorities having jurisdiction and from the Owner's representative.

1.5 DRAWINGS

- A. Because of the small-scale drawings, it is not possible to indicate all offsets, fittings and accessories which may be required. The Contractor shall carefully investigate the conditions surrounding installation of his work, furnishing the necessary piping, fittings, valves, traps, and other devices which may be required to complete the installation.
- B. The general arrangement indicated on the drawings shall be followed as closely as possible. Coordinate with the Architectural, Structural, Mechanical and Electrical Drawings and the work of other trades prior to installation of piping fixtures and equipment to verify adequate space available for installation of the work shown. In the event a field condition arises which makes it impossible to install the work as indicated, submit, in writing, the proposed departures to the Architect for his approval. Only when Architect's approval is given, in writing, shall Contractor proceed with installation of the work.
- C. Special Note: Should the Contractor make changes in the installation differing from what is indicated on the contract drawings and not necessitated due to field conditions as indicated hereinabove, the Contractor shall be required to re-install the work to comply with what has been indicated on the contract drawings. Should it be impossible to re-install the work and the installation is in accordance with all governing authorities, the architect may permit the installation to remain. However, all costs incurred to revise the contract drawings by the engineer for resubmittal to the building department indicating the as-installed condition shall become the responsibility of the Contractor.
- D. In case of a difference in the specifications or between the specifications and the drawings, the Contractor shall figure the most expensive alternate and after award of contract, shall secure direction from the Architect.

1.6 PERMITS, INSPECTIONS AND LICENSES

- A. All permits, inspections and licenses required by the legally constituted authorities for installation of the work according to the plans and specifications shall be obtained and paid as a part of the work of this section.

1.7 EXAMINATION OF PREMISES

- A. Before bidding on this work, Contractors shall make a careful examination of the premises and shall thoroughly familiarize themselves with the requirements of the contract. By the act of submitting a proposal for the work included in this contract, the Contractor shall be deemed to have made such study and examination, and that he is familiar with and accepts all conditions of the site.

1.8 PROTECTION

- A. All work, equipment and materials shall be protected at all times. Contractor shall make good all damage caused either directly or indirectly by his own workmen. Contractor shall also protect his own work from damage. He shall close all pipe openings with caps or plugs during installation. He shall protect all his equipment and materials against dirt, water, chemical and mechanical injury. Upon completion, all work shall be thoroughly cleaned and delivered in a new condition.

- B. Contractor shall be held responsible for all damage to equipment and materials until he has received written notice from the Architect or Engineer that his work has been accepted.

1.9 LOCATIONS

- A. The locations of apparatus, piping and equipment indicated on the drawings are approximate. Piping and equipment shall be installed in such a manner as to avoid all obstruction, preserve headroom, and keep openings and passages clear. The locations of and mounting heights of all fixtures shall be coordinated with the architectural plans and room elevations.
- B. Clearances and Openings: Contractor shall cooperate and coordinate his work with all other trades to avoid conflict and permit for a neat and orderly appearance of the entire installation. The Contractor shall, in advance of the work, furnish instructions to the General Contractor as to his requirements for equipment and material installation of any kind, whether or not specifically mentioned on drawings or in the specifications, and shall include recesses, chases in walls, and all required openings in the structure. Should furnishing this information be neglected, delayed or incorrect and additional cuttings are found to be required, the cost of the same shall be charged to this Contractor.
- C. Contractor shall verify and coordinate pipe routing with location of all electrical rooms, elevator equipment rooms, telecom/data rooms, and other rooms dedicated to the housing of switchgear, panels, or other electrical equipment. In no case shall piping be installed within or above the ceiling of such rooms.

1.10 SUBMITTAL DATA

A. Submittal Requirements:

1. Furnish, all at one time, prior to any installation, within the time noted below, six (6) copies of valid submittal data on all fixtures, material, equipment and devices. Each submitted item shall be indexed and referenced to these specifications and to identification numbers on fixtures and equipment schedules.
2. Manufacturers' submittal literature and shop drawings are required on all items to ensure the latest and most complete manufacturer's data is available for review. Requirements of the submittals and Engineer's submittal notes are a part of the work of this Division except that Engineer's notes may not be used as a means of increasing the scope of work of this Division.
3. Submittals will be checked for general conformance with the design concept of the project but the review does not guarantee quantities shown and does not supersede requirements of this Division to properly install work.
4. To be valid, all submittals must:
 - a. Be delivered to the Architect's office within thirty-five (35) days of award of the contract. Contractor shall make time allowance for Engineer's review, return of comments, if any, and resubmittal if required. Corrections or changes in submittals returned as inadequate or incomplete shall be accomplished within this time limit.
 - b. Clearly indicate and label as such any items proposed as substitution for that specified or shown on plans.
 - c. Include all pertinent construction, installation, performance and technical data.

- d. Have all product data sheets clearly labeled to indicate the individual items being submitted. In addition, all required options and accessories shall be clearly marked.
 - 1) Product data sheets corresponding to items indicated on plans shall be clearly labeled with the corresponding fixture or equipment tag number.
 - 2) Product data sheets corresponding to items indicated in specifications shall be clearly labeled with the specification section, page and item numbers.
- e. Include, for every item which differs in size, configuration, connections, service, accessibility or any other significant way, a drawing to the same (or larger) scale as to the pertinent portions of the contract drawings. In this drawing show a complete layout of the system except that which is identical to the contract drawings, unless the unchanged portions must be shown to indicate such things as clearances. This drawing, together with the contract design drawings must show the complete system as revised to accommodate the proposed alternate.

B. Substitution Requirements:

- 1. Any items included in submittals and proposed by the Contractor as substitution for that specified or shown on plans shall be submitted within thirty five (35) days of award of the contract. After such time, proposed substitutions shall not be accepted for review, and the Contractor shall submit all items as specified or shown on plans.
 - a. For each item proposed as substitution for that specified or shown on plans, copies of product data sheets for the specified item shall be placed side by side with product data sheets for the proposed substitution item within the submittal.
 - 1) In addition to the Submittal Requirements for labeling listed above, product data sheets for the specified item shall be clearly labeled "SPECIFIED ITEM, NOT SUBMITTED". Product data sheets for the corresponding proposed substitution item shall be clearly labeled "PROPOSED SUBSTITUTION".
 - b. Provide calculations and other detailed data justifying how any items proposed as substitution were selected for proposal. Data must be complete enough to permit detailed comparison of every significant characteristic for which the specified item was analyzed during design.
- 2. It shall be the Contractor's responsibility to provide sufficient information to allow the Engineer to analyze any proposed alternate. If inadequate information is provided, the proposal will not be approved and resubmittal will not be allowed.
- 3. The Contractor shall provide or perform tests required by Engineer for purpose of judging acceptability of proposed substitutions.
- 4. The Contractor assumes full responsibility that alternate items and procedures will meet the job requirements and is responsible for cost of redesign and of modifications to this and other parts of work caused by alternate items furnished under work in this Section. In view of these responsibilities, it is the purpose of these specifications to establish procedures to ensure that the Contractor has considered all the ramifications of proposed alternates before submitting them for review. Submittals which do not comply with the requirements of these specifications or which indicate proposed alternates that were selected without proper regard to the requirements of the job will not be approved. No more than one proposed alternate will be considered for each item.
- 5. Alternate items installed without Engineer's approval will be replaced with specified items at Contractor's expense.

1.11 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.
- B. Material Test Reports: From a qualified testing agency acceptable to authorities having jurisdiction indicating, interpreting, and certifying test results for compliance of insulation materials, sealers, attachments, cements, and jackets, with requirements indicated. Include dates of tests and test methods employed.
- C. Field quality-control reports.

1.12 QUALITY ASSURANCE

- A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.
- B. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84 by a testing agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.
 - 1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
 - 2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.
- C. Comply with the following applicable standards and other requirements specified for miscellaneous components:
 - 1. Supply and Drain Protective Shielding Guards: ICC A117.1.

1.13 UNINSPECTED WORK

- A. The Contractor shall not allow or cause any of his work to be covered up or closed in until it has been inspected, tested, approved by all authorities have jurisdiction, and until Project Record drawings have been properly annotated.
- B. Should any of his work be covered up or closed in before such inspection, he shall, at his own expense, uncover the work to the satisfaction of the inspection party. All related repair work cost shall be borne by the Contractor.

1.14 RECORD DRAWINGS (Also see General Conditions)

- A. Contractor shall provide and keep up-to-date a complete "as-built" record set of blueline prints which shall show every change from the original drawings and the exact "as-built" locations and sizes of the work provided under this Section of the specifications. This set shall include locations, dimensions, depth of buried piping, cleanouts, shut-off valves, sewer invert locations, plugged wyes, tees, etc. On completion of the work, the Contractor shall incorporate all as-built information on a set of reproducible tracings provided by the Architect and this set of reproducibles shall be delivered to the Architect.

1.15 GUARANTEES

- A. Contractor shall guarantee the entire plumbing and piping systems unconditionally for a period of one (1) year after final acceptance. If, during this period, any materials, equipment, or any part of the systems fail to function properly, the Contractor shall make good the defects promptly and without any expense to the Owner.
- B. Contractor shall be responsible for all damage to any part of the premises caused by leaks in pipelines or equipment furnished and installed under this Section for a period of one (1) year after date of acceptance of his work.
- C. All equipment and fixtures shall carry manufacturer's warranty against defective parts or poor workmanship for not less than one (1) year. See specific equipment specifications for extended warranty requirements.

1.16 DELIVERY, STORAGE, AND HANDLING

- A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

1.17 COORDINATION

- A. Coordinate sizes and locations of supports, hangers, and insulation shields specified in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."
- B. Coordinate clearance requirements with piping Installer for piping insulation application. Before preparing piping Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.
- C. Coordinate installation and testing of heat tracing.

1.18 SCHEDULING

- A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.
- B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

- A. Hot Water Pipe Insulation: All hot water supply and return piping, except exposed connections to plumbing fixtures, flanges and unions shall be insulated with ASTM C547, Class I, "Johns-Manville" "Micro-Lock" 850-APT, Owens-Corning Fiberglass Corp., ASJ/SL-11 or approved equal, 1" thick for sizes up to 2" and 1-1/2" thick for sizes 2" and larger with "Johns-Manville" "Zeston" pre-formed insulation inserts for all fittings. Insulation at all fittings shall be equal in thickness to insulation for piping. Insulation shall have a flame spread of not more than 25 and a smoke density not exceeding 50 per 2016 CMC
1. Exposed insulated piping in occupied areas and exposed outside the building shall be covered with Johns-Manville" "Zeston" 30-mil thick white PVC jacketing material per ASTM D1784 with "Johns-Manville" "Zeston" pre-formed insulation inserts for all fittings. Insulation at all fittings shall be equal in thickness to insulation for piping. Jacketing shall comply with ASTM E84, and shall have a flame spread of not more than 25 and a smoke density not exceeding 50 per 2016 CMC.
 2. Hot water piping below slab shall have insulation protected by a 10-mil thick polyethylene plastic sleeve sealed watertight with poly vinyl chloride tape.
- B. Comply with requirements in "Piping Insulation Schedule, General," "Indoor Piping Insulation Schedule," "Outdoor, Aboveground Piping Insulation Schedule," and "Outdoor, Underground Piping Insulation Schedule" articles for where insulating materials shall be applied.
- C. Products shall not contain asbestos, lead, mercury, or mercury compounds.
- D. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.
- E. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.
- F. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.
- G. Mineral-Fiber, Preformed Pipe Insulation:
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Johns Manville; Micro-Lok.
 - b. Knauf Insulation; 1000-Degree Pipe Insulation.
 - c. Owens Corning; Fiberglas Pipe Insulation.
 2. Type I, 850 Deg F Materials: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 547, Type I, Grade A, with factory-applied ASJ. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

- H. Polyolefin: Unicellular, polyethylene thermal plastic insulation. Comply with ASTM C 534 or ASTM C 1427, Type I, Grade 1 for tubular materials.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Armacell LLC; Tubolit.
 - b. Nomaco Insulation; IMCOLOCK and NOMALOCK.
 - I. Condensate Pipe Insulation: All condensate piping within the building shall be insulated with "Imcoa" "Imcolock" ¾" nominal wall thickness closed-cell insulation. Insulation shall have a flame spread of not more than 25 and a smoke density not exceeding 50 per 2016 CMC. All joints shall be mitered and secured with black duct tape.
 - J. Indirect Waste Pipe Insulation: All indirect waste drains from refrigerated kitchen equipment shall be insulated with "Armacell" "Armaflex" insulating tape.
 - K. All insulation shall be continuous through supports and hangers.
 - L. All fixtures complying with the provisions of the Americans with Disabilities Act shall be provided with Prowrap insulation for exposed hot water pipe, tailpiece, and trap as manufactured by McGuire, and secured per manufacturers recommendations. No tape wrapping shall be permitted.

2.2 ADHESIVES

- A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated, unless otherwise indicated.
- B. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-127.
 - b. Eagle Bridges - Marathon Industries; 225.
 - c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-60/85-70.
 2. For indoor applications, adhesive shall have a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 3. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- C. Phenolic Adhesive: Solvent-based resin adhesive, with a service temperature range of minus 75 to plus 300 deg F.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-96.
 - b. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 81-33.

2. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 3. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- D. ASJ Adhesive, and FSK Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-82.
 - b. Eagle Bridges - Marathon Industries; 225.
 - c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-20.
 2. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 3. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- E. PVC Jacket Adhesive: Compatible with PVC jacket.
1. Products: Subject to compliance with requirements, provide the following:
 - a. Johns Manville; Zeston Perma-Weld, CEEL-TITE Solvent Welding Adhesive.
 2. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 3. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.3 TAPES

- A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. ABI, Ideal Tape Division; 428 AWF ASJ.
 - b. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0836.
 - c. Compac Corporation; 104 and 105.
 - d. Venture Tape; 1540 CW Plus, 1542 CW Plus, and 1542 CW Plus/SQ.
 2. Width: 3 inches.
 3. Thickness: 11.5 mils.
 4. Adhesion: 90 ounces force/inch in width.
 5. Elongation: 2 percent.
 6. Tensile Strength: 40 lbf/inch in width.
 7. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.

B. PVC Tape: White vapor-retarder tape matching field-applied PVC jacket with acrylic adhesive; suitable for indoor and outdoor applications.

1. Products: Subject to compliance with requirements, provide one of the following:

- a. ABI, Ideal Tape Division; 370 White PVC tape.
- b. Compac Corporation; 130.
- c. Venture Tape; 1506 CW NS.

2. Width: 2 inches.
3. Thickness: 6 mils.
4. Adhesion: 64 ounces force/inch in width.
5. Elongation: 500 percent.
6. Tensile Strength: 18 lbf/inch in width.

2.4 SECUREMENTS

A. Staples: Outward-clinching insulation staples, nominal 3/4-inch- wide, stainless steel or Monel.

2.5 PROTECTIVE SHIELDING GUARDS

A. Protective Shielding Pipe Covers,:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. McGuire Manufacturing.
2. Description: Manufactured plastic wraps for covering plumbing fixture hot- and cold-water supplies and trap and drain piping. Comply with Americans with Disabilities Act (ADA) requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.

1. Verify that systems to be insulated have been tested and are free of defects.
2. Verify that surfaces to be insulated are clean and dry.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

- B. Surface Preparation: Clean and prepare surfaces to be insulated. Before insulating, apply a corrosion coating to insulated surfaces as follows:
 - 1. Stainless Steel: Coat 300 series stainless steel with an epoxy primer 5 mils thick and an epoxy finish 5 mils thick if operating in a temperature range between 140 and 300 deg F. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.
 - 2. Carbon Steel: Coat carbon steel operating at a service temperature between 32 and 300 deg F with an epoxy coating. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.
- C. Coordinate insulation installation with the trade installing heat tracing. Comply with requirements for heat tracing that apply to insulation.
- D. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use demineralized water.

3.3 GENERAL INSTALLATION REQUIREMENTS

- A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of piping including fittings, valves, and specialties.
- B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of pipe system as specified in insulation system schedules.
- C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.
- D. Install insulation with longitudinal seams at top and bottom of horizontal runs.
- E. Install multiple layers of insulation with longitudinal and end seams staggered.
- F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.
- G. Keep insulation materials dry during application and finishing.
- H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.
- I. Install insulation with least number of joints practical.
- J. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.
 - 1. Install insulation continuously through hangers and around anchor attachments.
 - 2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
 - 3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
 - 4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.

- K. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.
- L. Install insulation with factory-applied jackets as follows:
 - 1. Draw jacket tight and smooth.
 - 2. Cover circumferential joints with 3-inch- wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
 - 3. Overlap jacket longitudinal seams at least 1-1/2 inches. Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 2 inches o.c.
 - a. For below-ambient services, apply vapor-barrier mastic over staples.
 - 4. Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to maintain vapor seal.
 - 5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to pipe flanges and fittings.
- M. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.
- N. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.
- O. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.
- P. For above-ambient services, do not install insulation to the following:
 - 1. Vibration-control devices.
 - 2. Testing agency labels and stamps.
 - 3. Nameplates and data plates.
 - 4. Cleanouts.

3.4 PENETRATIONS

- A. Insulation Installation at Roof Penetrations: Install insulation continuously through roof penetrations.
 - 1. Seal penetrations with flashing sealant.
 - 2. For applications requiring only indoor insulation, terminate insulation above roof surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
 - 3. Extend jacket of outdoor insulation outside roof flashing at least 2 inches below top of roof flashing.
 - 4. Seal jacket to roof flashing with flashing sealant.
- B. Insulation Installation at Underground Exterior Wall Penetrations: Terminate insulation flush with sleeve seal. Seal terminations with flashing sealant.

- C. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.
 - 1. Seal penetrations with flashing sealant.
 - 2. For applications requiring only indoor insulation, terminate insulation inside wall surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
 - 3. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least 2 inches.
 - 4. Seal jacket to wall flashing with flashing sealant.
- D. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.
- E. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions.
 - 1. Comply with requirements in Section 078413 "Penetration Firestopping" for firestopping and fire-resistive joint sealers.
- F. Insulation Installation at Floor Penetrations:
 - 1. Pipe: Install insulation continuously through floor penetrations.
 - 2. Seal penetrations through fire-rated assemblies. Comply with requirements in Section 078413 "Penetration Firestopping."

3.5 GENERAL PIPE INSULATION INSTALLATION

- A. Requirements in this article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles.
- B. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:
 - 1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity unless otherwise indicated.
 - 2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
 - 3. Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.
 - 4. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.

5. Insulate strainers using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below-ambient services, provide a design that maintains vapor barrier.
 6. Insulate flanges and unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker.
 7. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below-ambient services and a breather mastic for above-ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.
 8. For services not specified to receive a field-applied jacket except for flexible elastomeric and polyolefin, install fitted PVC cover over elbows, tees, strainers, valves, flanges, and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing using PVC tape.
 9. Stencil or label the outside insulation jacket of each union with the word "union." Match size and color of pipe labels.
- C. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.
- D. Install removable insulation covers at locations indicated. Installation shall conform to the following:
1. Make removable flange and union insulation from sectional pipe insulation of same thickness as that on adjoining pipe. Install same insulation jacket as adjoining pipe insulation.
 2. When flange and union covers are made from sectional pipe insulation, extend insulation from flanges or union long at least two times the insulation thickness over adjacent pipe insulation on each side of flange or union. Secure flange cover in place with stainless-steel or aluminum bands. Select band material compatible with insulation and jacket.
 3. Construct removable valve insulation covers in same manner as for flanges, except divide the two-part section on the vertical center line of valve body.
 4. When covers are made from block insulation, make two halves, each consisting of mitered blocks wired to stainless-steel fabric. Secure this wire frame, with its attached insulation, to flanges with tie wire. Extend insulation at least 2 inches over adjacent pipe insulation on each side of valve. Fill space between flange or union cover and pipe insulation with insulating cement. Finish cover assembly with insulating cement applied in two coats. After first coat is dry, apply and trowel second coat to a smooth finish.
 5. Unless a PVC jacket is indicated in field-applied jacket schedules, finish exposed surfaces with a metal jacket.
- 3.6 INSTALLATION OF MINERAL-FIBER INSULATION
- A. Insulation Installation on Straight Pipes and Tubes:
1. Secure each layer of preformed pipe insulation to pipe with wire or bands and tighten bands without deforming insulation materials.

2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
3. For insulation with factory-applied jackets on above-ambient surfaces, secure laps with outward clinched staples at 6 inches o.c.
4. For insulation with factory-applied jackets on below-ambient surfaces, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.

B. Insulation Installation on Pipe Flanges:

1. Install preformed pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with mineral-fiber blanket insulation.
4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch, and seal joints with flashing sealant.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed insulation elbows and fittings are not available, install mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire or bands.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed sections are not available, install mitered sections of pipe insulation to valve body.
3. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
4. Install insulation to flanges as specified for flange insulation application.

3.7 INSTALLATION OF POLYOLEFIN INSULATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Seal split-tube longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

B. Insulation Installation on Pipe Flanges:

1. Install pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of polyolefin sheet insulation of same thickness as pipe insulation.
4. Secure insulation to flanges and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

- C. Insulation Installation on Pipe Fittings and Elbows:
 - 1. Install mitered sections of polyolefin pipe insulation.
 - 2. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

- D. Insulation Installation on Valves and Pipe Specialties:
 - 1. Install cut sections of polyolefin pipe and sheet insulation to valve body.
 - 2. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
 - 3. Install insulation to flanges as specified for flange insulation application.
 - 4. Secure insulation to valves and specialties, and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

3.8 FINISHES

- A. Insulation with ASJ, Glass-Cloth, or Other Paintable Jacket Material: Paint jacket with paint system identified below and as specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."
 - 1. Flat Acrylic Finish: Two finish coats over a primer that is compatible with jacket material and finish coat paint. Add fungicidal agent to render fabric mildew proof.
 - a. Finish Coat Material: Interior, flat, latex-emulsion size.
- B. Flexible Elastomeric Thermal Insulation: After adhesive has fully cured, apply two coats of insulation manufacturer's recommended protective coating.
- C. Color: Final color as selected by Architect. Vary first and second coats to allow visual inspection of the completed Work.
- D. Do not field paint aluminum or stainless-steel jackets.

3.9 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Perform tests and inspections.
- C. Tests and Inspections:
 - 1. Inspect pipe, fittings, strainers, and valves, randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to three locations of straight pipe, three locations of threaded fittings, three locations of welded fittings, three locations of threaded valves, and three locations of flanged valves for each pipe service defined in the "Piping Insulation Schedule, General" Article.
- D. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

3.10 PIPING INSULATION SCHEDULE, GENERAL

- A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.
- B. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:
 - 1. Drainage piping located in crawl spaces.
 - 2. Underground piping.
 - 3. Chrome-plated pipes and fittings unless there is a potential for personnel injury.

3.11 INDOOR PIPING INSULATION SCHEDULE

- A. Domestic Hot and Recirculated Hot Water:
 - 1. NPS 1-1/4 and Smaller: Insulation shall be the following:
 - a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.
 - 2. NPS 1-1/2 and Larger: Insulation shall be the following:
 - a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.
- B. Exposed Sanitary Drains, Domestic Water, Domestic Hot Water, and Stops for Plumbing Fixtures for People with Disabilities:
 - 1. All Pipe Sizes: Insulation shall be the following:
 - a. McGuire pre-insulated trap and supply covers.

END OF SECTION 22 07 19

SECTION 22 11 16

DOMESTIC WATER PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Under-building-slab and aboveground domestic water pipes, tubes, and fittings inside buildings.
2. Encasement for piping.

B. Related Requirements:

1. Section 221113 "Facility Water Distribution Piping" for water-service piping outside the building from source to the point where water-service piping enters the building.

1.3 WORK INCLUDED

- A. Furnish all labor, materials, services, testing, transportation and equipment necessary for the completion of all plumbing work as indicated on drawings and specified herein. Work materials and equipment not indicated or specified which is necessary for the complete and proper operation of the work of this Section in accordance with the true intent and meaning of the contract documents shall be provided and incorporated at no additional cost to the Owner.

1.4 QUALITY ASSURANCE

- A. Code Requirements: All work covered by this Section shall conform to the latest requirements of the following regulations:

1. C.C.R., Title 24, Part 5 (2022 CPC).
2. 2022 California Plumbing Code.
3. SMACNA Seismic Restraint Manual Guidelines for Mechanical Systems.
4. National Fire Protection Association.
5. California State Division of Industrial Safety.
6. County Health Department.
7. Any other legally constituted body-having jurisdiction thereof.

- B. Nothing in the specifications or drawings shall be construed to permit deviation from the requirements of governing codes unless approval for said deviation has been obtained from the legally constituted authorities having jurisdiction and from the Owner's representative.

1.5 DRAWINGS

- A. Because of the small-scale drawings, it is not possible to indicate all offsets, fittings and accessories which may be required. The Contractor shall carefully investigate the conditions surrounding installation of his work, furnishing the necessary piping, fittings, valves, traps, and other devices which may be required to complete the installation.
- B. The general arrangement indicated on the drawings shall be followed as closely as possible. Coordinate with the Architectural, Structural, Mechanical and Electrical Drawings and the work of other trades prior to installation of piping fixtures and equipment to verify adequate space available for installation of the work shown. In the event a field condition arises which makes it impossible to install the work as indicated, submit, in writing, the proposed departures to the Architect for his approval. Only when Architect's approval is given, in writing, shall Contractor proceed with installation of the work.
- C. Special Note: Should the Contractor make changes in the installation differing from what is indicated on the contract drawings and not necessitated due to field conditions as indicated hereinabove, the Contractor shall be required to re-install the work to comply with what has been indicated on the contract drawings. Should it be impossible to re-install the work and the installation is in accordance with all governing authorities, the architect may permit the installation to remain. However, all costs incurred to revise the contract drawings by the engineer for resubmittal to the building department indicating the as-installed condition shall become the responsibility of the Contractor.
- D. In case of a difference in the specifications or between the specifications and the drawings, the Contractor shall figure the most expensive alternate and after award of contract, shall secure direction from the Architect.

1.6 PERMITS, INSPECTIONS AND LICENSES

- A. All permits, inspections and licenses required by the legally constituted authorities for installation of the work according to the plans and specifications shall be obtained and paid as a part of the work of this section.

1.7 UTILITIES

- A. See Drawings for Points of Connection.
- B. Certain site utilities are to be connected to and extended. Before laying of any pipe or digging of any trenches, Contractor shall determine by actual excavation and measurement exact location and depth of lines to which he is to connect. In event depth of lines is not sufficient to permit connection in manner indicated, Contractor shall obtain direction from the Owner's representative before proceeding with this work.
- C. Verify that utility companies size their services and meters to suit ultimate demand indicated on the drawings.

- D. Domestic Water: The Contractor shall be responsible for the domestic water service outside of the building within five feet (5') of the foundation, and within the building itself. See Civil Engineer's plans for onsite domestic water system.
- E. Domestic Water Service: The Contractor shall arrange with the serving utility company for the installation of all water meter assemblies and reduced pressure backflow devices, including the service mains and vaults, and all required appurtenances as indicated on the drawings and in accordance with serving utility standards and shall pay all costs incurred. All required capacity fees, frontage fees and inspections, shall be paid for by the Owner. Contractor shall provide necessary tap-in connections in water main for sterilizing of domestic water system. Contractor shall connect into the main water service line as indicated on the drawings. The installation shall be in accordance with the serving utility company's standards.

1.8 EXAMINATION OF PREMISES

- A. Before bidding on this work, Contractors shall make a careful examination of the premises and shall thoroughly familiarize themselves with the requirements of the contract. By the act of submitting a proposal for the work included in this contract, the Contractor shall be deemed to have made such study and examination, and that he is familiar with and accepts all conditions of the site.

1.9 PROTECTION

- A. All work, equipment and materials shall be protected at all times. Contractor shall make good all damage caused either directly or indirectly by his own workmen. Contractor shall also protect his own work from damage. He shall close all pipe openings with caps or plugs during installation. He shall protect all his equipment and materials against dirt, water, chemical and mechanical injury. Upon completion, all work shall be thoroughly cleaned and delivered in a new condition.
- B. Contractor shall be held responsible for all damage to equipment and materials until he has received written notice from the Architect or Engineer that his work has been accepted.

1.10 LOCATIONS

- A. The locations of apparatus, piping and equipment indicated on the drawings are approximate. Piping and equipment shall be installed in such a manner as to avoid all obstruction, preserve headroom, and keep openings and passages clear. The locations of and mounting heights of all fixtures shall be coordinated with the architectural plans and room elevations.
- B. Clearances and Openings: Contractor shall cooperate and coordinate his work with all other trades to avoid conflict and permit for a neat and orderly appearance of the entire installation. The Contractor shall, in advance of the work, furnish instructions to the General Contractor as to his requirements for equipment and material installation of any kind, whether or not specifically mentioned on drawings or in the specifications, and shall include recesses, chases in walls, and all required openings in the structure. Should furnishing this information be neglected, delayed or incorrect and additional cuttings are found to be required, the cost of the same shall be charged to this Contractor.

- C. Contractor shall verify and coordinate pipe routing with location of all electrical rooms, elevator equipment rooms, telecom/data rooms, and other rooms dedicated to the housing of switchgear, panels, or other electrical equipment. In no case shall piping be installed within or above the ceiling of such rooms.

1.11 SUBMITTAL DATA

A. Submittal Requirements:

1. Furnish, all at one time, prior to any installation, within the time noted below, six (6) copies of valid submittal data on all fixtures, material, equipment and devices. Each submitted item shall be indexed and referenced to these specifications and to identification numbers on fixtures and equipment schedules.
2. Manufacturers' submittal literature and shop drawings are required on all items to ensure the latest and most complete manufacturer's data is available for review. Requirements of the submittals and Engineer's submittal notes are a part of the work of this Division except that Engineer's notes may not be used as a means of increasing the scope of work of this Division.
3. Submittals will be checked for general conformance with the design concept of the project but the review does not guarantee quantities shown and does not supersede requirements of this Division to properly install work.
4. To be valid, all submittals must:
 - a. Be delivered to the Architect's office within thirty-five (35) days of award of the contract. Contractor shall make time allowance for Engineer's review, return of comments, if any, and resubmittal if required. Corrections or changes in submittals returned as inadequate or incomplete shall be accomplished within this time limit.
 - b. Clearly indicate and label as such any items proposed as substitution for that specified or shown on plans.
 - c. Include all pertinent construction, installation, performance and technical data.
 - d. Have all product data sheets clearly labeled to indicate the individual items being submitted. In addition, all required options and accessories shall be clearly marked.
 - 1) Product data sheets corresponding to items indicated on plans shall be clearly labeled with the corresponding fixture or equipment tag number.
 - 2) Product data sheets corresponding to items indicated in specifications shall be clearly labeled with the specification section, page and item numbers.
 - e. Include, for every item which differs in size, configuration, connections, service, accessibility or any other significant way, a drawing to the same (or larger) scale as to the pertinent portions of the contract drawings. In this drawing show a complete layout of the system except that which is identical to the contract drawings, unless the unchanged portions must be shown to indicate such things as clearances. This drawing, together with the contract design drawings must show the complete system as revised to accommodate the proposed alternate.

B. Substitution Requirements:

1. Any items included in submittals and proposed by the Contractor as substitution for that specified or shown on plans shall be submitted within thirty five (35) days of award of the contract. After such time, proposed substitutions shall not be accepted for review, and the Contractor shall submit all items as specified or shown on plans.
 - a. For each item proposed as substitution for that specified or shown on plans, copies of product data sheets for the specified item shall be placed side by side with product data sheets for the proposed substitution item within the submittal.
 - 1) In addition to the Submittal Requirements for labeling listed above, product data sheets for the specified item shall be clearly labeled "SPECIFIED ITEM, NOT SUBMITTED". Product data sheets for the corresponding proposed substitution item shall be clearly labeled "PROPOSED SUBSTITUTION".
 - b. Provide calculations and other detailed data justifying how any items proposed as substitution were selected for proposal. Data must be complete enough to permit detailed comparison of every significant characteristic for which the specified item was analyzed during design.
2. It shall be the Contractor's responsibility to provide sufficient information to allow the Engineer to analyze any proposed alternate. If inadequate information is provided, the proposal will not be approved and resubmittal will not be allowed.
3. The Contractor shall provide or perform tests required by Engineer for purpose of judging acceptability of proposed substitutions.
4. The Contractor assumes full responsibility that alternate items and procedures will meet the job requirements and is responsible for cost of redesign and of modifications to this and other parts of work caused by alternate items furnished under work in this Section. In view of these responsibilities, it is the purpose of these specifications to establish procedures to ensure that the Contractor has considered all the ramifications of proposed alternates before submitting them for review. Submittals which do not comply with the requirements of these specifications or which indicate proposed alternates that were selected without proper regard to the requirements of the job will not be approved. No more than one proposed alternate will be considered for each item.
5. Alternate items installed without Engineer's approval will be replaced with specified items at Contractor's expense.

1.12 ACTION SUBMITTALS

- A. Product Data: For transition fittings and dielectric fittings.

1.13 INFORMATIONAL SUBMITTALS

- A. System purging and disinfecting activities report.
- B. Field quality-control reports.

1.14 FIELD CONDITIONS

- A. Interruption of Existing Water Service: Do not interrupt water service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary water service according to requirements indicated:
 - 1. Notify Architect no fewer than two days in advance of proposed interruption of water service.
 - 2. Do not interrupt water service without Architect's written permission.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

- A. Piping within the building and above grade shall be Type "L" ASTM B88, hard drawn copper tubing with wrought copper sweat fittings ANSI B16.18 and B16.22,
- B. Outdoor underground piping in sizes 2-1/2" and 3" shall be Type "L" ASTM B88, hard drawn copper as specified for water piping within the building. Piping 2" and smaller shall be Type "K" ASTM B88, hard drawn copper with wrought copper sweat fittings ANSI B16.18 and B16.22.
- C. Piping below the building floor shall be Type "K" soft annealed copper tubing with no fittings below the slab.

2.2 COPPER TUBE AND FITTINGS

- A. Hard Copper Tube: ASTM B 88, Type L water tube, drawn temper.
- B. Soft Copper Tube: ASTM B 88, Type K water tube, annealed temper.
- C. Wrought-Copper, Solder-Joint Fittings: ASME B16.22, wrought-copper pressure fittings.
- D. Bronze Flanges: ASME B16.24, Class 150, with solder-joint ends.
- E. Copper Unions:
 - 1. MSS SP-123.
 - 2. Cast-copper-alloy, hexagonal-stock body.
 - 3. Ball-and-socket, metal-to-metal seating surfaces.
 - 4. Solder-joint or threaded ends.

2.3 PIPING JOINING MATERIALS

- A. Pipe-Flange Gasket Materials:
 - 1. AWWA C110/A21.10, rubber, flat face, 1/8 inch thick or ASME B16.21, nonmetallic and asbestos free unless otherwise indicated.
 - 2. Full-face or ring type unless otherwise indicated.
- B. Metal, Pipe-Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.

- C. Solder Filler Metals: ASTM B 32, lead-free alloys.
- D. Flux: ASTM B 813, water flushable.
- E. Brazing Filler Metals: AWS A5.8/A5.8M, BCuP Series, copper-phosphorus alloys for general-duty brazing unless otherwise indicated.

2.4 ENCASEMENT FOR PIPING

- A. Standard: ASTM A 674 or AWWA C105/A21.5.
- B. Form: Sheet or tube.
- C. Color: natural.

PART 3 - EXECUTION

3.1 EARTHWORK

- A. Comply with requirements in Section 312000 "Earth Moving" for excavating, trenching, and backfilling.

3.2 PIPING INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of domestic water piping. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.
- B. Install copper tubing under building slab according to CDA's "Copper Tube Handbook."
- C. Install underground copper tube in PE encasement according to ASTM A 674 or AWWA C105/A21.5.
- D. Install shutoff valve, strainer, pressure gage, and test tee with valve inside the building at each domestic water-service entrance. Comply with requirements for pressure gages in Section 220519 "Meters and Gages for Plumbing Piping" and with requirements for drain valves and strainers in Section 221119 "Domestic Water Piping Specialties."
- E. Install shutoff valve immediately upstream of each dielectric fitting.
- F. Install domestic water piping level without pitch and plumb.
- G. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.
- H. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

- I. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal, and coordinate with other services occupying that space.
- J. Install piping to permit valve servicing.
- K. Install nipples, unions, special fittings, and valves with pressure ratings the same as or higher than the system pressure rating used in applications below unless otherwise indicated.
- L. Install piping free of sags and bends.
- M. Install fittings for changes in direction and branch connections.
- N. Install unions in copper tubing at final connection to each piece of equipment, machine, and specialty.
- O. Install thermometers on outlet piping from each water heater. Comply with requirements for thermometers in Section 220519 "Meters and Gages for Plumbing Piping."
- P. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."
- Q. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."
- R. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 220518 "Escutcheons for Plumbing Piping."

3.3 JOINT CONSTRUCTION

- A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- B. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.
- C. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
 - 1. Apply appropriate tape or thread compound to external pipe threads.
 - 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.
- D. Brazed Joints for Copper Tubing: Comply with CDA's "Copper Tube Handbook," "Braze Joints" chapter.
- E. Soldered Joints for Copper Tubing: Apply ASTM B 813, water-flushable flux to end of tube. Join copper tube and fittings according to ASTM B 828 or CDA's "Copper Tube Handbook."

3.4 HANGER AND SUPPORT INSTALLATION

- A. Comply with requirements for seismic-restraint devices in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."

- B. Comply with requirements for pipe hanger, support products, and installation in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."
1. Vertical Piping: MSS Type 8 or 42, clamps.
 2. Individual, Straight, Horizontal Piping Runs:
 - a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
 - b. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.
 - c. Longer Than 100 Feet if Indicated: MSS Type 49, spring cushion rolls.
 3. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
 4. Base of Vertical Piping: MSS Type 52, spring hangers.
- C. Support vertical piping and tubing at base and at each floor.
- D. Rod diameter may be reduced one size for double-rod hangers, to a minimum of 3/8 inch.
- E. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:
1. NPS 2 and Smaller: 72 inches with 3/8-inch rod.
 2. NPS 2-1/2 to NPS 3: 8 feet with 1/2-inch rod.
- F. Install supports for vertical copper tubing every 10 feet.
- G. Support piping and tubing not listed in this article according to MSS SP-69 and manufacturer's written instructions.

3.5 CONNECTIONS

- A. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. When installing piping adjacent to equipment and machines, allow space for service and maintenance.
- C. Connect domestic water piping to exterior water-service piping. Use transition fitting to join dissimilar piping materials.
- D. Connect domestic water piping to water-service piping with shutoff valve; extend and connect to the following:
1. Water Heaters: Cold-water inlet and hot-water outlet piping in sizes indicated, but not smaller than sizes of water heater connections.
 2. Plumbing Fixtures: Cold- and hot-water-supply piping in sizes indicated, but not smaller than that required by plumbing code.
 3. Equipment: Cold- and hot-water-supply piping as indicated, but not smaller than equipment connections. Provide shutoff valve and union for each connection. Use flanges instead of unions for NPS 2-1/2 and larger.

3.6 PIPE AND EQUIPMENT IDENTIFICATION

- A. Each operating and service line shut-off valve shall be identified by a 19 ga. brass tag with stamped, engraved type of service identified and area served, complete with hole and brass chain mounted on valve stem or handle. Tag shall be a minimum of one and one-half inch (1-1/2") in diameter.
- B. All piping systems shall be readily identifiable by appropriate labeling with the name of the piping contained. Such labeling shall be by means of metal tags, stenciling, stamping, or with adhesive markers, in a manner that is not readily removable. Labeling shall appear on the piping at intervals of not more than 20 ft and at least once in each room and each story traversed by the piping system.
- C. Provide on exterior wall of each building opposite the building's main gas service a sign reading "Gas Shut Off". Sign shall be metal with minimum 1-1/2" high-embossed letters.
 - 1. All equipment shall be provided with name plate indicating all pertinent information on it

3.7 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:
 - 1. Piping Inspections:
 - a. Do not enclose, cover, or put piping into operation until it has been inspected and approved by authorities having jurisdiction.
 - b. During installation, notify authorities having jurisdiction at least one day before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction:
 - 1) Roughing-in Inspection: Arrange for inspection of piping before concealing or closing in after roughing in and before setting fixtures.
 - 2) Final Inspection: Arrange for authorities having jurisdiction to observe tests specified in "Piping Tests" Subparagraph below and to ensure compliance with requirements.
 - c. Reinspection: If authorities having jurisdiction find that piping will not pass tests or inspections, make required corrections and arrange for reinspection.
 - d. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.
 - 2. Piping Tests:
 - a. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.
 - b. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit a separate report for each test, complete with diagram of portion of piping tested.
 - c. Leave new, altered, extended, or replaced domestic water piping uncovered and unconcealed until it has been tested and approved. Expose work that was covered or concealed before it was tested.

- d. Cap and subject piping to static water pressure of 50 psig above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow it to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
 - e. Repair leaks and defects with new materials, and retest piping or portion thereof until satisfactory results are obtained.
 - f. Prepare reports for tests and for corrective action required.
- B. Domestic water piping will be considered defective if it does not pass tests and inspections.
- C. Prepare test and inspection reports.

3.8 ADJUSTING

- A. Perform the following adjustments before operation:
- 1. Close drain valves, hydrants, and hose bibbs.
 - 2. Open shutoff valves to fully open position.
 - 3. Open throttling valves to proper setting.
 - 4. Adjust balancing valves in hot-water-circulation return piping to provide adequate flow.
 - a. Manually adjust ball-type balancing valves in hot-water-circulation return piping to provide hot-water flow in each branch.
 - b. Adjust calibrated balancing valves to flows indicated.
 - 5. Remove plugs used during testing of piping and for temporary sealing of piping during installation.
 - 6. Remove and clean strainer screens. Close drain valves and replace drain plugs.
 - 7. Remove filter cartridges from housings and verify that cartridges are as specified for application where used and are clean and ready for use.
 - 8. Check plumbing specialties and verify proper settings, adjustments, and operation.

3.9 CLEANING

- A. Clean and disinfect potable domestic water piping as follows:
- 1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
 - 2. Use purging and disinfecting procedures prescribed by authorities having jurisdiction; if methods are not prescribed, use procedures described in either AWWA C651 or AWWA C652 or follow procedures described below:
 - a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
 - b. Fill and isolate system according to either of the following:
 - 1) Fill system or part thereof with water/chlorine solution with at least 50 ppm of chlorine. Isolate with valves and allow to stand for 24 hours. Operate all valves during the retention period.
 - 2) Fill system or part thereof with water/chlorine solution with at least 200 ppm of chlorine. Isolate and allow to stand for three hours. Operate all valves during the retention period.

- c. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.
 - d. Repeat procedures if biological examination shows contamination.
 - e. Submit water samples in sterile bottles to authorities having jurisdiction.
- B. Prepare and submit reports of purging and disinfecting activities. Include copies of water-sample approvals from authorities having jurisdiction.
 - C. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.

3.10 TESTING

- A. No piping work shall be concealed or covered until piping has been tested, inspected and approved by the Inspector. All piping for plumbing systems shall be completely installed and tested as required by the Uniform Plumbing Code. Test pressures and times indicated are a minimum only. All tests shall be as required by the governing authority as well.

3.11 OPERATION INSTRUCTION

- A. Prior to occupancy or prior to the date of final inspection, whichever may occur first, the Contractor shall prepare two (2) sets of typewritten instructions for the operation of all equipment, valves, etc., specified and furnished as a part of the work under this section, and shall assign a competent person, thoroughly familiar with the job, to demonstrate and instruct a representative of the Owner in the operation of the equipment. The time of said demonstration and instructions shall be arranged with the Owner's representative approximately one (1) week in advance. Verbal instructions shall include shut-off location of gas and water. The Contractor shall assemble all operation and maintenance data supplied by the manufacturers of the various pieces of equipment, all keys and special wrenches required to operate and service the equipment (including keys for yard boxes, gas stops and fixture stops), and all equipment warranties and deliver same to the representative of the Owner on date of said instructions.

3.12 PIPING SCHEDULE

- A. Transition and special fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.
- B. Flanges and unions may be used for aboveground piping joints unless otherwise indicated.
- C. Fitting Option: Extruded-tee connections and brazed joints may be used on aboveground copper tubing.
- D. Under-building-slab, domestic water, building-service piping, NPS 3 and smaller, shall be the following:
 - 1. Hard copper tube, ASTM B 88, Type L; wrought-copper, solder-joint fittings; and brazed joints.
- E. Under-building-slab, domestic water piping, NPS 2 and smaller, shall be the following:
 - 1. Soft copper tube, ASTM B 88, Type L; wrought-copper, solder-joint fittings; and brazed joints.

F. Aboveground domestic water piping shall be the following:

1. Hard copper tube, ASTM B 88, Type L; wrought-copper, solder-joint fittings; and soldered joints.

3.13 VALVE SCHEDULE

A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:

1. Shutoff Duty: Use ball valves for piping NPS 2 and smaller. Use butterfly valves with flanged ends for piping NPS 2-1/2 and larger.

B. Use check valves to maintain correct direction of domestic water flow to and from equipment.

END OF SECTION 22 11 16

SECTION 22 11 19

DOMESTIC WATER PIPING SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Vacuum breakers.
2. Backflow preventers.
3. Water pressure-reducing valves.
4. Balancing valves.
5. Temperature-actuated, water mixing valves.
6. Hose bibbs.
7. Water-hammer arresters.
8. Trap-seal primer valves.
9. Trap-seal primer systems.

B. Related Requirements:

1. Section 223200 "Domestic Water Filtration Equipment" for water filters in domestic water piping.
2. Retain subparagraphs below to cross-reference requirements Contractor might expect to find in this Section but are specified in other Sections.
3. Section 224300 "Medical Plumbing Fixtures" for thermostatic mixing valves for sitz baths, thermostatic mixing-valve assemblies for hydrotherapy equipment, and outlet boxes for dialysis equipment.
4. Section 224500 "Emergency Plumbing Fixtures" for water tempering equipment.
5. Section 224713 "Drinking Fountains" for water filters for water coolers.
6. Section 224716 "Electric Water Coolers" for water filters for water coolers.

1.3 WORK INCLUDED

- A. Furnish all labor, materials, services, testing, transportation and equipment necessary for the completion of all plumbing work as indicated on drawings and specified herein. Work materials and equipment not indicated or specified which is necessary for the complete and proper operation of the work of this Section in accordance with the true intent and meaning of the contract documents shall be provided and incorporated at no additional cost to the Owner.

1.4 QUALITY ASSURANCE

- A. Code Requirements: All work covered by this Section shall conform to the latest requirements of the following regulations:
 - 1. C.C.R., Title 24, Part 5 (2022 CPC).
 - 2. 2022 California Plumbing Code.
 - 3. SMACNA Seismic Restraint Manual Guidelines for Mechanical Systems.
 - 4. National Fire Protection Association.
 - 5. California State Division of Industrial Safety.
 - 6. County Health Department.
 - 7. Any other legally constituted body-having jurisdiction thereof.
- B. Nothing in the specifications or drawings shall be construed to permit deviation from the requirements of governing codes unless approval for said deviation has been obtained from the legally constituted authorities having jurisdiction and from the Owner's representative.

1.5 PERFORMANCE REQUIREMENTS

- A. Components and installation shall be capable of withstanding the following minimum working pressure unless otherwise indicated:
 - 1. Soil, Waste, and Vent Piping: 10-foot head of water.
- B. Seismic Performance: Soil, waste, and vent piping and support and installation shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1.6 DRAWINGS

- A. Because of the small-scale drawings, it is not possible to indicate all offsets, fittings and accessories which may be required. The Contractor shall carefully investigate the conditions surrounding installation of his work, furnishing the necessary piping, fittings, valves, traps, and other devices which may be required to complete the installation.
- B. The general arrangement indicated on the drawings shall be followed as closely as possible. Coordinate with the Architectural, Structural, Mechanical and Electrical Drawings and the work of other trades prior to installation of piping fixtures and equipment to verify adequate space available for installation of the work shown. In the event a field condition arises which makes it impossible to install the work as indicated, submit, in writing, the proposed departures to the Architect for his approval. Only when Architect's approval is given, in writing, shall Contractor proceed with installation of the work.
- C. Special Note: Should the Contractor make changes in the installation differing from what is indicated on the contract drawings and not necessitated due to field conditions as indicated hereinabove, the Contractor shall be required to re-install the work to comply with what has been indicated on the contract drawings. Should it be impossible to re-install the work and the installation is in accordance with all governing authorities, the architect may permit the installation to remain. However, all costs incurred to revise the contract drawings by the engineer for resubmittal to the building department indicating the as-installed condition shall become the responsibility of the Contractor.
- D. In case of a difference in the specifications or between the specifications and the drawings, the Contractor shall figure the most expensive alternate and after award of contract, shall secure direction from the Architect.

1.7 PERMITS, INSPECTIONS AND LICENSES

- A. All permits, inspections and licenses required by the legally constituted authorities for installation of the work according to the plans and specifications shall be obtained and paid as a part of the work of this section.

1.8 UTILITIES

- A. See Drawings for Points of Connection.
- B. Certain site utilities are to be connected to and extended. Before laying of any pipe or digging of any trenches, Contractor shall determine by actual excavation and measurement exact location and depth of lines to which he is to connect. In event depth of lines is not sufficient to permit connection in manner indicated, Contractor shall obtain direction from the Owner's representative before proceeding with this work.
- C. Verify that utility companies size their services and meters to suit ultimate demand indicated on the drawings.
- D. Domestic Water: The Contractor shall be responsible for the domestic water service outside of the building within five feet (5') of the foundation, and within the building itself. See Civil Engineer's plans for onsite domestic water system.
- E. Domestic Water Service: The Contractor shall arrange with the serving utility company for the installation of all water meter assemblies and reduced pressure backflow devices, including the service mains and vaults, and all required appurtenances as indicated on the drawings and in accordance with serving utility standards and shall pay all costs incurred. All required capacity fees, frontage fees and inspections, shall be paid for by the Owner. Contractor shall provide necessary tap-in connections in water main for sterilizing of domestic water system. Contractor shall connect into the main water service line as indicated on the drawings. The installation shall be in accordance with the serving utility company's standards.

1.9 EXAMINATION OF PREMISES

- A. Before bidding on this work, Contractors shall make a careful examination of the premises and shall thoroughly familiarize themselves with the requirements of the contract. By the act of submitting a proposal for the work included in this contract, the Contractor shall be deemed to have made such study and examination, and that he is familiar with and accepts all conditions of the site.

1.10 PROTECTION

- A. All work, equipment and materials shall be protected at all times. Contractor shall make good all damage caused either directly or indirectly by his own workmen. Contractor shall also protect his own work from damage. He shall close all pipe openings with caps or plugs during installation. He shall protect all his equipment and materials against dirt, water, chemical and mechanical injury. Upon completion, all work shall be thoroughly cleaned and delivered in a new condition.
- B. Contractor shall be held responsible for all damage to equipment and materials until he has received written notice from the Architect or Engineer that his work has been accepted.

1.11 LOCATIONS

- A. The locations of apparatus, piping and equipment indicated on the drawings are approximate. Piping and equipment shall be installed in such a manner as to avoid all obstruction, preserve headroom, and keep openings and passages clear. The locations of and mounting heights of all fixtures shall be coordinated with the architectural plans and room elevations.
- B. Clearances and Openings: Contractor shall cooperate and coordinate his work with all other trades to avoid conflict and permit for a neat and orderly appearance of the entire installation. The Contractor shall, in advance of the work, furnish instructions to the General Contractor as to his requirements for equipment and material installation of any kind, whether or not specifically mentioned on drawings or in the specifications, and shall include recesses, chases in walls, and all required openings in the structure. Should furnishing this information be neglected, delayed or incorrect and additional cuttings are found to be required, the cost of the same shall be charged to this Contractor.
- C. Contractor shall verify and coordinate pipe routing with location of all electrical rooms, elevator equipment rooms, telecom/data rooms, and other rooms dedicated to the housing of switchgear, panels, or other electrical equipment. In no case shall piping be installed within or above the ceiling of such rooms.

1.12 SUBMITTAL DATA

A. Submittal Requirements:

- 1. Furnish, all at one time, prior to any installation, within the time noted below, six (6) copies of valid submittal data on all fixtures, material, equipment and devices. Each submitted item shall be indexed and referenced to these specifications and to identification numbers on fixtures and equipment schedules.
- 2. Manufacturers' submittal literature and shop drawings are required on all items to ensure the latest and most complete manufacturer's data is available for review. Requirements of the submittals and Engineer's submittal notes are a part of the work of this Division except that Engineer's notes may not be used as a means of increasing the scope of work of this Division.
- 3. Submittals will be checked for general conformance with the design concept of the project but the review does not guarantee quantities shown and does not supersede requirements of this Division to properly install work.
- 4. To be valid, all submittals must:
 - a. Be delivered to the Architect's office within thirty-five (35) days of award of the contract. Contractor shall make time allowance for Engineer's review, return of comments, if any, and resubmittal if required. Corrections or changes in submittals returned as inadequate or incomplete shall be accomplished within this time limit.
 - b. Clearly indicate and label as such any items proposed as substitution for that specified or shown on plans.
 - c. Include all pertinent construction, installation, performance and technical data.
 - d. Have all product data sheets clearly labeled to indicate the individual items being submitted. In addition, all required options and accessories shall be clearly marked.
 - 1) Product data sheets corresponding to items indicated on plans shall be clearly labeled with the corresponding fixture or equipment tag number.
 - 2) Product data sheets corresponding to items indicated in specifications shall be clearly labeled with the specification section, page and item numbers.

- e. Include, for every item which differs in size, configuration, connections, service, accessibility or any other significant way, a drawing to the same (or larger) scale as to the pertinent portions of the contract drawings. In this drawing show a complete layout of the system except that which is identical to the contract drawings, unless the unchanged portions must be shown to indicate such things as clearances. This drawing, together with the contract design drawings must show the complete system as revised to accommodate the proposed alternate.

B. Substitution Requirements:

1. Any items included in submittals and proposed by the Contractor as substitution for that specified or shown on plans shall be submitted within thirty five (35) days of award of the contract. After such time, proposed substitutions shall not be accepted for review, and the Contractor shall submit all items as specified or shown on plans.
 - a. For each item proposed as substitution for that specified or shown on plans, copies of product data sheets for the specified item shall be placed side by side with product data sheets for the proposed substitution item within the submittal.
 - 1) In addition to the Submittal Requirements for labeling listed above, product data sheets for the specified item shall be clearly labeled "SPECIFIED ITEM, NOT SUBMITTED". Product data sheets for the corresponding proposed substitution item shall be clearly labeled "PROPOSED SUBSTITUTION".
 - b. Provide calculations and other detailed data justifying how any items proposed as substitution were selected for proposal. Data must be complete enough to permit detailed comparison of every significant characteristic for which the specified item was analyzed during design.
2. It shall be the Contractor's responsibility to provide sufficient information to allow the Engineer to analyze any proposed alternate. If inadequate information is provided, the proposal will not be approved and resubmittal will not be allowed.
3. The Contractor shall provide or perform tests required by Engineer for purpose of judging acceptability of proposed substitutions.
4. The Contractor assumes full responsibility that alternate items and procedures will meet the job requirements and is responsible for cost of redesign and of modifications to this and other parts of work caused by alternate items furnished under work in this Section. In view of these responsibilities, it is the purpose of these specifications to establish procedures to ensure that the Contractor has considered all the ramifications of proposed alternates before submitting them for review. Submittals which do not comply with the requirements of these specifications or which indicate proposed alternates that were selected without proper regard to the requirements of the job will not be approved. No more than one proposed alternate will be considered for each item.
5. Alternate items installed without Engineer's approval will be replaced with specified items at Contractor's expense.

1.13 UNINSPECTED WORK

- A. The Contractor shall not allow or cause any of his work to be covered up or closed in until it has been inspected, tested, approved by all authorities have jurisdiction, and until Project Record drawings have been properly annotated.

- B. Should any of his work be covered up or closed in before such inspection, he shall, at his own expense, uncover the work to the satisfaction of the inspection party. All related repair work cost shall be borne by the Contractor.

1.14 RECORD DRAWINGS (Also see General Conditions)

- A. Contractor shall provide and keep up-to-date a complete "as-built" record set of blueline prints which shall show every change from the original drawings and the exact "as-built" locations and sizes of the work provided under this Section of the specifications. This set shall include locations, dimensions, depth of buried piping, cleanouts, shut-off valves, sewer invert locations, plugged wyes, tees, etc. On completion of the work, the Contractor shall incorporate all as-built information on a set of reproducible tracings provided by the Architect and this set of reproducibles shall be delivered to the Architect.

1.15 GUARANTEES (Also see General Conditions)

- A. Contractor shall guarantee the entire plumbing and piping systems unconditionally for a period of one (1) year after final acceptance. If, during this period, any materials, equipment, or any part of the systems fail to function properly, the Contractor shall make good the defects promptly and without any expense to the Owner.
- B. Contractor shall be responsible for all damage to any part of the premises caused by leaks in pipelines or equipment furnished and installed under this Section for a period of one (1) year after date of acceptance of his work.
- C. All equipment and fixtures shall carry manufacturer's warranty against defective parts or poor workmanship for not less than one (1) year. See specific equipment specifications for extended warranty requirements.

1.16 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For domestic water piping specialties to include in emergency, operation, and maintenance manuals.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR PIPING SPECIALTIES

- A. Potable-water piping and components shall comply with NSF 61 and NSF 14.

2.2 PERFORMANCE REQUIREMENTS

- A. Minimum Working Pressure for Domestic Water Piping Specialties: 125 psig unless otherwise indicated.

2.3 VACUUM BREAKERS

A. Pipe-Applied, Atmospheric-Type Vacuum Breakers:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. Ames Fire & Waterworks; a division of Watts Water Technologies, Inc.
 - b. Watts; a division of Watts Water Technologies, Inc.; Watts Regulator Company.
 - c. Zurn Industries, LLC; Plumbing Products Group; Wilkins Water Control Products.
3. Standard: ASSE 1001.
4. Size: NPS 1/4 to NPS 3 (DN 8 to DN 80), as required to match connected piping.
5. Body: Bronze.
6. Inlet and Outlet Connections: Threaded.
7. Finish: Rough bronze.

B. Hose-Connection Vacuum Breakers:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. Watts; a division of Watts Water Technologies, Inc.; Watts Regulator Company.
 - b. Woodford Manufacturing Company; a division of WCM Industries, Inc.
 - c. Zurn Industries, LLC; Plumbing Products Group; Light Commercial Products.
 - d. Zurn Industries, LLC; Plumbing Products Group; Wilkins Water Control Products.
3. Standard: ASSE 1011.
4. Body: Bronze, nonremovable, with manual drain.
5. Outlet Connection: Garden-hose threaded complying with ASME B1.20.7.
6. Finish: Rough bronze.

C. Pressure Vacuum Breakers:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. Ames Fire & Waterworks; a division of Watts Water Technologies, Inc.
 - b. Watts; a division of Watts Water Technologies, Inc.; Watts Regulator Company.
 - c. Zurn Industries, LLC; Plumbing Products Group; Wilkins Water Control Products.
3. Standard: ASSE 1020.
4. Operation: Continuous-pressure applications.
5. Pressure Loss: 5 psig maximum, through middle third of flow range.
6. Size: See plans.
7. Design Flow Rate: See plans.

8. Selected Unit Flow Range Limits: See plans.
9. Accessories:

- a. Valves: Ball type, on inlet and outlet.

D. Laboratory-Faucet Vacuum Breakers:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. Watts; a division of Watts Water Technologies, Inc.; Watts Regulator Company.
 - b. Woodford Manufacturing Company; a division of WCM Industries, Inc.
 - c. Zurn Industries, LLC; Plumbing Products Group; Wilkins Water Control Products.
3. Standard: ASSE 1035.
4. Size: NPS 1/4 or NPS 3/8 (DN 8 or DN 10) matching faucet size.
5. Body: Bronze.
6. End Connections: Threaded.
7. Finish: Chrome plated.

2.4 TEMPERATURE-ACTUATED, WATER MIXING VALVES

A. Water-Temperature Limiting Devices:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. Symmons Industries, Inc.
 - b. Bradley.
3. Standard: ASSE 1017.
4. Pressure Rating: 125 psig (860 kPa).
5. Type: Thermostatically controlled, water mixing valve.
6. Material: Bronze body with corrosion-resistant interior components.
7. Connections: Threaded[union] inlets and outlet.
8. Accessories: Check stops on hot- and cold-water supplies, and adjustable, temperature-control handle.
9. Tempered-Water Setting: 120°F.
10. Tempered-Water Design Flow Rate: 0.35 GPM.
11. Valve Finish: Rough bronze.

B. Primary, Thermostatic, Water Mixing Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. Symmons Industries, Inc.
 - b. Bradley.

3. Standard: ASSE 1017.
4. Pressure Rating: 125 psig (860 kPa) minimum unless otherwise indicated.
5. Type: Exposed-mounted or Cabinet-type (Refer to Plumbing Fixture Schedule), thermostatically controlled, water mixing valve.
6. Material: Bronze body with corrosion-resistant interior components.
7. Connections: Threaded[union] inlets and outlet.
8. Accessories: Manual temperature control, check stops on hot- and cold-water supplies, and adjustable, temperature-control handle.
9. Tempered-Water Setting: 120°F.
10. Tempered-Water Design Flow Rate: 0.35 GPM.
11. Selected Valve Flow Rate at 45-psig (310-kPa) Pressure Drop: 0.35 GPM.
12. Valve Finish: Rough bronze.
13. Piping Finish: Copper.
14. Cabinet: Factory fabricated, stainless steel, for recessed or surface (Refer to Plumbing Fixture Schedule) mounting and with hinged, stainless-steel door.

C. Individual-Fixture, Water Tempering Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. Symmons Industries, Inc.
 - b. Bradley.
3. Standard: ASSE 1016, thermostatically controlled, water tempering valve.
4. Pressure Rating: 125 psig (860 kPa) minimum unless otherwise indicated.
5. Body: Bronze body with corrosion-resistant interior components.
6. Temperature Control: Adjustable.
7. Inlets and Outlet: Threaded.
8. Finish: Rough or chrome-plated bronze.
9. Tempered-Water Setting: 110°F.
10. Tempered-Water Design Flow Rate: 0.35 GPM.

D. Primary Water Tempering Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. Symmons Industries, Inc.
 - b. Bradley.
3. Standard: ASSE 1017, thermostatically controlled, water tempering valve, listed as tempering valve.
4. Pressure Rating: 125 psig (860 kPa) minimum unless otherwise indicated.
5. Body: Bronze.
6. Temperature Control: Manual.
7. Inlets and Outlet: Threaded.
8. Selected Primary Water Tempering Valve Size: See plans.
9. Tempered-Water Setting: 120°F.
10. Tempered-Water Design Flow Rate: See plans.
11. Tempered-Water Outlet Size: See plans for end connection.
12. Cold-Water Inlet Size: See plans for end connection.

13. Hot-Water Inlet Size: See plans for end connection.
14. Valve Finish: Rough bronze.

2.5 OUTLET BOXES

A. Clothes Washer Outlet Boxes:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. Acorn Engineering Company.
 - b. Guy Gray Manufacturing Co., Inc.
 - c. IPS Corporation.
 - d. Symmons Industries, Inc.
 - e. Watts; a division of Watts Water Technologies, Inc.; Watts Regulator Company.
 - f. Whitehall Manufacturing; a div. of Acorn Engineering Company.
 - g. Zurn Industries, LLC; Plumbing Products Group; Light Commercial Products.
3. Mounting: Recessed.
4. Material and Finish: Plastic box and faceplate.
5. Faucet: Combination valved fitting or separate hot- and cold-water valved fittings complying with ASME A112.18.1. Include garden-hose thread complying with ASME B1.20.7 on outlets.
6. Supply Shutoff Fittings: NPS 1/2 (DN 15) gate, globe, or ball valves and NPS 1/2 (DN 15) copper, water tubing.
7. Drain: NPS 2 (DN 50) standpipe and P-trap for direct waste connection to drainage piping.
8. Inlet Hoses: Two 60-inch- (1500-mm-) long, rubber household clothes washer inlet hoses with female, garden-hose-thread couplings. Include rubber washers.
9. Drain Hose: One 48-inch- (1200-mm-) long, rubber household clothes washer drain hose with hooked end.

B. Icemaker Outlet Boxes:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. Acorn Engineering Company.
 - b. IPS Corporation.
3. Mounting: Recessed.
4. Material and Finish Plastic box and faceplate.
5. Faucet: Valved fitting complying with ASME A112.18.1. Include NPS 1/2 (DN 15) or smaller copper tube outlet.
6. Supply Shutoff Fitting: NPS 1/2 (DN 15) gate, globe, or ball valve and NPS 1/2 (DN 15) copper, water tubing.

2.6 HOSE BIBBS

A. Hose Bibbs:

1. Standard: ASME A112.18.1 for sediment faucets.
2. Body Material: Bronze.
3. Seat: Bronze, replaceable.
4. Supply Connections: NPS 3/4 threaded or solder-joint inlet.
5. Outlet Connection: Garden-hose thread complying with ASME B1.20.7.
6. Pressure Rating: 125 psig.
7. Vacuum Breaker: Integral nonremovable, drainable, hose-connection vacuum breaker complying with ASSE 1011.
8. Include operating key with each operating-key hose bibb.

2.7 WATER-HAMMER ARRESTERS

A. Water-Hammer Arresters:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Precision Plumbing Products, Inc.
 - b. Zurn Industries, LLC; Plumbing Products Group; Specification Drainage Products.
2. Standard: ASSE 1010 or PDI-WH 201.
3. Type: Metal bellows.
4. Size: ASSE 1010, Sizes AA and A through F, or PDI-WH 201, Sizes A through F.

2.8 TRAP-SEAL PRIMER DEVICE

A. Supply-Type, Trap-Seal Primer Device:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. MIFAB, Inc.
 - b. Precision Plumbing Products, Inc.
 - c. Sioux Chief Manufacturing Company, Inc.
2. Standard: ASSE 1018.
3. Pressure Rating: 125 psig minimum.
4. Body: Bronze.
5. Inlet and Outlet Connections: NPS 1/2 threaded, union, or solder joint.
6. Gravity Drain Outlet Connection: NPS 1/2 threaded or solder joint.
7. Finish: Chrome plated, or rough bronze for units used with pipe or tube that is not chrome finished.

2.9 TRAP-SEAL PRIMER SYSTEMS

A. Trap-Seal Primer Systems:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Precision Plumbing Products, Inc.
2. Standard: ASSE 1044.
3. Piping: NPS 3/4, ASTM B 88, Type L; copper, water tubing.
4. Cabinet: Surface-mounted steel box with stainless-steel cover.
5. Electric Controls: 24-hour timer, solenoid valve, and manual switch for 120-V ac power.
 - a. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
6. Vacuum Breaker: ASSE 1001.
7. Number Outlets: Four.
8. Size Outlets: NPS 1/2.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install water-hammer arresters in water piping according to PDI-WH 201.
- B. Install supply-type, trap-seal primer valves with outlet piping pitched down toward drain trap a minimum of 1 percent, and connect to floor-drain body, trap, or inlet fitting. Adjust valve for proper flow.
- C. Install trap-seal primer systems with outlet piping pitched down toward drain trap a minimum of 1 percent, and connect to floor-drain body, trap, or inlet fitting. Adjust system for proper flow.

3.2 Access Panels:

- A. Wall access panels shall be minimum 12" x 12" for concealed valves and other equipment unless otherwise specified or indicated. Ceiling access panels shall be 18" x 18" minimum. Access panels shall be located and positioned for ready access and service of equipment housed within. Where access panels are specified with keyed cylinder locks, all such locks shall be identically keyed.
 1. Wall, Non-Fire Rated: Elmdor/Stoneman DW-SS-CL, drywall, stainless steel finish, cylinder lock.
 2. Ceiling, Non-fire Rated: Elmdor/Stoneman DW, drywall, prime coated finish, screwdriver latch.
 3. Wall, Fire Rated: Elmdor/Stoneman FR-SS-CL, fire rated, stainless steel finish, cylinder lock.
 4. Ceiling, Fire rated: Elmdor/Stoneman FRC, Fire rated, prime coated finish, return latch.

5. Wall, Non-Fire Rated: Elmdor/Stoneman DW-SS-AKL, drywall, stainless steel finish, allen key latch.
6. Ceiling, Non-fire Rated: Elmdor/Stoneman DW, drywall, prime coated finish, screwdriver latch.
7. Wall, Fire Rated: Elmdor/Stoneman FR-SS, fire rated, stainless steel finish, return latch.
8. Ceiling, Fire rated: Elmdor/Stoneman FRC, Fire rated, prime coated finish, return latch.

3.3 CONNECTIONS

- A. Comply with requirements for ground equipment in Section 260526 "Grounding and Bonding for Electrical Systems."
- B. Fire-retardant-treated-wood blocking is specified in Section 260519 "Low-Voltage Electrical Power Conductors and Cables" for electrical connections.

3.4 LABELING AND IDENTIFYING

- A. Equipment Nameplates and Signs: Install engraved plastic-laminate equipment nameplate or sign on or near each of the following:
 1. Supply-type, trap-seal primer valves.
 2. Trap-seal primer systems.
- B. Distinguish among multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations, in addition to identifying unit. Nameplates and signs are specified in Section 220553 "Identification for Plumbing Piping and Equipment."

3.5 FIELD QUALITY CONTROL

- A. Domestic water piping specialties will be considered defective if they do not pass tests and inspections.
- B. Prepare test and inspection reports.

3.6 ADJUSTING

- A. Set field-adjustable pressure set points of water pressure-reducing valves.
- B. Set field-adjustable flow set points of balancing valves.
- C. Set field-adjustable temperature set points of temperature-actuated, water mixing valves.

END OF SECTION 22 11 19

SECTION 22 12 23

FACILITY NATURAL AND PROPANE-GAS PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Pipes, tubes, and fittings.
 - 2. Piping specialties.
 - 3. Piping and tubing joining materials.
 - 4. Valves.
 - 5. Pressure regulators.
 - 6. Concrete bases.

1.3 DEFINITIONS

- A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.
- B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.
- C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

1.4 WORK INCLUDED

- A. Furnish all labor, materials, services, testing, transportation and equipment necessary for the completion of all plumbing work as indicated on drawings and specified herein. Work materials and equipment not indicated or specified which is necessary for the complete and proper operation of the work of this Section in accordance with the true intent and meaning of the contract documents shall be provided and incorporated at no additional cost to the Owner.

1.5 QUALITY ASSURANCE

- A. Code Requirements: All work covered by this Section shall conform to the latest requirements of the following regulations:
 - 1. C.C.R., Title 24, Part 5 (2022 CPC).
 - 2. 2022 California Plumbing Code.
 - 3. SMACNA Seismic Restraint Manual Guidelines for Mechanical Systems.
 - 4. National Fire Protection Association.
 - 5. California Division of the State Architect.
 - 6. California State Division of Industrial Safety.
 - 7. County Health Department.

8. Any other legally constituted body-having jurisdiction thereof.

B. Nothing in the specifications or drawings shall be construed to permit deviation from the requirements of governing codes unless approval for said deviation has been obtained from the legally constituted authorities having jurisdiction and from the Owner's representative.

1.6 PERFORMANCE REQUIREMENTS

A. Minimum Operating-Pressure Ratings:

1. Piping and Valves: 100 psig minimum unless otherwise indicated.
2. Service Regulators: 65 psig minimum unless otherwise indicated.

B. Natural and Propane-Gas System Pressure within Buildings: 0.5 psig or less.

1.7 DRAWINGS

A. Because of the small-scale drawings, it is not possible to indicate all offsets, fittings and accessories which may be required. The Contractor shall carefully investigate the conditions surrounding installation of his work, furnishing the necessary piping, fittings, valves, traps, and other devices which may be required to complete the installation.

B. The general arrangement indicated on the drawings shall be followed as closely as possible. Coordinate with the Architectural, Structural, Mechanical and Electrical Drawings and the work of other trades prior to installation of piping fixtures and equipment to verify adequate space available for installation of the work shown. In the event a field condition arises which makes it impossible to install the work as indicated, submit, in writing, the proposed departures to the Architect for his approval. Only when Architect's approval is given, in writing, shall Contractor proceed with installation of the work.

C. Special Note: Should the Contractor make changes in the installation differing from what is indicated on the contract drawings and not necessitated due to field conditions as indicated hereinabove, the Contractor shall be required to re-install the work to comply with what has been indicated on the contract drawings. Should it be impossible to re-install the work and the installation is in accordance with all governing authorities, the architect may permit the installation to remain. However, all costs incurred to revise the contract drawings by the engineer for resubmittal to the building department indicating the as-installed condition shall become the responsibility of the Contractor.

D. In case of a difference in the specifications or between the specifications and the drawings, the Contractor shall figure the most expensive alternate and after award of contract, shall secure direction from the Architect.

1.8 PERMITS, INSPECTIONS AND LICENSES

A. All permits, inspections and licenses required by the legally constituted authorities for installation of the work according to the plans and specifications shall be obtained and paid as a part of the work of this section.

1.9 UTILITIES

A. See Drawings for Points of Connection.

B. Certain site utilities are to be connected to and extended. Before laying of any pipe or digging of any trenches, Contractor shall determine by actual excavation and measurement exact location and depth of lines to which he is to connect. In event depth of lines is not sufficient to permit connection in manner indicated, Contractor shall obtain direction from the Owner's representative before proceeding with this work.

- C. Verify that utility companies size their services and meters to suit ultimate demand indicated on the drawings.

1.10 EXAMINATION OF PREMISES

- A. Before bidding on this work, Contractors shall make a careful examination of the premises and shall thoroughly familiarize themselves with the requirements of the contract. By the act of submitting a proposal for the work included in this contract, the Contractor shall be deemed to have made such study and examination, and that he is familiar with and accepts all conditions of the site.

1.11 PROTECTION

- A. All work, equipment and materials shall be protected at all times. Contractor shall make good all damage caused either directly or indirectly by his own workmen. Contractor shall also protect his own work from damage. He shall close all pipe openings with caps or plugs during installation. He shall protect all his equipment and materials against dirt, water, chemical and mechanical injury. Upon completion, all work shall be thoroughly cleaned and delivered in a new condition.
- B. Contractor shall be held responsible for all damage to equipment and materials until he has received written notice from the Architect or Engineer that his work has been accepted.

1.12 LOCATIONS

- A. The locations of apparatus, piping and equipment indicated on the drawings are approximate. Piping and equipment shall be installed in such a manner as to avoid all obstruction, preserve headroom, and keep openings and passages clear. The locations of and mounting heights of all fixtures shall be coordinated with the architectural plans and room elevations.
- B. Clearances and Openings: Contractor shall cooperate and coordinate his work with all other trades to avoid conflict and permit for a neat and orderly appearance of the entire installation. The Contractor shall, in advance of the work, furnish instructions to the General Contractor as to his requirements for equipment and material installation of any kind, whether or not specifically mentioned on drawings or in the specifications, and shall include recesses, chases in walls, and all required openings in the structure. Should furnishing this information be neglected, delayed or incorrect and additional cuttings are found to be required, the cost of the same shall be charged to this Contractor.
- C. Contractor shall verify and coordinate pipe routing with location of all electrical rooms, elevator equipment rooms, telecom/data rooms, and other rooms dedicated to the housing of switchgear, panels, or other electrical equipment. In no case shall piping be installed within or above the ceiling of such rooms.

1.13 SUBMITTAL DATA

- A. Product Data: For each type of the following:
 - 1. Piping specialties.
 - 2. Valves. Include pressure rating, capacity, settings, and electrical connection data of selected models.
 - 3. Pressure regulators. Indicate pressure ratings and capacities.
 - 4. Dielectric fittings.

B. Submittal Requirements:

1. Furnish, all at one time, prior to any installation, within the time noted below, six (6) copies of valid submittal data on all fixtures, material, equipment and devices. Each submitted item shall be indexed and referenced to these specifications and to identification numbers on fixtures and equipment schedules.
2. Manufacturers' submittal literature and shop drawings are required on all items to ensure the latest and most complete manufacturer's data is available for review. Requirements of the submittals and Engineer's submittal notes are a part of the work of this Division except that Engineer's notes may not be used as a means of increasing the scope of work of this Division.
3. Submittals will be checked for general conformance with the design concept of the project but the review does not guarantee quantities shown and does not supersede requirements of this Division to properly install work.
4. To be valid, all submittals must:
 - a. Be delivered to the Architect's office within thirty-five (35) days of award of the contract. Contractor shall make time allowance for Engineer's review, return of comments, if any, and resubmittal if required. Corrections or changes in submittals returned as inadequate or incomplete shall be accomplished within this time limit.
 - b. Clearly indicate and label as such any items proposed as substitution for that specified or shown on plans.
 - c. Include all pertinent construction, installation, performance and technical data.
 - d. Have all product data sheets clearly labeled to indicate the individual items being submitted. In addition, all required options and accessories shall be clearly marked.
 - 1) Product data sheets corresponding to items indicated on plans shall be clearly labeled with the corresponding fixture or equipment tag number.
 - 2) Product data sheets corresponding to items indicated in specifications shall be clearly labeled with the specification section, page and item numbers.
 - e. Include, for every item which differs in size, configuration, connections, service, accessibility or any other significant way, a drawing to the same (or larger) scale as to the pertinent portions of the contract drawings. In this drawing show a complete layout of the system except that which is identical to the contract drawings, unless the unchanged portions must be shown to indicate such things as clearances. This drawing, together with the contract design drawings must show the complete system as revised to accommodate the proposed alternate.

C. Substitution Requirements:

1. Product Data: For each type of the following:
 - a. Piping specialties.
 - b. Valves. Include pressure rating, capacity, settings, and electrical connection data of selected models.
 - c. Pressure regulators. Indicate pressure ratings and capacities.
 - d. Dielectric fittings.
2. Any items included in submittals and proposed by the Contractor as substitution for that specified or shown on plans shall be submitted within thirty five (35) days of award of the contract. After such time, proposed substitutions shall not be accepted for review, and the Contractor shall submit all items as specified or shown on plans.
 - a. For each item proposed as substitution for that specified or shown on plans, copies of product data sheets for the specified item shall be placed side by side with product data sheets for the proposed substitution item within the submittal.
 - 1) In addition to the Submittal Requirements for labeling listed above, product data sheets for the specified item shall be clearly labeled "SPECIFIED ITEM, NOT

SUBMITTED". Product data sheets for the corresponding proposed substitution item shall be clearly labeled "PROPOSED SUBSTITUTION".

- b. Provide calculations and other detailed data justifying how any items proposed as substitution were selected for proposal. Data must be complete enough to permit detailed comparison of every significant characteristic for which the specified item was analyzed during design.
3. It shall be the Contractor's responsibility to provide sufficient information to allow the Engineer to analyze any proposed alternate. If inadequate information is provided, the proposal will not be approved and resubmittal will not be allowed.
4. The Contractor shall provide or perform tests required by Engineer for purpose of judging acceptability of proposed substitutions.
5. The Contractor assumes full responsibility that alternate items and procedures will meet the job requirements and is responsible for cost of redesign and of modifications to this and other parts of work caused by alternate items furnished under work in this Section. In view of these responsibilities, it is the purpose of these specifications to establish procedures to ensure that the Contractor has considered all the ramifications of proposed alternates before submitting them for review. Submittals which do not comply with the requirements of these specifications or which indicate proposed alternates that were selected without proper regard to the requirements of the job will not be approved. No more than one proposed alternate will be considered for each item.
6. Alternate items installed without Engineer's approval will be replaced with specified items at Contractor's expense.

1.14 QUALITY ASSURANCE

- A. Steel Support Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- B. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in CEC, by a qualified testing agency, and marked for intended location and application.

1.15 DELIVERY, STORAGE, AND HANDLING

- A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.
- B. Store and handle pipes and tubes having factory-applied protective coatings to avoid damaging coating, and protect from direct sunlight.
- C. Protect stored PE pipes and valves from direct sunlight.

1.16 PROJECT CONDITIONS

- A. Perform site survey, research public utility records, and verify existing utility locations. Contact utility-locating service for area where Project is located.

1.17 COORDINATION

- A. Coordinate sizes and locations of concrete bases with actual equipment provided.

PART 2 - PRODUCTS

2.1 Propane Gas Piping:

- A. Concealed propane gas piping within the building shall be Schedule 40 black steel pipe conforming to ASTM A-53 using 150 pound banded malleable iron screwed fittings for piping 2" and smaller and weld type steel fittings for piping 2-1/2" and larger.
- B. Exposed propane gas piping outside the building shall be Schedule 40 galvanized steel pipe conforming to ASTM A-53 using galvanized 150 pound banded galvanized malleable iron screwed fittings for piping in sizes 2" and smaller and seamless weld type steel fittings for all piping in sizes 2-1/2" and larger.
- C. Underground propane gas piping shall be SDR-11 Polyethylene PE2406 (Yellow) as manufactured by Driscoplex. Fittings shall be socket fusion weld Polyethylene as manufactured by Performance Pipe or Central, PE2406 (Yellow) complying with ASTM, D2513. Where required provide "Lyco" or Double "O" seal transition fittings between steel and polyethylene as manufactured by Central, all identified and approved for gas service. A 14 gauge copper tracer wire shall be installed with and attached to piping and shall terminate above grade at each end. Underground polyethylene piping shall be installed by personnel certified by the pipe manufacturer as having received instructions directly from the pipe manufacturer's field representative. Contractors not having certified personnel will be required to have a factory representative of the pipe manufacturer visit the site at the time of underground pipe installation and provide the required instructions. All required cost for training and certification shall be paid for by Contractor.
 1. Upon completion of the gas piping underground installation, Contractor shall submit a written report directly to the Architect stating that all materials installed are as specified and approved, and that installation was performed by factory certified personnel and tested to 60 P.S.I.
 2. All piping on roof shall be supported by pipe supports as manufactured by MAPA Products. Products by Miro Industries and Erico shall be accepted for submittal review.
 - a. Pressurized Piping:
 - 1) For pipe sizes 1" and less: MS-1 single post, adjustable height pipe support.
 - 2) For pipe sizes 2 1/2" and less: MS-4 adjustable, roller pipe support.
 - 3) For pipe sizes 4" and less: MS-5 adjustable, roller pipe support.
 - b. Gravity System Piping 2" and Less: MS-1 single post, adjustable height pipe support.
 3. All underground non-metallic piping shall have 14 gauge copper "Tracer Wire" continuous for entire length.

2.2 PIPES, TUBES, AND FITTINGS

- A. Steel Pipe: ASTM A 53/A 53M, black steel, Schedule 40, Type E or S, Grade B.
 1. Malleable-Iron Threaded Fittings: ASME B16.3, Class 150, standard pattern.
 2. Wrought-Steel Welding Fittings: ASTM A 234/A 234M for butt welding and socket welding.
 3. Unions: ASME B16.39, Class 150, malleable iron with brass-to-iron seat, ground joint, and threaded ends.
 4. Forged-Steel Flanges and Flanged Fittings: ASME B16.5, minimum Class 150, including bolts, nuts, and gaskets of the following material group, end connections, and facings:
 - a. Material Group: 1.1.
 - b. End Connections: Threaded or butt welding to match pipe.
 - c. Lapped Face: Not permitted underground.
 - d. Gasket Materials: ASME B16.20, metallic, flat, asbestos free, aluminum o-rings, and spiral-wound metal gaskets.
 - e. Bolts and Nuts: ASME B18.2.1, carbon steel aboveground and stainless steel underground.

Protective Coating for Underground Piping: Factory-applied, three-layer coating of epoxy, adhesive, and PE.

f. Joint Cover Kits: Epoxy paint, adhesive, and heat-shrink PE sleeves.

B. PE Pipe: ASTM D 2513, SDR 11.

1. PE Fittings: ASTM D 2683, socket-fusion type or ASTM D 3261, butt-fusion type with dimensions matching PE pipe.
2. PE Transition Fittings: Factory-fabricated fittings with PE pipe complying with ASTM D 2513, SDR 11; and steel pipe complying with ASTM A 53/A 53M, black steel, Schedule 40, Type E or S, Grade B.
3. Anodeless Service-Line Risers: Factory fabricated and leak tested.
 - a. Underground Portion: PE pipe complying with ASTM D 2513, SDR 11 inlet.
 - b. Aboveground Portion: PE transition fitting.
 - c. Outlet shall be threaded or flanged or suitable for welded connection.
 - d. Tracer wire connection.
 - e. Ultraviolet shield.
 - f. Stake supports with factory finish to match steel pipe casing or carrier pipe.
4. Transition Service-Line Risers: Factory fabricated and leak tested.
 - a. Underground Portion: PE pipe complying with ASTM D 2513, SDR 11 inlet connected to steel pipe complying with ASTM A 53/A 53M, Schedule 40, Type E or S, Grade B, with corrosion-protective coating for aboveground outlet.
 - b. Outlet shall be threaded or flanged or suitable for welded connection.
 - c. Bridging sleeve over mechanical coupling.
 - d. Factory-connected anode.
 - e. Tracer wire connection.
 - f. Ultraviolet shield.
 - g. Stake supports with factory finish to match steel pipe casing or carrier pipe.
5. Plastic Mechanical Couplings, NPS 1-1/2 and Smaller: Capable of joining PE pipe to PE pipe.
 - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Lyall, R. W. & Company, Inc.
 - 2) Mueller Co.; Gas Products Div.
 - 3) Perfection Corporation; a subsidiary of American Meter Company.
 - b. PE body with molded-in, stainless-steel support ring.
 - c. Buna-nitrile seals.
 - d. Acetal collets.
 - e. Electro-zinc-plated steel stiffener.
6. Steel Mechanical Couplings: Capable of joining plain-end PE pipe to PE pipe, steel pipe to PE pipe, or steel pipe to steel pipe.
 - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Dresser Piping Specialties; Division of Dresser, Inc.
 - 2) Smith-Blair, Inc.
 - b. Stainless-steel flanges and tube with epoxy finish.
 - c. Buna-nitrile seals.
 - d. Stainless-steel bolts, washers, and nuts.
 - e. Factory-installed anode for steel-body couplings installed underground.

2.3 PIPING SPECIALTIES

A. Appliance Flexible Connectors:

1. Indoor, Fixed-Appliance Flexible Connectors: Comply with ANSI Z21.24.
2. Outdoor, Appliance Flexible Connectors: Comply with ANSI Z21.75.
3. Corrugated stainless-steel tubing with polymer coating.
4. Operating-Pressure Rating: 0.5 psig.
5. End Fittings: Zinc-coated steel.
6. Threaded Ends: Comply with ASME B1.20.1.

A. Y-Pattern Strainers:

1. Body: ASTM A 126, Class B, cast iron with bolted cover and bottom drain connection.
2. End Connections: Threaded ends for NPS 2 and smaller; flanged ends for NPS 2-1/2 and larger.
3. Strainer Screen: 40-mesh startup strainer, and perforated stainless-steel basket with 50 percent free area.
4. CWP Rating: 125 psig.

B. Weatherproof Vent Cap: Cast- or malleable-iron increaser fitting with corrosion-resistant wire screen, with free area at least equal to cross-sectional area of connecting pipe and threaded-end connection.

2.4 JOINING MATERIALS

A. Joint Compound and Tape: Suitable for natural and propane gas.

B. Welding Filler Metals: Comply with AWS D10.12/D10.12M for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

C. Brazing Filler Metals: Alloy with melting point greater than 1000 deg F complying with AWS A5.8/A5.8M. Brazing alloys containing more than 0.05 percent phosphorus are prohibited.

2.5 MANUAL PROPANE GAS SHUTOFF VALVES

A. See "Underground Manual Propane Gas Shutoff Valve Schedule" and "Aboveground Manual Propane Gas Shutoff Valve Schedule" Articles for where each valve type is applied in various services.

B. General Requirements for Metallic Valves, NPS 2 and Smaller: Comply with ASME B16.33.

1. CWP Rating: 125 psig.
2. Threaded Ends: Comply with ASME B1.20.1.
3. Dryseal Threads on Flare Ends: Comply with ASME B1.20.3.
4. Tamperproof Feature: Locking feature for valves indicated in "Underground Manual Propane Gas Shutoff Valve Schedule" and "Aboveground Manual Propane Gas Shutoff Valve Schedule" Articles.
5. Listing: Listed and labeled by an NRTL acceptable to authorities having jurisdiction for valves 1 inch and smaller.
6. Service Mark: Valves 1-1/4 inches to NPS 2 shall have initials "WOG" permanently marked on valve body.

C. General Requirements for Metallic Valves, NPS 2-1/2 and Larger: Comply with ASME B16.38.

1. CWP Rating: 125 psig.
2. Flanged Ends: Comply with ASME B16.5 for steel flanges.

3. Tamperproof Feature: Locking feature for valves indicated in "Underground Manual Propane Gas Shutoff Valve Schedule" and "Aboveground Manual Propane Gas Shutoff Valve Schedule" Articles.
 4. Service Mark: Initials "WOG" shall be permanently marked on valve body.
- D. Two-Piece, Full-Port, Bronze Ball Valves with Bronze Trim: MSS SP-110.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. McDonald, A. Y. Mfg. Co.
 - b. Nibco.
 2. Body: Bronze, complying with ASTM B 584.
 3. Ball: Chrome-plated bronze.
 4. Stem: Bronze; blowout proof.
 5. Seats: Reinforced TFE; blowout proof.
 6. Packing: Threaded-body packnut design with adjustable-stem packing.
 7. Ends: Threaded, flared, or socket as indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
 8. CWP Rating: 600 psig.
 9. Listing: Valves NPS 1 and smaller shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction.
 10. Service: Suitable for natural and propane-gas service with "WOG" indicated on valve body.
- E. Bronze Plug Valves: MSS SP-78.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Lee Brass Company.
 - b. McDonald, A. Y. Mfg. Co.
 2. Body: Bronze, complying with ASTM B 584.
 3. Plug: Bronze.
 4. Ends: Threaded, socket, or flanged as indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
 5. Operator: Square head or lug type with tamperproof feature where indicated.
 6. Pressure Class: 125 psig.
 7. Listing: Valves NPS 1 and smaller shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction.
 8. Service: Suitable for natural or propane-gas service with "WOG" indicated on valve body.
- F. PE Ball Valves: Comply with ASME B16.40.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Kerotest Manufacturing Corp.
 - b. Lyall, R. W. & Company, Inc.
 - c. Perfection Corporation; a subsidiary of American Meter Company.
 2. Body: PE.
 3. Ball: PE.
 4. Stem: Acetal.
 5. Seats and Seals: Nitrile.
 6. Ends: Plain or fusible to match piping.
 7. CWP Rating: 80 psig.
 8. Operating Temperature: Minus 20 to plus 140 deg F.
 9. Operator: Nut or flat head for key operation.
 10. Include plastic valve extension.

G. Valve Boxes:

1. Yard Boxes & Vaults: For service shut-off valves on gas, shall be Brooks Products or Fraser Cement Products Co., rectangular concrete type with vandal-proof cast iron cover and name of service clearly marked on cover. Box shall be of size to permit full range of valve operation and to permit easy removal of valve assembly. Vaults shall be sectional type.
2. Cast-iron, two-section box.
3. Top section with cover with "GAS" lettering.
4. Bottom section with base to fit over valve and barrel a minimum of 5 inches in diameter.
5. Adjustable cast-iron extensions of length required for depth of bury.
6. Include tee-handle, steel operating wrench with socket end fitting valve nut or flat head, and with stem of length required to operate valve.

2.6 EARTHQUAKE VALVES

A. Earthquake Valves: Comply with ASCE 25.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Pacific Seismic Products, Inc.
2. Listing: Listed and labeled by an NRTL acceptable to authorities having jurisdiction.
3. Maximum Operating Pressure: 0.5 psig.
4. Cast-aluminum body with stainless-steel internal parts.
5. Nitrile-rubber, reset-stem o-ring seal.
6. Valve position, open or closed, indicator.
7. Composition valve seat with clapper held by spring or magnet locking mechanism.
8. Level indicator.
9. End Connections: Threaded for valves NPS 2 and smaller; flanged for valves NPS 2-1/2 and larger.

2.7 PRESSURE REGULATORS

A. General Requirements:

1. Single stage and suitable for natural or propane gas.
2. Steel jacket and corrosion-resistant components.
3. Elevation compensator.
4. End Connections: Threaded for regulators NPS 2 and smaller; flanged for regulators NPS 2-1/2 and larger.

B. Line Pressure Regulators: Comply with ANSI Z21.80.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. American Meter Company.
 - b. Fisher Control Valves and Regulators; Division of Emerson Process Management.
2. Body and Diaphragm Case: Cast iron or die-cast aluminum.
3. Springs: Zinc-plated steel; interchangeable.
4. Diaphragm Plate: Zinc-plated steel.
5. Seat Disc: Nitrile rubber resistant to propane gas impurities, abrasion, and deformation at the valve port.
6. Orifice: Aluminum; interchangeable.
7. Seal Plug: Ultraviolet-stabilized, mineral-filled nylon.

8. Single-port, self-contained regulator with orifice no larger than required at maximum pressure inlet, and no pressure sensing piping external to the regulator.
9. Pressure regulator shall maintain discharge pressure setting downstream, and not exceed 150 percent of design discharge pressure at shutoff.
10. Overpressure Protection Device: Factory mounted on pressure regulator.
11. Atmospheric Vent: Factory- or field-installed, stainless-steel screen in opening if not connected to vent piping.
12. Maximum Inlet Pressure: 5psig.

2.8 LABELING AND IDENTIFYING

- A. Detectable Warning Tape: Acid- and alkali-resistant, PE film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches wide and 4 mils thick, continuously inscribed with a description of utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep; colored yellow.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine roughing-in for natural or propane-gas piping system to verify actual locations of piping connections before equipment installation.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Close equipment shutoff valves before turning off propane gas to premises or piping section.
- B. Inspect propane gas piping according to NFPA 54 to determine that propane gas utilization devices are turned off in piping section affected.
- C. Comply with NFPA 54 requirements for prevention of accidental ignition.

3.3 OUTDOOR PIPING INSTALLATION

- A. Comply with NFPA 54 for installation and purging of propane gas piping.
- B. Install underground, PE, propane gas piping according to ASTM D 2774.
- C. Steel Piping with Protective Coating:
 1. Apply joint cover kits to pipe after joining to cover, seal, and protect joints.
 2. Repair damage to PE coating on pipe as recommended in writing by protective coating manufacturer.
 3. Replace pipe having damaged PE coating with new pipe.
- D. Install fittings for changes in direction and branch connections.

3.4 INDOOR PIPING INSTALLATION

- A. Comply with NFPA 54 for installation and purging of propane gas piping.

- B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.
- C. Arrange for pipe spaces, chases, slots, sleeves, and openings in building structure during progress of construction, to allow for mechanical installations.
- D. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.
- E. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- F. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
- G. Locate valves for easy access.
- H. Install piping free of sags and bends.
- I. Install fittings for changes in direction and branch connections.
- J. Verify final equipment locations for roughing-in.
- K. Comply with requirements in Sections specifying propane gas-fired appliances and equipment for roughing-in requirements.
- L. Drips and Sediment Traps: Install drips at points where condensate may collect, including service-meter outlets. Locate where accessible to permit cleaning and emptying. Do not install where condensate is subject to freezing.
 - 1. Construct drips and sediment traps using tee fitting with bottom outlet plugged or capped. Use nipple a minimum length of 3 pipe diameters, but not less than 3 inches long and same size as connected pipe. Install with space below bottom of drip to remove plug or cap.
- M. Extend relief vent connections for service regulators, line regulators, and overpressure protection devices to outdoors and terminate with weatherproof vent cap.
- N. Conceal pipe installations in walls, pipe spaces, utility spaces, above ceilings, below grade or floors, and in floor channels unless indicated to be exposed to view.
- O. Concealed Location Installations:
 - 1. Above Accessible Ceilings: Natural or propane-gas piping, fittings, valves, and regulators may be installed in accessible spaces without containment conduit.
 - 2. In Walls or Partitions: Protect tubing installed inside partitions or hollow walls from physical damage using steel striker barriers at rigid supports.
 - a. Exception: Tubing passing through partitions or walls does not require striker barriers.
 - 3. Prohibited Locations:
 - a. Do not install gas piping in or through circulating air ducts, clothes or trash chutes, chimneys or gas vents (flues), ventilating ducts, or dumbwaiter or elevator shafts.
 - b. Do not install gas piping in solid walls or partitions.
- P. Use eccentric reducer fittings to make reductions in pipe sizes. Install fittings with level side down.
- Q. Connect branch piping from top or side of horizontal piping.

- R. Install unions in pipes NPS 2 and smaller, adjacent to each valve, at final connection to each piece of equipment. Unions are not required at flanged connections.
- S. Do not use propane gas piping as grounding electrode.
- T. Install strainer on inlet of each line-pressure regulator.
- U. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."
- V. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 220518 "Escutcheons for Plumbing Piping."

3.5 VALVE INSTALLATION

- A. Install manual propane gas shutoff valve for each gas appliance ahead of corrugated stainless-steel tubing, aluminum, or copper connector.
- B. Install underground valves with valve boxes.
- C. Install regulators and overpressure protection devices with maintenance access space adequate for servicing and testing.

3.6 PIPING JOINT CONSTRUCTION

- A. Ream ends of pipes and tubes and remove burrs.
- B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- C. Threaded Joints:
 1. Thread pipe with tapered pipe threads complying with ASME B1.20.1.
 2. Cut threads full and clean using sharp dies.
 3. Ream threaded pipe ends to remove burrs and restore full inside diameter of pipe.
 4. Apply appropriate tape or thread compound to external pipe threads unless dryseal threading is specified.
 5. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
- D. Welded Joints:
 1. Construct joints according to AWS D10.12/D10.12M, using qualified processes and welding operators.
 2. Bevel plain ends of steel pipe.
 3. Patch factory-applied protective coating as recommended by manufacturer at field welds and where damage to coating occurs during construction.
- E. Flanged Joints: Install gasket material, size, type, and thickness appropriate for gas service. Install gasket concentrically positioned.
- F. PE Piping Heat-Fusion Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join according to ASTM D 2657.
 1. Plain-End Pipe and Fittings: Use butt fusion.
 2. Plain-End Pipe and Socket Fittings: Use socket fusion.

3.7 HANGER AND SUPPORT INSTALLATION

- A. Comply with requirements for pipe hangers and supports specified in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."
- B. Install hangers for horizontal steel piping with the following maximum spacing and minimum rod sizes:
 - 1. NPS 2 and Smaller: Maximum span, 6 feet; minimum rod size, 3/8 inch.
 - 2. NPS 2-1/2 to NPS 3-1/2: Maximum span, 8 feet; minimum rod size, 1/2 inch.

3.8 CONNECTIONS

- A. Connect to utility's gas main according to utility's procedures and requirements.
- B. Install piping adjacent to appliances to allow service and maintenance of appliances.
- C. Connect piping to appliances using manual gas shutoff valves and unions. Install valve within 72 inches of each gas-fired appliance and equipment. Install union between valve and appliances or equipment.
- D. Sediment Traps: Install tee fitting with capped nipple in bottom to form drip, as close as practical to inlet of each appliance.

3.9 LABELING AND IDENTIFYING

- A. Comply with requirements in Section 220553 "Identification for Plumbing Piping and Equipment" for piping and valve identification.
- B. Each operating and service line shut-off valve shall be identified by a 19 ga. brass tag with stamped, engraved type of service identified and area served, complete with hole and brass chain mounted on valve stem or handle. Tag shall be a minimum of one and one-half inch (1-1/2") in diameter.
- C. All piping systems shall be readily identifiable by appropriate labeling with the name of the piping contained. Such labeling shall be by means of metal tags, stenciling, stamping, or with adhesive markers, in a manner that is not readily removable. Labeling shall appear on the piping at intervals of not more than 20 ft and at least once in each room and each story traversed by the piping system.
- D. Provide on exterior wall of each building opposite the building's main gas service a sign reading "Gas Shut Off". Sign shall be metal with minimum 1-1/2" high-embossed letters.
- E. All equipment shall be provided with name plate indicating all pertinent information on it

3.10 PAINTING

- A. Paint exposed, exterior metal piping, valves, service regulators, service meters and meter bars, earthquake valves, and piping specialties, except components, with factory-applied paint or protective coating.
 - 1. Alkyd System: MPI EXT 5.1D.
 - a. Prime Coat: Alkyd anticorrosive metal primer.
 - b. Intermediate Coat: Exterior alkyd enamel matching topcoat.
 - c. Topcoat: Exterior alkyd enamel flat.
 - d. Color: Gray.
- B. Damage and Touchup: Repair marred and damaged factory-applied finishes with materials and by procedures to match original factory finish.

3.11 FIELD QUALITY CONTROL

A. Perform tests and inspections.

1. No piping work shall be concealed or covered until piping has been tested, inspected and approved by the Inspector. All piping for plumbing systems shall be completely installed and tested as required by the California Plumbing Code. Test pressures and times indicated are a minimum only. All tests shall be as required by the governing authority as well.

Schedule of Test Pressures:

<u>System Tested</u>	<u>Gauge</u>	<u>Test</u>	<u>Duration</u>
Propane Gas	60 PSI	Air	4 Hours

B. Tests and Inspections:

1. Test, inspect, and purge gas according to NFPA 54 and authorities having jurisdiction.
2. Gas piping will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

3.12 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain earthquake valves.

3.13 OUTDOOR PIPING SCHEDULE

A. Underground gas piping shall be:

1. PE pipe and fittings joined by heat fusion, or mechanical couplings; service-line risers with tracer wire terminated in an accessible location.

B. Aboveground gas piping in exposed locations shall be one of the following:

1. Galvanized steel pipe with galvanized steel malleable-iron fittings and threaded joints.
2. Galvanized steel pipe with galvanized wrought-steel fittings and welded joints.

3.14 INDOOR PIPING SCHEDULE FOR SYSTEM PRESSURES LESS THAN 0.5 PSIG

A. Aboveground piping NPS 2 and smaller shall be the following:

1. Steel pipe with malleable-iron fittings and threaded joints.

B. Aboveground piping NPS 2-1/2 and larger shall be the following:

1. Steel pipe with wrought-steel fittings and welded joints.

3.15 ABOVEGROUND MANUAL GAS SHUTOFF VALVE SCHEDULE

A. Piping valves shall be the following:

1. Two-piece, full-port, bronze ball valves with bronze trim.

END OF SECTION 22 11 24

SECTION 22 13 16
SANITARY WASTE AND VENT PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Pipe, tube, and fittings.
2. Specialty pipe fittings.
3. Encasement for underground metal piping.

B. Related Sections:

1. Section 221313 "Facility Sanitary Sewers" for sanitary sewerage piping and structures outside the building.

1.3 WORK INCLUDED

- A. Furnish all labor, materials, services, testing, transportation and equipment necessary for the completion of all plumbing work as indicated on drawings and specified herein. Work materials and equipment not indicated or specified which is necessary for the complete and proper operation of the work of this Section in accordance with the true intent and meaning of the contract documents shall be provided and incorporated at no additional cost to the Owner.

1.4 QUALITY ASSURANCE

- A. Code Requirements: All work covered by this Section shall conform to the latest requirements of the following regulations:

1. C.C.R., Title 24, Part 5 (2022 CPC).
2. 2022 California Plumbing Code.
3. SMACNA Seismic Restraint Manual Guidelines for Mechanical Systems.
4. National Fire Protection Association.
5. California State Division of Industrial Safety.
6. County Health Department.
7. Any other legally constituted body-having jurisdiction thereof.

- B. Nothing in the specifications or drawings shall be construed to permit deviation from the requirements of governing codes unless approval for said deviation has been obtained from the legally constituted authorities having jurisdiction and from the Owner's representative.

1.5 PERFORMANCE REQUIREMENTS

- A. Components and installation shall be capable of withstanding the following minimum working pressure unless otherwise indicated:
 - 1. Soil, Waste, and Vent Piping: 10-foot head of water.
- B. Seismic Performance: Soil, waste, and vent piping and support and installation shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1.6 DRAWINGS

- A. Because of the small-scale drawings, it is not possible to indicate all offsets, fittings and accessories which may be required. The Contractor shall carefully investigate the conditions surrounding installation of his work, furnishing the necessary piping, fittings, valves, traps, and other devices which may be required to complete the installation.
- B. The general arrangement indicated on the drawings shall be followed as closely as possible. Coordinate with the Architectural, Structural, Mechanical and Electrical Drawings and the work of other trades prior to installation of piping fixtures and equipment to verify adequate space available for installation of the work shown. In the event a field condition arises which makes it impossible to install the work as indicated, submit, in writing, the proposed departures to the Architect for his approval. Only when Architect's approval is given, in writing, shall Contractor proceed with installation of the work.
- C. Special Note: Should the Contractor make changes in the installation differing from what is indicated on the contract drawings and not necessitated due to field conditions as indicated hereinabove, the Contractor shall be required to re-install the work to comply with what has been indicated on the contract drawings. Should it be impossible to re-install the work and the installation is in accordance with all governing authorities, the architect may permit the installation to remain. However, all costs incurred to revise the contract drawings by the engineer for resubmittal to the building department indicating the as-installed condition shall become the responsibility of the Contractor.
- D. In case of a difference in the specifications or between the specifications and the drawings, the Contractor shall figure the most expensive alternate and after award of contract, shall secure direction from the Architect.

1.7 PERMITS, INSPECTIONS AND LICENSES

- A. All permits, inspections and licenses required by the legally constituted authorities for installation of the work according to the plans and specifications shall be obtained and paid as a part of the work of this section.

1.8 UTILITIES

- A. See Drawings for Points of Connection.

- B. Certain site utilities are to be connected to and extended. Before laying of any pipe or digging of any trenches, Contractor shall determine by actual excavation and measurement exact location and depth of lines to which he is to connect. In event depth of lines is not sufficient to permit connection in manner indicated, Contractor shall obtain direction from the Owner's representative before proceeding with this work.
- C. Verify that utility companies size their services and meters to suit ultimate demand indicated on the drawings.
- D. Sanitary Sewer: The Contractor shall be responsible for the soil and waste piping outside of the building within five feet (5') of the foundation, and within the building itself. See Civil Engineer's plans for onsite sewer system.

1.9 EXAMINATION OF PREMISES

- A. Before bidding on this work, Contractors shall make a careful examination of the premises and shall thoroughly familiarize themselves with the requirements of the contract. By the act of submitting a proposal for the work included in this contract, the Contractor shall be deemed to have made such study and examination, and that he is familiar with and accepts all conditions of the site.

1.10 PROTECTION

- A. All work, equipment and materials shall be protected at all times. Contractor shall make good all damage caused either directly or indirectly by his own workmen. Contractor shall also protect his own work from damage. He shall close all pipe openings with caps or plugs during installation. He shall protect all his equipment and materials against dirt, water, chemical and mechanical injury. Upon completion, all work shall be thoroughly cleaned and delivered in a new condition.
- B. Contractor shall be held responsible for all damage to equipment and materials until he has received written notice from the Architect or Engineer that his work has been accepted.

1.11 LOCATIONS

- A. The locations of apparatus, piping and equipment indicated on the drawings are approximate. Piping and equipment shall be installed in such a manner as to avoid all obstruction, preserve headroom, and keep openings and passages clear. The locations of and mounting heights of all fixtures shall be coordinated with the architectural plans and room elevations.
- B. Clearances and Openings: Contractor shall cooperate and coordinate his work with all other trades to avoid conflict and permit for a neat and orderly appearance of the entire installation. The Contractor shall, in advance of the work, furnish instructions to the General Contractor as to his requirements for equipment and material installation of any kind, whether or not specifically mentioned on drawings or in the specifications, and shall include recesses, chases in walls, and all required openings in the structure. Should furnishing this information be neglected, delayed or incorrect and additional cuttings are found to be required, the cost of the same shall be charged to this Contractor.
- C. Contractor shall verify and coordinate pipe routing with location of all electrical rooms, elevator equipment rooms, telecom/data rooms, and other rooms dedicated to the housing of switchgear, panels, or other electrical equipment. In no case shall piping be installed within or above the ceiling of such rooms.

1.12 SUBMITTAL DATA

A. Submittal Requirements:

1. Furnish, all at one time, prior to any installation, within the time noted below, six (6) copies of valid submittal data on all fixtures, material, equipment and devices. Each submitted item shall be indexed and referenced to these specifications and to identification numbers on fixtures and equipment schedules.
2. Manufacturers' submittal literature and shop drawings are required on all items to ensure the latest and most complete manufacturer's data is available for review. Requirements of the submittals and Engineer's submittal notes are a part of the work of this Division except that Engineer's notes may not be used as a means of increasing the scope of work of this Division.
3. Submittals will be checked for general conformance with the design concept of the project but the review does not guarantee quantities shown and does not supersede requirements of this Division to properly install work.
4. To be valid, all submittals must:
 - a. Be delivered to the Architect's office within thirty-five (35) days of award of the contract. Contractor shall make time allowance for Engineer's review, return of comments, if any, and resubmittal if required. Corrections or changes in submittals returned as inadequate or incomplete shall be accomplished within this time limit.
 - b. Clearly indicate and label as such any items proposed as substitution for that specified or shown on plans.
 - c. Include all pertinent construction, installation, performance and technical data.
 - d. Have all product data sheets clearly labeled to indicate the individual items being submitted. In addition, all required options and accessories shall be clearly marked.
 - 1) Product data sheets corresponding to items indicated on plans shall be clearly labeled with the corresponding fixture or equipment tag number.
 - 2) Product data sheets corresponding to items indicated in specifications shall be clearly labeled with the specification section, page and item numbers.
 - e. Include, for every item which differs in size, configuration, connections, service, accessibility or any other significant way, a drawing to the same (or larger) scale as to the pertinent portions of the contract drawings. In this drawing show a complete layout of the system except that which is identical to the contract drawings, unless the unchanged portions must be shown to indicate such things as clearances. This drawing, together with the contract design drawings must show the complete system as revised to accommodate the proposed alternate.

B. Substitution Requirements:

1. Any items included in submittals and proposed by the Contractor as substitution for that specified or shown on plans shall be submitted within thirty five (35) days of award of the contract. After such time, proposed substitutions shall not be accepted for review, and the Contractor shall submit all items as specified or shown on plans.
 - a. For each item proposed as substitution for that specified or shown on plans, copies of product data sheets for the specified item shall be placed side by side with product data sheets for the proposed substitution item within the submittal.
 - 1) In addition to the Submittal Requirements for labeling listed above, product data sheets for the specified item shall be clearly labeled "SPECIFIED

ITEM, NOT SUBMITTED". Product data sheets for the corresponding proposed substitution item shall be clearly labeled "PROPOSED SUBSTITUTION".

- b. Provide calculations and other detailed data justifying how any items proposed as substitution were selected for proposal. Data must be complete enough to permit detailed comparison of every significant characteristic for which the specified item was analyzed during design.
2. It shall be the Contractor's responsibility to provide sufficient information to allow the Engineer to analyze any proposed alternate. If inadequate information is provided, the proposal will not be approved and resubmittal will not be allowed.
3. The Contractor shall provide or perform tests required by Engineer for purpose of judging acceptability of proposed substitutions.
4. The Contractor assumes full responsibility that alternate items and procedures will meet the job requirements and is responsible for cost of redesign and of modifications to this and other parts of work caused by alternate items furnished under work in this Section. In view of these responsibilities, it is the purpose of these specifications to establish procedures to ensure that the Contractor has considered all the ramifications of proposed alternates before submitting them for review. Submittals which do not comply with the requirements of these specifications or which indicate proposed alternates that were selected without proper regard to the requirements of the job will not be approved. No more than one proposed alternate will be considered for each item.
5. Alternate items installed without Engineer's approval will be replaced with specified items at Contractor's expense.

1.13 INFORMATIONAL SUBMITTALS

- A. Seismic Qualification Certificates: For waste and vent piping, accessories, and components, from manufacturer.
 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 2. Detailed description of piping anchorage devices on which the certification is based and their installation requirements.
- B. Field quality-control reports.

1.14 QUALITY ASSURANCE

- A. Piping materials shall bear label, stamp, or other markings of specified testing agency.
- B. Comply with NSF/ANSI 14, "Plastics Piping Systems Components and Related Materials," for plastic piping components. Include marking with "NSF-dwv" for plastic drain, waste, and vent piping and "NSF-sewer" for plastic sewer piping.

1.15 PROJECT CONDITIONS

- A. Interruption of Existing Sanitary Waste Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:
 1. Notify Architect no fewer than two days in advance of proposed interruption of sanitary waste service.

2. Do not proceed with interruption of sanitary waste service without Architect's written permission.

1.16 UNINSPECTED WORK

- A. The Contractor shall not allow or cause any of his work to be covered up or closed in until it has been inspected, tested, approved by all authorities have jurisdiction, and until Project Record drawings have been properly annotated.
- B. Should any of his work be covered up or closed in before such inspection, he shall, at his own expense, uncover the work to the satisfaction of the inspection party. All related repair work cost shall be borne by the Contractor.

1.17 RECORD DRAWINGS (Also see General Conditions)

- A. Contractor shall provide and keep up-to-date a complete "as-built" record set of blueline prints which shall show every change from the original drawings and the exact "as-built" locations and sizes of the work provided under this Section of the specifications. This set shall include locations, dimensions, depth of buried piping, cleanouts, shut-off valves, sewer invert locations, plugged wyes, tees, etc. On completion of the work, the Contractor shall incorporate all as-built information on a set of reproducible tracings provided by the Architect and this set of reproducibles shall be delivered to the Architect.

1.18 GUARANTEES (Also see General Conditions)

- A. Contractor shall guarantee the entire plumbing and piping systems unconditionally for a period of one (1) year after final acceptance. If, during this period, any materials, equipment, or any part of the systems fail to function properly, the Contractor shall make good the defects promptly and without any expense to the Owner.
- B. Contractor shall be responsible for all damage to any part of the premises caused by leaks in pipelines or equipment furnished and installed under this Section for a period of one (1) year after date of acceptance of his work.
- C. All equipment and fixtures shall carry manufacturer's warranty against defective parts or poor workmanship for not less than one (1) year. See specific equipment specifications for extended warranty requirements.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

- A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

2.2 HUBLESS, CAST-IRON SOIL PIPE AND FITTINGS

- A. Pipe and Fittings: ASTM A 888 or CISPI 301.

- B. ASTM C 1540, CISPI, Hubless-Piping Couplings:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. ANACO-Husky SD 4000 series.
 - b. Clamp All HI_TORQ 125 series
 2. Standards: ASTM C 1277 and CISPI 310.
 3. Description: Stainless-steel corrugated shield with stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve with integral, center pipe stop.
- C. Soil and waste piping within the building itself and outside within five feet (5') of the foundation, shall be no-hub cast iron pipe and fittings, asphaltum coated, free from defects, and shall comply with CISPI Standard 301, ASTM A-888 or ASTM A-74. Pipe and fittings shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute. Fittings shall be made up with "Husky" SD 4000 series or "Clamp All" HI-TORQ 125 series stainless steel type 304 couplings and shall conform to ASTM C1540 & ASTM C564 except all above ground vent pipe fittings may be made with "Anaco" or "Tyler" stainless steel two band couplings conforming to CISPI Standard 310.

PART 3 - EXECUTION

3.1 EARTH MOVING

- A. Comply with requirements for excavating, trenching, and backfilling specified in Section 312000 "Earth Moving."

3.2 PIPING INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.
- B. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.
- C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
- E. Install piping to permit valve servicing.
- F. Install piping at indicated slopes.

- G. Install piping free of sags and bends.
- H. Install fittings for changes in direction and branch connections.
- I. Install piping to allow application of insulation.
- J. Install seismic restraints on piping. Comply with requirements for seismic-restraint devices specified in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."
- K. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical. Use long-turn, double Y-branch and 1/8-bend fittings if two fixtures are installed back to back or side by side with common drain pipe. Straight tees, elbows, and crosses may be used on vent lines. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.
- L. Lay buried building drainage piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.
- M. Install soil and waste drainage and vent piping at the following minimum slopes unless otherwise indicated:
 - 1. Sanitary Drain: 2 percent downward in direction of flow for piping NPS 3 and smaller; 1 percent downward in direction of flow for piping NPS 4 and larger.
 - 2. Vent Piping: 1 percent down toward vertical fixture vent or toward vent stack.
- N. Install cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."
 - 1. Install encasement on underground piping according to ASTM A 674 or AWWA C105/A 21.5.

O. Plumbing Specialties:

1. Install cleanouts at grade and extend to where building sanitary drains connect to building sanitary sewers in sanitary drainage gravity-flow piping. Install cleanout fitting with closure plug inside the building in sanitary drainage force-main piping. Comply with requirements for cleanouts specified in Section 221319 "Sanitary Waste Piping Specialties."
 2. Install drains in sanitary drainage gravity-flow piping. Comply with requirements for drains specified in Section 221319 "Sanitary Waste Piping Specialties."
- P. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.
- Q. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."
- R. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."
- S. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 220518 "Escutcheons for Plumbing Piping."

3.3 JOINT CONSTRUCTION

- A. Join hubless, cast-iron soil piping according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for hubless-piping coupling joints.
- B. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

3.4 HANGER AND SUPPORT INSTALLATION

- A. Comply with requirements for seismic-restraint devices specified in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."
- B. Comply with requirements for pipe hanger and support devices and installation specified in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."
 - 1. Install carbon-steel pipe hangers for horizontal piping in noncorrosive environments.
 - 2. Install stainless-steel pipe hangers for horizontal piping in corrosive environments.
 - 3. Install carbon-steel pipe support clamps for vertical piping in noncorrosive environments.
 - 4. Install stainless-steel pipe support clamps for vertical piping in corrosive environments.
 - 5. Vertical Piping: MSS Type 8 or Type 42, clamps.
 - 6. Install individual, straight, horizontal piping runs:
 - a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
 - b. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.
 - c. Longer Than 100 Feet if Indicated: MSS Type 49, spring cushion rolls.
 - 7. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
 - 8. Base of Vertical Piping: MSS Type 52, spring hangers.
- C. Support horizontal piping and tubing within 12 inches of each fitting and coupling.
- D. Support vertical piping and tubing at base and at each floor.
- E. Rod diameter may be reduced one size for double-rod hangers, with 3/8-inch minimum rods.
- F. Install hangers for cast-iron soil piping with the following maximum horizontal spacing and minimum rod diameters:
 - 1. NPS 1-1/2 and NPS 2: 60 inches with 3/8-inch rod.
 - 2. NPS 3: 60 inches with 1/2-inch rod.
 - 3. NPS 4 and NPS 5: 60 inches with 5/8-inch rod.
 - 4. Spacing for 10-foot lengths may be increased to 10 feet. Spacing for fittings is limited to 60 inches.
- G. Install supports for vertical cast-iron soil piping every 15 feet.
- H. Install hangers for steel piping with the following maximum horizontal spacing and minimum rod diameters:
 - 1. NPS 1-1/4: 84 inches with 3/8-inch rod.
 - 2. NPS 1-1/2: 108 inches with 3/8-inch rod.
 - 3. NPS 2: 10 feet with 3/8-inch rod.

4. NPS 2-1/2: 11 feet with 1/2-inch rod.
5. NPS 3: 12 feet with 1/2-inch rod.
6. NPS 4 and NPS 5: 12 feet with 5/8-inch rod.

- I. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

3.5 CONNECTIONS

- A. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Connect soil and waste piping to exterior sanitary sewerage piping. Use transition fitting to join dissimilar piping materials.
- C. Connect drainage and vent piping to the following:
 1. Plumbing Fixtures: Connect drainage piping in sizes indicated, but not smaller than required by plumbing code.
 2. Plumbing Fixtures and Equipment: Connect atmospheric vent piping in sizes indicated, but not smaller than required by authorities having jurisdiction.
 3. Plumbing Specialties: Connect drainage and vent piping in sizes indicated, but not smaller than required by plumbing code.
 4. Install test tees (wall cleanouts) in conductors near floor and floor cleanouts with cover flush with floor.
- D. Where installing piping adjacent to equipment, allow space for service and maintenance of equipment.

3.6 IDENTIFICATION

- A. Identify exposed sanitary waste and vent piping. Comply with requirements for identification specified in Section 220553 "Identification for Plumbing Piping and Equipment."

3.7 FIELD QUALITY CONTROL

- A. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.
 1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.

2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.
- B. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.
 - C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.
 - D. Test sanitary drainage and vent piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:
 1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
 2. Leave uncovered and unconcealed new, altered, extended, or replaced drainage and vent piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
 3. Roughing-in Plumbing Test Procedure: Test drainage and vent piping except outside leaders on completion of roughing-in. Close openings in piping system and fill with water to point of overflow, but not less than 10-foot head of water. From 15 minutes before inspection starts to completion of inspection, water level must not drop. Inspect joints for leaks.
 4. Finished Plumbing Test Procedure: After plumbing fixtures have been set and traps filled with water, test connections and prove they are gastight and watertight. Plug vent-stack openings on roof and building drains where they leave building. Introduce air into piping system equal to pressure of 1-inch wg. Use U-tube or manometer inserted in trap of water closet to measure this pressure. Air pressure must remain constant without introducing additional air throughout period of inspection. Inspect plumbing fixture connections for gas and water leaks.
 5. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
 6. Prepare reports for tests and required corrective action.

3.8 CLEANING AND PROTECTION

- A. Clean interior of piping. Remove dirt and debris as work progresses.

- B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.
- C. Place plugs in ends of uncompleted piping at end of day and when work stops.

3.9 PIPING SCHEDULE

- A. Flanges and unions may be used on aboveground pressure piping unless otherwise indicated.
- B. Aboveground, soil and waste piping shall be the following:
 - 1. Hubless, cast-iron soil pipe and fittings; heavy-duty hubless-piping couplings; and coupled joints.
- C. Aboveground, vent piping shall be the following:
 - 1. Hubless, cast-iron soil pipe and fittings; CISPI hubless-piping couplings; and coupled joints.
- D. Underground, soil, waste, and vent piping shall be the following:
 - 1. Hubless, cast-iron soil pipe and fittings; heavy-duty hubless-piping couplings; and coupled joints.

END OF SECTION 22 13 16

SECTION 22 13 19

SANITARY WASTE PIPING SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Cleanouts.
2. Floor drains.
3. Trench drains.
4. Miscellaneous sanitary drainage piping specialties.
5. Grease interceptors.

B. Related Requirements:

1. Section 221423 "Storm Drainage Piping Specialties" for storm drainage piping inside the building, drainage piping specialties, and drains.
2. Section 224300 "Medical Plumbing Fixtures" for plaster sink interceptors.
3. Section 334100 "Storm Utility Drainage Piping" for storm draining piping and piping specialties outside the building.

1.3 DEFINITIONS

- A. ABS: Acrylonitrile-butadiene-styrene plastic.
- B. FOG: Fats, oils, and greases.
- C. HDPE: High-density polyethylene plastic.

1.4 WORK INCLUDED

- A. Furnish all labor, materials, services, testing, transportation and equipment necessary for the completion of all plumbing work as indicated on drawings and specified herein. Work materials and equipment not indicated or specified which is necessary for the complete and proper operation of the work of this Section in accordance with the true intent and meaning of the contract documents shall be provided and incorporated at no additional cost to the Owner.

1.5 QUALITY ASSURANCE

- A. Code Requirements: All work covered by this Section shall conform to the latest requirements of the following regulations:
 - 1. C.C.R., Title 24, Part 5 (2022 CPC).
 - 2. 2022 California Plumbing Code.
 - 3. SMACNA Seismic Restraint Manual Guidelines for Mechanical Systems.
 - 4. National Fire Protection Association.
 - 5. California State Division of Industrial Safety.
 - 6. County Health Department.
 - 7. Any other legally constituted body-having jurisdiction thereof.

- B. Nothing in the specifications or drawings shall be construed to permit deviation from the requirements of governing codes unless approval for said deviation has been obtained from the legally constituted authorities having jurisdiction and from the Owner's representative.

1.6 PERFORMANCE REQUIREMENTS

- A. Components and installation shall be capable of withstanding the following minimum working pressure unless otherwise indicated:
 - 1. Soil, Waste, and Vent Piping: 10-foot head of water.

- B. Seismic Performance: Soil, waste, and vent piping and support and installation shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1.7 DRAWINGS

- A. Because of the small-scale drawings, it is not possible to indicate all offsets, fittings and accessories which may be required. The Contractor shall carefully investigate the conditions surrounding installation of his work, furnishing the necessary piping, fittings, valves, traps, and other devices which may be required to complete the installation.

- B. The general arrangement indicated on the drawings shall be followed as closely as possible. Coordinate with the Architectural, Structural, Mechanical and Electrical Drawings and the work of other trades prior to installation of piping fixtures and equipment to verify adequate space available for installation of the work shown. In the event a field condition arises which makes it impossible to install the work as indicated, submit, in writing, the proposed departures to the Architect for his approval. Only when Architect's approval is given, in writing, shall Contractor proceed with installation of the work.

- C. Special Note: Should the Contractor make changes in the installation differing from what is indicated on the contract drawings and not necessitated due to field conditions as indicated hereinabove, the Contractor shall be required to re-install the work to comply with what has been indicated on the contract drawings. Should it be impossible to re-install the work and the installation is in accordance with all governing authorities, the architect may permit the installation to remain. However, all costs incurred to revise the contract drawings by the engineer for resubmittal to the building department indicating the as-installed condition shall become the responsibility of the Contractor.

- D. In case of a difference in the specifications or between the specifications and the drawings, the Contractor shall figure the most expensive alternate and after award of contract, shall secure direction from the Architect.
- 1.8 PERMITS, INSPECTIONS AND LICENSES
- A. All permits, inspections and licenses required by the legally constituted authorities for installation of the work according to the plans and specifications shall be obtained and paid as a part of the work of this section.
- 1.9 EXAMINATION OF PREMISES
- A. Before bidding on this work, Contractors shall make a careful examination of the premises and shall thoroughly familiarize themselves with the requirements of the contract. By the act of submitting a proposal for the work included in this contract, the Contractor shall be deemed to have made such study and examination, and that he is familiar with and accepts all conditions of the site.
- 1.10 PROTECTION
- A. All work, equipment and materials shall be protected at all times. Contractor shall make good all damage caused either directly or indirectly by his own workmen. Contractor shall also protect his own work from damage. He shall close all pipe openings with caps or plugs during installation. He shall protect all his equipment and materials against dirt, water, chemical and mechanical injury. Upon completion, all work shall be thoroughly cleaned and delivered in a new condition.
 - B. Contractor shall be held responsible for all damage to equipment and materials until he has received written notice from the Architect or Engineer that his work has been accepted.
- 1.11 LOCATIONS
- A. The locations of apparatus, piping and equipment indicated on the drawings are approximate. Piping and equipment shall be installed in such a manner as to avoid all obstruction, preserve headroom, and keep openings and passages clear. The locations of and mounting heights of all fixtures shall be coordinated with the architectural plans and room elevations.
 - B. Clearances and Openings: Contractor shall cooperate and coordinate his work with all other trades to avoid conflict and permit for a neat and orderly appearance of the entire installation. The Contractor shall, in advance of the work, furnish instructions to the General Contractor as to his requirements for equipment and material installation of any kind, whether or not specifically mentioned on drawings or in the specifications, and shall include recesses, chases in walls, and all required openings in the structure. Should furnishing this information be neglected, delayed or incorrect and additional cuttings are found to be required, the cost of the same shall be charged to this Contractor.
 - C. Contractor shall verify and coordinate pipe routing with location of all electrical rooms, elevator equipment rooms, telecom/data rooms, and other rooms dedicated to the housing of switchgear, panels, or other electrical equipment. In no case shall piping be installed within or above the ceiling of such rooms.

1.12 SUBMITTAL DATA

A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, and accessories for the following:

1. Grease interceptors.

B. Submittal Requirements:

1. Furnish, all at one time, prior to any installation, within the time noted below, six (6) copies of valid submittal data on all fixtures, material, equipment and devices. Each submitted item shall be indexed and referenced to these specifications and to identification numbers on fixtures and equipment schedules.
2. Manufacturers' submittal literature and shop drawings are required on all items to ensure the latest and most complete manufacturer's data is available for review. Requirements of the submittals and Engineer's submittal notes are a part of the work of this Division except that Engineer's notes may not be used as a means of increasing the scope of work of this Division.
3. Submittals will be checked for general conformance with the design concept of the project but the review does not guarantee quantities shown and does not supersede requirements of this Division to properly install work.
4. To be valid, all submittals must:
 - a. Be delivered to the Architect's office within thirty-five (35) days of award of the contract. Contractor shall make time allowance for Engineer's review, return of comments, if any, and resubmittal if required. Corrections or changes in submittals returned as inadequate or incomplete shall be accomplished within this time limit.
 - b. Clearly indicate and label as such any items proposed as substitution for that specified or shown on plans.
 - c. Include all pertinent construction, installation, performance and technical data.
 - d. Have all product data sheets clearly labeled to indicate the individual items being submitted. In addition, all required options and accessories shall be clearly marked.
 - 1) Product data sheets corresponding to items indicated on plans shall be clearly labeled with the corresponding fixture or equipment tag number.
 - 2) Product data sheets corresponding to items indicated in specifications shall be clearly labeled with the specification section, page and item numbers.
 - e. Include, for every item which differs in size, configuration, connections, service, accessibility or any other significant way, a drawing to the same (or larger) scale as to the pertinent portions of the contract drawings. In this drawing show a complete layout of the system except that which is identical to the contract drawings, unless the unchanged portions must be shown to indicate such things as clearances. This drawing, together with the contract design drawings must show the complete system as revised to accommodate the proposed alternate.

C. Substitution Requirements:

1. Any items included in submittals and proposed by the Contractor as substitution for that specified or shown on plans shall be submitted within thirty five (35) days of award of the contract. After such time, proposed substitutions shall not be accepted for review, and the Contractor shall submit all items as specified or shown on plans.

- a. For each item proposed as substitution for that specified or shown on plans, copies of product data sheets for the specified item shall be placed side by side with product data sheets for the proposed substitution item within the submittal.
 - 1) In addition to the Submittal Requirements for labeling listed above, product data sheets for the specified item shall be clearly labeled "SPECIFIED ITEM, NOT SUBMITTED". Product data sheets for the corresponding proposed substitution item shall be clearly labeled "PROPOSED SUBSTITUTION".
 - b. Provide calculations and other detailed data justifying how any items proposed as substitution were selected for proposal. Data must be complete enough to permit detailed comparison of every significant characteristic for which the specified item was analyzed during design.
- 2. It shall be the Contractor's responsibility to provide sufficient information to allow the Engineer to analyze any proposed alternate. If inadequate information is provided, the proposal will not be approved and resubmittal will not be allowed.
 - 3. The Contractor shall provide or perform tests required by Engineer for purpose of judging acceptability of proposed substitutions.
 - 4. The Contractor assumes full responsibility that alternate items and procedures will meet the job requirements and is responsible for cost of redesign and of modifications to this and other parts of work caused by alternate items furnished under work in this Section. In view of these responsibilities, it is the purpose of these specifications to establish procedures to ensure that the Contractor has considered all the ramifications of proposed alternates before submitting them for review. Submittals which do not comply with the requirements of these specifications or which indicate proposed alternates that were selected without proper regard to the requirements of the job will not be approved. No more than one proposed alternate will be considered for each item.
 - 5. Alternate items installed without Engineer's approval will be replaced with specified items at Contractor's expense.

1.13 INFORMATIONAL SUBMITTALS

- A. Manufacturer Seismic Qualification Certification: Submit certification that grease interceptors, accessories, and components will withstand seismic forces defined in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment." Include the following:
 - 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - a. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified."
 - b. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."
 - 2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 - 3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
- B. Field quality-control reports.

1.14 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For drainage piping specialties to include in emergency, operation, and maintenance manuals.

1.15 QUALITY ASSURANCE

- A. Drainage piping specialties shall bear label, stamp, or other markings of specified testing agency.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. Comply with NSF 14, "Plastics Piping Components and Related Materials," for plastic sanitary piping specialty components.

1.16 UNINSPECTED WORK

- A. The Contractor shall not allow or cause any of his work to be covered up or closed in until it has been inspected, tested, approved by all authorities have jurisdiction, and until Project Record drawings have been properly annotated.
- B. Should any of his work be covered up or closed in before such inspection, he shall, at his own expense, uncover the work to the satisfaction of the inspection party. All related repair work cost shall be borne by the Contractor.

1.17 RECORD DRAWINGS (Also see General Conditions)

- A. Contractor shall provide and keep up-to-date a complete "as-built" record set of blueline prints which shall show every change from the original drawings and the exact "as-built" locations and sizes of the work provided under this Section of the specifications. This set shall include locations, dimensions, depth of buried piping, cleanouts, shut-off valves, sewer invert locations, plugged wyes, tees, etc. On completion of the work, the Contractor shall incorporate all as-built information on a set of reproducible tracings provided by the Architect and this set of reproducibles shall be delivered to the Architect.

1.18 GUARANTEES

- A. Contractor shall guarantee the entire plumbing and piping systems unconditionally for a period of one (1) year after final acceptance. If, during this period, any materials, equipment, or any part of the systems fail to function properly, the Contractor shall make good the defects promptly and without any expense to the Owner.
- B. Contractor shall be responsible for all damage to any part of the premises caused by leaks in pipelines or equipment furnished and installed under this Section for a period of one (1) year after date of acceptance of his work.
- C. All equipment and fixtures shall carry manufacturer's warranty against defective parts or poor workmanship for not less than one (1) year. See specific equipment specifications for extended warranty requirements.

1.19 COORDINATION

- A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Section 033000 "Cast-in-Place Concrete."
- B. Coordinate size and location of roof penetrations.

1.20 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Cultures: Provide 1-gal. bottles of bacteria culture recommended by manufacturer of FOG disposal systems equal to 200 percent of amount installed, but no fewer than 2 1-gal. bottles.

PART 2 - PRODUCTS

2.1 CLEANOUTS

A. Exposed Metal Cleanouts:

- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Zurn
 - b. JR Smith
 - c. Watts
- 2. Standard: ASME A112.36.2M for cast iron for cleanout test tee.
- 3. Size: Same as connected drainage piping
- 4. Body Material: Hubless, cast-iron soil pipe test tee as required to match connected piping.
- 5. Closure: Countersunk, brass plug.
- 6. Closure Plug Size: Same as or not more than one size smaller than cleanout size.

B. Metal Floor Cleanouts:

- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Zurn
 - b. JR Smith
 - c. Watts
- 2. Standard: ASME A112.36.2M for cast-iron soil pipe with cast-iron ferrule threaded, adjustable housing cleanout.
- 3. Size: Same as connected branch.
- 4. Type: Cast-iron soil pipe with cast-iron ferrule Threaded, adjustable housing.
- 5. Body or Ferrule: Cast iron.
- 6. Outlet Connection: Threaded.

7. Closure: Brass plug with tapered threads.
8. Adjustable Housing Material: Cast iron with set-screws or other device.
9. Frame and Cover Material and Finish: Nickel-bronze, copper alloy.
10. Frame and Cover Shape: Round.
11. Top Loading Classification: Heavy Duty.
12. Riser: ASTM A 74, Service class, cast-iron drainage pipe fitting and riser to cleanout.

C. Cast-Iron Wall Cleanouts:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Zurn
 - b. JR Smith
 - c. Watts
2. Standard: ASME A112.36.2M. Include wall access.
3. Size: Same as connected drainage piping.
4. Body: Hubless, cast-iron soil pipe test tee as required to match connected piping.
5. Option for drilled-and-threaded plug in first subparagraph below is for a screw for a wall cover plate.
6. Closure: Countersunk, brass plug.
7. Closure Plug Size: Same as or not more than one size smaller than cleanout size.
8. Wall Access: Round, flat, chrome-plated brass or stainless-steel cover plate with screw.
9. Wall Access: stainless-steel wall-installation frame and cover.

2.2 FLOOR DRAINS

A. Cast-Iron Floor Drains:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. Zurn
 - b. JR Smith
 - c. Watts
3. Standard: ASME A112.6.3.
4. Pattern: Floor drain.
5. Body Material: Gray iron.
6. Seepage Flange: Required.
7. Anchor Flange: Required.
8. Clamping Device: Required.
9. Outlet: Bottom.
10. Coating in first subparagraph below is usually used only on sanitary floor drains.
11. Coating on Interior and Exposed Exterior Surfaces: Acid-resistant enamel.
12. Sediment Bucket: Not required.
13. Top or Strainer Material: Nickel bronze.
14. Top of Body and Strainer Finish: Nickel bronze.
15. Top Shape: Round.

B. Stainless-Steel Floor Drains:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. Josam Company.
3. Standard: ASME A112.3.1.
4. Outlet: Bottom.
5. Top or Strainer Material: Stainless steel.
6. Top Shape: Round.
7. Trap-Primer Connection: Required.

2.3 TRENCH DRAINS

A. Trench Drains:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. Zurn
 - b. JR Smith
 - c. Watts
3. Standard: ASME A112.6.3 for trench drains.
4. Material: Ductile or gray iron.
5. Flange: Anchor.
6. Clamping Device: Required.
7. Outlet: Bottom.
8. Grate Material: Ductile iron.
9. Grate Finish: Painted.
10. Top Loading Classification: Medium Duty.

2.4 MISCELLANEOUS SANITARY DRAINAGE PIPING SPECIALTIES

A. Vent Caps:

1. Description: Cast-iron body with threaded or hub inlet and vandal-proof design. Include vented hood and setscrews to secure to vent pipe.
2. Size: Same as connected stack vent or vent stack.

2.5 SAND/OIL INTERCEPTORS

A. Sand/Oil Interceptors:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. Jensen Precast.
3. Standard: ASME A112.14.3 and PDI-G101; for intercepting and retaining fats, oils or - processing wastewater.
4. PDI certification is currently limited to 50-gpm (3.15-L/s) flow rate and 100-lb (45.4-kg) grease retention by PDI-G101. Larger uncertified units are available. PDI-G101 is being revised, should be available by end of 2003, and will include capacities to 100 gpm (6.3 L/s).
5. Plumbing and Drainage Institute Seal: Not required.
6. Rate in subparagraph below is limited to 100 gpm (6.3 L/s).
7. Capacity in first subparagraph below is limited to 200 lb (90.7 kg).
8. Sand/Oil Retention Capacity: 1000 Gallon.
9. Inlet and Outlet Size: 4"
10. Cleanout: Integral or field installed on outlet.
11. Mounting: Recessed, flush with floor.
12. Operation: Manual cleaning.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Equipment Mounting:

1. Install grease interceptors on cast-in-place concrete equipment base(s). Comply with requirements for equipment bases and foundations specified in Section 03 30 00 "Cast-in-Place Concrete." Section 03 30 53 "Miscellaneous Cast-in-Place Concrete."
2. Comply with requirements for vibration isolation and seismic control devices specified in Section 22 05 48 "Vibration and Seismic Controls for Plumbing Piping and Equipment"
3. Comply with requirements for vibration isolation devices specified in Section 22 05 48.13 "Vibration Controls for Plumbing Piping and Equipment."

B. Install cleanouts in aboveground piping and building drain piping according to the following, unless otherwise indicated:

1. Size same as drainage piping up to NPS 4. Use NPS 4 for larger drainage piping unless larger cleanout is indicated.
2. Locate at each change in direction of piping greater than 45 degrees.
3. Locate at minimum intervals of 50 feet for piping NPS 4 and smaller and 100 feet for larger piping.
4. Locate at base of each vertical soil and waste stack.

C. For floor cleanouts for piping below floors, install cleanout deck plates with top flush with finished floor.

D. For cleanouts located in concealed piping, install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall.

- E. Install floor drains at low points of surface areas to be drained. Set grates of drains flush with finished floor, unless otherwise indicated.
 - 1. Install floor-drain flashing collar or flange so no leakage occurs between drain and adjoining flooring. Maintain integrity of waterproof membranes where penetrated.
 - 2. Install individual traps for floor drains connected to sanitary building drain, unless otherwise indicated.
- F. Install trench drains at low points of surface areas to be drained. Set grates of drains flush with finished surface, unless otherwise indicated.
- G. Install roof flashing assemblies on sanitary stack vents and vent stacks that extend through roof.
- H. Install flashing fittings on sanitary stack vents and vent stacks that extend through roof.
- I. Install through-penetration firestop assemblies in plastic conductors and stacks at floor penetrations.
- J. Install floor-drain, trap-seal primer fittings on inlet to floor drains that require trap-seal primer connection.
 - 1. Exception: Fitting may be omitted if trap has trap-seal primer connection.
 - 2. Size: Same as floor drain inlet.
- K. Install air-gap fittings on draining-type backflow preventers and on indirect-waste piping discharge into sanitary drainage system.
- L. Install sleeve flashing device with each riser and stack passing through floors with waterproof membrane.
- M. Install vent caps on each vent pipe passing through roof.
- N. Install frost-resistant vent terminals on each vent pipe passing through roof. Maintain 1-inch clearance between vent pipe and roof substrate.
- O. Install expansion joints on vertical stacks and conductors. Position expansion joints for easy access and maintenance.
- P. Install frost-proof vent caps on each vent pipe passing through roof. Maintain 1-inch clearance between vent pipe and roof substrate.
- Q. Install grease interceptors, venting according to authorities having jurisdiction and with clear space for servicing.
 - 1. Flush with Floor Installation: Set unit and extension, if required, with cover flush with finished floor
 - 2. Install cleanout immediately downstream from interceptors not having integral cleanout on outlet.
- R. Install wood-blocking reinforcement for wall-mounting-type specialties.
- S. Install traps on plumbing specialty drain outlets. Omit traps on indirect wastes unless trap is indicated.

3.2 CONNECTIONS

- A. Comply with requirements in Section 22 13 16 "Sanitary Waste and Vent Piping" for piping installation requirements. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install piping adjacent to equipment to allow service and maintenance.
- C. Grease Interceptors: Connect inlet and outlet to unit, and connect flow-control fitting and vent to unit inlet piping. Install valve on outlet of automatic drawoff-type unit.
- D. Ground equipment according to Section 26 05 26 "Grounding and Bonding for Electrical Systems."
- E. Connect wiring according to Section 26 05 19 "Low-Voltage Electrical Power Conductors and Cables."

3.3 FLASHING INSTALLATION

- A. Fabricate flashing from single piece unless large pans, sumps, or other drainage shapes are required. Join flashing according to the following if required:
 - 1. Lead Sheets: Burn joints of lead sheets 6.0-lb/sq. ft., 0.0938-inch thickness or thicker. Solder joints of lead sheets 4.0-lb/sq. ft., 0.0625-inch thickness or thinner.
 - 2. Copper Sheets: Solder joints of copper sheets.
- B. Install sheet flashing on pipes, sleeves, and specialties passing through or embedded in floors and roofs with waterproof membrane.
 - 1. Pipe Flashing: Sleeve type, matching pipe size, with minimum length of 10 inches, and skirt or flange extending at least 8 inches around pipe.
 - 2. Sleeve Flashing: Flat sheet, with skirt or flange extending at least 8 inches around sleeve.
 - 3. Embedded Specialty Flashing: Flat sheet, with skirt or flange extending at least 8 inches around specialty.
- C. Set flashing on floors and roofs in solid coating of bituminous cement.
- D. Secure flashing into sleeve and specialty clamping ring or device.
- E. Install flashing for piping passing through roofs with counterflashing or commercially made flashing fittings, according to Section 07 62 00 "Sheet Metal Flashing and Trim."
- F. Extend flashing up vent pipe passing through roofs and turn down into pipe, or secure flashing into cast-iron sleeve having calking recess.
- G. Fabricate and install flashing and pans, sumps, and other drainage shapes.

3.4 LABELING AND IDENTIFYING

- A. Equipment Nameplates and Signs: Install engraved plastic-laminate equipment nameplate or sign on or near each of the following:
 - 1. Grease interceptors.

- B. Distinguish among multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations, in addition to identifying unit. Nameplates and signs are specified in Section 22 05 53 "Identification for Plumbing Piping and Equipment."

3.5 FIELD QUALITY CONTROL

- A. Perform tests and inspections and prepare test reports.
- B. Tests and Inspections:
 - 1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
 - 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3.6 PROTECTION

- A. Protect drains during remainder of construction period to avoid clogging with dirt or debris and to prevent damage from traffic or construction work.
- B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

3.7 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain grease removal devices. Refer to Section 01 79 00 "Demonstration and Training."

END OF SECTION 22 13 19

SECTION 22 14 13
STORM DRAIN PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Pipe, tube, and fittings.
2. Specialty pipe fittings.
3. Encasement for underground metal piping.

B. Related Sections:

1. Section 221429 "Sump Pumps" for storm drainage pumps.
2. Section 334100 "Storm Utility Drainage Piping" for storm drainage piping outside the building.

1.3 WORK INCLUDED

- A. Furnish all labor, materials, services, testing, transportation and equipment necessary for the completion of all plumbing work as indicated on drawings and specified herein. Work materials and equipment not indicated or specified which is necessary for the complete and proper operation of the work of this Section in accordance with the true intent and meaning of the contract documents shall be provided and incorporated at no additional cost to the Owner.

1.4 QUALITY ASSURANCE

- A. Code Requirements: All work covered by this Section shall conform to the latest requirements of the following regulations:

1. C.C.R., Title 24, Part 5 (2022 CPC).
2. 2022 California Plumbing Code.
3. SMACNA Seismic Restraint Manual Guidelines for Mechanical Systems.
4. National Fire Protection Association.
5. California State Division of Industrial Safety.
6. County Health Department.
7. Any other legally constituted body-having jurisdiction thereof.

- B. Nothing in the specifications or drawings shall be construed to permit deviation from the requirements of governing codes unless approval for said deviation has been obtained from the legally constituted authorities having jurisdiction and from the Owner's representative.

1.5 PERFORMANCE REQUIREMENTS

- A. Components and installation shall be capable of withstanding the following minimum working pressure unless otherwise indicated:
 - 1. Storm Drainage Piping: 10-foot head of water.
 - 2. Storm Drainage, Force-Main Piping: 150 psig.
- B. Seismic Performance: Storm drainage piping and support and installation shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1.6 DRAWINGS

- A. Because of the small-scale drawings, it is not possible to indicate all offsets, fittings and accessories which may be required. The Contractor shall carefully investigate the conditions surrounding installation of his work, furnishing the necessary piping, fittings, valves, traps, and other devices which may be required to complete the installation.
- B. The general arrangement indicated on the drawings shall be followed as closely as possible. Coordinate with the Architectural, Structural, Mechanical and Electrical Drawings and the work of other trades prior to installation of piping fixtures and equipment to verify adequate space available for installation of the work shown. In the event a field condition arises which makes it impossible to install the work as indicated, submit, in writing, the proposed departures to the Architect for his approval. Only when Architect's approval is given, in writing, shall Contractor proceed with installation of the work.
- C. Special Note: Should the Contractor make changes in the installation differing from what is indicated on the contract drawings and not necessitated due to field conditions as indicated hereinabove, the Contractor shall be required to re-install the work to comply with what has been indicated on the contract drawings. Should it be impossible to re-install the work and the installation is in accordance with all governing authorities, the architect may permit the installation to remain. However, all costs incurred to revise the contract drawings by the engineer for resubmittal to the building department indicating the as-installed condition shall become the responsibility of the Contractor.
- D. In case of a difference in the specifications or between the specifications and the drawings, the Contractor shall figure the most expensive alternate and after award of contract, shall secure direction from the Architect.

1.7 PERMITS, INSPECTIONS AND LICENSES

- A. All permits, inspections and licenses required by the legally constituted authorities for installation of the work according to the plans and specifications shall be obtained and paid as a part of the work of this section.

1.8 UTILITIES

- A. See Drawings for Points of Connection.

- B. Certain site utilities are to be connected to and extended. Before laying of any pipe or digging of any trenches, Contractor shall determine by actual excavation and measurement exact location and depth of lines to which he is to connect. In event depth of lines is not sufficient to permit connection in manner indicated, Contractor shall obtain direction from the Owner's representative before proceeding with this work.
- C. Verify that utility companies size their services and meters to suit ultimate demand indicated on the drawings.
- D. Storm Drain: The Contractor shall be responsible for the storm drain service outside of the building within five feet (5') of the foundation, and within the building itself. See Civil Engineer's plans for onsite storm drain system.

1.9 EXAMINATION OF PREMISES

- A. Before bidding on this work, Contractors shall make a careful examination of the premises and shall thoroughly familiarize themselves with the requirements of the contract. By the act of submitting a proposal for the work included in this contract, the Contractor shall be deemed to have made such study and examination, and that he is familiar with and accepts all conditions of the site.

1.10 PROTECTION

- A. All work, equipment and materials shall be protected at all times. Contractor shall make good all damage caused either directly or indirectly by his own workmen. Contractor shall also protect his own work from damage. He shall close all pipe openings with caps or plugs during installation. He shall protect all his equipment and materials against dirt, water, chemical and mechanical injury. Upon completion, all work shall be thoroughly cleaned and delivered in a new condition.
- B. Contractor shall be held responsible for all damage to equipment and materials until he has received written notice from the Architect or Engineer that his work has been accepted.

1.11 LOCATIONS

- A. The locations of apparatus, piping and equipment indicated on the drawings are approximate. Piping and equipment shall be installed in such a manner as to avoid all obstruction, preserve headroom, and keep openings and passages clear. The locations of and mounting heights of all fixtures shall be coordinated with the architectural plans and room elevations.
- B. Clearances and Openings: Contractor shall cooperate and coordinate his work with all other trades to avoid conflict and permit for a neat and orderly appearance of the entire installation. The Contractor shall, in advance of the work, furnish instructions to the General Contractor as to his requirements for equipment and material installation of any kind, whether or not specifically mentioned on drawings or in the specifications, and shall include recesses, chases in walls, and all required openings in the structure. Should furnishing this information be neglected, delayed or incorrect and additional cuttings are found to be required, the cost of the same shall be charged to this Contractor.
- C. Contractor shall verify and coordinate pipe routing with location of all electrical rooms, elevator equipment rooms, telecom/data rooms, and other rooms dedicated to the housing of switchgear, panels, or other electrical equipment. In no case shall piping be installed within or above the ceiling of such rooms.

1.12 SUBMITTAL DATA

A. Submittal Requirements:

1. Furnish, all at one time, prior to any installation, within the time noted below, six (6) copies of valid submittal data on all fixtures, material, equipment and devices. Each submitted item shall be indexed and referenced to these specifications and to identification numbers on fixtures and equipment schedules.
2. Manufacturers' submittal literature and shop drawings are required on all items to ensure the latest and most complete manufacturer's data is available for review. Requirements of the submittals and Engineer's submittal notes are a part of the work of this Division except that Engineer's notes may not be used as a means of increasing the scope of work of this Division.
3. Submittals will be checked for general conformance with the design concept of the project but the review does not guarantee quantities shown and does not supersede requirements of this Division to properly install work.
4. To be valid, all submittals must:
 - a. Be delivered to the Architect's office within thirty-five (35) days of award of the contract. Contractor shall make time allowance for Engineer's review, return of comments, if any, and resubmittal if required. Corrections or changes in submittals returned as inadequate or incomplete shall be accomplished within this time limit.
 - b. Clearly indicate and label as such any items proposed as substitution for that specified or shown on plans.
 - c. Include all pertinent construction, installation, performance and technical data.
 - d. Have all product data sheets clearly labeled to indicate the individual items being submitted. In addition, all required options and accessories shall be clearly marked.
 - 1) Product data sheets corresponding to items indicated on plans shall be clearly labeled with the corresponding fixture or equipment tag number.
 - 2) Product data sheets corresponding to items indicated in specifications shall be clearly labeled with the specification section, page and item numbers.
 - e. Include, for every item which differs in size, configuration, connections, service, accessibility or any other significant way, a drawing to the same (or larger) scale as to the pertinent portions of the contract drawings. In this drawing show a complete layout of the system except that which is identical to the contract drawings, unless the unchanged portions must be shown to indicate such things as clearances. This drawing, together with the contract design drawings must show the complete system as revised to accommodate the proposed alternate.

B. Substitution Requirements:

1. Any items included in submittals and proposed by the Contractor as substitution for that specified or shown on plans shall be submitted within thirty five (35) days of award of the contract. After such time, proposed substitutions shall not be accepted for review, and the Contractor shall submit all items as specified or shown on plans.
 - a. For each item proposed as substitution for that specified or shown on plans, copies of product data sheets for the specified item shall be placed side by side with product data sheets for the proposed substitution item within the submittal.
 - 1) In addition to the Submittal Requirements for labeling listed above, product data sheets for the specified item shall be clearly labeled "SPECIFIED

ITEM, NOT SUBMITTED". Product data sheets for the corresponding proposed substitution item shall be clearly labeled "PROPOSED SUBSTITUTION".

- b. Provide calculations and other detailed data justifying how any items proposed as substitution were selected for proposal. Data must be complete enough to permit detailed comparison of every significant characteristic for which the specified item was analyzed during design.
2. It shall be the Contractor's responsibility to provide sufficient information to allow the Engineer to analyze any proposed alternate. If inadequate information is provided, the proposal will not be approved and resubmittal will not be allowed.
3. The Contractor shall provide or perform tests required by Engineer for purpose of judging acceptability of proposed substitutions.
4. The Contractor assumes full responsibility that alternate items and procedures will meet the job requirements and is responsible for cost of redesign and of modifications to this and other parts of work caused by alternate items furnished under work in this Section. In view of these responsibilities, it is the purpose of these specifications to establish procedures to ensure that the Contractor has considered all the ramifications of proposed alternates before submitting them for review. Submittals which do not comply with the requirements of these specifications or which indicate proposed alternates that were selected without proper regard to the requirements of the job will not be approved. No more than one proposed alternate will be considered for each item.
5. Alternate items installed without Engineer's approval will be replaced with specified items at Contractor's expense.

1.13 INFORMATIONAL SUBMITTALS

- A. Seismic Qualification Certificates: For storm drainage piping, accessories, and components, from manufacturer.
 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 2. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
- B. Field quality-control reports.

1.14 QUALITY ASSURANCE

- A. Piping materials shall bear label, stamp, or other markings of specified testing agency.
- B. Comply with NSF/ANSI 14, "Plastics Piping System Components and Related Materials," for plastic piping components. Include marking with "NSF-drain" for plastic drain piping and "NSF-sewer" for plastic sewer piping.

1.15 PROJECT CONDITIONS

- A. Interruption of Existing Storm-Drainage Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:
 - 1. Notify Architect no fewer than two days in advance of proposed interruption of storm-drainage service.
 - 2. Do not proceed with interruption of storm-drainage service without Architect's written permission.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

- A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.
- B. Storm Drain Piping:
 - 1. Concealed storm drain piping within the building itself and outside within five feet (5') of the foundation, shall be no-hub cast iron pipe and fittings, asphaltum coated, free from defects, and shall comply with CISPI. Standard 301, ASTM A-888 or ASTM A-74. Pipe and fittings shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute. Fittings shall be made up with "Husky" SD 4000 series or "Clamp All" HI-TORQ 125 series stainless steel type 304 couplings and shall conform to ASTM C 1540 & ASTM C564.
 - 2. Exposed storm drain piping shall be Schedule 40 galvanized steel pipe, ASTM A53, with black cast iron recessed drainage fittings.
- C. Sub-soil Drainage System:
 - 1. Piping: PVC, SDR-35 perforated pipe with solid wall fittings and solvent-cemented joints. Perforations shall be 1/4" diameter on 3" centers, 120 degrees between two rows parallel to pipe axis. Install per pipe manufacturer's directions.

2.2 HUBLESS, CAST-IRON SOIL PIPE AND FITTINGS

- A. Pipe and Fittings: ASTM A 888 or CISPI 301.
- B. CISPI, Hubless-Piping Couplings:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. ANACO-Husky SD 4000 series.
 - b. Clamp All HI_TORQ 125 series.
 - 2. Standards: ASTM C 1277 and CISPI 310.

3. Description: Stainless-steel corrugated shield with stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve with integral, center pipe stop.

2.3 ENCASEMENT FOR UNDERGROUND METAL PIPING

- A. Standard: ASTM A 674 or AWWA C105.
- B. Material: High-density, crosslaminated PE film of 0.004-inch or LLDPE film of 0.008-inch minimum thickness.
- C. Form: Tube.
- D. Color: Black.

PART 3 - EXECUTION

3.1 EARTH MOVING

- A. Comply with requirements for excavating, trenching, and backfilling specified in Section 312000 "Earth Moving."

3.2 PIPING INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations from layout are approved on coordination drawings.
- B. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.
- C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
- E. Install piping to permit valve servicing.
- F. Install piping at indicated slopes.
- G. Install piping free of sags and bends.
- H. Install fittings for changes in direction and branch connections.
- I. Install piping to allow application of insulation.
- J. Install seismic restraints on piping. Comply with requirements for seismic-restraint devices specified in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."

- K. Make changes in direction for storm drainage piping using appropriate branches, bends, and long-sweep bends. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.
- L. Lay buried building storm drainage piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.
- M. Install storm drainage piping at the following minimum slopes unless otherwise indicated:
 - 1. Building Storm Drain: 1% downward in direction of flow for piping NPS 3 and smaller; 1% downward in direction of flow for piping NPS 4 and larger unless noted otherwise on drawings.
 - 2. Horizontal Storm-Drainage Piping: 1% downward in direction of flow unless noted otherwise on drawings.
- N. Install cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."
 - 1. Install encasement on underground piping according to ASTM A 674 or AWWA C105.
- O. Install steel piping according to applicable plumbing code.
- P. Install aboveground copper tubing according to CDA's "Copper Tube Handbook."
- Q. Install aboveground ABS piping according to ASTM D 2661.
- R. Install aboveground PVC piping according to ASTM D 2665.
- S. Install engineered siphonic drain specialties and storm drainage piping in locations indicated.
- T. Install underground, ductile-iron, force-main piping according to AWWA C600. Install buried piping inside building between wall and floor penetrations and connection to storm sewer piping outside building with restrained joints. Anchor pipe to wall or floor. Install thrust-block supports at vertical and horizontal offsets.
 - 1. Install encasement on piping according to ASTM A 674 or AWWA C105.
- U. Install underground, copper, force-main tubing according to CDA's "Copper Tube Handbook."
 - 1. Install encasement on piping according to ASTM A 674 or AWWA C105.
- V. Install force mains at elevations indicated.
- W. Plumbing Specialties:
 - 1. Install backwater valves in storm drainage gravity-flow piping. Comply with requirements for backwater valves specified in Section 221423 "Storm Drainage Piping Specialties."
 - 2. Install cleanouts at grade and extend to where building storm drains connect to building storm sewers in storm drainage gravity-flow piping. Install cleanout fitting with closure plug inside the building in storm drainage force-main piping. Comply with requirements for cleanouts specified in Section 221423 "Storm Drainage Piping Specialties."

3. Install drains in storm drainage gravity-flow piping. Comply with requirements for drains specified in Section 221423 "Storm Drainage Piping Specialties."
- X. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.
- Y. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."
- Z. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."
- AA. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 220518 "Escutcheons for Plumbing Piping."

3.3 JOINT CONSTRUCTION

- A. Hub-and-Spigot, Cast-Iron Soil Piping Gasketed Joints: Join according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for compression joints.
- B. Hub-and-Spigot, Cast-Iron Soil Piping Calked Joints: Join according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for lead-and-oakum calked joints.
- C. Hubless, Cast-Iron Soil Piping Coupled Joints: Join according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for hubless-piping coupling joints.
- D. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
 1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
- E. Join copper tube and fittings with soldered joints according to ASTM B 828 procedure. Use ASTM B 813, water-flushable, lead-free flux and ASTM B 32, lead-free-alloy solder.
- F. Grooved Joints: Cut groove ends of pipe according to AWWA C606. Lubricate and install gasket over ends of pipes or pipe and fittings. Install coupling housing sections, over gasket, with keys seated in piping grooves. Install and tighten housing bolts.
- G. Flanged Joints: Align bolt holes. Select appropriate gasket material, size, type, and thickness. Install gasket concentrically positioned. Use suitable lubricants on bolt threads. Torque bolts in cross pattern.
- H. Plastic, Nonpressure-Piping, Solvent-Cemented Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:
 1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
 2. .

3.4 VALVE INSTALLATION

- A. General valve installation requirements are specified in Section 220523 "General-Duty Valves for Plumbing Piping."
- B. Shutoff Valves: Install shutoff valve on each sump pump discharge.
 - 1. Install gate or full-port ball valve for piping NPS 2 and smaller.
 - 2. Install gate valve for piping NPS 2-1/2 and larger.
- C. Check Valves: Install swing-check valve, between pump and shutoff valve, on each sump pump discharge.
- D. Backwater Valves: Install backwater valves in piping subject to backflow.
 - 1. Horizontal Piping: Horizontal backwater valves. Use normally closed type unless otherwise indicated.
 - 2. Install backwater valves in accessible locations.
 - 3. Comply with requirements for backwater valves specified in Section 221423 "Storm Drainage Piping Specialties."

3.5 HANGER AND SUPPORT INSTALLATION

- A. Comply with requirements for seismic-restraint devices specified in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."
- B. Comply with requirements for pipe hanger and support devices and installation specified in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."
 - 1. Install carbon-steel pipe hangers for horizontal piping in noncorrosive environments.
 - 2. Install stainless-steel pipe hangers for horizontal piping in corrosive environments.
 - 3. Install carbon-steel pipe support clamps for vertical piping in noncorrosive environments.
 - 4. Install stainless-steel pipe support clamps for vertical piping in corrosive environments.
 - 5. Vertical Piping: MSS Type 8 or Type 42, clamps.
 - 6. Individual, Straight, Horizontal Piping Runs:
 - a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
 - b. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.
 - c. Longer Than 100 Feet if Indicated: MSS Type 49, spring cushion rolls.
 - 7. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
 - 8. Base of Vertical Piping: MSS Type 52, spring hangers.
- C. Support horizontal piping and tubing within 12 inches of each fitting, valve, and coupling.
- D. Support vertical piping and tubing at base and at each floor.
- E. Rod diameter may be reduced one size for double-rod hangers, with 3/8-inch minimum rods.
- F. Install hangers for cast-iron soil piping with the following maximum horizontal spacing and minimum rod diameters:
 - 1. NPS 1-1/2 and NPS 2: 60 inches with 3/8-inch rod.

2. NPS 3: 60 inches with 1/2-inch rod.
 3. NPS 4 and NPS 5: 60 inches with 5/8-inch rod.
 4. NPS 6 and NPS 8: 60 inches with 3/4-inch rod.
 5. NPS 10 and NPS 12: 60 inches with 7/8-inch rod.
 6. Spacing for 10-foot pipe lengths may be increased to 10 feet. Spacing for fittings is limited to 60 inches.
- G. Install supports for vertical cast-iron soil piping every 15 feet.
- H. Install supports for vertical copper tubing every 10 feet.
- I. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

3.6 CONNECTIONS

- A. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Connect interior storm drainage piping to exterior storm drainage piping. Use transition fitting to join dissimilar piping materials.
- C. Connect storm drainage piping to roof drains and storm drainage specialties.
1. Install test tees (wall cleanouts) in conductors near floor, and floor cleanouts with cover flush with floor.
 2. Install horizontal backwater valves with cleanout cover flush with floor.
 3. Comply with requirements for backwater valves cleanouts and drains specified in Section 221423 "Storm Drainage Piping Specialties."
- D. Connect force-main piping to the following:
1. Storm Sewer: To exterior force main.
 2. Sump Pumps: To sump pump discharge.
- E. Where installing piping adjacent to equipment, allow space for service and maintenance of equipment.
- F. Make connections according to the following unless otherwise indicated:
1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.
 2. Install flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final connection to each piece of equipment.

3.7 IDENTIFICATION

- A. Identify exposed storm drainage piping. Comply with requirements for identification specified in Section 220553 "Identification for Plumbing Piping and Equipment."

3.8 FIELD QUALITY CONTROL

- A. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.
 - 1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in.
 - 2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.
- B. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.
- C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.
- D. Test storm drainage piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:
 - 1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
 - 2. Leave uncovered and unconcealed new, altered, extended, or replaced storm drainage piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
 - 3. Test Procedure: Test storm drainage piping on completion of roughing-in. Close openings in piping system and fill with water to point of overflow, but not less than 10-foot head of water. From 15 minutes before inspection starts until completion of inspection, water level must not drop. Inspect joints for leaks.
 - 4. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
 - 5. Prepare reports for tests and required corrective action.
- E. Test force-main piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:
 - 1. Leave uncovered and unconcealed new, altered, extended, or replaced force-main piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
 - 2. Cap and subject piping to static-water pressure of 50 psig above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
 - 3. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
 - 4. Prepare reports for tests and required corrective action.

3.9 CLEANING

- A. Clean interior of piping. Remove dirt and debris as work progresses.
- B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.
- C. Place plugs in ends of uncompleted piping at end of day and when work stops.

END OF SECTION 22 14 13

SECTION 22 14 23

STROM DRAIN PIPING SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Roof drains.
 - 2. Miscellaneous storm drainage piping specialties.
 - 3. Cleanouts.
 - 4. Flashing materials.

1.3 WORK INCLUDED

- A. Furnish all labor, materials, services, testing, transportation and equipment necessary for the completion of all plumbing work as indicated on drawings and specified herein. Work materials and equipment not indicated or specified which is necessary for the complete and proper operation of the work of this Section in accordance with the true intent and meaning of the contract documents shall be provided and incorporated at no additional cost to the Owner.

1.4 QUALITY ASSURANCE

- A. Code Requirements: All work covered by this Section shall conform to the latest requirements of the following regulations:
 - 1. C.C.R., Title 24, Part 5 (2022 CPC).
 - 2. 2022 California Plumbing Code.
 - 3. SMACNA Seismic Restraint Manual Guidelines for Mechanical Systems.
 - 4. National Fire Protection Association.
 - 5. California State Division of Industrial Safety.
 - 6. County Health Department.
 - 7. Any other legally constituted body-having jurisdiction thereof.
- B. Nothing in the specifications or drawings shall be construed to permit deviation from the requirements of governing codes unless approval for said deviation has been obtained from the legally constituted authorities having jurisdiction and from the Owner's representative.

1.5 PERFORMANCE REQUIREMENTS

- A. Components and installation shall be capable of withstanding the following minimum working pressure unless otherwise indicated:
 - 1. Storm Drainage Piping: 10-foot head of water.
 - 2. Storm Drainage, Force-Main Piping: 150 psig.
- B. Seismic Performance: Storm drainage piping and support and installation shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1.6 DRAWINGS

- A. Because of the small-scale drawings, it is not possible to indicate all offsets, fittings and accessories which may be required. The Contractor shall carefully investigate the conditions surrounding installation of his work, furnishing the necessary piping, fittings, valves, traps, and other devices which may be required to complete the installation.
- B. The general arrangement indicated on the drawings shall be followed as closely as possible. Coordinate with the Architectural, Structural, Mechanical and Electrical Drawings and the work of other trades prior to installation of piping fixtures and equipment to verify adequate space available for installation of the work shown. In the event a field condition arises which makes it impossible to install the work as indicated, submit, in writing, the proposed departures to the Architect for his approval. Only when Architect's approval is given, in writing, shall Contractor proceed with installation of the work.
- C. Special Note: Should the Contractor make changes in the installation differing from what is indicated on the contract drawings and not necessitated due to field conditions as indicated hereinabove, the Contractor shall be required to re-install the work to comply with what has been indicated on the contract drawings. Should it be impossible to re-install the work and the installation is in accordance with all governing authorities, the architect may permit the installation to remain. However, all costs incurred to revise the contract drawings by the engineer for resubmittal to the building department indicating the as-installed condition shall become the responsibility of the Contractor.
- D. In case of a difference in the specifications or between the specifications and the drawings, the Contractor shall figure the most expensive alternate and after award of contract, shall secure direction from the Architect.

1.7 PERMITS, INSPECTIONS AND LICENSES

- A. All permits, inspections and licenses required by the legally constituted authorities for installation of the work according to the plans and specifications shall be obtained and paid as a part of the work of this section.

1.8 EXAMINATION OF PREMISES

- A. Before bidding on this work, Contractors shall make a careful examination of the premises and shall thoroughly familiarize themselves with the requirements of the contract. By the act of submitting a proposal for the work included in this contract, the Contractor shall be deemed to have made such study and examination, and that he is familiar with and accepts all conditions of the site.

1.9 PROTECTION

- A. All work, equipment and materials shall be protected at all times. Contractor shall make good all damage caused either directly or indirectly by his own workmen. Contractor shall also protect his own work from damage. He shall close all pipe openings with caps or plugs during installation. He shall protect all his equipment and materials against dirt, water, chemical and mechanical injury. Upon completion, all work shall be thoroughly cleaned and delivered in a new condition.
- B. Contractor shall be held responsible for all damage to equipment and materials until he has received written notice from the Architect or Engineer that his work has been accepted.

1.10 LOCATIONS

- A. The locations of apparatus, piping and equipment indicated on the drawings are approximate. Piping and equipment shall be installed in such a manner as to avoid all obstruction, preserve headroom, and keep openings and passages clear. The locations of and mounting heights of all fixtures shall be coordinated with the architectural plans and room elevations.
- B. Clearances and Openings: Contractor shall cooperate and coordinate his work with all other trades to avoid conflict and permit for a neat and orderly appearance of the entire installation. The Contractor shall, in advance of the work, furnish instructions to the General Contractor as to his requirements for equipment and material installation of any kind, whether or not specifically mentioned on drawings or in the specifications, and shall include recesses, chases in walls, and all required openings in the structure. Should furnishing this information be neglected, delayed or incorrect and additional cuttings are found to be required, the cost of the same shall be charged to this Contractor.
- C. Contractor shall verify and coordinate pipe routing with location of all electrical rooms, elevator equipment rooms, telecom/data rooms, and other rooms dedicated to the housing of switchgear, panels, or other electrical equipment. In no case shall piping be installed within or above the ceiling of such rooms.

1.11 SUBMITTAL DATA

- A. Submittal Requirements:
 - 1. Furnish, all at one time, prior to any installation, within the time noted below, six (6) copies of valid submittal data on all fixtures, material, equipment and devices. Each submitted item shall be indexed and referenced to these specifications and to identification numbers on fixtures and equipment schedules.
 - 2. Manufacturers' submittal literature and shop drawings are required on all items to ensure the latest and most complete manufacturer's data is available for review. Requirements of the submittals and Engineer's submittal notes are a part of the work of this Division except that Engineer's notes may not be used as a means of increasing the scope of work of this Division.
 - 3. Submittals will be checked for general conformance with the design concept of the project but the review does not guarantee quantities shown and does not supersede requirements of this Division to properly install work.

4. To be valid, all submittals must:

- a. Be delivered to the Architect's office within thirty-five (35) days of award of the contract. Contractor shall make time allowance for Engineer's review, return of comments, if any, and resubmittal if required. Corrections or changes in submittals returned as inadequate or incomplete shall be accomplished within this time limit.
- b. Clearly indicate and label as such any items proposed as substitution for that specified or shown on plans.
- c. Include all pertinent construction, installation, performance and technical data.
- d. Have all product data sheets clearly labeled to indicate the individual items being submitted. In addition, all required options and accessories shall be clearly marked.
 - 1) Product data sheets corresponding to items indicated on plans shall be clearly labeled with the corresponding fixture or equipment tag number.
 - 2) Product data sheets corresponding to items indicated in specifications shall be clearly labeled with the specification section, page and item numbers.
- e. Include, for every item which differs in size, configuration, connections, service, accessibility or any other significant way, a drawing to the same (or larger) scale as to the pertinent portions of the contract drawings. In this drawing show a complete layout of the system except that which is identical to the contract drawings, unless the unchanged portions must be shown to indicate such things as clearances. This drawing, together with the contract design drawings must show the complete system as revised to accommodate the proposed alternate.

B. Substitution Requirements:

1. Any items included in submittals and proposed by the Contractor as substitution for that specified or shown on plans shall be submitted within thirty five (35) days of award of the contract. After such time, proposed substitutions shall not be accepted for review, and the Contractor shall submit all items as specified or shown on plans.
 - a. For each item proposed as substitution for that specified or shown on plans, copies of product data sheets for the specified item shall be placed side by side with product data sheets for the proposed substitution item within the submittal.
 - 1) In addition to the Submittal Requirements for labeling listed above, product data sheets for the specified item shall be clearly labeled "SPECIFIED ITEM, NOT SUBMITTED". Product data sheets for the corresponding proposed substitution item shall be clearly labeled "PROPOSED SUBSTITUTION".
 - b. Provide calculations and other detailed data justifying how any items proposed as substitution were selected for proposal. Data must be complete enough to permit detailed comparison of every significant characteristic for which the specified item was analyzed during design.
2. It shall be the Contractor's responsibility to provide sufficient information to allow the Engineer to analyze any proposed alternate. If inadequate information is provided, the proposal will not be approved and resubmittal will not be allowed.
3. The Contractor shall provide or perform tests required by Engineer for purpose of judging acceptability of proposed substitutions.

4. The Contractor assumes full responsibility that alternate items and procedures will meet the job requirements and is responsible for cost of redesign and of modifications to this and other parts of work caused by alternate items furnished under work in this Section. In view of these responsibilities, it is the purpose of these specifications to establish procedures to ensure that the Contractor has considered all the ramifications of proposed alternates before submitting them for review. Submittals which do not comply with the requirements of these specifications or which indicate proposed alternates that were selected without proper regard to the requirements of the job will not be approved. No more than one proposed alternate will be considered for each item.
5. Alternate items installed without Engineer's approval will be replaced with specified items at Contractor's expense.

1.12 INFORMATIONAL SUBMITTALS

- A. Seismic Qualification Certificates: For storm drainage piping, accessories, and components, from manufacturer.
 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 2. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
- B. Field quality-control reports.

1.13 QUALITY ASSURANCE

- A. Piping materials shall bear label, stamp, or other markings of specified testing agency.
- B. Comply with NSF/ANSI 14, "Plastics Piping System Components and Related Materials," for plastic piping components. Include marking with "NSF-drain" for plastic drain piping and "NSF-sewer" for plastic sewer piping.

1.14 PROJECT CONDITIONS

- A. Interruption of Existing Storm-Drainage Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:
 1. Notify Architect no fewer than two days in advance of proposed interruption of storm-drainage service.
 2. Do not proceed with interruption of storm-drainage service without Architect's written permission.
- B. Elastic Membrane Sheet: ASTM D 4068, flexible, chlorinated polyethylene, 40-mil minimum thickness.
- C. Fasteners: Metal compatible with material and substrate being fastened.
- D. Metal Accessories: Sheet metal strips, clamps, anchoring devices, and similar accessory units required for installation; matching or compatible with material being installed.
- E. Solder: ASTM B 32, lead-free alloy.

PART 2 - PRODUCTS

2.1 METAL ROOF DRAINS

A. Cast-Iron, Large-Sump, General-Purpose Roof Drains:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. Zurn
 - b. JR Smith
 - c. Watts
3. Standard: ASME A112.6.4, for general-purpose roof drains.
4. Body Material: Cast iron.
5. Dimension of Body: Nominal 15-inch diameter.
6. Combination Flashing Ring and Gravel Stop: Required.
7. Outlet: Bottom.
8. Extension Collars: Required.
9. Underdeck Clamp: Required.
10. Sump Receiver Plate: Required.
11. Dome Material: Cast iron.
12. Perforated Gravel Guard: Stainless steel.
13. Vandal-Proof Dome: Required.
14. Overflow Drain Water Dam: 2 inches.

2.2 MISCELLANEOUS STORM DRAINAGE PIPING SPECIALTIES

A. Downspout Adaptors:

1. Description: Manufactured, gray-iron casting, for attaching to horizontal-outlet, parapet roof drain and to exterior, sheet metal downspout.
2. Size: Inlet size to match parapet drain outlet.

B. Downspout Boots:

1. Description: Manufactured, ASTM A 48/A 48M, gray-iron casting, with strap or ears for attaching to building; NPS 4 (DN 100) outlet; and shop-applied bituminous coating.
2. Size: Inlet size to match downspout and NPS 4 (DN 100) outlet.

C. Conductor Nozzles:

1. Description: Bronze body with threaded inlet and bronze wall flange with mounting holes.
2. Size: Same as connected conductor.

2.3 CLEANOUTS

A. Floor Cleanouts:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. Zurn
 - b. JR Smith
 - c. Watts.
3. Standard: ASME A112.36.2M, for adjustable housing cleanouts.
4. Size: Same as connected branch.
5. Type: Adjustable housing.
6. Body or Ferrule Material: Cast iron.
7. Clamping Device Required.
8. Outlet Connection: Spigot.
9. Closure: Cast-iron plug.
10. Adjustable Housing Material: Cast iron with threads
11. Frame and Cover Material and Finish: Stainless steel.
12. Frame and Cover Shape: Round.
13. Top-Loading Classification: Heavy Duty.
14. Riser: ASTM A 74, Service class, cast-iron drainage pipe fitting and riser to cleanout.

B. Test Tees:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. Zurn
 - b. JR Smith
 - c. Watts
3. Standard: ASME A112.36.2M and ASTM A 74, ASTM A 888, or CISPI 301, for cleanout test tees.
4. Size: Same as connected drainage piping.
5. Body Material: Hub-and-spigot, cast-iron soil-pipe T-branch or hubless, cast-iron soil-pipe test tee as required to match connected piping.
6. Closure Plug: Countersunk.
7. Closure Plug Size: Same as or not more than one size smaller than cleanout size.

C. Wall Cleanouts:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. Zurn

- b. JR Smith.
 - c. Watts
3. Standard: ASME A112.36.2M, for cleanouts. Include wall access.
 4. Size: Same as connected drainage piping.
 5. Body Material Hubless, cast-iron soil-pipe test tee as required to match connected piping.
 6. Closure: Countersunk or raised-head cast-iron plug.
 7. Closure Plug Size: Same as or not more than one size smaller than cleanout size.
 8. Wall Access: Round, flat, chrome-plated brass or stainless-steel cover plate with screw.
 9. Wall Access: Round stainless-steel wall-installation frame and cover.

2.4 TRENCH DRAINS

A. Trench Drains:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. Z
 - b. JR Smith
 - c. Watts
3. Standard: ASME A112.6.3, for trench drains.
4. Body Material: Cast iron.
5. Flange: Anchor with weep holes as required.
6. Clamping Device: Refer to Plumbing Fixture Schedule.
7. Outlet: Bottom.
8. Grate Material: See to Plumbing Fixture Schedule.
9. Grate Finish: See to Plumbing Fixture Schedule.
10. Dimensions of Frame and Grate: See Plumbing Fixture Schedule.
11. Top-Loading Classification: Heavy Duty.

2.5 THROUGH-PENETRATION FIRESTOP ASSEMBLIES

A. Through-Penetration Firestop Assemblies:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. ProSet Systems Inc.
3. Standard: ASTM E 814, for through-penetration firestop assemblies.
4. Certification and Listing: Intertek Testing Service NA for through-penetration firestop assemblies.
5. Size: Same as connected pipe.
6. Sleeve: Molded PVC plastic, of length to match slab thickness and with integral nailing flange on one end for installation in cast-in-place concrete slabs.

7. Stack Fitting: ASTM A 48/A 48M, gray-iron, hubless-pattern, wye branch with neoprene O-ring at base and gray-iron plug in thermal-release harness. Include PVC protective cap for plug.
8. Special Coating: Corrosion resistant on interior of fittings.

2.6 FLASHING MATERIALS

- A. Copper Sheet: ASTM B 152/B 152M, 12 oz./sq. ft.
- B. Zinc-Coated Steel Sheet: ASTM A 653/A 653M, with 0.20 percent copper content and 0.04-inch minimum thickness unless otherwise indicated. Include G90 hot-dip galvanized, mill-phosphatized finish for painting if indicated.
- C. Elastic Membrane Sheet: ASTM D 4068, flexible, chlorinated polyethylene, 40-mil minimum thickness.
- D. Fasteners: Metal compatible with material and substrate being fastened.
- E. Metal Accessories: Sheet metal strips, clamps, anchoring devices, and similar accessory units required for installation; matching or compatible with material being installed.
- F. Solder: ASTM B 32, lead-free alloy.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install roof drains at low points of roof areas according to roof membrane manufacturer's written installation instructions.
 1. Install flashing collar or flange of roof drain to prevent leakage between drain and adjoining roofing. Maintain integrity of waterproof membranes where penetrated.
 2. Install expansion joints, if indicated, in roof drain outlets.
 3. Position roof drains for easy access and maintenance.
- B. Install cleanouts in aboveground piping and building drain piping according to the following instructions unless otherwise indicated:
 1. Use cleanouts the same size as drainage piping up to NPS 4. Use NPS 4 for larger drainage piping unless larger cleanout is indicated.
 2. Locate cleanouts at each change in direction of piping greater than 45 degrees.
 3. Locate cleanouts at base of each vertical soil and waste stack.
- C. For floor cleanouts for piping below floors, install cleanout deck plates with top flush with finished floor.
- D. For cleanouts located in concealed piping, install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall.
- E. Install test tees in vertical conductors and near floor.
- F. Install wall cleanouts in vertical conductors. Install access door in wall if indicated.

3.2 CONNECTIONS

- A. Comply with requirements for piping specified in Section 221413 "Facility Storm Drainage Piping." Drawings indicate general arrangement of piping, fittings, and specialties.

3.3 FLASHING INSTALLATION

- A. Fabricate flashing from single piece of metal unless large pans, sumps, or other drainage shapes are required. Join flashing according to the following if required:
 - 1. Lead Sheets: Burn joints of 6.0-lb/sq. ft. lead sheets, 0.0938-inch thickness or thicker. Solder joints of 4.0-lb/sq. ft. lead sheets, 0.0625-inch thickness or thinner.
 - 2. Copper Sheets: Solder joints of copper sheets.
- B. Install sheet flashing on pipes, sleeves, and specialties passing through or embedded in floors and roofs with waterproof membrane.
 - 1. Pipe Flashing: Sleeve type, matching the pipe size, with a minimum length of 10 inches and with skirt or flange extending at least 8 inches around pipe.
 - 2. Sleeve Flashing: Flat sheet, with skirt or flange extending at least 8 inches around sleeve.
 - 3. Embedded Specialty Flashing: Flat sheet, with skirt or flange extending at least 8 inches around specialty.
- C. Set flashing on floors and roofs in solid coating of bituminous cement.
- D. Secure flashing into sleeve and specialty clamping ring or device.
- E. Fabricate and install flashing and pans, sumps, and other drainage shapes.

3.4 PROTECTION

- A. Protect drains during remainder of construction period to avoid clogging with dirt or debris and to prevent damage from traffic or construction work.
- B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

END OF SECTION 22 14 23

SECTION 22 16 16
CONDENSATE DRAIN PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:

1. Pipe, tube, and fittings.
2. Specialty pipe fittings.

- B. Related Sections:S

1. Section 221619 "Condensate Drain Piping Specialties" for sanitary sewerage piping and structures outside the building.

1.3 WORK INCLUDED

- A. Furnish all labor, materials, services, testing, transportation and equipment necessary for the completion of all plumbing work as indicated on drawings and specified herein. Work materials and equipment not indicated or specified which is necessary for the complete and proper operation of the work of this Section in accordance with the true intent and meaning of the contract documents shall be provided and incorporated at no additional cost to the Owner.

1.4 QUALITY ASSURANCE

- A. Code Requirements: All work covered by this Section shall conform to the latest requirements of the following regulations:

1. C.C.R., Title 24, Part 5 (2022 CPC).
2. 2022 California Plumbing Code.
3. SMACNA Seismic Restraint Manual Guidelines for Mechanical Systems.
4. National Fire Protection Association.
5. California State Division of Industrial Safety.
6. County Health Department.
7. Any other legally constituted body-having jurisdiction thereof.

- B. Nothing in the specifications or drawings shall be construed to permit deviation from the requirements of governing codes unless approval for said deviation has been obtained from the legally constituted authorities having jurisdiction and from the Owner's representative.

1.5 PERFORMANCE REQUIREMENTS

- A. Components and installation shall be capable of withstanding the following minimum working pressure unless otherwise indicated:
 - 1. Single-Wall Piping Pressure Rating: 10-foot head of water.
- A. Delegated Design: Design seismic restraints for aboveground piping, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

1.6 DRAWINGS

- A. Because of the small-scale drawings, it is not possible to indicate all offsets, fittings and accessories which may be required. The Contractor shall carefully investigate the conditions surrounding installation of his work, furnishing the necessary piping, fittings, valves, traps, and other devices which may be required to complete the installation.
- B. The general arrangement indicated on the drawings shall be followed as closely as possible. Coordinate with the Architectural, Structural, Mechanical and Electrical Drawings and the work of other trades prior to installation of piping fixtures and equipment to verify adequate space available for installation of the work shown. In the event a field condition arises which makes it impossible to install the work as indicated, submit, in writing, the proposed departures to the Architect for his approval. Only when Architect's approval is given, in writing, shall Contractor proceed with installation of the work.
- C. Special Note: Should the Contractor make changes in the installation differing from what is indicated on the contract drawings and not necessitated due to field conditions as indicated hereinabove, the Contractor shall be required to re-install the work to comply with what has been indicated on the contract drawings. Should it be impossible to re-install the work and the installation is in accordance with all governing authorities, the architect may permit the installation to remain. However, all costs incurred to revise the contract drawings by the engineer for resubmittal to the building department indicating the as-installed condition shall become the responsibility of the Contractor.
- D. In case of a difference in the specifications or between the specifications and the drawings, the Contractor shall figure the most expensive alternate and after award of contract, shall secure direction from the Architect.

1.7 PERMITS, INSPECTIONS AND LICENSES

- A. All permits, inspections and licenses required by the legally constituted authorities for installation of the work according to the plans and specifications shall be obtained and paid as a part of the work of this section.

1.8 EXAMINATION OF PREMISES

- A. Before bidding on this work, Contractors shall make a careful examination of the premises and shall thoroughly familiarize themselves with the requirements of the contract. By the act of submitting a proposal for the work included in this contract, the Contractor shall be deemed to have made such study and examination, and that he is familiar with and accepts all conditions of the site.

1.9 PROTECTION

- A. All work, equipment and materials shall be protected at all times. Contractor shall make good all damage caused either directly or indirectly by his own workmen. Contractor shall also protect his own work from damage. He shall close all pipe openings with caps or plugs during installation. He shall protect all his equipment and materials against dirt, water, chemical and mechanical injury. Upon completion, all work shall be thoroughly cleaned and delivered in a new condition.
- B. Contractor shall be held responsible for all damage to equipment and materials until he has received written notice from the Architect or Engineer that his work has been accepted.

1.10 LOCATIONS

- A. The locations of apparatus, piping and equipment indicated on the drawings are approximate. Piping and equipment shall be installed in such a manner as to avoid all obstruction, preserve headroom, and keep openings and passages clear. The locations of and mounting heights of all fixtures shall be coordinated with the architectural plans and room elevations.
- B. Clearances and Openings: Contractor shall cooperate and coordinate his work with all other trades to avoid conflict and permit for a neat and orderly appearance of the entire installation. The Contractor shall, in advance of the work, furnish instructions to the General Contractor as to his requirements for equipment and material installation of any kind, whether or not specifically mentioned on drawings or in the specifications, and shall include recesses, chases in walls, and all required openings in the structure. Should furnishing this information be neglected, delayed or incorrect and additional cuttings are found to be required, the cost of the same shall be charged to this Contractor.
- C. Contractor shall verify and coordinate pipe routing with location of all electrical rooms, elevator equipment rooms, telecom/data rooms, and other rooms dedicated to the housing of switchgear, panels, or other electrical equipment. In no case shall piping be installed within or above the ceiling of such rooms.

1.11 SUBMITTAL DATA

- A. Submittal Requirements:
 - 1. Furnish, all at one time, prior to any installation, within the time noted below, six (6) copies of valid submittal data on all fixtures, material, equipment and devices. Each submitted item shall be indexed and referenced to these specifications and to identification numbers on fixtures and equipment schedules.
 - 2. Manufacturers' submittal literature and shop drawings are required on all items to ensure the latest and most complete manufacturer's data is available for review. Requirements of the submittals and Engineer's submittal notes are a part of the work of this Division except that Engineer's notes may not be used as a means of increasing the scope of work of this Division.
 - 3. Submittals will be checked for general conformance with the design concept of the project but the review does not guarantee quantities shown and does not supersede requirements of this Division to properly install work.

4. To be valid, all submittals must:
- a. Be delivered to the Architect's office within thirty-five (35) days of award of the contract. Contractor shall make time allowance for Engineer's review, return of comments, if any, and resubmittal if required. Corrections or changes in submittals returned as inadequate or incomplete shall be accomplished within this time limit.
 - b. Clearly indicate and label as such any items proposed as substitution for that specified or shown on plans.
 - c. Include all pertinent construction, installation, performance and technical data.
 - d. Have all product data sheets clearly labeled to indicate the individual items being submitted. In addition, all required options and accessories shall be clearly marked.
 - 1) Product data sheets corresponding to items indicated on plans shall be clearly labeled with the corresponding fixture or equipment tag number.
 - 2) Product data sheets corresponding to items indicated in specifications shall be clearly labeled with the specification section, page and item numbers.
 - e. Include, for every item which differs in size, configuration, connections, service, accessibility or any other significant way, a drawing to the same (or larger) scale as to the pertinent portions of the contract drawings. In this drawing show a complete layout of the system except that which is identical to the contract drawings, unless the unchanged portions must be shown to indicate such things as clearances. This drawing, together with the contract design drawings must show the complete system as revised to accommodate the proposed alternate.

B. Substitution Requirements:

1. Any items included in submittals and proposed by the Contractor as substitution for that specified or shown on plans shall be submitted within thirty five (35) days of award of the contract. After such time, proposed substitutions shall not be accepted for review, and the Contractor shall submit all items as specified or shown on plans.
 - a. For each item proposed as substitution for that specified or shown on plans, copies of product data sheets for the specified item shall be placed side by side with product data sheets for the proposed substitution item within the submittal.
 - 1) In addition to the Submittal Requirements for labeling listed above, product data sheets for the specified item shall be clearly labeled "SPECIFIED ITEM, NOT SUBMITTED". Product data sheets for the corresponding proposed substitution item shall be clearly labeled "PROPOSED SUBSTITUTION".
 - b. Provide calculations and other detailed data justifying how any items proposed as substitution were selected for proposal. Data must be complete enough to permit detailed comparison of every significant characteristic for which the specified item was analyzed during design.
2. It shall be the Contractor's responsibility to provide sufficient information to allow the Engineer to analyze any proposed alternate. If inadequate information is provided, the proposal will not be approved and resubmittal will not be allowed.
3. The Contractor shall provide or perform tests required by Engineer for purpose of judging acceptability of proposed substitutions.

4. The Contractor assumes full responsibility that alternate items and procedures will meet the job requirements and is responsible for cost of redesign and of modifications to this and other parts of work caused by alternate items furnished under work in this Section. In view of these responsibilities, it is the purpose of these specifications to establish procedures to ensure that the Contractor has considered all the ramifications of proposed alternates before submitting them for review. Submittals which do not comply with the requirements of these specifications or which indicate proposed alternates that were selected without proper regard to the requirements of the job will not be approved. No more than one proposed alternate will be considered for each item.
5. Alternate items installed without Engineer's approval will be replaced with specified items at Contractor's expense.

1.12 INFORMATIONAL SUBMITTALS

- A. Seismic Qualification Certificates: For waste and vent piping, accessories, and components, from manufacturer.
 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 2. Detailed description of piping anchorage devices on which the certification is based and their installation requirements.
- B. Field quality-control reports.

1.13 QUALITY ASSURANCE

- A. Piping materials shall bear label, stamp, or other markings of specified testing agency.
- B. Comply with NSF/ANSI 14, "Plastics Piping Systems Components and Related Materials," for plastic piping components. Include marking with "NSF-dwv" for plastic drain, waste, and vent piping and "NSF-sewer" for plastic sewer piping.

1.14 PROJECT CONDITIONS

- A. Interruption of Existing Sanitary Waste Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:
 1. Notify Architect no fewer than two days in advance of proposed interruption of sanitary waste service.
 2. Do not proceed with interruption of sanitary waste service without Architect's written permission.

1.15 UNINSPECTED WORK

- A. The Contractor shall not allow or cause any of his work to be covered up or closed in until it has been inspected, tested, approved by all authorities have jurisdiction, and until Project Record drawings have been properly annotated.
- B. Should any of his work be covered up or closed in before such inspection, he shall, at his own expense, uncover the work to the satisfaction of the inspection party. All related repair work cost shall be borne by the Contractor.

1.16 RECORD DRAWINGS (Also see General Conditions)

- A. Contractor shall provide and keep up-to-date a complete "as-built" record set of blueline prints which shall show every change from the original drawings and the exact "as-built" locations and sizes of the work provided under this Section of the specifications. This set shall include locations, dimensions, depth of buried piping, cleanouts, shut-off valves, sewer invert locations, plugged wyes, tees, etc. On completion of the work, the Contractor shall incorporate all as-built information on a set of reproducible tracings provided by the Architect and this set of reproducibles shall be delivered to the Architect.

1.17 GUARANTEES (Also see General Conditions)

- A. Contractor shall guarantee the entire plumbing and piping systems unconditionally for a period of one (1) year after final acceptance. If, during this period, any materials, equipment, or any part of the systems fail to function properly, the Contractor shall make good the defects promptly and without any expense to the Owner.
- B. Contractor shall be responsible for all damage to any part of the premises caused by leaks in pipelines or equipment furnished and installed under this Section for a period of one (1) year after date of acceptance of his work.
- C. All equipment and fixtures shall carry manufacturer's warranty against defective parts or poor workmanship for not less than one (1) year. See specific equipment specifications for extended warranty requirements.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

- A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.
- B. Indirect Waste Piping.
 - 1. Shall be Type "L" copper as specified for water piping.
- C. Air Conditioning Condensate Drain Piping.
 - 1. Shall be Type "M" copper as specified for water piping.

2.2 COPPER TUBE AND FITTINGS:

- A. Hard Copper Tube: ASTM B 88, Type M tube, drawn temper.
- B. Wrought-Copper, Solder-Joint Fittings: ASME B16.22, wrought-copper pressure fittings.

C. Copper Unions:

1. MSS SP-123.
2. Cast-copper-alloy, hexagonal-stock body.
3. Ball-and-socket, metal-to-metal seating surfaces.
4. Solder-joint or threaded ends

2.3 SPECIALTY PIPE FITTINGS

A. Dielectric Fittings:

1. General Requirements: Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.
2. Dielectric Unions:
 - a. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - 1) Wilkins; a Zurn company.
 - b. Description:
 - 1) Standard: ASSE 1079.
 - 2) Pressure Rating: 150 psig.
 - 3) End Connections: Solder-joint copper alloy and threaded ferrous.

PART 3 - EXECUTION

3.1 PIPING INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of condensate drain piping. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.
- B. Install condensate drain piping with 1 percent slope downward toward drain.
- C. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.
- D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
- F. Install piping at indicated slopes.
- G. Install nipples, unions, special fittings, and valves with pressure ratings the same as or higher than the system pressure rating used in applications below unless otherwise indicated

- H. Install piping free of sags and bends.
- I. Install fittings for changes in direction and branch connections.
- J. Install piping to allow application of insulation.
- K. Install unions in copper tubing at connection to each piece of equipment, machine, and specialty.
- L. Install seismic restraints on piping. Comply with requirements for seismic-restraint devices specified in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."
- M. Install aboveground copper tubing according to CDA's "Copper Tube Handbook."
- N. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.
- O. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."
- P. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."
- Q. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 220518 "Escutcheons for Plumbing Piping."

3.2 JOINT CONSTRUCTION

- A. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
 - 1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
 - 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
- B. Join copper tube and fittings with soldered joints according to ASTM B 828. Use ASTM B 813, water-flushable, lead-free flux and ASTM B 32, lead-free-alloy solder.

3.3 SPECIALTY PIPE FITTING INSTALLATION

- A. Dielectric Fittings:
 - 1. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.
 - 2. Dielectric Fittings for NPS 2 and Smaller: Use dielectric unions.

3.4 HANGER AND SUPPORT INSTALLATION

- A. Comply with requirements for seismic-restraint devices specified in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."

B. Comply with requirements for pipe hanger and support devices and installation specified in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."

1. Vertical Piping: MSS Type 8 or 42, clamps.
2. Individual, Straight, Horizontal Piping Runs:
 - a. 100 Feet (30 m) and Less: MSS Type 1, adjustable, steel clevis hangers.
 - b. Longer Than 100 Feet (30 m): MSS Type 43, adjustable roller hangers.
 - c. Longer Than 100 Feet (30 m) if Indicated: MSS Type 49, spring cushion rolls.
3. Multiple, Straight, Horizontal Piping Runs 100 Feet (30 m) or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
4. Base of Vertical Piping: MSS Type 52, spring hangers
5. Vertical Piping: MSS Type 8 or Type 42, clamps.
6. Install individual, straight, horizontal piping runs:
 - a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
 - b. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.
 - c. Longer Than 100 Feet if Indicated: MSS Type 49, spring cushion rolls.
7. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
8. Base of Vertical Piping: MSS Type 52, spring hangers.

C. Support vertical piping and tubing at base and at each floor.

D. Rod diameter may be reduced one size for double-rod hangers, with 3/8-inch minimum rods.

E. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1-1/4 and Smaller: 72 inches with 3/8-inch rod.
2. NPS 1-1/2 and NPS 2: 96 inches with 3/8-inch rod.

F. Install supports for vertical copper tubing every 10 feet.

G. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

3.5 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect drainage and vent piping to the following:

1. Plumbing Specialties: Connect drainage piping in sizes indicated, but not smaller than required by plumbing code.
2. Install test tees (wall cleanouts) in conductors near floor.
3. Equipment: Connect drainage piping as indicated. Provide union for each connection.

- C. Where installing piping adjacent to equipment, allow space for service and maintenance of equipment.
- D. Make connections according to the following unless otherwise indicated:
 - 1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.

3.6 IDENTIFICATION

- A. Identify exposed condensate drain piping. Comply with requirements for identification specified in Section 220553 "Identification for Plumbing Piping and Equipment."

3.7 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:

- 1. Piping Inspections:

- a. Do not enclose, cover, or put piping into operation until it has been inspected and approved by authorities having jurisdiction.
- b. During installation, notify authorities having jurisdiction at least one day before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction:
 - 1) Roughing-in Inspection: Arrange for inspection of piping before concealing or closing in after roughing in and before setting fixtures.
 - 2) Final Inspection: Arrange for authorities having jurisdiction to observe tests specified in "Piping Tests" Subparagraph below and to ensure compliance with requirements.
- c. Reinspection: If authorities having jurisdiction find that piping will not pass tests or inspections, make required corrections and arrange for reinspection.
- d. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

- 2. Piping Tests:

- a. Fill condensate drain piping. Check components to determine that they are not air bound and that piping is full of water.
- b. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit a separate report for each test, complete with diagram of portion of piping tested.
- c. Leave new, altered, extended, or replaced domestic water piping uncovered and unconcealed until it has been tested and approved. Expose work that was covered or concealed before it was tested.
- d. Cap and subject piping to static water pressure of 50 psig. Isolate test source and allow it to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
- e. Repair leaks and defects with new materials, and retest piping or portion thereof until satisfactory results are obtained.
- f. Prepare reports for tests and for corrective action required.

- B. Condensate drain piping will be considered defective if it does not pass tests and inspections

- C. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.
- D. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

3.8 CLEANING AND PROTECTION

- A. Clean interior of piping. Remove dirt and debris as work progresses.
- B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.
- C. Place plugs in ends of uncompleted piping at end of day and when work stops.

3.9 PIPING SCHEDULE

- A. Flanges and unions may be used on aboveground pressure piping unless otherwise indicated.
- B. Aboveground, condensate drain piping NPS 2 and smaller, shall be the following:
 - 1. Hard copper tube, ASTM B 88, Type M copper, solder-joint fittings; and soldered joints.

END OF SECTION 22 16 16

SECTION 22 33 00

ELECTRIC DOMESTIC-WATER HEATERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:

1. Commercial, electric, storage, domestic-water heaters.
2. Domestic-water heater accessories.

1.3 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Commercial domestic-water heaters shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified."

1.4 WORK INCLUDED

- A. Furnish all labor, materials, services, testing, transportation and equipment necessary for the completion of all plumbing work as indicated on drawings and specified herein. Work materials and equipment not indicated or specified which is necessary for the complete and proper operation of the work of this Section in accordance with the true intent and meaning of the contract documents shall be provided and incorporated at no additional cost to the Owner.

1.5 QUALITY ASSURANCE

- A. Code Requirements: All work covered by this Section shall conform to the latest requirements of the following regulations:

1. C.C.R., Title 24, Part 5 (2022 CPC).
2. 2022 California Plumbing Code.
3. SMACNA Seismic Restraint Manual Guidelines for Mechanical Systems.
4. National Fire Protection Association.
5. California Division of the State Architect.
6. California State Division of Industrial Safety.
7. County Health Department.
8. Any other legally constituted body-having jurisdiction thereof.

- B. Nothing in the specifications or drawings shall be construed to permit deviation from the requirements of governing codes unless approval for said deviation has been obtained from the legally constituted authorities having jurisdiction and from the Owner's representative.

1.6 DRAWINGS

- A. Because of the small-scale drawings, it is not possible to indicate all offsets, fittings and accessories which may be required. The Contractor shall carefully investigate the conditions surrounding installation of his work, furnishing the necessary piping, fittings, valves, traps, and other devices which may be required to complete the installation.
- B. The general arrangement indicated on the drawings shall be followed as closely as possible. Coordinate with the Architectural, Structural, Mechanical and Electrical Drawings and the work of other trades prior to installation of piping fixtures and equipment to verify adequate space available for installation of the work shown. In the event a field condition arises which makes it impossible to install the work as indicated, submit, in writing, the proposed departures to the Architect for his approval. Only when Architect's approval is given, in writing, shall Contractor proceed with installation of the work.
- C. Special Note: Should the Contractor make changes in the installation differing from what is indicated on the contract drawings and not necessitated due to field conditions as indicated hereinabove, the Contractor shall be required to re-install the work to comply with what has been indicated on the contract drawings. Should it be impossible to re-install the work and the installation is in accordance with all governing authorities, the architect may permit the installation to remain. However, all costs incurred to revise the contract drawings by the engineer for resubmittal to the building department indicating the as-installed condition shall become the responsibility of the Contractor.
- D. In case of a difference in the specifications or between the specifications and the drawings, the Contractor shall figure the most expensive alternate and after award of contract, shall secure direction from the Architect.

1.7 PERMITS, INSPECTIONS AND LICENSES

- A. All permits, inspections and licenses required by the legally constituted authorities for installation of the work according to the plans and specifications shall be obtained and paid as a part of the work of this section.

1.8 EXAMINATION OF PREMISES

- A. Before bidding on this work, Contractors shall make a careful examination of the premises and shall thoroughly familiarize themselves with the requirements of the contract. By the act of submitting a proposal for the work included in this contract, the Contractor shall be deemed to have made such study and examination, and that he is familiar with and accepts all conditions of the site.

1.9 PROTECTION

- A. All work, equipment and materials shall be protected at all times. Contractor shall make good all damage caused either directly or indirectly by his own workmen. Contractor shall also protect his own work from damage. He shall close all pipe openings with caps or plugs during installation. He shall protect all his equipment and materials against dirt, water, chemical and mechanical injury. Upon completion, all work shall be thoroughly cleaned and delivered in a new condition.
- B. Contractor shall be held responsible for all damage to equipment and materials until he has received written notice from the Architect or Engineer that his work has been accepted.

1.10 LOCATIONS

- A. The locations of apparatus, piping and equipment indicated on the drawings are approximate. Piping and equipment shall be installed in such a manner as to avoid all obstruction, preserve headroom, and keep openings and passages clear. The locations of and mounting heights of all fixtures shall be coordinated with the architectural plans and room elevations.
- B. Clearances and Openings: Contractor shall cooperate and coordinate his work with all other trades to avoid conflict and permit for a neat and orderly appearance of the entire installation. The Contractor shall, in advance of the work, furnish instructions to the General Contractor as to his requirements for equipment and material installation of any kind, whether or not specifically mentioned on drawings or in the specifications, and shall include recesses, chases in walls, and all required openings in the structure. Should furnishing this information be neglected, delayed or incorrect and additional cuttings are found to be required, the cost of the same shall be charged to this Contractor.
- C. Contractor shall verify and coordinate pipe routing with location of all electrical rooms, elevator equipment rooms, telecom/data rooms, and other rooms dedicated to the housing of switchgear, panels, or other electrical equipment. In no case shall piping be installed within or above the ceiling of such rooms.

1.11 SUBMITTAL DATA

A. Submittal Requirements:

- 1. Furnish, all at one time, prior to any installation, within the time noted below, six (6) copies of valid submittal data on all fixtures, material, equipment and devices. Each submitted item shall be indexed and referenced to these specifications and to identification numbers on fixtures and equipment schedules.
- 2. Manufacturers' submittal literature and shop drawings are required on all items to ensure the latest and most complete manufacturer's data is available for review. Requirements of the submittals and Engineer's submittal notes are a part of the work of this Division except that Engineer's notes may not be used as a means of increasing the scope of work of this Division.
- 3. Submittals will be checked for general conformance with the design concept of the project but the review does not guarantee quantities shown and does not supersede requirements of this Division to properly install work.
- 4. To be valid, all submittals must:
 - a. Be delivered to the Architect's office within thirty-five (35) days of award of the contract. Contractor shall make time allowance for Engineer's review, return of comments, if any, and resubmittal if required. Corrections or changes in submittals returned as inadequate or incomplete shall be accomplished within this time limit.
 - b. Clearly indicate and label as such any items proposed as substitution for that specified or shown on plans.
 - c. Include all pertinent construction, installation, performance and technical data.
 - d. Have all product data sheets clearly labeled to indicate the individual items being submitted. In addition, all required options and accessories shall be clearly marked.
 - 1) Product data sheets corresponding to items indicated on plans shall be clearly labeled with the corresponding fixture or equipment tag number.
 - 2) Product data sheets corresponding to items indicated in specifications shall be clearly labeled with the specification section, page and item numbers.

- e. Include, for every item which differs in size, configuration, connections, service, accessibility or any other significant way, a drawing to the same (or larger) scale as to the pertinent portions of the contract drawings. In this drawing show a complete layout of the system except that which is identical to the contract drawings, unless the unchanged portions must be shown to indicate such things as clearances. This drawing, together with the contract design drawings must show the complete system as revised to accommodate the proposed alternate.

B. Substitution Requirements:

1. Any items included in submittals and proposed by the Contractor as substitution for that specified or shown on plans shall be submitted within thirty five (35) days of award of the contract. After such time, proposed substitutions shall not be accepted for review, and the Contractor shall submit all items as specified or shown on plans.
 - a. For each item proposed as substitution for that specified or shown on plans, copies of product data sheets for the specified item shall be placed side by side with product data sheets for the proposed substitution item within the submittal.
 - 1) In addition to the Submittal Requirements for labeling listed above, product data sheets for the specified item shall be clearly labeled "SPECIFIED ITEM, NOT SUBMITTED". Product data sheets for the corresponding proposed substitution item shall be clearly labeled "PROPOSED SUBSTITUTION".
 - b. Provide calculations and other detailed data justifying how any items proposed as substitution were selected for proposal. Data must be complete enough to permit detailed comparison of every significant characteristic for which the specified item was analyzed during design.
2. It shall be the Contractor's responsibility to provide sufficient information to allow the Engineer to analyze any proposed alternate. If inadequate information is provided, the proposal will not be approved and resubmittal will not be allowed.
3. The Contractor shall provide or perform tests required by Engineer for purpose of judging acceptability of proposed substitutions.
4. The Contractor assumes full responsibility that alternate items and procedures will meet the job requirements and is responsible for cost of redesign and of modifications to this and other parts of work caused by alternate items furnished under work in this Section. In view of these responsibilities, it is the purpose of these specifications to establish procedures to ensure that the Contractor has considered all the ramifications of proposed alternates before submitting them for review. Submittals which do not comply with the requirements of these specifications or which indicate proposed alternates that were selected without proper regard to the requirements of the job will not be approved. No more than one proposed alternate will be considered for each item.
5. Alternate items installed without Engineer's approval will be replaced with specified items at Contractor's expense.
6. The Architect or his authorized representative shall be the sole judge as to the quality and suitability of proposed alternate equipment, fixtures or materials. Decisions of the Architect or that of his representative shall be final and conclusive.

1.12 UNINSPECTED WORK

- A. The Contractor shall not allow or cause any of his work to be covered up or closed in until it has been inspected, tested, approved by all authorities have jurisdiction, and until Project Record drawings have been properly annotated.

1.13 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. ASHRAE/IESNA Compliance: Fabricate and label fuel-fired, domestic-water heaters to comply with ASHRAE/IESNA 90.1.
- C. ASME Compliance:
 - 1. Where ASME-code construction is indicated, fabricate and label commercial, domestic-water heater storage tanks to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.
- D. NSF Compliance: Fabricate and label equipment components that will be in contact with potable water to comply with NSF 61, "Drinking Water System Components - Health Effects."

1.14 COORDINATION

- A. Coordinate sizes and locations of concrete bases with actual equipment provided.

1.15 RECORD DRAWINGS (Also see General Conditions)

- A. Contractor shall provide and keep up-to-date a complete "as-built" record set of blue-line prints which shall show every change from the original drawings and the exact "as-built" locations and sizes of the work provided under this Section of the specifications. This set shall include locations, dimensions, depth of buried piping, cleanouts, shut-off valves, sewer invert locations, plugged wyes, tees, etc. On completion of the work, the Contractor shall incorporate all as-built information on a set of reproducible tracings provided by the Architect and this set of reproducible tracings shall be delivered to the Architect.

1.16 WARRANTY

- A. Contractor shall guarantee the entire plumbing and piping systems unconditionally for a period of one (1) year after final acceptance. If, during this period, any materials, equipment, or any part of the systems fail to function properly, the Contractor shall make good the defects promptly and without any expense to the Owner.
- B. Contractor shall be responsible for all damage to any part of the premises caused by leaks in pipelines or equipment furnished and installed under this Section for a period of one (1) year after date of acceptance of his work.
- C. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of fuel-fired, domestic-water heaters that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including storage tank and supports.
 - b. Faulty operation of controls.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal use.
 - 2. Warranty Periods: From date of Substantial Completion.
 - a. Commercial, Gas-Fired, Storage, Domestic-Water Heaters:
 - 1) Storage Tank: Five years.

2) Controls and Other Components: Two years.

b. Compression Tanks: Five years.

c.

PART 2 - PRODUCTS

2.1 COMMERCIAL, ELECTRIC, domestic-WATER HEATERS

A. Commercial, Electric, Storage, Domestic-Water Heaters:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. AO Smith
 - b. Bradford White
 - c. Rheem
2. Standard: UL 1453.
3. Factory-Installed Storage-Tank Appurtenances:
 - a. Anode Rod: Replaceable magnesium.
 - b. Drain Valve: Corrosion-resistant metal complying with ASSE 1005.
 - c. Insulation: Comply with ASHRAE/IESNA 90.1.
 - d. Jacket: Steel with enameled finish.
 - e. Heating Elements: Electric, screw-in or bolt-on immersion type arranged in multiples of three.
 - f. Temperature Control: Adjustable thermostat.
 - g. Safety Controls: High-temperature-limit and low-water cutoff devices or systems.
 - h. Relief Valves: ASME rated and stamped for combination temperature-and-pressure relief valves. Include one or more relief valves with total relieving capacity at least as great as heat input, and include pressure setting less than domestic-water heater working-pressure rating. Select one relief valve with sensing element that extends into storage tank.
4. Special Requirements: NSF 5 construction.

2.2 domestic-WATER HEATER ACCESSORIES

A. Domestic-Water Compression Tanks:

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. AMTROL Inc.
 - b. Smith, A. O. Water Products Co.; a division of A. O. Smith Corporation.
 - c. Taco, Inc.
2. Description: Steel pressure-rated tank constructed with welded joints and factory-installed butyl-rubber diaphragm. Include air precharge to minimum system-operating pressure at tank.
3. Construction:
 - a. Tappings: Factory-fabricated steel, welded to tank before testing and labeling. Include ASME B1.20.1 pipe thread.
 - b. Interior Finish: Comply with NSF 61 barrier materials for potable-water tank linings, including extending finish into and through tank fittings and outlets.
 - c. Air-Charging Valve: Factory installed.

- B. Drain Pans: Corrosion-resistant metal with raised edge. Comply with ANSI/CSA LC 3. Include dimensions not less than base of domestic-water heater, and include drain outlet not less than NPS 3/4 with ASME B1.20.1 pipe threads or with ASME B1.20.7 garden-hose threads.
- C. Combination Temperature-and-Pressure Relief Valves: ASME rated and stamped. Include relieving capacity at least as great as heat input, and include pressure setting less than domestic-water heater working-pressure rating. Select relief valves with sensing element that extends into storage tank.
- D. Pressure Relief Valves: ASME rated and stamped. Include pressure setting less than domestic-water heater working-pressure rating.
- E. Vacuum Relief Valves: ANSI Z21.22/CSA 4.4.
- F. Shock Absorbers: ASSE 1010 or PDI-WH 201, Size A water hammer arrester.
- G. Domestic-Water Heater Stands: Manufacturer's factory-fabricated steel stand for floor mounting, capable of supporting domestic-water heater and water. Include dimension that will support bottom of domestic-water heater a minimum of 18 inches above the floor.
- H. Domestic-Water Heater Mounting Brackets: Manufacturer's factory-fabricated steel bracket for wall mounting, capable of supporting domestic-water heater and water.

2.3 SOURCE QUALITY CONTROL

- A. Factory Tests: Test and inspect domestic-water heaters specified to be ASME-code construction, according to ASME Boiler and Pressure Vessel Code.
- B. Hydrostatically test commercial domestic-water heaters to minimum of one and one-half times pressure rating before shipment.
- C. Electric, domestic-water heaters will be considered defective if they do not pass tests and inspections. Comply with requirements in Section 014000 "Quality Requirements" for retesting and reinspecting requirements and Section 017300 "Execution" for requirements for correcting the Work.
- D. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 DOMESTIC-WATER HEATER INSTALLATION

- A. Commercial, Electric, Domestic-Water Heater Mounting: Install commercial, electric, domestic-water heaters on concrete base. Comply with requirements for concrete bases specified in Section 033000 "Cast-in-Place Concrete."
 1. Exception: Omit concrete bases for commercial, electric, domestic-water heaters if installation on stand, bracket, suspended platform, or directly on floor is indicated.
 2. Maintain manufacturer's recommended clearances.
 3. Arrange units so controls and devices that require servicing are accessible.
 4. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of concrete base.
 5. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
 6. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 7. Install anchor bolts to elevations required for proper attachment to supported equipment.
 8. Anchor domestic-water heaters to substrate.

- B. Install electric, domestic-water heaters level and plumb, according to layout drawings, original design, and referenced standards. Maintain manufacturer's recommended clearances. Arrange units so controls and devices needing service are accessible.
 - 1. Install shutoff valves on domestic-water-supply piping to domestic-water heaters and on domestic-hot-water outlet piping. Comply with requirements for shutoff valves specified in Section 220523 "General-Duty Valves for Plumbing Piping."
 - C. Install commercial, electric, domestic-water heaters with seismic-restraint devices. Comply with requirements for seismic-restraint devices specified in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."
 - D. Install combination temperature-and-pressure relief valves in top portion of storage tanks. Use relief valves with sensing elements that extend into tanks. Extend commercial-water-heater relief-valve outlet, with drain piping same as domestic-water piping in continuous downward pitch, and discharge by positive air gap onto closest floor drain.
 - E. Install combination temperature-and-pressure relief valves in water piping for electric, domestic-water heaters without storage. Extend commercial-water-heater relief-valve outlet, with drain piping same as domestic-water piping in continuous downward pitch, and discharge by positive air gap onto closest floor drain.
 - F. Install water-heater drain piping as indirect waste to spill by positive air gap into open drains or over floor drains. Install hose-end drain valves at low points in water piping for electric, domestic-water heaters that do not have tank drains. Comply with requirements for hose-end drain valves specified in Section 221119 "Domestic Water Piping Specialties."
 - G. Install thermometers on outlet piping of electric, domestic-water heaters. Comply with requirements for thermometers specified in Section 220519 "Meters and Gages for Plumbing Piping."
 - H. Install thermometers on inlet and outlet piping of residential, solar, electric, domestic-water heaters. Comply with requirements for thermometers specified in Section 220519 "Meters and Gages for Plumbing Piping."
 - I. Assemble and install inlet and outlet piping manifold kits for multiple electric, domestic-water heaters. Fabricate, modify, or arrange manifolds for balanced water flow through each electric, domestic-water heater. Include shutoff valve and thermometer in each domestic-water heater inlet and outlet, and throttling valve in each electric, domestic-water heater outlet. Comply with requirements for valves specified in Section 220523 "General-Duty Valves for Plumbing Piping," and comply with requirements for thermometers specified in Section 220519 "Meters and Gages for Plumbing Piping."
 - J. Install piping-type heat traps on inlet and outlet piping of electric, domestic-water heater storage tanks without integral or fitting-type heat traps.
 - K. Fill electric, domestic-water heaters with water.
 - L. Charge domestic-water compression tanks with air.
- 3.2 CONNECTIONS
- A. Comply with requirements for piping specified in Section 221116 "Domestic Water Piping." Drawings indicate general arrangement of piping, fittings, and specialties.
 - B. Where installing piping adjacent to electric, domestic-water heaters, allow space for service and maintenance of water heaters. Arrange piping for easy removal of domestic-water heaters.

3.3 IDENTIFICATION

- A. Identify system components. Comply with requirements for identification specified in Section 220553 "Identification for Plumbing Piping and Equipment."

3.4 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
 - 1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
 - 2. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
 - 3. Operational Test: After electrical circuitry has been energized, start units to confirm proper operation.
 - 4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- B. Electric, domestic-water heaters will be considered defective if they do not pass tests and inspections. Comply with requirements in Section 014000 "Quality Requirements" for retesting and reinspecting requirements and Section 017300 "Execution" for requirements for correcting the Work.
- C. Prepare test and inspection reports.

3.5 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain commercial, electric, domestic-water heaters.

END OF SECTION 22 33 00

SECTION 22 42 13 13

COMMERCIAL WATER CLOSETS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Water closets.
 - 2. Flushometer valves.
 - 3. Toilet seats.

1.3 WORK INCLUDED

- A. Furnish all labor, materials, services, testing, transportation and equipment necessary for the completion of all plumbing work as indicated on drawings and specified herein. Work materials and equipment not indicated or specified which is necessary for the complete and proper operation of the work of this Section in accordance with the true intent and meaning of the contract documents shall be provided and incorporated at no additional cost to the Owner.

1.4 QUALITY ASSURANCE

- A. Code Requirements: All work covered by this Section shall conform to the latest requirements of the following regulations:
 - 1. C.C.R., Title 24, Part 5 (2022 CPC).
 - 2. 2022 California Plumbing Code.
 - 3. SMACNA Seismic Restraint Manual Guidelines for Mechanical Systems.
 - 4. National Fire Protection Association.
 - 5. California State Division of Industrial Safety.
 - 6. County Health Department.
 - 7. Any other legally constituted body-having jurisdiction thereof.
 - 8. Plumbing fixtures and accessories provided in a toilet room or bathing room required to comply with CBC Section 11B-213.2 shall comply with CBC Section 11B-213.3.
 - 9. Access plumbing fixtures shall comply with all of the requirements of CBC Division 6.
 - 10. Clearance around accessible water closets and in toilet compartments shall be 60 inches minimum measured perpendicular from the side wall and 56 inches minimum measured perpendicular from the rear wall per CBC Section 11B-604.3.1.
 - 11. Heights and location of all fixtures shall be mounted according to CBC Sections 11B-602 through 11B-612.
 - 12. Accessible fixture controls shall comply with CBC Sections 11B-604.6 for water closets and 11B-604.9.5 for children's water closets.

- B. Nothing in the specifications or drawings shall be construed to permit deviation from the requirements of governing codes unless approval for said deviation has been obtained from the legally constituted authorities having jurisdiction and from the Owner's representative.

1.5 DRAWINGS

- A. Because of the small-scale drawings, it is not possible to indicate all offsets, fittings and accessories which may be required. The Contractor shall carefully investigate the conditions surrounding installation of his work, furnishing the necessary piping, fittings, valves, traps, and other devices which may be required to complete the installation.
- B. The general arrangement indicated on the drawings shall be followed as closely as possible. Coordinate with the Architectural, Structural, Mechanical and Electrical Drawings and the work of other trades prior to installation of piping fixtures and equipment to verify adequate space available for installation of the work shown. In the event a field condition arises which makes it impossible to install the work as indicated, submit, in writing, the proposed departures to the Architect for his approval. Only when Architect's approval is given, in writing, shall Contractor proceed with installation of the work.
- C. Special Note: Should the Contractor make changes in the installation differing from what is indicated on the contract drawings and not necessitated due to field conditions as indicated hereinabove, the Contractor shall be required to re-install the work to comply with what has been indicated on the contract drawings. Should it be impossible to re-install the work and the installation is in accordance with all governing authorities, the architect may permit the installation to remain. However, all costs incurred to revise the contract drawings by the engineer for resubmittal to the building department indicating the as-installed condition shall become the responsibility of the Contractor.
- D. In case of a difference in the specifications or between the specifications and the drawings, the Contractor shall figure the most expensive alternate and after award of contract, shall secure direction from the Architect.

1.6 PERMITS, INSPECTIONS AND LICENSES

- A. All permits, inspections and licenses required by the legally constituted authorities for installation of the work according to the plans and specifications shall be obtained and paid as a part of the work of this section.

1.7 EXAMINATION OF PREMISES

- A. Before bidding on this work, Contractors shall make a careful examination of the premises and shall thoroughly familiarize themselves with the requirements of the contract. By the act of submitting a proposal for the work included in this contract, the Contractor shall be deemed to have made such study and examination, and that he is familiar with and accepts all conditions of the site.

1.8 PROTECTION

- A. All work, equipment and materials shall be protected at all times. Contractor shall make good all damage caused either directly or indirectly by his own workmen. Contractor shall also protect his own work from damage. He shall close all pipe openings with caps or plugs during installation. He shall protect all his equipment and materials against dirt, water, chemical and mechanical injury. Upon completion, all work shall be thoroughly cleaned and delivered in a new condition.
- B. Contractor shall be held responsible for all damage to equipment and materials until he has received written notice from the Architect or Engineer that his work has been accepted.

1.9 LOCATIONS

- A. The locations of apparatus, piping and equipment indicated on the drawings are approximate. Piping and equipment shall be installed in such a manner as to avoid all obstruction, preserve headroom, and keep openings and passages clear. The locations of and mounting heights of all fixtures shall be coordinated with the architectural plans and room elevations.
- B. Clearances and Openings: Contractor shall cooperate and coordinate his work with all other trades to avoid conflict and permit for a neat and orderly appearance of the entire installation. The Contractor shall, in advance of the work, furnish instructions to the General Contractor as to his requirements for equipment and material installation of any kind, whether or not specifically mentioned on drawings or in the specifications, and shall include recesses, chases in walls, and all required openings in the structure. Should furnishing this information be neglected, delayed or incorrect and additional cuttings are found to be required, the cost of the same shall be charged to this Contractor.
- C. Contractor shall verify and coordinate pipe routing with location of all electrical rooms, elevator equipment rooms, telecom/data rooms, and other rooms dedicated to the housing of switchgear, panels, or other electrical equipment. In no case shall piping be installed within or above the ceiling of such rooms.

1.10 SUBMITTAL DATA

- A. Submittal Requirements:
 - 1. Furnish, all at one time, prior to any installation, within the time noted below, six (6) copies of valid submittal data on all fixtures, material, equipment and devices. Each submitted item shall be indexed and referenced to these specifications and to identification numbers on fixtures and equipment schedules.
 - 2. Manufacturers' submittal literature and shop drawings are required on all items to ensure the latest and most complete manufacturer's data is available for review. Requirements of the submittals and Engineer's submittal notes are a part of the work of this Division except that Engineer's notes may not be used as a means of increasing the scope of work of this Division.
 - 3. Submittals will be checked for general conformance with the design concept of the project but the review does not guarantee quantities shown and does not supersede requirements of this Division to properly install work.

4. To be valid, all submittals must:
 - a. Be delivered to the Architect's office within thirty-five (35) days of award of the contract. Contractor shall make time allowance for Engineer's review, return of comments, if any, and resubmittal if required. Corrections or changes in submittals returned as inadequate or incomplete shall be accomplished within this time limit.
 - b. Clearly indicate and label as such any items proposed as substitution for that specified or shown on plans.
 - c. Include all pertinent construction, installation, performance and technical data.
 - d. Have all product data sheets clearly labeled to indicate the individual items being submitted. In addition, all required options and accessories shall be clearly marked.
 - 1) Product data sheets corresponding to items indicated on plans shall be clearly labeled with the corresponding fixture or equipment tag number.
 - 2) Product data sheets corresponding to items indicated in specifications shall be clearly labeled with the specification section, page and item numbers.
 - e. Include, for every item which differs in size, configuration, connections, service, accessibility or any other significant way, a drawing to the same (or larger) scale as to the pertinent portions of the contract drawings. In this drawing show a complete layout of the system except that which is identical to the contract drawings, unless the unchanged portions must be shown to indicate such things as clearances. This drawing, together with the contract design drawings must show the complete system as revised to accommodate the proposed alternate.

B. Substitution Requirements:

1. Any items included in submittals and proposed by the Contractor as substitution for that specified or shown on plans shall be submitted within thirty five (35) days of award of the contract. After such time, proposed substitutions shall not be accepted for review, and the Contractor shall submit all items as specified or shown on plans.
 - a. For each item proposed as substitution for that specified or shown on plans, copies of product data sheets for the specified item shall be placed side by side with product data sheets for the proposed substitution item within the submittal.
 - 1) In addition to the Submittal Requirements for labeling listed above, product data sheets for the specified item shall be clearly labeled "SPECIFIED ITEM, NOT SUBMITTED". Product data sheets for the corresponding proposed substitution item shall be clearly labeled "PROPOSED SUBSTITUTION".
 - b. Provide calculations and other detailed data justifying how any items proposed as substitution were selected for proposal. Data must be complete enough to permit detailed comparison of every significant characteristic for which the specified item was analyzed during design.
2. It shall be the Contractor's responsibility to provide sufficient information to allow the Engineer to analyze any proposed alternate. If inadequate information is provided, the proposal will not be approved and resubmittal will not be allowed.
3. The Contractor shall provide or perform tests required by Engineer for purpose of judging acceptability of proposed substitutions.

4. The Contractor assumes full responsibility that alternate items and procedures will meet the job requirements and is responsible for cost of redesign and of modifications to this and other parts of work caused by alternate items furnished under work in this Section. In view of these responsibilities, it is the purpose of these specifications to establish procedures to ensure that the Contractor has considered all the ramifications of proposed alternates before submitting them for review. Submittals which do not comply with the requirements of these specifications or which indicate proposed alternates that were selected without proper regard to the requirements of the job will not be approved. No more than one proposed alternate will be considered for each item.
5. Alternate items installed without Engineer's approval will be replaced with specified items at Contractor's expense.
6. The Architect or his authorized representative shall be the sole judge as to the quality and suitability of proposed alternate equipment, fixtures or materials. Decisions of the Architect or that of his representative shall be final and conclusive.

1.11 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that are packaged with protective covering for storage and identified with labels describing contents.
 1. Flushometer-Valve Repair Kits: Equal to 10 percent of amount of each type installed, but no fewer than six of each type.

1.12 UNINSPECTED WORK

- A. The Contractor shall not allow or cause any of his work to be covered up or closed in until it has been inspected, tested, approved by all authorities have jurisdiction, and until Project Record drawings have been properly annotated.
- B. Should any of his work be covered up or closed in before such inspection, he shall, at his own expense, uncover the work to the satisfaction of the inspection party. All related repair work cost shall be borne by the Contractor.

1.13 RECORD DRAWINGS (Also see General Conditions)

- A. Contractor shall provide and keep up-to-date a complete "as-built" record set of blue-line prints which shall show every change from the original drawings and the exact "as-built" locations and sizes of the work provided under this Section of the specifications. This set shall include locations, dimensions, depth of buried piping, cleanouts, shut-off valves, sewer invert locations, plugged wyes, tees, etc. On completion of the work, the Contractor shall incorporate all as-built information on a set of reproducible tracings provided by the Architect and this set of reproducible tracings shall be delivered to the Architect.

1.14 GUARANTEES (Also see General Conditions)

- A. Contractor shall guarantee the entire plumbing and piping systems unconditionally for a period of one (1) year after final acceptance. If, during this period, any materials, equipment, or any part of the systems fail to function properly, the Contractor shall make good the defects promptly and without any expense to the Owner.

- B. Contractor shall be responsible for all damage to any part of the premises caused by leaks in pipelines or equipment furnished and installed under this Section for a period of one (1) year after date of acceptance of his work.
- C. All equipment and fixtures shall carry manufacturer's warranty against defective parts or poor workmanship for not less than one (1) year. See specific equipment specifications for extended warranty requirements.

PART 2 - PRODUCTS

2.1 Equipment and Fixtures:

A. Fixtures:

- 1. See schedule on drawings.

2.2 FLOOR-MOUNTED, BOTTOM-OUTLET WATER CLOSETS

A. Water Closets: Floor mounted, bottom outlet, top spud.

- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- 2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. American Standard America.
 - b. Kohler Co.
- 3. Bowl:
 - a. Standards: ASME A112.19.2/CSA B45.1 and ASME A112.19.5.
 - b. Material: Vitreous china.
 - c. Type: Siphon jet.
 - d. Style: Flushometer valve.
 - e. Height: Standard.
 - f. Rim Contour: Elongated.
 - g. Water Consumption: 1.28 gal. (4.8 L) per flush.
 - h. Spud Size and Location: NPS 1-1/2 (DN 40); top.

2.3 FLUSHOMETER VALVES

A. Lever-Handle, Diaphragm Flushometer Valves:

- 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
- 2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. Sloan Valve Company.

3. Standard: ASSE 1037.
4. Minimum Pressure Rating: 125 psig (860 kPa).
5. Features: Include integral check stop and backflow-prevention device.
6. Material: Brass body with corrosion-resistant components.
7. Exposed Flushometer-Valve Finish: Chrome plated.
8. Panel Finish: Chrome plated or stainless steel.
9. Style: Exposed.
10. Consumption: 1.28 gal. (4.8 L) per flush.
11. Minimum Inlet: NPS 1 (DN 25).
12. Minimum Outlet: NPS 1-1/4 (DN 32).

2.4 TOILET SEATS

A. Toilet Seats:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. Bemis Manufacturing Company.
 - b. Olsonite Seat Co.
3. Standard: IAPMO/ANSI Z124.5.
4. Material: Plastic.
5. Type: Commercial (Standard).
6. Shape: Elongated rim, open front.
7. Hinge: Self-sustaining, check.
8. Hinge Material: Noncorroding metal.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Locations and Accessibility: Install equipment for ease of maintenance and repair. If changes in the indicated locations or arrangements are made by the Contractor, they shall be made without additional charges.
- B. Openings: Furnish information to the other trades on size and location of openings which are required in walls, slabs, roof, for piping and equipment at the proper times.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.
- D. Closing-In of Uninspected Work: Do not allow or cause any of the work to be covered up or enclosed until it has been inspected, tested, and approved by the Architect. Any work enclosed or covered prior to such inspection and test shall be uncovered and, after it has been inspected, tested, and approved, make all repairs with such materials as may be necessary to restore all work, including that of other trades, to its original and proper condition.

3.2 INSTALLATION

A. Water-Closet Installation:

1. Install level and plumb according to roughing-in drawings.
2. Install accessible, wall-mounted water closets at mounting height for handicapped/elderly, according to ICC/ANSI A117.1.

B. Flushometer-Valve Installation:

1. Install flushometer-valve, water-supply fitting on each supply to each water closet.
2. Attach supply piping to supports or substrate within pipe spaces behind fixtures.
3. Install lever-handle flushometer valves for accessible water closets with handle mounted on open side of water closet.

C. Install toilet seats on water closets.

D. Wall Flange and Escutcheon Installation:

1. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations and within cabinets and millwork.
2. Install deep-pattern escutcheons if required to conceal protruding fittings.
3. Comply with escutcheon requirements specified in Section 220518 "Escutcheons for Plumbing Piping."

E. Joint Sealing:

1. Seal joints between water closets and walls and floors using sanitary-type, one-part, mildew-resistant silicone sealant.
2. Match sealant color to water-closet color.
3. Comply with sealant requirements specified in Section 079200 "Joint Sealants."

3.3 CONNECTIONS

- A. Connect water closets with water supplies and soil, waste, and vent piping. Use size fittings required to match water closets.
- B. Comply with water piping requirements specified in Section 221116 "Domestic Water Piping."
- C. Comply with soil and waste piping requirements specified in Section 221316 "Sanitary Waste and Vent Piping."
- D. Where installing piping adjacent to water closets, allow space for service and maintenance.

3.4 ADJUSTING

- A. Operate and adjust water closets and controls. Replace damaged and malfunctioning water closets, fittings, and controls.
- B. Adjust water pressure at flushometer valves to produce proper flow.
- C. Install fresh batteries in battery-powered, electronic-sensor mechanisms.

3.5 CLEANING AND PROTECTION

- A. Clean water closets and fittings with manufacturers' recommended cleaning methods and materials.
- B. Install protective covering for installed water closets and fittings.
- C. Do not allow use of water closets for temporary facilities unless approved in writing by Owner.

3.6 PLUMBING FIXTURES

- A. Accessible plumbing fixtures shall comply with all of the requirements of CBC Division 6.
- B. Heights and location of all accessible fixtures shall be mounted according to CBC Sections 11B-602 through 11B-612.
- C. Fixture controls shall comply with CBC Sections 11B-604.6 for water closets

END OF SECTION 22 42 13 13

SECTION 22 42 16 13

COMMERCIAL LAVATORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:

- 1. Lavatories.
- 2. Faucets.

1.3 WORK INCLUDED

- A. Furnish all labor, materials, services, testing, transportation and equipment necessary for the completion of all plumbing work as indicated on drawings and specified herein. Work materials and equipment not indicated or specified which is necessary for the complete and proper operation of the work of this Section in accordance with the true intent and meaning of the contract documents shall be provided and incorporated at no additional cost to the Owner.

1.4 QUALITY ASSURANCE

- A. Code Requirements: All work covered by this Section shall conform to the latest requirements of the following regulations:

- 1. C.C.R., Title 24, Part 5 (2022 CPC).
- 2. 2022 California Plumbing Code.
- 3. SMACNA Seismic Restraint Manual Guidelines for Mechanical Systems.
- 4. National Fire Protection Association.
- 5. California State Division of Industrial Safety.
- 6. County Health Department.
- 7. Any other legally constituted body-having jurisdiction thereof.
- 8. Plumbing fixtures and accessories provided in a toilet room or bathing room required to comply with CBC Section 11B-213.2 shall comply with CBC Section 11B-213.3.
- 9. Access plumbing fixtures shall comply with all of the requirements of CBC Division 6.
- 10. Heights and location of all fixtures shall be mounted according to CBC Sections 11B-602 through 11B-612.
- 11. Accessible fixture controls shall comply with CBC Sections 11B-611.3 for lavatories and sinks.
- 12. Accessible lavatories and sinks shall be mounted with the front of the higher of the rim or counter surface 34" maximum above the finish floor or ground. Depth of lavatories or sinks shall not interfere with knee and toe clearance provided in accordance with CBC 11B-306 when forward approach is required CBC Sections 11B-606.3 and 11B606.7.

13. Water supply and drain pipes under accessible lavatories and sinks shall be insulated or otherwise configured to protect against contact. There shall be no sharp or abrasive surfaces under accessible lavatories or sinks. CBC Section 11B-606.5.

B. Nothing in the specifications or drawings shall be construed to permit deviation from the requirements of governing codes unless approval for said deviation has been obtained from the legally constituted authorities having jurisdiction and from the Owner's representative.

1.5 DRAWINGS

A. Because of the small-scale drawings, it is not possible to indicate all offsets, fittings and accessories which may be required. The Contractor shall carefully investigate the conditions surrounding installation of his work, furnishing the necessary piping, fittings, valves, traps, and other devices which may be required to complete the installation.

B. The general arrangement indicated on the drawings shall be followed as closely as possible. Coordinate with the Architectural, Structural, Mechanical and Electrical Drawings and the work of other trades prior to installation of piping fixtures and equipment to verify adequate space available for installation of the work shown. In the event a field condition arises which makes it impossible to install the work as indicated, submit, in writing, the proposed departures to the Architect for his approval. Only when Architect's approval is given, in writing, shall Contractor proceed with installation of the work.

C. Special Note: Should the Contractor make changes in the installation differing from what is indicated on the contract drawings and not necessitated due to field conditions as indicated hereinabove, the Contractor shall be required to re-install the work to comply with what has been indicated on the contract drawings. Should it be impossible to re-install the work and the installation is in accordance with all governing authorities, the architect may permit the installation to remain. However, all costs incurred to revise the contract drawings by the engineer for resubmittal to the building department indicating the as-installed condition shall become the responsibility of the Contractor.

D. In case of a difference in the specifications or between the specifications and the drawings, the Contractor shall figure the most expensive alternate and after award of contract, shall secure direction from the Architect.

1.6 PERMITS, INSPECTIONS AND LICENSES

A. All permits, inspections and licenses required by the legally constituted authorities for installation of the work according to the plans and specifications shall be obtained and paid as a part of the work of this section.

1.7 EXAMINATION OF PREMISES

A. Before bidding on this work, Contractors shall make a careful examination of the premises and shall thoroughly familiarize themselves with the requirements of the contract. By the act of submitting a proposal for the work included in this contract, the Contractor shall be deemed to have made such study and examination, and that he is familiar with and accepts all conditions of the site.

1.8 PROTECTION

- A. All work, equipment and materials shall be protected at all times. Contractor shall make good all damage caused either directly or indirectly by his own workmen. Contractor shall also protect his own work from damage. He shall close all pipe openings with caps or plugs during installation. He shall protect all his equipment and materials against dirt, water, chemical and mechanical injury. Upon completion, all work shall be thoroughly cleaned and delivered in a new condition.
- B. Contractor shall be held responsible for all damage to equipment and materials until he has received written notice from the Architect or Engineer that his work has been accepted.

1.9 LOCATIONS

- A. The locations of apparatus, piping and equipment indicated on the drawings are approximate. Piping and equipment shall be installed in such a manner as to avoid all obstruction, preserve headroom, and keep openings and passages clear. The locations of and mounting heights of all fixtures shall be coordinated with the architectural plans and room elevations.
- B. Clearances and Openings: Contractor shall cooperate and coordinate his work with all other trades to avoid conflict and permit for a neat and orderly appearance of the entire installation. The Contractor shall, in advance of the work, furnish instructions to the General Contractor as to his requirements for equipment and material installation of any kind, whether or not specifically mentioned on drawings or in the specifications, and shall include recesses, chases in walls, and all required openings in the structure. Should furnishing this information be neglected, delayed or incorrect and additional cuttings are found to be required, the cost of the same shall be charged to this Contractor.
- C. Contractor shall verify and coordinate pipe routing with location of all electrical rooms, elevator equipment rooms, telecom/data rooms, and other rooms dedicated to the housing of switchgear, panels, or other electrical equipment. In no case shall piping be installed within or above the ceiling of such rooms.

1.10 SUBMITTAL DATA

- A. Submittal Requirements:
 - 1. Furnish, all at one time, prior to any installation, within the time noted below, six (6) copies of valid submittal data on all fixtures, material, equipment and devices. Each submitted item shall be indexed and referenced to these specifications and to identification numbers on fixtures and equipment schedules.
 - 2. Manufacturers' submittal literature and shop drawings are required on all items to ensure the latest and most complete manufacturer's data is available for review. Requirements of the submittals and Engineer's submittal notes are a part of the work of this Division except that Engineer's notes may not be used as a means of increasing the scope of work of this Division.
 - 3. Submittals will be checked for general conformance with the design concept of the project but the review does not guarantee quantities shown and does not supersede requirements of this Division to properly install work.

4. To be valid, all submittals must:
- a. Be delivered to the Architect's office within thirty-five (35) days of award of the contract. Contractor shall make time allowance for Engineer's review, return of comments, if any, and resubmittal if required. Corrections or changes in submittals returned as inadequate or incomplete shall be accomplished within this time limit.
 - b. Clearly indicate and label as such any items proposed as substitution for that specified or shown on plans.
 - c. Include all pertinent construction, installation, performance and technical data.
 - d. Have all product data sheets clearly labeled to indicate the individual items being submitted. In addition, all required options and accessories shall be clearly marked.
 - 1) Product data sheets corresponding to items indicated on plans shall be clearly labeled with the corresponding fixture or equipment tag number.
 - 2) Product data sheets corresponding to items indicated in specifications shall be clearly labeled with the specification section, page and item numbers.
 - e. Include, for every item which differs in size, configuration, connections, service, accessibility or any other significant way, a drawing to the same (or larger) scale as to the pertinent portions of the contract drawings. In this drawing show a complete layout of the system except that which is identical to the contract drawings, unless the unchanged portions must be shown to indicate such things as clearances. This drawing, together with the contract design drawings must show the complete system as revised to accommodate the proposed alternate.

B. Substitution Requirements:

- 1. Any items included in submittals and proposed by the Contractor as substitution for that specified or shown on plans shall be submitted within thirty five (35) days of award of the contract. After such time, proposed substitutions shall not be accepted for review, and the Contractor shall submit all items as specified or shown on plans.
 - a. For each item proposed as substitution for that specified or shown on plans, copies of product data sheets for the specified item shall be placed side by side with product data sheets for the proposed substitution item within the submittal.
 - 1) In addition to the Submittal Requirements for labeling listed above, product data sheets for the specified item shall be clearly labeled "SPECIFIED ITEM, NOT SUBMITTED". Product data sheets for the corresponding proposed substitution item shall be clearly labeled "PROPOSED SUBSTITUTION".
 - b. Provide calculations and other detailed data justifying how any items proposed as substitution were selected for proposal. Data must be complete enough to permit detailed comparison of every significant characteristic for which the specified item was analyzed during design.
- 2. It shall be the Contractor's responsibility to provide sufficient information to allow the Engineer to analyze any proposed alternate. If inadequate information is provided, the proposal will not be approved and resubmittal will not be allowed.
- 3. The Contractor shall provide or perform tests required by Engineer for purpose of judging acceptability of proposed substitutions.

4. The Contractor assumes full responsibility that alternate items and procedures will meet the job requirements and is responsible for cost of redesign and of modifications to this and other parts of work caused by alternate items furnished under work in this Section. In view of these responsibilities, it is the purpose of these specifications to establish procedures to ensure that the Contractor has considered all the ramifications of proposed alternates before submitting them for review. Submittals which do not comply with the requirements of these specifications or which indicate proposed alternates that were selected without proper regard to the requirements of the job will not be approved. No more than one proposed alternate will be considered for each item.
5. Alternate items installed without Engineer's approval will be replaced with specified items at Contractor's expense.
6. The Architect or his authorized representative shall be the sole judge as to the quality and suitability of proposed alternate equipment, fixtures or materials. Decisions of the Architect or that of his representative shall be final and conclusive.

1.11 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that are packaged with protective covering for storage and identified with labels describing contents.

1.12 UNINSPECTED WORK

- A. The Contractor shall not allow or cause any of his work to be covered up or closed in until it has been inspected, tested, approved by all authorities have jurisdiction, and until Project Record drawings have been properly annotated.
- B. Should any of his work be covered up or closed in before such inspection, he shall, at his own expense, uncover the work to the satisfaction of the inspection party. All related repair work cost shall be borne by the Contractor.

1.13 RECORD DRAWINGS (Also see General Conditions)

- A. Contractor shall provide and keep up-to-date a complete "as-built" record set of blue-line prints which shall show every change from the original drawings and the exact "as-built" locations and sizes of the work provided under this Section of the specifications. This set shall include locations, dimensions, depth of buried piping, cleanouts, shut-off valves, sewer invert locations, plugged wyes, tees, etc. On completion of the work, the Contractor shall incorporate all as-built information on a set of reproducible tracings provided by the Architect and this set of reproducible shall be delivered to the Architect.

1.14 GUARANTEES

- A. Contractor shall guarantee the entire plumbing and piping systems unconditionally for a period of one (1) year after final acceptance. If, during this period, any materials, equipment, or any part of the systems fail to function properly, the Contractor shall make good the defects promptly and without any expense to the Owner.
- B. Contractor shall be responsible for all damage to any part of the premises caused by leaks in pipelines or equipment furnished and installed under this Section for a period of one (1) year after date of acceptance of his work.

- C. All equipment and fixtures shall carry manufacturer's warranty against defective parts or poor workmanship for not less than one (1) year. See specific equipment specifications for extended warranty requirements.

PART 2 - PRODUCTS

2.1 Equipment and Fixtures:

A. Fixtures:

- 1. See schedule on drawings.

2.2 VITREOUS-CHINA, WALL-MOUNTED LAVATORIES

A. Lavatory: Vitreous china, wall mounted, with back.

- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. American Standard America.
 - b. Kohler Co.
- 2. Fixture:
 - a. Standard: ASME A112.19.2/CSA B45.1.
 - b. Type: For wall hanging.
 - c. Faucet-Hole Location: Top.
 - d. Color: White.
 - e. Mounting Material: Chair carrier.
- 3. Support: ASME A112.6.1M, Type II, concealed-arm lavatory carrier.

2.3 VITREOUS-CHINA, UNDERCOUNTER-MOUNTED LAVATORIES

A. Lavatory: Vitreous china, under-counter mounted.

- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- 2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. American Standard America.
 - b. Kohler Co.
- 3. Fixture:
 - a. Standard: ASME A112.19.2/CSA B45.1.
 - b. Type: For deck mounted.
 - c. Faucet-Hole Location: Counter.
 - d. Color: White.
 - e. Mounting Material: Manufacturers recommended installation.

2.4 SOLID-BRASS, MANUALLY OPERATED FAUCETS

- A. NSF Standard: Comply with NSF/ANSI 61, "Drinking Water System Components - Health Effects," for faucet materials that will be in contact with potable water.
- B. Lavatory Faucets: Manual-type, single-control mixing, commercial, solid-brass valve.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - 2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. Chicago Faucets.
 - 3. Standard: ASME A112.18.1/CSA B125.1.
 - 4. General: Include hot- and cold-water indicators; coordinate faucet inlets with supplies and fixture hole punchings; coordinate outlet with spout and fixture receptor.
 - 5. Body Material: Commercial, solid brass.
 - 6. Finish: Polished chrome plate.
 - 7. Mounting Type: Deck, exposed.

2.5 SUPPLY FITTINGS

- A. NSF Standard: Comply with NSF/ANSI 61, "Drinking Water System Components - Health Effects," for supply-fitting materials that will be in contact with potable water.
- B. Standard: ASME A112.18.1/CSA B125.1.
- C. Supply Piping: Chrome-plated-brass pipe or chrome-plated copper tube matching water-supply piping size. Include chrome-plated-brass or stainless-steel wall flange.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - 2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. Chicago
- D. Supply Stops: Chrome-plated-brass, one-quarter-turn, ball-type or compression valve with inlet connection matching supply piping.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - 2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. Chicago
- E. Operation: Loose key.
- F. Risers:
 - 1. NPS 3/8.
 - 2. Chrome-plated, rigid-copper-pipe and brass straight or offset tailpieces riser.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Locations and Accessibility: Install equipment for ease of maintenance and repair. If changes in the indicated locations or arrangements are made by the Contractor, they shall be made without additional charges.
- B. Openings: Furnish information to the other trades on size and location of openings which are required in walls, slabs, roof, for piping and equipment at the proper times.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.
- D. Closing-In of Uninspected Work: Do not allow or cause any of the work to be covered up or enclosed until it has been inspected, tested, and approved by the Architect. Any work enclosed or covered prior to such inspection and test shall be uncovered and, after it has been inspected, tested, and approved, make all repairs with such materials as may be necessary to restore all work, including that of other trades, to its original and proper condition.

3.2 INSTALLATION

- A. Install lavatories level and plumb according to roughing-in drawings.
- B. Install supports, affixed to building substrate, for wall-mounted lavatories.
- C. Install accessible wall-mounted lavatories at handicapped/elderly mounting height for people with disabilities or the elderly, according to ICC/ANSI A117.1.
- D. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations. Use deep-pattern escutcheons if required to conceal protruding fittings. Comply with escutcheon requirements specified in Section 220518 "Escutcheons for Plumbing Piping."
- E. Seal joints between lavatories, counters, and walls using sanitary-type, one-part, mildew-resistant silicone sealant. Match sealant color to fixture color. Comply with sealant requirements specified in Section 079200 "Joint Sealants."
- F. Install protective shielding pipe covers and enclosures on exposed supplies and waste piping of accessible lavatories. Comply with requirements in Section 220719 "Plumbing Piping Insulation."
- G. Point of use mixing valve in cabinet to be recessed in wall, under lavatory.

3.3 CONNECTIONS

- A. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.
- B. Comply with water piping requirements specified in Section 221116 "Domestic Water Piping."
- C. Comply with soil and waste piping requirements specified in Section 221316 "Sanitary Waste and Vent Piping."

3.4 ADJUSTING

- A. Operate and adjust lavatories and controls. Replace damaged and malfunctioning lavatories, fittings, and controls.
- B. Adjust water pressure at faucets to produce proper flow.

3.5 CLEANING AND PROTECTION

- A. After completing installation of lavatories, inspect and repair damaged finishes.
- B. Clean lavatories, faucets, and other fittings with manufacturers' recommended cleaning methods and materials.
- C. Provide protective covering for installed lavatories and fittings.
- D. Do not allow use of lavatories for temporary facilities unless approved in writing by Owner.

3.6 PLUMBING FIXTURES

- A. Accessible plumbing fixtures shall comply with all of the requirements of CBC Division 6.
- B. Heights and location of all accessible fixtures shall be mounted according to CBC Sections 11B-602 through 11B-612.
- C. Fixture controls shall comply with CBC Sections 11B-606.4 for lavatories and sinks.
- D. Accessible sinks shall be 6-1/2" deep maximum. Sinks shall be mounted with front of the higher of the rim and counter surface 34" maximum above the finish floor or ground.
- E. Water supply and drain pipes under lavatories and sinks shall be insulated or otherwise configured to protect against contact. There shall be no sharp or abrasive surfaces under lavatories and sinks. CBC Section 11B-606.

END OF SECTION 22 42 16 13

SECTION 22 42 23

COMMERCIAL SHOWERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Individual shower receptors.
2. Shower faucets.
3. Group showers.
4. Grout.

B. Related Requirements:

1. Section 224100 "Residential Plumbing Fixtures" for residential showers.
2. Section 224300 "Medical Plumbing Fixtures" for healthcare showers.
3. Section 224500 "Emergency Plumbing Fixtures" for emergency showers.
4. Section 224600 "Security Plumbing Fixtures" for security showers.

1.1 WORK INCLUDED

- A. Furnish all labor, materials, services, testing, transportation and equipment necessary for the completion of all plumbing work as indicated on drawings and specified herein. Work materials and equipment not indicated or specified which is necessary for the complete and proper operation of the work of this Section in accordance with the true intent and meaning of the contract documents shall be provided and incorporated at no additional cost to the Owner.

1.2 QUALITY ASSURANCE

- A. Code Requirements: All work covered by this Section shall conform to the latest requirements of the following regulations:

1. C.C.R., Title 24, Part 5 (2022 CPC).
2. 2022 California Plumbing Code.
3. SMACNA Seismic Restraint Manual Guidelines for Mechanical Systems.
4. National Fire Protection Association.
5. California State Division of Industrial Safety.
6. County Health Department.
7. Any other legally constituted body having jurisdiction thereof.
8. Plumbing fixtures and accessories provided in a toilet room or bathing room required to comply with CBC Section 11B-213.2 shall comply with CBC Section 11B-213.3.

9. Access plumbing fixtures shall comply with all of the requirements of CBC Division 6.
10. Heights and location of all fixtures shall be mounted according to CBC Sections 11B-602 through 11B-612.
11. Accessible fixture controls shall comply with CBC Sections 11B-608.5 for showers.

- B. Nothing in the specifications or drawings shall be construed to permit deviation from the requirements of governing codes unless approval for said deviation has been obtained from the legally constituted authorities having jurisdiction and from the Owner's representative.

1.1 DRAWINGS

- A. Because of the small-scale drawings, it is not possible to indicate all offsets, fittings and accessories which may be required. The Contractor shall carefully investigate the conditions surrounding installation of his work, furnishing the necessary piping, fittings, valves, traps, and other devices which may be required to complete the installation.
- B. The general arrangement indicated on the drawings shall be followed as closely as possible. Coordinate with the Architectural, Structural, Mechanical and Electrical Drawings and the work of other trades prior to installation of piping fixtures and equipment to verify adequate space available for installation of the work shown. In the event a field condition arises which makes it impossible to install the work as indicated, submit, in writing, the proposed departures to the Architect for his approval. Only when Architect's approval is given, in writing, shall Contractor proceed with installation of the work.
- C. Special Note: Should the Contractor make changes in the installation differing from what is indicated on the contract drawings and not necessitated due to field conditions as indicated hereinabove, the Contractor shall be required to re-install the work to comply with what has been indicated on the contract drawings. Should it be impossible to re-install the work and the installation is in accordance with all governing authorities, the architect may permit the installation to remain. However, all costs incurred to revise the contract drawings by the engineer for resubmittal to the building department indicating the as-installed condition shall become the responsibility of the Contractor.
- D. In case of a difference in the specifications or between the specifications and the drawings, the Contractor shall figure the most expensive alternate and after award of contract, shall secure direction from the Architect.

1.2 PERMITS, INSPECTIONS AND LICENSES

- A. All permits, inspections and licenses required by the legally constituted authorities for installation of the work according to the plans and specifications shall be obtained and paid as a part of the work of this section.

1.1 EXAMINATION OF PREMISES

- A. Before bidding on this work, Contractors shall make a careful examination of the premises and shall thoroughly familiarize themselves with the requirements of the contract. By the act of submitting a proposal for the work included in this contract, the Contractor shall be deemed to have made such study and examination, and that he is familiar with and accepts all conditions of the site.

1.2 PROTECTION

- A. All work, equipment and materials shall be protected at all times. Contractor shall make good all damage caused either directly or indirectly by his own workmen. Contractor shall also protect his own work from damage. He shall close all pipe openings with caps or plugs during installation. He shall protect all his equipment and materials against dirt, water, chemical and mechanical injury. Upon completion, all work shall be thoroughly cleaned and delivered in a new condition.
- B. Contractor shall be held responsible for all damage to equipment and materials until he has received written notice from the Architect or Engineer that his work has been accepted.

1.3 LOCATIONS

- A. The locations of apparatus, piping and equipment indicated on the drawings are approximate. Piping and equipment shall be installed in such a manner as to avoid all obstruction, preserve headroom, and keep openings and passages clear. The locations of and mounting heights of all fixtures shall be coordinated with the architectural plans and room elevations.
- B. Clearances and Openings: Contractor shall cooperate and coordinate his work with all other trades to avoid conflict and permit for a neat and orderly appearance of the entire installation. The Contractor shall, in advance of the work, furnish instructions to the General Contractor as to his requirements for equipment and material installation of any kind, whether or not specifically mentioned on drawings or in the specifications, and shall include recesses, chases in walls, and all required openings in the structure. Should furnishing this information be neglected, delayed or incorrect and additional cuttings are found to be required, the cost of the same shall be charged to this Contractor.
- C. Contractor shall verify and coordinate pipe routing with location of all electrical rooms, elevator equipment rooms, telecom/data rooms, and other rooms dedicated to the housing of switchgear, panels, or other electrical equipment. In no case shall piping be installed within or above the ceiling of such rooms.

1.4 SUBMITTAL DATA

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for showers.
 - 2. Include rated capacities, operating characteristics, and furnished specialties and accessories.
- B. Submittal Requirements:
 - 1. Furnish, all at one time, prior to any installation, within the time noted below, six (6) copies of valid submittal data on all fixtures, material, equipment and devices. Each submitted item shall be indexed and referenced to these specifications and to identification numbers on fixtures and equipment schedules.
 - 2. Manufacturers' submittal literature and shop drawings are required on all items to ensure the latest and most complete manufacturer's data is available for review. Requirements of the submittals and Engineer's submittal notes are a part of the work of this Division except that Engineer's notes may not be used as a means of increasing the scope of work of this Division.

3. Submittals will be checked for general conformance with the design concept of the project but the review does not guarantee quantities shown and does not supersede requirements of this Division to properly install work.
4. To be valid, all submittals must:
 - a. Be delivered to the Architect's office within thirty-five (35) days of award of the contract. Contractor shall make time allowance for Engineer's review, return of comments, if any, and resubmittal if required. Corrections or changes in submittals returned as inadequate or incomplete shall be accomplished within this time limit.
 - b. Clearly indicate and label as such any items proposed as substitution for that specified or shown on plans.
 - c. Include all pertinent construction, installation, performance and technical data.
 - d. Have all product data sheets clearly labeled to indicate the individual items being submitted. In addition, all required options and accessories shall be clearly marked.
 - 1) Product data sheets corresponding to items indicated on plans shall be clearly labeled with the corresponding fixture or equipment tag number.
 - 2) Product data sheets corresponding to items indicated in specifications shall be clearly labeled with the specification section, page and item numbers.
 - e. Include, for every item which differs in size, configuration, connections, service, accessibility or any other significant way, a drawing to the same (or larger) scale as to the pertinent portions of the contract drawings. In this drawing show a complete layout of the system except that which is identical to the contract drawings, unless the unchanged portions must be shown to indicate such things as clearances. This drawing, together with the contract design drawings must show the complete system as revised to accommodate the proposed alternate.

C. Substitution Requirements:

1. Any items included in submittals and proposed by the Contractor as substitution for that specified or shown on plans shall be submitted within thirty five (35) days of award of the contract. After such time, proposed substitutions shall not be accepted for review, and the Contractor shall submit all items as specified or shown on plans.
 - a. For each item proposed as substitution for that specified or shown on plans, copies of product data sheets for the specified item shall be placed side by side with product data sheets for the proposed substitution item within the submittal.
 - 1) In addition to the Submittal Requirements for labeling listed above, product data sheets for the specified item shall be clearly labeled "SPECIFIED ITEM, NOT SUBMITTED". Product data sheets for the corresponding proposed substitution item shall be clearly labeled "PROPOSED SUBSTITUTION".
 - b. Provide calculations and other detailed data justifying how any items proposed as substitution were selected for proposal. Data must be complete enough to permit detailed comparison of every significant characteristic for which the specified item was analyzed during design.
2. It shall be the Contractor's responsibility to provide sufficient information to allow the Engineer to analyze any proposed alternate. If inadequate information is provided, the proposal will not be approved and resubmittal will not be allowed.

3. The Contractor shall provide or perform tests required by Engineer for purpose of judging acceptability of proposed substitutions.
4. The Contractor assumes full responsibility that alternate items and procedures will meet the job requirements and is responsible for cost of redesign and of modifications to this and other parts of work caused by alternate items furnished under work in this Section. In view of these responsibilities, it is the purpose of these specifications to establish procedures to ensure that the Contractor has considered all the ramifications of proposed alternates before submitting them for review. Submittals which do not comply with the requirements of these specifications or which indicate proposed alternates that were selected without proper regard to the requirements of the job will not be approved. No more than one proposed alternate will be considered for each item.
5. Alternate items installed without Engineer's approval will be replaced with specified items at Contractor's expense.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For shower faucets to include in maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 1. Faucet Washers and O-Rings: Equal to 10 percent of amount of each type and size installed.
 2. Faucet Cartridges and O-Rings: Equal to 5 percent of amount of each type and size installed.

1.7 QUALITY ASSURANCE

- A. Piping materials shall bear label, stamp, or other markings of specified testing agency.
- B. Comply with NSF/ANSI 14, "Plastics Piping System Components and Related Materials," for plastic piping components. Include marking with "NSF-drain" for plastic drain piping and "NSF-sewer" for plastic sewer piping.

1.8 PROJECT CONDITIONS

- A. Interruption of Existing Storm-Drainage Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:
 1. Notify Architect no fewer than two days in advance of proposed interruption of storm-drainage service.
 2. Do not proceed with interruption of storm-drainage service without Architect's written permission.

PART 2 - PRODUCTS

2.1 SHOWER FAUCETS

- A. NSF Standard: Comply with NSF 61, "Drinking Water System Components - Health Effects," for shower materials that will be in contact with potable water.
- B. Shower Faucets Faculty:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - 2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. Symmons
 - b. Bradley
 - c. Acorn Engineering Company
 - 3. Description: Single-handle, pressure-balance mixing valve with hot- and cold-water indicators; check stops; and shower head.
 - 4. Faucet:
 - a. Standards: ASME A112.18.1/CSA B125.1 and ASSE 1016.
 - b. Body Material: Solid brass.
 - c. Finish: Polished chrome plate.
 - d. Maximum Flow Rate: 1.5 gpm.
 - e. Mounting: Exposed.
 - f. Operation: Single-handle control.
 - g. Antiscald Device: Integral with mixing valve.
 - h. Check Stops: Check-valve type, integral with or attached to body; on hot- and cold-water supply connections.
 - 5. Supply Connections: NPS 1/2.
 - 6. Shower Head:
 - a. Standard: ASME A112.18.1/CSA B125.1.
 - b. Type: Hand shower with five foot stainless steel hose.
 - c. Shower Head Material: Metallic with chrome-plated finish.
 - d. Spray Pattern: Fixed.
 - e. Integral Volume Control: Required.
 - f. Shower-Arm, Flow-Control Fitting: 1.5 gpm.
 - g. Temperature Indicator: Not required.

2.2 GROUT

- A. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.
- B. Characteristics: Nonshrink; recommended for interior and exterior applications.
- C. Design Mix: 5000-psi, 28-day compressive strength.
- D. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine roughing-in of water-supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before shower installation.
- B. Examine walls and floors for suitable conditions where showers will be installed.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Assemble shower components according to manufacturers' written instructions.
- B. Install showers level and plumb according to roughing-in drawings.
- C. Install water-supply piping with stop on each supply to each shower faucet.
 - 1. Exception: Use ball, gate, or globe valves if supply stops are not specified with shower. Comply with valve requirements specified in Section 220523 "General-Duty Valves for Plumbing Piping."
 - 2. Install stops in locations where they can be easily reached for operation.
- D. Install shower flow-control fittings with specified maximum flow rates in shower arms.
- E. Set shower receptors in leveling bed of cement grout.
- F. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations. Use deep-pattern escutcheons if required to conceal protruding fittings. Comply with escutcheons requirements specified in Section 220518 "Escutcheons for Plumbing Piping."
- G. Seal joints between showers and floors and walls using sanitary-type, one-part, mildew-resistant silicone sealant. Match sealant color to fixture color. Comply with sealant requirements specified in Section 079200 "Joint Sealants."

3.3 COMPLETION OF INSTALLATION:

- A. Cleaning and Flushing: Clean all equipment and materials thoroughly. Leave surface to be painted smooth and clean, ready for painting.
- B. Flush each unit of water supply and distribution system thoroughly with clean water at the highest velocities attainable.
- C. Clean all piping, valves, traps, water heaters, fixtures and other devices thoroughly and flush or blow out until free of scale, oil silt, sand, sediment, pipe dope and foreign matter of any kind.

3.4 CONNECTIONS

- A. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.

- B. Comply with water piping requirements specified in Section 221116 "Domestic Water Piping."
- C. Comply with traps and soil and waste piping requirements specified in Section 221316 "Sanitary Waste and Vent Piping."

3.5 ADJUSTING

- A. Operate and adjust showers and controls. Replace damaged and malfunctioning showers, fittings, and controls.
- B. Adjust water pressure at faucets to produce proper flow.

3.6 CLEANING AND PROTECTION

- A. After completing installation of showers, inspect and repair damaged finishes.
- B. Clean showers, faucets, and other fittings with manufacturers' recommended cleaning methods and materials.
- C. Provide protective covering for installed fixtures and fittings.
- D. Do not allow use of showers for temporary facilities unless approved in writing by Owner.

3.7 OPERATION INSTRUCTION

- A. Prior to occupancy or prior to the date of final inspection, whichever may occur first, the Contractor shall prepare two (2) sets of typewritten instructions for the operation of all equipment, valves, etc., specified and furnished as a part of the work under this section, and shall assign a competent person, thoroughly familiar with the job, to demonstrate and instruct a representative of the Owner in the operation of the equipment. The time of said demonstration and instructions shall be arranged with the Owner's representative approximately one (1) week in advance. Verbal instructions shall include shut-off location of gas and water. The Contractor shall assemble all operation and maintenance data supplied by the manufacturers of the various pieces of equipment, all keys and special wrenches required to operate and service the equipment (including keys for yard boxes, gas stops and fixture stops), and all equipment warranties and deliver same to the representative of the Owner on date of said instructions.

END OF SECTION 22 42 23

SECTION 23 05 53

IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Equipment labels.
 - 2. Warning signs and labels.
 - 3. Pipe labels.
 - 4. Duct labels.
 - 5. Stencils.
 - 6. Valve tags.
 - 7. Warning tags.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Equipment Label Schedule: Include a listing of all equipment to be labeled with the proposed content for each label.
- C. Valve numbering scheme.
- D. Valve Schedules: For each piping system to include in maintenance manuals.

1.4 COORDINATION

- A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- B. Coordinate installation of identifying devices with locations of access panels and doors.
- C. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 EQUIPMENT LABELS

A. Plastic Labels for Equipment:

1. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.
2. Letter Color: White.
3. Background Color: Black.
4. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
5. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
6. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
7. Fasteners: Stainless-steel self-tapping screws.
8. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

B. Label Content: Include equipment's unique equipment number.

C. Equipment Label Schedule: For each item of equipment to be labeled, on 8-1/2-by-11-inch bond paper. Tabulate equipment identification number, manufacturer, model number, and identify Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.

2.2 WARNING SIGNS AND LABELS

A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.

B. Letter Color: Black.

C. Background Color: Yellow.

D. Maximum Temperature: Able to withstand temperatures up to 160 deg F.

E. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.

F. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.

G. Fasteners: Stainless-steel rivets or self-tapping screws.

H. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

I. Label Content: Include caution and warning information, plus emergency notification instructions.

2.3 PIPE LABELS

A. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction.

- B. Pretensioned Pipe Labels: Precoiled, semirigid plastic formed to cover full circumference of pipe and to attach to pipe without fasteners or adhesive.
- C. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings, pipe size, and an arrow indicating flow direction.
 - 1. Flow-Direction Arrows: Integral with piping system service lettering to accommodate both directions, or as separate unit on each pipe label to indicate flow direction.
 - 2. Lettering Size: At least 1-1/2 inches high.

2.4 DUCT LABELS

- A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.
- B. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
- C. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
- D. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
- E. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- F. Duct Label Contents: Include identification of duct service using same designations or abbreviations as used on Drawings, duct size, and an arrow indicating flow direction.
 - 1. Flow-Direction Arrows: Integral with duct system service lettering to accommodate both directions, or as separate unit on each duct label to indicate flow direction.
 - 2. Lettering Size: At least 1-1/2 inches high.

2.5 VALVE TAGS

- A. Valve Tags: Stamped or engraved with 1/4-inch letters for piping system abbreviation and 1/2-inch numbers.
 - 1. Tag Material: Brass, 0.032-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.
 - 2. Fasteners: Brass wire-link or beaded chain; or S-hook.
- B. Valve Schedules: For each piping system, on 8-1/2-by-11-inch bond paper. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal-operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.
 - 1. Valve-tag schedule shall be included in operation and maintenance data.

2.6 WARNING TAGS

- A. Warning Tags: Preprinted or partially preprinted, accident-prevention tags, of plasticized card stock with matte finish suitable for writing.
 - 1. Size: 3 by 5-1/4 inches minimum.
 - 2. Fasteners: Brass grommet and wire.

3. Nomenclature: Large-size primary caption such as "DANGER," "CAUTION," or "DO NOT OPERATE."
4. Color: Yellow background with black lettering.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

3.2 EQUIPMENT LABEL INSTALLATION

- A. Install or permanently fasten labels on each major item of mechanical equipment.
- B. Locate equipment labels where accessible and visible.

3.3 PIPE LABEL INSTALLATION

- A. Piping Color-Coding: Painting of piping is specified in other sections.
- B. Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:
 1. Near each valve and control device.
 2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
 3. Near penetrations through walls, floors, ceilings, and inaccessible enclosures.
 4. At access doors, manholes, and similar access points that permit view of concealed piping.
 5. Near major equipment items and other points of origination and termination.
 6. Spaced at maximum intervals of 50 feet along each run. Reduce intervals to 25 feet in areas of congested piping and equipment.
 7. On piping above removable acoustical ceilings. Omit intermediately spaced labels.
- C. Pipe Label Color Schedule:
 1. Refrigerant Piping:
 - a. Background Color: Orange.
 - b. Letter Color: Black.

3.4 DUCT LABEL INSTALLATION

- A. Install plastic-laminated duct labels with permanent adhesive on air ducts in the following color codes:
 1. Blue: For cold-air supply ducts.
 2. Yellow: For hot-air supply ducts.
 3. Green: For exhaust-, outside-, relief-, return-, and mixed-air ducts.
 4. ASME A13.1 Colors and Designs: For hazardous material exhaust.
- B. Locate labels near points where ducts enter into concealed spaces and at maximum intervals of 50 feet in each space where ducts are exposed or concealed by removable ceiling system.

3.5 VALVE-TAG INSTALLATION

- A. Install tags on valves and control devices in piping systems, except check valves; valves within factory-fabricated equipment units; shutoff valves; faucets; convenience and lawn-watering hose connections; and HVAC terminal devices and similar roughing-in connections of end-use fixtures and units. List tagged valves in a valve schedule.
- B. Valve-Tag Application Schedule: Tag valves according to size, shape, and color scheme and with captions similar to those indicated in the following subparagraphs:
 - 1. Valve-Tag Size and Shape:
 - a. All Valve-Tags: 1-1/2 inches minimum, round.
 - 2. Valve-Tag Color:
 - a. All Valve-Tags: Natural.
 - 3. Letter Color:
 - a. All Valve-Tags: Black.

3.6 WARNING-TAG INSTALLATION

- A. Write required message on, and attach warning tags to, equipment and other items where required.

END OF SECTION 23 05 53

SECTION 23 05 93

TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Balancing Air Systems:
 - a. Constant-volume air systems.

1.3 DEFINITIONS

- A. AABC: Associated Air Balance Council.
- B. TAB: Testing, adjusting, and balancing.
- C. TAB Specialist: An entity engaged to perform TAB Work.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: Within 30 days of Contractor's Notice to Proceed, submit documentation that the TAB contractor and this Project's TAB team members meet the qualifications specified in "Quality Assurance" Article.
- B. Contract Documents Examination Report: Within 30 days of Contractor's Notice to Proceed, submit the Contract Documents review report as specified in Part 3.
- C. Strategies and Procedures Plan: Within 30 days of Contractor's Notice to Proceed, submit TAB strategies and step-by-step procedures as specified in "Preparation" Article.
- D. Certified TAB reports.
- E. Sample report forms.
- F. Instrument calibration reports, to include the following:
 - 1. Instrument type and make.
 - 2. Serial number.
 - 3. Application.
 - 4. Dates of use.
 - 5. Dates of calibration.

1.5 QUALITY ASSURANCE

- A. TAB Contractor Qualifications: Engage a TAB entity certified by AABC.
 - 1. TAB Field Supervisor: Employee of the TAB contractor and certified by AABC.
 - 2. TAB Technician: Employee of the TAB contractor and who is certified by AABC as a TAB technician.
- B. TAB Conference: Meet with Owner on approval of the TAB strategies and procedures plan to develop a mutual understanding of the details. Require the participation of the TAB field supervisor and technicians. Provide seven days' advance notice of scheduled meeting time and location.
 - 1. Agenda Items:
 - a. The Contract Documents examination report.
 - b. The TAB plan.
 - c. Coordination and cooperation of trades and subcontractors.
 - d. Coordination of documentation and communication flow.
- C. Certify TAB field data reports and perform the following:
 - 1. Review field data reports to validate accuracy of data and to prepare certified TAB reports.
 - 2. Certify that the TAB team complied with the approved TAB plan and the procedures specified and referenced in this Specification.
- D. TAB Report Forms: Use standard TAB contractor's forms approved by Architect.
- E. Instrumentation Type, Quantity, Accuracy, and Calibration: As described in ASHRAE 111, Section 5, "Instrumentation."
- F. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 7.2.2 - "Air Balancing."
- G. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6.7.2.3 - "System Balancing."

1.6 PROJECT CONDITIONS

- A. Full Owner Occupancy: Owner will occupy the site and existing building during entire TAB period. Cooperate with Owner during TAB operations to minimize conflicts with Owner's operations.

1.7 COORDINATION

- A. Notice: Provide seven days' advance notice for each test. Include scheduled test dates and times.
- B. Perform TAB after leakage and pressure tests on air and water distribution systems have been satisfactorily completed.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems' designs that may preclude proper TAB of systems and equipment.
- B. Examine systems for installed balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers. Verify that locations of these balancing devices are accessible.
- C. Examine the approved submittals for HVAC systems and equipment.
- D. Examine design data including HVAC system descriptions, statements of design assumptions for environmental conditions and systems' output, and statements of philosophies and assumptions about HVAC system and equipment controls.
- E. Examine ceiling plenums and underfloor air plenums used for supply, return, or relief air to verify that they meet the leakage class of connected ducts as specified in Section 233113 "Metal Ducts" and are properly separated from adjacent areas. Verify that penetrations in plenum walls are sealed and fire-stopped if required.
- F. Examine equipment performance data including fan curves.
 - 1. Relate performance data to Project conditions and requirements, including system effects that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system.
 - 2. Calculate system-effect factors to reduce performance ratings of HVAC equipment when installed under conditions different from the conditions used to rate equipment performance. To calculate system effects for air systems, use tables and charts found in AMCA 201, "Fans and Systems," or in SMACNA's "HVAC Systems - Duct Design." Compare results with the design data and installed conditions.
- G. Examine system and equipment installations and verify that field quality-control testing, cleaning, and adjusting specified in individual Sections have been performed.
- H. Examine test reports specified in individual system and equipment Sections.
- I. Examine HVAC equipment and filters and verify that bearings are greased, belts are aligned and tight, and equipment with functioning controls is ready for operation.
- J. Examine operating safety interlocks and controls on HVAC equipment.
- K. Report deficiencies discovered before and during performance of TAB procedures. Observe and record system reactions to changes in conditions. Record default set points if different from indicated values.

3.2 PREPARATION

- A. Prepare a TAB plan that includes strategies and step-by-step procedures.
- B. Complete system-readiness checks and prepare reports. Verify the following:
 - 1. Permanent electrical-power wiring is complete.
 - 2. Automatic temperature-control systems are operational.
 - 3. Equipment and duct access doors are securely closed.

4. Balance, smoke, and fire dampers are open.
5. Isolating and balancing valves are open and control valves are operational.
6. Ceilings are installed in critical areas where air-pattern adjustments are required and access to balancing devices is provided.
7. Windows and doors can be closed so indicated conditions for system operations can be met.

3.3 GENERAL PROCEDURES FOR TESTING AND BALANCING

- A. Perform testing and balancing procedures on each system according to the procedures contained in AABC's "National Standards for Total System Balance", ASHRAE 111, and SMACNA's "HVAC Systems - Testing, Adjusting, and Balancing" and in this Section.
 1. Comply with requirements in ASHRAE 62.1, Section 7.2.2 - "Air Balancing."
- B. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary for TAB procedures.
 1. After testing and balancing, patch probe holes in ducts with same material and thickness as used to construct ducts.
 2. After testing and balancing, install test ports and duct access doors that comply with requirements in Section 233300 "Air Duct Accessories."
 3. Install and join new insulation that matches removed materials. Restore insulation, coverings, vapor barrier, and finish according to Section 230713 "Duct Insulation" and Section 230719 "HVAC Piping Insulation."
- C. Mark equipment and balancing devices, including damper-control positions, valve position indicators, fan-speed-control levers, and similar controls and devices, with paint or other suitable, permanent identification material to show final settings.
- D. Take and report testing and balancing measurements in inch-pound (IP) units.

3.4 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

- A. Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Crosscheck the summation of required outlet volumes with required fan volumes.
- B. Prepare schematic diagrams of systems' "as-built" duct layouts.
- C. For variable-air-volume systems, develop a plan to simulate diversity.
- D. Determine the best locations in main and branch ducts for accurate duct-airflow measurements.
- E. Check airflow patterns from the outdoor-air louvers and dampers and the return- and exhaust-air dampers through the supply-fan discharge and mixing dampers.
- F. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.
- G. Verify that motor starters are equipped with properly sized thermal protection.
- H. Check dampers for proper position to achieve desired airflow path.
- I. Check for airflow blockages.
- J. Check condensate drains for proper connections and functioning.
- K. Check for proper sealing of air-handling-unit components.

- L. Verify that air duct system is sealed as specified in Section 233113 "Metal Ducts."

3.5 PROCEDURES FOR CONSTANT-VOLUME AIR SYSTEMS

- A. Adjust fans to deliver total indicated airflows within the maximum allowable fan speed listed by fan manufacturer.
 - 1. Measure total airflow.
 - a. Where sufficient space in ducts is unavailable for Pitot-tube traverse measurements, measure airflow at terminal outlets and inlets and calculate the total airflow.
 - 2. Measure fan static pressures as follows to determine actual static pressure:
 - a. Measure outlet static pressure as far downstream from the fan as practical and upstream from restrictions in ducts such as elbows and transitions.
 - b. Measure static pressure directly at the fan outlet or through the flexible connection.
 - c. Measure inlet static pressure of single-inlet fans in the inlet duct as near the fan as possible, upstream from the flexible connection, and downstream from duct restrictions.
 - d. Measure inlet static pressure of double-inlet fans through the wall of the plenum that houses the fan.
 - 3. Measure static pressure across each component that makes up an air-handling unit, rooftop unit, and other air-handling and -treating equipment.
 - a. Report the cleanliness status of filters and the time static pressures are measured.
 - 4. Measure static pressures entering and leaving other devices, such as sound traps, heat-recovery equipment, and air washers, under final balanced conditions.
 - 5. Review Record Documents to determine variations in design static pressures versus actual static pressures. Calculate actual system-effect factors. Recommend adjustments to accommodate actual conditions.
 - 6. Obtain approval from Architect for adjustment of fan speed higher or lower than indicated speed. Comply with requirements in HVAC Sections for air-handling units for adjustment of fans, belts, and pulley sizes to achieve indicated air-handling-unit performance.
 - 7. Do not make fan-speed adjustments that result in motor overload. Consult equipment manufacturers about fan-speed safety factors. Modulate dampers and measure fan-motor amperage to ensure that no overload will occur. Measure amperage in full-cooling, full-heating, economizer, and any other operating mode to determine the maximum required brake horsepower.
- B. Adjust volume dampers for main duct, submain ducts, and major branch ducts to indicated airflows within specified tolerances.
 - 1. Measure airflow of submain and branch ducts.
 - a. Where sufficient space in submain and branch ducts is unavailable for Pitot-tube traverse measurements, measure airflow at terminal outlets and inlets and calculate the total airflow for that zone.
 - 2. Measure static pressure at a point downstream from the balancing damper, and adjust volume dampers until the proper static pressure is achieved.
 - 3. Remeasure each submain and branch duct after all have been adjusted. Continue to adjust submain and branch ducts to indicated airflows within specified tolerances.
- C. Measure air outlets and inlets without making adjustments.
 - 1. Measure terminal outlets using a direct-reading hood or outlet manufacturer's written instructions and calculating factors.

D. Adjust air outlets and inlets for each space to indicated airflows within specified tolerances of indicated values. Make adjustments using branch volume dampers rather than extractors and the dampers at air terminals.

1. Adjust each outlet in same room or space to within specified tolerances of indicated quantities without generating noise levels above the limitations prescribed by the Contract Documents.
2. Adjust patterns of adjustable outlets for proper distribution without drafts.

3.6 TOLERANCES

A. Set HVAC system's air flow rates and water flow rates within the following tolerances:

1. Supply, Return, and Exhaust Fans and Equipment with Fans: Plus or minus 10 percent.
2. Air Outlets and Inlets: Plus or minus 10 percent.

3.7 REPORTING

A. Initial Construction-Phase Report: Based on examination of the Contract Documents as specified in "Examination" Article, prepare a report on the adequacy of design for systems' balancing devices. Recommend changes and additions to systems' balancing devices to facilitate proper performance measuring and balancing. Recommend changes and additions to HVAC systems and general construction to allow access for performance measuring and balancing devices.

3.8 FINAL REPORT

A. General: Prepare a certified written report; tabulate and divide the report into separate sections for tested systems and balanced systems.

1. Include a certification sheet at the front of the report's binder, signed and sealed by the certified testing and balancing engineer.
2. Include a list of instruments used for procedures, along with proof of calibration.

B. Final Report Contents: In addition to certified field-report data, include the following:

1. Fan curves.
2. Manufacturers' test data.
3. Field test reports prepared by system and equipment installers.
4. Other information relative to equipment performance; do not include Shop Drawings and product data.

C. General Report Data: In addition to form titles and entries, include the following data:

1. Title page.
2. Name and address of the TAB contractor.
3. Project name.
4. Project location.
5. Architect's name and address.
6. Engineer's name and address.
7. Contractor's name and address.
8. Report date.
9. Signature of TAB supervisor who certifies the report.
10. Table of Contents with the total number of pages defined for each section of the report. Number each page in the report.
11. Summary of contents including the following:
 - a. Indicated versus final performance.

- b. Notable characteristics of systems.
 - c. Description of system operation sequence if it varies from the Contract Documents.
12. Nomenclature sheets for each item of equipment.
 13. Data for terminal units, including manufacturer's name, type, size, and fittings.
 14. Notes to explain why certain final data in the body of reports vary from indicated values.
 15. Test conditions for fans and pump performance forms including the following:
 - a. Settings for outdoor-, return-, and exhaust-air dampers.
 - b. Conditions of filters.
 - c. Cooling coil, wet- and dry-bulb conditions.
 - d. Face and bypass damper settings at coils.
 - e. Fan drive settings including settings and percentage of maximum pitch diameter.
 - f. Inlet vane settings for variable-air-volume systems.
 - g. Settings for supply-air, static-pressure controller.
 - h. Other system operating conditions that affect performance.
- D. System Diagrams: Include schematic layouts of air and hydronic distribution systems. Present each system with single-line diagram and include the following:
1. Quantities of outdoor, supply, return, and exhaust airflows.
 2. Water and steam flow rates.
 3. Duct, outlet, and inlet sizes.
 4. Pipe and valve sizes and locations.
 5. Terminal units.
 6. Balancing stations.
 7. Position of balancing devices.
- E. Air-Handling-Unit Test Reports: For air-handling units with coils, include the following:
1. Unit Data:
 - a. Unit identification.
 - b. Location.
 - c. Make and type.
 - d. Model number and unit size.
 - e. Manufacturer's serial number.
 - f. Unit arrangement and class.
 - g. Discharge arrangement.
 - h. Sheave make, size in inches, and bore.
 - i. Center-to-center dimensions of sheave, and amount of adjustments in inches.
 - j. Number, make, and size of belts.
 - k. Number, type, and size of filters.
 2. Motor Data:
 - a. Motor make, and frame type and size.
 - b. Horsepower and rpm.
 - c. Volts, phase, and hertz.
 - d. Full-load amperage and service factor.
 - e. Sheave make, size in inches, and bore.
 - f. Center-to-center dimensions of sheave, and amount of adjustments in inches.
 3. Test Data (Indicated and Actual Values):
 - a. Total air flow rate in cfm.
 - b. Total system static pressure in inches wg.
 - c. Fan rpm.
 - d. Discharge static pressure in inches wg.
 - e. Filter static-pressure differential in inches wg.

- f. Preheat-coil static-pressure differential in inches wg.
- g. Cooling-coil static-pressure differential in inches wg.
- h. Heating-coil static-pressure differential in inches wg.
- i. Outdoor airflow in cfm.
- j. Return airflow in cfm.
- k. Outdoor-air damper position.
- l. Return-air damper position.
- m. Vortex damper position.

F. Fan Test Reports: For supply, return, and exhaust fans, include the following:

1. Fan Data:

- a. System identification.
- b. Location.
- c. Make and type.
- d. Model number and size.
- e. Manufacturer's serial number.
- f. Arrangement and class.
- g. Sheave make, size in inches, and bore.
- h. Center-to-center dimensions of sheave, and amount of adjustments in inches.

2. Motor Data:

- a. Motor make, and frame type and size.
- b. Horsepower and rpm.
- c. Volts, phase, and hertz.
- d. Full-load amperage and service factor.
- e. Sheave make, size in inches, and bore.
- f. Center-to-center dimensions of sheave, and amount of adjustments in inches.
- g. Number, make, and size of belts.

3. Test Data (Indicated and Actual Values):

- a. Total airflow rate in cfm.
- b. Total system static pressure in inches wg.
- c. Fan rpm.
- d. Discharge static pressure in inches wg.
- e. Suction static pressure in inches wg.

G. Round, Flat-Oval, and Rectangular Duct Traverse Reports: Include a diagram with a grid representing the duct cross-section and record the following:

1. Report Data:

- a. System and air-handling-unit number.
- b. Location and zone.
- c. Traverse air temperature in deg F.
- d. Duct static pressure in inches wg.
- e. Duct size in inches.
- f. Duct area in sq. ft.
- g. Indicated air flow rate in cfm.
- h. Indicated velocity in fpm.
- i. Actual air flow rate in cfm.
- j. Actual average velocity in fpm.
- k. Barometric pressure in psig.

H. Instrument Calibration Reports:

1. Report Data:

- a. Instrument type and make.
- b. Serial number.
- c. Application.
- d. Dates of use.
- e. Dates of calibration.

3.9 INSPECTIONS

A. Initial Inspection:

- 1. After testing and balancing are complete, operate each system and randomly check measurements to verify that the system is operating according to the final test and balance readings documented in the final report.
- 2. Check the following for each system:
 - a. Measure airflow of at least 10 percent of air outlets.
 - b. Measure room temperature at each thermostat/temperature sensor. Compare the reading to the set point.
 - c. Verify that balancing devices are marked with final balance position.
 - d. Note deviations from the Contract Documents in the final report.

B. Final Inspection:

- 1. After initial inspection is complete and documentation by random checks verifies that testing and balancing are complete and accurately documented in the final report, request that a final inspection be made by Architect.
- 2. The TAB contractor's test and balance engineer shall conduct the inspection in the presence of Owner.
- 3. Owner shall randomly select measurements, documented in the final report, to be rechecked. Rechecking shall be limited to either 10 percent of the total measurements recorded or the extent of measurements that can be accomplished in a normal 8-hour business day.
- 4. If rechecks yield measurements that differ from the measurements documented in the final report by more than the tolerances allowed, the measurements shall be noted as "FAILED."
- 5. If the number of "FAILED" measurements is greater than 10 percent of the total measurements checked during the final inspection, the testing and balancing shall be considered incomplete and shall be rejected.

C. TAB Work will be considered defective if it does not pass final inspections. If TAB Work fails, proceed as follows:

- 1. Recheck all measurements and make adjustments. Revise the final report and balancing device settings to include all changes; resubmit the final report and request a second final inspection.
- 2. If the second final inspection also fails, Owner may contract the services of another TAB contractor to complete TAB Work according to the Contract Documents and deduct the cost of the services from the original TAB contractor's final payment.

D. Prepare test and inspection reports.

3.10 ADDITIONAL TESTS

- A. Within 90 days of completing TAB, perform additional TAB to verify that balanced conditions are being maintained throughout and to correct unusual conditions.
- B. Seasonal Periods: If initial TAB procedures were not performed during near-peak summer and winter conditions, perform additional TAB during near-peak summer and winter conditions.

END OF SECTION 23 05 93

SECTION 23 31 13

METAL DUCTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Single-wall rectangular ducts and fittings.
2. Single-wall round ducts and fittings.
3. Sheet metal materials.
4. Duct liner.
5. Sealants and gaskets.
6. Hangers and supports.
7. Seismic-restraint devices.

B. Related Sections:

1. Section 230593 "Testing, Adjusting, and Balancing for HVAC" for testing, adjusting, and balancing requirements for metal ducts.
2. Section 233300 "Air Duct Accessories" for dampers, sound-control devices, duct-mounting access doors and panels, turning vanes, and flexible ducts.

1.3 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Duct hangers and supports and seismic restraints shall withstand the effects of gravity and seismic loads and stresses within limits and under conditions described in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" and ASCE/SEI 7.
- B. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of the following products:

1. Liners and adhesives.
2. Sealants and gaskets.
3. Seismic-restraint devices.

B. Shop Drawings:

1. Fabrication, assembly, and installation, including plans, elevations, sections, components, and attachments to other work.
2. Factory- and shop-fabricated ducts and fittings.

3. Duct layout indicating sizes, configuration, liner material, and static-pressure classes.
4. Elevation of top of ducts.
5. Dimensions of main duct runs from building grid lines.
6. Fittings.
7. Reinforcement and spacing.
8. Seam and joint construction.
9. Penetrations through fire-rated and other partitions.
10. Equipment installation based on equipment being used on Project.
11. Locations for duct accessories, including dampers, turning vanes, and access doors and panels.
12. Hangers and supports, including methods for duct and building attachment, seismic restraints, and vibration isolation.

1.5 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
 1. Duct installation in congested spaces, indicating coordination with general construction, building components, and other building services. Indicate proposed changes to duct layout.
 2. Suspended ceiling components.
 3. Structural members to which duct will be attached.
 4. Size and location of initial access modules for acoustical tile.
 5. Penetrations of smoke barriers and fire-rated construction.
 6. Items penetrating finished ceiling including the following:
 - a. Lighting fixtures.
 - b. Air outlets and inlets.
 - c. Speakers.
 - d. Sprinklers.
 - e. Access panels.
 - f. Perimeter moldings.
- B. Welding certificates.
- C. Field quality-control reports.

1.6 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel," for hangers and supports. AWS D9.1M/D9.1, "Sheet Metal Welding Code," for duct joint and seam welding.
- B. Welding Qualifications: Qualify procedures and personnel according to the following:
 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel," for hangers and supports.
 2. AWS D9.1M/D9.1, "Sheet Metal Welding Code," for duct joint and seam welding.
- C. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment" and Section 7 - "Construction and System Start-up."
- D. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6.4.4 - "HVAC System Construction and Insulation."

PART 2 - PRODUCTS

2.1 SINGLE-WALL RECTANGULAR DUCTS AND FITTINGS

- A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" based on indicated static-pressure class unless otherwise indicated.
- B. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-1, "Rectangular Duct/Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- C. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-2, "Rectangular Duct/Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- D. Elbows, Transitions, Offsets, Branch Connections, and Other Duct Construction: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 4, "Fittings and Other Construction," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.2 SINGLE-WALL ROUND DUCTS AND FITTINGS

- A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 3, "Round, Oval, and Flexible Duct," based on indicated static-pressure class unless otherwise indicated.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Lindab Inc.
 - b. McGill AirFlow LLC.
 - c. SEMCO Incorporated.
 - d. Sheet Metal Connectors, Inc.
 - e. Spiral Manufacturing Co., Inc.
- B. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-1, "Round Duct Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
 - 1. Transverse Joints in Ducts Larger Than 60 Inches in Diameter: Flanged.
- C. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-2, "Round Duct Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
 - 1. Fabricate round ducts larger than 90 inches in diameter with butt-welded longitudinal seams.
- D. Tees and Laterals: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "Conical Tees," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.3 SHEET METAL MATERIALS

- A. General Material Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.
- B. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.
 - 1. Galvanized Coating Designation: G90.
 - 2. Finishes for Surfaces Exposed to View: Mill phosphatized.
- C. Reinforcement Shapes and Plates: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.
 - 1. Where black- and galvanized-steel shapes and plates are used to reinforce aluminum ducts, isolate the different metals with butyl rubber, neoprene, or EPDM gasket materials.
- D. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.4 DUCT LINER

- A. Fibrous-Glass Duct Liner: Comply with ASTM C 1071, NFPA 90A, or NFPA 90B; and with NAIMA AH124, "Fibrous Glass Duct Liner Standard."
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. CertainTeed Corporation; Insulation Group.
 - b. Johns Manville.
 - c. Knauf Insulation.
 - d. Owens Corning.
 - 2. Antimicrobial Erosion-Resistant Coating: Apply to the surface of the liner that will form the interior surface of the duct to act as a moisture repellent and erosion-resistant coating. Antimicrobial compound shall be tested for efficacy by an NRTL and registered by the EPA for use in HVAC systems.
 - 3. Water-Based Liner Adhesive: Comply with NFPA 90A or NFPA 90B and with ASTM C 916.
 - a. For indoor applications, adhesive shall have a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - b. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- B. Insulation Pins and Washers:
 - 1. Cupped-Head, Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, 0.106-inch-diameter shank, length to suit depth of insulation indicated with integral 1-1/2-inch galvanized carbon-steel washer.
 - 2. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch- thick galvanized steel; with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches in diameter.

C. Shop Application of Duct Liner: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 7-11, "Flexible Duct Liner Installation."

1. Adhere a single layer of indicated thickness of duct liner with at least 90 percent adhesive coverage at liner contact surface area. Attaining indicated thickness with multiple layers of duct liner is prohibited.
2. Apply adhesive to transverse edges of liner facing upstream that do not receive metal nosing.
3. Butt transverse joints without gaps, and coat joint with adhesive.
4. Fold and compress liner in corners of rectangular ducts or cut and fit to ensure butted-edge overlapping.
5. Do not apply liner in rectangular ducts with longitudinal joints, except at corners of ducts, unless duct size and dimensions of standard liner make longitudinal joints necessary.
6. Apply adhesive coating on longitudinal seams in ducts with air velocity of 2500 fpm.
7. Secure liner with mechanical fasteners 4 inches from corners and at intervals not exceeding 12 inches transversely; at 3 inches from transverse joints and at intervals not exceeding 18 inches longitudinally.
8. Secure transversely oriented liner edges facing the airstream with metal nosings that have either channel or "Z" profiles or are integrally formed from duct wall. Fabricate edge facings at the following locations:
 - a. Fan discharges.
 - b. Intervals of lined duct preceding unlined duct.
 - c. Upstream edges of transverse joints in ducts where air velocities are higher than 2500 fpm or where indicated.
9. Secure insulation between perforated sheet metal inner duct of same thickness as specified for outer shell. Use mechanical fasteners that maintain inner duct at uniform distance from outer shell without compressing insulation.
 - a. Sheet Metal Inner Duct Perforations: 3/32-inch diameter, with an overall open area of 23 percent.
10. Terminate inner ducts with buildouts attached to fire-damper sleeves, dampers, turning vane assemblies, or other devices. Fabricated buildouts (metal hat sections) or other buildout means are optional; when used, secure buildouts to duct walls with bolts, screws, rivets, or welds.

2.5 SEALANT AND GASKETS

- A. General Sealant and Gasket Requirements: Surface-burning characteristics for sealants and gaskets shall be a maximum flame-spread index of 25 and a maximum smoke-developed index of 50 when tested according to UL 723; certified by an NRTL.
- B. Two-Part Tape Sealing System:
 1. Tape: Woven cotton fiber impregnated with mineral gypsum and modified acrylic/silicone activator to react exothermically with tape to form hard, durable, airtight seal.
 2. Tape Width: 4 inches.
 3. Sealant: Modified styrene acrylic.
 4. Water resistant.
 5. Mold and mildew resistant.
 6. Maximum Static-Pressure Class: 10-inch wg, positive and negative.
 7. Service: Indoor and outdoor.
 8. Service Temperature: Minus 40 to plus 200 deg F.
 9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum.
 10. For indoor applications, sealant shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

11. Sealant shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

C. Water-Based Joint and Seam Sealant:

1. Application Method: Brush on.
2. Solids Content: Minimum 65 percent.
3. Shore A Hardness: Minimum 20.
4. Water resistant.
5. Mold and mildew resistant.
6. VOC: Maximum 75 g/L (less water).
7. Maximum Static-Pressure Class: 10-inch wg, positive and negative.
8. Service: Indoor or outdoor.
9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.

D. Flanged Joint Sealant: Comply with ASTM C 920.

1. General: Single-component, acid-curing, silicone, elastomeric.
2. Type: S.
3. Grade: NS.
4. Class: 25.
5. Use: O.
6. For indoor applications, sealant shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
7. Sealant shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

E. Flange Gaskets: Butyl rubber, neoprene, or EPDM polymer with polyisobutylene plasticizer.

F. Round Duct Joint O-Ring Seals:

1. Seal shall provide maximum leakage class of 3 cfm/100 sq. ft. at 1-inch wg and shall be rated for 10-inch wg static-pressure class, positive or negative.
2. EPDM O-ring to seal in concave bead in coupling or fitting spigot.
3. Double-lipped, EPDM O-ring seal, mechanically fastened to factory-fabricated couplings and fitting spigots.

2.6 HANGERS AND SUPPORTS

A. Hanger Rods for Noncorrosive Environments: Cadmium-plated steel rods and nuts.

B. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct."

C. Steel Cables for Galvanized-Steel Ducts: Galvanized steel complying with ASTM A 603.

D. Steel Cable End Connections: Cadmium-plated steel assemblies with brackets, swivel, and bolts designed for duct hanger service; with an automatic-locking and clamping device.

E. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.

F. Trapeze and Riser Supports:

1. Supports for Galvanized-Steel Ducts: Galvanized-steel shapes and plates.

2.7 SEISMIC-RESTRAINT DEVICES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Cooper B-Line, Inc.; a division of Cooper Industries.
 2. Ductmate Industries, Inc.
 3. Hilti Corp.
 4. Mason Industries.
 5. TOLCO; a brand of NIBCO INC.
 6. Unistrut Corporation; Tyco International, Ltd.
- B. General Requirements for Restraint Components: Rated strengths, features, and applications shall be as defined in reports by the Office of Statewide Health Planning and Development for the State of California.
1. Structural Safety Factor: Allowable strength in tension, shear, and pullout force of components shall be at least four times the maximum seismic forces to which they will be subjected.
- C. Channel Support System: Shop- or field-fabricated support assembly made of slotted steel channels rated in tension, compression, and torsion forces and with accessories for attachment to braced component at one end and to building structure at the other end. Include matching components and corrosion-resistant coating.
- D. Restraint Cables: ASTM A 603, galvanized-steel cables with end connections made of cadmium-plated steel assemblies with brackets, swivel, and bolts designed for restraining cable service; and with an automatic-locking and clamping device or double-cable clips.
- E. Hanger Rod Stiffener: Steel tube or steel slotted-support-system sleeve with internally bolted connections or Reinforcing steel angle clamped to hanger rod.
- F. Mechanical Anchor Bolts: Drilled-in and stud-wedge or female-wedge type. Select anchor bolts with strength required for anchor and as tested according to ASTM E 488.

PART 3 - EXECUTION

3.1 DUCT INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of duct system. Indicated duct locations, configurations, and arrangements were used to size ducts and calculate friction loss for air-handling equipment sizing and for other design considerations. Install duct systems as indicated unless deviations to layout are approved on Shop Drawings and Coordination Drawings.
- B. Install ducts according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" unless otherwise indicated.
- C. Install round ducts in maximum practical lengths.
- D. Install ducts with fewest possible joints.
- E. Install factory- or shop-fabricated fittings for changes in direction, size, and shape and for branch connections.
- F. Unless otherwise indicated, install ducts vertically and horizontally, and parallel and perpendicular to building lines.
- G. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.

- H. Install ducts with a clearance of 1 inch, plus allowance for insulation thickness.
- I. Route ducts to avoid passing through transformer vaults and electrical equipment rooms and enclosures.
- J. Where ducts pass through non-fire-rated interior partitions and exterior walls and are exposed to view, cover the opening between the partition and duct or duct insulation with sheet metal flanges of same metal thickness as the duct. Overlap openings on four sides by at least 1-1/2 inches.
- K. Where ducts pass through fire-rated interior partitions and exterior walls, install fire dampers. Comply with requirements in Section 233300 "Air Duct Accessories" for fire and smoke dampers.
- L. Protect duct interiors from moisture, construction debris and dust, and other foreign materials. Comply with SMACNA's "IAQ Guidelines for Occupied Buildings Under Construction," Appendix G, "Duct Cleanliness for New Construction Guidelines."

3.2 INSTALLATION OF EXPOSED DUCTWORK

- A. Protect ducts exposed in finished spaces from being dented, scratched, or damaged.
- B. Trim duct sealants flush with metal. Create a smooth and uniform exposed bead. Do not use two-part tape sealing system.
- C. Grind welds to provide smooth surface free of burrs, sharp edges, and weld splatter. When welding stainless steel with a No. 3 or 4 finish, grind the welds flush, polish the exposed welds, and treat the welds to remove discoloration caused by welding.
- D. Maintain consistency, symmetry, and uniformity in the arrangement and fabrication of fittings, hangers and supports, duct accessories, and air outlets.
- E. Repair or replace damaged sections and finished work that does not comply with these requirements.

3.3 DUCT SEALING

- A. Seal ducts for duct static-pressure, seal classes, and leakage classes specified in "Duct Schedule" Article according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- B. Seal ducts to the following seal classes according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible":
 - 1. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
 - 2. Outdoor, Supply-Air Ducts: Seal Class A.
 - 3. Outdoor, Exhaust Ducts: Seal Class C.
 - 4. Outdoor, Return-Air Ducts: Seal Class C.
 - 5. Unconditioned Space, Supply-Air Ducts in Pressure Classes 2-Inch wg and Lower: Seal Class B.
 - 6. Unconditioned Space, Supply-Air Ducts in Pressure Classes Higher Than 2-Inch wg: Seal Class A.
 - 7. Unconditioned Space, Exhaust Ducts: Seal Class C.
 - 8. Unconditioned Space, Return-Air Ducts: Seal Class B.
 - 9. Conditioned Space, Supply-Air Ducts in Pressure Classes 2-Inch wg and Lower: Seal Class C.
 - 10. Conditioned Space, Supply-Air Ducts in Pressure Classes Higher Than 2-Inch wg: Seal Class B.
 - 11. Conditioned Space, Exhaust Ducts: Seal Class B.
 - 12. Conditioned Space, Return-Air Ducts: Seal Class C.

3.4 HANGER AND SUPPORT INSTALLATION

- A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 5, "Hangers and Supports."

- B. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.
 - 1. Where practical, install concrete inserts before placing concrete.
 - 2. Install powder-actuated concrete fasteners after concrete is placed and completely cured.
 - 3. Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than 4 inches thick.
 - 4. Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches thick.
 - 5. Do not use powder-actuated concrete fasteners for seismic restraints.
- C. Hanger Spacing: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct," for maximum hanger spacing; install hangers and supports within 24 inches of each elbow and within 48 inches of each branch intersection.
- D. Hangers Exposed to View: Threaded rod and angle or channel supports.
- E. Support vertical ducts with steel angles or channel secured to the sides of the duct with welds, bolts, sheet metal screws, or blind rivets; support at each floor and at a maximum intervals of 16 feet.
- F. Install upper attachments to structures. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

3.5 SEISMIC-RESTRAINT-DEVICE INSTALLATION

- A. Install ducts with hangers and braces designed to support the duct and to restrain against seismic forces required by applicable building codes. Comply with SMACNA's "Seismic Restraint Manual: Guidelines for Mechanical Systems" and ASCE/SEI 7.
 - 1. Space lateral supports a maximum of 40 feet o.c., and longitudinal supports a maximum of 80 feet o.c.
 - 2. Brace a change of direction longer than 12 feet.
- B. Select seismic-restraint devices with capacities adequate to carry present and future static and seismic loads.
- C. Install cables so they do not bend across edges of adjacent equipment or building structure.
- D. Install cable restraints on ducts that are suspended with vibration isolators.
- E. Install seismic-restraint devices using methods approved by the Office of Statewide Health Planning and Development for the State of California.
- F. Attachment to Structure: If specific attachment is not indicated, anchor bracing and restraints to structure, to flanges of beams, to upper truss chords of bar joists, or to concrete members.
- G. Drilling for and Setting Anchors:
 - 1. Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Do not damage existing reinforcement or embedded items during drilling. Notify the Architect if reinforcing steel or other embedded items are encountered during drilling. Locate and avoid prestressed tendons, electrical and telecommunications conduit, and gas lines.
 - 2. Do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength.
 - 3. Wedge Anchors: Protect threads from damage during anchor installation. Heavy-duty sleeve anchors shall be installed with sleeve fully engaged in the structural element to which anchor is to be fastened.
 - 4. Set anchors to manufacturer's recommended torque, using a torque wrench.

5. Install zinc-coated steel anchors for interior applications and stainless-steel anchors for applications exposed to weather.

3.6 CONNECTIONS

- A. Make connections to equipment with flexible connectors complying with Section 233300 "Air Duct Accessories."
- B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.

3.7 PAINTING

- A. Paint interior of metal ducts that are visible through registers and grilles and that do not have duct liner. Apply one coat of flat, black, latex paint over a compatible galvanized-steel primer. Paint materials and application requirements are specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

3.8 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Leakage Tests:
 1. Comply with SMACNA's "HVAC Air Duct Leakage Test Manual." Submit a test report for each test.
 2. Test the following systems:
 - a. Ducts with a Pressure Class Higher Than 3-Inch wg: Test representative duct sections totaling no less than 25 percent of total installed duct area for each designated pressure class.
 - b. Supply, Return, Outdoor Air, Exhaust Ducts with a Pressure Class of 2-Inch wg or Higher: Test representative duct sections totaling no less than 100 percent of total installed duct area for each designated pressure class.
 3. Disassemble, reassemble, and seal segments of systems to accommodate leakage testing and for compliance with test requirements.
 4. Test for leaks before applying external insulation.
 5. Conduct tests at static pressures equal to maximum design pressure of system or section being tested. If static-pressure classes are not indicated, test system at maximum system design pressure. Do not pressurize systems above maximum design operating pressure.
 6. Give seven days' advance notice for testing.
- C. Duct System Cleanliness Tests:
 1. Visually inspect duct system to ensure that no visible contaminants are present.
 2. Test sections of metal duct system, chosen randomly by Owner, for cleanliness according to "Vacuum Test" in NADCA ACR, "Assessment, Cleaning and Restoration of HVAC Systems."
 - a. Acceptable Cleanliness Level: Net weight of debris collected on the filter media shall not exceed 0.75 mg/100 sq. cm.
- D. Duct system will be considered defective if it does not pass tests and inspections.
- E. Prepare test and inspection reports.

3.9 DUCT CLEANING

- A. Clean new and existing duct system(s) before testing, adjusting, and balancing.
- B. Use service openings for entry and inspection.
 - 1. Create new openings and install access panels appropriate for duct static-pressure class if required for cleaning access. Provide insulated panels for insulated or lined duct. Patch insulation and liner as recommended by duct liner manufacturer. Comply with Section 233300 "Air Duct Accessories" for access panels and doors.
 - 2. Disconnect and reconnect flexible ducts as needed for cleaning and inspection.
 - 3. Remove and reinstall ceiling to gain access during the cleaning process.
- C. Particulate Collection and Odor Control:
 - 1. When venting vacuuming system inside the building, use HEPA filtration with 99.97 percent collection efficiency for 0.3-micron-size (or larger) particles.
 - 2. When venting vacuuming system to outdoors, use filter to collect debris removed from HVAC system, and locate exhaust downwind and away from air intakes and other points of entry into building.
- D. Clean the following components by removing surface contaminants and deposits:
 - 1. Air outlets and inlets (registers, grilles, and diffusers).
 - 2. Supply, return, and exhaust fans including fan housings, plenums (except ceiling supply and return plenums), scrolls, blades or vanes, shafts, baffles, dampers, and drive assemblies.
 - 3. Air-handling unit internal surfaces and components including mixing box, coil section, air wash systems, spray eliminators, condensate drain pans, humidifiers and dehumidifiers, filters and filter sections, and condensate collectors and drains.
 - 4. Coils and related components.
 - 5. Return-air ducts, dampers, actuators, and turning vanes except in ceiling plenums and mechanical equipment rooms.
 - 6. Supply-air ducts, dampers, actuators, and turning vanes.
 - 7. Dedicated exhaust and ventilation components and makeup air systems.
- E. Mechanical Cleaning Methodology:
 - 1. Clean metal duct systems using mechanical cleaning methods that extract contaminants from within duct systems and remove contaminants from building.
 - 2. Use vacuum-collection devices that are operated continuously during cleaning. Connect vacuum device to downstream end of duct sections so areas being cleaned are under negative pressure.
 - 3. Use mechanical agitation to dislodge debris adhered to interior duct surfaces without damaging integrity of metal ducts, duct liner, or duct accessories.
 - 4. Clean fibrous-glass duct liner with HEPA vacuuming equipment; do not permit duct liner to get wet. Replace fibrous-glass duct liner that is damaged, deteriorated, or delaminated or that has friable material, mold, or fungus growth.
 - 5. Clean coils and coil drain pans according to NADCA 1992. Keep drain pan operational. Rinse coils with clean water to remove latent residues and cleaning materials; comb and straighten fins.
 - 6. Provide drainage and cleanup for wash-down procedures.
 - 7. Antimicrobial Agents and Coatings: Apply EPA-registered antimicrobial agents if fungus is present. Apply antimicrobial agents according to manufacturer's written instructions after removal of surface deposits and debris.

3.10 START UP

- A. Air Balance: Comply with requirements in Section 230593 "Testing, Adjusting, and Balancing for HVAC."

3.11 DUCT SCHEDULE

- A. Fabricate ducts with galvanized sheet steel except as otherwise indicated.
- B. Supply Ducts:
 - 1. Ducts Connected to Fan Coil Units, Furnaces, Heat Pumps, and Terminal Units
 - a. Pressure Class: Positive 2-inch wg.
 - b. Minimum SMACNA Seal Class: C.
 - c. SMACNA Leakage Class for Rectangular: 24.
 - d. SMACNA Leakage Class for Round and Flat Oval: 12.
 - 2. Ducts Connected to Air-Handling Units:
 - a. Pressure Class: Positive 2-inch wg.
 - b. Minimum SMACNA Seal Class: C.
 - c. SMACNA Leakage Class for Rectangular: 24.
 - d. SMACNA Leakage Class for Round and Flat Oval: 12.
 - 3. Ducts Connected to Equipment Not Listed Above:
 - a. Pressure Class: Positive 2-inch wg.
 - b. Minimum SMACNA Seal Class: C.
 - c. SMACNA Leakage Class for Rectangular: 24.
 - d. SMACNA Leakage Class for Round and Flat Oval: 12.
- C. Return Ducts:
 - 1. Ducts Connected to Fan Coil Units, Furnaces, Heat Pumps, and Terminal Units:
 - a. Pressure Class: Positive or negative 2-inch wg.
 - b. Minimum SMACNA Seal Class: C.
 - c. SMACNA Leakage Class for Rectangular: 24.
 - d. SMACNA Leakage Class for Round and Flat Oval: 12.
 - 2. Ducts Connected to Air-Handling Units:
 - a. Pressure Class: Positive or negative 2-inch wg.
 - b. Minimum SMACNA Seal Class: C.
 - c. SMACNA Leakage Class for Rectangular: 24.
 - d. SMACNA Leakage Class for Round and Flat Oval: 12.
 - 3. Ducts Connected to Equipment Not Listed Above:
 - a. Pressure Class: Positive or negative 2-inch wg.
 - b. Minimum SMACNA Seal Class: C.
 - c. SMACNA Leakage Class for Rectangular: 24.
 - d. SMACNA Leakage Class for Round and Flat Oval: 12.
- D. Exhaust Ducts:
 - 1. Ducts Connected to Fans Exhausting (ASHRAE 62.1, Class 1 and 2) Air:
 - a. Pressure Class: Negative 2-inch wg.
 - b. Minimum SMACNA Seal Class: C.
 - c. SMACNA Leakage Class for Rectangular: 24.
 - d. SMACNA Leakage Class for Round and Flat Oval: 12.

2. Ducts Connected to Air-Handling Units:
 - a. Pressure Class: Positive or negative 2-inch wg.
 - b. Minimum SMACNA Seal Class: C.
 - c. SMACNA Leakage Class for Rectangular: 24.
 - d. SMACNA Leakage Class for Round and Flat Oval: 12

3. Ducts Connected to Equipment Not Listed Above:
 - a. Pressure Class: Positive or negative 2-inch wg.
 - b. Minimum SMACNA Seal Class: C.
 - c. SMACNA Leakage Class for Rectangular: 24.
 - d. SMACNA Leakage Class for Round and Flat Oval: 12

- E. Outdoor-Air (Not Filtered, Heated, or Cooled) Ducts:
 1. Ducts Connected to Fan Coil Units, Furnaces, Heat Pumps, and Terminal Units:
 - a. Pressure Class: Positive or negative 2-inch wg.
 - b. Minimum SMACNA Seal Class: C.
 - c. SMACNA Leakage Class for Rectangular: 24.
 - d. SMACNA Leakage Class for Round and Flat Oval: 12

 2. Ducts Connected to Air-Handling Units:
 - a. Pressure Class: Positive or negative 2-inch wg.
 - b. Minimum SMACNA Seal Class: C.
 - c. SMACNA Leakage Class for Rectangular: 24.
 - d. SMACNA Leakage Class for Round and Flat Oval: 12

 3. Ducts Connected to Equipment Not Listed Above:
 - a. Pressure Class: Positive or negative 2-inch wg.
 - b. Minimum SMACNA Seal Class: C.
 - c. SMACNA Leakage Class for Rectangular: 24.
 - d. SMACNA Leakage Class for Round and Flat Oval: 12

- F. Intermediate Reinforcement:
 1. Galvanized-Steel Ducts: Galvanized steel.

- G. Liner:
 1. Supply and Return Air Ducts and Plenums: Fibrous glass, Type I, 1-1/2 inches thick.
 2. Transfer Ducts: Fibrous glass, Type I, 2 inches thick.

- H. Elbow Configuration:
 1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-2, "Rectangular Elbows."
 - a. Velocity 1000 fpm or Lower:
 - 1) Radius Type RE 1 with minimum 0.5 radius-to-diameter ratio.
 - 2) Mitered Type RE 4 without vanes.

- b. Velocity 1000 to 1500 fpm:
 - 1) Radius Type RE 1 with minimum 1.0 radius-to-diameter ratio.
 - 2) Radius Type RE 3 with minimum 0.5 radius-to-diameter ratio and two vanes.
 - 3) Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."
- c. Velocity 1500 fpm or Higher:
 - 1) Radius Type RE 1 with minimum 1.5 radius-to-diameter ratio.
 - 2) Radius Type RE 3 with minimum 1.0 radius-to-diameter ratio and two vanes.
 - 3) Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."
- 2. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-2, "Rectangular Elbows."
 - a. Radius Type RE 1 with minimum 1.5 radius-to-diameter ratio.
 - b. Radius Type RE 3 with minimum 1.0 radius-to-diameter ratio and two vanes.
 - c. Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."
- 3. Round Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-4, "Round Duct Elbows."
 - a. Minimum Radius-to-Diameter Ratio and Elbow Segments: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 3-1, "Mitered Elbows." Elbows with less than 90-degree change of direction have proportionately fewer segments.
 - 1) Velocity 1000 fpm or Lower: 0.5 radius-to-diameter ratio and three segments for 90-degree elbow.
 - 2) Velocity 1000 to 1500 fpm: 1.0 radius-to-diameter ratio and four segments for 90-degree elbow.
 - 3) Velocity 1500 fpm or Higher: 1.5 radius-to-diameter ratio and five segments for 90-degree elbow.
 - 4) Radius-to Diameter Ratio: 1.5.
 - b. Round Elbows, 12 Inches and Smaller in Diameter: Stamped or pleated.
 - c. Round Elbows, 14 Inches and Larger in Diameter: Standing seam.
- I. Branch Configuration:
 - 1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-6, "Branch Connection."
 - a. Rectangular Main to Rectangular Branch: 45-degree entry.
 - b. Rectangular Main to Round Branch: Spin in.

2. Round and Flat Oval: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "Conical Tees." Saddle taps are permitted in existing duct.
 - a. Velocity 1000 fpm or Lower: 90-degree tap.
 - b. Velocity 1000 to 1500 fpm: Conical tap.
 - c. Velocity 1500 fpm or Higher: 45-degree lateral.

END OF SECTION 23 31 13

SECTION 23 33 00

AIR DUCT ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:

1. Backdraft and pressure relief dampers.
2. Manual volume dampers.
3. Flange connectors.
4. Turning vanes.
5. Remote damper operators.
6. Duct-mounted access doors.
7. Flexible connectors.
8. Flexible ducts.
9. Duct accessory hardware.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1. For duct silencers, include pressure drop and dynamic insertion loss data. Include breakout noise calculations for high transmission loss casings.

- B. Shop Drawings: For duct accessories. Include plans, elevations, sections, details and attachments to other work.

1. Detail duct accessories fabrication and installation in ducts and other construction. Include dimensions, weights, loads, and required clearances; and method of field assembly into duct systems and other construction. Include the following:

- a. Special fittings.
- b. Manual volume damper installations.
- c. Control-damper installations.
- d. Fire-damper, smoke-damper, combination fire- and smoke-damper, ceiling, and corridor damper installations, including sleeves; and duct-mounted access doors and remote damper operators.
- e. Duct security bars.
- f. Wiring Diagrams: For power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which ceiling-mounted access panels and access doors required for access to duct accessories are shown and coordinated with each other, using input from Installers of the items involved.

- B. Source quality-control reports.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For air duct accessories to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 ASSEMBLY DESCRIPTION

- A. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," and with NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."
- B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.

2.2 MATERIALS

- A. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.
 - 1. Galvanized Coating Designation: G90.
 - 2. Exposed-Surface Finish: Mill phosphatized.
- B. Stainless-Steel Sheets: Comply with ASTM A 480/A 480M, Type 304, and having a No. 2 finish for concealed ducts and finish for exposed ducts.
- C. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.
- D. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.3 BACKDRAFT AND PRESSURE RELIEF DAMPERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Greenheck Fan Corporation.
 - 2. Pottorff.
 - 3. Ruskin Company.
- B. Description: Gravity balanced.
- C. Maximum Air Velocity: 2500 fpm.
- D. Maximum System Pressure: 2-inch wg.
- E. Frame: Hat-shaped, 18-gage galvanized sheet steel, with welded corners or mechanically attached and mounting flange.
- F. Blades: Multiple single-piece blades, center pivoted, maximum 6-inch width, 0.025-inch-thick, roll-formed aluminum with sealed edges.

- G. Blade Action: Parallel.
- H. Blade Seals: Extruded vinyl, mechanically locked.
- I. Blade Axles:
 - 1. Material: Plated steel.
 - 2. Diameter: 0.20 inch.
- J. Tie Bars and Brackets: Galvanized steel.
- K. Return Spring: Adjustable tension.
- L. Bearings: Synthetic pivot bushings.
- M. Accessories:
 - 1. Adjustment device to permit setting for varying differential static pressure.
 - 2. Counterweights and spring-assist kits for vertical airflow installations.
 - 3. Chain pulls.
 - 4. Screen Mounting: Front mounted in sleeve.
 - a. Sleeve Thickness: 20 gage minimum.
 - b. Sleeve Length: 6 inches minimum.
 - 5. Screen Mounting: Rear mounted.
 - 6. Screen Material: Galvanized steel.
 - 7. Screen Type: Bird.
 - 8. 90-degree stops.

2.4 MANUAL VOLUME DAMPERS

- A. Standard, Steel, Manual Volume Dampers:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Nailor Industries Inc.
 - b. Pottorff.
 - c. Ruskin Company.
 - d. Trox USA Inc.
 - 2. Standard leakage rating.
 - 3. Suitable for horizontal or vertical applications.
 - 4. Frames:
 - a. Frame: Hat-shaped, 20-gage, galvanized sheet steel.
 - b. Mitered and welded corners.
 - c. Flanges for attaching to walls and flangeless frames for installing in ducts.
 - 5. Blades:
 - a. Multiple or single blade.
 - b. Parallel- or opposed-blade design.
 - c. Stiffen damper blades for stability.
 - d. Galvanized-steel, 0.064 inch thick.
 - 6. Blade Axles: Plated steel.

7. Bearings:
 - a. Molded synthetic.
 - b. Dampers in ducts with pressure classes of 3-inch wg or less shall have axles full length of damper blades and bearings at both ends of operating shaft.
8. Tie Bars and Brackets: Galvanized steel.

2.5 FLANGE CONNECTORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Ductmate Industries, Inc.
 2. Nexus PDQ; Division of Shilco Holdings Inc.
 3. Ward Industries, Inc.; a division of Hart & Cooley, Inc.
- B. Description: Roll-formed, factory-fabricated, slide-on transverse flange connectors, gaskets, and components.
- C. Material: Galvanized steel.
- D. Gage and Shape: Match connecting ductwork.

2.6 TURNING VANES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Ductmate Industries, Inc.
 2. Duro Dyne Inc.
 3. METALAIRE, Inc.
 4. SEMCO Incorporated.
- B. Manufactured Turning Vanes for Metal Ducts: Curved blades of galvanized sheet steel; support with bars perpendicular to blades set; set into vane runners suitable for duct mounting.
 1. Acoustic Turning Vanes: Fabricate airfoil-shaped aluminum extrusions with perforated faces and fibrous-glass fill.
- C. Manufactured Turning Vanes for Nonmetal Ducts: Fabricate curved blades of resin-bonded fiberglass with acrylic polymer coating; support with bars perpendicular to blades set; set into vane runners suitable for duct mounting.
- D. General Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"; Figures 4-3, "Vaness and Vane Runners," and 4-4, "Vane Support in Elbows."
- E. Vane Construction: Double wall.

2.7 REMOTE DAMPER OPERATORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Pottorff.
 2. Ventfabrics, Inc.
 3. Young Regulator Company.

- B. Description: Cable system designed for remote manual damper adjustment.
- C. Tubing: Galvanized spiral wire sheath.
- D. Cable: Stainless steel.
- E. Wall-Box Mounting: Recessed.
- F. Wall-Box Cover-Plate Material: Steel.

2.8 DUCT-MOUNTED ACCESS DOORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Ductmate Industries, Inc.
 - 2. Greenheck Fan Corporation.
 - 3. Pottorff.
- B. Duct-Mounted Access Doors: Fabricate access panels according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"; Figures 7-2, "Duct Access Doors and Panels," and 7-3, "Access Doors - Round Duct."
 - 1. Door:
 - a. Double wall, rectangular.
 - b. Galvanized sheet metal with insulation fill and thickness as indicated for duct pressure class.
 - c. Vision panel.
 - d. Hinges and Latches: 1-by-1-inch butt or piano hinge and cam latches.
 - e. Fabricate doors airtight and suitable for duct pressure class.
 - 2. Frame: Galvanized sheet steel, with bend-over tabs and foam gaskets.
 - 3. Number of Hinges and Locks:
 - a. Access Doors Less Than 12 Inches Square: No hinges and two sash locks.
 - b. Access Doors up to 18 Inches Square: Continuous and two sash locks.
 - c. Access Doors up to 24 by 48 Inches: Continuous and two compression latches with outside and inside handles.
 - d. Access Doors Larger Than 24 by 48 Inches: Continuous and two compression latches with outside and inside handles.
- C. Pressure Relief Access Door:
 - 1. Door and Frame Material: Galvanized sheet steel.
 - 2. Door: Single wall or double wall with insulation fill with metal thickness applicable for duct pressure class.
 - 3. Operation: Open outward for positive-pressure ducts and inward for negative-pressure ducts.
 - 4. Factory set.
 - 5. Doors close when pressures are within set-point range.
 - 6. Hinge: Continuous piano.
 - 7. Latches: Cam.
 - 8. Seal: Neoprene or foam rubber.
 - 9. Insulation Fill: 1-inch- thick, fibrous-glass or polystyrene-foam board.

2.9 DUCT ACCESS PANEL ASSEMBLIES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Ductmate Industries, Inc.
 - 2. Flame Gard, Inc.
 - 3. 3M.
- B. Labeled according to UL 1978 by an NRTL.
- C. Panel and Frame: Minimum thickness 11-gage carbon steel.
- D. Fasteners: Carbon steel. Panel fasteners shall not penetrate duct wall.
- E. Gasket: Comply with NFPA 96; grease-tight, high-temperature ceramic fiber, rated for minimum 2000 deg F.
- F. Minimum Pressure Rating: 10-inch wg, positive or negative.

2.10 FLEXIBLE CONNECTORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Ductmate Industries, Inc.
 - 2. Duro Dyne Inc.
 - 3. Ward Industries, Inc.; a division of Hart & Cooley, Inc.
- B. Materials: Flame-retardant or noncombustible fabrics.
- C. Coatings and Adhesives: Comply with UL 181, Class 1.
- D. Metal-Edged Connectors: Factory fabricated with a fabric strip 3-1/2 inches wide attached to two strips of 2-3/4-inch- wide, 0.028-inch- thick, galvanized sheet steel or 0.032-inch- thick aluminum sheets. Provide metal compatible with connected ducts.
- E. Indoor System, Flexible Connector Fabric: Glass fabric double coated with neoprene.
 - 1. Minimum Weight: 26 oz./sq. yd..
 - 2. Tensile Strength: 480 lbf/inch in the warp and 360 lbf/inch in the filling.
 - 3. Service Temperature: Minus 40 to plus 200 deg F.
- F. Outdoor System, Flexible Connector Fabric: Glass fabric double coated with weatherproof, synthetic rubber resistant to UV rays and ozone.
 - 1. Minimum Weight: 24 oz./sq. yd..
 - 2. Tensile Strength: 530 lbf/inch in the warp and 440 lbf/inch in the filling.
 - 3. Service Temperature: Minus 50 to plus 250 deg F.
- G. High-Temperature System, Flexible Connectors: Glass fabric coated with silicone rubber.
 - 1. Minimum Weight: 16 oz./sq. yd..
 - 2. Tensile Strength: 285 lbf/inch in the warp and 185 lbf/inch in the filling.
 - 3. Service Temperature: Minus 67 to plus 500 deg F.

- H. High-Corrosive-Environment System, Flexible Connectors: Glass fabric with chemical-resistant coating.
 - 1. Minimum Weight: 14 oz./sq. yd..
 - 2. Tensile Strength: 450 lbf/inch in the warp and 340 lbf/inch in the filling.
 - 3. Service Temperature: Minus 67 to plus 500 deg F.

- I. Thrust Limits: Combination coil spring and elastomeric insert with spring and insert in compression, and with a load stop. Include rod and angle-iron brackets for attaching to fan discharge and duct.
 - 1. Frame: Steel, fabricated for connection to threaded rods and to allow for a maximum of 30 degrees of angular rod misalignment without binding or reducing isolation efficiency.
 - 2. Outdoor Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
 - 3. Minimum Additional Travel: 50 percent of the required deflection at rated load.
 - 4. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
 - 5. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
 - 6. Elastomeric Element: Molded, oil-resistant rubber or neoprene.
 - 7. Coil Spring: Factory set and field adjustable for a maximum of 1/4-inch movement at start and stop.

2.11 FLEXIBLE DUCTS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Flexmaster U.S.A., Inc.
 - 2. McGill AirFlow LLC.
 - 3. Ward Industries, Inc.; a division of Hart & Cooley, Inc.

- B. Insulated, Flexible Duct: UL 181, Class 1, polyethylene film supported by helically wound, galvanized-steel wire; fibrous-glass insulation; aluminized vapor-barrier film.
 - 1. Pressure Rating: 10-inch wg positive and 1.0-inch wg negative.
 - 2. Maximum Air Velocity: 5500 fpm.
 - 3. Temperature Range: Minus 10 to plus 160 deg F.
 - 4. Insulation R-value: Comply with ASHRAE/IESNA 90.1.

- C. Flexible Duct Connectors:
 - 1. Clamps: Stainless-steel band with cadmium-plated hex screw to tighten band with a worm-gear action in sizes 3 through 18 inches, to suit duct size.
 - 2. Non-Clamp Connectors: Adhesive plus sheet metal screws.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install duct accessories according to applicable details in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for metal ducts and in NAIMA AH116, "Fibrous Glass Duct Construction Standards," for fibrous-glass ducts.

- B. Install duct accessories of materials suited to duct materials; use galvanized-steel accessories in galvanized-steel and fibrous-glass ducts, stainless-steel accessories in stainless-steel ducts, and aluminum accessories in aluminum ducts.

- C. Install backdraft dampers at inlet of exhaust fans or exhaust ducts as close as possible to exhaust fan unless otherwise indicated.
- D. Install volume dampers at points on supply, return, and exhaust systems where branches extend from larger ducts. Where dampers are installed in ducts having duct liner, install dampers with hat channels of same depth as liner, and terminate liner with nosing at hat channel.
 - 1. Install steel volume dampers in steel ducts.
 - 2. Install aluminum volume dampers in aluminum ducts.
- E. Set dampers to fully open position before testing, adjusting, and balancing.
- F. Install test holes at fan inlets and outlets and elsewhere as indicated.
- G. Install fire and smoke dampers according to UL listing.
- H. Connect ducts to duct silencers rigidly.
- I. Install duct access doors on sides of ducts to allow for inspecting, adjusting, and maintaining accessories and equipment at the following locations:
 - 1. On both sides of duct coils.
 - 2. Upstream from duct filters.
 - 3. At outdoor-air intakes and mixed-air plenums.
 - 4. At drain pans and seals.
 - 5. Downstream from manual volume dampers, control dampers, backdraft dampers, and equipment.
 - 6. Adjacent to and close enough to fire or smoke dampers, to reset or reinstall fusible links. Access doors for access to fire or smoke dampers having fusible links shall be pressure relief access doors and shall be outward operation for access doors installed upstream from dampers and inward operation for access doors installed downstream from dampers.
 - 7. At each change in direction and at maximum 50-foot spacing.
 - 8. Upstream from turning vanes.
 - 9. Upstream or downstream from duct silencers.
 - 10. Control devices requiring inspection.
 - 11. Elsewhere as indicated.
- J. Install access doors with swing against duct static pressure.
- K. Access Door Sizes:
 - 1. One-Hand or Inspection Access: 8 by 5 inches.
 - 2. Two-Hand Access: 12 by 6 inches.
 - 3. Head and Hand Access: 18 by 10 inches.
 - 4. Head and Shoulders Access: 21 by 14 inches.
 - 5. Body Access: 25 by 14 inches.
 - 6. Body plus Ladder Access: 25 by 17 inches.
- L. Label access doors according to Section 230553 "Identification for HVAC Piping and Equipment" to indicate the purpose of access door.
- M. Install flexible connectors to connect ducts to equipment.
- N. For fans developing static pressures of 5-inch wg and more, cover flexible connectors with loaded vinyl sheet held in place with metal straps.
- O. Connect diffusers to ducts with maximum 60-inch lengths of flexible duct clamped or strapped in place.
- P. Connect flexible ducts to metal ducts with draw bands.

- Q. Install duct test holes where required for testing and balancing purposes.
- R. Install thrust limits at centerline of thrust, symmetrical on both sides of equipment. Attach thrust limits at centerline of thrust and adjust to a maximum of 1/4-inch movement during start and stop of fans.

3.2 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. Operate dampers to verify full range of movement.
2. Inspect locations of access doors and verify that purpose of access door can be performed.
3. Operate fire, smoke, and combination fire and smoke dampers to verify full range of movement and verify that proper heat-response device is installed.
4. Inspect turning vanes for proper and secure installation.
5. Operate remote damper operators to verify full range of movement of operator and damper.

END OF SECTION 23 33 00

SECTION 23 34 23

HVAC POWER VENTILATORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Centrifugal roof ventilators.

1.3 PERFORMANCE REQUIREMENTS

- A. Project Altitude: Base fan-performance ratings on actual project site elevations.
- B. Operating Limits: Classify according to AMCA 99.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, and furnished specialties and accessories. Also include the following:
 - 1. Certified fan performance curves with system operating conditions indicated.
 - 2. Certified fan sound-power ratings.
 - 3. Motor ratings and electrical characteristics, plus motor and electrical accessories.
 - 4. Material thickness and finishes, including color charts.
 - 5. Dampers, including housings, linkages, and operators.
 - 6. Roof curbs.
 - 7. Fan speed controllers.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
 - 1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - 2. Wiring Diagrams: For power, signal, and control wiring.

1.5 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Reflected ceiling plans and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from Installers of the items involved:
 - 1. Roof framing and support members relative to duct penetrations.
 - 2. Ceiling suspension assembly members.
 - 3. Size and location of initial access modules for acoustical tile.

- 4. Ceiling-mounted items including light fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.
 - B. Field quality-control reports.
- 1.6 CLOSEOUT SUBMITTALS
- A. Operation and Maintenance Data: For power ventilators to include in emergency, operation, and maintenance manuals.
- 1.7 MAINTENANCE MATERIAL SUBMITTALS
- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Belts: One set for each belt-driven unit.
- 1.8 QUALITY ASSURANCE
- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 - B. AMCA Compliance: Fans shall have AMCA-Certified performance ratings and shall bear the AMCA-Certified Ratings Seal.
 - C. UL Standards: Power ventilators shall comply with UL 705. Power ventilators for use for restaurant kitchen exhaust shall also comply with UL 762.
- 1.9 COORDINATION
- A. Coordinate size and location of structural-steel support members.
 - B. Coordinate sizes and locations of concrete bases with actual equipment provided.
 - C. Coordinate sizes and locations of roof curbs, equipment supports, and roof penetrations with actual equipment provided.

PART 2 - PRODUCTS

2.1 CENTRIFUGAL ROOF VENTILATORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Greenheck Fan Corporation.
 - 2. Loren Cook Company.
 - 3. Aerovent; a division of Twin City Fan Companies, Ltd.
- B. Housing: Removable, spun-aluminum, dome top and outlet baffle; square, one-piece, aluminum base with venturi inlet cone.
 - 1. Upblast Units: Provide spun-aluminum discharge baffle to direct discharge air upward, with rain and snow drains.

- C. Fan Wheels: Aluminum hub and wheel with backward-inclined blades.
- D. Belt Drives:
 - 1. Resiliently mounted to housing.
 - 2. Fan Shaft: Turned, ground, and polished steel; keyed to wheel hub.
 - 3. Shaft Bearings: Permanently lubricated, permanently sealed, self-aligning ball bearings.
 - 4. Pulleys: Cast-iron, adjustable-pitch motor pulley.
 - 5. Fan and motor isolated from exhaust airstream.
- E. Accessories:
 - 1. Variable-Speed Controller: Solid-state control to reduce speed from 100 to less than 50 percent.
 - 2. Disconnect Switch: Nonfusible type, with thermal-overload protection mounted outside fan housing, factory wired through an internal aluminum conduit.
 - 3. Bird Screens: Removable, 1/2-inch mesh, aluminum or brass wire.
 - 4. Dampers: Counterbalanced, parallel-blade, backdraft dampers mounted in curb base; factory set to close when fan stops.
- F. Roof Curbs: Galvanized steel; mitered and welded corners; 1-1/2-inch- thick, rigid, fiberglass insulation adhered to inside walls; and 1-1/2-inch wood nailer. Size as required to suit roof opening and fan base.
 - 1. Configuration: Built-in cant and mounting flange.
 - 2. Overall Height: As required to maintain 12" above finish roof.
 - 3. Sound Curb: Curb with sound-absorbing insulation.
 - 4. Pitch Mounting: Manufacture curb for roof slope.
 - 5. Metal Liner: Galvanized steel.

2.2 MOTORS

- A. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
- B. Enclosure Type: Totally enclosed, fan cooled.

2.3 SOURCE QUALITY CONTROL

- A. Certify sound-power level ratings according to AMCA 301, "Methods for Calculating Fan Sound Ratings from Laboratory Test Data." Factory test fans according to AMCA 300, "Reverberant Room Method for Sound Testing of Fans." Label fans with the AMCA-Certified Ratings Seal.
- B. Certify fan performance ratings, including flow rate, pressure, power, air density, speed of rotation, and efficiency by factory tests according to AMCA 210, "Laboratory Methods of Testing Fans for Aerodynamic Performance Rating." Label fans with the AMCA-Certified Ratings Seal.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install power ventilators level and plumb.
- B. Equipment Mounting:
 - 1. Install power ventilators on cast-in-place concrete equipment base(s). Comply with requirements for equipment bases and foundations specified in other sections.

2. Comply with requirements for vibration isolation and seismic control devices specified in Section 230548 "Vibration and Seismic Controls for HVAC."
- C. Secure roof-mounted fans to roof curbs with cadmium-plated hardware. See Section 077200 "Roof Accessories" for installation of roof curbs.
- D. Ceiling Units: Suspend units from structure; use steel wire or metal straps.
- E. Support suspended units from structure using threaded steel rods and spring hangers having a static deflection of 1 inch. Vibration-control devices are specified in Section 230548 "Vibration and Seismic Controls for HVAC."
- F. Install units with clearances for service and maintenance.
- G. Label units according to requirements specified in Section 230553 "Identification for HVAC Piping and Equipment."

3.2 CONNECTIONS

- A. Drawings indicate general arrangement of ducts and duct accessories. Make final duct connections with flexible connectors. Flexible connectors are specified in Section 233300 "Air Duct Accessories."
- B. Install ducts adjacent to power ventilators to allow service and maintenance.
- C. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."
- D. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

3.3 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
 1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
- B. Tests and Inspections:
 1. Verify that shipping, blocking, and bracing are removed.
 2. Verify that unit is secure on mountings and supporting devices and that connections to ducts and electrical components are complete. Verify that proper thermal-overload protection is installed in motors, starters, and disconnect switches.
 3. Verify that cleaning and adjusting are complete.
 4. Disconnect fan drive from motor, verify proper motor rotation direction, and verify fan wheel free rotation and smooth bearing operation. Reconnect fan drive system, align and adjust belts, and install belt guards.
 5. Adjust belt tension.
 6. Adjust damper linkages for proper damper operation.
 7. Verify lubrication for bearings and other moving parts.
 8. Verify that manual and automatic volume control and fire and smoke dampers in connected ductwork systems are in fully open position.
 9. Disable automatic temperature-control operators, energize motor and adjust fan to indicated rpm, and measure and record motor voltage and amperage.
 10. Shut unit down and reconnect automatic temperature-control operators.
 11. Remove and replace malfunctioning units and retest as specified above.
- C. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Prepare test and inspection reports.

3.4 ADJUSTING

A. Adjust damper linkages for proper damper operation.

B. Adjust belt tension.

C. Comply with requirements in Section 230593 "Testing, Adjusting, and Balancing for HVAC" for testing, adjusting, and balancing procedures.

D. Replace fan and motor pulleys as required to achieve design airflow.

E. Lubricate bearings.

END OF SECTION 233423

SECTION 23 37 13

AIR DIFFUSERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Modular core, square ceiling diffusers.
2. Perforated diffusers.

B. Related Sections:

1. Section 233300 "Air Duct Accessories" for fire and smoke dampers and volume-control dampers not integral to diffusers, registers, and grilles.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated, include the following:

1. Data Sheet: Indicate materials of construction, finish, and mounting details; and performance data including throw and drop, static-pressure drop, and noise ratings.
2. Diffuser, Register, and Grille Schedule: Indicate drawing designation, room location, quantity, model number, size, and accessories furnished.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from Installers of the items involved:

1. Ceiling suspension assembly members.
2. Method of attaching hangers to building structure.
3. Size and location of initial access modules for acoustical tile.
4. Ceiling-mounted items including lighting fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.
5. Duct access panels.

B. Source quality-control reports.

PART 2 - PRODUCTS

2.1 CEILING DIFFUSERS

A. Modular Core, Square Ceiling Diffuser:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Price Industries.
 - b. Titus.
 - c. Anemostat Products; a Mestek company.
2. Devices shall be specifically designed for variable-air-volume flows.
3. Material: Steel.
4. Finish: Baked enamel, color selected by Architect.
5. Face Style: Modular Core.
6. Mounting: Surface.
7. Pattern: Adjustable.

B. Perforated Diffuser:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Price Industries.
 - b. Titus.
 - c. Anemostat Products; a Mestek company.
2. Devices shall be specifically designed for variable-air-volume flows.
3. Material: Steel.
4. Finish: Baked enamel, color selected by Architect.
5. Duct Inlet: Square.
6. Face Style: Flush.
7. Mounting: T-bar.
8. Pattern Controller: Adjustable with louvered pattern modules at inlet.

2.2 SOURCE QUALITY CONTROL

- A. Verification of Performance: Rate diffusers, registers, and grilles according to ASHRAE 70, "Method of Testing for Rating the Performance of Air Outlets and Inlets."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas where diffusers, registers, and grilles are to be installed for compliance with requirements for installation tolerances and other conditions affecting performance of equipment.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install diffusers, registers, and grilles level and plumb.

- B. Ceiling-Mounted Outlets and Inlets: Drawings indicate general arrangement of ducts, fittings, and accessories. Air outlet and inlet locations have been indicated to achieve design requirements for air volume, noise criteria, airflow pattern, throw, and pressure drop. Make final locations where indicated, as much as practical. For units installed in lay-in ceiling panels, locate units in the center of panel. Where architectural features or other items conflict with installation, notify Architect for a determination of final location.
- C. Install diffusers, registers, and grilles with airtight connections to ducts and to allow service and maintenance of dampers, air extractors, and fire dampers.

3.3 ADJUSTING

- A. After installation, adjust diffusers, registers, and grilles to air patterns indicated, or as directed, before starting air balancing.

END OF SECTION 23 37 13

SECTION 26 00 00

ELECTRICAL

PART 1 - GENERAL

1.1 SCOPE

- A. Work of this section includes everything necessary for or incidental to completing the electrical work, to provide a complete and operable electrical system, except as herein specifically excluded.

1.2 GENERAL REQUIREMENTS

- A. Electrical System Characteristics: 120/240V. 1PH, 3W., 120/240V. 3PH, 4W.
- B. Guarantee: Furnish a written guarantee for a period of one-year from date of acceptance.
- C. Codes and Regulations: Work done under this Section shall comply with the latest edition of the following: California Electrical Code, State of California Title 24, State Building Standards, Occupational Safety and Health Administration (OSHA) requirements, State of California Title 17 and to all local codes having jurisdiction. In the case where the codes have different levels of requirements, the most stringent rule shall apply.
- D. Wherever a discrepancy in quantity or size of conduit, wire, equipment, devices, circuit breakers, etc., (all materials), arises on the Drawing and/or Specifications, the Contractor shall be responsible for providing and installing all material and services required by the strictest condition noted on Drawings and/or in Specifications to insure complete and operable systems as required by the Owner and Engineer.
- E. The General and Supplementary Conditions, as well as Special Conditions apply in addition to items in the Electrical Section. Special attention is directed to the following sections:
 - 1. Drawings and Specifications at the site.
 - 2. Shop drawings and samples.
 - 3. Record drawings.
 - 4. Cutting and Patching.
 - 5. Cleaning up.
 - 6. Guarantee.
 - 7. Tests.
- F. Additional Work: Refer to Mechanical, Plumbing and Alerting System Contractor drawings and specifications for additional Electrical requirements.
- G. Testing:
 - 1. Scan:
 - a. Infrascan test of the distribution branch circuit panels and existing panels used to serve the project shall be required.

- b. Infrascan certified reports shall be submitted on completion to the Owner and Engineer.
 - c. Scans shall be performed by an independent testing laboratory with total connected loads in operation.
- 2. Megger:
 - a. New branch circuit - phase, neutral and ground conductors.
 - b. New insulated bonding conductors.
 - 3. All circuits shall be tested for continuity and circuit integrity. Adjustments shall be made for circuits not complying with testing criteria.
 - 4. Grounding System: Shall be tested by an independent testing laboratory to meet resistance specified in Part 3.1, D.3 of these Specifications. It shall be this Contractor's responsibility to make adjustments, as required, to upgrade non-complying systems to proper and safe operation.
 - 5. All certified testing reports shall be submitted to the Owner at completion of project.
- H. All Core Cutting, Drilling, and Patching:
- 1. For the installation of work under this Section, the aforementioned shall be performed under this Section of the Specifications and the Concrete section of the Specifications.
 - 2. No holes will be allowed in any structural members without the written approval of the Structural Engineer.
 - 3. For penetrations of concrete slabs or concrete footings, the work will be as directed in the Concrete Section of Specifications.
 - 4. The contractor shall be responsible for patching and repairing surfaces where he is required to penetrate for work under this contract.
 - 5. Penetrations shall be sealed to meet the rated integrity of the surface required to be patched and repaired. The patched surface shall be painted or finished to match the existing surface.
- I. Verifying Drawings and Job Conditions:
- 1. This Contractor shall examine all Drawings and Specifications in a manner to be fully cognizant of all work required under this Section.
 - 2. This Contractor shall visit the site and verify existing conditions. Where existing conditions differ from Drawings, adjustment shall be made and allowances included for all necessary equipment to complete all parts of the Drawings and Specifications.
- J. Shop Drawings/Product Submittals:
- 1. Drawings shall be submitted in six (6) bound sets accompanied by Letter of Transmittal, which shall give a list of the number and dates of the drawings submitted. Drawings shall be complete in every respect and bound in sets.
 - 2. The Drawings submitted shall be marked with the name of the project, numbered consecutively and bear the approval of the Contractor as evidence that the Drawings have been checked by the Contractor. Any Drawings submitted without this approval will be returned to the Contractor for resubmission.

3. If the shop drawings show variations from the requirements of the Contract because of standard shop practice or other reasons, the Contractor shall make specific mention of such variations in his letter of transmittal. If the substitution is accepted, the Contractor shall be responsible for proper adjustment which may be caused by the substitution. Complete working samples shall be submitted with all requests for substitution.
4. Shop drawings/product data shall be submitted on the following but not limited to:
 - a. Lighting fixtures and drivers.
 - b. Panels accompanied by a copy of the Overcurrent Protective Device Coordination Study.
 - c. Circuit breakers accompanied by a copy of the Overcurrent Protective Device Coordination Study.
 - d. Switches/Occupant sensors/Disconnect switches.
 - e. Receptacles.
 - f. Fuses.
 - g. Pull boxes.
 - h. Conduit and fittings.
 - i. Wire/conductors.
 - j. Conduit/Cable supports.
5. Shop drawings shall include scaled site plans and floor plans indicating the location of all equipment, devices, interconnecting wire/cable, wiring diagrams, rack/enclosure elevations indicating the location of all rack mounted equipment, and sequence of operation.
6. Shop drawings shall include copies of the contractor's current C-10 license. For low voltage systems the submittal shall include copies of the contractor's current C-7 license, and copies of certificates identifying the low voltage contractor as a licensed distributor/installer of the equipment included in the submittal.
- K. Drawings of Record: The Contractor shall provide and keep up-to-date, a complete record set of blueprints. These shall be corrected daily and show every change from the original Drawings. This set of prints shall be kept on the job site and shall be used only as a record set. This shall not be construed as authorization for the Contractor to make changes in the layout without definite instruction in each case. Upon completion of the work, a set of reproducible Contract Drawings shall be obtained from the General Contractor and all changes as noted on the record set of prints shall be incorporated thereon with black ink in a neat, legible, understandable and professional manner. Refer to the Supplementary General Conditions for complete requirements.

1.3 WORK IN COOPERATION WITH OTHER TRADES

- A. Examine the Drawings and Specifications and determine the work to be performed by the site utilities contractor, mechanical and plumbing contractor, Alerting system contractor, and other trades. Provide the type and amount of electrical materials and equipment necessary to place this work in proper operation, completely wired, tested and ready for use. This shall include all conduit, wire, disconnects, relays, and other devices for the required operation of all systems or equipment whether shown on plan or not.

- B. Provide power and control circuits, conduit and wire as indicated on the Mechanical, Plumbing and Alerting system drawings as required for complete and operable systems.
- C. The electrical contractor shall be responsible for providing and installing specialty back-boxes for all communication/signal systems. The electrical contractor shall patch, repair and refinish walls, ceilings or floors disturbed by the installation of the subject back boxes.

1.4 TESTING AND ADJUSTMENT

- A. Upon completion of all electrical work, this Contractor shall test all circuits, switches, motors, breakers, motor starter(s) and their auxiliary circuits and any other electrical items to insure perfect operation of all electrical equipment.
- B. Equipment and parts in need of correction and discovered during such testing shall be immediately repaired or replaced with all new equipment and that part of the system shall then be retested. All such replacement or repair shall be done at no additional cost to the Owner.
- C. All circuit shall be tested for continuity and circuit integrity. Adjustments shall be made for circuits not complying with testing criteria.
- D. All certified testing reports shall be submitted to the Engineer at completion of project.

1.5 IDENTIFICATION

- A. Identification nameplates shall be Micarta 1/8" thick and of approved size, with bevelled edges and engraved white letters 1/4" high minimum on black background. Nameplates shall be provided for all circuits in the distribution switchboards, and selector switches. Inscriptions on equipment shall be identical to those indicated in panels and/or motor control centers and other similar devices. Each nameplate shall be provided with drillings and suitable mounting screws corresponding to finish of the nameplate. The inscriptions in each nameplate shall be as indicated on the Drawings.
- B. Identification of Air Conditioning Equipment: Equipment to be so identified shall include, but shall not be limited to: Pressure and temperature controllers; switches; equipment motors and boxes or cans housing other control items. Mechanical equipment nameplates shall have letters a minimum of 3/8" high.
- C. Identification of Signal/Communication Outlet Wall Plates: Outlet wall plates shall be engraved on the backside with its related signal/communication system and its serving conduit origin point.

1.6 MAINTENANCE, SERVICING, INSTRUCTION MANUALS AND WIRING DIAGRAMS

- A. Prior to final acceptance of the job, the Electrical Contractor shall furnish to the Owner at least four (4) copies of operating and maintenance and servicing instructions, as well as four (4) complete wiring diagrams for the following item(s) or equipment:
 - 1. Panelboards.
 - 2. Circuit breakers.
 - 3. Disconnect switches.
 - 4. LED drivers.
 - 5. Lighting controls (i.e. Occupant sensors, power packs, relay packs).

- B. All wiring diagrams shall specifically cover the system supplied. Typical drawings will not be accepted. Two (2) copies shall be presented to the Electrical Engineer and four (4) copies to the Owner.

1.7 ELECTRICAL CONTRACTOR'S RESPONSIBILITY

- A. It shall be the Electrical Contractor's responsibility to obtain a complete set of Drawings and Specifications. He shall check the Drawings of the other trades and shall carefully read the entire Specifications and determine his responsibilities.
- B. Contractor shall carry a valid State of California contractor's license.

1.8 FINAL INSPECTION AND ACCEPTANCE

- A. After all requirements of the Specifications and/or the Drawings have been fully completed, representatives of the Owner will inspect the work. Contractor shall provide competent personnel to demonstrate the operation of any item or system to the full satisfaction of each representative.
- B. Final acceptance of the work will be made by the Owner after receipt of approval and recommendation of acceptance from each representative.

1.9 RECORD DRAWINGS

- A. Contractor shall furnish one set of reproducible record drawings before final payment of retention.

1.10 SUBSTITUTIONS

- A. Substitution to specified equipment shall be submitted and received by the Engineer fifteen (15) days after the bid date for review and approval.
- B. To receive consideration, requests for substitutions must be accompanied by documentary proof of its equality with the specified material. Documentary proof shall be in letter form and identify the specified values/materials alongside proposed equal values/materials. In addition, catalog brochures and samples must be included in the submittal.
- C. In the event that authorization is given for a substitute equal to bid, after award of contract the Contractor shall submit to the Engineer certified quotations from suppliers of both the specified and proposed equal material for price comparison and delivery dates.
- D. In the event of cost reduction, the Owner will be credited with 100 percent of the reduction, arranged by Change Order.
- E. The Contractor warrants that substitutions proposed for specified items will fully perform the functions required.
- F. Substitutions or requests for substitution shall not be accepted and rejected for failure to comply with items A-E above.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Materials and Equipment: All electrical materials and equipment shall be new and shall be listed by Underwriter's Laboratories and bear their label, or listed and certified by a nationally recognized testing authority where UL does not have an approval. Custom made equipment must have complete test data submitted by the manufacturer attesting to its safety. In addition, the materials and equipment shall comply with the requirements of the following:
1. American Society of Testing Materials (ASTM).
 2. Insulated Cable Engineers Association (ICEA).
 3. National Electrical Manufacturer's Association (NEMA).
 4. National Fire Protection Association (NFPA).
 5. American National Standard Institute (ANSI).
- B. Existing Panels – Circuit Breaker:
1. Circuit breaker shall match existing in manufacturer, operation and short circuit duty. Provide new circuit breaker with required mounting hardware.
 2. Circuit breaker ampere interrupting capacity (AIC) shall be equal to or greater than the existing circuit breaker AIC rating.
 3. Circuit breaker shall be the number of poles and current capacity as indicated on the single line diagram.
 4. Circuit breaker shall be provided with a device for locking circuit breaker in "OFF" position.
 5. Provide custom steel covers to safe-off unused openings in the enclosure.
- C. Panelboards – Branch Circuit:
1. Branch circuit panelboards shall be of the dead front safety type equipped with thermal-magnetic bolt-on type 40 deg C. circuit breakers. Panels shall be suitable for the disaggregation of loads with provisions for the installation of future current transformer (CT's). Enclosure shall be minimum 20" wide and 5-3/4" deep unless otherwise noted on plan. Refer to panel schedule for ratings and quantity of circuits to be provided. Panels shall be provided with copper busses. Branch circuit panelboards shall be Eaton or approved equal Siemens, Square D or General Electric to match the main switchboard manufacturer. Equipment manufactured by third party OEM is not acceptable.
 2. Circuit breakers shall be fully AIC rated. Circuit breakers shall be the number of poles and current capacity as indicated on the panel schedule with terminals/lugs UL listed for 75°C. Circuit breakers shall be fully coordinated to ensure a local fault does not trip any upstream circuit breaker.
 3. Trims shall have doors equipped with flush type combination lock and catch, two milled type keys supplied with each panel. All locks shall be keyed alike and each door shall have a plastic covered directory frame with a typed identification card of all circuit and panel numbers for branch circuit panelboards and engraved lamacoid nameplates for power distribution panelboards.

4. Provide nameplate for all panelboards, 1/8" thick, Micarta or Lamacoid plate of approved size, with bevelled edges and engraved white letters on black background. Install nameplates on exterior trim of panel, above the panel door. For panels connected to normal power sources: Provide white letters on black background. For panels connected to emergency power sources: Provide white letters on red background
5. All wiring shall be neatly arranged and laced together.
6. All circuit breakers shall be provided with a device for locking circuit breaker in "OFF" position.
7. Refer to Painting Section of these Specifications for all panel finish. Panel shall be primed for painting.
8. Copper neutral busbar shall be 100% and shall have terminals for all active, spare, or inactive circuits.
9. Phase, Neutral, and Ground bus bars shall be full height/size, rectangular in cross section constructed of copper and interconnections.
10. Provide Arc-Fault warning labels on panel front covers.
11. Where indicated on plan, panels housing time clocks and contactors for control of lighting shall be provided with an auxiliary section. Panel shall consist of a two-section panelboard with two boxes and one trim/cover, each with their own door/lock.
12. Refer to Section 26 05 73 for additional requirements. Panelboards and the overcurrent protective device coordination study must be submitted concurrently. A Panelboard submittal that does not include the overcurrent protective device coordination study will be considered incomplete.
13. Panelboard product data and shop drawings submitted without a copy of the overcurrent protective device coordination study shall be accompanied by a Hold Harmless letter relieving the Architect and Engineer of any liability resulting from discrepancies between the submitted panels and the overcurrent protective device coordination study submitted at a later date. The Hold Harmless letter shall also state that the contractor shall be responsible for all costs associated with remedial work required to bring the submitted equipment into compliance with the findings, recommendations and conclusions of the overcurrent protective device coordination study. Remedial work shall include, but not be limited to, replacement of previously reviewed and accepted equipment, replacement of installed equipment, re-submittal of product data and shop drawings for equipment compliant with the overcurrent protective device coordination study

D. Lighting Fixtures:

1. Furnish, install and connect a lighting fixture at each outlet where a lighting fixture type symbol (designated on plans) is shown as being installed. Each fixture shall be complete with all required accessories including sockets, glassware, boxes, spacers, mounting devices, fire rating enclosure, chips and drivers.
2. LED Driver shall be Class 1, 120-277V, 50/60HZ (constant current) with surge protection in accordance with IEEE/ANSI C62.41.2 guidelines with a surge current rating of 10,000 amps. Operating temperature for interior fixtures shall range from 0°C to 35°C (32°F to 95°F). Operating temperature for exterior fixtures shall range from -40°C to 40°C (-40°F to 104°F). All defective drivers shall be replaced at no cost to the Owner.

3. LED chips shall be as manufactured by CREE, Philips-Lumileds, Nichia, Osram or approved equal.
4. Interior fixtures installed in individual rooms shall be provided with LED chips of the same manufacturer. Mixing of chip manufacturers will not be allowed. All fixtures in any one room must be replaced with new fixtures when the fixtures in the room display dissimilar illumination colors.
5. Exterior fixtures shall be provided with LED chips of the same manufacturer. Mixing of chip manufacturers will not be allowed. All fixtures within line of sight must be replaced with new fixtures when the fixtures in the line of sight display dissimilar illumination colors.
6. LED chips shall have 4000° Kelvin color temperature. Interior fixtures shall meet IESNA LM-79-08. Exterior fixtures shall meet IESNA LM-80-08.
7. Where indicated on the Lighting Fixture Schedule, interior light fixtures shall be provided with integral occupancy sensor and/or daylight sensor. Provide two (2) programming/configuration tools for programming the integral control devices.
8. Refer to Architectural reflected ceiling plan for type of ceiling being installed in each room and provide each fixture with required mounting devices and accessories for the particular ceiling.
9. All light fixtures shall be individually supported and properly anchored to the surfaces indicated on the Architectural elevations.
10. Locations of fixtures shall be per the architectural reflected ceiling plan and shall be coordinated at time of rough-in.
11. All exterior mounted light fixtures shall comply with current city or local lighting ordinance.
12. LED drivers for interior light fixtures shall provide full range dimming. Refer to the Lighting Fixture Schedule for the type of fixture being provided and provide a fully compatible dimming driver.

E. Conduit:

1. Rigid conduit shall be full weight threaded type aluminum or steel, except where specifically required to be steel. Steel conduit shall be protected by overall zinc coating to inside and outside surfaces, applied by the hot dip, metallizing or sherardizing process.
2. Galvanized Rigid Conduit (GRC), shall be full weight threaded type aluminum or steel, except where specifically required to be steel. Steel conduit shall be protected by overall zinc coating to inside and outside surfaces, applied by the hot dip, metallizing, or sherardizing process.
3. Intermediate Metal Conduit (IMC), shall be hot-dipped galvanized in accordance with UL 1242 and meeting Federal Specification WWC-581 (latest revision).
4. Electrical Metallic Tubing (EMT), shall be zinc-coated steel with baked enamel or plastic finish on inside surfaces.
5. Flexible metal conduit shall be constructed of aluminum or hot-dipped galvanized steel strips wound spirally with interlocking edges to provide greatest flexibility with maximum strength. Interior surfaces shall be smooth and offer minimum drag to pulling in conductors. Used only as directed by the Engineer.

6. Liquid-tight conduit (Seal-Tite) shall be galvanized steel flexible conduit as above except with moisture and oil-proof jacket, pre-cut lengths and factory installed fittings. For outdoor installations and motor connection.
7. Non-Metallic Conduit:
 - a. Polyvinyl chloride (PVC) rigid conduit, Schedule 40, Type II for underground installation only.
 - b. Conduit and fitting shall be produced by the same manufacturer.
8. Electrical non-metallic tubing (ENT) is not permitted.

F. Fittings:

1. Condulet type fittings shall be smooth inside and out, taper threaded with integral insulating bushing and of the shapes, sizes and types required to facilitate installation or removal of wires and cables from the conduit and tubing system. These fittings shall be of metal, smooth inside and out, thoroughly galvanized, and sherardized cadmium plated.
2. Metallic condulet covers shall have the same finish as the fitting and shall be provided for the opening of each fitting where conductor do not pass through the cover.
3. Connector, coupling, locknut, bushings and caps used with rigid conduit shall be steel, threaded and thoroughly galvanized. Bushings shall be insulated.
4. EMT fittings, connectors and couplings, shall be steel, zinc or cadmium plated, raintight, threadless, compression or tap-on multiple point, steel locking ring type with insulated throat.
5. Flexible steel conduit connectors shall be malleable iron clamp or squeeze type or steel twist-in type with insulated throat. The finish shall be zinc or cadmium plating.
6. Die cast, set screw or indenter type fittings are not acceptable.
7. Conduit unions shall be "Erickson" couplings, or approved equal. The use of running threads will not be permitted.

G. 600 Volt Conductors - Wire and Cable:

1. All conductors shall be stranded copper. Simpull type or equal.
2. Type THHN/THWN thermoplastic, 600 volt, UL approved, dry and wet locations, for conductor sizes up to and including #4 AWG.
3. Type XHHW cross-linked synthetic polymer, 600 volt, UL approved, for dry and wet locations, for conductor sizes #2 AWG. and above.
4. Cross-linked synthetic polymer, XHHW, 600 volts, UL approved, for installation underground, in concrete or masonry.
5. Wire and cable shall be new, manufactured not more than six (6) months prior to installation, shall have size, type of insulation, voltage rating and manufacturer's name permanently marked on outer covering at regular intervals.
6. Wire and cable shall be factory color coded by integral pigmentation with a separate color for each phase and neutral. Each system shall be color coded and it shall be maintained throughout.

7. Systems Conductor Color Coding:

a. Power 240/120V, 3PH, 4W:

- (1) Phase A = Black
- (2) Phase B = Orange (Identify as "High-Leg")
- (3) Phase C = Red
- (3) Neutral = White

b. Power 240/120V, 1PH, 3W:

- (1) Phase A = Black
- (2) Phase B = Red
- (3) Neutral = White
- (4) Switchlegs = Purple (Switchlegs shall also be identified separately by numerical tags).
- (5) Travelers = Purple with Black stripe.

c. Ground Conductors:

- (1) Green

d. Communication/Signal/Fire Alarm System:

- (1) As recommended by the manufacturer.

8. Multi-Conductor metal clad (MC) cable or non-metallic sheathed cable (Romex) is not permitted.

9. All color coding for #4 conductor and above shall be as identified above, utilizing phase tape at each termination.

10. No conductors carrying 120 volt or more shall be smaller than #12 AWG.

H. Outlet Boxes:

1. For fixtures, boxes shall be galvanized, steel, knockout type equipped with 3/8" fixture studs and plaster rings where required.
2. Unless otherwise noted on plan or specified herein, outlet boxes shall be 4" square x 2 1/8" deep, steel, knockout type, mounted flush with wall. Provide with plaster rings and wall plate.
3. For surface mounting in the training tower, outlet boxes shall be Nema 4X with threaded hubs; covers shall be Nema 4x with gaskets and non-ferrous screws.
4. For locations where standard boxes are not suitable due to number and size of conduit to be terminated, special boxes shall be designed to fit space or meet other requirements and submitted for approval.
5. For surface mounting or exposure to wet or damp locations, outlet boxes shall be heavy cast aluminum or cast iron with threaded hubs; covers shall be watertight with gaskets and non-ferrous screws.

I. Switches:

1. Standard single pole switches shall be flush tumbler, A.C. rated, quiet type, heavy duty back or side wired with binding screws, standard rocker Hubbell #1221, 20A, 120/277V, or approved equal, color as elected by Architect. Two pole three-way and other switches shall be similar. Refer to Device Plate Section of Specifications for other requirements.
2. Switches located outdoors or in damp or wet locations shall be the same as above provided with steel locking weatherproof lift cover.
3. Switches controlling or disconnecting single phase motor loads in excess of 1/3HP shall be horsepower rated and approved or motor control service. Switches shall be complete with overload device of proper motor nameplate rating, where required.
4. Disconnect (safety) switches shall be fused, heavy duty type meeting NEMA Specifications. Switches shall be provided with rejection type fuse blocks. Provide switches with the number of poles, the voltage, current and horsepower ratings as required. Provide externally operable, quickmake, quick-break type mechanism with cover interlock and padlockable in either the open or closed position. Unless indicated otherwise, provide switches indoors in NEMA Type 1 enclosure and in NEMA Type 4x rain-tight enclosure where indicated to be outdoors or weatherproof. Provide nameplate indicating equipment served. Provide unit as manufactured by Eaton or approved equal to match the main switchboard manufacturer.
5. Occupant sensors shall be low voltage, dual technology type, suitable for ceiling or wall mounting. Stand-alone ceiling mounted sensors shall be provided complete with relay/power pack and slave-packs to perform the switching indicated on plan. Sensors shall provide minimum 1,000 square foot coverage and provide complete coverage of the areas indicated on plan. Stand-alone sensors shall be as manufactured by nLight, or approved equal, Watt Stopper or Leviton. Sensors in dorms shall be programmed to operate in "vacancy" mode.
6. Occupant sensors located in hallways/corridors shall be programmed to automatically dim the lights to 50% when the space is unoccupied. Hallway/corridor sensors shall capable of detecting motion within a 130'-0" area. Stand-alone sensors shall be provided complete with relay/power pack and slave-packs.
7. Wall mounted, switch type, combination sensor and dimmer shall be dual technology type with single or dual circuit to provide the control indicated on plan. Sensors shall provide minimum 900 square feet major motion and 400 square feet minor motion coverage. Sensor shall have a multi-function tap switch with small, raised rocker, for dimmer adjustment. Sensors shall be as manufactured by Sensor Switch or approved equal Lutron, WattStopper or Leviton. Custom color as selected by the Architect. The contractor shall ensure the dimmers are fully compatible with the LED drivers being controlled. Sensors in toilets/bathrooms and dorms shall be programmed to operate in "vacancy" mode
8. All switches, dimmers and sensors shall be listed and certified by the California Energy Commission.
9. Switches/dimmers connected to emergency circuits shall be "red" in color.

J. Receptacles:

1. Convenience outlet shall consist of duplex convenience receptacle mounted in an outlet box in the wall, flush with the finish surface and shall be complete with a mud ring and wall plate.

2. Receptacles for convenience outlets, unless otherwise indicated, shall be industrial heavy duty type, duplex 3W grounding type, 20A, 125V, Hubbell-Bryant #5362-*. (*) color as selected by Architect.
3. Weatherproof receptacles and receptacles located outdoors shall be industrial heavy duty type, ground fault interrupter, 20 ampere, three wire grounding type, 120 volt, Hubbell-Bryant #GFSG5362*, color as selected by the Architect, with steel lockable lift cover U.L. listed for "wet" locations when in operation.
4. GFI receptacles shall be Hubell-Bryant #GFSG5362*, color as selected by the Architect..
5. Receptacles located within 6'-0" of a sink or in a wet location shall be GFI type Hubell-Bryant #GFR5362TR, color as selected by the Architect.
6. Receptacles in indoor damp locations shall be 20A, 125V, Hubbell-Bryant #5362WR or approved equal, color as selected by Architect. Provide with steel locking lift cover, Hubbell-Bryant #96067 or approved equal.
7. Receptacles located in the training tower shall be 20A. 125V. Nema 4x.
8. Specialty receptacles, identified on plans, for use with Owner furnished equipment shall be provided complete with outlet box, wall plate and receptacle to match the configuration of the plug being provided with the subject equipment. Actual receptacle configuration shall be determined at time of rough-in.

K. Device Plates:

1. Shall be smooth thermoplastic wall plates, for the number of gang and types of openings necessary. Color shall be as selected by the Architect.
2. Plates shall be fitted, when specified for more than two gangs.
3. All switch and receptacle plates shall be engraved with related serving panel and circuit number identification on the front.
4. Plates for interior damp or wet areas, including kitchen/break rooms, shall be stainless steel, weatherproof, complete with neoprene gaskets.
5. Covers for exterior mounted receptacles shall be metallic, U.L. listed for wet locations when "in-use".

L. Junction and Pullboxes:

1. For interior dry locations, boxes shall be galvanized one-piece drawn steel, knockout type, with removable, machine screw secured covers.
2. All boxes shall be sized for the number and sizes of conductors and conduits entering the box and equipped with plaster rings where required. Each conductor shall be terminated at an insulated, barriered terminal connector and completely identified with an engraved fiber identification marker, Electrovert or Underwriter's Safety Device Company.
3. For surface mounting in the training tower, boxes shall be Nema 4X with threaded hubs; covers shall be watertight with gaskets and non-ferrous screws.

M. Terminal Cabinets:

1. Terminal cabinets shall be fabricated of hot dipped galvanized code gauge sheet metal for flush or surface mounting, as indicated on plan. Unless specifically noted on plans otherwise, terminal cabinets shall be no smaller than 24" high, 30" wide and 6" deep. Doors shall be hinged and lockable. Locks shall be keyed to match the branch circuit panelboards. Terminal cabinet trims shall match the branch circuit panels.
2. Provide each terminal cabinet with a full size plywood backboard and terminal blocks (minimum 25% or 12 spare terminal blocks). All wires terminating on the terminal blocks shall be identified with an engraved fiber tag.
3. Surface mounted terminal cabinets shall be installed complete with full length skirts of the same construction and finish as the terminal cabinet.
4. Where mounted outdoors, terminal cabinets shall be NEMA 3R, weatherproof complete with gaskets and required sealant to prevent moisture from entering the terminal cabinet.

N. Plywood Backboards:

1. Where indicated for telephone or communications system terminals or other equipment assemblies, provide backboards to cover the entire wall it is attached to (full wall height and width).
2. Use Douglas Fir Plywood, exterior grade, finished one side and painted on all surfaces with intumescent gray paint. Unless otherwise indicated, use 3/4" thick plywood.
3. Where terminal cabinets are used, provide full size plywood backboard to mount inside the terminal cabinet.

O. Painting:

1. Terminal cabinets, panels, junction boxes, pull boxes, etc., and conduit installed outdoors and in public view shall be painted with colors selected by the Architect to match the subject exterior surface. Refer to painting section of the specifications for additional requirements.

P. Seismic Design and Anchoring of Electrical Equipment:

1. Seismic anchorage of electrical equipment shall conform to C.C.R. Title 24, 2022 CBC. Anchorage details for roof/floor mounted equipment shall be as shown on plans.

PART 3 - EXECUTION

3.1 PREPARATION AND INSTALLATION

A. Installation of Conduit and Outlet Boxes:

1. All conduit installed in concrete and masonry shall be galvanized rigid steel conduit (GRC), or intermediate metal conduit (IMC).
2. Rigid conduit may be installed under floor slabs, under concrete sidewalls and as noted on the Drawings. Rigid conduit installed under slabs shall be 1" trade size minimum and shall be wrapped with 20 mil. polyvinyl chloride plastic tape.

3. All conduit except as hereinafter specified, installed in concrete, masonry and block walls, or damp or hazardous location, or subject to mechanical injury shall be heavy wall, threaded, galvanized rigid steel conduit (GRC), or intermediate metal conduit (IMC). Installation of conduit in block walls shall be approved by the Structural Engineer prior to rough-in.
4. Flexible steel conduit shall only be permitted to be used at light fixture outlets, building seismic separations, and connections to vibrating electrical equipment. All flexible steel conduit runs shall be less than 6'-0". All outdoor installation shall be made using liquid-tight flex with approved fittings. Use of flexible conduit shall be as approved by the Engineer.
5. Intermediate metal conduit (IMC), is approved for use in all locations as approved for GRC or EMT and in accordance with Article 345 of CEC and UL Information card #DYBY.
6. All conduit installed in the dry walls or ceilings of the building shall be steel tube (EMT), Galvanized Rigid Steel (GRC), or Intermediate Metal Conduit (IMC).
7. NM or MC cable is not allowed.
8. Conduit shall be run so as not to interfere with other piping fixtures or equipment.
9. The ends of all conduit shall be cut square, carefully reamed out to full size and shall be shouldered in fitting.
10. No running threads will be permitted in locations exposed to the weather, in concrete or underground. Special union fittings shall be used in these locations.
11. Underground conduit shall be, unless otherwise indicated, Schedule 40 PVC (polyvinyl chloride) installed at depth of not less than 24" below grade, concrete encased with a minimum of 3" concrete envelope and 2" minimum between conduits. Conduit separation shall be maintained using plastic spacers located at 10'-0" intervals. Where power and communication/signal conduits are run in a common trench a (12") inch minimum separation shall be maintained between power and communication/signal conduits. The grounding wire in plastic conduit shall be rated in accordance with Article 250 of 2022 CEC. Conduit encasement will not be required for conduits installed under the building slab (building footprint).
12. All underground or imbedded conduit shall be 1" minimum trade size for steel and for PVC.
13. Where underground power feeder conduit runs stub-up, conduit shall transition to GRC underground. The contractor shall use GRC elbows and GRC risers wrapped in 20 mil. PVC tape for stub-ups. Conduit stub-ups for branch circuits and low voltage systems shall be PVC.
14. PVC conduit shall not be run in walls.
15. Where underground conduit runs penetrate floor slab, conduit shall terminate 6" above finished floor with a grounding bushing.
16. Underground stub-ups at the generator shall extend, unbroken, 20" above finished grade.
17. Where conductors enter a raceway in a cabinet, pull box, junction box, or auxiliary gutter, the conductors shall be protected by a plastic bushing type fitting providing a smoothly rounded insulating surface.

18. Where conduit extends through roof to equipment on roof area, this Contractor shall provide 24 gauge galvanized sheet metal flashing cones with 4" flanges on roof surface. This flashing shall be delivered to the roofing contractor for installation. The actual location of all such roof penetrations and outlet shall be verified by the Contractor.
19. All conduit underground, in masonry and concrete walls, and where concealed under floor slabs shall have joints painted with thread compound prior to makeup. No conduit shall be installed horizontally in concrete walls or floors.
20. All conduit shall be supported at intervals not less than 6'-0" and within 12" from any outlet and at each side of bends and elbows. Conduit supports shall be galvanized, heavy stamped, two hole conduit clamp properly secured.
21. Where conduit racks are used the rack shall consist of two piece conduit clamps attached to galvanized steel slotted channels, properly secured via threaded rods attached directly to the building structure.
22. Nail-in conduit supports will not be allowed. One piece set-screw type conduit clamps or perforated iron for supporting conduit will not be permitted.
23. Seismic Conduit Support:
 - a. All conduit shall be supported in such a manner that it is securely attached to the structure of the building. Attachment is to be capable of supporting the tributary weight of conduit and contents in any direction. Maximum spacing of support and braces are to be as follows:

<u>CONDUIT TYPE</u>	<u>MAXIMUM SPACING</u>
EMT, IMC	10'-0"
GRC (3/4" thru 1 1/2")	10'-0"
GRC (2" thru 2 1/2")	16'-0"
GRC (3" and larger)	20'-0"

24. All conduit runs shall be installed parallel or perpendicular to walls, structural members, or intersection of vertical planes and ceilings. Field made bends and offset shall be avoided where possible. Crushed or deformed raceway shall not be installed.
25. Open knockouts in outlet boxes only where required for inserting conduit.
26. Outlet boxes on metal studs shall be attached to metal hangers, tack welded or bolted to studs; on wood studs attachment shall be with wood screws, nails not acceptable.
27. Recessed panels shall be provided with (4) 3/4" spare conduit stub-ups into accessible ceiling space. Surface mounted panels secured to stud walls shall be secured to wall using 1/2" x 3" screws into steel backing plate provided by the Architect.
28. All boxes shall be covered with outlet box protector, Appleton SB-CK. Keep dirt from entering box or panels. If dirt does get in, it shall be removed prior to pulling wires.
29. All boxes installed outdoors shall be suitable for outdoor installations, gasketed, screw cover and painted as directed by the Architect with weatherproof paint to match building.
30. All conduit entries to outdoor mounted panels, cabinets, boxes, etc., shall be made using Myers "SCRU-TITE" hubs Series ST.

31. All conduit shall have a 200 lb test poly-propylene pull line left in place for future use in all runs tagged with a plastic tag at terminating end indicating the location of the opposite end of the conduit.
32. All rotating electrical equipment shall be supplied with flexible, liquid-tight conduit with appropriate slack and shall not exceed thirty-six (36) inches.
33. All multiple conduit runs within suspended ceilings shall be suspended from building structure by means of unistrut hangers/rack, see note 21. Refer to note 20 for support of single conduit runs within suspended ceilings. Conduit shall not be allowed to lay on ceiling or be supported from ceiling suspension wires or other suspension system.
34. Provide complete conduit system for all line voltage systems. Provide conduit for low voltage systems installed over inaccessible ceilings and in rooms with no dropped ceilings (open ceilings). The Contractor shall coordinate the location of inaccessible or open ceilings with the Architectural Reflected Ceiling Plan and in the filed with the ceiling contractor prior to rough-in.
35. All raceways shall be installed concealed in walls, floors or ceilings. Exposed raceways shall be permitted only in open ceiling (no T-bar or hard-lid ceiling) areas, unless specifically approved in writing by the Architect/Engineer. When approved by the Architect/Engineer exposed conduits shall be painted to match the finish of the surface to which it is supported to.
36. Provide minimum 18" square ceiling access panels for devices, outlets, junction/pull boxes installed over inaccessible ceilings. Refer to the Architectural Reflected Ceiling plans for location of hard-lid/gyp board ceilings.
37. Install two (2) 2"C. sleeves in the common wall between the ceiling space of a room on the other side of a corridor. The sleeves shall be used for routing of low voltage wire/cable thru full height walls and fire rated walls.

B. Installation of Conductors:

1. All line voltage wire, including control circuits, shall be installed in conduit.
2. All communications wire/cable shall be listed for open wiring (without conduit) and shall be plenum rated. Communications wire/cable shall be supported by "J" hooks installed along the perimeter walls of the building or full-height interior walls. Low voltage wiring installed over inaccessible ceilings shall be installed in conduit. Conduit shall be sized for the quantity of wire/cables contained therein and in compliance with the CEC. Communications wire/cable installed below raised floors shall be U.L. listed for the application.
3. All line voltage circuits and feeder wires shall be continuous from the service point to terminal or farthest outlet. No joints shall be made except in pull, junction or outlet boxes, or in panel or switchboard gutters.
4. All low voltage wire/cables shall be continuous from the service point to terminal or farthest outlet. No joints will be allowed.
5. Thoroughly clean all conduit and wire-ways and see that all parts are perfectly dry before pulling any wires. No line voltage joint shall be made except in pull, junction or outlet boxes, or in panel or switchboard gutters.
6. Provide conduit only for routing of HVAC control wiring. Refer to Mechanical drawings for conduit requirements.

7. Install UL approved, fixture wire from all lighting fixture lamp sockets into fixture outlet or junction box.

C. Joints in 600 Volt Conductors:

1. Joints in 600 volt conductors smaller than No. 4 AWG shall be made with Scotchlok spring type connectors. Wires No 4 AWG and larger shall be joined together with approved type of pressure connector and taped with #33 3M tape, three (3) layers minimum to provide insulation not less than that of conductor. Connections to switch or busbar shall be made with one-piece copper lugs. Splicing of all 600 volt or less in-line connections #2 AWG through 350 MCM shall be made with 3M brand PST connector.
2. Joints/splices will not be permitted in underground pull boxes unless specifically authorized by the Engineer.

D. Grounding:

1. Provide grounding for entire electric installation as shown on plans and as required by applicable codes. Included as requiring grounding are:
 - a. Conduit.
 - b. Neutral or identified conductors of interior wiring system.
 - c. Switchboards and Branch Circuit Panelboards.
 - d. Non-current carrying metal parts of fixed equipment.
 - e. Telephone distribution equipment.
 2. Grounding and bonding conductors shall be sized per the latest edition of the California Code of Regulations, Title 24, State of California and the CEC.
 3. Provide and install an equipment grounding conductor in all feeder and branch circuit conduits.
 4. Where required to be installed, ground rods shall be 3/4" x 10', copper clad, installed individually or grouped as required to meet the specified resistance. Provide ground rods with all required clamps, fittings, wire and concrete boxes.
 5. Building grounding system resistance to ground shall not exceed 25 ohm.
- E. Prefabricated Equipment: Installation of all prefabricated items and equipment shall conform to the requirements of the manufacturer's specifications and installation instruction pamphlets. Where code requirements affect installation of materials and equipment, the more stringent requirements, code or manufacturer's instructions and/or specifications, shall govern the work.

END OF SECTION 26 00 00

SECTION 26 05 73

OVERCURRENT PROTECTIVE DEVICE COORDINATION STUDY

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes arc flash study and short circuit and protective device coordination study encompassing portions of electrical distribution system from emergency and normal power source or sources up to and including breakers in service entrance switchboard, main breaker in sub-distribution panels, main breaker in each panelboard and breaker provided with the generator.
- B. Adjustable circuit breaker settings and non-adjustable circuit breaker selections shall be based on the results of the coordination study to ensure a local fault does not trip any upstream circuit breaker. Refer to 26 05 73 Item 1.7 for additional requirements.
- C. Panel and circuit breaker short circuit ratings shall be based on the results of the study's short circuit calculation results.
- D. Provide arc-flash labels for switchboards and panels. Labels shall indicate the nominal system voltage, arc flash PPE category, arc flash boundary, minimum arc rating of clothing.
- E. Study shall be performed by the Contractor's third party consultant.

1.2 REFERENCES

- A. Institute of Electrical and Electronics Engineers:
 - 1. IEEE 242 - Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems (Buff Book).
- B. National Fire Protection Association:
 - 1. NFPA 70 - California Electrical Code.

1.3 DESIGN REQUIREMENTS

- A. Complete Short Circuit and Protective Device Coordination Study to meet requirements of NFPA 70.
- B. Report Preparation:
 - 1. Prepare study prior to ordering distribution equipment to verify equipment ratings required.
 - 2. Perform study with aid of computer software program.
 - 3. Obtain actual settings for packaged motor characteristics for equipment incorporated into Work.
 - 4. Calculate short circuit interrupting and, when applicable, momentary duties for assumed 3-phase bolted fault short circuit current and phase to ground fault short circuit current at each of the following:
 - a. Utility supply bus.
 - b. Automatic transfer switch.
 - c. Engine generator.
 - d. Low-voltage switchgear.
 - e. Switchboards.

- f. Distribution panelboards.
- g. Branch circuit panelboards.
- h. Each other significant equipment location throughout system.

C. Report Contents:

1. Include the following:
 - a. Calculation methods and assumptions.
 - b. Base per unit value selected.
 - c. One-line diagram.
 - d. Source impedance data including power company system available power and characteristics.
 - e. Typical calculations.
 - 1) Fault impedance.
 - 2) X to R ratios.
 - 3) Asymmetry factors.
 - 4) Motor fault contribution.
 - 5) Short circuit kVA.
 - 6) Symmetrical and asymmetrical phase-to-phase and phase-to-ground fault currents.
 - 7) Tabulations of calculation quantities and results.
 - f. One-line diagram revised by adding actual instantaneous short circuits available.
 - g. State conclusions and recommendations.
2. Prepare time-current device coordination curves graphically indicating coordination proposed for system, centered on conventional, full-size, log-log forms.
3. Prepare with each time-curve sheet complete title and one-line diagram with legend identifying specific portion of system covered by that particular curve sheet.
4. Prepare detailed description of each protective device identifying its type, function, manufacturer, and time-current characteristics. Tabulate recommended device tap, time dial, pickup, instantaneous, and time delay settings.
5. Plot device characteristic curves at point reflecting maximum symmetrical fault current to which device is exposed. Include on curve sheets the following:
 - a. Power company relay characteristics.
 - b. Power company fuse characteristics.
 - c. Low voltage equipment circuit breaker trip device characteristics.
 - d. Low voltage equipment fuse characteristics.
 - e. Cable damage point characteristics.
 - f. Pertinent transformer characteristics including:
 - 1) Transformer full load current.
 - 2) Transformer magnetizing inrush.
 - 3) ANSI transformer withstand parameters.
 - 4) Significant symmetrical fault current.
 - g. Pertinent motor characteristics.
 - h. Other system load protective device characteristics.

1.4 SUBMITTALS

- A. Qualifications Data: Submit the following for review prior to starting study.
 1. Submit qualifications and background of firm.
 2. Submit qualifications of Professional Engineer performing study.
- B. Software: Submit for review information on software proposed to be used in performing study.

- C. Product Data: Submit the following:
 - 1. Report: Summarize results of study in report format including the following:
 - a. Descriptions, purpose, basis, and scope of study.
 - b. Tabulations of circuit breaker, fuse and other protective device ratings versus calculated short-circuit duties, and commentary regarding same.
 - c. Protective device time versus current coordination curves, tabulations of relay and circuit breaker trip settings, fuse selection, and commentary regarding same.
 - d. Fault current calculations including definition of terms and guide for interpretation of computer printout.
- D. Submit copies of final report signed by professional engineer. Make additions or changes required by review comments.

1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with CEC requirements.
- B. Maintain one copy of each document on site.
- C. Use commercially available software, designed specifically for short circuit and protective device coordination studies with minimum of five years documented availability.
- D. Perform study in accordance with IEEE 242.

1.6 QUALIFICATIONS

- A. Study Preparer: Company specializing in performing work of this section with minimum five years documented experience and having completed five projects of similar size and complexity within the past two years.
- B. Perform study under direct supervision of Professional Engineer experienced in design of this Work and licensed in State of California with minimum of five years experience in power system analysis.
- C. Demonstrate company performing study has capability and experience to provide assistance during system start up.

1.7 SEQUENCING

- A. Submit short circuit and protective device coordination study to Architect/Engineer prior to receiving final approval of distribution equipment shop drawings and prior to releasing equipment for manufacturing.
- B. When formal completion of study will cause delay in equipment manufacturing, obtain approval from Architect/Engineer for preliminary submittal of study data sufficient in scope to ensure selection of device ratings and characteristics will be satisfactory.

1.8 SCHEDULING

- A. Schedule work to expedite collection of data to ensure completion of study for final approval of distribution equipment shop drawings prior to release of equipment for manufacturing.

1.9 COORDINATION

- A. The professional performing the study shall be responsible for contacting the serving utility company and obtaining all values required for the completion of the overcurrent protective device coordination study.
- B. The professional performing the study shall be responsible for contacting the generator manufacturer and obtaining the manufacturer and trip curves for the circuit breakers being provided with the generator and including the generator circuit breakers in the overcurrent protective device coordination study.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.1 FIELD QUALITY CONTROL

- A. Provide assistance to electrical distribution system equipment manufacturer during start up of electrical system and equipment.

3.2 ADJUSTING

- A. Perform field adjustments of protective devices and modifications to equipment to place equipment in final operating condition. Adjust settings in accordance with approved short circuit and protective device coordination study.

END OF SECTION

SECTION 26 31 00

PACKAGED PV SYSTEM

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. This section shall consist of providing a packaged PV system with battery storage and all accessories as specified and required by the 2022 California Energy Commission Title 24. The equipment supplier must be the authorized distributor for each component of the products specified herein. The work includes the furnishing of all labor, materials, equipment, test, and training to provide a complete and workable solar power generating system, including the PV modules, inverters, battery storage, PV module support system and interconnecting conduit/wire, and specified herein. It is the intent of these specifications to have a single source responsibility for the PV modules, inverter, battery storage and support structure.
- B. Any and all exceptions to the published specifications shall be subject to the approval of the engineer.
- C. The power generating system shall be furnished by a solar integrator (contractor) who shall be responsible for the installation, coordination, and testing of the complete system. The entire system shall be installed as shown on the plans, drawings, and specifications herein.
- D. The equipment shall be produced by a manufacturer who has produced this type of equipment for a period of at least 10 years and who maintains a service organization available twenty-four hours a day throughout the year.
- E. The equipment shall be produced by a manufacturer who is ISO 9001 certified for the design, development, production, installation, and service of the complete product line.
- F. Complete and submit utility company interconnect agreement and required documentation (plans, diagrams, specifications and equipment data sheets) to the serving utility company for approval.
- G. Secure and pay for required permits and approvals from the serving utility company.
- H. Complete and submit utility company, State and local incentive/rebate program applications.
- I. The PV system is a deferred approval item and the sole responsibility of the contractor to submit plans, equipment data sheets, wiring diagrams and calculations to the authority having jurisdiction (AHJ) for review and approval. The PV system submittal to the AHJ shall bear the stamp and signature of a professional engineer registered in the State of California.
- J. Installation of the PV system shall commence upon approval of the PV plans by the AHJ.

1.02 GENERAL REQUIREMENTS

- A. It is the intent of this specification to secure an electrical power generating system that has been tested during design verification, production and at the final job site. All finished equipment shall be of the latest commercial design and will be complete with all of the necessary accessories for complete installation as shown on the plans, drawings, and specifications herein. The equipment supplied and installed shall meet the requirements of the 2022 California Electrical Code, along with all applicable local codes and regulations. All equipment shall be new and of current production of a national firm that manufactures PV modules, inverters and assembles them as a complete and coordinated system. There will be one source responsibility for warranty, parts, and service through a local representative with factory-trained servicemen.
- B. The electrical power generating system shall be rated 24.57 kW (STC).
- C. Refer to Section 260000 for Submittal requirements.

1.03 RELATED DOCUMENTS

- A. The following specification section apply to all work herein:
 - 1. Section 260000 – General Electrical Requirements.

PART 2 - PRODUCTS

2.01 INVERTER:

- A. 208V, 3 phase transformerless string inverter with integral AC and DC disconnect switches, DC arc-fault protection, integrated DC fused string combiner, and 96.5% CEC efficiency. As manufactured by Solectria Renewables or approved equal.

2.02 PV MODULES

- A. Modules shall be as manufactured by PhonoSolar or approved equal by the project Electrical Engineer.
- B. Module shall meet UL 1703 requirements, shall carry the CE mark and meet IEC 61215 standards.
- C. Module shall have a 25 year power performance warranty for 80% of warranted minimum power.
- D. Construction:
 - I. Front – Solar glass with anti-reflective surface treatment, 3.2mm (0.13”).
 - II. Back Sheet – Highly resistant polymer (black).
 - III. Frame – Anodized aluminum (black).
- E. The terminal box shall have integral built-in bypass diode protection (to preserve array output power during periods of local shading). The junction box shall be weather resistant, watertight, UV and microbe resistant and meet IEC 61215 edition 2 design. The junction box will have positive and negative, 12 AWG, dual insulated cables with UL listed polarized weatherproof connectors. Connectors will be IP65 designed and meet 2022 CEC standards.
- F. The module manufacturer shall have been in business for more than 20 years with modules operating in the field for more than 20 years.

2.03 SUPPORT SYSTEM:

A. Unirack or equivalent. To be mounted on the solar carport.

PART 3 - EXECUTION

- 3.01** Coordinate the assembly of the PV module support system with the solar carport manufacturer.
- 3.02** Replace damaged PV modules and modules that are not performing to the manufacturer's specifications with new modules.
- 3.03** Test inverter for compliance with the manufacturer's specifications. Replace damaged or non-performing inverter with new inverter.
- 3.04** Clean all module and inverter surfaces at completion of the project.
- 3.05** Refer to the solar carport roof plan for system configuration and the electrical plans for PV system equipment locations and wiring connections to the facility power distribution system.

END OF SECTION 26 31 00

SECTION 31 10 00

SITE CLEARING

1. PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Remove surface debris.
- B. Remove or Recycle indicated paving, curbs, gutters and sidewalks.
- C. Clear site of plant life and grass.
- D. Remove trees and shrubs.
- E. Remove root system of trees and shrubs.
- F. Erosion and sedimentation control measures.

1.2 REGULATORY REQUIREMENTS

- A. Conform to applicable code for dust control and disposal of debris.
- B. Coordinate clearing Work with utility companies.
- C. Obtain required permits from authorities.
- D. Do not close or obstruct roadways and sidewalks without permits.

1.3 DEFINITIONS

- A. Remove: Removal of existing construction and legally dispose of items off-site unless indicated to be removed and salvaged or recycled.
- B. Disposal: Removal off-site of demolition waste and subsequently deposit in landfill acceptable to authorities having jurisdiction.
- C. Salvage: Recovery of demolition waste for subsequent reuse.
- D. Recycle: Recovery of demolition waste for subsequent processing.

1.4 SUBMITTALS

- A. Preclearing Photographs: Show conditions of existing adjacent construction and site improvements that might be misconstrued as damaged by clearing operations. Submit before work begins.
- B. Record Documents: Submit under provisions of Section 01 77 00. Accurately record locations of capped utilities and other subsurface conditions.

1.5 QUALITY ASSURANCE

- A. Perform best management practice techniques for given site conditions as defined in Section 3 of the Stormwater Best Management Practice Handbook (BMP Handbook), Construction Edition, as published by the California Storm Water Quality Association, as shown on the Erosion Control Plan.
- B. Comply with City of Ontario Dust Control Ordinance.

2. PART 2 PRODUCTS

Not used

3. PART 3 EXECUTION

3.1 EXAMINATION

- A. Correlate existing conditions with requirements indicated.
- B. Inventory and record condition of items to be removed and salvaged.
- C. Execute predemolition photographs.

3.2 PREPARATION

- A. Verify that existing plant life and features designated to remain are tagged or identified.

3.3 EROSION AND SEDIMENTATION CONTROL

- A. Provide erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, as shown on the Erosion Control Plan.
- B. Inspect, repair, and maintain erosion and sedimentation control measures during clearing operations.

3.4 PROTECTION

- A. Protect utilities that remain, from damage.
- B. Protect trees, plant growth, and features designated to remain as final landscaping.
- C. Protect bench marks and existing structures from damage or displacement.

3.5 CLEARING

- A. Clear areas required for access to site and execution of Work.
- B. Remove trees and shrubs indicated. Remove stumps, and main root ball.
- C. Clear undergrowth and deadwood without disturbing subsoil.
- D. Remove debris, rock, and extracted plant life.
- E. Remove paving, curbs, and other items as indicated. Neatly saw cut edges at right angle to surface.

3.6 RECYCLING OF DEMOLITION MATERIALS

- A. Separate recycled demolition materials from other demolished materials.
- B. Stockpile processed materials on-site without intermixing with other materials.
- C. Place, grade, and shape stockpiles to drain surface water. Cover to prevent wind blown dust.
- D. Do not store materials within drip line of trees.
- E. Transport recyclable materials that are not indicated to be reused off Owner's property to recycling receiver or processor.
- F. Recycled incentives received for building demolition materials shall be equally shared between Contractor and Owner.

- G. Asphalt: Break up and transport asphalt paving to asphalt recycling facility.
- H. Concrete: Break up and transport to concrete-recycling facility.
- I. Concrete Reinforcement: Remove reinforcement from concrete and sort with other metals.

3.7 DISPOSAL OF DEMOLISHED MATERIALS

- A. Except for items to be recycled or otherwise indicated to remain, remove demolished materials from Project site and legally dispose of them in an EPA – approved landfill.
- B. Do not burn or bury materials on site.

3.8 CLEANING

- A. Clean adjacent structures and improvements of dust, dirt and debris caused by clearing.
- B. Return adjacent areas to condition existing before clearing operations began.
- C. Leave site in a clean condition.

END OF SECTION

SECTION 31 20 00

EARTH MOVING

1. PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Top soil excavation.
- B. Site rough grading.
- C. Building excavation, backfill and compaction.
- D. Excavation for pavements and site structures.
- E. Consolidation and compaction.
- F. Fill for overexcavation.
- G. Utility trenches, backfill and compaction.
- H. Subgrade preparation of pavement areas.
- I. Finish grading.
- J. Erosion and sedimentation control measures.

1.2 REFERENCES

- A. CBC - California Building Code, Title 24, Part 2, Chapter 18A and Appendix J.
- B. Orange County Code.
- C. City of Costa Mesa Dust Control Ordinance.
- D. Storm Water Quality Association - Stormwater Best Management Practice Handbook (BMP Handbook) Construction Edition.
- E. ASTM C136 - Method for Sieve Analysis of Fine and Coarse Aggregates.
- F. ASTM D448 - Sizes of Aggregate for Roadway and Bridge Construction.
- G. ASTM D1556 - Test Method for Density of Soil in Place by the Sand-Cone Method.
- H. ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 lb. Rammer and 18 inch Drop.
- I. ASTM D2922 - Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods. (Shallow Depth).
- J. ASTM D2937 - Test Method for Density of Soil in Place by the Drive-Cylinder Method.
- K. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).

1.3 SUBMITTALS

- A. Submit samples under provisions of Section 01 33 00.
- B. Submit 10 lb. sample of each type of fill to testing laboratory in air-tight containers.

- C. Submit name of imported materials source. Provide materials from same source throughout the work. Change of source requires Architect's approval.
- D. Submit test reports under provisions of Section 01 45 29.

1.4 PROJECT RECORD DOCUMENTS

- A. Submit documents under provisions of Section 01 77 00.
- B. Accurately record location of utilities remaining, rerouted utilities, new utilities by horizontal dimensions, elevations or inverts, and slope gradients.

1.5 QUALITY ASSURANCE

- A. Comply with California Building Code (CBC), Title 24, Part 2, Chapter 18A and Appendix J.
- B. Comply with Orange County Code.
- C. Comply with City of Costa Mesa Dust Control Ordinance.
- D. Perform best management practice dust control techniques for given site conditions as defined in Section 3 of the Storm Water Best Management Practice Handbook, (BMP Handbook) Construction Edition.
- E. Comply with all CALOSHA safety requirements for excavations, shoring, and backfilling.

1.6 FIELD CONDITIONS

- A. Verify that survey benchmark and intended elevations for the work areas are as indicated.
- B. Notify Architect of unexpected subsurface conditions and discontinue work in area affected until notified to resume work.
- C. Perform site assessment to identify any contaminated soils which may occur on site.

1.7 PROTECTION

- A. Protect trees, shrubs, lawns, and other features remaining as portion of final landscaping.
- B. Protect bench marks, fences, roads, sidewalks, paving, and curbs.
- C. Underpin adjacent structures, including utilities and pipe chases, which may be damaged by excavation work.
- D. Protect above or below grade utilities which are to remain.
- E. Barricade open excavations and post warning lights. Operate lights from dusk to dawn.
- F. Protect facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.
- G. Repair or replace all damage.

2. PART 2 PRODUCTS

2.1 SOIL MATERIALS

- A. Existing Subsoil: Excavated and re-used material, graded free of lumps and rocks larger than 3 inches in any dimension.

- B. Imported Subsoil: Non-expansive predominantly granular soils such as a silty sand, free of lumps and rocks larger than 3 inches in any dimension, and debris. Expansion index less than 20, and no more than 50 percent of the material shall pass a No. 200 sieve. Material shall contain sufficient fines (binder) to result in a stable subgrade.
- C. Existing Topsoil: Excavated and re-used material, graded free of roots, rocks larger than one inch, subsoil, debris and large weeds.
- D. Imported Topsoil: Friable loam, free of subsoil, roots, grass, excessive amounts of weeds, stones and foreign matter; acidity range (ph) of 5.5 to 7.5; containing an amount of organic matter normal to the region.
- E. Sand: Natural river or bank sand: Free of silt, clay, loam, friable or soluble materials or organic matter, graded in accordance with ASTM C136, all passing the No. 4 sieve and only 5 percent passing the No. 200 sieve.
- F. Gravel: Coarse aggregate; free of clay, shale and organic matter; ASTM D448, grading size 6 with 100 percent passing a 1 inch sieve and not more than 5 percent passing a No. 4 sieve.
- G. Pea Gravel: Natural Stone; washed, free of clay, slate, organic matter, graded in accordance with ASTM C136, 1/4 inch to 5/8 inch.
- H. Drainage Fill: Washed, evenly graded mixture of crushed stone, or crushed or uncrushed gravel, graded in accordance with ASTM C136, with 100 percent passing a 1-1/2 inch sieve and not more than 5 percent passing a No. 4 sieve.
- I. Crushed Stone Base: Permeable base meeting California Department of Transportation 3/4 inch Permeable Class II Base designation according to the following gradation:

Mesh Size	% Passing
1 inch	100
3/4 inch	90-100
3/8 inch	40-100
#4	25-40
#8	18-33
#30	5-15
#50	0-7
#200	0-3

- J. Concrete: Structural concrete conforming to Section 03 30 00 with a compressive strength of 2,000 psi for fill to correct over-excavation.
- K. Materials (existing and import) shall be free of any toxic materials listed (by the federal or state EPA or federal or state health agencies) as hazardous material.
- L. Materials (existing and import) are subject to the approval of the Soils Engineer for use in the project.
- M. Provide imported materials when sufficient satisfactory soil materials are not available from on site sources.

2.2 ACCESSORIES

- A. Permeable Geotextile Fabric: 14ON fabric manufactured by Mirafi Inc., www.tcmirafi.com or equal.

- B. Impermeable Geotextile Fabric: Reinforced liner, 20 mils thick; Hercuscrim 20 Fabric manufactured by In-Line Plastics, LC, www.in-lineplastics.com or equal.
- C. Substitutions: Under provisions of Section 01 25 13.

2.3 EQUIPMENT

- A. Equipment: Capable of excavating subsoil, mixing and placing materials, wetting, consolidation, grading, and compaction of material.

3. PART 3 EXECUTION

3.1 INSPECTION

- A. Verify agreement of existing site conditions with indicated conditions.
- B. Notify Architect of discrepancies found.
- C. Beginning work of this Section constitutes acceptance of existing conditions.

3.2 PREPARATION

- A. Identify required lines, levels, contours, and datum.
- B. Identify known below grade utilities. Stake and flag locations.
- C. Identify and flag above grade utilities.
- D. Maintain and protect existing utilities remaining which pass through work area.
- E. Notify utility company and pay all costs to remove and relocate utilities.
- F. Upon discovery of unknown utility or concealed conditions, discontinue affected work; notify Architect.

3.3 EROSION AND SEDIMENTATION CONTROL

- A. Provide erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways and in accordance with the Erosion Control Plan.
- B. Inspect, repair, and maintain erosion and sedimentation control measures during earthwork operations.

3.4 TOPSOIL EXCAVATION

- A. Excavate topsoil from areas to be further excavated, relandscaped, or regraded.
- B. Stockpile in area designated on site.
- C. Stockpile topsoil to depth not exceeding 8 feet. Place, grade, and shape stockpile for proper drainage.

3.5 GRADING

- A. Uniformly grade areas within limits of grading including adjacent transition areas.
- B. Make such cuts or fills as may be required to bring subgrade to elevations shown and to tolerances specified.
- C. Plow or otherwise break up sloped surfaces steeper than 1 vertical to 4 horizontal so that fill material will bond to existing surface.
- D. Where grades are not indicated, grade uniformly level or slope between points for which elevations are given.

- E. In absence of more specific grading information, slope ground away from building for a distance of 20 feet at 2 percent.
- F. Make grade changes gradual. Blend slope into level areas.
- G. Compact each layer of fill to required density.

3.6 EXCAVATION FOR STRUCTURES

- A. Excavate subsoil required to accommodate building foundation, site structures and construction operations.
- B. Conform to elevations and dimensions shown within a tolerance of plus or minus 0.10 foot.
- C. Extend a sufficient distance from footings and foundations to permit placing and removal of formwork, installation of services, other construction, and for inspection.
- D. Overexcavate a minimum depth of 3 feet beneath all footings.
- E. Extend overexcavation a minimum distance of 5 feet horizontally beyond exterior face of footings.
- F. Hand trim excavation. Remove loose matter.
- G. Remove lumped subsoil, boulders and rock up to 1/3 cu yd measured by volume. Replace with approved fill material and compact as specified.
- H. Do not disturb bottom of excavations intended for bearing surface.
- I. Scarify bottom of excavation to a depth of 12 inches moisture-condition to optimum moisture content and compact as specified.

3.7 EXCAVATION FOR PAVEMENTS

- A. Cut surface under pavements to comply with cross-sections, elevations, and grades as shown, to subgrade elevations required and to grade tolerances specified.
- B. Overexcavate a minimum depth of 12 inches beneath all slabs-on-grade.
- C. Overexcavate a minimum depth of 12 inches beneath all paving.
- D. Scarify subgrade beneath slabs-on-grade to a depth of 12 inches, moisture-condition to optimum moisture content and compact as specified.
- E. Scarify subgrade beneath paving to a depth of 12 inches, moisture-condition to optimum moisture content and compact as specified.

3.8 TRENCH EXCAVATION

- A. Excavate subsoil required to accommodate storm sewer, sanitary sewer, water, gas, electric and telephone conduits, and other utilities, and piping to municipal or private utilities.
- B. Excavate trenches to uniform width, sufficiently wide to provide ample working room and a minimum of 8 inch clearance on both sides of the pipe.
- C. Excavate trenches to depth indicated or required to establish indicated slope and invert elevations.
- D. Depth of excavations on the exterior of the building shall provide for the minimum coverage above the top of the pipe, conduit, or tank measured from the lowest adjacent finish grade, as follows unless otherwise indicated on the Drawings:

- 1. Steel Pipe and Conduit 24 inches

2. Copper Water Tube 18 inches
 3. Cast-Iron, Pressure Pipe 36 inches
 4. Plastic Pipe (other than waste) 30 inches
 5. Plastic Waste Pipe 24 inches
 6. Soil, Sewer & Storm Drain 18 inches
 7. Irrigation Pipe (pressure) 24 inches
 8. Irrigation Pipe (non-pressure) 12 inches
- E. For pipe or conduit less than 4 inches in nominal size, do not excavate beyond indicated depths. Hand-excavate bottom to accurate elevations and support pipe or conduit on undisturbed soil.
 - F. For pipe or conduit, 4 inches and larger, carry excavation 4 inches below required elevation and backfill with sand bedding to support pipe or conduit.
 - G. Hand trim excavation. Remove loose material.
 - H. Excavation cut not to interfere with bearing splay of foundations.
 - I. At each pipe joint dig bell hole to relieve pipe bell of loads and to ensure continuous bearing of pipe on bearing surface.
 - J. Remove lumped subsoil, boulders and rock up to 1/3 cu yd measured by volume. Replace with sand bedding material and compact as specified.

3.9 STORAGE OF EXCAVATED MATERIALS

- A. Stockpile excavated materials in designated on-site area.
- B. Segregate excavated materials based upon intended use.
- C. Place, grade, and shape stockpile for proper drainage.
- D. Locate stockpile away from edge of excavations.
- E. Do not stockpile materials within drip line of trees.

3.10 UNAUTHORIZED EXCAVATION

- A. Correct unauthorized excavation at no cost to Owner.
- B. Backfill excavation to correct elevation with concrete or approved fill material compacted as specified.

3.11 STABILITY OF EXCAVATIONS

- A. Comply with local codes, ordinances, and requirements of agencies having jurisdiction.
- B. Machine slope banks to angle of repose or less.
- C. Maintain sides and slopes of excavations in safe condition until completion of backfilling.
- D. Shore and brace where sloping is not possible because of space restrictions or stability of material excavated.
- E. Provide shoring and bracing in good serviceable condition.

- F. Extend shoring and bracing as excavation progresses.
- G. Maintain shoring and bracing in excavations regardless of time period excavation will be open.
- H. Provide permanent steel sheet piling wherever subsequent removal of piling would permit lateral movement of soil under adjacent structures. Cut off top of piling 2'-6" below finish grade and leave permanently in place.
- I. Design and Calculations: Provide by licensed California engineer in accordance with requirements of the California Building Code and Safety Orders of the State of California, Division of Industrial Safety; Title 8, Division 1, Chapter 4, Subchapter 4, Article 6.

3.12 DEWATERING

- A. Prevent surface water and subsurface or ground water from flowing into excavations and from flooding project site and surrounding area.
- B. Grade top perimeter of excavations to prevent surface water from draining into excavations.
- C. Do not allow water to accumulate in excavations.
- D. Remove water to prevent softening of foundation bottoms and soil changes detrimental to stability of subgrades.
- E. Provide and maintain pumps, well points, sumps, suction and discharge lines and other components necessary to convey water away from excavations.
- F. Establish and maintain temporary drainage ditches and other diversions to convey rain water and water removed from excavations to runoff areas.
- G. Do not use trench excavations as temporary ditches.

3.13 BEDDING OF TRENCHES

- A. Support pipe and conduit during placement and compaction of bedding fill.
- B. Place a minimum of 4 inches of sand bedding beneath all piping and conduit 4 inches in diameter and larger.
- C. Place a minimum of 12 inches of sand bedding above all piping and conduit.
- D. Compact sand bedding to density required.

3.14 BACKFILLING

- A. Backfill excavations as promptly as work permits, but not until the following has been completed:
 - 1. Acceptance of subgrade.
 - 2. Construction below grade, where applicable, for waterproofing, and protection board.
 - 3. Inspection, testing, approval and record documentation of location of underground utilities.
 - 4. Removal of concrete formwork.
 - 5. Removal of shoring and bracing if not to be left in place.
 - 6. Backfill of voids in subgrade with satisfactory materials.
 - 7. Removal of trash and debris.
 - 8. Installation of bedding material.

- 9. Permanent or temporary bracing of horizontally supported walls.
- B. Compact subgrade to density requirements for subsequent backfill.
- C. Backfill to contours and elevations required.
- D. Place geotextile fabric over drainage fill prior to placing backfill.
- E. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen or spongy subgrade surfaces.
- F. Place and compact fill material in continuous layers not exceeding specified compacted depth for each layer.
- G. Employ a placement method that does not disturb or damage foundation perimeter drainage, foundation waterproofing protective cover and utilities in trenches.
- H. Before placing successive layers, all ruts, and other hollows more than 6 inches in depth shall be regraded and compacted.
- I. Maintain optimum moisture content of backfill materials.
- J. Backfill against supported foundation walls.
- K. Backfill simultaneously on each side of unsupported foundation walls.
- L. Backfill trenches with concrete where excavation is less than 3 feet below bottom of footing. Place concrete to level of bottom of adjacent footing. Width of concrete backfill to match width of footing and be full width of trench. Maintain minimum 6 inch encasement on sides, top, and bottom.
- M. Place 4 inch thick concrete base slab then backfill trenches with concrete for piping or conduit where top of piping or conduit is less than 30 inches below finished elevation of paving or 18 inches below finished grade. Minimum 6 inches of encasement on sides and top.
- N. Remove and replace or scarify and air dry subgrade or fill material that is too wet to permit compaction to required density.

3.15 PLACING TOPSOIL

- A. Eliminate uneven areas and low spots. Remove debris, roots, branches, stones, in excess of one inch in size.
- B. Remove subsoil contaminated with petroleum products.
- C. Scarify subgrade to depth of 12 inches where topsoil is scheduled. Scarify in areas where equipment used for hauling and spreading topsoil has compacted subsoil. Remove all rocks larger than one inch in size.
- D. Place topsoil in areas where seeding, sodding, planting is scheduled.
- E. Use topsoil in relatively dry state. Place during dry weather.
- F. Fine grade topsoil eliminating rough or low areas. Maintain levels, profiles, and contours of subgrade.
- G. Remove stones, roots, grass, weeds, debris, and foreign material while spreading.
- H. Manually spread topsoil around trees, plants, and building to prevent damage.
- I. Lightly compact placed topsoil.

J. Place compacted topsoil thicknesses for the following various locations:

1. Grass, Seeded: 6 inches.
2. Grass, Sod: 4 inches.
3. Shrub Beds: 18 inches.
4. Flower Beds: 12 inches.
5. Planter Boxes: To within 3 inches of box rim.

3.16 COMPACTION

- A. Control soil compaction during construction providing density specified for each area classification.
- B. Place and compact fill materials in continuous layers of not more than 6 inch thick compacted depth.
- C. Provide not less than the specified percentages of density of soil material compacted at optimum moisture content, for each layer of soil material in place.
- D. When existing ground surfaces have a density less than that specified for a particular area classification, scarify existing surface to a depth of 12 inches, moisture-condition to optimum moisture content and compact to required percentage of maximum density.
- E. Maintain optimum moisture content of fill materials to attain required compaction density.
- F. Moisture content shall be uniform throughout all layers. Add necessary moisture or aerate soil material at borrow source if it is not possible to obtain uniform moisture content at soil surface at time of placement.
- G. When moisture content and condition of each soil layer is satisfactory compact soils to specified density.
- H. Compaction of free draining material such as gravel shall be by treads of crawler type tractor, surface vibrator, smooth or pneumatic roller, hand or power tampers.
- I. Compaction of soils by use of water jetting or puddling is not an acceptable procedure.
- J. Correct improperly compacted areas or layers as directed by Architect if soil density tests indicate inadequate compaction.

3.17 DISPOSAL OF EXCESS AND WASTE MATERIAL

- A. Remove waste materials, including unacceptable excavated material, trash, and debris, and dispose of legally off site.
- B. Remove surplus backfill materials from site and dispose of legally off site.
- C. Remove surplus topsoil materials from site and dispose of legally off site.
- D. Leave material stockpile areas completely free of excess materials.

3.18 PROTECTION OF WORK

- A. Protect finished work under provisions of Section 01 61 00.
- B. Protect excavations by methods required to prevent cave-in or loose soil from falling into excavation.
- C. Protect bottom of excavations from freezing, water saturation, and disturbance.

3.19 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed under provisions of Section 01 45 29.
- B. Allow testing service to inspect, test, and approve each subgrade and fill layer before further backfill or construction work is performed
- C. Laboratory tests and analysis of fill material will be performed in accordance with ASTM D1557 and with Section 01 45 29.
- D. In place site tests and analysis of fill material will be performed in accordance with ASTM D1556, ASTM D2937 or ASTM D2922, and with Section 01 45 29.
- E. In place site moisture tests will be performed in accordance with ASTM D3017.
- F. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to Owner.

3.20 GRADING TOLERANCES

- A. Lawn or Unpaved Areas: Finish areas to receive topsoil to within not more than 0.10 foot above or below required subgrade elevation.
- B. Walks: Shape surface of areas under walks to line, grade, and cross-section, with finish surface not more than 0.10 foot above or below required subgrade elevation.
- C. Pavements: Shape surface of areas under pavement to line, grade, and cross-section, with finish surface not more than 1/2 inch above or below required subgrade elevation.
- D. Building Slab: Grade smooth and even, free of voids, to required subgrade elevation. Final grade tolerance to be within 1/2 inch when tested with a 10 foot straightedge.

3.21 MAINTENANCE

- A. Protect newly graded areas. Keep free of trash and debris.
- B. Provide erosion control methods to prevent erosion.
- C. Repair and reestablish grades in settled, eroded, and rutted areas to specified tolerances and density.
- D. Where completed areas are disturbed by subsequent construction operations or adverse weather, scarify surface, reshape, and compact to required density prior to further construction.
- E. Where settling occurs, remove surface (pavement, lawn, or other finish), add backfill material, compact, and replace surface treatment. Restore appearance, quality, and condition of surface finish to match adjacent work and eliminate evidence of restoration.

3.22 PLACEMENT SCHEDULE

- A. Interior Slab-On-Grade:
 - 1. Existing or imported subsoil or fill to subgrade elevation compacted to 90 percent.
 - 2. Cover with sand and base, compact to 95 percent.
- B. Exterior Side of Foundation Walls:
 - 1. Existing or imported subsoil or fill, to subgrade elevation, compacted to 90 percent.

- C. Fill Under Footings:
 - 1. Existing or imported subsoil or fill to subgrade elevation, compacted to 90 percent.
- D. Retaining Walls:
 - 1. Existing or imported subsoil or fill to subgrade elevation, compacted to 90 percent.
- E. Planted Areas:
 - 1. Subsoil fill, existing or import, to subgrade elevation, compact to 90 percent.
 - 2. Cover with topsoil, existing or import, to finished grade elevation, lightly tamped.
- F. Asphalt Paving:
 - 1. Subsoil fill, existing or import, to subgrade elevation, compact to 90 percent.
 - 2. Cover with aggregate base specified under Section 32 12 16.
- G. Concrete Paving:
 - 1. Subsoil or fill existing or import, to subgrade elevation, compact to 90 percent.
 - 2. Cover with aggregate base specified under Section 32 13 13.
- H. Concrete Walks, Curbs, and Gutters:
 - 1. Subsoil or fill existing or import, to subgrade elevation, compact to 90 percent.
 - 2. Cover with aggregate base, base to subgrade required, compact to 90 percent.
- I. Drainage Pipe:
 - 1. Drainage fill, below finished grade and above pipe, compact to 90 percent.
 - 2. Wrap drainage fill with geotextile fabric per plans.
 - 3. Remaining fill of subsoil fill, existing or import, to subgrade elevation, compact to 90 percent.
- J. Utility Trenches on Interior of Building:
 - 1. Sand bedding to 12 inches above pipe, compact to 90 percent.
 - 2. Existing or imported subsoil fill, compact to 90 percent.
 - 3. Cover with gravel fill, 6 inches thick, compact to 90 percent.
- K. Utility Trenches on Exterior of Building:
 - 1. Sand bedding, compact per plans.
 - 2. Existing or imported subsoil fill, compact to 90 percent.

L. Underground Tanks:

1. Backfill to centerline of tank radius or top of tank, compact to 90 percent and as per plans.
2. Remaining fill of subsoil, existing or import, to required subgrade, compact to 90 percent and as per plans.

END OF SECTION

SECTION 32 12 16

ASPHALT PAVING

1. PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Weed killer.
- B. Geotextile paving grid.
- C. Prepared base.
- D. Headers and stakes.
- E. Asphaltic concrete paving.
- F. Surface sealer.
- G. Pavement striping.

1.2 REFERENCES

- A. ASTM D979 - Standard Practice for Sampling Bituminous Paving Mixtures.
- B. ASTM D2041 - Standard Test Method for Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures.
- C. ASTM D2726 - Standard Test Method for Bulk Specific Gravity and Density of Non-Absorptive Compacted Bituminous Mixtures.
- D. ASTM D2950 - Standard Test Method for Density of Bituminous Concrete In Place by Nuclear Methods.
- E. ASTM D3549 - Standard test Method for Thickness or Height of Compacted Bituminous Paving Mixture Specimens.
- F. Southern California Chapter, American Public Works Association - Standard Specifications for Public Works Construction.
- G. Redwood Inspection Service - Standard Specifications for Grades of California Redwood Lumber.
- H. Storm Water Quality Association - Storm Water Best Management Practice Handbook (BMP Handbook) Construction Edition.
- I. TAI (The Asphalt Institute) - Manual Series No. 2 (MS-2).

1.3 QUALITY ASSURANCE

- A. Perform work in accordance with Standard Specifications for Public Works Construction.
- B. Mixing Plant: Conform to State of California standards.
- C. Obtain materials from same source throughout.

1.4 REGULATORY REQUIREMENTS

- A. Conform to applicable City of Costa Mesa standards for paving work on public property.

B. Detectable Warning Surfaces:

1. Detectable warning surfaces shall comply with CBC Section 11B-705.1.
2. Detectable warning surfaces at transit boarding platform edges, bus stops, hazardous vehicular areas, reflecting pools, and track crossings shall be yellow and approximate FS 33538 of Federal Standard 595C. Detectable warning surfaces at other locations shall be either the aforementioned yellow or a color providing a 70 percent minimum visual contrast with that of adjacent walking surfaces. The material used to provide visual contrast shall be an integral part of the surface. CBC Section 11B-705.1.1.3.
3. Detectable warning surfaces shall differ from adjoining surfaces in resiliency or sound-on-cane contact. Such constraint shall not be required for detectable warning surfaces at curb ramps, islands, or cut-through medians. CBC Section 11B-705.1.1.4.

1.5 SUBMITTALS

- A. Submit proposed mix design of each class of mix for review prior to commencement of work under provisions of Section 01 33 00.
- B. Submit product data for asphalt pavement and seal coat under provisions of Section 01 33 00.
- C. Submit manufacturer's instructions for asphalt pavement and seal coat under provisions of Section 01 33 00.

1.6 ENVIRONMENTAL REQUIREMENTS

- A. Do not place asphalt when base surface temperature is less than 40 degrees F.
- B. Perform asphalt paving waste management techniques as defined in Section 4 of the Storm Water Best Management Practice Handbook, (BMP Handbook) Construction Edition.

2. PART 2 PRODUCTS

2.1 AGGREGATES

- A. Provide aggregates consisting of crushed stone, gravel, sand, or other sound, durable mineral materials processed and blended, and naturally combined.
- B. Granular base aggregate: In accordance with Section 200-2.2 of Standard Specifications for Public Works Construction.
- C. Granular base aggregate maximum size:
 1. Base courses over 6 inch thick: 1-1/2 inches.
 2. Other base courses: 3/4 inches.
- D. Aggregates for asphaltic concrete paving: In accordance with Section 203.6.2.2. of Standard Specifications for Public Works Construction.

2.2 WEED KILLER

- A. Commercial chemical for weed control, registered by EPA. Dry, free-flowing, dust-free chemical compound, nonflammable, not creating a fire hazard when applied in accordance with the manufacturer's recommendations, soluble in water, and capable of being spread dry or in solution.
- B. Weed Killer products:
 1. Oust: E.I. Dupont de Nemours and Co., www.dupont.com.
 2. Casoron 4G: Uniroyal Chemical Co., Inc., www.cromptoncorp.com.

3. Substitutions: Under provisions of Section 01 25 13.

2.3 HEADERS AND STAKES

- A. Headers: Construction heart grade redwood in compliance with the Standard Specifications for Grades of California Redwood Lumber.
- B. Stakes: Redwood of grade specified for headers.
- C. Nails: Common, galvanized, 12d minimum.

2.4 PAVEMENT STRIPING PAINT

- A. Vinyl emulsion type, white color, except at accessible parking spaces, provide blue color. Blue color to be equal to Color 15090 in accordance with Federal Standard 595C.
- B. Striping products:
 - 1. W801 Vin-L-Stripe Traffic Paint, manufactured by Dunn-Edwards, www.dunnedwards.com.
 - 2. Substitutions: Under provisions of Section 01 25 13.

2.5 ASPHALTS

- A. Comply with provisions of Standard Specifications for Public Works Construction, Section 203-1:
 - 1. Paving asphalt : PG-64-10
 - 2. Tack coat : SS-1h

2.6 ASPHALTIC PAVING MIX

- A. Provide hot plant mixed asphaltic concrete paving materials in accordance with Section 203-6 of Standard Specifications for Public Works Construction:
 - 1. Base Course Mix : B
 - 2. Parking and Drive Area Mix : C2
- B. Asphalt concrete paving mix to have 5 to 7 percent asphalt cement content by weight in accordance with TAI Publication MS-2.

2.7 SEAL COAT

- A. Parking Lot and Drive Areas: Emulsified asphalt and mineral aggregate mix complying with Section 203-9 of Standard Specifications for Public Works Construction, using Type SS-1h asphalt emulsion.
- B. Substitutions: Under provisions of Section 01 25 13.

3. PART 3 EXECUTION

3.1 INSPECTION

- A. Verify compacted subgrade is dry and ready to support paving and imposed loads.
- B. Verify gradients and elevations of base are correct.
- C. Beginning of installation means acceptance of substrate.

3.2 PREPARATION

- A. Apply weed killer to entire area to be paved. Follow manufacturer's application directions.
- B. Install headers and stakes to achieve arrangement of paving shown on the Drawings.

3.3 PLACEMENT OF GRANULAR BASE COURSE

- A. Spread granular base material to compacted thickness shown on the Drawings. Compact according to Section 31 20 00 to 95 percent.
- B. Do not displace geotextile paving grid during placement.
- C. Thickness tolerance: Minus 0.0 inch to plus 0.5 inch.
- D. Smoothness tolerance: 3/8 inch in 10 feet.
 - 1. Deviations: Correct by removing materials, replacing with new materials, and reworking and recompacting as required.
- E. Moisture content: Only the amount needed to achieve the specified compaction.

3.4 PLACEMENT OF ASPHALTIC CONCRETE FINISHED PAVING

- A. Remove all loose materials from compacted base.
- B. Adjust frames and covers, if so required, to meet final grades.
- C. Tack Coat:
 - 1. Apply tack coat at the rate of 0.05 to 0.10 gallon per square yard to all existing pavement, curbs, gutters, manholes, and the like immediately before asphalt concrete is placed.
 - 2. Avoid smearing adjacent surfaces. Remove spillage and clean affected areas.
- D. Spreading Asphaltic Concrete Materials:
 - 1. Spread material in a manner which requires the least handling.
 - 2. Spread asphalt concrete to compacted thickness shown on drawings.
 - 3. Where thickness of asphalt concrete paving will be 3 inches or less, spread in one layer.
 - 4. Where thickness of asphalt concrete paving will be more than 3 inches, spread in two layers. Surface course shall be a minimum of 1 inch thick.
 - 5. Prime asphalt surface between layers.
 - 6. Offset layers of paving a minimum of 6 inches.
- E. Rolling:
 - 1. After material has been spread to proper depth, roll until the surface is hard, smooth, unyielding, and true to the thickness and elevations shown.
 - 2. Roll in at least two directions until no roller marks are visible.
- F. Compacting:
 - 1. Average density according to ASTM D2041 to be 92 percent but not less than 90 percent and not more than 96 percent.

3.5 TOLERANCES

- A. Free from birdbaths.
- B. Flatness, Parking Lot, and Drive Areas: Maximum variation of 1/8 inch in 6 feet.
- C. Compacted Thickness: Within 1/4 inch.
- D. Variation from True Elevation: Within 1/2 inch.

3.6 REPAVING

- A. Where existing pavement is cut, removed, or disturbed, existing pavement shall be saw cut.
- B. Where excavations are 12 inches or less in width, existing pavement to be cut 12 inches greater in length and width of excavation.
- C. Where excavations are greater than 12 inches in width, existing pavement to be cut 24 inches greater in length and width of excavation.
- D. Where existing pavement being cut is to be overlayed, pavement cutting outside limits of excavation is not required.
- E. Backfill shall conform to requirements of Section 31 20 00.
- F. Repaving shall match existing paving, but shall not be less than 3 inches of asphalt concrete placed upon 12 inches of crushed aggregate base in compliance with Section 200-2.2 of the Standard Specifications for Public Works Construction.

3.7 SEAL COAT

- A. Apply seal coat to parking and drive areas in accordance with manufacturer's instructions in two separate coats. Do not apply seal coat until 30 days after initial placement of asphaltic concrete paving.

3.8 PAVEMENT STRIPING

- A. Layout line markings and other painting in accordance with Drawings.
- B. Clean surfaces to be painted. Apply paint in accordance with manufacturer's directions only when weather conditions permit proper application. Machine apply paint in as many coats as are required to provide opaque markings.

3.9 WHEEL STOPS

- A. Place wheel stops at all parking stalls as indicated.
- B. Anchor permanently in place with two steel rods.

3.10 FIELD QUALITY CONTROL

- A. Field inspection and testing of granular base and of asphalt concrete paving mix will be performed under provisions of Section 01 45 29.
- B. Testing firm to take samples and perform tests in accordance with TAI MS-2 and as specified.
- C. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- D. Thickness: In-place compacted thickness of hot-mix asphalt courses will be determined according to ASTM D3549.

- E. Surface Smoothness: Finished surface of each hot-mix asphalt course will be tested for compliance with smoothness tolerances.
- F. In-Place Density: Testing agency will take samples of uncompacted paving mixtures and compacted pavement according to ASTM D979.
- G. Reference maximum theoretical density will be determined by averaging results from four samples of hot-mix asphalt-paving mixture delivered daily to site, prepared according to ASTM D2041, and compacted as specified.
- H. In-place density of compacted pavement will be determined by testing core samples according to ASTM D2726.
 - 1. One core sample will be taken for every 1000 sq. yd. or less of installed pavement, with no fewer than 3 cores taken.
 - 2. Field density of in-place compacted pavement may also be determined by nuclear method according to ASTM D2950 and correlated with ASTM D2726.
- I. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements.

3.11 PROTECTION

- A. Immediately after placement, protect pavement under provisions of Section 01 61 00 from mechanical injury for 2 days.
- B. Protect all new placed pavement from landscape irrigation overspray and planter area soil erosion.

3.12 FLOOD TEST

- A. Perform flood test of finished paving by use of water tank truck.
- B. Where water ponds to a depth of more than 1/8 inch, fill or otherwise correct to provide proper drainage.
- C. Feather and smooth edge of fill so that joint between fill and original surface is invisible.

END OF SECTION

SECTION 32 13 13

CONCRETE PAVING

1. PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Concrete sidewalks, curbs, gutters, utility slabs, parking areas, driveways, driveway aprons and approaches.
- B. Expansion, control and isolation joints.
- C. Finishing concrete pavements.
- D. Concrete pavement striping.
- E. Recycled composite wheel stops.
- F. Steel reinforcement.
- G. Fibrous secondary reinforcement.

1.2 REFERENCES

- A. 2010 Americans with Disabilities Act (ADA) Standards for Accessible Design.
- B. ACI 117 - Standard Specification for Tolerances for Concrete Construction and Materials.
- C. ACI 301 - Specifications for Structural Concrete for Buildings.
- D. ACI 318 - Building Code Requirements for Structural Concrete.
- E. ASTM A184 - Specification for Fabricated Deformed Steel Bar Mats for Concrete.
- F. ASTM A1064 - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.
- G. ASTM A615 - Deformed and Plain Billet-Steel for Concrete Reinforcement.
- H. ASTM C33 - Concrete Aggregates.
- I. ASTM C94 - Ready Mixed Concrete.
- J. ASTM C150 - Portland Cement.
- K. ASTM C260 - Air-Entraining Admixtures for Concrete.
- L. ASTM C309 - Liquid Membrane-Forming Compounds for Curing Concrete.
- M. ASTM C494 - Chemical Admixtures for Concrete.
- N. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
- O. ASTM C979 - Pigments for Integrally Colored Concrete.
- P. ASTM C1116 - Specification for Fiber-Reinforced Concrete and Shotcrete.
- Q. ASTM C1602 - Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete.

- R. ASTM C1778 - Standard Guide for Reducing the Risk of Deleterious Alkali-Aggregate Reaction in Concrete.
- S. ASTM D1751 - Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction.
- T. CBC - California Building Code, (CCR) California Code of Regulations, Title 24, Part 2, California State Accessibility Standards.
- U. DSA/AC - Division of State Architect/Access Compliance.
- V. National Ready Mix Concrete Association - Plant Certification Program.
- W. Southern California Chapter, American Public Works Association - Standard Specifications for Public Works Construction.
- X. Stormwater Best Management Practice Handbook (BMP Handbook), Construction Edition, as published by the California Storm Water Quality Association.

1.3 QUALITY ASSURANCE

- A. Perform work in accordance with ACI 301.
- B. Obtain materials from same source throughout.

1.4 QUALIFICATIONS

- A. Manufacturer: Manufacturer of ready-mix concrete products complying with ASTM C94 requirements for production facilities and equipment. Certified according to National Ready Mix Concrete Association's Plant Certification Program.
- B. Pavement Installer: Company who has completed pavement work similar in material, design, and extent to that indicated for this project.
- C. Detectable Warning Pavement Installer: Company specializing in applying the work of this section with a minimum of 5 years experience and approved by manufacturer of the detectable warning products used.

1.5 REGULATORY REQUIREMENTS

- A. Conform to applicable code for paving work on public property.
- B. Conform to (CBC) California Building Code, (CCR) Title 24, Part 2, and the 2010 ADA Standards for Accessible Design for access requirements for individuals with disabilities.
- C. Detectable Warning Surfaces:
 1. Detectable warning surfaces shall comply with CBC Section 11B-705.1.
 2. Detectable warning surfaces at transit boarding platform edges, bus stops, hazardous vehicular areas, reflecting pools, and track crossings shall be yellow and approximate FS 33538 of Federal Standard 595C. Detectable warning surfaces at other locations shall be either the aforementioned yellow or a color providing a 70 percent minimum visual contrast with that of adjacent walking surfaces. The material used to provide visual contrast shall be an integral part of the surface. CBC Section 11B-705.1.1.3.
 3. Detectable warning surfaces shall differ from adjoining surfaces in resiliency or sound-on-cane contact. Such constraint shall not be required for detectable warning surfaces at curb ramps, islands, or cut-through medians. CBC Section 11B-705.1.1.4.

1.6 ENVIRONMENTAL REQUIREMENTS

- A. Provide concrete curing, finishing, and waste management techniques as defined in Section 4 of the Storm Water Best Management Practice Handbook, (BMP Handbook) Construction Edition.

1.7 SUBMITTALS

- A. Submit product data under provisions of Section 01 33 00.
- B. Include data on joint filler, admixtures and curing compounds.
- C. Submit proposed mix design to testing laboratory and to Architect for review prior to commencement of work.
- D. Submit manufacturer's instructions under provisions of Section 01 33 00.

1.8 MOCKUP

- A. Provide mockup of concrete pavement finish under provisions of Section 01 43 00.
- B. Construct mockup area under conditions similar to those which will exist during actual placement, with coatings applied.
- C. Locate where directed.
- D. Mockup may remain as part of the work.

2. PART 2 PRODUCTS

2.1 CONCRETE MATERIALS

- A. Cement: ASTM C150 Normal-Type II Portland type, gray color, from single source throughout project.
- B. Fine and Coarse Aggregates: ASTM C33, non-reactive when tested in accordance with ASTM C1778 and Appendix X-1 of ASTM C33.
- C. Water: ASTM C1602, clean and not detrimental to concrete.

2.2 BASE MATERIALS

- A. Aggregate Base: Crushed rock conforming to Section 200-2.2 of the Standard Specifications for Public Works Construction.

2.3 FORM MATERIALS

- A. Conform to ACI 301.

2.4 REINFORCEMENT

- A. Reinforcing Steel: ASTM A615; 40 ksi yield grade; deformed billet steel bars, uncoated finish.
- B. Welded Steel Wire Fabric: Plain type, ASTM A1064; in coiled rolls or flat sheets; uncoated finish.
- C. Fabricated Bar Mats: ASTM A184; welded or clip-assembled steel bar mats of ASTM A615, Grade 60 steel bars.
- D. Tie Wire: ASTM A1064, annealed steel, minimum 16 gage size.
- E. Dowels: ASTM A615; 40 ksi yield grade, plain steel, uncoated finish.
- F. Supports: Chairs, spacers, dowel bar supports and other devices for spacing, supporting and fastening reinforcing bars, welded wire fabric, and dowels in place.

G. Secondary Fibrous Reinforcement:

1. Collated, fibrillated, polypropylene fibers for secondary reinforcement of concrete slabs with length varying from 1-1/2 to 2 inches; nylon filamentized fibers of 3/4 inch length; cellulose fibers of 1/8 inch length meeting requirements of ASTM C1116, Type III or IV.
2. Manufacturers:
 - (a) Forta Mono or Forta, Forta Corp., www.fortacorp.com.
 - (b) Fibermix or Fibermesh, SI Concrete Corp., www.fibermesh.com.
 - (c) Nycon, Nycon, Inc., www.nycon.com.
 - (d) Grace Fibers or Micro Fibers, W.R. Grace and Co., www.graceconstruction.com.
 - (e) Buckeye Building Fibers, www.ultrafiber500.com.
3. Substitutions: Under provisions of Section 01 25 13.

2.5 ACCESSORIES

- A. Curing Compound: ASTM C309, Type 1-D, Class B.
- B. Preformed Joint Filler: ASTM D1751, 1/2 inch thick.
- C. Clear Sealer: One component alkylalkoxy, silane penetrating sealer.
- D. Joint Sealers: As specified in Section 07 92 00.
- E. Rock Salt: Commercial standard packaged rock crystals, No. 2 size, free of fines.

2.6 ADMIXTURES

- A. Air Entrainment: ASTM C260.
- B. Surface Retarder: ASTM C494, Type B or D.
- C. Fly Ash: ASTM C618, Class F.
- D. Water Reducing Admixture: ASTM C494, Type A.

2.7 DETECTABLE WARNING PAVEMENT

- A. Surface applied detectable warning system meeting nominal dimensional and color contrast requirements of the CBC, California Building Code, (CCR), California Code of Regulations, Title 24, Part 2, Section 11B-705 and be approved by DSA/AC.
- B. Detectable warning pavement to be construction using the Vitriified Polymer Composite Armor-Tile System manufactured by Engineered Plastics, Inc., www.armor-tile.com.
- C. Color of pavement shall be of contrasting yellow color conforming to Color 33538 in accordance with standard SAE AMS-STD-595.

2.8 CONCRETE MIX

- A. Mix concrete in accordance with ASTM C94, Alternative No. 3.
- B. Provide concrete of the following characteristics:
 1. Driveways, aprons and approaches: Compressive strength of 4,500 psi at 28 days.

2. Sidewalks, curbs, gutters and utility slabs: Compressive Strength of 3,250 psi at 28 days.
 3. Slump: 4 inches.
 4. Maximum aggregate size: 1 inch.
 5. Cement Content: Minimum 520 lbs/cu. yd.
 6. Fly Ash: Maximum 20 percent by weight.
 7. Air Entrainment: 2 to 4 percent.
 8. Water Cement Ratio: 0.45.
 9. Fibrous Reinforcement: 1.5 to 1.6 lbs/cu. yd. of polypropelene fibers or 1 lb/cu. yd. of nylon and cellulose fibers in all mix designs except for curb and gutters.
- C. When automatic machine placement is used, determine mix design and obtain laboratory test results that comply with or exceed requirements.

2.9 PAVEMENT STRIPING PAINT

- A. Vinyl emulsion type, yellow color, except at accessible parking spaces, blue color. Blue color to be equal to Color 15090 in accordance with Federal Standard SAE AMS-STD-595. Color of fire lane curb marking to be red with white letters.
- B. Acceptable products:
1. W801 Vin-L-Stripe Traffic Paint, manufactured by Dunn-Edwards, www.dunnedwards.com.
 2. 506 Traffic Line Paint-Vinyl, manufactured by Frazee, www.frazeepaint.com.
- C. Substitutions: Under provisions of Section 01 25 13.

2.10 COMPOSITE FIBER WHEEL STOPS

- A. Prefabricated composite recycled parking stops, nominal 4 inch high x 6 inches wide x 48 inch long manufactured of a recycled blend of vinyl, nylon and plastic, [gray] [yellow] color. Blue color at accessible parking spaces.
1. 6'-0" Plastic Car Stop manufactured by California Car Stops, www.californiacarstops.com.
 2. Model STWHLSTD-DS manufactured by Barco Products, www.barcoproducts.com.
- B. Pre-drill parking stops for two dowel anchors.
- C. Dowels: Galvanized steel, 1/2 inch diameter, minimum 12 inch length.

3. PART 3 EXECUTION

3.1 INSPECTION

- A. Verify compacted subgrade is ready to support paving and imposed loads.
- B. Verify gradients and elevations of base are correct.
- C. Beginning of installation means acceptance of existing conditions.

3.2 BASE

- A. Prepare and compact base materials in accordance with provisions of Section 31 20 00.

3.3 PREPARATION

- A. Moisten base to minimize absorption of water from fresh concrete.
- B. Coat surfaces of adjacent curbs, gutters, manholes, catch basins, inlets, light pole bases and other fixed objects with form release agent to form isolation joint and prevent bond with paving.
- C. Notify Architect minimum 24 hours prior to commencement of concreting operations.

3.4 FORMING

- A. Place and secure forms to correct location, dimension, and profile.
- B. Assemble formwork to permit easy stripping and dismantling without damaging concrete.
- C. Place joint fillers vertical in position, in straight lines. Secure during concrete placement.

3.5 REINFORCEMENT

- A. Place reinforcement at mid-height of slabs-on-grade.
- B. Lap adjoining pieces of welded wire fabric one full mesh and lace splice with wire. Offset laps of adjoining sheets.
- C. Place fabricated bar mats in lengths as long as practical. Overlap adjacent mat 2 inches.
- D. Interrupt reinforcement at expansion joints.
- E. Place secondary fiber reinforcement in concrete mix in quantities as specified for concrete pavements.
- F. Place reinforcement to achieve slab and curb alignment as detailed.
- G. Provide doweled joints at interruption of concrete with one end of dowel set in capped sleeve to allow longitudinal movement.
- H. Where joining existing concrete pavement, drill and set new dowels with epoxy grout into existing paving. Set opposite end of dowel in capped sleeve to allow for longitudinal movement.

3.6 PLACING CONCRETE

- A. Place concrete in accordance with ACI 301.
- B. Hot and Cold Weather Placement: ACI 301.
- C. Place concrete formwork on public property in conformance with applicable code.
- D. Ensure reinforcement, inserts, embedded parts, and formed joints are not disturbed during concrete placement.
- E. Place concrete continuously between predetermined construction joints and expansion joints. Do not break or interrupt successive pours such that cold joints occur.
- F. Do not push or drag concrete into place or use vibrators to move concrete into place.
- G. Place concrete to pattern indicated in strip sequence.

- H. Curb and Gutter: For automatic machine placement, produce curbs and gutters to required cross section, lines, grades, finish and jointing.
- I. Slip - Form Paving: For automatic machine placement, produce paving to required thickness, line, grade, finish and jointing.

3.7 JOINTS

- A. Review locations of joints when indicated and make recommendations for any additional joints or suggestions for new locations. Lack of joints or misplacement of joints will not constitute justification of pavement cracking.
- B. Place expansion joints as indicated on drawings, and at not to exceed 20 foot intervals to correct elevation and profile. Align curb, gutter, and sidewalk joints.
- C. Place joint filler at expansion joints and building or other appurtenances. Recess top of filler for sealant placement by Section 07 92 00. Cast top of joint with fine topping sand.
- D. Provide control joints at indicated intervals.
- E. Saw cut control joints 3/16 inch wide at an optimum time after finishing. Cut 1/3 into depth of slab.
- F. Provide keyed joints as indicated.
- G. Finish each edge of joint with radiused jointer tool.
- H. Use form release agent at isolation joints where paving abutts curbs, gutters, manholes, catch basins, inlets, light pole bases, and other fixed objects to prevent bonding with pavement.
- I. Where joining existing pavement, align new expansion, control and isolation joints with previously placed joints.

3.8 FINISHING

- A. Uniformly spread, screed and consolidate concrete. Do not spread concrete by vibration.
- B. Smooth Form Finish:
 - 1. Coordinate as necessary to secure form construction using smooth, hard, uniform surfaces, with number of seams kept to a practical minimum and in a uniform, orderly pattern.
 - 2. Patch tie holes and defects.
 - 3. Trowel to smooth even finish.
 - 4. Use for curbs, gutters, and mowstrips.
- C. Medium Broom Finish:
 - 1. Float surface and trowel to smooth even finish.
 - 2. While surface is still plastic draw a soft fiber bristle broom uniformly over surface in perpendicular direction to traffic.
 - 3. Use for sidewalks utility slabs, parking areas, driveways which have a slope of 6 percent or less.

3.9 CURING

- A. Cure concrete surfaces in accordance with ACI 301.
- B. Apply curing compound on finished slab surfaces in accordance with manufacturer's instructions.

3.10 SEALING

- A. Apply sealing compound on finished slab surfaces in accordance with manufacturer's instructions.

3.11 PAVEMENT STRIPING

- A. Lay out line markings and other painting in accordance with Drawings. Lines shall be 4 inches wide.
- B. Clean surfaces to be painted.
- C. Apply paint in accordance with manufacturer's directions.
- D. Apply only when weather conditions permit proper application.
- E. Machine apply paint in as many coats as are required to provide opaque markings..

3.12 CONCRETE WHEEL STOPS

- A. Place wheel stops at all parking stalls as indicated.
- B. Anchor permanently in place with two steel rods.

3.13 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed under provisions of Section 01 45 29.
- B. Owners's Inspector will take cylinders and perform slump, [air entrainment,] temperatures, density, and compressive strength cylinder tests per ACI 301. Preparing compressive strength test cylinder shall be per ACI 301 and the number of cylinders for a valid 28-day compressive strength test shall be determined in accordance with ACI 318, Item 26.12.1 (a). Project Inspector will arrange for pickup by Testing Laboratory.
- C. Three concrete test cylinders will be taken for every 50 or less cu yds of each class of concrete placed each day.
- D. One slump test will be taken for each set of test cylinders taken.
- E. Maintain records of placed concrete items. Record date, location of pour, quantity, air temperature, and test samples taken.

3.14 TOLERANCES

- A. Provide tolerances under provisions of Section 01 43 00 in accordance with ACI 117.
- B. Maximum Variation of Surface Flatness: 1/4 inch in 10 feet.
- C. Maximum Variation from True Position: 1/4 inch.
- D. Variation of Pavement Thickness: Plus 3/8 inch, minus 1/4 inch.
- E. Maximum Variation of Pavement Joints: 1/8 inch vertical alignment.

3.15 PROTECTION

- A. Immediately after placement, protect concrete under provisions of Section 01 61 00 from premature drying, excessive hot or cold temperatures, and mechanical injury.
- B. Do not permit traffic over pavement for 7 days after finishing.
- C. Maintain pavement free of stains, discoloration, dirt and other foreign materials. Remove surface stains and spillage of material as they occur.

3.16 REPAIR

- A. Remove and replace pavement that is broken, damaged, defective or does not comply with requirements of this Section.
- B. Refinishing pavement that is broken, damaged, or defective is not acceptable.
- C. Remove pavement in complete sections from joint to joint.
- D. Recycle pavement debris under provisions of Section 01 74 19.

END OF SECTION

SECTION 33 10 00

WATER UTILITIES

1. PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Water mains, valves, fittings, and accessories.
- B. Fire hydrants and assemblies.
- C. Backflow preventer.
- D. Thrust blocks.

1.2 REFERENCES

- A. ASSE 1013 - Performance Requirements for Reduced Pressure Principle Backflow Preventers.
- B. ASSE 1015 - Performance Requirements for Double Check Backflow Prevention Assembly.
- C. AWWA C104 - Standard for Cement-Mortar Lining for Ductile-Iron and Gray Iron Pipe and Fittings for Water.
- D. AWWA C105 - Standard for Polyethylene Encasement for Ductile-Iron Piping for Water and other Liquids.
- E. AWWA C110 - Standard for Gray-Iron and Ductile-Iron Fittings, 3 inch through 48 inch for Water and Other Liquids.
- F. AWWA C111 - Standard for Rubber-Gasket Joints for Ductile-Iron and Gray-Iron Pressure Pipe and Fittings.
- G. AWWA C151 - Standard for Ductile-Iron Pipe Centrifugally Cast in Metal Molds or Sand-Lined Molds for Water or Other Liquids.
- H. AWWA C300 - Standard for Reinforced Concrete Pressure Pipe, Steel Cylinder Type, for Water and Other Liquids.
- I. AWWA C502 - Standard for Dry-Barrel Fire Hydrants.
- J. AWWA C600 - Standard for Installation of Gray and Ductile Cast-Iron Water Mains and Appurtenances.
- K. AWWA C651 - Standard for Disinfecting Water Mains.
- L. AWWA C900 - Standard for Polyvinyl Chloride (PVC) Pressure Pipe, 4 inch through 12 inch for Water.
- M. AWWA C901 - Standard for Polyethylene Pressure. Pipe and Tubing 1/2 inch through 3 inch, for Water Service.
- N. AWWA M17 - Manual for Installation, Field Testing, and Maintenance of Fire Hydrants.
- O. AWWA M23 - Manual for PVC Pipe-Design and Installation.
- P. ASTM B88 - Seamless Copper Water Tube.
- Q. ACPA - American Concrete Pipe Association, Concrete Pipe Handbook.
- R. CDA - Copper Development Association, Copper Tube Handbook.
- S. NFPA 1963 - Standard for Screw Threads and Gaskets for Fire Hose Connections.

T. UL 246 - Standard for Hydrants for Fire Protection Service.

1.3 REGULATORY REQUIREMENTS

A. Conform to applicable code for materials and installation of the Work of this Section.

1.4 SUBMITTALS

A. Submit under provisions of Section 01 33 00.

B. Submit product data for pipe and pipe accessories.

C. Submit reports on piping disinfecting.

1.5 PROJECT RECORD DOCUMENTS

A. Submit documents under provisions of Section 01 77 00.

B. Accurately record location of pipe runs, connections, and depths.

C. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

2. PART 2 PRODUCTS

2.1 PIPE AND PIPE FITTINGS

A. General: Provide piping materials and factory-fabricated piping products of sizes, types, pressure ratings, and capacities as indicated. Where not indicated, provide proper selection as determined by Installer to comply with installation requirements. Provide sizes and types matching piping and equipment connections; provide fittings of materials which match pipe materials used in potable water systems. Where more than one type of materials or product are indicated, selection is Installer's option.

B. Piping: Provide pipes of the following materials, of weight/ class indicated. Provide pipe fittings and accessories of same material and weight/class as pipes , with joining method as indicated.

C. Copper Tube: ASTM B88; Type K hard drawn.

D. Ductile-Iron Pipe: AWWA C151, with cement mortar lining complying with AWWA C104; Class 51 unless otherwise indicated.

1. Fittings: Ductile-iron, AWWA C110; cement lined, AWWA C104; and rubber-gasket joints, AWWA C111.

2. Encasement: AWWA C105, polyethylene film tube.

E. Concrete Pipe: Reinforced steel cylinder type, AWWA C300.

1. Fittings: Reinforced concrete pipe fittings.

F. Polyvinyl Chloride (PVC) Pipe: AWWA C900, Class 200.

1. Fittings: Integral wall (thickened bell end), integral sleeve reinforced bell end or elastomeric gasket couplings meeting the requirements of AWWA C900.

2.2 HYDRANT

A. Type as Indicated on plans.

B. Cast-iron body, compression - type valve, opening against pressure and closing with pressure, 150 psig working pressure.

- C. Hydrant Extensions: Fabricate in multiples of 6 inches with rod and coupling to increase barrel length.
- D. Outlet Threads: as indicated on plans..
- E. Finish: Primer and two coats of enamel in color required by fire department.

2.3 BACKFLOW PREVENTORS

- A. ASSE standard backflow preventer of size indicated for maximum flow rate and maximum pressure loss indicated.
- B. ASSE 1015 double-check backflow prevention assembly with valves on inlet and outlet and strainer on inlet. Include test rocks with 2 positive-seating check valves for continuous-pressure application.

2.4 PIPE IDENTIFICATION

- A. Plastic Underground Warning Tapes: Polyethylene plastic tape, 6 inches wide by 4 mils thick, solid blue in color with continuously printed caption in black letters "CAUTION - WATER LINE BURIED BELOW."
- B. Metallic-Lined Plastic Underground Warning Tapes: Polyethylene plastic tape with metallic core, 6 inches wide by 4 mils thick, solid blue in color with continuously printed caption in black letters "CAUTION - WATER LINE BURIED BELOW."
- C. Nonmetallic Piping Label: Engraved plastic-laminate label, for installation on main electrical meter panel; not less than 1 inch by 3 inches, with captions "CAUTION - THIS STRUCTURE HAS A NONMETALLIC WATER SERVICE."

2.5 PIPE ACCESSORIES

- A. Valves and Fittings: Conform to AWWA Specifications. All valves and fittings shall be designed for an operating pressure larger than the design pressure of lines on which they are installed.
- B. Gate Valves: Double disk parallel seat type, iron body, bronze mounted inside screw, non-rising stem, flanged or screw filling standard hub nut.
- C. Thrust Blocking: Provide on water lines at bends, tees and fire hydrants. Use 2,500 psi concrete as specified in Section 03 30 00. Locate and place in accordance with standard practice.
- D. Access Boxes: Unless otherwise specified in accordance with plumbing specifications.

2.6 FILL MATERIAL

- A. Sand: Type specified in Section 31 20 00.

3. PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that trench cut is ready to receive work, and excavations, dimensions, and elevations are as indicated.
- B. Beginning of installation means acceptance of existing conditions.

3.2 PREPARATION

- A. Hand trim excavations to required elevations. Correct over excavation with fill material of sand.
- B. Remove large stones or other hard matter which could damage drainage tile or impede consistent backfilling or compaction.

3.3 INSTALLATION - PIPE AND FITTINGS

- A. Maintain separation of water main from sewer piping in accordance with code.
- B. Install pipe to indicated elevation to within 5/8 inches.
- C. Route pipe in straight line.
- D. Install pipe to allow for expansion and contraction without stressing pipe or joints.
- E. Slope water pipe and position drains at low points.
- F. Form and place concrete for thrust restraints at each elbow or change of direction of pipe.
- G. Copper Tube: Install in accordance with CDA "Copper Tube Handbook"
- H. Ductile-Iron Pipe: Install in accordance with AWWA C600 "Appurtenances." Install polyethylene encasement in accordance with AWWA C105.
- I. Concrete Pipe: Install in accordance with ACPA "Concrete Pipe Handbook."
- J. Polyvinyl Chloride (PVC) Pipe: Install in accordance with AWWA M23.
- K. Form and place concrete for thrust blocks.
- L. Install warning tape during back-filling of trench for underground water service piping. Locate 8 inches below finished grade directly over piping. Attach non-metallic piping label permanently to main electrical meter panel.
- M. Water Main Connection: Arrange and pay for tap in water main, of size and in location as indicated, from water Purveyor.
- N. Water Service Termination: Terminate water service piping 5'-0" from building foundation in location and invert as indicated. Provide temporary pipe plug for piping extension into building.

3.4 INSTALLATION - HYDRANT

- A. Comply with AWWA M17. Install with gate valve and provision for drainage as indicated.
- B. Set hydrants plumb and locate nozzles perpendicular to roadway.
- C. Set hydrants to grade with nozzles at least 20 inches above ground.
- D. Locate control valve 4 inches away from hydrant.
- E. Provide drainage pit 36 inches square by 24 inches deep filled with 2 inch washed gravel. Encase elbow of hydrant in gravel to 6 inches above drain opening. Do not connect drain opening to sewer.
- F. Paint hydrants in accordance with Section 09 90 00.

3.5 INSTALLATION - BACKFLOW PREVENTOR

- A. Install backflow preventer of type, size and capacity indicated. Include valves and test cocks.
- B. Install according to authority having jurisdiction.
- C. Support backflow preventers, valves, and piping on 2,500-psi; concrete piers as indicated.

3.6 INSTALLATION OF VALVES

- A. General: Install valves as indicated with stems pointing up. Provide valve box over underground valves.

3.7 FIELD QUALITY CONTROL

- A. Piping Tests: Conduct piping tests before joints are covered, and after thrust blocks have sufficiently hardened. Fill pipeline 24 hours prior to testing, and apply test pressure to stabilize system. Use only potable water.
- B. Hydrostatic Test: Test at not less than 1-1/2 times working pressure for two hours.

3.8 ADJUSTING AND CLEANING

- A. Use disinfecting procedure prescribed by authority having jurisdiction.
- B. In case a method is not prescribed by that authority, use procedure described in AWWA C651, or as described below:
 - 1. Fill system or part thereof with water/chlorine solution containing at least 50 ppm of chlorine. Valve off system or part thereof and allow to stand for 24 hours.
 - 2. Drain system or part thereof of previous solution and refill with water/chlorine solution containing at least 200 ppm of chlorine. Valve off system or part thereof and allow to stand for three hours.
 - 3. Flush system with clean potable water until chlorine does not remain in water coming from system.
- C. Prepare reports for all disinfecting activities and submit to Architect.

END OF SECTION

SECTION 33 30 00

SANITARY UTILITIES

1. PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Sanitary drainage piping, fittings, and accessories.
- B. Connection of building sanitary drainage system to municipal sewers.
- C. Cleanout access.

1.2 REFERENCES

- A. ACPA - American Concrete Pipe Association.
- B. ASTM A74 - Cast Iron Soil Pipe and Fittings.
- C. ASTM C12 - Practice for Installing Vitrified Clay Pipe Lines.
- D. ASTM C76 - Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.
- E. ASTM C425 - Compression Joints for Vitrified Clay Pipe and Fittings.
- F. ASTM C443 - Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets.
- G. ASTM C564 - Rubber Gaskets for Cast Iron Soil Pipe and Fittings.
- H. ASTM C700 - Vitrified Clay Pipe, Extra Strength, Standard Strength and Perforated.
- I. ASTM D2321 - Recommended Practice for Underground Installation of Flexible Thermoplastic Sewer Pipe.
- J. ASTM D2751 - Acrylonitrile-Butadiene-Styrene (ABS) Sewer Pipe and Fittings.
- K. ASTM D2855 - Practice for Making Solvent-Cemented Joints with Poly (Vinyl Chloride) (PVC) Pipe and Fittings.
- L. ASTM D3212 - Specifications for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals.
- M. ASTM D3034 - Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
- N. AWWA C105 - Standard for Polyethylene Encasement for Ductile-Iron Piping for Water and other Liquids.
- O. CISPI - Cast Iron Soil Pipe Institute.

1.3 REGULATORY REQUIREMENTS

- A. Conform to applicable code for materials and installation of the Work of this Section.

1.4 SUBMITTALS

- A. Submit under provisions of Section 01 33 00.
- B. Submit product data for pipe and pipe accessories.

1.5 PROJECT RECORD DOCUMENTS

- A. Submit documents under provisions of Section 01 77 00.
- B. Accurately record location of pipe runs, connections, manholes, cleanouts and invert elevations.
- C. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

2. PART 2 PRODUCTS

2.1 SEWER PIPE MATERIALS

- A. Vitrified Clay Pipe: ASTM C700; extra, standard strength, unperforated; plain end joints.
- B. Vitrified Clay Pipe Joint Device: ASTM C425, compression gasket joint.
- C. Plastic Pipe: ASTM D3034, Type PSM, SDR35 wall thickness, polyvinyl chloride (PVC) material; bell and spigot style solvent sealed end joints.

2.2 PIPE ACCESSORIES

- A. Fittings: Same material as pipe, molded or formed to suit pipe size and end design, in required 'T', bends, elbows, cleanouts, reducers, traps, and other configurations required.

2.3 PIPE IDENTIFICATION

- A. Plastic Underground Warning Tapes: Polyethylene plastic tape, 6 inches wide by 4 mils thick, solid blue in color with continuously printed caption in black letters "CAUTION - SANITARY SEWER LINE BURIED BELOW."
- B. Metallic-Lined Underground Warning Tapes: Polyethylene plastic tape with metallic core, 6 inches wide by 4 mils thick, solid blue in color with continuously printed caption in black letters "CAUTION - SANITARY SEWER LINE BURIED BELOW."

2.4 CLEANOUTS

- A. Cleanouts: Cast-iron ferrule and countersunk brass cleanout plug, with round cast-iron access frame and heavy-duty secured, scoriated cast-iron cover.

2.5 FILL MATERIAL

- A. Sand: Type specified in Section 31 20 00.

3. PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that trench cut is ready to receive work, and excavations, dimensions, and elevations are as indicated.
- B. Beginning of installation means acceptance of existing conditions.

3.2 PREPARATION

- A. Hand trim excavations to required elevations. Correct over excavation with fill material of sand.
- B. Remove large stones or other hard matter which could damage drainage tile or impede consistent backfilling or compaction.

3.3 INSTALLATION - PIPE

- A. Extend sanitary sewerage system to connect to building sanitary drain, of sizes and in locations indicated.
- B. Join and install cast-iron soil pipe and fittings with compression gaskets in accordance with CISPI Handbook, Volume I. Use service class gaskets.
- C. Join vitrified clay pipe and fittings with rubber sealing elements and install piping in accordance with ASTM C12.
- D. Solvent cement PVC pipe and fittings in accordance with ASTM D2855 and install piping in accordance with ASTM D2321.
- E. Place pipe on minimum four inch deep bed of sand.
- F. Lay pipe to slope gradient noted on Drawings with maximum variation from true slope of 1/8 inch in 10 feet.
- G. Install warning tape during back-filling of trench for underground sanitary sewer piping. Locate 8 inches below finished grade directly over piping.
- H. Install sand at sides and over top of pipe. Provide top cover to minimum compacted thickness of 12 inches.
- I. Place sand in maximum 6 inch lifts, consolidating each lift.
- J. Increase compaction of each successive lift. Refer to Section 31 20 00 for compaction requirements. Do not displace or damage pipe when compacting.
- K. Connect to municipal sewer system as indicated on plans.

3.4 INSTALLATION - CLEANOUTS

- A. Install cleanouts and extension from sewer pipe to cleanout at grade as indicated.
- B. Set cleanout frame and cover in concrete block 18 x 18 x 12 inches deep.
- C. Set top of cleanouts flush with paved surfaces. Elsewhere, set top 1 inch above surrounding earth grade.
- D. Install accessories as indicated.
- E. Set top of frame and covers flush with paved surfaces. Elsewhere, set top 3 inches above grade.

3.5 FIELD QUALITY CONTROL

- A. Field inspection will be performed under provisions of Section 01 45 29.

3.6 PROTECTION

- A. Protect finished installation under provisions of Section 01 61 00.
- B. Protect pipe from damage or displacement until backfilling operation is in progress.

END OF SECTION

SECTION 33 40 00

STORM DRAINAGE UTILITIES

1. PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Storm drainage piping, fittings, and accessories.
- B. Connection of building and site storm drainage system to point of disposal.
- C. Catch basins, cleanouts.
- D. Paved area drainage, and site surface drainage.

1.2 REFERENCES

- A. ACPA - American Concrete Pipe Association.
- B. ASTM A74 - Cast Iron Soil Pipe and Fittings.
- C. ASTM C12 - Practice for Installing Vitrified Clay Pipe Lines.
- D. ASTM C33 - Specification for Cement Aggregates.
- E. ASTM C76 - Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.
- F. ASTM C700 - Vitrified Clay Pipe, Extra Strength, Standard Strength and Perforated.
- G. ASTM C858 - Specifications for Underground Precast Concrete Utility Structures.
- H. ASTM D2564 - Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Pipe and Fittings.
- I. ASTM D2855 - Practice for making Solvent - Cemented Joints with Poly (Vinyl Chloride) (PVC) Pipe and Fittings.
- J. ASTM D2321 - Underground Installation of Thermoplastic Pipe for Sewers and other Gravity-Flow Applications.
- K. ASTM D3034 - Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
- L. ASTM D3350 - Standard Specification for Polyethylene Plastic Pipe and Fittings Materials.
- M. AWWA C105 - Standard for Polyethylene Encasement for Ductile-Iron Piping for Water and other Liquids.
- N. CISPI - Cast Iron Soil Pipe Institute.

1.3 REGULATORY REQUIREMENTS

- A. Conform to applicable code for materials and installation of the Work of this Section.

1.4 SUBMITTALS

- A. Submit under provisions of Section 01 33 00.
- B. Submit product data indicating pipe, pipe accessories and drainage structure.
- C. Submit manufacturer's installation instructions.

1.5 PROJECT RECORD DOCUMENTS

- A. Submit documents under provisions of Section 01 77 00.
- B. Accurately record location of pipe runs, connections, catch basins, manholes, cleanouts, and invert elevations.
- C. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

2. PART 2 PRODUCTS

2.1 STORM DRAINAGE PIPE MATERIALS

- A. Polyvinyl Chloride Pipe (PVC): ASTM D3034; SDR 35 minimum wall thickness; bell and spigot style; solvent cement joints conforming to ASTM D2564.
- B. Perforated Polyvinyl Chloride Pipe (PVC): ASTM D3034; SDR 35 minimum wall thickness; bell and spigot style; solvent cement joints conforming to ASTM D2564; perforations to be symmetrically located in an arc of 160 degrees. Perforations shall have a total open area of at least 0.3 square inches per lineal foot of pipe. Perforations shall be either holes or slots. Diameter of holes may vary from 1/4 inch minimum to 3/8 inch maximum; the width of the slots may vary from 3/16 inch minimum to 5/16 inch maximum; the length of the slot shall not exceed 4 inches.
- C. Trench Drain: Per plans.
- D. Substitutions: Under provisions of Section 01 25 13.

2.2 PIPE ACCESSORIES

- A. Fittings: Same material as pipe, molded or formed to suit pipe size and end design, in required 'T', bends, elbows, cleanouts, reducers, traps, and other configurations required.
- B. Geotextile Fabric: As specified in Section 31 20 00.

2.3 PIPE IDENTIFICATION

- A. Metallic-Lined Plastic Underground Warning Tapes: Polyethylene plastic tape with metallic core, 6 inches wide by 4 mils thick, solid blue in color with continuously printed caption in black letters "CAUTION - STORM SEWER SERVICE BURIED BELOW."

2.4 CATCH BASINS

- A. Basin Lid and Frame: Galvanized cast iron construction, hinged lid, linear grill lid design; nominal lid and frame size as indicated. Grate bars to be less than 1/2 inch apart.
- B. Base Pad: Cast-in-place concrete of type specified in Section 32 13 13; levelled top surface sleeved to receive storm sewer pipe sections.

2.5 MANHOLES AND CLEANOUTS

- A. Lid and Frame: Cast iron construction, removable lid, nominal lid and frame diameter as indicated.
- B. Cleanouts: Cast-iron ferrule and countersunk brass cleanout plug, with round cast-iron access frame and heavy-duty, secured, scoriated cast-iron cover.

2.6 FILL MATERIAL

- A. Sand: Type specified in Section 31 20 00.

3. PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that trench cut is ready to receive work, and excavations, dimensions, and elevations are as indicated.
- B. Beginning of installation means acceptance of existing conditions.

3.2 PREPARATION

- A. Hand trim excavations to required elevations. Correct over excavation with fill material of sand.
- B. Remove large stones or other hard matter which could damage drainage tile or impede consistent backfilling or compaction.

3.3 INSTALLATION - PIPE

- A. Extend storm sewerage piping to connect to building storm drain, of sizes and in locations indicated.
- B. Include storm sewerage system piping and appurtenances from a point 5'-0" outside building foundation to point of disposal.
- C. Solvent cement PVC pipe and fittings in accordance with ASTM D2855 and install piping in accordance with ASTM D2321.
- D. Place pipe on minimum 4 inch deep bed of sand.
- E. Install perforated PVC pipe at a minimum slope as indicated on plans. Coordinate with installation of drainage fill specified in Section 31 20 00.
- F. Install warning tape during back-filling of trench for underground storm drain piping. Locate 8 inches below finished grade directly over piping.
- G. Lay pipe to slope gradients noted with maximum variation from true slope of 1/8 inch in 10 feet.
- H. Install coarse sand at sides and over top of pipe. Provide top cover to minimum compacted thickness of 12 inches.
- I. Place sand in maximum 6 inch lifts, consolidating each lift.
- J. Increase compaction of each successive lift. Refer to Section 31 20 00 for compaction requirements. Do not displace or damage pipe when compacting.
- K. Connect to point of disposal as indicated on plans.

3.4 INSTALLATION - CATCH BASINS, AND MANHOLES

- A. Form bottom of excavation clean and smooth to correct elevation.
- B. Form and place cast-in-place concrete base pad, with provision for storm drainage pipe end sections.
- C. Establish elevations and pipe inverts for inlets and outlets as indicated.
- D. Mount lid and frame level in grout, secured to top cone section to elevation indicated.
- E. Install accessories as indicated.
- F. Set top of frame and covers flush with paved surfaces as indicated on plans.

3.5 INSTALLATION - CLEANOUTS

- A. Install cleanouts and extension from sewer pipe to cleanout at grade as indicated.
- B. Set cleanout frame and cover in concrete block as indicated on plans.
- C. Set top of cleanout flush with paved surfaces. Elsewhere, set top 1 inch above surrounding earth grade.

3.6 FIELD QUALITY CONTROL

- A. Field inspection will be performed under provisions of Section 01 45 29.
- B. Clear interior of piping and structures of dirt and other debris as work progresses.

3.7 PIPELINE FLUSHING

- A. Flush newly constructed storm drain piping with water.
- B. Collect and remove any rock, debris and silt using a metal screen during flushing procedure.

3.8 PROTECTION

- A. Protect finished installation under provisions of Section 01 61 00.
- B. Protect pipe from damage or displacement until backfilling operation is in progress.

END OF SECTION

SECTION 33 51 00

NATURAL GAS DISTRIBUTION

1. PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Pipe and fittings.
- B. Valves.
- C. Service regulators.
- D. Underground pipe markers.

1.2 REFERENCES

- A. ASCE 25 - Earthquake Actuated Automatic Gas Shut Off Valves.
- B. ASME B16.3 - Malleable Iron Threaded Fittings.
- C. ASTM A53 - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
- D. ASTM A234 - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service.
- E. ASTM D2513 - Standard Specification for Thermoplastic Gas Pressure Pipe, Tubing, and Fittings.
- F. ASTM D2683 - Standard Specification for Socket-Type Polyethylene Fittings for Outside Diameter-Controlled Polyethylene Pipe and Tubing.
- G. AWS D1.1 - American Welding Society - Structural Welding Code.

1.3 SUBMITTALS

- A. Product Data: Submit data on pipe materials, pipe fittings, valves and accessories under provisions of Section 01 33 00.

1.4 CLOSEOUT SUBMITTALS

- A. Submit documents under provisions of Section 01 77 00.
- B. Project Record Documents: Record actual locations of pipe mains, valves, connections, and invert elevations.
- C. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with utility company standard.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Requirements for transporting, handling, storing, and protecting products as required by Section 01 73 00.
- B. Deliver and store valves in shipping containers with labeling in place.

2. PART 2 PRODUCTS

2.1 PIPE AND FITTINGS

- A. Per Southern California Gas Company requirements.
- B. Steel Pipe Above Ground: ASTM A53, Schedule 40 black:
 - 1. Fittings: ASTM A234, forged steel welding type.
 - 2. Joints: Threaded. Welded for pipe sizes over 2 inches.
- C. Polyethylene Pipe Below Grade: ASTM D2513, SDR 11.
 - 1. Fittings: ASTM D2513 or ASTM D2683.
 - 2. Joints: Fusion Welded.

2.2 VALVES

- A. Per Southern California Gas Company requirements.
- B. 2 inches and Smaller: 150 psig WOG, bronze body, bronze tapered plug, lubricated, Teflon packing, threaded ends with cast iron curb box, cover, and key.
- C. 2-1/2 inches and Larger: 125 psig WOG, steel body and tapered plug, lubricated. Teflon packing, threaded ends, with cast iron curb box, cover, and key.
- D. Earthquake Valve: ASCE 25, mechanical-operation and automatic-shutoff type with operating pressure rating at least as great as system pressure.
- E. Furnish valves with manufacturer's name and pressure rating marked on valve body.

2.3 SERVICE REGULATOR

- A. Per Southern California Gas Company requirements.
- B. Single stage, malleable iron body, corrosion-resistant, pressure regulator with atmospheric vent, elevation compensator; threaded ends for 2 inch and smaller, flanged ends for 2-1/2 inch and larger.
- C. Furnish valves with manufacturer's name and pressure rating marked on valve body.
- D. Capacity: Inlet and outlet gas pressures, specific gravity, and flow rate as indicated on Drawings.

2.4 UNDERGROUND PIPE MARKERS

- A. Trace Wire: Magnetic detectable conductor, brightly colored plastic covering, imprinted with "Natural Gas Service" in large letters.

2.5 BEDDING AND COVER MATERIALS

- A. Bedding: Sand as specified in Section 31 20 00.
- B. Cover: Sand, as specified in Section 31 20 00.
- C. Soil Backfill from Above Pipe to Finish Grade: Soil type, as specified in Section 31 20 00.

3. PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify building service connection and utility gas main size, location and invert area as indicated on Drawings.

3.2 PREPARATION

- A. Cut pipe ends square, ream pipe and tube ends to full pipe diameter, remove burrs. Bevel plain end ferrous pipe 2-1/2 inches diameter and larger. Thread ferrous pipe 2 inches diameter and smaller.
- B. Remove scale and dirt on inside and outside before assembly.
- C. Prepare piping connections with flanges or threading and unions.

3.3 BEDDING

- A. Excavate pipe trench in accordance with Section 31 20 00.
- B. Place bedding material at trench bottom, level fill materials in one continuous layer.
- C. Backfill around sides and to top of pipe with cover fill, tamped in place and compacted.
- D. Maintain optimum moisture content of bedding material to attain required compaction density.

3.4 INSTALLATION - PIPING

- A. Maintain separation of gas line from other utility piping in accordance with code and Southern California Gas Company requirements.
- B. Route piping in straight line.
- C. Install piping to conserve space and not interfere with use of site space.
- D. Install piping to allow for expansion and contraction without stressing pipe or joints.
- E. Install valves and other fittings as indicated.
- F. Establish elevations of buried piping with not less than 36 inches of cover.
- G. Lay pipe on bedding.
- H. Wrap couplings and fittings of steel pipe with polyethylene tape and heat shrink over pipe.
- I. Install trace wire continuous above pipe line; coordinate with Section 31 20 00.
- J. Backfill trench in accordance with Section 31 20 00.
- K. Center and plumb valve box over valve. Set box cover flush with finished ground surface. Prevent shock or stress from being transmitted through valve box to valve.
- L. Install Work in accordance with utility company standards.

3.5 SERVICE CONNECTIONS

- A. For plastic service pipe, use steel pipe riser from below ground to service connection.
- B. Anchor service main to exterior surface of foundation wall.
- C. Install service regulator adjacent to building wall in specified location.

- D. Install service valve in yard box adjacent to building wall.
- E. Install Work in accordance with utility company standards.

3.6 FIELD QUALITY CONTROL

- A. Section 01 43 00 - Quality Assurance: Field inspecting testing, adjusting, and balancing.
- B. Pressure test gas lines to 60 psi for no less than 30 minutes.
- C. When pressure tests do not meet specified requirements, remove defective work, replace and retest.

END OF SECTION

SECTION H

**MISCELLANEOUS
CONTRACT DOCUMENTS
(SAMPLES)**

**CITY OF COSTA MESA
(SAMPLE) PUBLIC WORKS AGREEMENT FOR
CITY PROJECT NO. 22-##**

THIS PUBLIC WORKS AGREEMENT (“Agreement”), dated _____ (“Effective Date”), is made by the CITY OF COSTA MESA, a political subdivision of the State of California (“CITY”), and _____, a [state] [type of organization] (“CONTRACTOR”).

CITY desires to construct the public work and improvements described below under Scope of Work, Paragraph 1 (“Work”).

ACCORDINGLY, the parties hereto agree as follows:

1. SCOPE OF WORK.

The Work consists of _____.

The Work is further described in the “Contract Documents” referred to below.

The Project is known as _____, City Project No. ____ (“Project”).

2. CONTRACT DOCUMENTS.

The complete Agreement consists of the following documents relating to the Project:

- a. This Agreement;
- b. CONTRACTOR’s bid;
- c. Notice inviting bids;
- d. Complete plans, profiles, detailed drawings and specifications, including general provisions and special provisions;
- e. Certificates of Insurance;
- f. Faithful Performance Bond and Labor and Material Bond, including agent’s Power of Attorney for each bond;
- g. Supplements, attachments, and exhibits attached to the above items;
- h. Provisions of the most current edition of The Greenbook: Standard Specifications for Public Works Construction (“The Greenbook”); and

- i. All addenda setting forth any modifications or interpretations of the above documents.

The documents attached hereto are incorporated herein by this reference. The Greenbook is incorporated by reference as if fully set forth herein. The documents comprising the complete Agreement will be referred to as the "Contract Documents."

All of the Contract Documents are intended to complement one another, so that any Work called for in one and not mentioned in another is to be performed as if mentioned in all documents.

In the event of an inconsistency in the Contract Documents, the terms of this Agreement shall prevail over all other Contract Documents. The order of precedence between the remaining Contract Documents shall be as set forth in The Greenbook.

The Contract Documents constitute the entire agreement between the parties and supersede any and all other writings and oral negotiations.

3. CITY'S REPRESENTATIVE.

The CITY's Representative is _____, referred to herein as the Project Manager ("Project Manager").

4. CONTRACTOR'S PROJECT MANAGER; PERSONNEL.

(a) Project Manager. CONTRACTOR's Project Manager must be approved by City. Such approval shall be at CITY's sole discretion.

(b) Personnel. CITY has the right to review and approve any personnel who are assigned to perform work under this Agreement. CONTRACTOR shall remove personnel from performing work under this Agreement if requested to do so by CITY.

This Paragraph 4 is a material provision of the Agreement.

5. SCHEDULE.

All Work shall be performed in accordance with the schedule approved on behalf of CITY

by the Project Manager, and in accordance with the time of performance set forth in Paragraph 8 (Time of Performance).

6. EQUIPMENT - PERFORMANCE OF WORK.

CONTRACTOR shall furnish all tools, equipment, apparatus, facilities, labor and materials necessary to perform and complete the Work of construction in a good and workmanlike manner in strict conformity with the Contract Documents.

The equipment, apparatus, facilities, labor and material shall be furnished and such Work performed and completed as required in the plans and specifications to the satisfaction of the Project Manager or his or her designee, and subject to his or her approval.

7. CONTRACT PRICE.

_____ (\$_____.00).

8. TIME OF PERFORMANCE.

CONTRACTOR shall commence Work by the date specified in CITY's Notice to Proceed, unless a later date is agreed upon in writing by the parties. The Work shall be completed within _____ [working/calendar] days from the first day of commencement of the Work.

9. TERMINATION.

(a) Termination for Convenience.

CITY may terminate this Agreement at any time, with or without cause, by providing thirty (30) days' written notice to CONTRACTOR.

(b) Termination for Breach of Contract.

(i) If CONTRACTOR refuses or fails to prosecute the Work or any severable part of it with such diligence as will ensure its timely completion, or if CONTRACTOR fails to complete the Work on time, or if CONTRACTOR, or any subcontractor, violates any of the provisions of the Contract Documents, the Project Manager may give written notice to

CONTRACTOR and CONTRACTOR's sureties of the CITY's intention to terminate this Agreement; and, unless within five (5) days after the serving of that notice, such conduct shall cease and arrangements for the correction thereof be made to the satisfaction of the CITY, this Agreement may be terminated at the option of CITY effective upon CONTRACTOR's receipt of a second notice sent by the CITY indicating that the CITY has exercised its option to terminate.

(ii) If CONTRACTOR is adjudged bankrupt or files for any relief under the Federal Bankruptcy Code or State insolvency laws, this Agreement shall automatically terminate without any further action or notice by CITY.

(iii) If CONTRACTOR is in breach of any material provision of this Agreement, CITY may immediately terminate this Agreement by providing written notice to CONTRACTOR of same.

10. LIQUIDATED DAMAGES.

In the event the Work is not completed, for any reason, within the time required including any approved extensions of time, and to the satisfaction of the Project Manager, CITY may, in addition to any other remedies, equitable and legal, including remedies authorized by Paragraph 9 (Termination) of this Agreement, charge to CONTRACTOR or its sureties, or deduct from payments or credits due CONTRACTOR, a sum equal to _____ as liquidated damages for each day beyond the date provided for the completion of such Work.

The parties hereto agree that the amount set forth above, as liquidated damages constitutes a fair and reasonable estimate of the costs the CITY would suffer for each day that the CONTRACTOR fails to meet the performance schedule. The parties hereby agree and acknowledge that the delays in the performance schedule will cause CITY to incur costs and expenses not contemplated by this Agreement.

11. PERFORMANCE BY SURETIES.

In the event CONTRACTOR fails or refuses to perform the Work, CITY may provide

CONTRACTOR with a notice of intent to terminate as provided in Paragraph 9 (Termination), of this Agreement. The CITY shall immediately give written notice of such intent to terminate to CONTRACTOR and CONTRACTOR's surety or sureties, and the sureties shall have the right to take over and perform this Agreement; provided, however, that the sureties must, within five (5) days after CITY's giving notice of termination, (a) give the CITY written notice of their intention to take over the performance of this Agreement; (b) provide adequate assurances, to the satisfaction of the CITY that the Work shall be performed diligently and in a timely manner; and (c) must commence performance thereof within five (5) days after providing notice to the CITY of their intention to take over the Work. Upon the failure of the sureties to comply with the provisions set forth above, CITY may take over the Work and complete it, at the expense of CONTRACTOR, and the CONTRACTOR and the sureties shall be liable to CITY for any excess costs or damages including those referred to in Paragraph 10 (Liquidated Damages), incurred by CITY. In such event, CITY may, without liability for so doing, take possession of such materials, equipment, tools, appliances, Contract Documents and other property belonging to CONTRACTOR as may be on the site of the Work and reasonably necessary therefor and may use them to complete the Work.

12. DISPUTES PERTAINING TO PAYMENT FOR WORK.

Should any dispute arise respecting whether any delay is excusable, or its duration, or the value of the Work done, or of any Work omitted, or of any extra Work which CONTRACTOR may be required to do, or respecting any payment to CONTRACTOR during the performance of this Agreement, such dispute shall be decided by the Project Manager, and his or her decisions shall be final and binding upon CONTRACTOR and its sureties.

13. SUPERINTENDENCE BY CONTRACTOR.

At all times during performance of the Work, CONTRACTOR shall give personal superintendence or have a competent foreman or superintendent on the worksite, with authority

to act for CONTRACTOR.

14. INSPECTION BY CITY.

CONTRACTOR shall at all times maintain proper facilities and provide safe access for inspection by CITY to all parts of the Work and to all shops on or off-site where the Work or portions of the Work, are in preparation. CITY shall have the right of access to the premises for inspection at all times. However, CITY shall, at all times, comply with CONTRACTOR's safety requirements on the job site.

15. CARE OF THE WORK AND OFF-SITE AUTHORIZATION.

CONTRACTOR warrants that it has examined the site of the Work and is familiar with its topography and condition, location of property lines, easements, building lines and other physical factors and limitations affecting the performance of this Agreement. CONTRACTOR, at CONTRACTOR's sole cost and expense, shall obtain any permission, and all approvals, licenses, or easements necessary for any operations conducted off the premises owned or controlled by CITY. CONTRACTOR shall be responsible for the proper care and protection of all materials delivered to the site or stored off-site and for the Work performed until completion and final inspection and acceptance by CITY. The risk, damage or destruction of materials delivered to the site or to Work performed shall be borne by CONTRACTOR.

16. PAYMENTS TO CONTRACTOR.

On or before the last Monday of each and every month during the performance of the Work, CONTRACTOR shall meet with the Project Manager or his or her designee to determine the quantity of pay items incorporated into the improvement during that month. A "Progress Payment Order" will then be jointly prepared, approved, and signed by the Project Manager and the CONTRACTOR setting forth the amount to be paid and providing for a five percent (5%) retention. Upon approval of the progress payment order by the Project Manager, or his or her designee, it shall be submitted to CITY's Finance Department and processed for payment by

obtaining approval from the City Council to issue a warrant.

Within three (3) days following City Council's approval to issue a warrant, CITY shall mail to CONTRACTOR a warrant for the amount specified in the progress payment order as the amount to be paid. The retained five percent (5%) shall be paid to CONTRACTOR thirty-five (35) days after the recording of the Notice of Completion of the Work by the COUNTY and after CONTRACTOR shall have furnished releases of all claims against CITY by persons who furnished labor or materials for the Work, if required by CITY.

Upon the request of CONTRACTOR and at its expense, securities equivalent to the amount withheld pursuant to the foregoing provisions may be presented to CITY for substitution for the retained funds. If CITY approves the form and amount of the offered securities it will release the retained funds and will hold the securities in lieu thereof. CONTRACTOR shall be entitled to any interest earned on the securities.

In the event that claims for property damage or bodily injury are presented to CITY arising out of CONTRACTOR's or any subcontractor's Work under this Agreement; CITY shall give notice thereof to CONTRACTOR, and CONTRACTOR shall have thirty-five (35) days from the mailing of any such notice to evaluate the claim and to settle it by whole or partial payment, or to reject it, and to give notice of settlement or rejection to CITY. If CITY does not receive notice within the above-mentioned 35-day period that the claim has been settled, and if the Project Manager, after consultation with the City Attorney, determines that the claim is meritorious, CITY may pay the claim or a portion of it in exchange for an appropriate release from the claimant, and may deduct the amount of the payment from the retained funds that would otherwise be paid to CONTRACTOR upon completion of the Work; provided, however, that the maximum amount paid for any one claim pursuant to this provision shall be One Thousand Dollars (\$1,000.00), and the maximum amount for all such claims in the aggregate paid pursuant to this provision shall be Five Thousand Dollars (\$5,000.00).

17. PROMPT PAYMENT OF SUBCONTRACTORS.

The CONTRACTOR agrees to pay each subcontractor under this Agreement for satisfactory performance of its contract no later than seven (7) days from the receipt of each payment the CONTRACTOR receives from CITY.

The CONTRACTOR agrees further to release retainage payments to each subcontractor within thirty (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.

18. CONTRACT SECURITY AND GUARANTEE.

Unless previously provided by CONTRACTOR to CITY, CONTRACTOR shall furnish, concurrently with the execution of this Agreement, the following: (1) a surety bond in an amount equal to one hundred percent (100%) of the contract price as security for the faithful performance of this Agreement, and (2) a separate surety bond in an amount equal to at least one hundred percent (100%) of the contract price as security for the payment of all persons furnishing labor or materials in connection with the Work under this Agreement. Sureties for each of the bonds and the forms thereof shall be satisfactory to CITY. In addition, such sureties must be authorized to issue bonds in California; sureties must be listed on the latest revision to the U.S. Department of the Treasury Circular 570; and must be shown to have sufficient bonding capacity to provide the bonds required by the Contract Documents.

CONTRACTOR shall provide a certified copy of the certificate of authority of the surety issued by the Insurance Commissioner; a certificate from the clerk of the county in which the court or officer is located that the certificate of authority of the surety has not been surrendered, revoked, canceled, annulled, or suspended or, in the event that it has, that renewed authority has been granted; and copies of the surety's most recent annual statement and quarterly statement filed with the Department of Insurance pursuant to Article 10 (commencing with

Section 900) of Chapter 1 of Part 2 of Division 1 of the Insurance Code.

CONTRACTOR guarantees that all materials used in the Work and all labor performed shall be in conformity with the Contract Documents including, but not limited to, the standards and specifications set forth in the most current edition of The Greenbook. CONTRACTOR shall, at its own expense, make any and all repairs and replacements that shall become necessary as the result of any failure of the Work to conform to the aforementioned Contract Documents, and standard specifications; provided, however, that CONTRACTOR shall be obligated under this provision only to the extent of those failures or defects of which he is given notice within a period of twelve (12) months from the date that the Notice of Completion is recorded.

The rights and remedies available to CITY pursuant to this provision shall be cumulative with all rights and remedies available to CITY pursuant to statutory and common law, which rights and remedies are hereby expressly reserved, and neither the foregoing guarantee by CONTRACTOR nor its furnishing of the Bonds, nor acceptance thereof by CITY, shall constitute a waiver of any rights or remedies available to CITY against CONTRACTOR.

19. INDEMNIFICATION.

CONTRACTOR agrees to protect, defend, indemnify and hold harmless CITY and its elected and appointed boards, officers, agents, and employees from any and all claims, liabilities, expenses, or damages of any nature, including attorney fees, for injury to or death of any person, and for injury or damage to any property, including consequential damages of any nature resulting therefrom, arising out of or in any way connected with the performance of this Agreement. The defense obligation provided for hereunder shall apply without any advance showing of negligence or wrongdoing by the CONTRACTOR, its employees, and/or authorized subcontractors, but shall be required whenever any claim, action, complaint, or suit asserts as its basis the negligence, errors, omissions or misconduct of the CONTRACTOR, its employees, and/or authorized subcontractors, and/or whenever any claim, action, complaint or suit asserts

liability against the CITY, its elected officials, officers, agents and employees based upon the work performed by the CONTRACTOR, its employees, and/or authorized subcontractors under this Agreement, whether or not the CONTRACTOR, its employees, and/or authorized subcontractors are specifically named or otherwise asserted to be liable. Notwithstanding the foregoing, the CONTRACTOR shall not be liable for the defense or indemnification of the CITY for claims, actions, complaints or suits arising out of the sole active negligence or willful misconduct of the CITY. This provision shall supersede and replace all other indemnity provisions contained either in the CITY's specifications or CONTRACTOR's proposal, which shall be of no force and effect.

CONTRACTOR shall comply with all of the provisions of the Workers' Compensation insurance laws and Safety in Employment laws of the State of California, including the applicable provisions of Divisions 4 and 5 of the California Labor Code and all amendments thereto and regulations promulgated pursuant thereto, and all similar State, Federal or local laws applicable; and CONTRACTOR shall indemnify and hold harmless CITY from and against all claims, liabilities, expenses, damages, suits, actions, proceedings and judgments, of every nature and description, including attorney fees, that may be presented, brought or recovered against CITY for or on account of any liability under or failure to comply with any of said laws which may be incurred by reason of any Work performed under this Agreement by CONTRACTOR or any subcontractor or others performing on behalf of CONTRACTOR.

CITY does not, and shall not, waive any rights against CONTRACTOR which it may have by reason of the above hold harmless agreements, because of the acceptance by CITY or the deposit with CITY by CONTRACTOR of any or all of the insurance policies described in Paragraph 20 (Insurance) of this Agreement.

The hold harmless agreements by CONTRACTOR shall apply to all liabilities, expenses, claims, and damages of every kind (including but not limited to attorney fees) incurred or alleged

to have been incurred, by reason of the operations of CONTRACTOR or any subcontractor or others performing on behalf of CONTRACTOR, whether or not such insurance policies are applicable. CONTRACTOR shall require any and all tiers of subcontractors to afford the same degree of indemnification to the CITY OF COSTA MESA and its elected and appointed boards, officers, agents, and employees that is required of CONTRACTOR and shall incorporate identical indemnity provisions in all contracts between CONTRACTOR and all tiers of its subcontractors.

In the event that CONTRACTOR and CITY are sued by a third party for damages caused or allegedly caused by negligent or other wrongful conduct of CONTRACTOR, or by a dangerous condition of CITY's property created by CONTRACTOR or existing while the property was under the control of CONTRACTOR, CONTRACTOR shall not be relieved of its indemnity obligation to CITY by any settlement with any such third party unless that settlement includes a full release and dismissal of all claims by the third party against the CITY.

20. INSURANCE.

CONTRACTOR shall not commence Work under this Agreement until it has obtained all insurance required under this section and CITY has approved the insurance as to form, amount, and carrier, nor shall CONTRACTOR allow any subcontractor to commence any Work until all similar insurance required of the subcontractor has been obtained and approved.

Neither the failure of CONTRACTOR to supply specified insurance policies and coverage, nor the failure of CITY to approve same shall alter or invalidate the provisions of Paragraph 19 (Indemnification) of this Agreement.

(a) Workers' Compensation Insurance.

CONTRACTOR shall obtain and maintain during the life of this Agreement workers' compensation insurance and, if any Work is sublet, CONTRACTOR shall require all tiers of subcontractors to obtain workers' compensation insurance.

All workers' compensation insurance policies shall provide that the insurance may not be canceled without thirty (30) days' advance written notice of such cancellation to CITY.

CONTRACTOR agrees to waive, and obtain endorsements from its workers' compensation insurer waiving, subrogation rights under its workers' compensation insurance policy against the CITY and to require each of its subcontractors, if any, to do likewise under their workers' compensation insurance policies.

(b) Liability Insurance Coverage.

CONTRACTOR shall obtain and maintain during the life of this Agreement the following insurance coverage:

(i) Commercial General Liability, including coverage for premises-operations, products/completed operations hazard, blanket contractual, broad form property damage, and independent contractors. In addition, CONTRACTOR shall obtain and maintain during the life of this Agreement each of the following insurance coverage which are not stricken out and initialed by the Project Manager: Explosion and collapse hazard, underground hazard, personal injury, and automobile liability, including owned, hired, and non-owned vehicles. All insurance coverage shall have limits of not less than \$1,000,000.00 combined single limits, per occurrence and aggregate.

(ii) Below are approved endorsements which satisfy the basic insurance requirements contained in contracts entered into by City of Costa Mesa. These have been approved by the City Attorney's Office. The terms of any specific contract with the City are controlling. Prior to the commencement of any work, the City requires that the Engineer receive Certificates of Insurance in DUPLICATE for liability coverage of at least \$1,000,000.00 combined single limits, per occurrence and in the aggregate. Endorsements to the policies providing the above insurance shall be obtained by CONTRACTOR, adding the following three provisions:

(1) Additional Insured:

“The City of Costa Mesa and its elected and appointed boards, officers, agents, and employees are additional insureds with respect to the subject project and agreement.”

(2) Notice:

“Said policy shall not terminate, nor shall it be canceled nor the coverage reduced, until thirty (30) days after written notice is given to CITY.”

(3) Other Insurance:

“Any other insurance maintained by the City of Costa Mesa shall be excess and not contributing with the insurance provided by this policy.”

If any of such policies provide for a deductible or self-insured retention to provide such coverage, the amount of such deductible or self-insured retention shall be approved in advance by CITY. No policy of insurance issued as to which the CITY is an additional insured shall contain a provision which requires that no insured except the named insured can satisfy any such deductible or self-insured retention.

21. PROOF OF INSURANCE.

Prior to commencement of the Work, CONTRACTOR shall furnish CITY, through the Project Manager, proof of compliance with the above insurance requirements in a form satisfactory to the Risk Management.

22. LEGAL WORK DAY - PENALTIES FOR VIOLATION.

Eight (8) hours of labor shall constitute a legal day's work during any one (1) calendar day. CONTRACTOR shall forfeit to CITY the sum of Twenty-Five Dollars (\$25.00) for each workman employed in the execution of this Agreement by CONTRACTOR or by any subcontractor for each calendar day during which such workman is required or permitted to work more than eight (8) hours in any one calendar day and 40 hours in any one calendar week in violation of California Labor Code Sections 1810 through 1815, inclusive.

23. PREVAILING WAGE SCALE.

CONTRACTOR shall comply in all respects with the Davis-Bacon Act (40 U.S.C. section 276a) and with California Labor Code sections 1770 et seq., including the keeping of all records required by the provisions of Labor Code section 1776.

CONTRACTOR shall furnish each week to CITY's Project Administration Division a statement with respect to the wages of each of its employees during the preceding weekly payroll period.

24. COMPLIANCE WITH ALL LAWS.

CONTRACTOR shall, at its own cost and expense, comply with all applicable local, state, and federal laws, regulations, and requirements in the performance of this Agreement, including but not limited to laws regarding health and safety, labor and employment, and wage and hours.

25. DRUG-FREE WORKPLACE POLICY.

CONTRACTOR, upon notification of the award of this Agreement, shall establish a Drug-Free Awareness Program to inform employees of the dangers of drug abuse in the workplace, the penalties that may be imposed upon employees for drug abuse violations occurring in the workplace, and the employee assistance programs available to employees. Each employee engaged in the performance of a CITY contract must be notified of this Drug-Free Awareness Program, and must abide by its terms. CONTRACTOR shall conform to all the requirements of CITY's Policy No. 100-5, attached hereto as Attachment 1. Failure to establish a program, notify employees, or inform the CITY of a drug-related workplace conviction will constitute a material breach of contract and cause for immediate termination of the contract by the CITY.

26. NON-DISCRIMINATION.

In performing this Agreement, CONTRACTOR will not engage in, nor permit its agents to engage in, discrimination in employment of persons because of their race, religion, color, national origin, ancestry, physical handicap, medical condition, marital status or sex, or sexual

orientation, except as permitted pursuant to Section 12940 of the Government Code. Violation of this provision may result in the imposition of penalties referred to in Section 1735 of the California Labor Code.

27. CONTRACT ASSURANCE.

The CONTRACTOR or subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this Agreement. 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 Agreement, which may result in the termination of this Agreement or such other remedy as recipient deems appropriate.

The CONTRACTOR will require that the above provision is included in all subcontracts.

28. PROVISIONS CUMULATIVE.

The provisions of this Agreement are cumulative and in addition to, and not in limitation of, any other rights or remedies available to CITY.

29. NOTICES.

It shall be the duty and responsibility of CONTRACTOR to notify all tiers of subcontractors and material men of the following special notice provision; namely, all preliminary 20-day notices or stop notices shall be directed only to the City Clerk and to no other department, and shall be either personally delivered or sent by certified mail, postage prepaid.

All other notices shall be in writing and delivered in person or sent by certified mail, postage prepaid. Notices required to be given to CITY pursuant to this Agreement shall be addressed as follows:

City of Costa Mesa
77 Fair Drive
Costa Mesa, CA 92626
Attn: _____

Notices required to be given to CONTRACTOR shall be addressed as follows:

Attn: _____

Notices required to be given to CONTRACTOR's sureties shall be addressed as follows:

Attn: _____

30. INDEPENDENT CONTRACTOR.

The parties hereto acknowledge and agree that the relationship between CITY and CONTRACTOR is one of principal and independent contractor and no other. All personnel to be utilized by CONTRACTOR in the performance of this Agreement shall be employees of CONTRACTOR and not employees of the CITY. CONTRACTOR shall pay all salaries and wages, employer's social security taxes, unemployment insurance and similar taxes relating to employees and shall be responsible for all applicable withholding taxes. Nothing contained in this Agreement shall create or be construed as creating a partnership, joint venture, employment relations, or any other relationship except as set forth between the parties. The parties specifically acknowledge and agree that CONTRACTOR is not a partner with CITY, whether general or limited, and no activities of CITY or CONTRACTOR or statements made by CITY or CONTRACTOR shall be interpreted by any of the parties hereto as establishing any type of business relationship other than an independent contractor relationship.

31. PERS ELIGIBILITY INDEMNIFICATION.

In the event that CONTRACTOR or any employee, agent, or subcontractor of CONTRACTOR providing services under this Agreement claims or is determined by a court of competent jurisdiction or the California Public Employees' Retirement System (PERS) to be eligible for enrollment in PERS as an employee of the CITY, CONTRACTOR shall indemnify, defend, and hold harmless CITY for the payment of any employee and/or employer contributions

for PERS benefits on behalf of CONTRACTOR or its employees, agents, or subcontractors, as well as for the payment of any penalties and interest on such contributions, which would otherwise be the responsibility of CITY.

Notwithstanding any other agency, state or federal policy, rule, regulation, law or ordinance to the contrary, CONTRACTOR and any of its employees, agents, and subcontractors providing service under this Agreement shall not qualify for or become entitled to, and hereby agree to waive any claims to, any compensation, benefit, or any incident of employment by CITY, including but not limited to eligibility to enroll in PERS as an employee of CITY and entitlement to any contribution to be paid by CITY for employer contribution and/or employee contributions for PERS benefits.

32. VALIDITY.

The invalidity in whole or in part of any provision of this Agreement shall not void or affect the validity of any of the other provisions of this Agreement.

33. GOVERNING LAW.

This Agreement shall be governed by and construed in accordance with the laws of the State of California. Any legal action relating to or arising out of this Agreement shall be subject to the jurisdiction of the County of Orange, California.

34. NO THIRD PARTY BENEFICIARY RIGHTS.

This Agreement is entered into for the sole benefit of the CITY and CONTRACTOR and no other parties are intended to be direct or incidental beneficiaries of this Agreement and no third party shall have any right in, under or to this Agreement.

35. ASSIGNABILITY.

This Agreement may not be sold, transferred or assigned by either party, or by operation of law, to any other person or persons or business entity, without the other party's written permission. Any such sale, transfer or assignment, or attempted sale, transfer or assignment

without written permission, may be deemed by the other party to constitute a voluntary termination of this Agreement and this Agreement shall thereafter be deemed terminated and void.

36. WAIVER.

No waiver of any provision of this Agreement shall be effective unless in writing and signed by a duly authorized representative of the party against whom enforcement of a waiver is sought referring expressly to this Paragraph. The waiver of any right or remedy in respect to any occurrence or event shall not be deemed a waiver of any right or remedy in respect to any other occurrence or event, nor shall any waiver constitute a continuing waiver.

37. HEADINGS.

Section and subsection headings are not to be considered part of this Agreement, are included solely for convenience, and are not intended to modify or explain or to be a full or accurate description of the content thereof.

38. COUNTERPARTS.

This Agreement may be executed in one or more counterparts by the parties hereto. All counterparts shall be construed together and shall constitute one Agreement.

39. CORPORATE AUTHORITY.

The persons executing this Agreement on behalf of the Parties hereto warrant that they are duly authorized to execute this Agreement on behalf of said Parties and that by doing so, the Parties hereto are formally bound to the provisions of this Agreement.

40. ADDITIONAL SERVICES.

CONTRACTOR shall not receive compensation for any services provided outside the scope of the Contract Documents unless such additional services, including change orders, are approved in writing by CITY prior to CONTRACTOR performing the additional services.

It is specifically understood that oral requests or approvals of such additional services, change orders or additional compensation and any approvals from CITY shall be barred and are unenforceable.

[Signatures appear on following page.]

IN WITNESS WHEREOF, the parties hereto have caused this Agreement to be executed by and through their respective authorized officers, as of the date first above written.

CITY OF COSTA MESA,
A municipal corporation

Lori Ann Farrell Harrison
City Manager

Date: _____

CONTRACTOR

Signature

Date: _____

Name and Title

Signature

Date: _____

Name and Title

Social Security or Taxpayer ID Number

ATTEST:

Brenda Green
City Clerk

Date: _____

APPROVED AS TO FORM:

Kimberly Hall Barlow
City Attorney

Date: _____

APPROVED AS TO INSURANCE:

Ruth Wang
Risk Management

Date: _____

APPROVED AS TO PURCHASING:

Carol Molina
Acting Finance Director

Date: _____

DEPARTMENTAL APPROVAL:

Raja Sethuraman
Public Services Director

Date: _____

Sueng Yang, P.E.
City Engineer

Date: _____

(Signature and printed name of project manager)
Project Manager

Date: _____

SECTION I

EXHIBIT "A"

PROJECT LOCATION MAP



CITY OF COSTA MESA

Public Works/Engineering



PROJECT LOCATION MAP

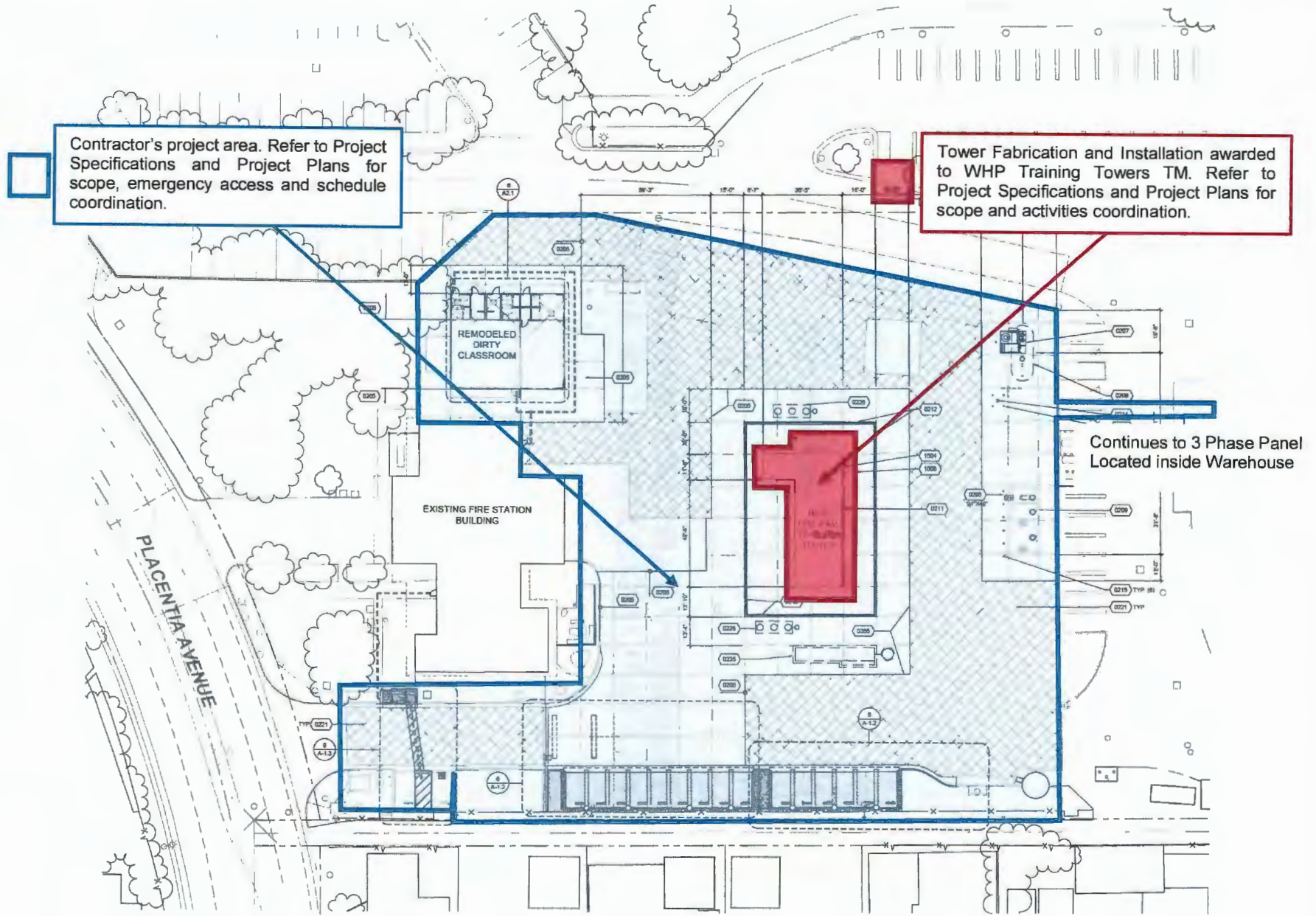
FIRE STATION NO. 4 - TRAINING TOWER FACILITY
CITY PROJECT NO. 23-04

 PROPOSED IMPROVEMENTS

EXHIBIT "B"

**TRAINING FACILITY SITE IMPROVEMENTS & TOWER
INSTALLATION AREAS SUBJECT OF ACTIVITY COORDINATION**

EXHIBIT "B" - TRAINING FACILITY SITE IMPROVEMENTS & TOWER INSTALLATION AREAS SUBJECT OF ACTIVITY COORDINATION



Contractor's project area. Refer to Project Specifications and Project Plans for scope, emergency access and schedule coordination.

Tower Fabrication and Installation awarded to WHP Training Towers TM. Refer to Project Specifications and Project Plans for scope and activities coordination.

Continues to 3 Phase Panel Located inside Warehouse

N.T.S.

EXHIBIT "C"

FIRE STATION 4 EMERGENCY ACCESS REQUIREMENTS

STAGING REQUIREMENTS (PART 1)

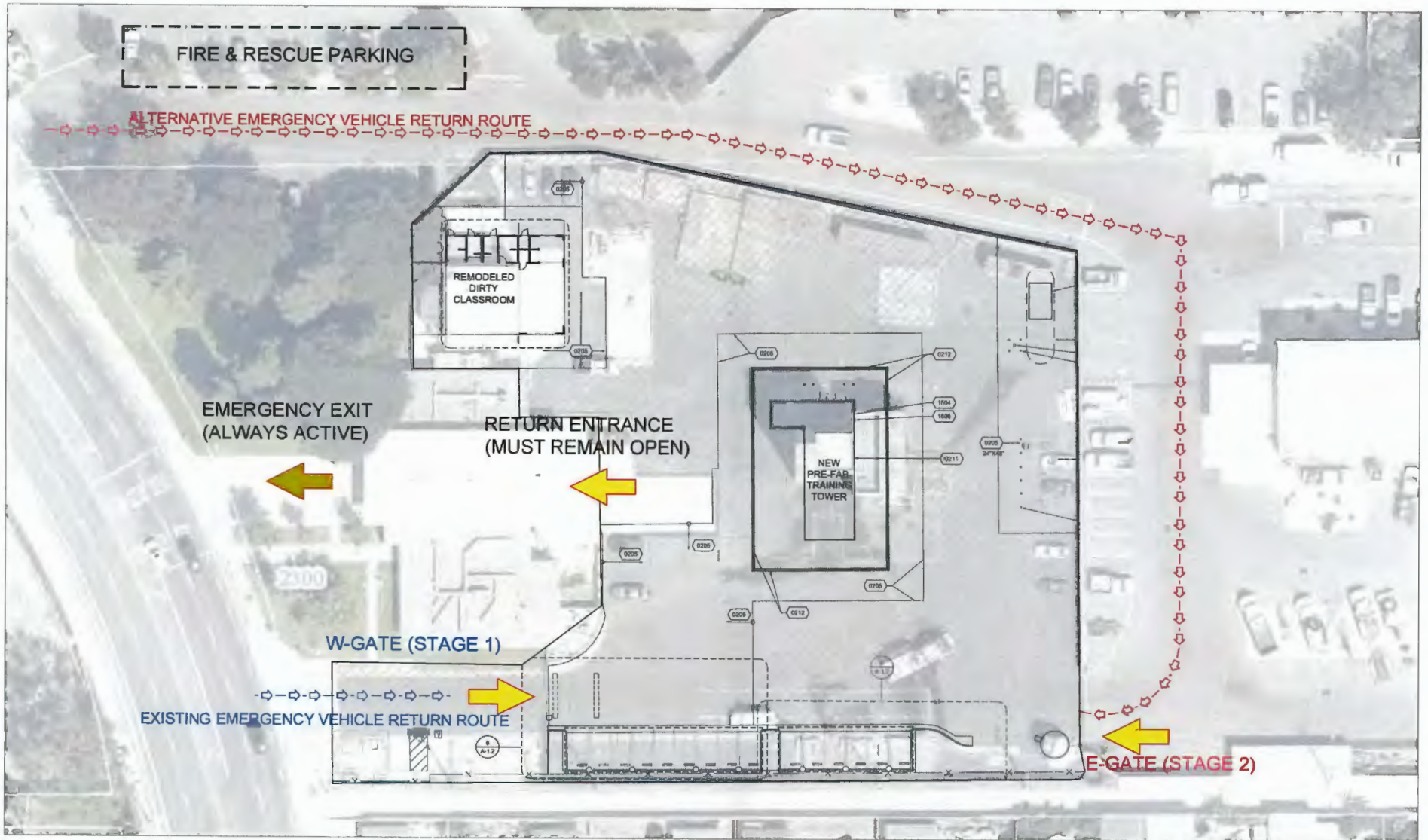


EXHIBIT "D"

REMOVAL AND RELOCATION LAYOUT

DISPOSAL AND RELOCATION LAYOUT

(Sheet 1 of 2)



NOT TO SCALE

DISPOSAL AND RELOCATION LAYOUT

(Sheet 2 of 2)



DISPOSE



RELOCATE



DISPOSE



DISPOSE



DISPOSE

NOTE TO CONTRACTOR:

IMAGES ARE FOR REFERENCE ONLY, AND SHOW MAJOR ITEMS TO BE DISPOSSED OR RELOCATED. CONTRACTOR IS RESPONSIBLE FOR VERIFYING SITE CONDITIONS.



DISPOSE



RELOCATE



DISPOSE

EXHIBIT "E"

STAGING LAYOUT

STAGING REQUIREMENTS (PART 2)

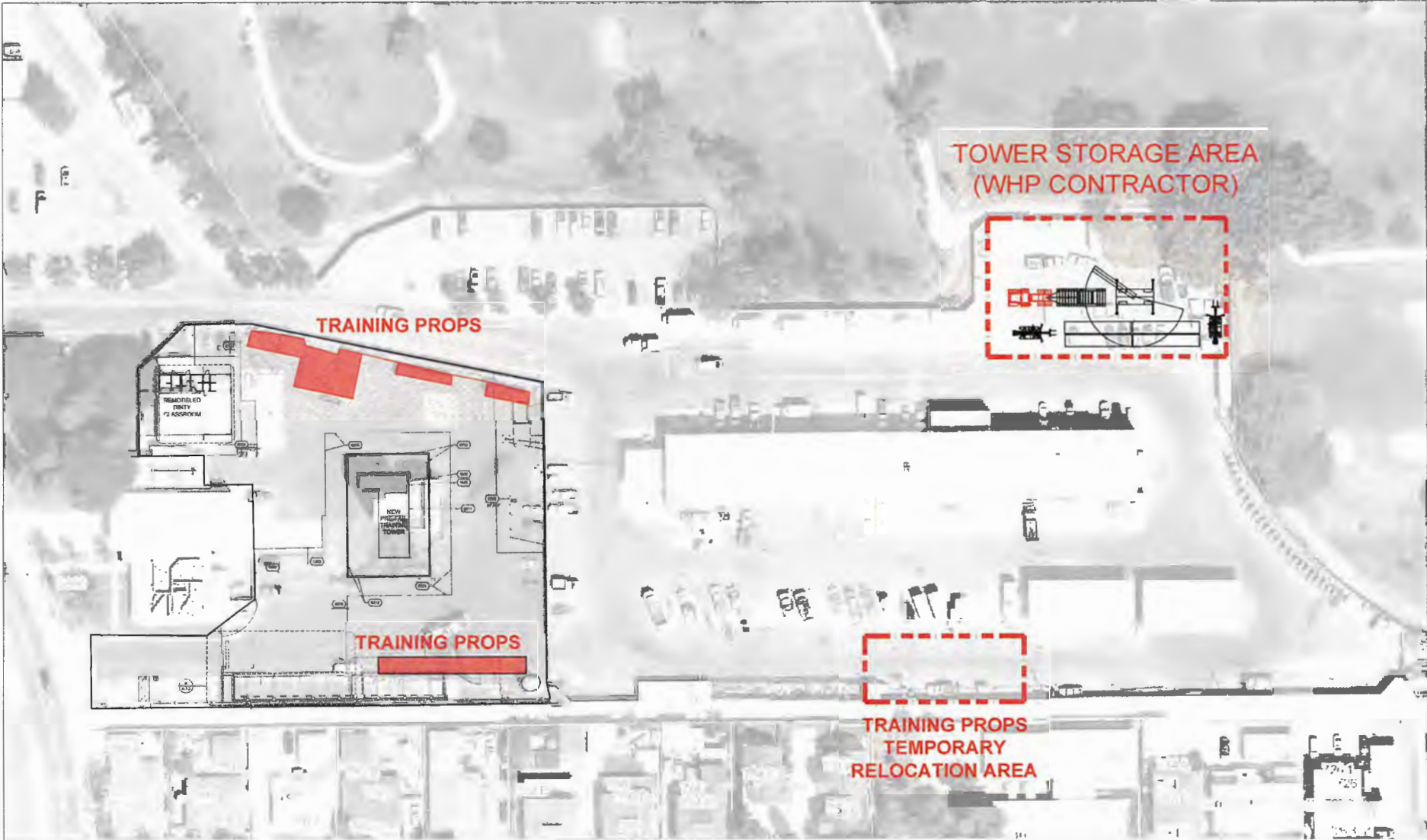
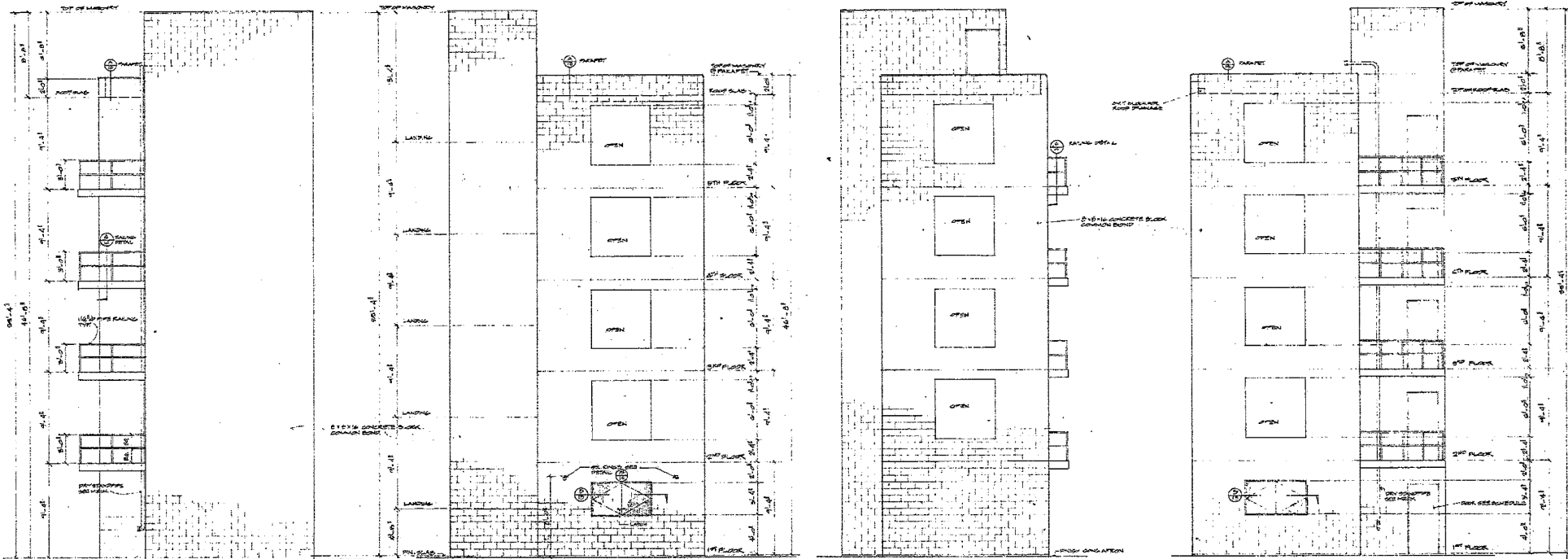


EXHIBIT "F"

FIRE STATION 4 AND TRAINING TOWER AS BUILTS

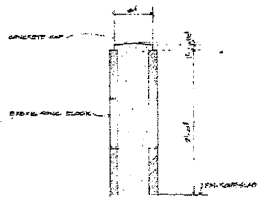


WEST ELEVATION
1/4" = 1'-0"

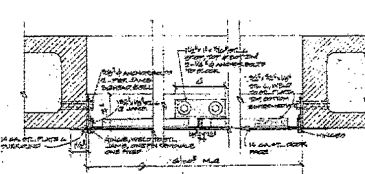
SOUTH ELEVATION
1/4" = 1'-0"

EAST ELEVATION
1/4" = 1'-0"

NORTH ELEVATION
1/4" = 1'-0"



PARAPET DETAIL (A)
1/4" = 1'-0"



NOTE:
ASSUME ALL STEEL
FRAMES UNLESS NOTED
STEEL SHUTTER DETAIL (B)
1/4" = 1'-0"

SCHWAGER, DESATO & HENDERSON AIA

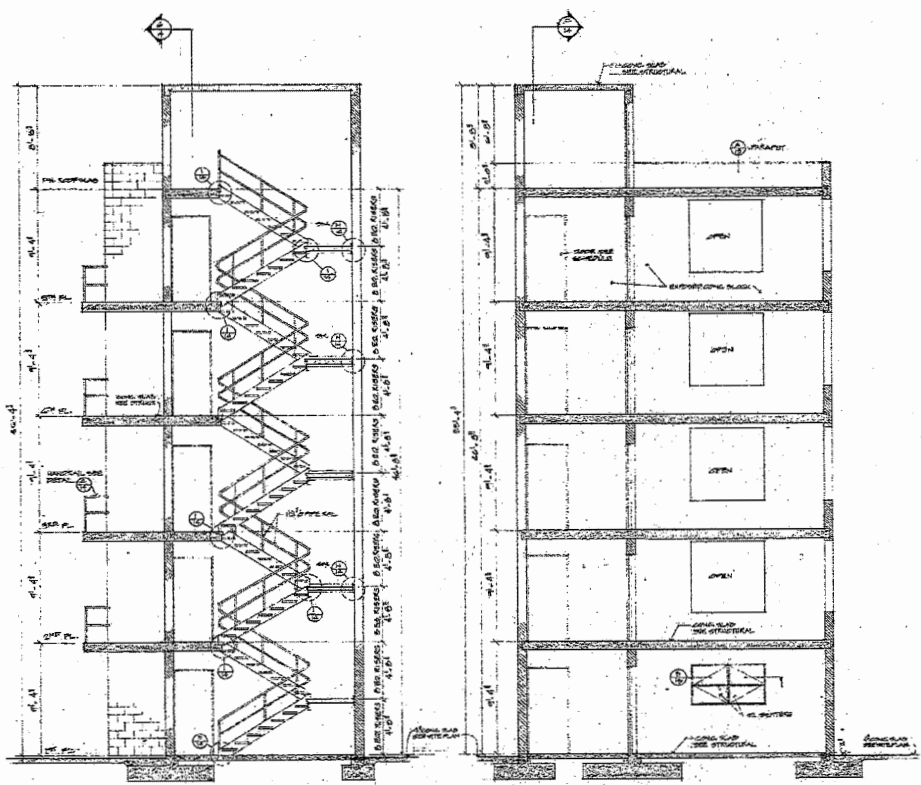
RESTATION WAREHOUSE AND TRAINING BUILDING

TYPE OF DRAWING
TRAINING TOWER ELEVATIONS

A-13

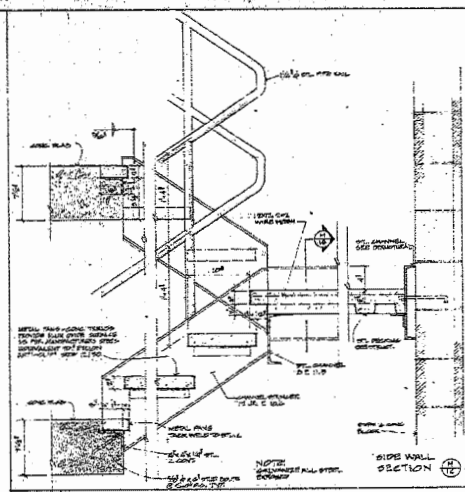
OF 37

SCALE: AS SHOWN	REVISED BY	APPROVED BY	DATE
THE CONTRACTOR SHALL VERIFY ALL THE DIMENSIONS ON THE JOB	DRAWN BY	DATE	

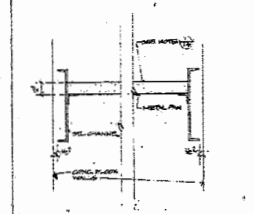


SECTION 101

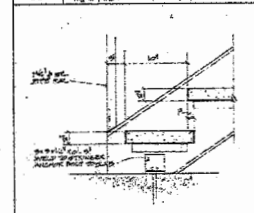
SECTION 102



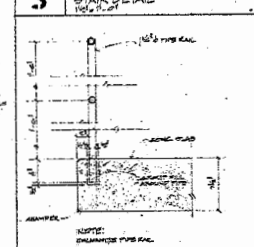
1 PARTIAL TRAINING TOWER STAIR SECTION



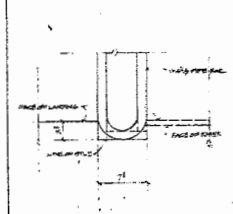
2 TREAD DETAIL



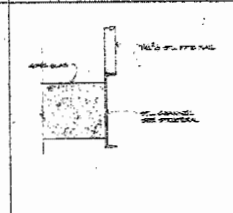
3 STAIR DETAIL



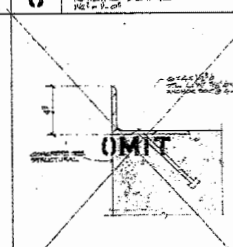
4 BALCONY RAILING



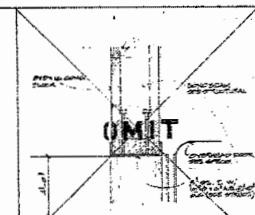
5 HANDRAIL PLAN OF LANDING



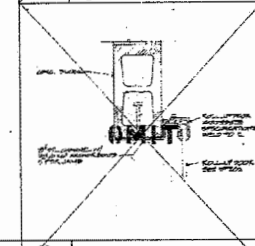
6 RAILING DETAIL



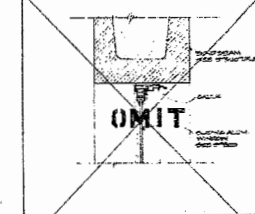
7 1\"/>



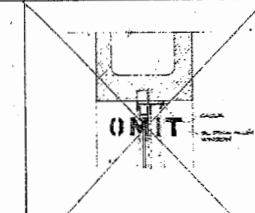
8 HEAD, ROLLING DOOR



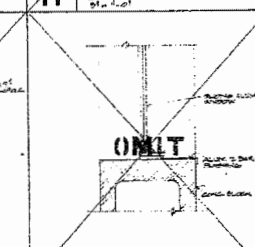
9 JAMB, ROLLING DOOR



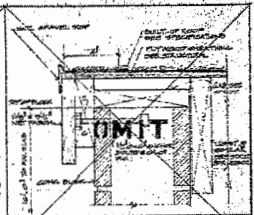
10 HEAD, ALUM. WINDOW



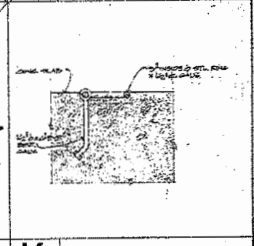
11 JAMB, ALUM. WINDOW



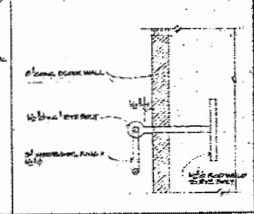
12 2\"/>



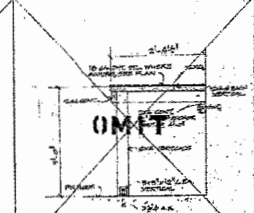
13 FASCIA



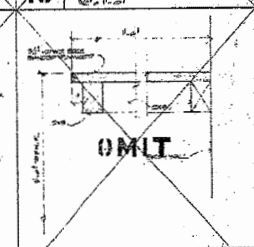
14 FLOOR KING



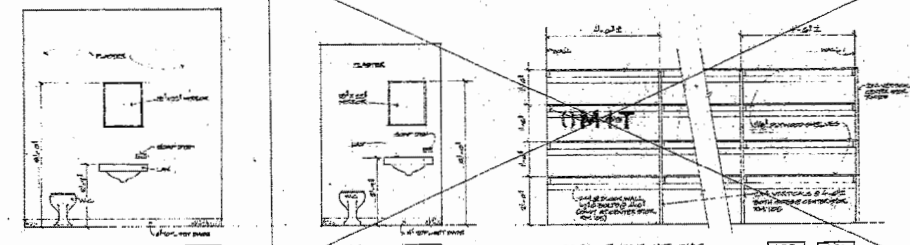
15 WALL KING



16 WORK BENCH



17 SHIELD DETAIL



103 INTERIOR ELEVATIONS

105 STORAGE ELEVATIONS

SCHWAGER, DEBATCH & HENDERSON AIA
 1800 ADAMS ST. SUITE 200 P.O. BOX 11111 CANTON, MA 01820-0111

FIRE STATION NO. 4
 WAREHOUSE AND SHOP BUILDING
 FOR
 THE CITY OF PORTLAND, ME
 4000 PLACENTIA DRIVE, PORTLAND, ME 04106

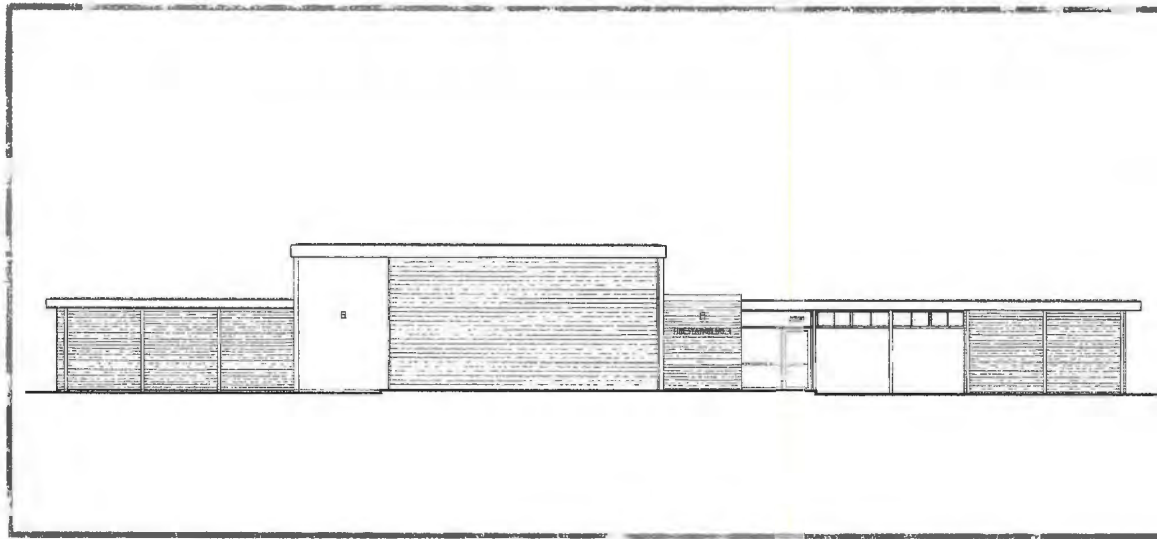
TITLE OF DRAWING TRAINING TOWER SECTIONS & MISC. DETAILS		DATE OF DRAWING A.14	
SCALE AS SHOWN	REVISIONS	APPROVED BY	DRAWN BY
DESIGNED BY	CHECKED BY	DATE	SCALE



COSTA MESA

fire station #4

2300 Placentia Avenue, Costa Mesa, CA 92627



EXPIRED
lets.02.13.15

COSTA MESA FIRE STATION #4 APPARATUS ROOM EXTENSION 1.13.15 (DS #14.039.00)



1 PETERS CANYON ROAD, SUITE 130
IRVINE, CA 92606

www.idsgj.com

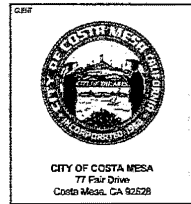
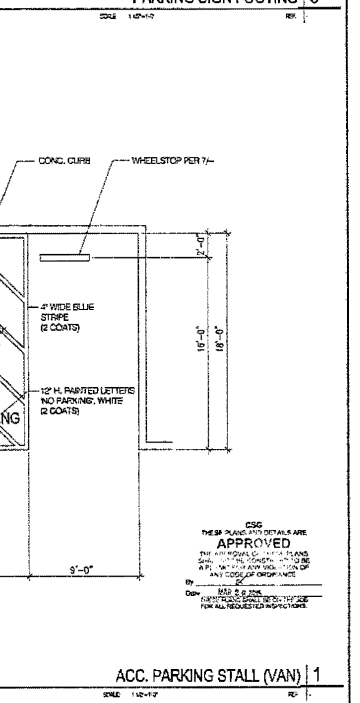
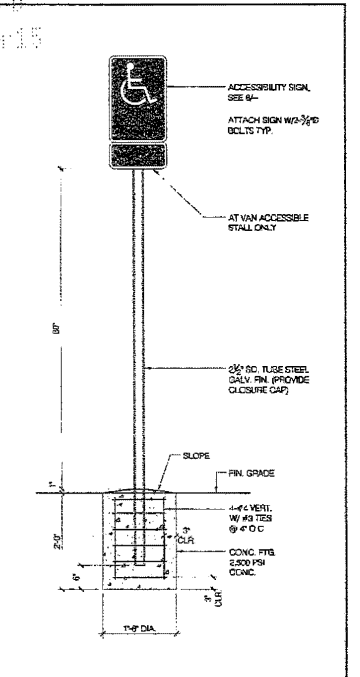
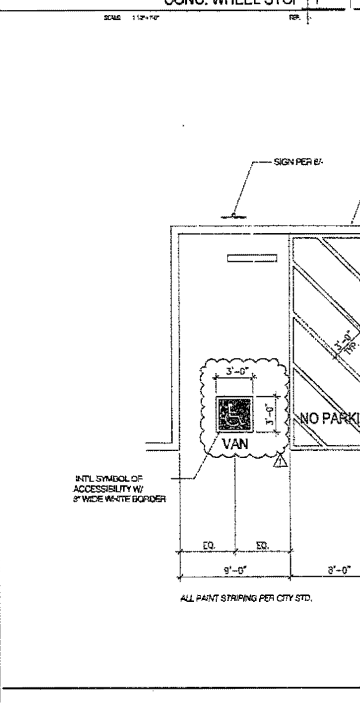
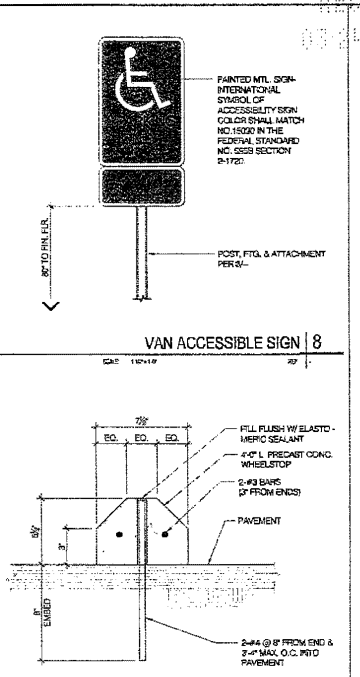
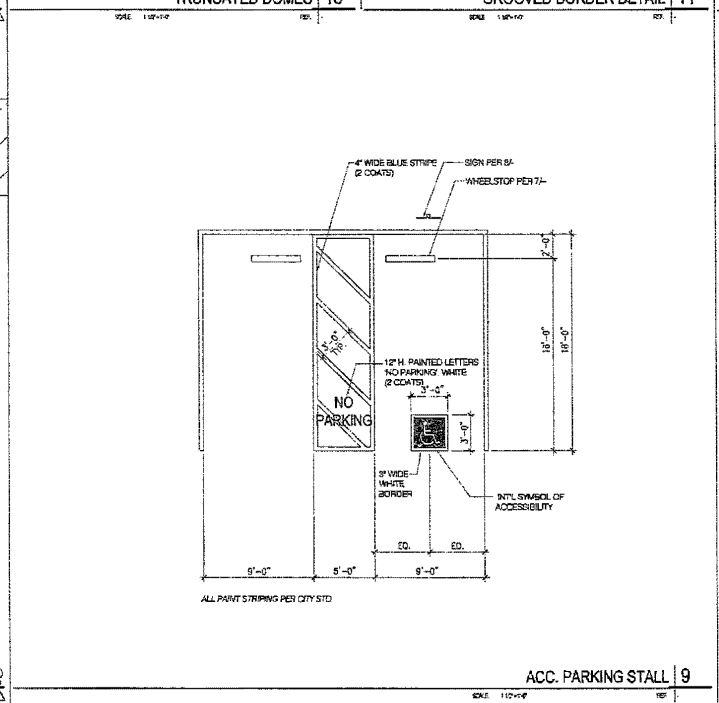
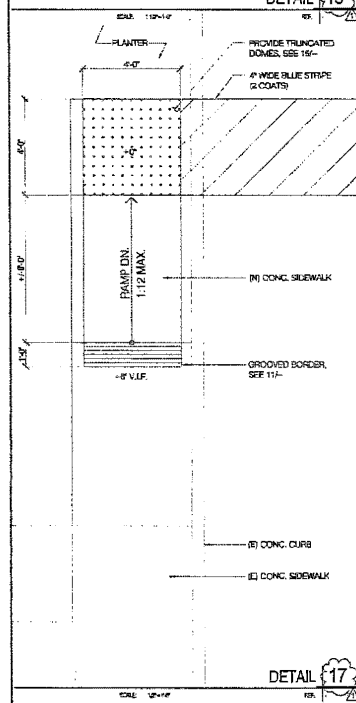
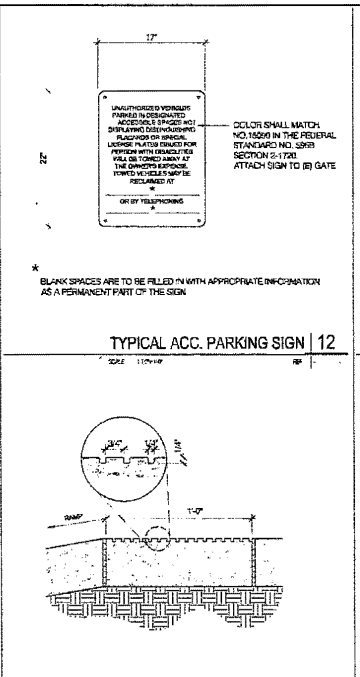
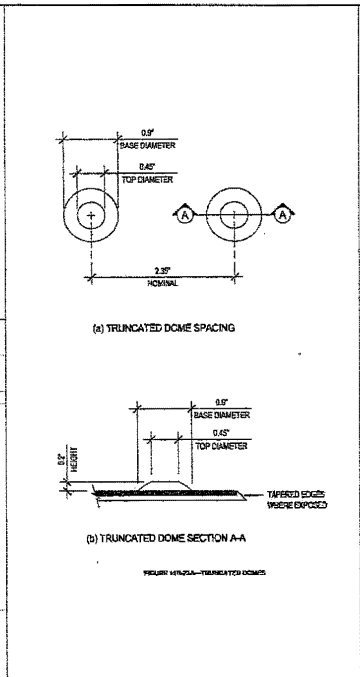
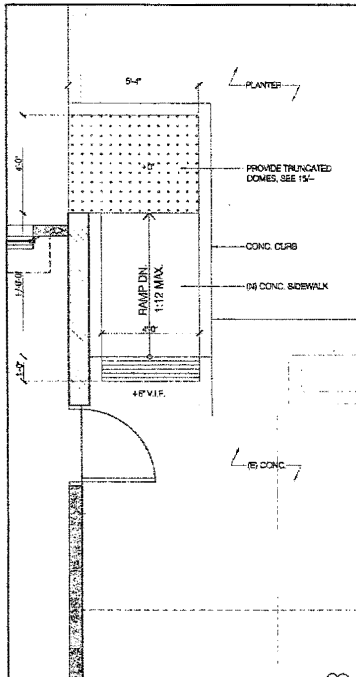
IDS GROUP

TEL: 949-387-8500, FAX 949-387-0800

APPROVED
CITY OF COSTA MESA
FIRE DEPARTMENT

EXPIRED
lets.02.13.15

02.13.2015
PLAN CHECK CORRECTIONS



**APPARATUS ROOM
EXTENSION
AND
RESCUE VEHICLE
STORAGE
BUILDING**

Costa Mesa Fire Department, Station #4
2300 Placencia Avenue
Costa Mesa, CA 92627



REV.	DESCRIPTION	DATE
-	50% CD SUBMITTAL	7.10.14
-	90% CD SUBMITTAL	8.20.14
-	PLAN CHECK #1 SUBMITTAL	8.28.14
-	PLAN CHECK CORRECTIONS	2.13.16

PROJECT NO. 14-032-00
 PRINT DATE 01/13/2016
 DRAWN BY
 CHECKED BY JS

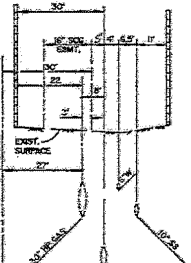
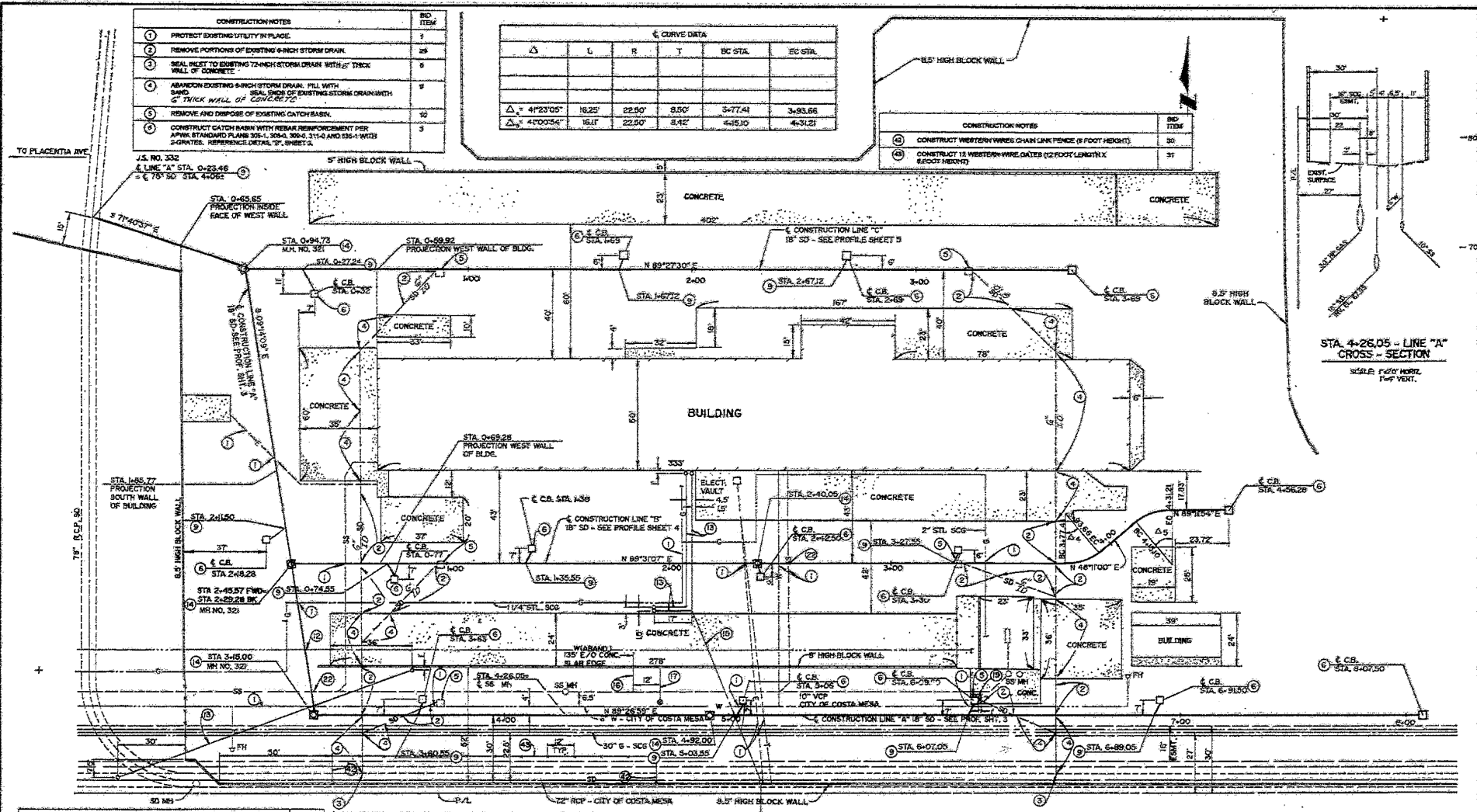
**SITE
DETAILS**

SHEET NUMBER
A1.03

CONSTRUCTION NOTES	NO. ITEM
1. PROTECT EXISTING UTILITY IN PLACE.	1
2. REMOVE PORTIONS OF EXISTING 6-INCH STORM DRAIN.	20
3. SEAL HOLE TO EXISTING 24-INCH STORM DRAIN WITH 6" THICK WALL OF CONCRETE.	6
4. ABANDON EXISTING 6-INCH STORM DRAIN. FILL WITH SAND. SEAL INSIDE OF EXISTING STORM DRAIN WITH 6" THICK WALL OF CONCRETE.	7
5. REMOVE AND DISPOSE OF EXISTING CATCH BASIN.	10
6. CONSTRUCT CATCH BASIN WITH REBAR REINFORCEMENT PER APWA STANDARD PLANS 334-1, 334-2, 334-3, 334-4 AND 334-5 WITH 3 GRATES. REFERENCE DETAIL "C", SHEET 2.	3

CURVE DATA					
Δ	L	R	T	BC STA.	EC STA.
Δ = 4°23'05"	16.25'	22.50'	9.50'	3+77.41	3+93.66
Δ = 4°00'54"	16.11'	22.50'	9.42'	4+15.10	4+31.21

CONSTRUCTION NOTES	NO. ITEM
10. CONSTRUCT WESTERN WIRE CHAIN LINK FENCE (8 FOOT HEIGHT).	30
11. CONSTRUCT 12 WESTERN WIRE GATES (12 FOOT LENGTH X 6 FOOT HEIGHT).	31



STA. 4-26.05 - LINE "A"
CROSS-SECTION
SCALE: 1/4" = 1'-0" HORIZ.
1/4" = 1'-0" VERT.

CONSTRUCTION NOTES	NO. ITEM
12. CONSTRUCT JUNCTION STRUCTURE PER APWA STANDARD PLAN 334-4, CASE 1. SEE DETAIL "C", SHEET 4.	4
13. REMOVE INTERFERING PORTION OF ABANDONED WATERLINE AND FILL END.	7
14. CONSTRUCT 3" DIA. PVC - SCHEDULE 40 WITH A MINIMUM 30" COVER. CAP ENDS PER DETAIL "G", SHEET 6.	18
15. CONSTRUCT 4" DIA. PVC PER APWA STANDARD PLAN 334-0.	2
16. CONSTRUCT 4" DIA. PVC - SCHEDULE 40 WITH A MINIMUM 30" COVER. CAP ENDS PER DETAIL "G", SHEET 6.	18

CONSTRUCTION NOTES	NO. ITEM
16. CONSTRUCT 6" INSIDE DIA. VCP SEWER (MINIMUM SLOPE OF 2 PERCENT) WITH A 30" COVER PER CITY OF COSTA MESA SANITARY DISTRICT STANDARD SPECIFICATIONS AND DRAWINGS THROUGH EXISTING 48" CONCRETE.	20
17. CONSTRUCT 4" INSIDE DIA. PVC (CLASS 150) WATER LINE WITH A 30" COVER AND 2" GATE VALVE AND 2" BARRIER PER COSTA MESA SANITARY DISTRICT STANDARD SPECIFICATIONS AND DRAWINGS THROUGH EXISTING 48" CONCRETE.	21
18. REMOVE EXISTING SECTION AND CONSTRUCT 1" PCC(2) CURB.	17
19. CONSTRUCT SEWER PIPE SUPPORT ACROSS TRENCH PER COSTA MESA SANITARY DISTRICT STD PLANS-199, CASE 1.	22

PLAN

SCALE: 1" = 20'

PREPARED BY

 1827 Quail Street, P.O. Box 2000
 Newport Beach, California 92660-0200
 714/478-3393



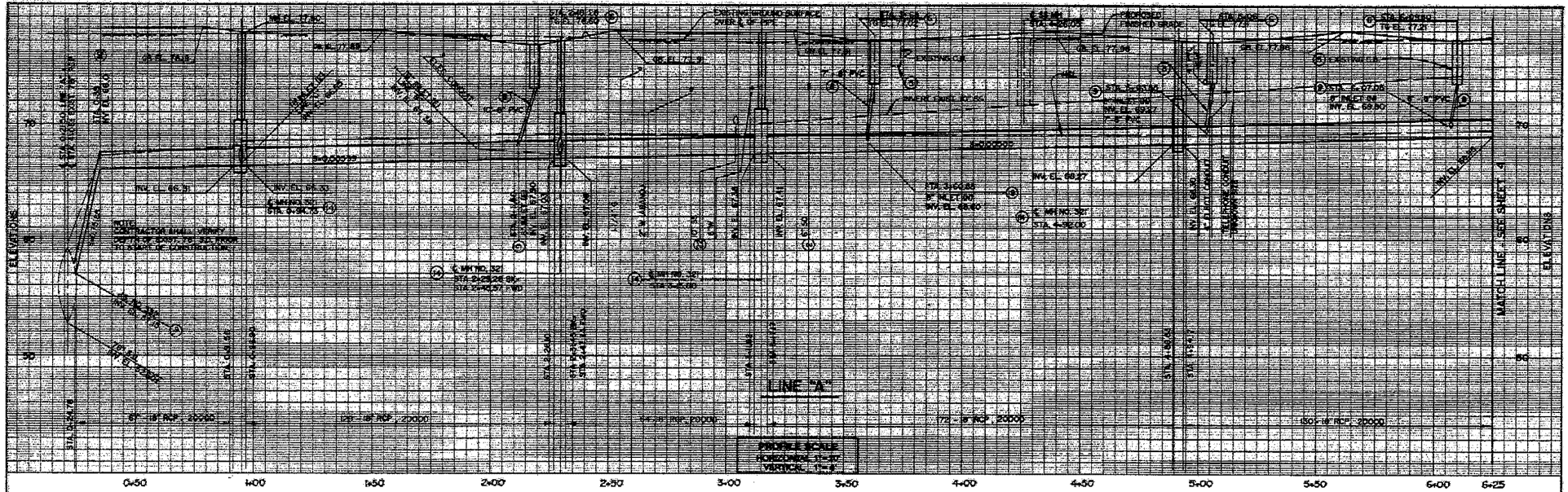
CORPORATION YARD STORM DRAIN AND PAVING PROJECT

PLAN SHEET
STORM DRAIN AND MISCELLANEOUS CONDUITS

CITY OF COSTA MESA

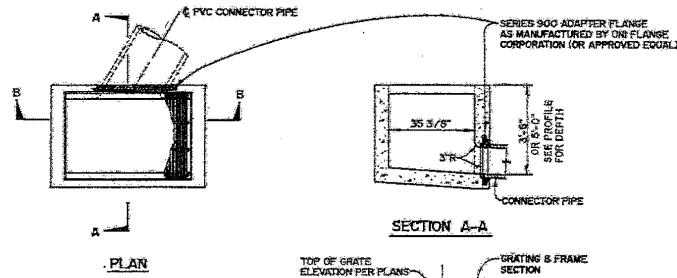
2 SHEET OF **7**

PLAN NUMBER
95-04.2

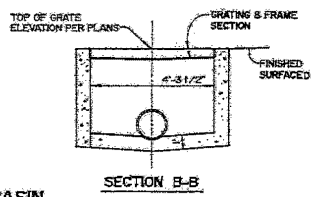


CONSTRUCTION NOTES	BID ITEM
⑩ REMOVE AND DISPOSE OF EXISTING CATCH BASIN.	10
⑨ CONSTRUCT CATCH BASIN WITH REBAR REINFORCEMENT PER APWA STANDARD PLANS 305-1, 306-0, 308-0, 311-0 AND 605-1 WITH 2 GRATES. REFERENCE DETAIL 'B', SHEET 3.	3
⑧ CONSTRUCT 8-INCH DIAMETER PVC (SDR-35) INSTANT ADAPTER FLANGE PER DETAIL 'B', SHEET 3.	7
⑦ CONSTRUCT JUNCTION STRUCTURE PER APWA STANDARD PLAN 332-0, CASE 1. SEE DETAIL 'C', SHEET 4.	4
⑥ CONSTRUCT CONCRETE COLLAR PER APWA STANDARD PLAN 380-0.	5
⑤ CONSTRUCT MANHOLE PER APWA STANDARD PLAN 521-0.	2

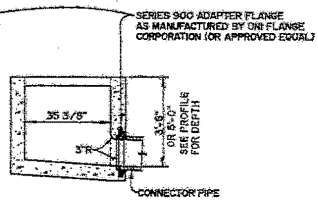
NOTE: SERIES 900 ADAPTER FLANGE SHALL BE USED WHERE CONNECTING PVC TO 18" RCP IN APWA STD PLAN 332-0.



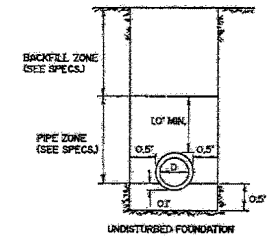
DETAIL "B" - TYPICAL CATCH BASIN
NOT TO SCALE



SECTION B-B

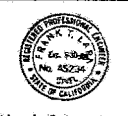


SECTION A-A



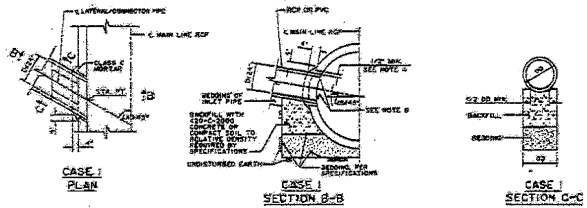
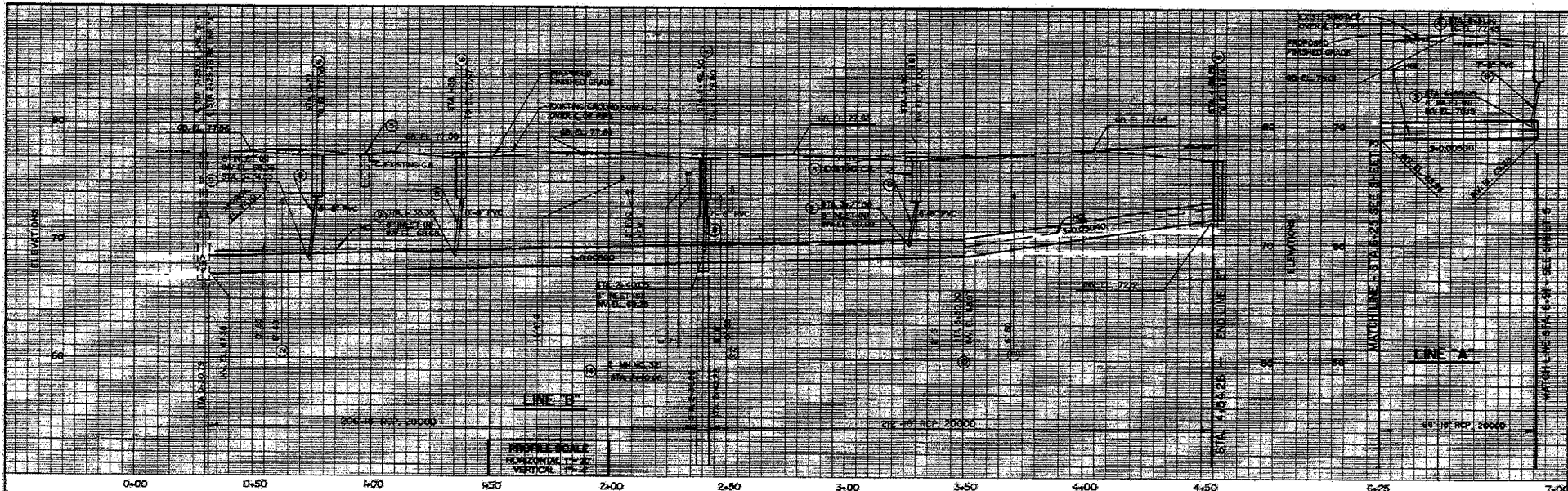
DETAIL "A" - TYPICAL TRENCH SECTION
NOT TO SCALE

PREPARED BY
BOYLE CORPORATION
1007 Ouellet Street P.O. Box 3620
Menlo Park, California 94025
7247-676-3200



CORPORATION YARD STORM DRAIN AND PAVING PROJECT
PROFILE SHEET
LINE "A"
CITY OF COSTA MESA

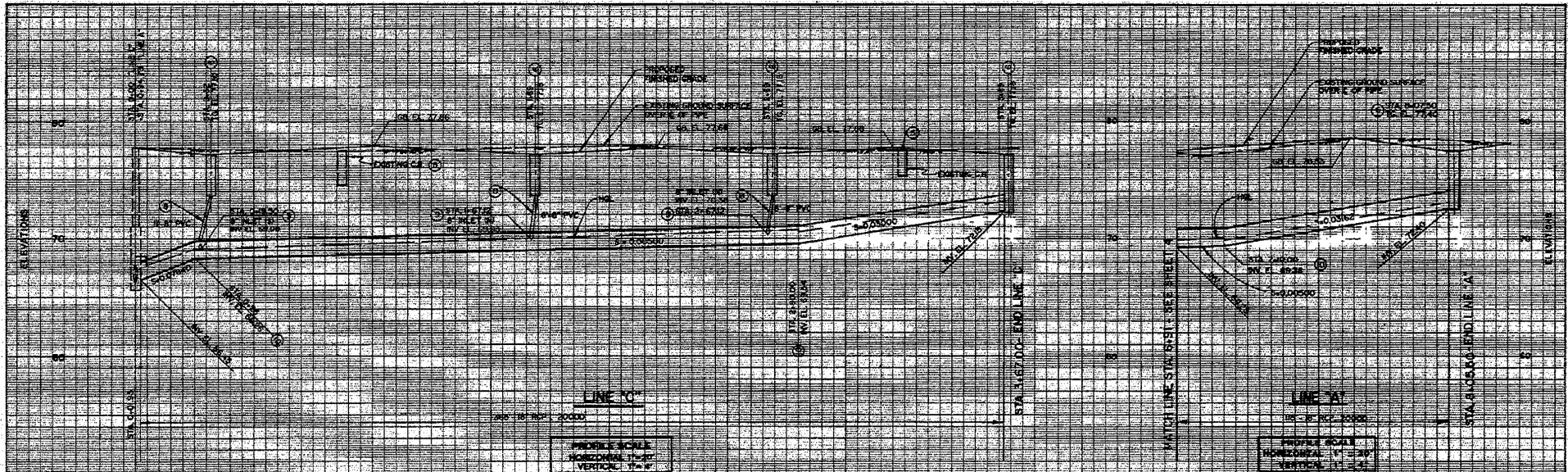
3 SHEET OF **7**
PLAN NUMBER
95-04.3



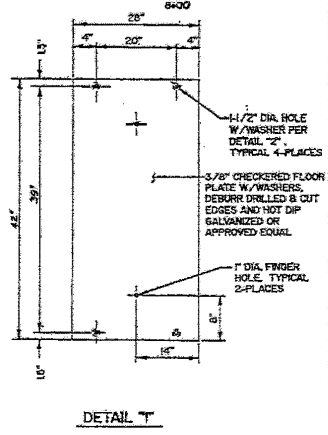
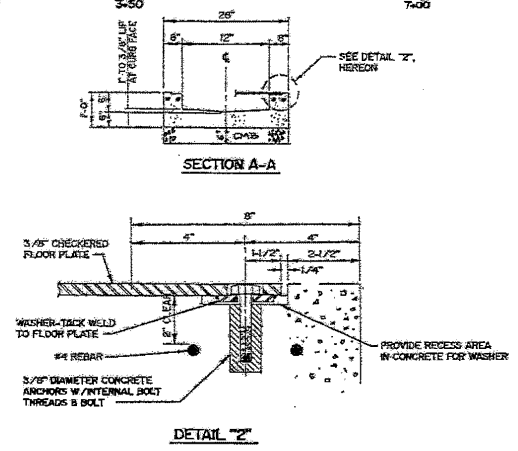
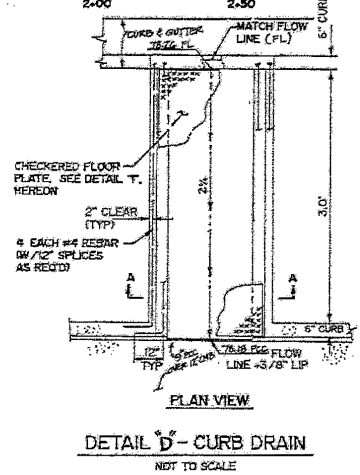
CONSTRUCTION NOTES		BID ITEM
5	REMOVE AND DISPOSE OF EXISTING CATCH BASIN.	10
6	CONSTRUCT CATCH BASIN WITH REBAR REINFORCEMENT PER APWA STANDARD PLANS 332-1, 308-1, 308-2, 311-0 AND 332-1 WITH 2-GRADES. REFERENCE DETAIL 'B', SHEET 3.	3
7	DELETED	
8	CONSTRUCT 8-INCH DIAMETER PVC (SDR-35), INSTALL ADAPTER FLANGE PER DETAIL 'B', SHEET 3.	7
9	CONSTRUCT JUNCTION STRUCTURE PER APWA STANDARD PLAN 332-0, CASE 1. SEE DETAIL 'C', SHEET 4.	4
10	CONSTRUCT MANHOLE PER APWA STANDARD PLAN 321-1.	2



DETAIL "C" - TYPICAL JUNCTION STRUCTURE NO.332-0
NOT TO SCALE

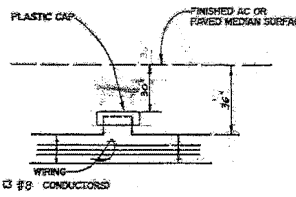
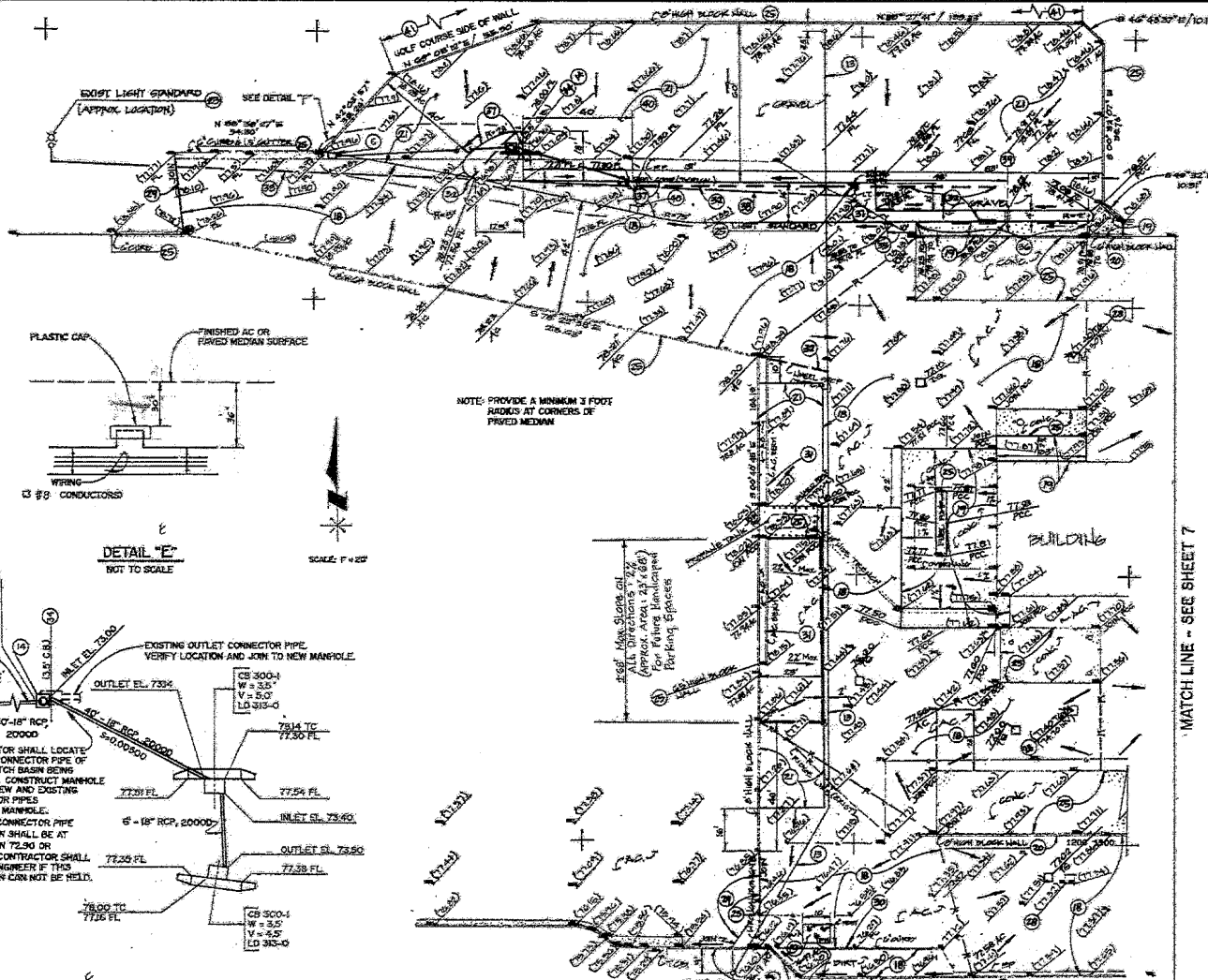
PREPARED BY 794 AVENUE 200		CORPORATION YARD STORM DRAIN AND PAVING PROJECT PROFILE SHEET LINE "B"	4 OF 7 PLAN NUMBER 95-04.4
		CITY OF COSTA MESA	



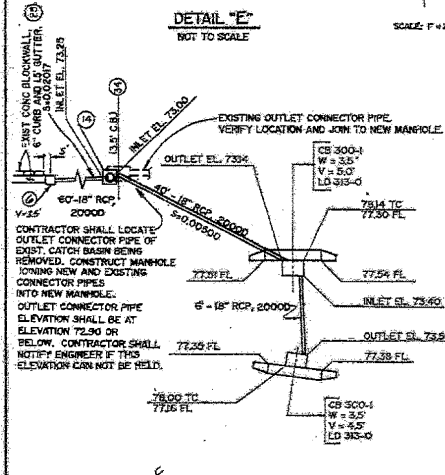
CONSTRUCTION NOTES	BID ITEM
⑤ REMOVE AND DISPOSE OF EXISTING CATCH BASIN.	3D
⑥ CONSTRUCT CATCH BASIN WITH REBAR REINFORCEMENT PER APWA STANDARD PLANS 305-1, 305-0, 309-0, 311-0 AND 335-1 WITH 2 GRATES. REFERENCE DETAIL 'D', SHEET 3.	3
⑦ DELETED	
⑧ CONSTRUCT 6-INCH DIAMETER PVC (SDR-35). INSTALL ADAPTER FLANGE PER DETAIL 'D', SHEET 3.	7
⑨ CONSTRUCT JUNCTION STRUCTURE PER APWA STANDARD PLAN 322-0, CASE 1. SEE DETAIL 'C', SHEET 4.	4
⑩ CONSTRUCT CONCRETE COLLAR PER APWA STANDARD PLAN 380-0.	5
⑪ CONSTRUCT MANHOLE PER APWA STANDARD PLAN 321-0.	2



PREPARED BY  1381 Cliff Street, P.O. Box 3020 Newport Beach, California 92659-0200 714/478-2288	 Frank J. Lee P. E.	CORPORATION YARD STORM DRAIN AND PAVING PROJECT	5 SHEET OF 7
		PROFILE SHEET LINE 'C'	PLAN NUMBER 45-045
CITY OF COSTA MESA			



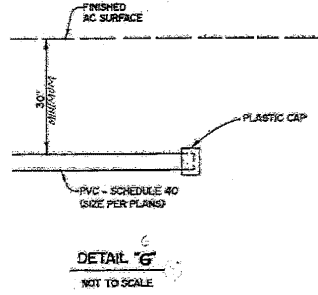
DETAIL "E"
NOT TO SCALE



DETAIL "F" - CATCH BASIN CONNECTOR PIPE ALIGNMENT
NOT TO SCALE

CONSTRUCTION NOTES	REQ. ITEM
1. CONSTRUCT CATCH BASIN WITH REBAR REINFORCEMENT PER APWA STANDARD PLAN 504 - 304, 304-1, 314 AND 304-1 WITH 2-04476. REFERENCED DETAIL "E", SHEET 5.	3
2. REMOVE INTERFERING PORTION OF ABANDONED WATERLINE AND FLOOD END.	1
3. CONSTRUCT 3" DIA. PVC - SCHEDULE 40 CAP END PER DETAIL "E" SHEET 6.	15
4. CONSTRUCT MANHOLE PER APWA STANDARD PLAN 504-0	2
5. REMOVE EXISTING PARKING LOT SECTION (INCLUDING PCD/CURB); CONSTRUCT 2" AC WITH REBAR/AGC/GRASSGRADE FABRIC.	11,12, 12,14
6. REMOVE EXISTING SECTION AND CONSTRUCT 12" PCD/12" CURB.	17
7. REMOVE EXISTING CONCRETE BLOCK WALL AND FOOTING.	15
8. REMOVE EXISTING SECTION AND CONSTRUCT 2" AC WITH R/LA CURB 2' AC OVER 2" MILLED AC (BEING STORED IN CORPORATION YARD)	11,12, 12,24
9. PROTECT IN PLACE.	VARIOUS
10. TO BE REMOVED PER STORM DRAIN PLANS (TOP)	10
11. SAWCUT EXISTING ASPHALT.	12,13
12. REMOVE EXISTING CURB.	12,13
13. REMOVE EXISTING R.C. BERM.	VARIOUS
14. SALVAGE EXISTING WHEEL STOPS AND STORE AT LOCATIONS DIRECTED BY ENGINEER.	VARIOUS
15. REMOVE EXISTING CATCH BASIN, CURB AND GUTTER; PROTECT AND MAINTAIN EXISTING CONNECTOR PIPES.	10
16. CONSTRUCT 12" TRANSITION FROM PCD PAD TO TYPE "C" CURB.	25
17. CONSTRUCT TYPE "B" CURB PER CITY OF COSTA MESA STD PLAN 311.	27
18. CONSTRUCT MEDIAN WITH TYPE "C" CURB AND GUTTER PER CITY OF COSTA MESA STD PLANS 311 AND PATTERN-EQUIPPED MEDIAN PAVING PER ORANGE COUNTY ENVIRONMENTAL MANAGEMENT AGENCY STD PLAN 1827.	23,28
19. CONSTRUCT 2" PVC ELEC. CONDUIT. CONTRACTOR SHALL CONFIRM WIRING REQUIREMENTS WITH ENGINEER PRIOR TO CONSTRUCTION. INSTALL TEE AND PLASTIC CAP PER DETAIL "E", SHEET 6. THE EXACT LOCATION OF THE TEE SHALL BE CONFIRMED WITH THE ENGINEER PRIOR TO CONSTRUCTION.	22
20. CONSTRUCT 1" CURB DRAIN PER DETAIL "D", SHT 5	22
21. CONSTRUCT CATCH BASIN PER APWA STD PLAN 504-1, WALL - SEE DETAIL "F", SHEET 6 FOR CONNECTOR PIPE ALIGNMENT AND CATCH BASIN V-DEPTH. CONSTRUCT LOCAL DEPRESSION PER APWA STD PLAN 514, CASE "C".	6
22. CONSTRUCT 60" COURSE SETTING, POSTS AND APPURTENANCES. ALIGNMENT TO BE CONFIRMED WITH ENGINEER.	23

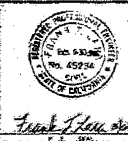
- GENERAL NOTES
1. BEST STORM DRAIN PLANS FOR UTILITIES.
 2. NEW ASPHALT CONCRETE FINISHED SURFACE SHALL BE 1/4" BELOW PCC FLOORING UNLESS OTHERWISE NOTED.
 3. DO NOT DISTURB EXISTING BUILDING FOUNDATION DURING CONSTRUCTION.
 4. ALL EXISTING MANHOLE, VALVE AND PULLING COVERS SHALL BE ADJUSTED TO MEET FINISHED GRADE.



DETAIL "G"
NOT TO SCALE

MATCH LINE - SEE SHEET 7

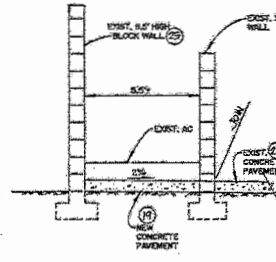
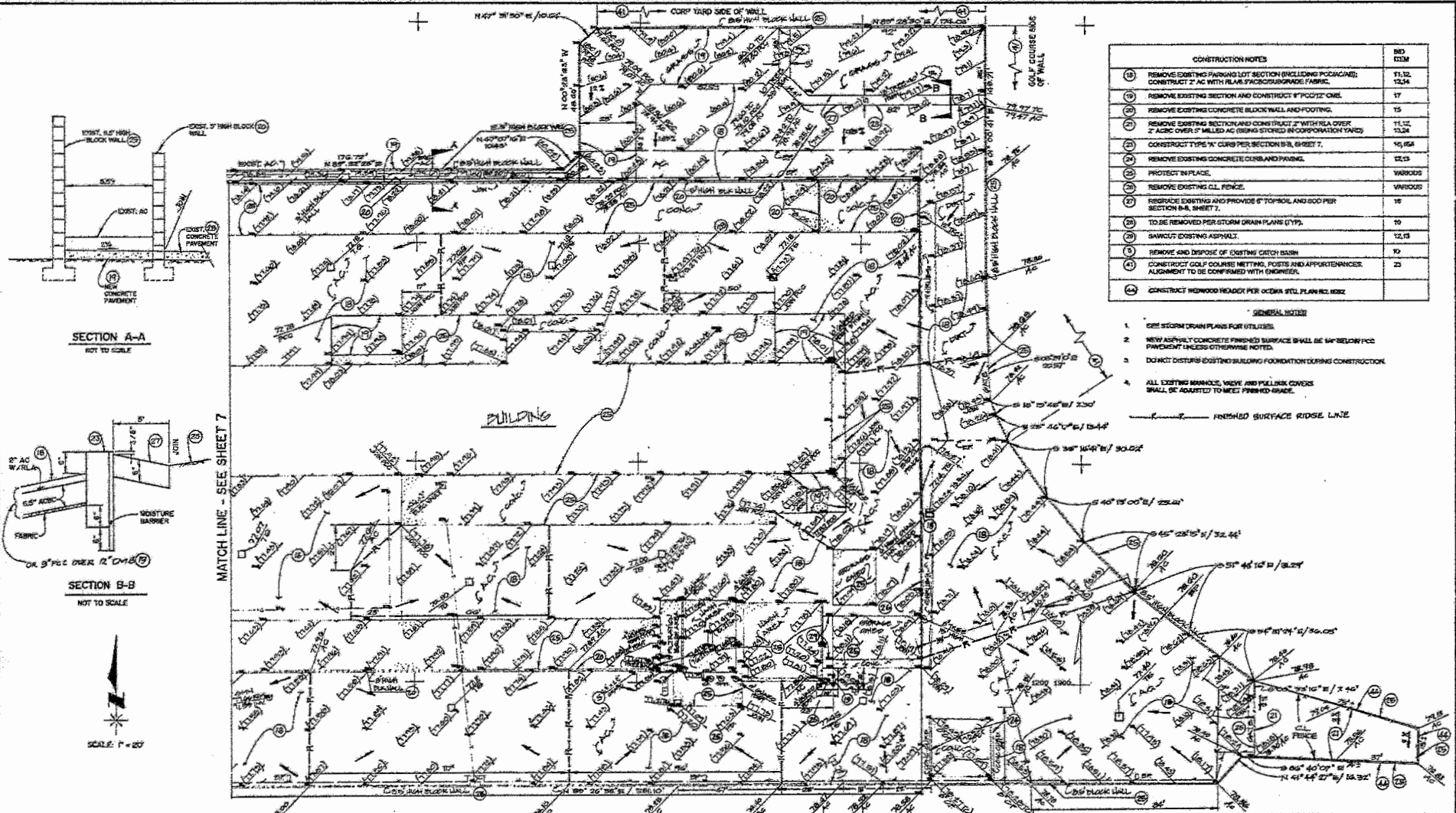
PREPARED BY
BOYLE ENGINEERING
1201 Chief Street, P.O. Box 200
Menlo Park, California 94025-0200
764 / 476-2200



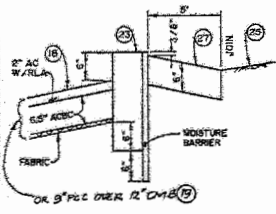
CORPORATION YARD STORM DRAIN AND PAVING PROJECT
GRADING, PAVING AND MISCELLANEOUS IMPROVEMENTS

CITY OF COSTA MESA

6 SHEET OF 7
PLAN NUMBER
95-04.6



SECTION A-A
NOT TO SCALE



SECTION B-B
NOT TO SCALE

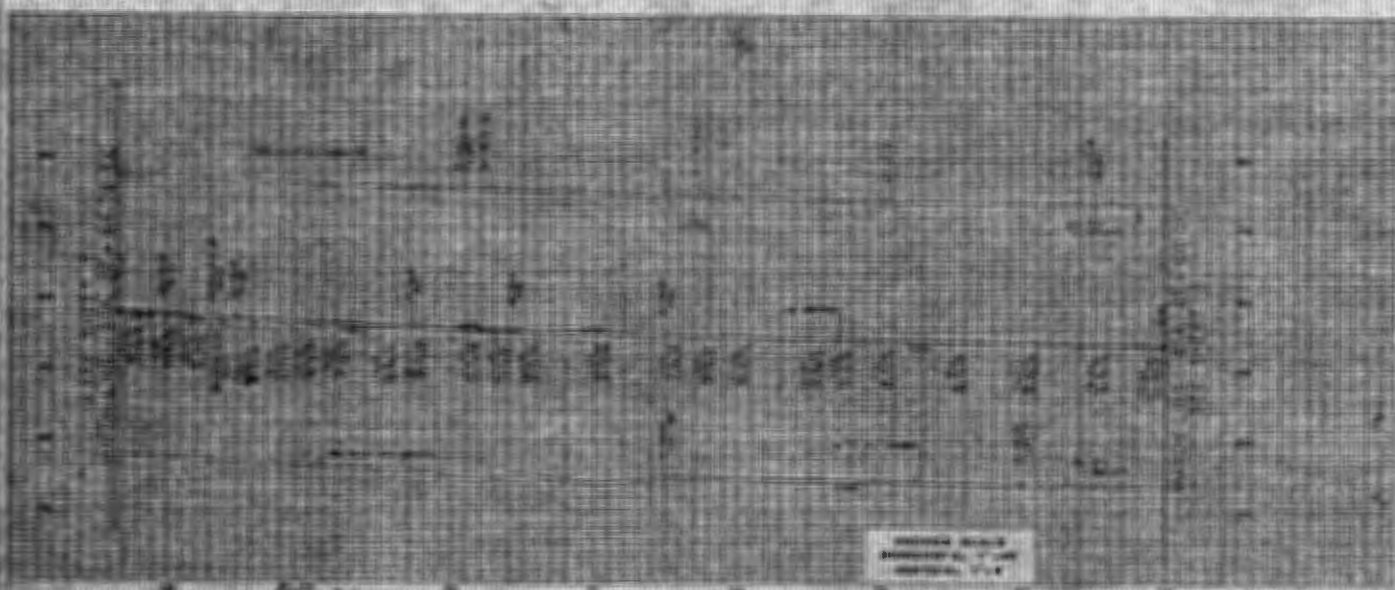


CONSTRUCTION NOTES		NO	DATE
(18)	REMOVE EXISTING PARKING LOT SECTION (INCLUDING POCAGRADE); CONSTRUCT 2\"/>	11.12	13.14
(19)	REMOVE EXISTING SECTION AND CONSTRUCT 4\"/>	17	
(20)	REMOVE EXISTING CONCRETE BLOCKWALL AND FOOTING.	15	
(21)	REMOVE EXISTING SECTION AND CONSTRUCT 2\"/>	11.12	13.14
(22)	2\"/>	16.16A	
(23)	CONSTRUCT TYPE 'A' CURB PER SECTION B-B, SHEET 7.	12.13	
(24)	REMOVE EXISTING CONCRETE CURBS AND PAVING.	12.13	
(25)	PROTECT IN PLACE.	VARIOUS	
(26)	RESHOPE EXISTING C.L. FENCE.	VARIOUS	
(27)	RESHOPE EXISTING AND PROVIDE 6\"/>	16	
(28)	TO BE REMOVED PER STORM DRAIN PLANS (TYP).	10	
(29)	REMOVE EXISTING ASPHALT.	12.13	
(30)	REMOVE AND DISPOSE OF EXISTING CATCH BASIN.	10	
(31)	CONSTRUCT GOLF COURSE NETTING, POSTS AND APPEARANCE RAIL. ALIGNMENT TO BE CONFIRMED WITH ENGINEER.	23	
(32)	CONSTRUCT REDWOOD HEADQUARTERS PER OCEANA STD. PLAN RLSBZ.		

- GENERAL NOTES:
- SEE STORM DRAIN PLANS FOR UTILITIES.
 - NEW ASPHALT CONCRETE FINISHED SURFACE SHALL BE 1/2\"/>
 - DO NOT DISTURB EXISTING BUILDING FOUNDATION DURING CONSTRUCTION.
 - ALL EXISTING MANHOLES, VENTS AND PULLBOX COVERS SHALL BE ADJUSTED TO MEET FINISHED GRADE.
- FRESHED SURFACE RIDGE LINE

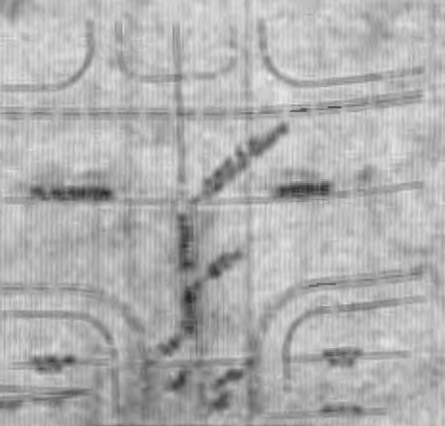
PREPARED BY BOYLE CONSTRUCTION CORPORATION 1551 Central Street, P.O. Box 2025 Newport Beach, California 92660-2025 714/475-2200		CORPORATION YARD STORM DRAIN AND PAVING PROJECT	7 SHEET OF 7
		GRADING, PAVING AND MISCELLANEOUS IMPROVEMENTS	PLAN NUMBER 95-04.7
		CITY OF COSTA MESA	

PLACENTIA AVENUE
CITY OF COSTA MESA



GENERAL NOTES
1. THE CITY ENGINEER HAS REVIEWED THIS PLAN AND APPROVES IT FOR THE CITY OF COSTA MESA.

GENERAL NOTES
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10. THE CITY ENGINEER HAS REVIEWED THIS PLAN AND APPROVES IT FOR THE CITY OF COSTA MESA.



INTERSECTION DETAIL

FOR THE
CITY OF COSTA MESA
BY
[Signature]

DATE: 12-15-11

NO.	DATE	DESCRIPTION
1	12-15-11	ISSUED FOR PERMITS



PLACENTIA AVENUE
CITY OF COSTA MESA
CITY OF COSTA MESA

12-15-11
12-15-11

RECONSTRUCTION AND IMPROVEMENTS of PARKING LOT for FIRE STATION NO. 4

CONSTRUCTION NOTES & QUANTITY ESTIMATES

NO.	DESCRIPTION	QTY.	UNIT
1	REMOVE EXISTING A.C. (REPAIRS OF A.C. ALSO EXCLUDED UNLESS INDICATED OTHERWISE) SEE SHEET NO. 5 FOR NEW SECTION TO BE CONSTRUCTED	18400.00	SF
2	REMOVE EXISTING A.C./P.C. CURB	720.00	LF
3	REMOVE EXISTING P.C. SLAB AND CONSTRUCT NEW P.C. SLAB PER DETAIL "D" SHEET NO. 4 OF 6	30.00	SF
4	REMOVE EXISTING P.C. DRIVE APPROACH AND A.C. PAVEMENT CONCRETE AND DRIVE APPROACH WITH P.C. DRIVE & C.A.B. PROTECTIVE WITH CURB AND TO CURB AND GRADES AS SHOWN ON PLANS AND CITY STD. NO. 100	46.00	SF
5	CONSTRUCT SIGNALS PER STANDARD AS WITH TRIPLE DRIVE RAMP PER CITY STD. NO. 100	18.00	SETS
6	REMOVE EXISTING 6" CHAIN LINK FENCE AND INSTALL NEW 6" CHAIN LINK FENCE	800.00	LF
7	CONSTRUCT P.C. "Y" BUTTER PER DETAIL "E" ON SHEET NO. 4 OF 6	80.00	SF
8	FILL WITH CLEAN GRANULATED SOIL FROM SITE	30.00	CY
9	REMOVE EXISTING DRAIN MANHOLE AND DEMOLISH CLEAN OUT TO FINISHED GRADE - REPLACE WITH CLEAN OUT PER DETAIL "F" ON SHEET NO. 4 OF 6	1.00	NO.
10	CONSTRUCT 4" A.C. OVER 6" C.A.B. FOR DRIVE APPROACH WITH P.C. DRIVE APPROACH PER DETAIL "G" ON SHEET NO. 4 OF 6	180.00	SF
11	CONSTRUCT TYPE "C" CURB AND GUTTER PER CITY OF COSTA MESA STANDARD DRAWING NO. 310	100.00	LF
12	CONSTRUCT TYPE "B" CURB PER CITY OF COSTA MESA STANDARD DRAWING NO. 310	100.00	LF
13	RELOCATE EXISTING CITY SIGNAL MANHOLE TO NEW LOCATION AS DIRECTED BY THE ENGINEER	1.00	NO.
14	RELOCATE EXISTING SIGNAL CONTROL WIRE BOX TO NEW LOCATION AS DIRECTED BY THE ENGINEER	1.00	NO.
15	RELOCATE EXISTING SIGNAL WIRE TO NEW LOCATION AS DIRECTED BY THE ENGINEER (PER STANDARD DRAWING NO. 310)	100.00	LF
16	REMOVE DRAINLET-BACKFILL WITH C.B.	200.00	SF
17	CUT & PLUG EXISTING DRAIN PIPE (SEE SECTION ON SHEET NO. 4)	3.00	NO.
18	EXCAVATE AND REMOVE EXISTING DRAIN PIPE AND BACKFILL WITH C.B.	700.00	SF
19	CUT HOLE IN EXIST. MAN. AND CONNECT PIPE PER L.A.C.G. STD. DWG. NO. 3-DWG 4 SECTION 2.01	1.00	NO.
20	CONSTRUCT 4" A.C. OVER 6" C.A.B. FOR DRIVE APPROACH WITH P.C. DRIVE APPROACH PER DETAIL "G" ON SHEET NO. 4 OF 6	180.00	SF
21	CONSTRUCT 12" (3000) R.C.P.	16.00	LF
22	CONSTRUCT 18" (4500) R.C.P.	10.00	LF
23	SAWCUT AND REMOVE EXIST. P.C. CONCRETE WASH RACK PER DETAIL "V" SHEET NO. 4	1.00	NO.
24	INSTALL 4" P.C. CLASS 100 A.W.W. C. 400. 8" P.C. PER DETAIL "V" SHEET NO. 4	200.00	LF
25	INSTALL FIRE HYDRANT PER M.C.W.D. STANDARD DRAWING NO. 4	3.00	NO.
26	INSTALL 4" R.T.X. FLD" TR	3.00	NO.
27	CONSTRUCT 7" FOOT HIGH REINFORCED CONCRETE WALL PER DETAIL "W" ON SHEET NO. 4	4.00	NO.
28	INSTALL THRUST BLOCK PER M.C.W.D. STD. DWG. NO. 12	1.00	NO.
29	INSTALL 2" SERVICE LINE TO NEW WASH RACK PER M.C.W.D. STD. DWG. NO. 2 (NO METER) COPPER PER (ENCL. LIT. AT PROJECT LOC. UNDER CONTRACT)	100.00	LF
30	CONNECT 1.5" 15' 6" WATER LINE AS NECESSARY TO TAKE TO UNKNOWN	3.00	NO.
31	INSTALL 6" 90° RT ELL	3.00	NO.
32	INSTALL 6" F.L.G. 90° BUTTERFLY VALVE	6.00	NO.
33	REMOVE AND DEMOLISH EXIST. FIRE HYDRANT	1.00	NO.
34	INSTALL 4" P.C. PIPE FOR DRAIN LINE FROM WASH RACK PER DETAIL "V" SHEET NO. 4	20.00	LF
35	SAWCUT, REMOVE EXIST. P.C. RECONSTRUCT OVER 6" C.A.B. AND PLACE REINFORCED STEEL BARS PER DETAIL "X" ON SHEET NO. 4	100.00	SF
36	LOCATE EXIST. 1.5" 15' 6" WATER LINE, REMOVE, SAWCUT AND REMOVE P.C. REMOVE EXIST. 1.5" 15' 6" WATER LINE AND INSTALL NEW 1.5" 15' 6" WATER LINE AND CONNECT TO EXIST. WATER LINE AND CONNECT TO NEW MANHOLE STD. DWG. NO. 2 (NO METER)	1.50	NO.
37	RELOCATE SIGNAL POLE AND DEMOLISH TO LOCATION AS SHOWN	2.00	NO.
38	RELOCATE SIGNAL POLES TO NEW LOCATION, UP TO BE RATED TO 15' FT. OF WIREHOLE RAMP - ONE TO BE BASE OF POLE	2.00	NO.
39	ESTABLISH CONDUIT RUNS TO NEW POLE LOCATIONS (12")	25.00	LF
40	PULL ALL WIRE FROM SIGNAL POLES FROM SIGNAL CONTROLLER TO SIGNAL POLES EXCEPT INTERCONNECT	2000.00	LF
41	REPLACE 5.0" 60' 30" QUADRANGLE LOOP	1.00	NO.



STRUCTURAL NOTES

- Clearance from top of concrete to steel shall be two inches unless otherwise shown.
- All bar bends and hooks shall conform to the American Concrete Institute's "Building Code Requirements for Reinforced Concrete" Section 901.
- Placing of reinforcement shall conform to the American Concrete Institute's "Building Code Requirements for Reinforced Concrete" Section 901.
- Reinforcement shall be placed within 20 inches of member or junction structure opening.
- The reinforcing steel shall extend two inches from the concrete surface unless otherwise shown on the structural details.
- Reinforcing steel shall be rounded or lapped (L).
- Longitudinal steel shall be lapped 20 bar diameters at splices. Transverse steel shall be lapped 30 bar diameters at splices unless otherwise shown.
- No splices in steel reinforcement will be permitted other than shown on the drawing without approval of the Engineer.

CONSTRUCTION NOTES & QUANTITY ESTIMATES

NO.	DESCRIPTION	QTY.	UNIT
1	CONSTRUCT 10" REINFORCED CONCRETE OVER 6" C.A.B. PER DETAIL ON SHEET NO. 5	180.00	SF
2	CONSTRUCT 12" A.C. OVER 6" C.A.B. FOR DRIVE APPROACH WITH P.C. DRIVE APPROACH PER DETAIL "G" ON SHEET NO. 4 OF 6	180.00	SF
3	CONSTRUCT 8" REINFORCED CONCRETE OVER 6" C.A.B. PER DETAIL ON SHEET NO. 5	100.00	SF
4	CONSTRUCT 2" A.C. OVER 6" C.A.B. TRANSITION TO SHEET NO. 6 (P.C. WASH RACK & 8" P.C. OVER 6" C.A.B.)	100.00	SF
5	CONSTRUCT 7" FOOT HIGH REINFORCED CONCRETE WALL PER DETAIL "W" ON SHEET NO. 4	4.00	NO.
6	SAWCUT AND REMOVE EXIST. P.C. OVER 6" C.A.B. PER CITY OF COSTA MESA STD. DWG. NO. 310	1.00	NO.

87-61

NO.	DATE	DESCRIPTION	BY
1	10/15/01	ISSUED FOR PERMITS	JM
2	10/15/01	ISSUED FOR PERMITS	JM
3	10/15/01	ISSUED FOR PERMITS	JM
4	10/15/01	ISSUED FOR PERMITS	JM
5	10/15/01	ISSUED FOR PERMITS	JM

REFERENCES		DESIGNED BY		CHECKED BY	
REVISION	DATE	NAME	DATE	NAME	DATE
1	10/15/01	JM	10/15/01	JM	10/15/01
2	10/15/01	JM	10/15/01	JM	10/15/01
3	10/15/01	JM	10/15/01	JM	10/15/01
4	10/15/01	JM	10/15/01	JM	10/15/01
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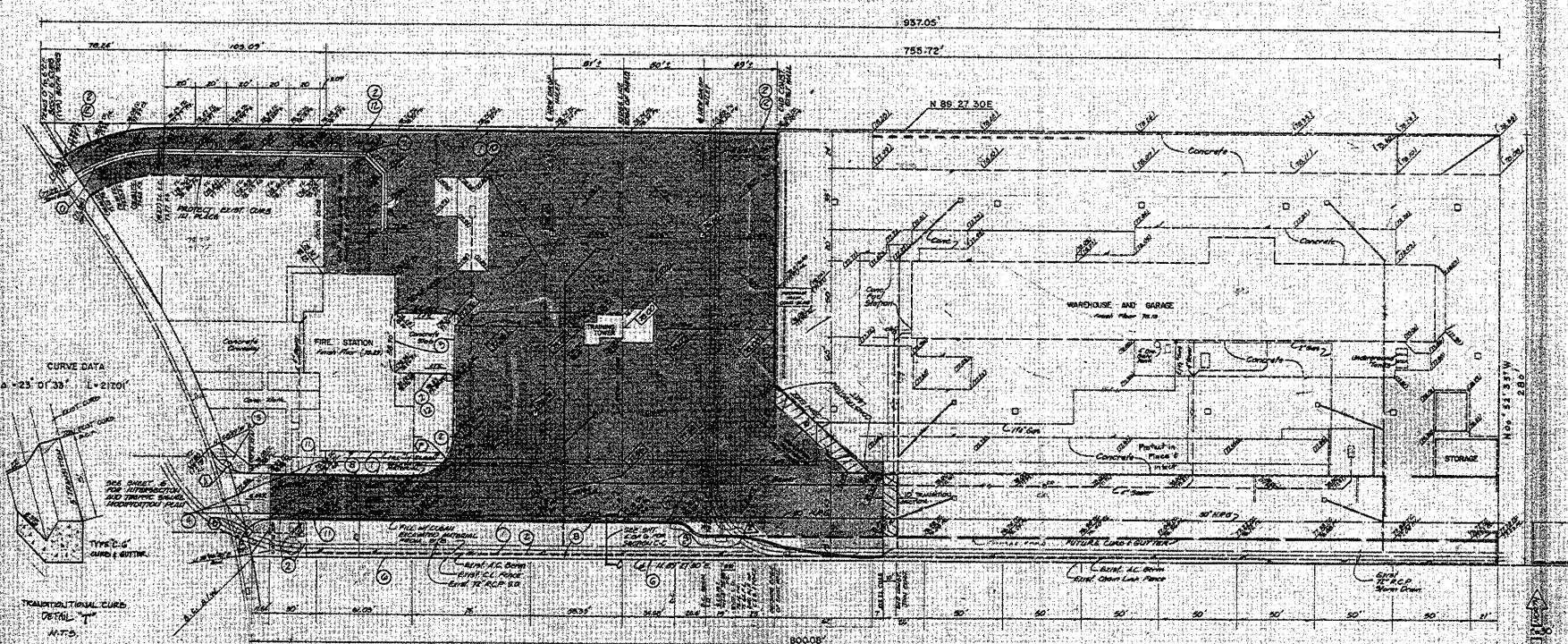
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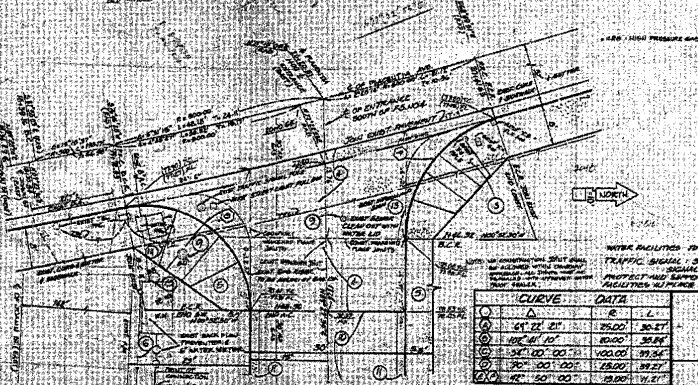
SHEET OF 6

PLAN NUMBER 87-61

CITY OF COSTA MESA
DEPARTMENT OF PUBLIC SERVICES / ENGINEERING DIVISION



NO.	DESCRIPTION	QTY	UNIT	CONTINUED
1	REMOVE EXISTING A.C. (SEE GENERAL NOTE 1)	50	SQ. YD.	RELOCATE EXISTING RADIUM FREQUENCY TO NEW LOCATION AS DESIGNATED BY THE SUBMITTER.
2	REMOVE EXISTING A.C./E.C. CURB	1	LINEAL FOOT	
3	REMOVE EXISTING A.C. SLABS AND CONCRETE CURB (SEE SUBSHEET 50) SHEET 100	2	SQ. YD.	
4	REMOVE EXISTING A.C. DRIVE APPROACH AND A.C. PAVEMENT. CONSTRUCT MAIN DRIVE APPROACH WITH 4" TOP 2" CURB & 4" A.C. (SEE GENERAL NOTE 1) AND TO LINES AND GARAGES (SEE GENERAL NOTE 1)	3	SQ. YD.	
5	CONSTR. SIDE WALK PERIM. STD. 48" W/ WHEELCHAIR RAMP PER ADA TO 1/4" SLOPE	4	LINEAL FOOT	
6	REMOVE EXISTING 4" FT. CHAIN LINK FENCE AND METAL W/ 4" FENCE	5	LINEAL FOOT	
7	CONSTR. 4" FT. CHAIN LINK FENCE ON SHEET 100	7	LINEAL FOOT	
8	FILL WITH CLEAN EXCAVATED SOIL FROM SITE	93	CY	
9	REMOVE EXISTING 2" THICK DRIVE W/ WALK AND 2 1/2" W/ WALK	2	SQ. YD.	
10	CONSTRUCT 4" A.C. OVER 4" C.C.	4	SQ. YD.	
11	CONSTRUCT TYPE "C" CURB AND BUTTER PER CITY STANDARD (1/4" SLOPE)	1	LINEAL FOOT	
12	CONSTRUCT TYPE "S" CURB PER CITY STANDARD (1/4" SLOPE)	1	LINEAL FOOT	
13	RELOCATE 1/4" CITY STANDARD SIGN TO NEW POSITION AS DESIGNATED BY THE SUBMITTER.	1	NO.	
14	RELOCATE 1/4" CITY STANDARD SIGN TO NEW POSITION AS DESIGNATED BY THE SUBMITTER.	1	NO.	



- GENERAL NOTES**
- REMOVAL OF A.C. ALSO INCLUDES REMOVAL OF ALL EXISTING CURBS, BARRIERS AND STRUCTURAL SECTIONS TO 10" BELOW FINISHED GRADE.
 - NEW STRUCTURAL SECTIONS SHALL BE CONSTRUCTED IN ALL AREAS AS SHOWN BY THE FOLLOWING LEGEND.
 - ELEVATIONS SHOWN IN NOTES ARE VERT. CONTROL FOR NEW FINISHED SURFACE ELEVATIONS.
 - PROTECT AND SUPPORT IN PLACE AND MAINTAIN ALL EXIST. UTILITIES NOT DESIGNATED TO BE REMOVED.
 - PROTECT AND SUPPORT IN PLACE AND MAINTAIN ALL EXIST. IMPROVEMENTS NOT DESIGNATED TO BE REMOVED.

NO.	Δ	R	L
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2	25° 01' 33"	217.01'	217.01'
3	25° 01' 33"	217.01'	217.01'
4	25° 01' 33"	217.01'	217.01'

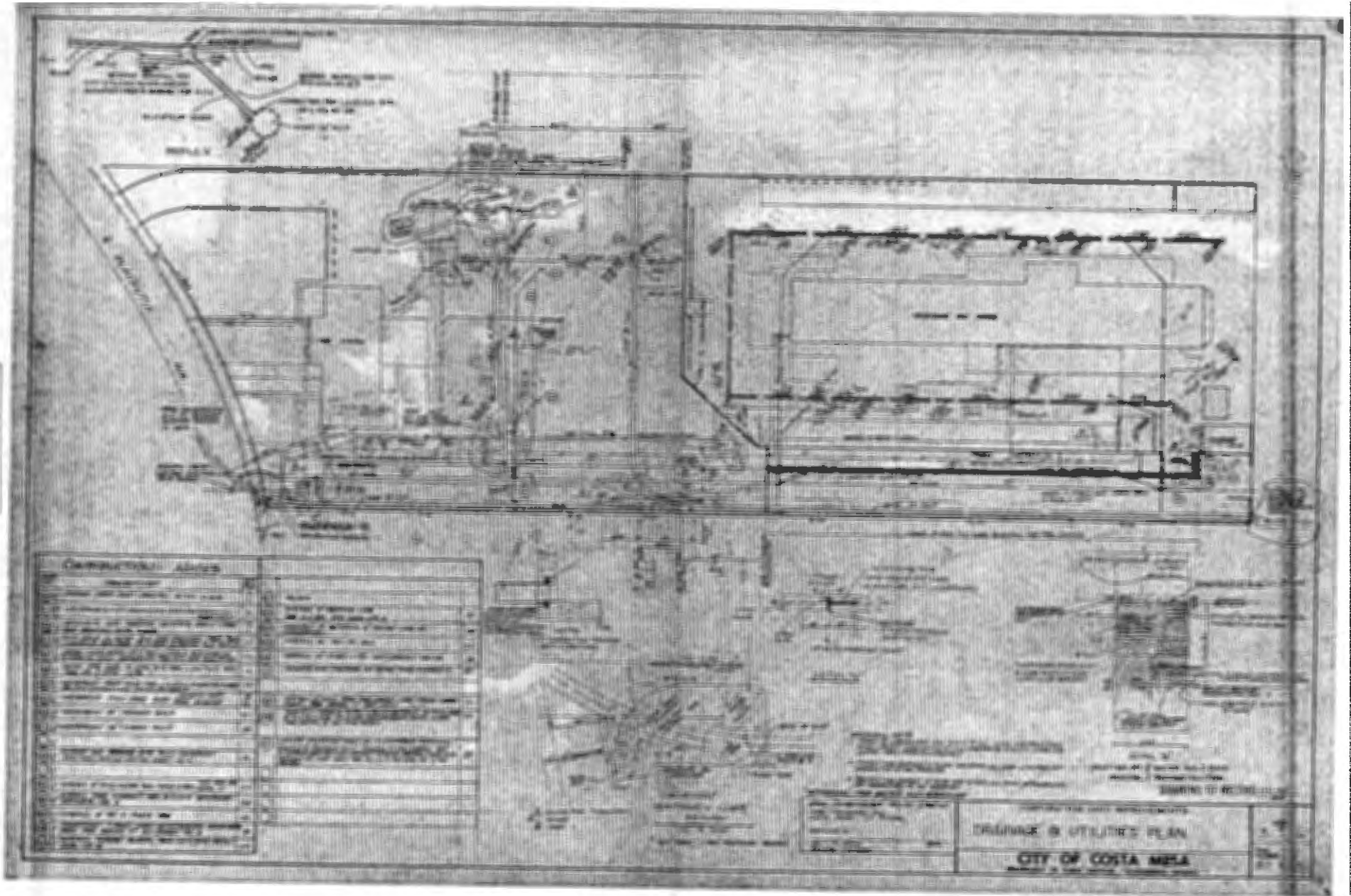
DRAWING OF RECORD

CORPORATION YARD IMPROVEMENTS
GRADING PLAN

CITY OF COSTA MESA
DEPARTMENT OF PUBLIC SERVICES / ENGINEERING DIVISION

2 OF 6
87-6.2

07-01 1960



CONSTRUCTION AIDS	
1. ALL UTILITIES TO BE SHOWN AT 12" = 1' UNLESS OTHERWISE NOTED.	
2. ALL UTILITIES TO BE SHOWN AT 12" = 1' UNLESS OTHERWISE NOTED.	
3. ALL UTILITIES TO BE SHOWN AT 12" = 1' UNLESS OTHERWISE NOTED.	
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18. ALL UTILITIES TO BE SHOWN AT 12" = 1' UNLESS OTHERWISE NOTED.	
19. ALL UTILITIES TO BE SHOWN AT 12" = 1' UNLESS OTHERWISE NOTED.	
20. ALL UTILITIES TO BE SHOWN AT 12" = 1' UNLESS OTHERWISE NOTED.	

DRAINAGE & UTILITY PLAN
CITY OF COSTA MESA
DATE: 07-01-1960
DRAWN BY: [Name]

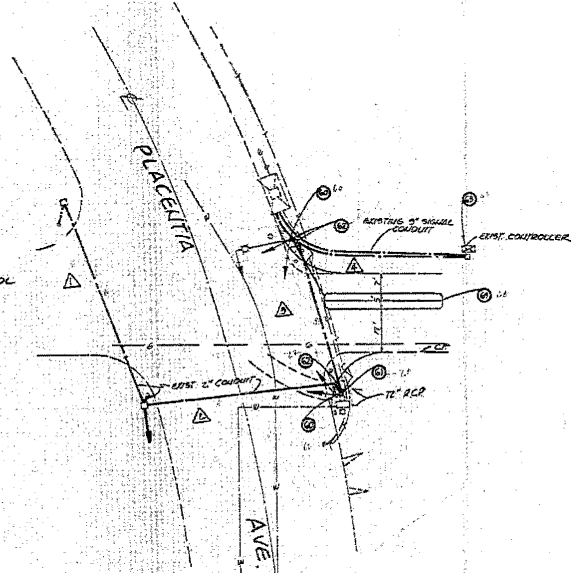
CONDUCTOR SCHEDULE				
CIRCUIT	SIGNAL NUMBER			
	2"	2"	2"	3"
2	3	3	3	6
4	3	3	3	6
2p	2	2	2	2
4p	2	2	2	2
PPB 2	1	1	1	1
PPB 4	1	1	1	1
SIGNALS	3	3	3	6
INTERCONNECT	-	3	3	3
TOTAL #14	15	15	15	27
#8 Conductors	-	2	2	2
#12 PPB Conn.	1	1	1	2
TOTAL #12	1	3	3	6
LUNARINGS	-	2	2	2
SIGNAL Conn.	1	1	1	2
TOTAL #10	1	3	3	6
Grand Tot.	17	26	26	39

#8-12 SPECIAL 2-CONDUCTOR CABLE

CONSTRUCTION NOTES & QUALITY ESTIMATE

- 32. (C) RELOCATE SIGNAL POLE AND BASE TO NEW LOCATION. 2 EG.
- 32. (A) RELOCATE SIGNAL PULLBOOTS TO NEW LOCATIONS, NOT TO BE WITHIN ONE (1) FOOT OF WAREHOUSE WALKS. ONLY PULLBOOTS IN AREA OF POLE RELOCATIONS. 1 EG.
- 32. (C) STRIP CONDUIT RUNS TO NEW POLE LOCATIONS. 2' x 25 LF.
- 32. (A) PULL ALL NEW #14 SIGNAL WIRE FROM SIGNAL CONTROLLERS TO SIGNAL POLES EXCEPT INTERCONNECT. 9,000 LF.
- 32. (A) REPLACE 5' x 50' QUADRUPLE LOOP. 1 EG.

ESTABLISH HIGH SCHOOL SOUTH ENTRANCE



GENERAL NOTES

1. TRAFFIC SIGNAL AND HIGHWAY LIGHTING CONSTRUCTION SHALL CONFORM TO STATE OF CALIFORNIA STANDARD SPECIFICATIONS SECTION ON AND STANDARD PLANS (JULY 66) AND SPECIAL PROVISIONS.
2. THE TRAFFIC ENGINEER FOR THE CITY OF COSTA MESA SHALL APPROVE POLE AND DETECTOR LOCATIONS PRIOR TO INSTALLATION BY THE CONTRACTOR.
3. THE TRAFFIC SIGNAL SHALL ONLY BE TURNED OFF DURING THE ACTUAL WORKING OF THE POLE TO BE RELOCATED AND MUST BE TURNED BACK ON AFTER EACH DAILY WORKING HOURS.
4. EXCAVATION SHALL NOT BE LEFT BARRICADED FOR LONGER THAN THREE (3) WORKING DAYS. EXCAVATIONS SHALL BE FILLED TO PROVIDE A WALKABLE SURFACE TO PEDESTRIAN TRAFFIC.

SCALE: 1" = 20'

DRAWING OF RECORD 4-12-88

REVISIONS		CONTRACTOR	REFERENCES		DESIGNED BY	DATE	CHECKED BY	DATE
NO.	DATE	DESCRIPTION	APPROVED	REVISIONS	CD			
				WORK STOPPED	CD			
				WORK RESUMED	CD			
				WORK TO BE	CD			
				REVISIONS	CD			

TRAFFIC SIGNAL RELOCATION PLAN FOR CORPORATION YARD (SOUTH ENTRANCE)

CITY OF COSTA MESA DEPARTMENT OF PUBLIC SERVICES / ENGINEERING DIVISION

SHEET OF 6
PLAN NUMBER 87-6.6

6 OF 6

EXHIBIT "G"

SOILS REPORT

APPENDIX 1

GEOTECHNICAL REPORT



**GEOTECHNICAL EXPLORATION
PROPOSED COSTA MESA FIRE TRAINING
TOWER PROJECT
COSTA MESA FIRE STATION NO. 4
2300 PLACENTIA AVENUE
COSTA MESA, ORANGE COUNTY, CALIFORNIA**

Prepared For **PBK ARCHITECTS**
8163 Rochester Avenue, Suite 100
Rancho Cucamonga, California 91730

Prepared By **LEIGHTON CONSULTING, INC.**
10532 Acacia Street, Suite B-6
Rancho Cucamonga, California 91730

Project No. 13893.001

June 6, 2023



Leighton Consulting, Inc.

A Leighton Group Company

June 6, 2023

Project No. 13893.001

PBK Architects
8163 Rochester Avenue, Suite 100
Rancho Cucamonga, California 91730

Attention: Mr. Kelley Needham, AIA
Principal

**Subject: Geotechnical Exploration
Proposed Costa Mesa Fire Training Tower Project
Costa Mesa Fire Station No. 4
2300 Placentia Avenue
Costa Mesa, Orange County, California**

In accordance with our April 18, 2023 proposal, Leighton Consulting, Inc. (Leighton) presents this draft geotechnical exploration in support of the proposed Fire Training Tower, to be constructed within the existing Costa Mesa Fire Station No. 4, located at 2300 Placentia Avenue in the City of Costa Mesa, Orange County, California. The purpose of our geotechnical exploration has been to evaluate geologic hazards and geotechnical conditions of the site with respect to the proposed improvements, and provide geotechnical recommendations for design of the proposed Fire Training Tower.

The site is not located within a currently designated Alquist-Priolo Earthquake Fault Zone and no known active faults have been mapped on or trending toward the site. Based on these, a subsurface study for surface fault rupture hazards for this project is not warranted. However, as is the case for most of southern California, strong ground shaking has and is anticipated to occur at this site. This project is located outside of a State-designated liquefaction hazard zone. Although the California Geological Society has estimated the historically highest groundwater level in the region to be about 30 feet below the surface, based on our borings for this exploration and nearby groundwater well data, current groundwater levels below the proposed improvements are expected to be deeper. Based on our observation made during drilling, encountered native site soils have been characterized primarily as very stiff to hard sandy clay and sandy silt, and

medium dense to very dense clayey sand and silty sand. Based on our analysis, the potential for liquefaction is not likely to occur at this site due to the relatively stiff and dense nature of encountered soils.

The proposed Fire Training Tower can be founded on post tensioned or stiffened footings bearing solely on a zone of newly excavated and recompacted fill soils derived from onsite soils, overlying undisturbed native soils. This report addresses these and other geotechnical aspects of the project.

We appreciate this opportunity to be of additional service to PBK Architects. If you have any questions or if we can be of further service, please contact us at your convenience at **866-LEIGHTON**, directly at the phone extensions or e-mail addresses listed below.

Respectfully submitted,

LEIGHTON CONSULTING, INC.



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AA/JAT/SGO/JDH/rsm
 Distribution: (1) addressee (via e-mail PDF)

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- Appendix B - Geotechnical Laboratory Testing
- Appendix C - Seismic
- Appendix D - General Earthwork and Grading Specifications for Rough Grading
- Appendix E - GBA’s Important Information About This Geotechnical-Engineering Report

1.0 INTRODUCTION

1.1 Site Location and Description

As depicted on Figure 1 - *Site Location Map*, the proposed Fire Training Tower project is located northeast of Placentia Avenue and Joann Street, within the existing approximately 2.4-acre Costa Mesa Fire Station No. 4 property located at 2300 Placentia Avenue in the City of Costa Mesa, Orange County, California. The Costa Mesa Fire Station No. 4 is bounded to the north and east by the Costa Mesa Corporation Yard and Costa Mesa Golf Course just beyond, Placentia Avenue to the west, and to the south by residential homes with Joann Street just beyond.

Based on our review of historical aerial imagery (NETR, 2023) the site appears to have been developed to its current general configuration sometime between 1963 and 1972. Prior to 1963, the project site was vacant and undeveloped.

1.2 Proposed Development

Based on the provided *Proposed Site Plan*, dated December 23, 2022, we understand that a prefabricated Training Tower is proposed to replace the existing 1,500-square-foot (SF) training tower centrally located within the overall existing fire station development. Preliminary site layouts depict an approximate 1,600-SF prefabricated Training Tower to be located within the same general area as the existing tower. Also planned is a separate approximately 870-SF restroom and shower building to the northwest corner of the site, a proposed approximately 150-SF above-ground Pump Building and underground recovery tank to the northeast corner of the site, and two solar panel carport areas to the south end of the site. Structural loading of the proposed foundations has not yet been provided to us. We assume the structures will be relatively lightly loaded.

1.3 Purpose and Scope of Exploration

The purpose of our exploration has been to: (1) evaluate geotechnical conditions of the site of the proposed Training Tower with respect to the proposed improvements, (2) identify significant geotechnical and geologic issues that would impact proposed improvements, and (3) provide preliminary geotechnical recommendations for design and construction of proposed building and associated improvements as currently planned. In accordance with our April 19, 2023 proposal, the scope of our exploration included the following:

- **Research:** We reviewed readily available geotechnical literature, reports, and aerial photographs relevant to this site. Pertinent geotechnical documents are referenced at the end of this report text.
- **Field Exploration:** On May 4, 2023, six (6) hollow-stem auger borings (LB-1 through LB-4, LI-1, and LI-2) were drilled with a truck-mounted drill rig, each logged and sampled to total depths ranging from approximately 15 feet to 51 feet below the existing ground surface (bgs). Encountered earth materials were logged in the field by our field representative and described in accordance with the Unified Soil Classification System (ASTM D2488). Relatively undisturbed soil samples were obtained at selected intervals within these borings using both a ring-lined Modified California split-barrel sampler and an unlined, 2-inch outside diameter Standard Penetration Test (SPT) split-spoon sampler was also used in collecting samples, which had room for a liner, but no liner was used, as is customary in this area. Sampling resistance blow counts were obtained by dropping a 140-pound, automatic-trip hammer through a 30-inch free fall onto a sampling rod anvil. Modified California and SPT samplers were driven 18 inches and the number of blows was recorded for each 6 inches of penetration. Both sampling methods generally followed respective ASTM D3550 and ASTM D1586 procedures. Representative bulk soil samples were also collected at shallow depths.

Infiltration tests were conducted within two (2) of the borings (LI-1 and LI-2), which were both located in the southern portion of the project. Testing was conducted between depths of 20 feet and 25 feet bgs for LI-1 and depths of 10 feet and 15 feet bgs for LI-2 to estimate infiltration characteristics of the soil tested at those locations and depths. These infiltration tests were conducted in general accordance with Orange County Guidelines.

After drilling, sampling, logging, and testing, all borings were immediately backfilled with soils generated from drilling activities and patched at the surface with concrete and black dye. Boring logs and infiltration measurements collected in the field are presented in Appendix A, *Geotechnical Exploration Logs*. The approximate boring locations are shown on the accompanying Figure 2, *Geotechnical Map*.

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- **Geotechnical Laboratory Testing:** Geotechnical laboratory tests were conducted on selected relatively undisturbed and bulk soil samples obtained during our field exploration. Our laboratory testing program was designed to evaluate engineering characteristics of onsite soils. A description of test procedures and results are presented in Appendix B, *Geotechnical Laboratory Testing*.
 - **Engineering and Geologic Analysis:** Data obtained from field exploration and geotechnical laboratory testing were evaluated and analyzed to develop geotechnical conclusions and provide recommendations in general accordance with the California Geological Survey (CGS) Note 48.
 - **Report Preparation:** Results of our geologic hazards review and geotechnical exploration have been summarized in this report, presenting our findings, conclusions, and preliminary geotechnical design recommendations.

This report does not address the potential for encountering hazardous materials in site soils or within groundwater. Important information about limitations of geotechnical reports in general, is presented in Appendix E, *GBA's Important Information About This Geotechnical-Engineering Report*.

2.0 FINDINGS

2.1 Regional Geologic Setting

The subject site is located in the Peninsular Ranges geomorphic province on the Newport Mesa. The Newport Mesa is located east of the current channel of the Santa Ana River and west of Newport Bay. This mesa is composed of Pleistocene age tidal flat deposits that have been uplifted by the Quaternary development of the northwest-plunging San Joaquin Hills anticline. The dextral Newport-Inglewood-Rose Canyon fault zone trends along this anticlinal axis and its potentially active segments are located as close as approximately 0.3-mile south of Costa Mesa Fire Station No. 4.

As regionally mapped on Figure 3, *Regional Geology Map*, the site is underlain by Late to Middle Pleistocene age Old Paralic (interfingered lacustrine, playa, and estuarine) deposits (Qol), which have been regionally mapped to consist of silt, sand, and cobbles.

2.2 Subsurface Soil Conditions

Based on results of our research and subsurface exploration, site soils encountered to the depths explored (51 feet bgs) consist of the following:

- **Undocumented Fill (Afu):** We are unaware of any documentation of previous fill placement for this site, so we have characterized all fill onsite as undocumented. Undocumented artificial fill was encountered in our borings to be generally about 2.5 feet thick, with one area to about 5 feet thick. Fill encountered in our borings consisted of clay (CL) with varying amounts of sands.
- **Late to Middle Pleistocene Old Paralic Deposits (Qol):** Native paralic deposits consisting of tidal flat sediments were encountered below undocumented fill, extending to the depths explored (reaching a maximum of 51 feet bgs). These deposits generally consisted of gray to brown, clay (CL), sandy silt (ML), silty sand (SM), and poorly graded sand (SP). Paralic deposits found in our borings were generally composed of medium dense to dense sandy soils and stiff to very stiff fine-grained soils.

More detailed descriptions of subsurface soils encountered are presented on our boring logs in Appendix A.

2.3 **Groundwater**

Free groundwater was not encountered on May 4, 2023, within our six borings, which reached depths as deep as 51 feet below the existing ground surface. The site lies within the Coastal Plain of Orange County Groundwater Basin. According to the Seismic Hazard Zone Report for the Anaheim and Newport Beach 7.5-Minute Quadrangles (CGS 1997), historically high groundwater levels at the site were estimated to have been on the order of 30 feet below ground surface. To research recent groundwater levels at this site, we obtained groundwater level data from the California Department of Water Resources (CDWR, 2023) Water Data Library website from State Well No. 06S10W09E003S, located approximately 0.6 mile north of the site. Well data from this location ranged in date from 1991 through 2000 and indicated the highest groundwater level at an elevation of approximately -8 feet above mean sea level (msl), which correlates to a depth of greater than 70 feet below the surface at the site.

Based on our borings and nearby groundwater well data, groundwater is not anticipated to be encountered during construction activities for the proposed Training Tower.

2.4 **Faulting and Seismicity**

Southern California is a seismically active area. As such, the site will be subject to seismic hazards from numerous sources in the area. The severity of potential seismic hazards is related to site-specific geology, distances from seismic sources, and the magnitude of earthquake events. Principal seismic hazards evaluated on a site-specific basis included: potential for surface rupture along active or potentially active fault traces, magnitude of seismic shaking, and the susceptibility to ground failure (liquefaction, lurching, and seismically induced landslides). Site-specific faulting and seismicity considerations are discussed in the following two subsections:

- 2.4.1 Surface Fault Rupture:** Fault classification criteria adopted by the California Geological Survey, formerly the California Division of Mines and Geology, defines Earthquake Fault Zones along active or potentially active faults. The California Alquist-Priolo Earthquake Fault Zoning Act of 1972 classification system is used in this report, as follows:

- **Active:** An active fault is one that has ruptured within the Holocene epoch (the last 11,700 years).
- **Potentially Active:** A fault that has ruptured during the last 1.8 million years (Quaternary period), but has not been proven by direct evidence to have not moved within the Holocene epoch is considered to be potentially active.
- **Inactive:** A fault that has not moved during both Pleistocene and Holocene epochs (that is, no movement within the last 1.8 million years) is considered to be inactive.

This project lies outside of a State designated Earthquake Fault Zone. Based on our review of available in-house literature, and as depicted on Figure 4, *Regional Faults and Historic Seismicity Map*, there are no currently known active surface faults that traverse or trend towards this site. Additionally, this site is not located within a currently designated Alquist-Priolo Earthquake Fault Zone (CGS, 2022), or a fault zone delineated by the City (City of Costa Mesa, 2015). The Third California Earthquake Rupture Forecast (UCERF3) has estimated locations of potential fault rupture outside or trending outside the project site. The U.S. Geological Survey has mapped the potentially active South Los Angeles basin section of the Newport-Inglewood-Rose Canyon fault zone to trend outside the project site (USGS, 2023a).

The two nearby traces were also identified by the California Geological Survey (CGS, formerly the Division of Mines and Geology) as the Bolsa-Fairview fault and the Adams Avenue fault (Bryant, 1985) were inferred to be at distances of 4,800 feet northeast and 1,800 feet from the site, respectively.

The closest known active fault is the Newport-Inglewood fault located approximately 2 miles southwest of the project site. Known regional active or potentially active faults that could produce the most significant ground shaking at the site include the Newport-Inglewood fault and San Joaquin Hills blind thrust. Nearby faults are depicted in Figure 4 – *Regional Fault and Historical Seismicity Map*.

- 2.4.2 Seismicity (Ground Shaking):** A principal seismic hazard that could impact this site is ground shaking resulting from an earthquake occurring along several major active or potentially active faults throughout southern California. An

evaluation of historical seismicity from significant past earthquakes related to the site was performed. Plotted on Figure 4, *Regional Fault and Historical Seismicity Map*, are epicenters of historic earthquakes (1769 through 2014) in and around Huntington Beach, color coded as a function of magnitude. Based on this map, it appears that the site has been exposed to relatively significant seismic events; however, this site does not appear to have experienced more severe seismicity that compared to much of southern California in general. We are unaware of documentation indicating that past earthquake damage in the site vicinity has been significantly worse than for the majority of southern California. In addition, we are unaware of damage in the site vicinity as the result of liquefaction, lateral spreading, or other related phenomenon.

2.5 **Secondary Seismic Hazards**

In general, secondary seismic hazards for sites in this region could include soil liquefaction, earthquake-induced settlement, slope instability and landslides, earthquake-induced seiches and tsunamis flooding. Site-specific potential for secondary seismic hazards is discussed in the following subsections:

2.5.1 Liquefaction Potential: Liquefaction is the loss of soil strength due to a buildup of excess pore-water pressure during strong and long-duration ground shaking. Liquefaction is associated primarily with loose (low density), saturated, relatively uniform fine- to medium-grained, clean cohesionless soils. As shaking action of an earthquake progresses, soil granules are rearranged and the soil densifies within a short period. This rapid densification of soil results in a buildup of pore-water pressure. When the pore-water pressure approaches the total overburden pressure, soil shear strength reduces abruptly and temporarily behaves similar to a fluid. For liquefaction to occur there must be:

- (1) loose, clean granular soils,
- (2) shallow groundwater, and
- (3) strong, long-duration ground shaking

The State of California has mapped the site to be outside any areas of liquefaction hazards as delineated by the State of California. Groundwater was not encountered in our borings, which were drilled to a maximum depth of 51 feet bgs, however, historically high groundwater levels have been estimated to be on the order of 30 feet bgs.

Our analysis was based on the modified Seed Simplified Procedure as detailed by Youd et al. (2001) and Martin and Lew (1999), which compares the seismic demand on a soil layer (Cyclic Stress Ratio, or CSR) to the capacity of the soil to resist liquefaction (Cyclic Resistance Ratio, or CRR) (Youd et al., 2001). A minimum required factor of safety of 1.3 was used in our analysis, with factor of safety defined as CRR/CSR. As required, our analysis assumes that the design earthquake would occur while the groundwater is at its estimated historically highest level. In the SPT method, soil resistance to liquefaction is estimated based on several factors, including SPT sampling blow counts normalized and corrected for several factors including fines content, and overburden pressure. Soil plasticity and moisture content are also considered in an evaluation of liquefaction. Parameters utilized in our analysis include Standard Penetration Test (SPT) results from the borings, visual descriptions of soil samples retrieved, and geotechnical laboratory test results.

Based on our analysis, potentially liquefiable layers were not encountered at the project site. Due to the cohesive and dense nature of underlying soils, the potential for liquefaction onsite (including effects of liquefaction, such as lateral spreading) is considered very low. A summary of our liquefaction analyses is included in Appendix C.

- 2.5.2 Lateral Spreading:** Lateral spreading is unlikely to occur at the site due to the minor amount of liquefaction potential and lack of significant topographic relief at and around this site.
- 2.5.3 Seismically Induced Settlement:** During a strong seismic event, non-liquefaction, seismically induced settlement can occur within loose and dry granular soils. Settlement caused by ground shaking is often unevenly distributed, which can result in differential settlement. Loose fill soils are typically highly susceptible to seismically induced settlement. Undocumented fill soils under the proposed building footprint are recommended (discussed later in this report) to be overexcavated and recompacted to reduce dynamic settlement concerns.

We have performed analyses to estimate the potential for seismically induced settlement using the method of Tokimatsu and Seed, and based on Martin and Lew (1999), considering the maximum considered earthquake (MCE) peak ground acceleration (PGA_M). Design/historic high groundwater levels of 30 feet below ground surface were used in the analysis. Based on our analysis, a potential for approximately 0.4 inch of seismic settlement is estimated at the site. Results of our seismic settlement analysis is presented in Appendix C.

If the potential differential settlement is estimated as half of the total seismic settlement over a horizontal distance of 30 feet, this would result in a maximum 0.2-inch differential settlement in 30 feet, or angular distortion of $0.0006L$. This would be within the differential settlement threshold of $0.002L$ for structures of Risk Category IV, as listed in Table 12.13-3 of ASCE 7-16. "Other" buildings are those not constructed with concrete or masonry wall systems (i.e., wood- or steel-framed). The structural engineer should determine Structure Type and Risk Category and evaluate whether the differential settlement estimates described above are tolerable. A copy of ASCE 7-16 Table 12.13-3 is provided as follows for reference.

Table 12.13-3 Differential Settlement Threshold

Structure Type	Risk Category		
	I or II	III	IV
Single-story structures with concrete or masonry wall systems	0.0075L	0.005L	0.002L
Other single-story structures	0.015L	0.010L	0.002L
Multistory structures with concrete or masonry wall systems	0.005L	0.003L	0.002L
Other multistory structures	0.010L	0.006L	0.002L

2.5.4 Slope Instability and Landslides: Seismically induced landslides and other slope failures are common occurrences during or soon after earthquakes. The State of California has mapped the site outside any zones of seismic landslide hazards. Considering the site and vicinity are relatively flat, the potential for seismically induced landslide activity is less than significant.

2.5.5 Earthquake-Induced Seiches and Tsunamis: Seiches are large waves generated in enclosed bodies of water in response to ground shaking. Tsunamis are predominately ocean waves generated by undersea large magnitude fault displacement or major ground movement.

The site is located approximately 2.5 miles inland from the Pacific Ocean and is mapped outside of a tsunami hazard area as delineated by the State of California (CGS, 2021). Thus, the risk of tsunamis to affect the site is considered nil.

2.5.6 Earthquake-Induced Inundation: This inundation hazard is flooding caused by failure of dams or other water-retaining structures as a result of earthquakes. Figure 7, *Dam Breach Inundation Map*, shows the subject site mapped outside of any dam breach inundation zone.

2.6 Storm-Induced Flood Hazard

As depicted on Figure 6, *Flood Hazard Zone Map*, the site is mapped outside of any “500-year” or “100-year” flood zones as defined by the Federal Emergency Management Agency’s (FEMA’s) Flood Insurance Rate Map (FIRM). As such, the risk of flood hazards at the site is considered to be low.

2.7 Infiltration Testing

Infiltration testing was conducted within two of our borings onsite (LI-1 and LI-2) to estimate the infiltration characteristics of the onsite soils at the depths and locations tested. The infiltration testing was conducted at a bottom test zone depth of approximately 25 feet bgs at LI-1 and 15 feet bgs at LI-2 within native soils.

Well permeameter tests are useful for field measurements of soil infiltration rates, and are suited for testing when the design depth of the basin or chamber is deeper than current existing grades. It should be noted that this is a clean-water, small-scale test, and that correction factors need to be applied. A test consists of excavating a boring to the depth of the test (or deeper as long as it is partially backfilled with soil and a bentonite plug with a thin soil covering is placed just below the design test elevation). A layer of clean sand or gravel is then placed in the boring bottom to temporarily support a perforated well casing pipe system. Once the well casing pipe has been installed, coarse sand or gravel is poured in the

annular space outside of the well casing within the test zone to prevent the boring from caving/collapsing or spalling when water is added. Water is added into the boring to a specified height as water infiltrates into the soils, while maintaining a relatively constant water head. Measurements are taken of the height of the water column and gallons of water introduced within the boring at equally timed intervals (known as a constant head test). The infiltration rate as measured during intervals of the test is defined as the flow rate of water infiltrated, divided by the surface area of the infiltration interface. The test was conducted based on the USBR 7300-89 test method.

Infiltration Test Rates

Boring	Soil Type*	Approx. Test Zone (ft), bgs	Percent Fines	Unfactored Infiltration Rate (in/hr)
LI-1	SP-SM	20 to 25	7	56
LI-2	SP-SM	10 to 15	10	8

3.0 CONCLUSIONS AND RECOMMENDATIONS

3.1 Conclusions

This site is not located within a currently designated Alquist-Priolo Earthquake Fault Zone for surface fault rupture. However, as is the case for most of southern California, strong ground shaking has and will occur at this site. Historic groundwater levels have been estimated to be on the order of 30 feet below the surface or deeper based on available seismic hazard zone reports and well data. Based on our analysis, the potential for liquefaction is not likely to occur at this site due to the relatively stiff and dense nature of encountered soils. Encountered native site soils were generally stiff to very stiff clay and sandy silt, and medium dense to very dense sand and silty sand. Undocumented artificial fill was encountered to depths of approximately 5 feet below the surface.

3.2 Recommendations Summary

Based upon our geotechnical exploration and analysis, all existing fill soil and compressible native paralic soils within the proposed building footprint should be excavated and recompacted to provide more uniform shallow foundation support. In any case, overexcavation within building footprints should extend at least 5 feet below existing grade, until undocumented artificial fill has been removed, or at least 3 feet below proposed footings, whichever is deeper. More detailed earthwork recommendations are presented below. The proposed fire training tower building can be founded on conventional spread footings bearing solely on a zone of newly excavated and recompacted fill soils derived from onsite soils, overlying solely undisturbed native soils.

Geotechnical recommendations for the proposed project site are presented in the following subsections.

3.3 Earthwork

Project earthwork is expected to include overexcavation and recompaction of undocumented fill soils and onsite alluvium soils below the proposed new building footprint as described in the following subsections:

- 3.3.1 Earthwork Observation and Testing:** Leighton should observe and test all grading and earthwork to check that the site has been properly prepared, to assess that selected fill materials are satisfactory, and to evaluate that placement and compaction of fills has been performed in accordance with our

recommendations and the project specifications. Any imported soil or aggregate material to be evaluated for its suitability as onsite fill material should be submitted to a Leighton geotechnical laboratory at least two working days in advance of earth material placement and compaction. Project plans and specifications should incorporate recommendations contained in the text of this report.

Variations in site conditions are possible and may be encountered during construction. To confirm correlation between soil data obtained during our field and laboratory testing and actual subsurface conditions encountered during construction, and to observe conformance with approved plans and specifications, we should be retained to perform continuous or intermittent review during earthwork, excavation, and foundation construction phases. Conclusions and recommendations presented in this report are contingent upon construction geotechnical observation services.

- 3.3.2 Site Preparation:** Prior to construction, the site should be cleared of vegetation, trash and debris, which should be disposed of offsite. Any underground obstructions should be removed. Resulting cavities should be properly backfilled and compacted. Efforts should be made to locate existing utility lines. Those lines should be removed or rerouted if they interfere with the proposed construction, and the resulting cavities should be properly backfilled and compacted.

Based on encountered site conditions, we recommend that all fill and potentially compressible native soils should be excavated below proposed building footprints to at least 3 feet below the bottoms of proposed footings or at least 5 feet below existing grade, whichever is deeper. Undocumented fill was observed to be generally 5 feet thick in our exploratory borings, but locally thicker undocumented fills may be exposed during grading. Overexcavation bottoms should be evaluated by Leighton, and localized deeper removals may be recommended during grading.

Where possible, overexcavation bottoms should extend horizontally a distance beyond the outside edges of proposed building perimeter footings equal to the depth of excavation below finish grade or at least 5 feet horizontally, whichever is greater. Where this is not achievable, overexcavation should be reviewed on

a case-by-case basis. Overexcavation should encompass the whole new building footprint including attached columns.

In areas where excavation will be close to existing structures or property lines, the excavation may be possible by making a series of adjacent slot cut excavations perpendicular to the buildings in a sequential 'ABC' method, limiting the width of excavation adjacent to existing buildings at any given time and reducing the potential for undermining the existing structure. The maximum width and depth of the slot cuts should be based on the specific conditions of the planned excavations and the soil conditions. For the proposed building and minimum overexcavation depth recommended, slot cuts should be no more than 6 feet in width. The excavations should be no deeper than necessary and should be left open for as short a period as feasible. Backfill of these slot cut excavations should be compacted to a minimum of 95 percent relative compaction as determined by ASTM Test Method D1557.

Areas outside proposed building pads, planned for asphalt and/or concrete pavement, should be overexcavated to a minimum depth of 24 inches below existing or finish grade, or 12 inches below proposed pavement sections; whichever is deeper.

Resulting removal excavation bottom surfaces should be observed by Leighton prior to placement of any backfill or new construction. It is essential that all existing fill soils be excavated from the proposed building footprints, regardless of depth. After overexcavation is completed and prior to fill placement, exposed surfaces should be scarified to a minimum depth of 6 inches, moisture conditioned to or slightly above optimum moisture content, and recompact to a minimum 90 percent relative compaction as determined by ASTM D1557 standard test method (modified Proctor compaction curve).

- 3.3.3 Fill Placement and Compaction:** Onsite soils free of organics and debris are suitable for use as compacted structural fill provided it is also free of oversized material (greater than 8 inches in its largest dimension). However, any soil to be placed as fill, whether onsite or imported material, should be first viewed by Leighton and then tested if and as necessary, prior to approval for use as compacted fill. All structural fill should be free of hazardous materials.

All fill soil should be placed in thin, loose lifts, moisture-conditioned, as necessary, to within 3 percent above optimum moisture content, and compacted to a minimum 90% relative compaction as determined by ASTM D1557 standard test method (modified Proctor compaction curve) within the building footprint. Aggregate base for pavement sections should be compacted to a minimum of 95% relative compaction.

No debris and oversize cobbles were observed at the site during our exploration. If oversize material and debris are encountered during grading, it should be removed from soils prior to placement as compacted fill.

- 3.3.4 Shrinkage or Bulking:** The change in volume of excavated and recompacted soil varies according to soil type and location. This volume change is represented as a percentage increase (bulking) or decrease (shrinkage) in volume of fill after removal and recompaction. Subsidence occurs as in-place soil (e.g., natural ground) is moisture-conditioned and densified to receive fill, such as in processing an overexcavation bottom. Subsidence is in addition to shrinkage due to recompaction of fill soil. Based on our laboratory test results for the underlying soils at the site we estimate the following earth volume changes will occur during grading:

Shrinkage and Subsidence	
Shrinkage	Approximately 5 +/- 10 percent
Subsidence (overexcavation bottom processing)	Approximately 0.1 foot

The level of fill compaction, variations in the dry density of the existing soils and other factors influence the amount of volume change. Some adjustments to earthwork volume should be anticipated during grading of the site.

3.4 Seismic Design Parameters

The site will experience strong ground shaking after the proposed project is developed resulting from an earthquake occurring along one or more of the major active or potentially active faults in southern California. Accordingly, the project should be designed in accordance with all applicable current codes and standards utilizing the appropriate seismic design parameters to reduce seismic risk as defined by California Geological Survey (CGS) Chapter 2 of Special Publication 117a (CGS, 2008). Through compliance with these regulatory

requirements and the utilization of appropriate seismic design parameters selected by the design professionals, potential effects relating to seismic shaking can be reduced.

The following parameters should be considered for design under the 2022 CBC:

Table 1 . 2022 CBC Site-Specific Seismic Parameters

2022 CBC Parameters (CBC or ASCE 7-16 reference)	Value 2022 CBC
Site Latitude and Longitude: 33.6582, -117.9314	
Site Class Definition (1613.2.2, ASCE 7-16 Ch 20)	D**
Mapped Spectral Response Acceleration at 0.2s Period (1613.2.1), S_s	1.367 g
Mapped Spectral Response Acceleration at 1s Period (1613.2.1), S_1	0.490 g
Short Period Site Coefficient at 0.2s Period (T1613.2.3(1)), F_a	1.000
Long Period Site Coefficient at 1s Period (T1613.2.3(2)), F_v	1.810*
Adjusted Spectral Response Acceleration at 0.2s Period (1613.2.3), S_{MS}	1.367 g
Adjusted Spectral Response Acceleration at 1s Period (1613.2.3), S_{M1}	0.887* g
Design Spectral Response Acceleration at 0.2s Period (1613.2.4), S_{DS}	0.912 g
Design Spectral Response Acceleration at 1s Period (1613.2.4), S_{D1}	0.591* g
Mapped MCE_G peak ground acceleration (11.8.3.2, Fig 22-9 to 13), PGA	0.593 g
Site Coefficient for Mapped MCE_G PGA (11.8.3.2), F_{PGA}	1.100
Site-Modified Peak Ground Acceleration (1803.5.12; 11.8.3.2), PGA_M	0.652 g

* See Section 11.4.8 of ASCE 7-16. A site-specific ground motion hazard analysis in accordance with Section 21.2 of ASCE 7-16 is required for this site. **Per Supplement 3 to ASCE 7-16, a site-specific ground motion hazard analysis is not required where the value of the parameters S_{M1} and S_{D1} in the table are increased by 50%.**

** Site Class D, and all of the resulting parameters in this table, may only be used for structures without seismic isolation or seismic damping systems.

A Site Class analysis is included in Appendix C in accordance with ASCE 7-16 Chapter 20. Soil data below 50 feet was conservatively estimated using Standard Penetration Test (SPT) blowcounts from our deepest boring. Hazard deaggregation was estimated using the USGS Interactive Deaggregations utility. The results of this analysis indicate that the predominant modal earthquake has a magnitude of approximately 7.5 (M_w) at a distance on the order of 2.57 kilometers for the Maximum Considered Earthquake (2% probability of exceedance in 50 years).

3.5 Foundations

Based on our exploration and our experience in the region, onsite soils exposed at pad grade exhibit a **medium expansive potential**. As such, we recommend that the proposed structures be constructed using **stiffened foundations**, this may include a **post-tension foundation system** designed in accordance with the California Building Code (CBC). Anticipated foundation loads were not available during preparation of this report. We assumed maximum column dead loads up to (\leq) 50 kips and wall loads of 3 kips per lineal foot for our preliminary foundation recommendations. Overexcavation and recompaction of footing subgrade soils should be performed as detailed in Section 3.3 of this report. Post-tension foundation recommendations are provided in the following section.

- 3.5.1 Post Tension Foundation Design Parameters:** Post-tensioned foundations should be designed by a qualified structural engineer in accordance with the 2019 CBC using the minimum geotechnical parameters provided below for soils with a medium Expansion Index. Expansion index should be confirmed upon completion of grading. While we do not expect this value to change, expansion index (EI) should be confirmed upon completion of grading.

Post-tensioned Foundation Design Recommendations		
Edge Moisture Variation, e_m	Center Lift	8.4 feet
	Edge Lift	4.3 feet
Differential Swell Y_m	Center Lift	1.1 inch
	Edge Lift	1.6 inch
Modulus of Subgrade Reaction		100 pci

For post-tension slab foundations, exterior footings (thickened edges) should have a minimum depth of 24 inches below the lowest adjacent soil grade and a minimum width of 12 inches. These footings may be designed for a maximum allowable bearing pressure of 1,800 pounds per square foot. The allowable bearing pressure may be increased by one-third for short-term loading. A lateral sliding coefficient of 0.30 may be used in the design. The recommended slab design parameters are based on the Post-Tensioning Institute Design of Post-Tensioned Slabs-on Ground, 3rd Edition with 2008 supplement (PTI DC10.1-08). The structural engineer should also design the post-tensioned slabs with adequate stiffness to minimize potential cracking in the slabs.

To provide more uniform moisture in the subgrade, the top 18 inches of the prepared subgrade should be pre-saturated to 120 percent of the optimum moisture prior to placement of concrete.

The Post-Tensioning Institute (PTI) has recommended the following guidelines:

- Initial landscaping should be done on all sides adjacent to the foundation. Positive drainage away from the foundation should be implemented and maintained.
- Irrigation watering should be done in a uniform manner as equally as possible on all sides of the foundation to maintain constant soil moisture content. Ponding of irrigation or rainfall water adjacent to the foundation slab can cause differential soil moisture levels potentially leading to differential movements.
- Planting trees closer to the structure than a distance equal to one-half the mature height of the tree could allow the root system to enter under the foundation. The root system could alter the soil moisture content within the soil and cause soil shrinkage, which may lead to differential movements of the foundation. A landscape architect should be consulted and made aware of these recommendations.

Based on the time of year and characteristics of fill material observed during our investigation, near surface soils to a depth of at least 2 feet will dry rapidly during hot windy weather and do not meet minimum optimal moisture conditions. Therefore, it is critical to long term performance of the foundations that the soil-moisture prior to construction and around the immediate perimeter of the slab after construction be maintained at 2 percent above optimum moisture content up through occupancy of the homes. All fill soils should be compacted to a minimum of 90 percent relative compaction.

3.6 Concrete Slab-On-Grade

Concrete slabs-on-grade should be designed by the structural engineer in accordance with 2022 CBC requirements. An effective PI value of 20 should be used for conventional foundation and slab design. More stringent requirements may be required by the structural engineer and/or architect; however, slabs-on-grade should have the following minimum recommended components:

- **Subgrade:** Slab-on-grade subgrade soil should be moisture conditioned to or within 3% over optimum moisture content, to a minimum depth of 24 inches within building footprints, and compacted to 95% of the modified Proctor (ASTM D1557) laboratory maximum density prior to placing either a moisture barrier, steel and/or concrete.
- **Moisture Barrier:** A moisture barrier consisting of at least 15-mil-thick Stego-wrap vapor barriers (see: http://www.stegoindustries.com/products/stego_wrap_vapor_barrier.php), or equivalent, should then be placed below slabs where moisture-sensitive floor coverings or equipment will be placed.
- **Reinforced Concrete:** A conventionally reinforced concrete slab-on-grade with a thickness of at least 5 inches should be placed in pedestrian areas without heavy loads. Reinforcing steel should be designed by the structural engineer, but as a minimum should be No. 4 rebar placed at 18 inches on-center, each direction (perpendicularly), mid-depth in the slab. A modulus of subgrade reaction (k) as a linear spring constant, of 175 pounds per square inch per inch deflection (pci) can be used for design of heavily loaded slabs-on-grade, assuming a linear response up to deflections on the order of 3/4 inch.
- **Slab-On-Grade Control Joints:** Slab-on-grade crack control joint locations and spacing should be designed by the project Structural Engineer (SE). We suggest control joints of 12 feet on center. Control joints should form square panels.

Minor cracking of concrete after curing due to drying and shrinkage is normal and should be expected. However, cracking is often aggravated by a high water-to-cement ratio, high concrete temperature at the time of placement, small nominal aggregate size, and rapid moisture loss due to hot, dry, and/or windy weather conditions during placement and curing. Cracking due to temperature and moisture fluctuations can also be expected. The use of low-slump concrete or low water/cement ratios can reduce the potential for shrinkage cracking.

3.7 Sulfate Attack and Ferrous Corrosion Protection

- 3.7.1 **Sulfate Exposure:** Sulfate ions in the soil can lower the soil resistivity and can be highly aggressive to Portland cement concrete by combining chemically with certain constituents of the concrete, principally tricalcium aluminate. This

reaction is accompanied by expansion and eventual disruption of the concrete matrix. A potentially high sulfate content could also cause corrosion of reinforcing steel in concrete. Section 1904A of the 2022 California Building Code (CBC) defers to the American Concrete Institute’s (ACI’s) ACI 318-14 for concrete durability requirements. Table 19.3.1.1 of ACI 318-14 lists “*Exposure categories and classes,*” including sulfate exposure as follows:

Table 2. Sulfate Concentration and Exposure

Soluble Sulfate in Water (parts-per-million)	Water-Soluble Sulfate (SO ₄) in soil (percentage by weight)	ACI 318-14 Sulfate Class
0-150	0.00 - 0.10	S0 (negligible)
150-1,500	0.10 - 0.20	S1 (moderate*)
1,500-10,000	0.20 - 2.00	S2 (severe)
>10,000	>2.00	S3 (very severe)

*or seawater

3.7.2 Ferrous Corrosivity: Many factors can modify corrosion potential of soil including soil moisture content, resistivity, permeability and pH, as well as chloride and sulfate concentration. In general, soil resistivity, which is a measure of how easily electrical current flows through soils, is the most influential factor. Based on the findings of studies presented in ASTM STP 1013 titled “*Effects of Soil Characteristics on Corrosion*” (February 1989), the approximate relationship between soil resistivity and soil corrosiveness was developed as follows:

Table 3. Soil Resistivity and Soil Corrosivity

Soil Resistivity (ohm-cm)	Classification of Soil Corrosiveness
0 to 900	Very Severely Corrosive
900 to 2,300	Severely Corrosive
2,300 to 5,000	Moderately Corrosive
5,000 to 10,000	Mildly Corrosive
10,000 to >100,000	Very Mildly Corrosive

Acidity is an important factor of soil corrosivity. The lower the pH (the more acidic the environment), the higher the soil corrosivity will be with respect to buried metallic structures and utilities. As soil pH increases above 7 (the neutral value), the soil is increasingly more alkaline and less corrosive to buried

steel structures, due to protective surface films, which form on steel in high pH environments. A pH between 5 and 8.5 is generally considered relatively passive from a corrosion standpoint. Chloride and sulfate ion concentrations, and pH appear to play secondary roles in modifying corrosion potential. High chloride levels tend to reduce soil resistivity and break down otherwise protective surface deposits, which can result in corrosion of buried steel or reinforced concrete structures.

3.7.3 Corrosivity Estimates: To evaluate corrosion potential of soils sampled from this site, we tested a bulk soil sample for soluble sulfate content, soluble chloride content, pH and resistivity. Results of these tests are summarized below:

Table 4. Results of Corrosivity Testing

Locations	Sample Depth (feet)	Sulfate (mg/kg)	Chloride (mg/kg)	pH	Minimum Resistivity (ohm-cm)
Boring LB-2	0 - 5	198	40	7.7	2,500

Note: mg/kg = milligrams per kilogram, or parts-per-million (ppm)

These results are discussed as follows:

- Sulfate Exposure:** Based on recovered near surface soils and Table 19.3.1.1 of ACI 318-14, in our opinion, sulfate exposure should be considered "negligible" with an Exposure Class S0 for soils sampled at the site. Based on Table 19.3.2.1 of ACI 318-14, for this Exposure Category S0, there would be no restrictions on cement type ("cementitious material") nor water/cement ratio, and an f'_c (28-day compressive strength) of at least 2,500 pounds per square inch (psi) is required at a minimum for structural concrete.
- Ferrous Corrosivity:** As shown above, minimum soil resistivity of 2,500 ohm-centimeters was measured in our laboratory test. In our opinion, it appears for site soils that corrosion potential to buried steel may be characterized as "moderately corrosive" at the site. Ferrous pipe buried in moist to wet site earth materials should be avoided by using high-density polyethylene (HDPE) or other non-ferrous pipe when possible. Or ferrous pipe can be protected by polyethylene bags, tap or coatings, di-electric fittings or other means to separate the pipe from on-site earth materials.

3.8 Pavement Section Design

Based on design procedures outlined in the 2017 Caltrans *Highway Design Manual* and an R-value of 21 for potential onsite clay subgrade soils based on laboratory testing preliminary flexible pavement sections were calculated for the Traffic Indices (TIs) tabulated, and are listed below:

Table 5. Hot Mixed Asphalt (HMA) Pavement Sections

Assumed Traffic Index	Asphalt Concrete (inches)	Class 2 Aggregate Base (inches)
5.0 (automobile parking, driveways)	3.0	7.0
6.0 (truck traffic)	3.5	9.5
7.0 (roadways and heavy truck traffic)	5.0	10.0

For fire truck (60,000-pound “apparatus”) lanes, asphalt pavements designed for a TI=6.0 are recommended. However, note that undistributed apparatus outrigger loads could cause local asphalt pavement punching damage. When possible, outrigger loads should be distributed over asphalt pavements with planks and plywood. Otherwise, areas where outrigger loads are anticipated could be paved with 8-inch-thick concrete as described below.

Onsite clays are expected to have a medium expansive potential, and R-value test results of near surface sample on the order of 21. Subgrade samples should be collected during grading to perform additional R-Value tests to verify pavement design.

Portland cement concrete (PCC) pavement sections were calculated in accordance with procedures developed by the Portland Cement Association. Concrete paving sections for three Traffic Indices (TIs) are presented below:

Table 6. Portland Cement Concrete Pavement Sections

Assumed Traffic Index	PC Concrete (inches)	Base Course (inches)
5.0 (automobile parking, driveways)	6	8
6.0 (roadways and truck traffic)	8	

We have assumed that this Portland cement concrete will have a compressive strength of at least 3,000 psi. Prior to placement of aggregate base, subgrade soils should be scarified to a minimum depth of 8 inches, moisture-conditioned, as

necessary, and recompact to a minimum of 95 percent relative compaction, determined in accordance with ASTM D1557 modified Proctor laboratory maximum density. Aggregate base should be placed in thin lifts; moisture conditioned, as necessary, and compacted to a minimum of 95 percent relative compaction. Field observation and periodic testing, as needed during placement of base course materials, should be undertaken to ensure that requirements of Caltrans' *Standard Specifications (2015)* and Special Provisions are fulfilled. Consideration should be given to reinforce concrete pavements where large outrigger point loads are anticipated.

Adequate drainage (both surface and subsurface) should be provided such that the subgrade soils and aggregate base materials are not allowed to become wet. All pavement construction should be performed in accordance with the current Caltrans *Standard Specifications* or *Standard Specifications for Public Works Construction* ("Greenbook"). Recommended structural pavement materials should conform to the specified provisions in the Caltrans *Standard Specifications (2015)* including grading and quality requirements, shown below:

- **Asphalt Concrete (Hot Mixed Asphalt)** for pavement should be Type A and should conform to Section 39 of the *Standard Specifications*. Asphalt concrete specimens should be tested for surface abrasion in accordance with CT-360.
- **Portland Cement Concrete (PCC)** pavement should conform to Section 40 of the *Standard Specifications*. PCC pavement materials (pavement, structures, minor concrete) should conform to Section 90 of the *Standard Specifications*.
- **Class II Aggregate Base (AB)** should conform to Section 26 of the *Standard Specifications*.

Traffic Indices (TIs) used in our pavement design are considered reasonable values for typical parking lot areas, and should provide a pavement life of approximately 20 years with a normal amount of flexible pavement maintenance. Irrigation adjacent to pavements, without a deep curb or other cutoff to separate landscaping from the paving, will result in premature pavement failure. Traffic parameters used for design were selected based on engineering judgment and not on information furnished to us such as an equivalent wheel-load analysis or a traffic study. The project Civil Engineer should confirm the TI assumptions.

- 3.9 Surface Drainage:** Pad drainage should be designed to collect and direct surface water away from structures to approved drainage facilities. Hardscape drains should be installed and drain to approved storm water disposal systems. Drainage

patterns and drainpipes approved at the time of fine grading should be maintained throughout the life of proposed structures.

3.10 Retaining Wall Recommendations

The following retaining wall recommendations are included for design consideration of walls with a height less than 6 feet. We recommend that retaining walls be backfilled with very low expansive soil and constructed with a backdrain in accordance with the recommendations provided on Figure 8, *Retaining Wall Backfill and Subdrain Detail*. Using expansive soil as retaining wall backfill will result in higher lateral earth pressures exerted on the wall and are, therefore, not recommended. Retaining wall locations and configurations are unknown at the time of this report.

Table 7. Retaining Wall Design Parameters

Static Equivalent Fluid Pressure (pcf)	
Condition	Level Backfill
Active	45
At-Rest (drained, compacted-fill backfill)	65
Passive (ultimate)	230 (Max. 3,000 psf)

The above values do not contain an appreciable factor of safety, so the structural engineer should apply the applicable factors of safety and/or load factors during design.

Cantilever walls that are designed to yield at least $0.001H$, where H is equal to the wall height, may be designed using the active condition. Rigid walls and walls braced at the top should be designed using the at-rest condition.

Passive pressure is used to compute soil resistance to lateral structural movement. In addition, for sliding resistance, a frictional resistance coefficient of 0.30 may be used at the concrete and soil interface. The lateral passive resistance should be taken into account only if it is ensured that the soil providing passive resistance, embedded against the foundation elements, will remain intact with time. A soil unit weight of 120 pcf may be assumed for calculating the actual weight of the soil over the wall footing.

In addition to the above lateral forces due to retained earth, surcharge due to improvements, such as an adjacent structure or traffic loading, should be considered in the design of the retaining wall. Loads applied within a 1:1 projection from the surcharging structure on the stem of the wall should be considered in the design. A third of uniform vertical surcharge-loads should be applied at the surface as a horizontal pressure on cantilever (active) retaining walls, while half of uniform vertical surcharge-loads should be applied as a horizontal pressure on braced (at-rest) retaining walls. To account for automobile parking surcharge, we suggest that a uniform horizontal pressure of 100 psf (for restrained walls) or 70 psf (for cantilever walls) be added for design, where autos are parked within a horizontal distance behind the retaining wall less than the height of the retaining wall stem.

We recommend that the wall designs for walls 6 feet tall or taller be checked seismically using an *additive seismic* Equivalent Fluid Pressure (EFP) of 18 pcf, which is added to the EFP. The *additive seismic* EFP should be applied at the retained midpoint.

Conventional retaining wall footings should have a minimum width of 24 inches and a minimum embedment of 12 inches below the lowest adjacent grade. An allowable bearing pressure of 2,000 psf may be used for retaining wall footing design, based on the minimum footing width and depth. This bearing value may be increased by 250 psf per foot increase in width or depth to a maximum allowable bearing pressure of 3,000 psf.

3.11 Infiltration Recommendations

We recommend that the onsite artificial fill not be relied upon for infiltration. For underlying alluvial soils that are granular with a low fines content, we recommend an unfactored (small-scale) infiltration rate of 8 inches per hour, for depths of at least 15 feet. The incremental infiltration rate is defined as the incremental flow rate of water infiltrated, divided by the surface area of the infiltration interface. We recommend that a correction factor/safety factor be applied to the infiltration rate in conformance with *South Orange County Technical Guidance Document for Water Quality Management Plans (WQMP)* guidelines, since monitoring of actual facility performance has shown that actual infiltration rates are lower than for small-scale tests. The small-scale infiltration rate should be divided by a correction factor of at least 3 for buried chambers and higher for open basins, but the correction/safety factor may be higher based on project-specific aspects.

The infiltration rates described herein are for a clean, unsilted infiltration surface in native, sandy alluvial soil. These values may be reduced over time as silting of the basin or chamber occurs. Furthermore, if the chamber bottom is allowed to be compacted by heavy equipment, this value is expected to be significantly reduced. Infiltration of water through soil is highly dependent on such factors as grain size distribution of the soil particles, particle shape, fines content, clay content, and density. Small changes in soil conditions, including density, can cause large differences in observed infiltration rates. Infiltration is not suitable in compacted fill.

It should be noted that during periods of prolonged precipitation, the underlying soils tend to become saturated to greater and greater depths/extents. Therefore, infiltration rates tend to decrease with prolonged rainfall. It is difficult to extrapolate longer-term, full-scale infiltration rates from small-scale tests, and as such, this is a significant source of uncertainty in infiltration rates.

General Design Considerations:

The periodic flow of water carrying sediments in the basin or chamber, plus the introduction of wind-blown sediments and sediments from erosion of the basin side walls, can eventually cause the bottom of the basin or chamber to accumulate a layer of silt, which has the potential of significantly reducing the overall infiltration rate of the basin or chamber. Therefore, we recommend that significant amounts of silt/sediment not be allowed to flow into the facility within storm water, especially during construction of the project and prior to achieving a mature landscape on site. As it is typically very difficult to remove silt from buried infiltration facilities, we recommend that an easily maintained, robust silt/sediment removal system be installed to pretreat storm water before it enters the infiltration facility.

As infiltrating water can seep within the soil strata nearly horizontally for long distances, it is important to consider the impact that infiltration facilities can have on nearby subterranean structures, such as basement walls or open excavations, whether onsite or offsite, and whether existing or planned. Any such nearby features should be identified and evaluated as to whether infiltrating water can impact these. Such features should be brought to Leighton's attention as they are identified.

Infiltration facilities should not be constructed adjacent to or under buildings. Setbacks should be discussed with Leighton during the planning process.

Infiltration facilities should be constructed with spillways or other appropriate means that would cause overflowing to not be a concern to the facility or nearby improvements.

For buried chambers that allow interior standing water, control/access manhole covers should not contain holes or should be screened to prevent mosquitos from entering the chambers.

Construction Considerations:

We recommend that Leighton evaluate the infiltration facility excavations, to confirm that granular, undisturbed alluvium is exposed in the bottoms and sides. Additional excavation or evaluation may be required if fine grained soils are exposed.

It is critical to infiltration that the basin or chamber bottom not be allowed to be compacted during construction or maintenance; rubber-tired equipment and vehicles should not be allowed to operate on the bottom. We recommend that at least the bottom 3 feet of the basins or chambers be excavated with an excavator or similar.

If fill material is needed to be placed in the basin, such as due to removal of uncontrolled artificial fill, the fill material should be select and free-draining sand, and should be observed and evaluated by Leighton.

Maintenance Considerations:

The infiltration facilities should be routinely monitored, especially before and during the rainy season, and corrective measures should be implemented as/when needed. Things to check for include proper upkeep, proper infiltration, absence of accumulated silt, and that de-silting filters/features are clean and functioning. Pretreatment desilting features should be cleaned and maintained per manufacturers' recommendations. Even with measures to prevent silt from flowing into the infiltration facility, accumulated silt may need to be removed occasionally as part of maintenance.

4.0 CONSTRUCTION CONSIDERATIONS

4.1 Trench Excavations

Based on our field observations, caving of cohesionless and loose fill soils will likely be encountered in unshored trench excavations. To protect workers entering excavations, excavations should be performed in accordance with OSHA and Cal-OSHA requirements, and the current edition of the California Construction Safety Orders, see:

<http://www.dir.ca.gov/title8/sb4a6.html>

Contractors should be advised that sand and fill soils should initially be considered Type C soils as defined in the California Construction Safety Orders. As indicated in Table B-1 of Article 6, Section 1541.1, Appendix B, of the California Construction Safety Orders, excavations less-than (<) 20 feet deep within Type C soils should be sloped back no steeper than 1½:1 (horizontal:vertical), where workers are to enter the excavation. This may be impractical near adjacent existing utilities and structures; so shoring may be required depending on trench locations. Stiff undisturbed native clays will stand steeper.

During construction, soil conditions should be regularly evaluated to verify that conditions are as anticipated. The contractor is responsible for providing the "competent person" required by OSHA standards to evaluate soil conditions. Close coordination between the competent person and Leighton Consulting, Inc. should be maintained to facilitate construction while providing safe excavations.

4.2 Temporary Shoring

Temporary cantilever shoring can be designed based on the active equivalent fluid pressure of 38 pounds-per-cubic-foot (pcf) in alluvium. If excavations are braced at the top and at specific depth intervals, then braced earth pressure may be approximated by a uniform rectangular soil pressure distribution. This uniform pressure expressed in pounds-per-square-foot (psf), may be assumed to be 25 multiplied by H for design, where H is equal to the depth of the excavation being shored, in feet. These recommendations are valid only for trenches not exceeding 15 feet in depth at this site.

4.3 Trench Backfill

Utility trenches should be backfilled with compacted fill in accordance with Sections

306-1.2 and 306-1.3 of the *Standard Specifications for Public Works Construction* (SSPWC, "Greenbook"), 2018 Edition. Utility trenches may be backfilled with onsite material free of rubble, debris, organic and oversized material up to 3 inches in largest dimension. Prior to backfilling trenches, pipes should be bedded in and covered with either:

- (1) **Granular Bedding:** a uniform sand material with a Sand Equivalent (SE) greater-than-or-equal-to (\geq) 30, passing the No. 4 U.S. Standard Sieve (or as specified by the pipe manufacturer). As this is a clayey site, sand bedding should not be jetted, but should be mechanically compacted in accordance with the Greenbook, latest edition.
- (2) **CLSM:** Controlled Low Strength Material (CLSM) conforming to Section 201-6 of the SPWC. CLSM bedding should be placed to 1-foot (0.3 m) over the top of the conduit and vibrated.

We recommend that open-graded crushed rock or similar material not be used as bedding material, unless special provisions are implemented to limit the migration of surrounding soil into the open-graded material, including surrounding the open-graded material with filter fabric (Mirafi 140N or equivalent), or mixing sand with the open-graded material. Pipe bedding should extend at least 4 inches below the pipeline invert and at least 12 inches over the top of the pipeline. The bedding and shading sand is recommended to be densified in place by vibratory, lightweight compaction equipment.

Trench backfill over the pipe bedding zone may consist of native and clean fill soils. All backfill should be placed in thin lifts (appropriate for the type of compaction equipment), moisture conditioned to slightly above optimum, and mechanically compacted to at least 90 percent of the laboratory derived maximum density as determined by ASTM Test Method D 1557.

4.4 **Geotechnical Services During Construction**

Our geotechnical recommendations provided in this report are based on information available at the time the report was prepared and may change as plans are developed. Additional geotechnical exploration, testing and/or analysis may be required based on final plans. Leighton Consulting, Inc. should review site grading, foundation, and shoring (if any) plans when available, to comment further on geotechnical aspects of this project and check to see general conformance of final project plans to recommendations presented in this report.

Leighton Consulting, Inc. should be retained to provide geotechnical observation and testing during excavation and all phases of earthwork. Our conclusions and recommendations should be reviewed and verified by us during construction and revised accordingly if geotechnical conditions encountered vary from our findings and interpretations. Geotechnical observation and testing should be provided:

- During all excavation,
- During compaction of all fill materials,
- After excavation of all footings and prior to placement of concrete,
- During utility trench backfilling and compaction,
- During pavement subgrade and base preparation, and/or
- If and when any unusual geotechnical conditions are encountered.

5.0 LIMITATIONS

This report was necessarily based in part upon data obtained from a limited number of observances, site visits, soil samples, tests, analyses, histories of occurrences, spaced subsurface explorations and limited information on historical events and observations. Such information is necessarily incomplete. The nature of many sites is such that differing characteristics can be experienced within small distances and under various climatic conditions. Changes in subsurface conditions can and do occur over time. This exploration was performed with the understanding that this subject site is proposed for development as described in Section 1.2 of this report. Please also refer to Appendix E, *GBA's Important Information About This Geotechnical-Engineering Report*, presenting additional information and limitations regarding geotechnical engineering studies and reports.

Until reviewed and accepted by the reviewing government agency, this report may be subject to change. Changes may be required as part of the review process. Leighton Consulting, Inc. assumes no risk or liability for consequential damages that may arise due to design work progressing before this report is reviewed and accepted.

This report was prepared for PBK Architects based on their needs, directions and requirements at the time of our exploration, in accordance with generally accepted geotechnical engineering practices at this time in the City of Costa Mesa for public sites. This report is not authorized for use by, and is not to be relied upon by, any party except PBK Architects and their design and construction management team, with whom Leighton Consulting, Inc. has contracted for this work. Use of or reliance on this report by any other party is at that party's risk. Unauthorized use of or reliance on this report constitutes an agreement to defend and indemnify Leighton Consulting, Inc. from and against any liability which may arise as a result of such use or reliance, regardless of any fault, negligence, and/or strict liability of Leighton Consulting, Inc.

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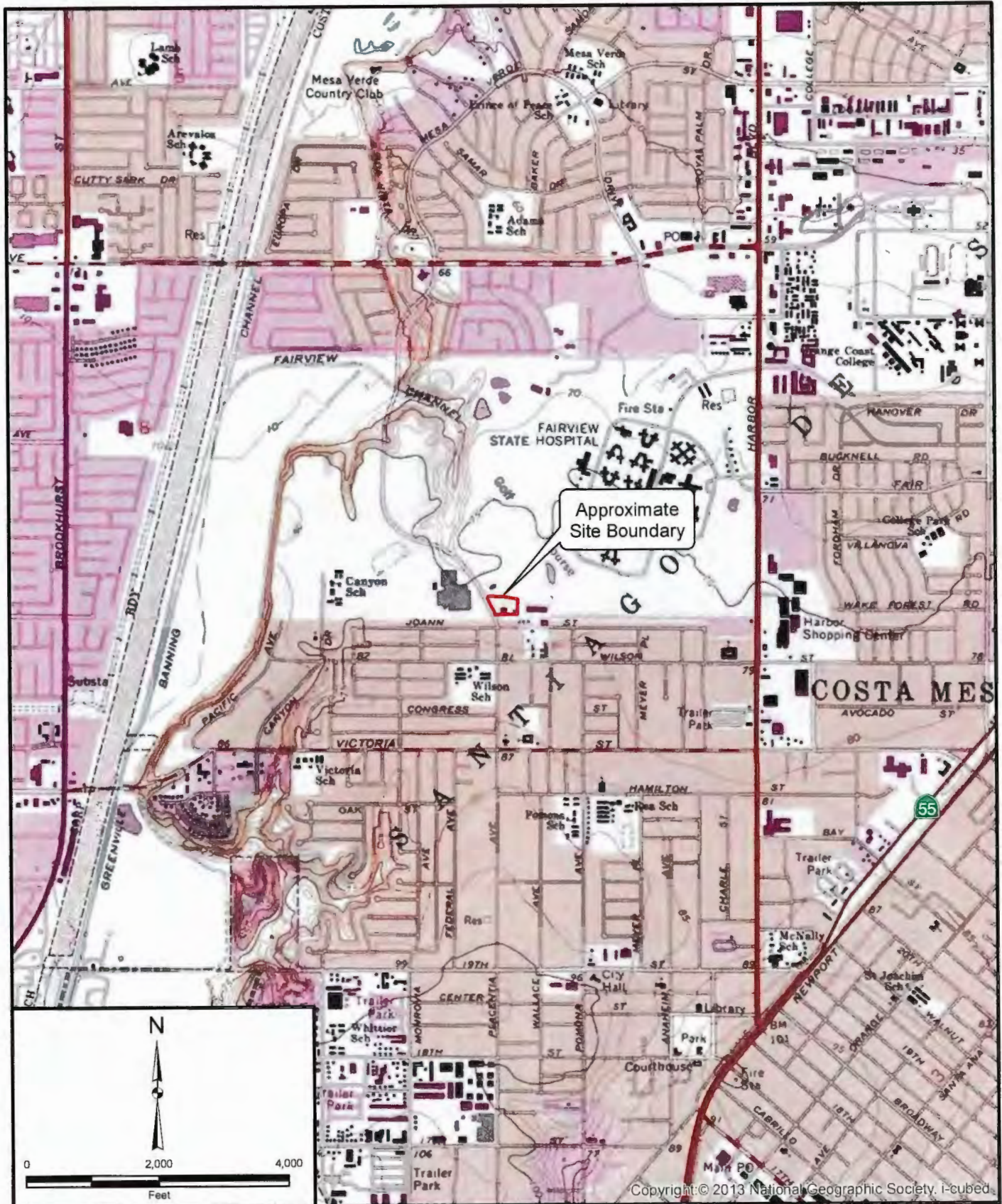
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Project: 13893.001	Eng/Geol: JDH/SGO
Scale: 1" = 2,000'	Date: June 2023
Base Map: ESRI ArcGIS Online 2023 Thematic Information: Leighton Author: Leighton Geomatics (btran)	

SITE LOCATION MAP
 Proposed Costa Mesa Fire Training Tower
 Costa Mesa Fire Station No. 4
 2300 Placentia Avenue, Costa Mesa, California

FIGURE 1




LELGEND

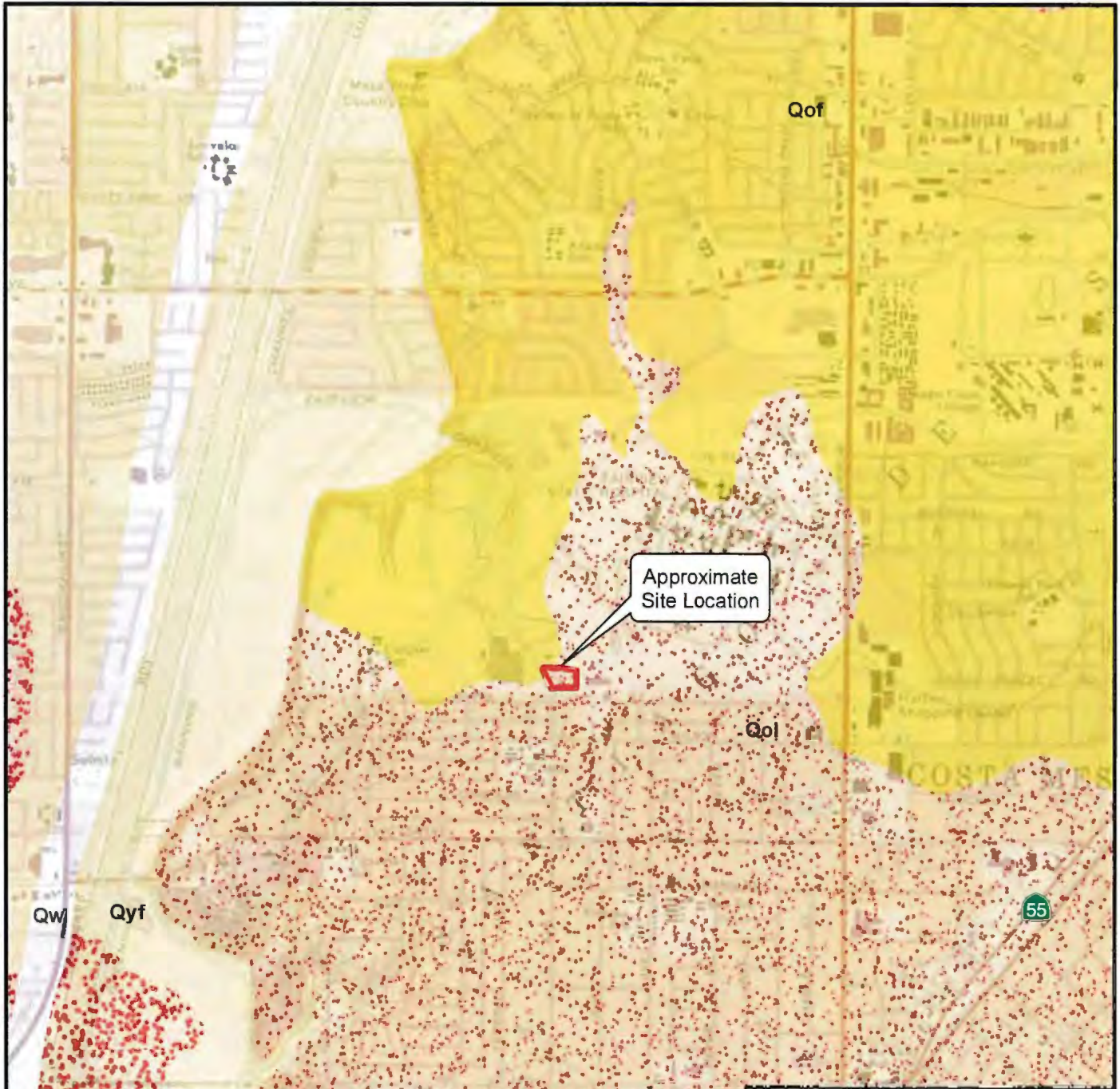
- LB-4** Approximate location of boring showing total depth (T.D.), Groundwater (G.W.), not encountered.
- LI-2** Approximate location of infiltration test showing total depth (T.D.), Groundwater (G.W.), not encountered.
- Proposed Improvements
- Approximate site boundary

EXPLORATION LOCATION MAP
 Proposed Costa Mesa Fire Training Tower
 Costa Mesa Fire Station No. 4
 2300 Placentia Avenue, Costa Mesa, California

FIGURE 2

Project: 13893.001 Eng/Geol: JDH/SGO
 Scale: 1" = 40' Date: June 2023
 Base Map: Proposed Site Plan, Dated: 12/23/2022
 Author: Leighton Geomatics (btran)

Map Saved as J:\Working\13893000\Mapset\13893-001_FIG_2_EL_M_2023-05-12.mxd on 5/11/2023 11:13:27 AM



LEGEND

- Qya, Young Alluvial Valley Deposits
- Qyf, Young Alluvial Fan
- Qw, Alluvial Wash
- Qol, Qvol, Old Lacustrine, Playa and Estuarine (Paralic) Deposits
- Qof, Old Alluvial Fan

N

0 2,000 4,000

Feet

Project: 13893.001 Eng/Geol: JDH/SGO

Scale: 1" = 2,000' Date: June 2023

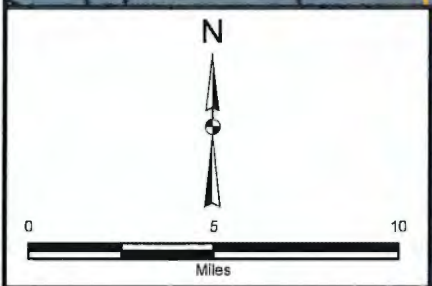
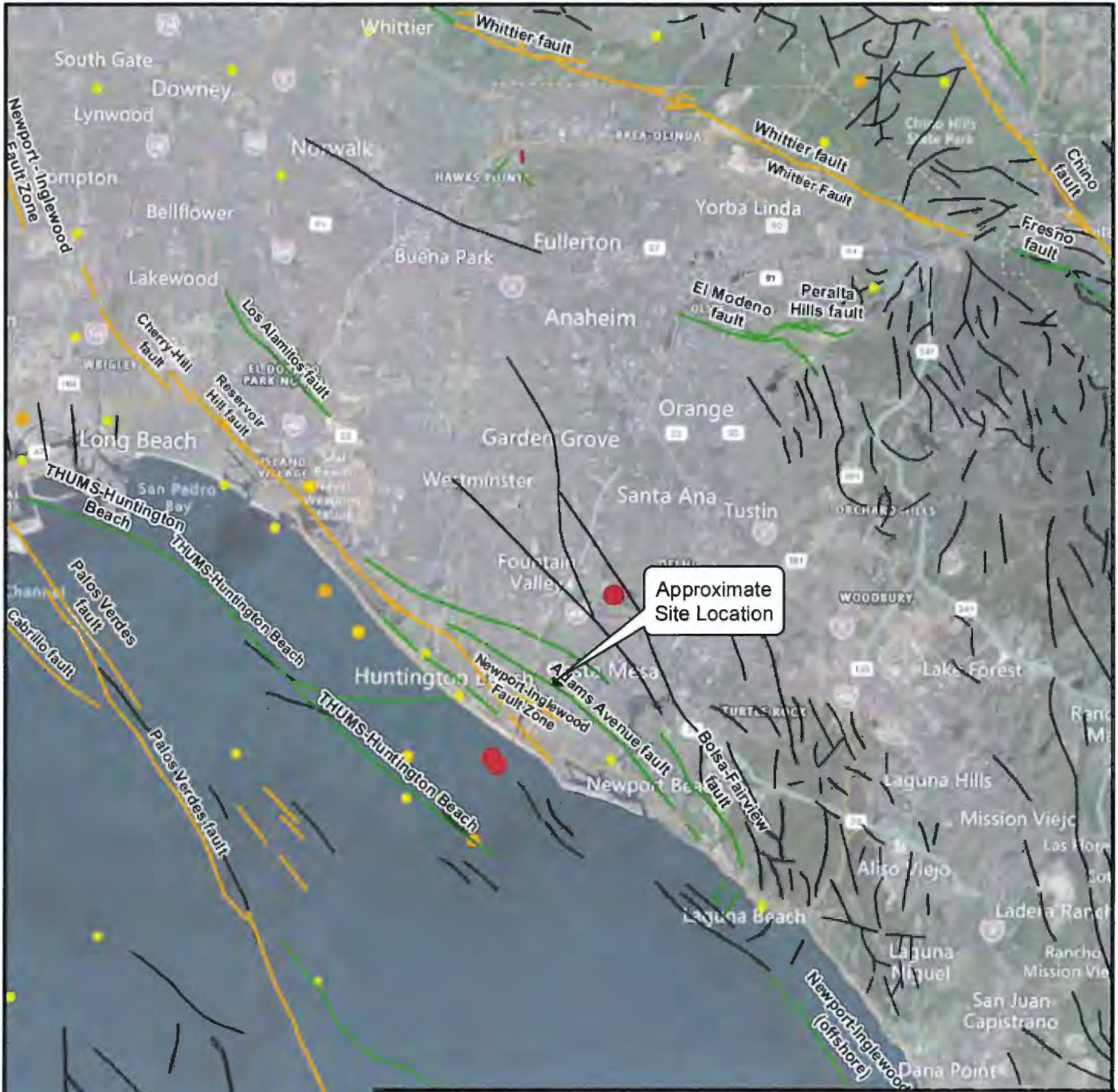
Base Map: Southern California USGS Geology in GIS Format served by California Geological Survey, 2012.

Author: Leighton Geomatics (btran)

REGIONAL GEOLOGY MAP

Proposed Costa Mesa Fire Training Tower
 Costa Mesa Fire Station No. 4
 2300 Placentia Avenue, Costa Mesa, California

FIGURE 3



LEGEND

<u>Earthquake Events (1769 - 2016)</u>		<u>Fault Ages</u>	
<u>Moment Magnitude Range M_o</u>			
●	4 - 5	—	Historic (<200 years)
●	5 - 6	—	(Holocene (<10K years)
●	6 - 7	—	Quaternary (<1.6M years)
●	7 - 8	—	Pre-Quaternary (before 1.6 million years)

Project: 13893.001 Eng/Geol: JDH/SGO
 Scale: 1" = 5 miles Date: June 2023

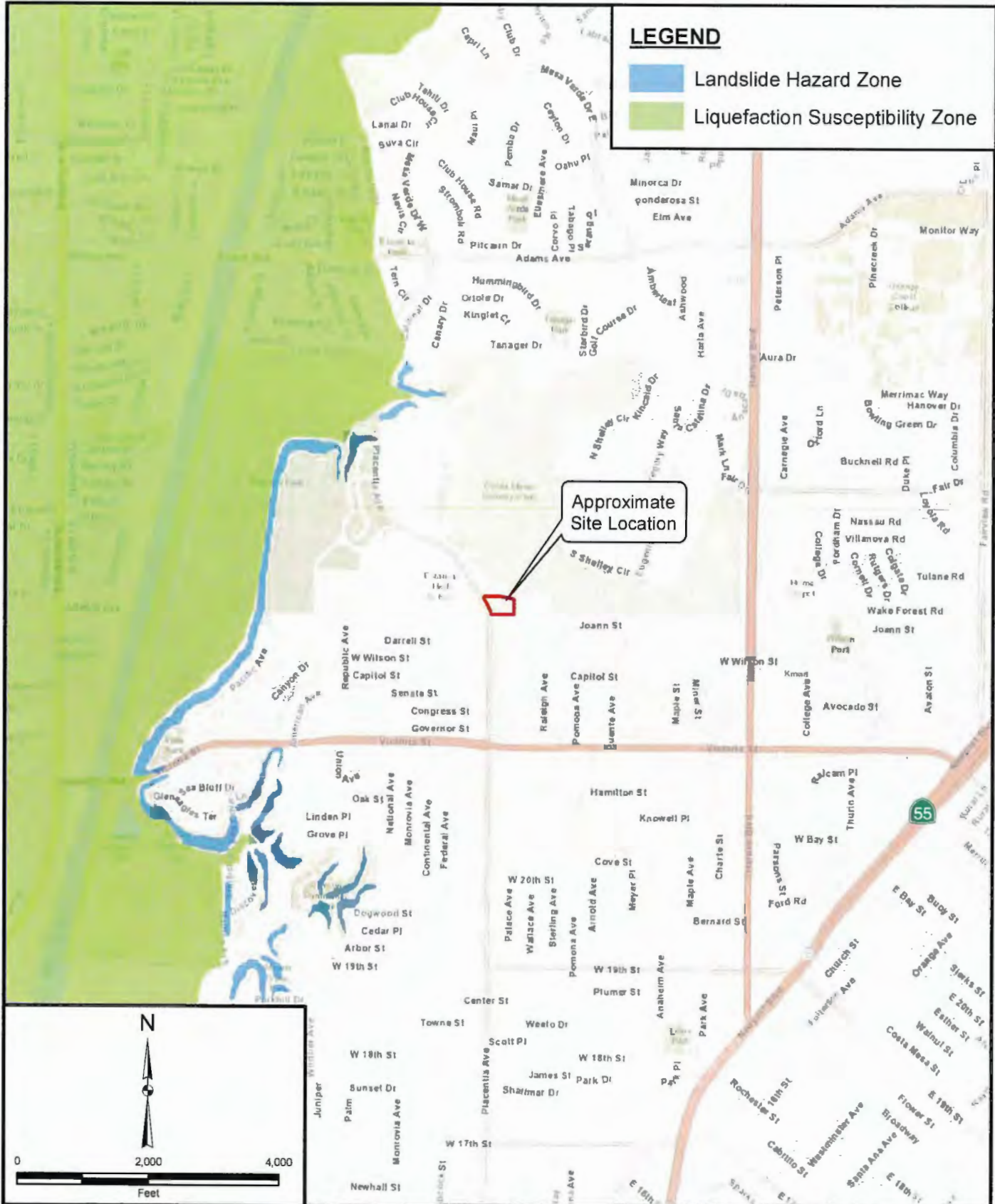
Reference: ESRI ArcGIS Online 2023
 Bryant, W. A. (compiler), 2005, Digital Database of Quaternary and Younger Faults from the Fault Activity Map of California, version 2.0: CGS, USGS, SCEC.
 Author: Leighton Geomatics (btran)

REGIONAL FAULT AND HISTORICAL SEISMICITY MAP
 Proposed Costa Mesa Fire Training Tower
 Costa Mesa Fire Station No. 4
 2300 Placentia Avenue, Costa Mesa, California

FIGURE 4

LEGEND

- Landslide Hazard Zone
- Liquefaction Susceptibility Zone



Project: 13893.001	Eng/Geol: JDH/SGO
Scale: 1" = 2,000'	Date: June 2023
Base Map: ESRI ArcGIS Online 2023	
Author: Leighton Geomatics (btran)	

SEISMIC HAZARD MAP
 Proposed Costa Mesa Fire Training Tower
 Costa Mesa Fire Station No. 4
 2300 Placentia Avenue, Costa Mesa, California

FIGURE 5



Project: 13893.001 Eng/Geol: JDH/SGO

Scale: 1" = 2,000' Date: June 2023

Reference: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community
FEMA (<http://www.fema.gov/index.shtm>), DWR (<http://www.dwr.ca.gov/>)



FLOOD HAZARD ZONE MAP

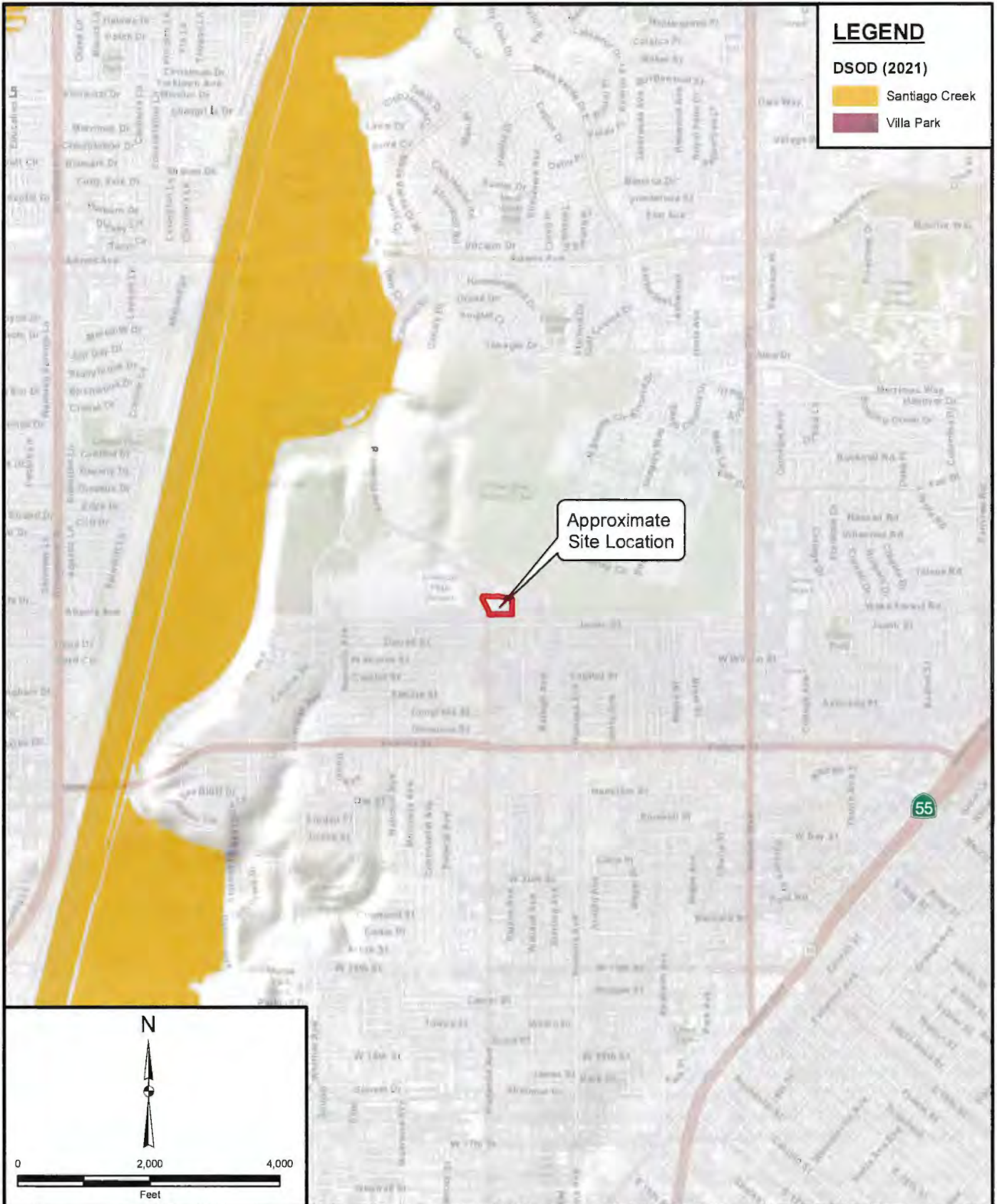
Proposed Costa Mesa Fire Training Tower
Costa Mesa Fire Station No. 4
2300 Placentia Avenue, Costa Mesa, California

FIGURE 6

LEGEND

DSOD (2021)

-  Santiago Creek
-  Villa Park



Project: 13893.001 Eng/Geol: JDH/SGO

Scale: 1" = 2,000' Date: June 2023

Base Map: ESRI ArcGIS Online 2023
Reference: Office of Emergency Services (2007),
Dept of Safety of Dams (2021)
National Inventory of Dams, Army Corps of Engrs (2021)

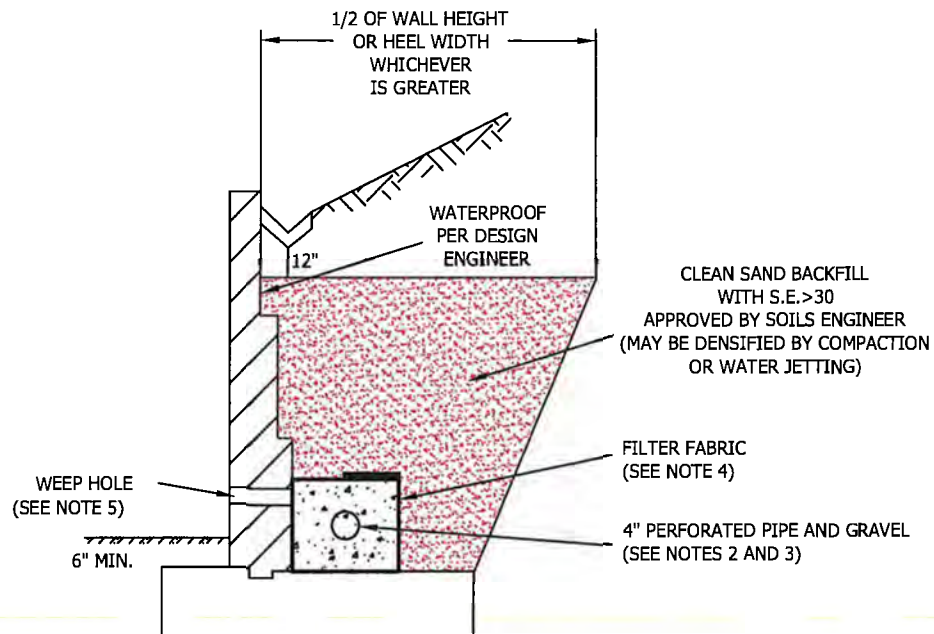
DAM BREACH INUNDATION MAP

FIGURE 7

Proposed Costa Mesa Fire Training Tower
Costa Mesa Fire Station No. 4
2300 Placentia Avenue, Costa Mesa, California



SUBDRAIN OPTIONS AND BACKFILL WHEN NATIVE MATERIAL HAS EXPANSION INDEX OF >50



NOTE: AS AN ALTERNATE TO CLEAN SAND BACKFILL, CLEAN GRAVEL MAY BE UTILIZED WITH APPROVED FILTER FABRIC. A SECOND ALTERNATE IS TO UTILIZE AN AGGREGATE BASE MATERIAL COMPACTED TO 90% RELATIVE COMPACTION. A SAMPLE OF THE PROPOSED BASE MUST BE APPROVED BY THE GEOTECHNICAL CONSULTANT PRIOR TO BACKFILL FOR SUITABILITY. COMPACTION SHOULD BE ACHIEVED WITHOUT DAMAGING THE WALL.

GENERAL NOTES:

- * Waterproofing should be provided where moisture nuisance problem through the wall is undesirable.
- * Water proofing of the walls is not under purview of the geotechnical engineer
- * All drains should have a gradient of 1 percent minimum
- * Outlet portion of the subdrain should have a 4-inch diameter solid pipe discharged into a suitable disposal area designed by the project engineer. The subdrain pipe should be accessible for maintenance (rodding)
- * Other subdrain backfill options are subject to the review by the geotechnical engineer and modification of design parameters.

Notes:

- 1) Sand should have a sand equivalent of 30 or greater and may be densified by water jetting.
- 2) 1 Cu. ft. per ft. of 1/4- to 1 1/2-inch size gravel wrapped in filter fabric
- 3) Pipe type should be ASTM D1527 Acrylonitrile Butadiene Styrene (ABS) SDR35 or ASTM D1785 Polyvinyl Chloride plastic (PVC), Schedule 40, Armco A2000 PVC, or approved equivalent. Pipe should be installed with perforations down. Perforations should be 3/8 inch in diameter placed at the ends of a 120-degree arc in two rows at 3-inch on center (staggered)
- 4) Filter fabric should be Mirafi 140NC or approved equivalent.
- 5) Weephole should be 3-inch minimum diameter and provided at 10-foot maximum intervals. If exposure is permitted, weepholes should be located 12 inches above finished grade. If exposure is not permitted such as for a wall adjacent to a sidewalk/curb, a pipe under the sidewalk to be discharged through the curb face or equivalent should be provided. For a basement-type wall, a proper subdrain outlet system should be provided.
- 6) Retaining wall plans should be reviewed and approved by the geotechnical engineer.
- 7) Walls over six feet in height are subject to a special review by the geotechnical engineer and modifications to the above requirements.

RETAINING WALL BACKFILL AND SUBDRAIN DETAIL WHEN NATIVE MATERIAL HAS EXPANSION INDEX OF >50

APPENDIX A

FIELD EXPLORATION

Our field exploration consisted of geologic reconnaissance and a subsurface exploration program consisting of six (6) geotechnical borings. These subsurface exploration locations are plotted on Figure 2, *Exploration Location Map*, and describe in more detail below:

Hollow Stem Auger Borings: On May 4, 2023, six (6) borings were drilled with a truck-mounted drill rig, logged and sampled to depths ranging from approximately 15 feet to 51 feet bgs. After sampling and logging, all borings were immediately backfilled with soil cuttings generated during drilling. Encountered soils were continuously logged in the field by our representative and described in accordance with the Unified Soil Classification System (ASTM D 2488). Near surface bulk soil samples were collected from these borings. Boring logs are included as part of this appendix.

Subsurface Variations and Limitations: These attached subsurface exploration logs and related information depict subsurface conditions only at the approximate locations indicated and at the particular date designated on the logs. Subsurface conditions at other locations may differ from conditions occurring at these locations. Passage of time may result in altered subsurface conditions due to possible environmental changes. In addition, any stratification lines depicted on these logs represent an approximate boundary between soil types, but these transitions can be gradual.

GEOTECHNICAL BORING LOG LB-1

Project No. 13893.001
Project Costa Mesa Fire Station No. 4
Drilling Co. Matini Drilling
Drilling Method Hollow Stem Auger - Autohammer
Location See Figure 2 - Exploration Location Map

Date Drilled 5-4-23
Logged By AA
Hole Diameter 8"
Ground Elevation 82'
Sampled By AA

Elevation Feet	Depth Feet	Graphic Log	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
	0	N S			Bulk Driven				@Surface: ASPHALT 3-inches over 11-inches BASE	
	80			B-1					Artificial Fill (Afu)	
				R-1	3 7 14			CL	@2.5': LEAN CLAY (CL), stiff, brown, moist, 95% medium plasticity fines (field estimate)	
	5			R-2	6 13 25	117	15	CL	Old Paralic Deposits (Qol) @5': LEAN CLAY (CL), very stiff, brown, moist, high toughness, 95% medium plasticity fines (field estimate)	
	75			R-3	5 6 11			SP-SM	@7.5': POORLY GRADED SAND WITH SILT (SP-SM), medium dense, tan, slightly moist, fine to coarse sand, 9% fines (lab)	-200, CO
	10			R-4	6 11 17			SP	@10': POORLY GRADED SAND (SP), medium dense, tan, moist, fine to coarse sand, 5% fines (field estimate)	
	70			S-1	4 6 12			SP	@15': POORLY GRADED SAND (SP), medium dense, orange brown, moist, coarse sand, 5% fines (field estimate)	
	15			R-5	9 25 46			SM	@20': SILTY SAND (SM), dense, olive, slightly moist, fine to medium sand, 25% fines (field estimate)	
	60			S-2	9 19 28			SM	@25': SILTY SAND (SM), dense, olive, slightly moist, fine to medium sand, 35% fines (field estimate)	
	25									
	55									
	30									

SAMPLE TYPES:

- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:

- 200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL

- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

*** This log is a part of a report by Leighton and should not be used as a stand-alone document. ***

GEOTECHNICAL BORING LOG LB-1

Project No.	13893.001	Date Drilled	5-4-23
Project	Costa Mesa Fire Station No. 4	Logged By	AA
Drilling Co.	Matini Drilling	Hole Diameter	8"
Drilling Method	Hollow Stem Auger - Autohammer	Ground Elevation	82'
Location	See Figure 2 - Exploration Location Map	Sampled By	AA

Elevation Feet	Depth Feet	Graphic Log	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
		N S			Bulk Driven				This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.	
30				R-6	15 41 50/3"			SM	@30': SILTY SAND (SM), very dense, olive, slightly moist, fine to medium sand, 35% fines (field estimate)	
50				S-3	3 4 6		33	CL	@35': LEAN CLAY (CL), stiff, dark brown/gray, moist, high toughness, 94% high plasticity fines (lab)	-200, AL
35									TOTAL DEPTH = 36.5 FEET NO GROUNDWATER ENCOUNTERED BACKFILLED TO SURFACE WITH SOIL CUTTINGS AND CONCRETE WITH BLACK DYE	
45										
40										
40										
45										
35										
50										
30										
55										
25										
60										

SAMPLE TYPES: B BULK SAMPLE C CORE SAMPLE G GRAB SAMPLE R RING SAMPLE S SPLIT SPOON SAMPLE T TUBE SAMPLE	TYPE OF TESTS: -200 % FINES PASSING AL ATTERBERG LIMITS CN CONSOLIDATION CO COLLAPSE CR CORROSION CU UNDRAINED TRIAXIAL	DS DIRECT SHEAR EI EXPANSION INDEX H HYDROMETER MD MAXIMUM DENSITY PP POCKET PENETROMETER RV R VALUE SA SIEVE ANALYSIS SE SAND EQUIVALENT SG SPECIFIC GRAVITY UC UNCONFINED COMPRESSIVE STRENGTH
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GEOTECHNICAL BORING LOG LB-2

Project No. 13893.001
Project Costa Mesa Fire Station No. 4
Drilling Co. Matini Drilling
Drilling Method Hollow Stem Auger - Autohammer
Location See Figure 2 - Exploration Location Map

Date Drilled 5-4-23
Logged By AA
Hole Diameter 8"
Ground Elevation 81'
Sampled By AA

Elevation Feet	Depth Feet	Graphic Log	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
	0	N S							This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.	
80		BULK DRIVEN		B-1				CL	@Surface: ASPHALT 4-inches over 5-inches BASE	RV, CR
				R-1	4 6 11	115	15	CL	Artificial Fill (Afu) @1': LEAN CLAY with SAND (CL), brown, slightly moist, fine to coarse sand, 80% fines (field estimate)	
	5			R-2	4 7 11			CL	Old Paralic Deposits (Qol) @2.5': LEAN CLAY with SAND (CL), stiff, brown, slightly moist, fine to coarse sand, 80% medium plasticity fines (field estimate)	
75				R-3	4 9 13	103	25	CL	@7.5': LEAN CLAY (CL), stiff, brown, moist, high toughness, 95% medium plasticity fines (field estimate)	CO
	10			R-4	5 9 12	103	5	CL	@10': LEAN CLAY (CL), stiff, brown, moist, high toughness, 95% medium plasticity fines (field estimate)	
	15			S-1	8 14 18			SM	@15': SILTY SAND (SM), dense, grayish brown, slightly moist, fine to medium sand, 30% fines (field estimate)	
65									@18': Auger chatter for 3 inches	
	20			R-5	27 40 50/3"			SM	@20': SILTY SAND (SM), very dense, grayish brown, slightly moist, fine to medium sand, trace of seashells, 20% fines (field estimate)	
60				S-2	13 19 20			SP	@25': POORLY GRADED SAND (SP), dense, olive, slightly moist, medium to coarse sand, some seashells present, 5% fines (field estimate)	
55										
	30								TOTAL DEPTH = 26.5 FEET NO GROUNDWATER ENCOUNTERED BACKFILLED TO SURFACE WITH SOIL CUTTINGS AND CONCRETE WITH BLACK DYE	

- | | | | |
|---|--|---|--|
| SAMPLE TYPES:
B BULK SAMPLE
C CORE SAMPLE
G GRAB SAMPLE
R RING SAMPLE
S SPLIT SPOON SAMPLE
T TUBE SAMPLE | TYPE OF TESTS:
-200 % FINES PASSING
AL ATTERBERG LIMITS
CN CONSOLIDATION
CO COLLAPSE
CR CORROSION
CU UNDRAINED TRIAXIAL | DS DIRECT SHEAR
EI EXPANSION INDEX
H HYDROMETER
MD MAXIMUM DENSITY
PP POCKET PENETROMETER
RV R VALUE | SA SIEVE ANALYSIS
SE SAND EQUIVALENT
SG SPECIFIC GRAVITY
UC UNCONFINED COMPRESSIVE STRENGTH |
|---|--|---|--|



GEOTECHNICAL BORING LOG LB-3

Project No.	13893.001	Date Drilled	5-4-23
Project	Costa Mesa Fire Station No. 4	Logged By	AA
Drilling Co.	Matini Drilling	Hole Diameter	8"
Drilling Method	Hollow Stem Auger - Autohammer	Ground Elevation	80'
Location	See Figure 2 - Exploration Location Map	Sampled By	AA

Elevation Feet	Depth Feet	Graphic Log	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
80	0	N S							@Surface: ASPHALT 8.5-inches over 5-inches BASE	
		Bulk Driven		B-1				CL	Artificial Fill (Afu) @1.5': LEAN CLAY (CL), brown, slightly moist	MD, SA, EI
				R-1	5 10 18	116	15	CL	Old Paralic Deposits (Qol) @2.5': LEAN CLAY (CL), very stiff, brown, dry, medium to high toughness, high dry strength, 65% medium plasticity fines (lab)	
75	5			R-2	6 10 12	102	11	ML	@5': SANDY SILT (ML), stiff, brown, slightly moist, very fine sand, 70% nonplastic fines, (field estimate)	
				R-3	4 12 23	100	23	CL	@7.5': LEAN CLAY with SAND (CL), very stiff, light brown, slightly moist, fine sand, 85% medium plasticity fines (field estimate)	
70	10			R-4	8 16 25	94	13	SM	@10': SILTY SAND (SM), medium dense, olive brown, slightly moist, fine sand, 25% fines (field estimate)	
				S-1	8 13 19			SM	@15': SILTY SAND (SM), medium dense, gray, slightly moist, medium to coarse sand, micaceous, 15% fines (field estimate)	
60	20			R-5	15 33 50/5"			SM	@20': SILTY SAND (SM), very dense, gray, slightly moist, medium to coarse sand, micaceous, 15% fines (field estimate)	
55	25			S-2	10 21 26			SM	@25': SILTY SAND (SM), dense, gray, slightly moist, fine sand, micaceous, 15% fines (field estimate)	
50	30									

SAMPLE TYPES:

- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:

- 200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL

- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE

- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH



GEOTECHNICAL BORING LOG LB-3

Project No. 13893.001
Project Costa Mesa Fire Station No. 4
Drilling Co. Matini Drilling
Drilling Method Hollow Stem Auger - Autohammer
Location See Figure 2 - Exploration Location Map

Date Drilled 5-4-23
Logged By AA
Hole Diameter 8"
Ground Elevation 80'
Sampled By AA

Elevation Feet	Depth Feet	Graphic Log	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
50	30	N S		R-6	16 41 50/5"			SP-SM	@30': POORLY GRADED SAND WITH SILT (SP-SM), very dense, olive brown, moist, fine to coarse sand, 10% fines (field estimate)	
45	35			S-3	2 4 6			CH	@35': FAT CLAY (CH), stiff, dark brown/gray, moist, high toughness, 95% high plasticity fines (field estimate)	
40	40			R-7	6 12 17	91	32	CH	@40': FAT CLAY (CH), very stiff, dark brown/gray, moist, high toughness, 99% high plasticity fines (lab)	-200, AL
35	45			S-4	6 8 10			CH	@45': FAT CLAY (CH), very stiff, dark brown/gray, moist, high toughness, 95% high plasticity fines (field estimate) @46.25': SANDY FAT CLAY (CH), very stiff, dark brown/gray, coarse sand, 60% high plasticity fines (field estimate)	
30	50	N S		R-8	30 50/6"			SP	@50': POORLY GRADED SAND (SP), very dense, gray, moist, coarse sand, 5% fines (field estimate)	
25	55								TOTAL DEPTH = 51 FEET NO GROUNDWATER ENCOUNTERED BACKFILLED TO SURFACE WITH SOIL CUTTINGS AND CONCRETE WITH BLACK DYE	
20	60									

SAMPLE TYPES:
 B BULK SAMPLE
 C CORE SAMPLE
 G GRAB SAMPLE
 R RING SAMPLE
 S SPLIT SPOON SAMPLE
 T TUBE SAMPLE

TYPE OF TESTS:
 -200 % FINES PASSING
 AL ATTERBERG LIMITS
 CN CONSOLIDATION
 CO COLLAPSE
 CR CORROSION
 CU UNDRAINED TRIAXIAL

DS DIRECT SHEAR
 EI EXPANSION INDEX
 H HYDROMETER
 MD MAXIMUM DENSITY
 PP POCKET PENETROMETER
 RV R VALUE

SA SIEVE ANALYSIS
 SE SAND EQUIVALENT
 SG SPECIFIC GRAVITY
 UC UNCONFINED COMPRESSIVE STRENGTH



*** This log is a part of a report by Leighton and should not be used as a stand-alone document. ***

GEOTECHNICAL BORING LOG LB-4

Project No.	13893.001	Date Drilled	5-4-23
Project	Costa Mesa Fire Station No. 4	Logged By	AA
Drilling Co.	Matini Drilling	Hole Diameter	8"
Drilling Method	Hollow Stem Auger - Autohammer	Ground Elevation	81'
Location	See Figure 2 - Exploration Location Map	Sampled By	AA

Elevation Feet	Depth Feet	Graphic Log	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
	0	N W E S							<p><i>This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.</i></p> <p>@Surface: ASPHALT 4-inches over 5-inches BASE</p>	
80									<p>Artificial Fill (Afu) @1': LEAN CLAY (CL), brown, slightly moist</p>	
				R-1	6 14 16			CL	<p>Old Paralic Deposits (Qol) @2.5': LEAN CLAY (CL), stiff, brown, slightly moist, 95% medium plasticity fines (field estimate)</p>	
75	5			R-2	8 12 18	115	15	CL	@5': LEAN CLAY (CL), stiff, brown, slightly moist, 95% medium plasticity fines (field estimate)	
				R-3	3 5 15	109	19	CL SM	@7.5': LEAN CLAY (CL), stiff, brown, slightly moist, 95% medium plasticity fines (field estimate) @8.5': SILTY SAND (SM), medium dense, brown, slightly moist, fine to medium sand, 15% fines (field estimate)	
70	10			R-4	6 12 19	98	22	CH	@10': FAT CLAY (CH), stiff, light brown, slightly moist, slow dilatency, 95% high plasticity fines (field estimate)	
				S-1	4 14 14			CH SM	@15': FAT CLAY (CH), light brown, slightly moist, slow dilatency, 95% high plasticity fines (field estimate) @16': SILTY SAND (SM), medium dense, grayish brown, slightly moist, fine to medium sand, 30% fines (field estimate)	
65	15									
				R-5	11 25 50/6"			SM	@20': SILTY SAND (SM), very dense, grayish, slightly moist, fine to medium sand, 20% fines (field estimate)	
60	20								<p>TOTAL DEPTH = 21.5 FEET NO GROUNDWATER ENCOUNTERED BACKFILLED TO SURFACE WITH SOIL CUTTINGS AND CONCRETE WITH BLACK DYE</p>	
	25									
55										
	30									

SAMPLE TYPES: B BULK SAMPLE C CORE SAMPLE G GRAB SAMPLE R RING SAMPLE S SPLIT SPOON SAMPLE T TUBE SAMPLE	TYPE OF TESTS: -200 % FINES PASSING AL ATTERBERG LIMITS CN CONSOLIDATION CO COLLAPSE CR CORROSION CU UNDRAINED TRIAXIAL	DS DIRECT SHEAR EI EXPANSION INDEX H HYDROMETER MD MAXIMUM DENSITY PP POCKET PENETROMETER RV R VALUE	SA SIEVE ANALYSIS SE SAND EQUIVALENT SG SPECIFIC GRAVITY UC UNCONFINED COMPRESSIVE STRENGTH
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GEOTECHNICAL BORING LOG LI-1

Project No.	13893.001	Date Drilled	5-4-23
Project	Costa Mesa Fire Station No. 4	Logged By	AA
Drilling Co.	Matini Drilling	Hole Diameter	8"
Drilling Method	Hollow Stem Auger - Autohammer	Ground Elevation	77'
Location	See Figure 2 - Exploration Location Map	Sampled By	AA

Elevation Feet	Depth Feet	Graphic Log	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
	0	N S							<i>This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.</i>	
	75	N S						CL	@Surface: ASPHALT 3-inches over 8-inches BASE Artificial Fill (Afu) @1': LEAN CLAY (CL), brown, slightly moist	
	5	N S							Old Paralic Deposits (Qol)	
	70	N S						CL	@5': LEAN CLAY (CL), brown, slightly moist, 95% medium plasticity fines (field estimate)	
	10	N S						SP-SM	@10': POORLY GRADED SAND WITH SILT (SP-SM), olive brown, slightly moist, fine sand, 10% fines (field estimate)	
	65	N S							@15': As above	
	15	N S								
	60	N S								
	20	N S		S-1	6 18 27			CL SP-SM	@20': LEAN CLAY (CL), brown, slightly moist, 95% medium plasticity fines (field estimate) @20.5': POORLY GRADED SAND WITH SILT (SP-SM), dense, gray, slightly moist, fine to medium sand, 10% fines (field estimate)	
	55	N S		S-2	12 19 23			SP-SM	@23.5': POORLY GRADED SAND WITH SILT (SP-SM), dense, gray, slightly moist, fine to medium sand, 7% fines (lab)	-200
	25	N S							TOTAL DEPTH = 25 FEET NO GROUNDWATER ENCOUNTERED INFILTRATION TEST PERFORMED AT 19.5 to 24.5 FEET BACKFILLED TO SURFACE WITH SOIL CUTTINGS AND CONCRETE WITH BLACK DYE	
	50	N S								
	30	N S								

SAMPLE TYPES:

B BULK SAMPLE
 C CORE SAMPLE
 G GRAB SAMPLE
 R RING SAMPLE
 S SPLIT SPOON SAMPLE
 T TUBE SAMPLE

TYPE OF TESTS:

-200 % FINES PASSING
 AL ATTERBERG LIMITS
 CN CONSOLIDATION
 CO COLLAPSE
 CR CORROSION
 CU UNDRAINED TRIAXIAL

DS DIRECT SHEAR
 EI EXPANSION INDEX
 H HYDROMETER
 MD MAXIMUM DENSITY
 PP POCKET PENETROMETER
 RV R VALUE

SA SIEVE ANALYSIS
 SE SAND EQUIVALENT
 SG SPECIFIC GRAVITY
 UC UNCONFINED COMPRESSIVE STRENGTH



GEOTECHNICAL BORING LOG LI-2

Project No.	13893.001	Date Drilled	5-4-23
Project	Costa Mesa Fire Station No. 4	Logged By	AA
Drilling Co.	Matini Drilling	Hole Diameter	8"
Drilling Method	Hollow Stem Auger - Autohammer	Ground Elevation	77'
Location	See Figure 2 - Exploration Location Map	Sampled By	AA

Elevation Feet	Depth Feet	Graphic Log	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
									This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.	
	0	Z 6							@Surface: ASPHALT 3-inches over 8-inches BASE	
	75							CL	Artificial Fill (Afu) @1': LEAN CLAY (CL), brown, slightly moist	
	5								Old Paralic Deposits (Qol)	
	70							CL	@5': LEAN CLAY (CL), brown, slightly moist, 95% medium plasticity fines (field estimate)	
	10			S-1	5 10 11			SP-SM	@10': POORLY GRADED SAND WITH SILT (SP-SM), medium dense, gray, slightly moist, fine to medium sand, 10% fines (field estimate)	
	65			S-2	9 16 19			SP-SM	@13.5': POORLY GRADED SAND WITH SILT (SP-SM), dense, gray, slightly moist, fine to medium sand, 10% fines (lab)	-200
	15								TOTAL DEPTH = 15 FEET NO GROUNDWATER ENCOUNTERED INFILTRATION TEST PERFORMED AT 10 to 15 FEET BACKFILLED TO SURFACE WITH SOIL CUTTINGS AND CONCRETE WITH BLACK DYE	
	60									
	20									
	55									
	25									
	50									
	30									
SAMPLE TYPES:			TYPE OF TESTS:							
B	BULK SAMPLE	-200	% FINES PASSING	DS	DIRECT SHEAR	SA	SIEVE ANALYSIS			
C	CORE SAMPLE	AL	ATTERBERG LIMITS	EI	EXPANSION INDEX	SE	SAND EQUIVALENT			
G	GRAB SAMPLE	CN	CONSOLIDATION	H	HYDROMETER	SG	SPECIFIC GRAVITY			
R	RING SAMPLE	CO	COLLAPSE	MD	MAXIMUM DENSITY	UC	UNCONFINED COMPRESSIVE STRENGTH			
S	SPLIT SPOON SAMPLE	CR	CORROSION	PP	POCKET PENETROMETER					
T	TUBE SAMPLE	CU	UNDRAINED TRIAXIAL	RV	R VALUE					



APPENDIX B

GEOTECHNICAL LABORATORY TESTING

Our geotechnical laboratory testing program was directed toward a quantitative and qualitative evaluation of physical and mechanical properties of soils underlying proposed improvements, and to aid in verifying soil classification.

In-Situ Moisture and Density: As-sampled soil moisture content was measured (ASTM D 2216) on selected samples recovered from our borings. In addition, in place dry density was measured (ASTM D 2937) on selected relatively undisturbed soil samples. Results of these tests are shown on our logs at the appropriate sample depths in Appendix A.

Percent Passing No. 200 Sieve: Percent fines (silt and clay) passing the No. 200 U.S. Standard Sieve was determined for soil samples in accordance with ASTM D 1140 Standard Test Method. Samples were dried and passed through a No. 4 sieve, then a No. 200 sieve. Result of this grain size analysis, as percent by dry weight passing the No. 200 U.S. Standard Sieve, is tabulated in this appendix and entered on our test pit logs.

Particle Size (Sieve) Analysis: Particle size analysis of bulk soil samples by passing sieves was evaluated using the ASTM D 6913 Standard Test Method. Results of these analysis are presented on the *Particle-Size Distribution ASTM D 6913* sheets in this appendix.

Modified Proctor Compaction Curve: A laboratory modified Proctor compaction curve (ASTM D1557) was established for bulk soil-sample to evaluate the modified Proctor laboratory maximum dry density and optimum moisture content. Results of this test are presented on the following *Modified Proctor Compaction Test* sheet in this appendix.

Corrosivity Tests: To evaluate corrosion potential of subsurface soils at the site, we tested a bulk soil sample collected during our subsurface exploration for pH, electrical resistivity (CTM 532/643), soluble sulfate content (CTM 417 Part II) and soluble chloride content (CTM 422) testing. Results of these tests are enclosed at the end of this appendix.

Expansion Index (EI): An Expansion Index (EI) test was performed on a representative shallow bulk soil sample from this site, in general accordance with the ASTM D4829 Standard Test Method. Results of this test are presented on the following "*Expansion Index of Soils*" table.

Swell or Collapse of Soils (CO): Swell or collapse of soil tests were performed on relatively-undisturbed ring-lined drive-sampler soil samples, to measure the magnitude of one-dimensional wetting-induced swell or collapse on unsaturated soils. Results are presented in this appendix on the *One-Dimensional Swell or Collapse of Soils* (ASTM D 4546) sheets.

Resistance Value (R-Value): R-Value for a shallow bulk soil sample was established by California Test Method 301 to assist in preliminary pavement design recommendations. R-Value results are presented in this appendix on the *R-Value Test Results* sheets.

MODIFIED PROCTOR COMPACTION TEST

ASTM D 1557

Project Name: PBK/Costa Mesa FS No. 4 Training Tested By: J. Foltz Date: 05/31/23
 Center
 Project No.: 13893.001 Input By: M. Vinet Date: 06/01/23
 Boring No.: LB-3 Depth (ft.): N/A
 Sample No.: B-1
 Soil Identification: Sandy Lean Clay s(CL), Yellowish Brown.

Preparation Method:

Moist
 Dry

Mechanical Ram
 Manual Ram

Mold Volume (ft³)

0.03340

Ram Weight = 10 lb.; Drop = 18 in.

TEST NO.	1	2	3	4	5	6
Wt. Compacted Soil + Mold (g)	5480	5558	5508			
Weight of Mold (g)	3521	3521	3521			
Net Weight of Soil (g)	1959	2037	1987			
Wet Weight of Soil + Cont. (g)	1244.8	1593.9	1271.0			
Dry Weight of Soil + Cont. (g)	1158.6	1458.0	1152.5			
Weight of Container (g)	279.1	277.3	278.0			
Moisture Content (%)	9.8	11.5	13.6			
Wet Density (pcf)	129.3	134.5	131.2			
Dry Density (pcf)	117.8	120.6	115.5			

Maximum Dry Density (pcf)

120.6

Optimum Moisture Content (%)

11.5

PROCEDURE USED

Procedure A
 Soil Passing No. 4 (4.75 mm) Sieve
 Mold : 4 in. (101.6 mm) diameter
 Layers : 5 (Five)
 Blows per layer : 25 (twenty-five)
 May be used if +#4 is 20% or less

Procedure B
 Soil Passing 3/8 in. (9.5 mm) Sieve
 Mold : 4 in. (101.6 mm) diameter
 Layers : 5 (Five)
 Blows per layer : 25 (twenty-five)
 Use if +#4 is >20% and +3/8 in. is 20% or less

Procedure C
 Soil Passing 3/4 in. (19.0 mm) Sieve
 Mold : 6 in. (152.4 mm) diameter
 Layers : 5 (Five)
 Blows per layer : 56 (fifty-six)
 Use if +3/8 in. is >20% and +3/4 in. is <30%

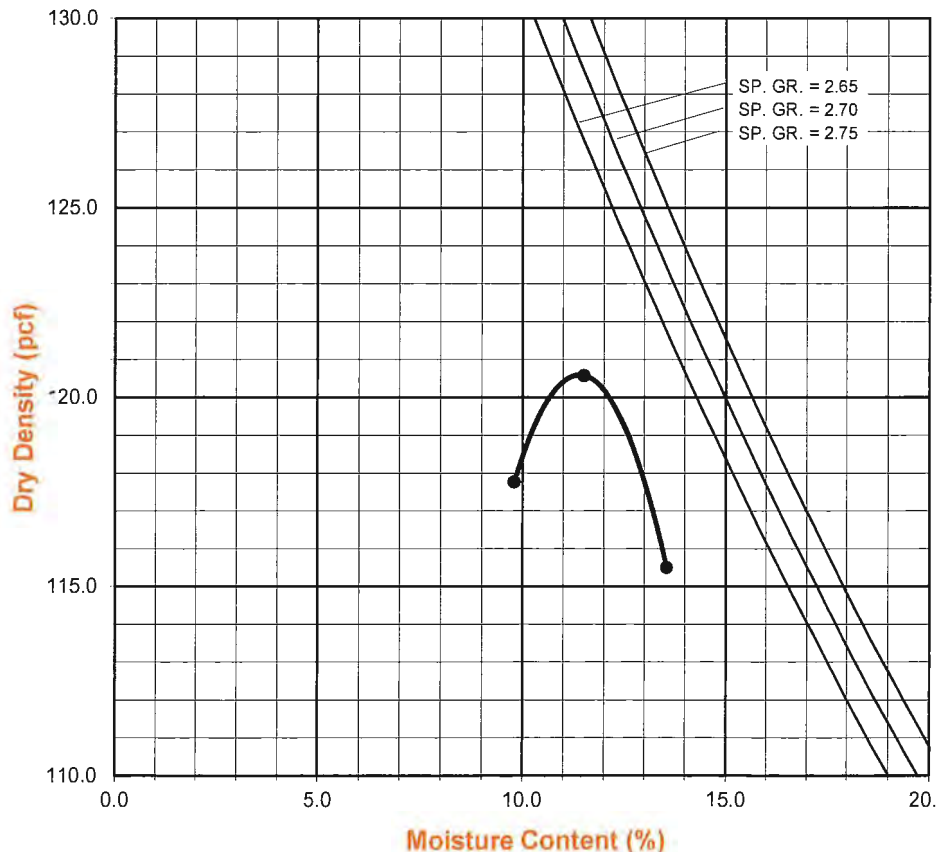
Particle-Size Distribution:

0:35:65

GR:SA:FI

Atterberg Limits:

LL, PL, PI





**PARTICLE-SIZE DISTRIBUTION (GRADATION)
of SOILS USING SIEVE ANALYSIS
ASTM D 6913**

Project Name: PBK/Costa Mesa FS No. 4 Training Center Tested By: MRV Date: 05/31/23
 Project No.: 13893.001 Checked By: MRV Date: 06/01/23
 Boring No.: LB-3 Depth (feet): 0 - 5.0
 Sample No.: B-1
 Soil Identification: Sandy Lean Clay s(CL), Yellowish Brown.

		Moisture Content of Total Air - Dry Soil	
Container No.:	BL	Wt. of Air-Dry Soil + Cont. (g)	652.0
Wt. of Air-Dried Soil + Cont.(g)	652.0	Wt. of Dry Soil + Cont. (g)	602.8
Wt. of Container (g)	278.7	Wt. of Container No. _____ (g)	278.7
Dry Wt. of Soil (g)	324.1	Moisture Content (%)	15.2

After Wet Sieve	Container No.	BL
	Wt. of Dry Soil + Container (g)	405.4
	Wt. of Container (g)	278.7
	Dry Wt. of Soil Retained on # 200 Sieve (g)	126.7

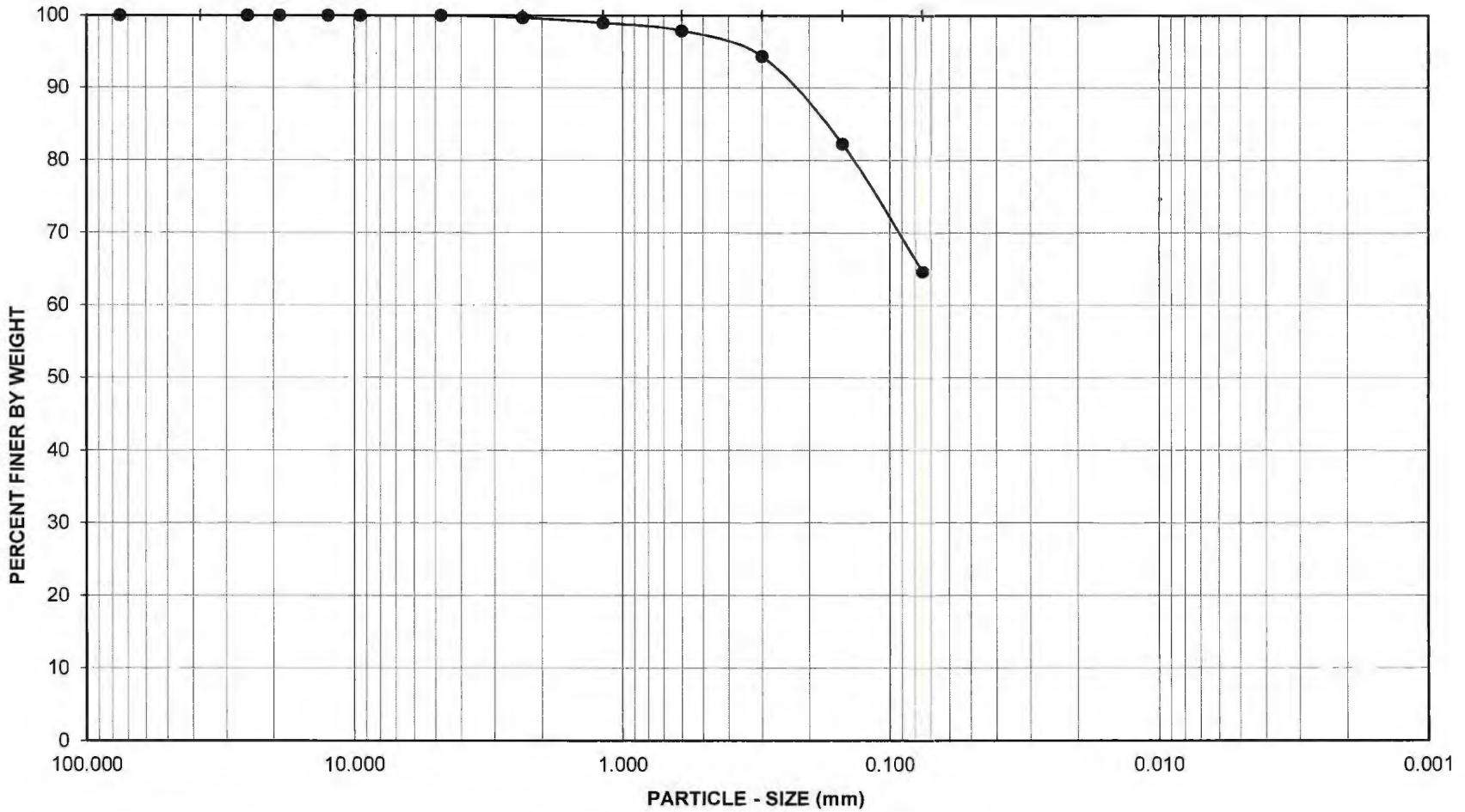
U. S. Sieve Size		Cumulative Weight Dry Soil Retained (g)	Percent Passing (%)
(in.)	(mm.)		
3"	75.000		100.0
1"	25.000		100.0
3/4"	19.000		100.0
1/2"	12.500		100.0
3/8"	9.500		100.0
#4	4.750	0.0	100.0
#8	2.360	1.0	99.7
#16	1.180	3.3	99.0
#30	0.600	6.8	97.9
#50	0.300	18.5	94.3
#100	0.150	57.7	82.2
#200	0.075	115.0	64.5
PAN			


GRAVEL: **0 %**
 SAND: **35 %**
 FINES: **65 %**
 GROUP SYMBOL: **s(CL)**

Cu = D60/D10 = N/A
 Cc = (D30)²/(D60*D10) = N/A

Remarks: _____

GRAVEL				SAND				FINES				
COARSE		FINE		COARSE	MEDIUM	FINE		SILT		CLAY		
U.S. STANDARD SIEVE OPENING				U.S. STANDARD SIEVE NUMBER				HYDROMETER				
3.0"	1 1/2"	3/4"	3/8"	#4	#8	#16	#30	#50	#100	#200		



Boring No.	LB-1	LB-1	LB-3	IT-1	IT-2			
Sample No.	R-3	S-3	R-7	S-2	S-2			
Depth (ft.)	7.5	35.0	40.0	23.5	13.5			
Sample Type	RING	SPT	RING	SPT	SPT			
Soil Classification	SP-SM	CL	CH	SP-SM	SP-SM			
Soak Time (min)	10	10	10	10	10			
Moisture Correction								
Wet Weight of Soil + Container (gm.)	507.9	560.3	586.2	644.2	586.0			
Dry Weight of Soil + Container (gm.)	499.7	491.4	511.9	629.4	576.4			
Weight of Container (gm)	278.3	279.2	276.5	277.7	278.8			
Moisture Content (%)	3.7	32.5	31.6	4.2	3.2			
Container No.:	LB-1	AL	R2	AB	BL			
Sample Dry Weight Determination								
Weight of Sample + Container (gm.)	499.7	491.4	511.9	629.4	576.4			
Weight of Container (gm.)	278.3	279.2	276.5	277.7	278.8			
Weight of Dry Sample (gm.)	221.4	212.2	235.4	351.7	297.6			
Container No.:	LB-1	AL	R2	AB	BL			
After Wash								
Dry Weight of Sample + Container (gm)	479.5	292.3	278.0	604.8	546.8			
Weight of Container (gm)	278.3	279.2	276.5	277.7	278.8			
Dry Weight of Sample (gm)	201.2	13.1	1.5	327.1	268.0			
% Passing No. 200 Sieve	9	94	99	7	10			
% Retained No. 200 Sieve	91	6	1	93	90			
	PERCENT PASSING No. 200 SIEVE ASTM D 1140				Project Name: Costa Mesa FS No. 4 Training Center			
					Project No.: 13893.001			
					Client Name: PBK Architects			
					Tested By: M. Vinet		Date: 05/29/23	

Project Name: PBK/Costa Mesa FS No. 4 Training Center Tested By: M. Vinet Date: 06/01/23
 Project No. : 13893.001 Input By: M. Vinet Date: 06/01/23
 Boring No.: LB-1 Checked By: M. Vinet
 Sample No.: S-3 Depth (ft.) 35.0
 Soil Identification: Lean Clay (CL), Black.

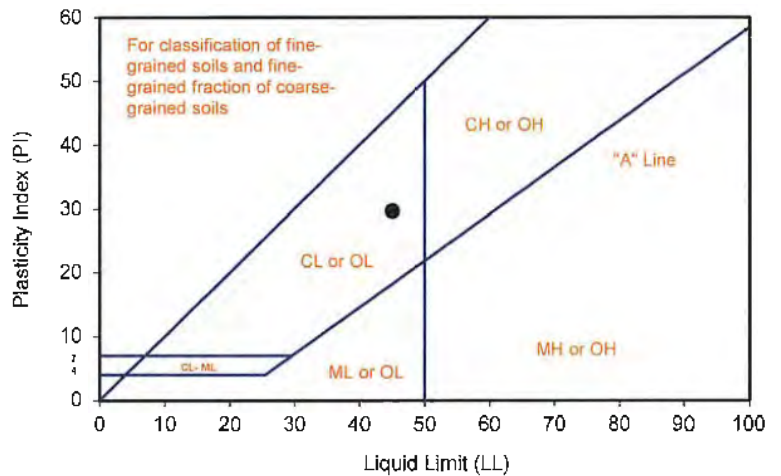
TEST NO.	PLASTIC LIMIT		LIQUID LIMIT			
	1	2	1	2	3	4
Number of Blows [N]			18	24	30	
Wet Wt. of Soil + Cont. (g)	22.64	24.67	26.13	26.22	27.50	
Dry Wt. of Soil + Cont. (g)	21.44	23.25	22.11	22.34	23.39	
Wt. of Container (g)	13.76	13.78	13.82	13.79	13.70	
Moisture Content (%) [W _n]	15.63	14.99	48.49	45.38	42.41	

Liquid Limit	45
Plastic Limit	15
Plasticity Index	30
Classification	CL

PI at "A" - Line = $0.73(LL-20)$ 18.25

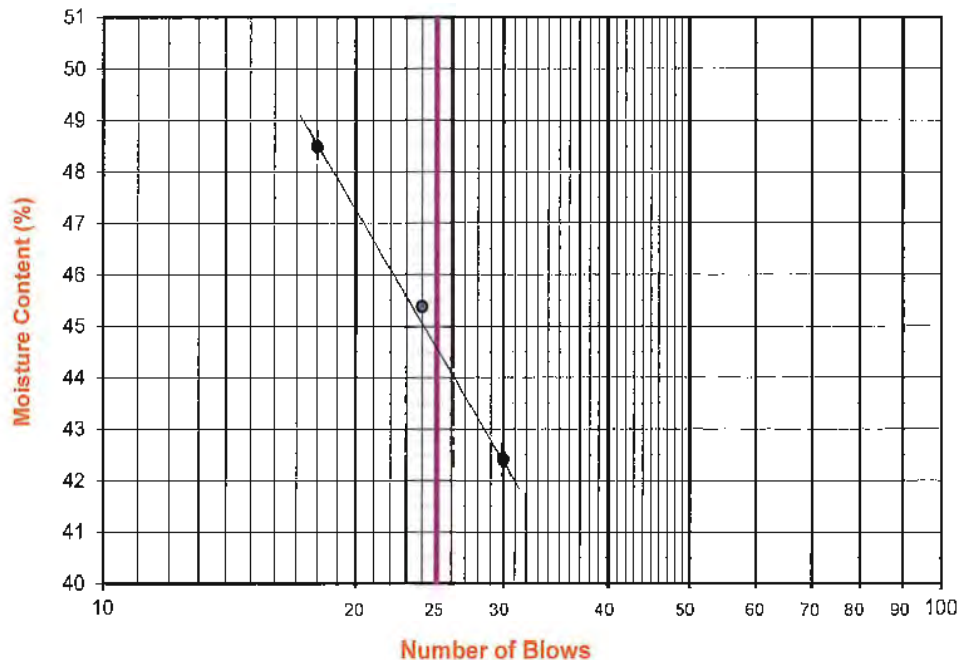
One - Point Liquid Limit Calculation

$$LL = W_n(N/25)^{0.121}$$



PROCEDURES USED

- Wet Preparation Multipoint - Wet
- Dry Preparation Multipoint - Dry
- Procedure A Multipoint Test
- Procedure B One-point Test



Project Name: PBK/Costa Mesa FS No. 4 Training Tested By: M. Vinet Date: 06/01/23
 Project No. : 13893.001 Input By: M. Vinet Date: 06/01/23
 Boring No.: LB-3 Checked By: M. Vinet
 Sample No.: R-7 Depth (ft.) 40.0
 Soil Identification: Fat Clay (CH), Black.

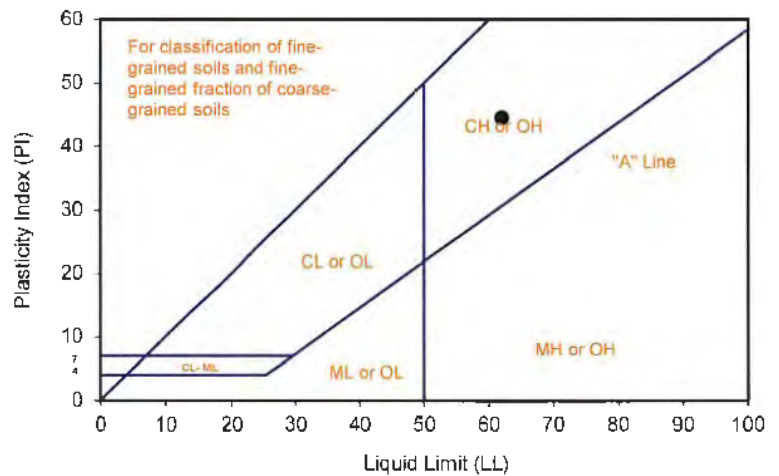
TEST NO.	PLASTIC LIMIT		LIQUID LIMIT			
	1	2	1	2	3	4
Number of Blows [N]			15	21	31	
Wet Wt. of Soil + Cont. (g)	25.57	23.27	22.50	23.46	23.60	
Dry Wt. of Soil + Cont. (g)	23.77	21.88	19.02	19.73	19.86	
Wt. of Container (g)	13.77	13.67	13.78	13.85	13.63	
Moisture Content (%) [Wn]	18.00	16.93	66.41	63.44	60.03	

Liquid Limit	62
Plastic Limit	17
Plasticity Index	45
Classification	CH

PI at "A" - Line = $0.73(LL-20)$ = 30.66

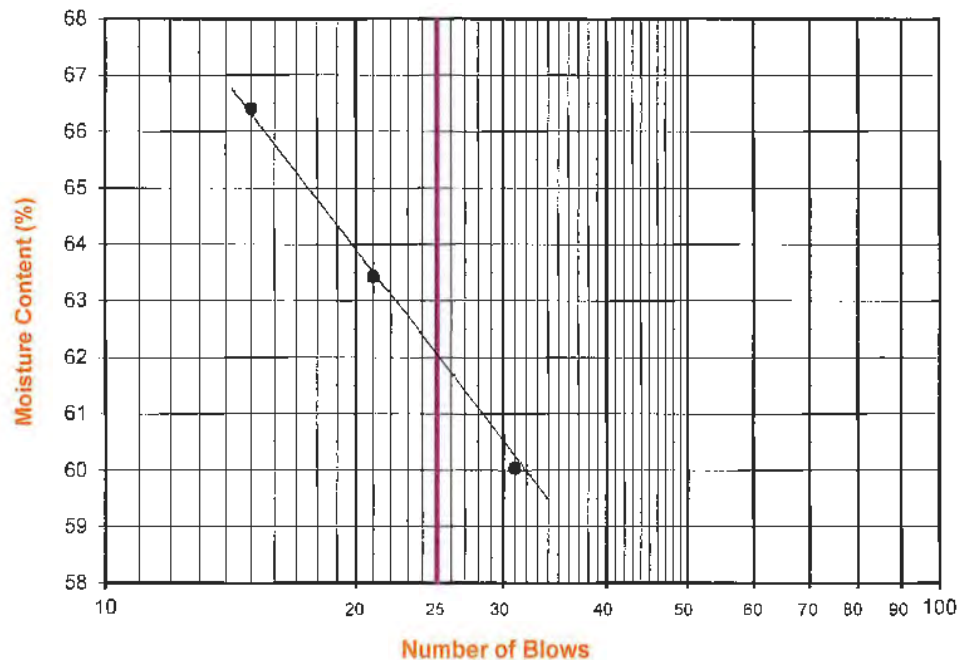
One - Point Liquid Limit Calculation

$$LL = Wn(N/25)^{0.121}$$



PROCEDURES USED

- Wet Preparation
Multipoint - Wet
- Dry Preparation
Multipoint - Dry
- Procedure A
Multipoint Test
- Procedure B
One-point Test





EXPANSION INDEX of SOILS
ASTM D 4829

Project Name: PBK/Costa Mesa FS No. 4 Training Center Tested By: M. Vinet Date: 5/31/23
 Project No. : 13893.001 Checked By: M. Vinet Date: 6/1/23
 Boring No.: LB-3 Depth: 0 - 5.0
 Sample No. : B-1 Location: N/A
 Sample Description: Sandy Lean Clay s(CL), Yellowish Brown.

Dry Wt. of Soil + Cont. (gm.)	2512.2
Wt. of Container No. (gm.)	0.0
Dry Wt. of Soil (gm.)	2512.2
Weight Soil Retained on #4 Sieve	0.0
Percent Passing # 4	100.0

MOLDED SPECIMEN	Before Test	After Test
Specimen Diameter (in.)	4.01	4.01
Specimen Height (in.)	1.0000	1.0610
Wt. Comp. Soil + Mold (gm.)	579.6	612.1
Wt. of Mold (gm.)	177.7	177.7
Specific Gravity (Assumed)	2.70	2.70
Container No.	7	7
Wet Wt. of Soil + Cont. (gm.)	579.9	612.1
Dry Wt. of Soil + Cont. (gm.)	552.6	365.4
Wt. of Container (gm.)	279.9	177.7
Moisture Content (%)	10.0	18.9
Wet Density (pcf)	121.2	123.5
Dry Density (pcf)	110.2	103.9
Void Ratio	0.530	0.623
Total Porosity	0.346	0.384
Pore Volume (cc)	71.7	84.3
Degree of Saturation (%) [S meas]	51.0	81.9

SPECIMEN INUNDATION in distilled water for the period of 24 h or expansion rate < 0.0002 in./h.

Date	Time	Pressure (psi)	Elapsed Time (min.)	Dial Readings (in.)
5/31/23	9:00	1.0	0	0.5000
5/31/23	9:10	1.0	10	0.5000
Add Distilled Water to the Specimen				
6/1/23	8:00	1.0	1370	0.5610
6/1/23	9:00	1.0	1430	0.5610

Expansion Index (EI meas) = ((Final Rdg - Initial Rdg) / Initial Thick.) x 1000	61.0
Expansion Index (Report) = Nearest Whole Number or Zero (0) if Initial Height is > than Final Height	61



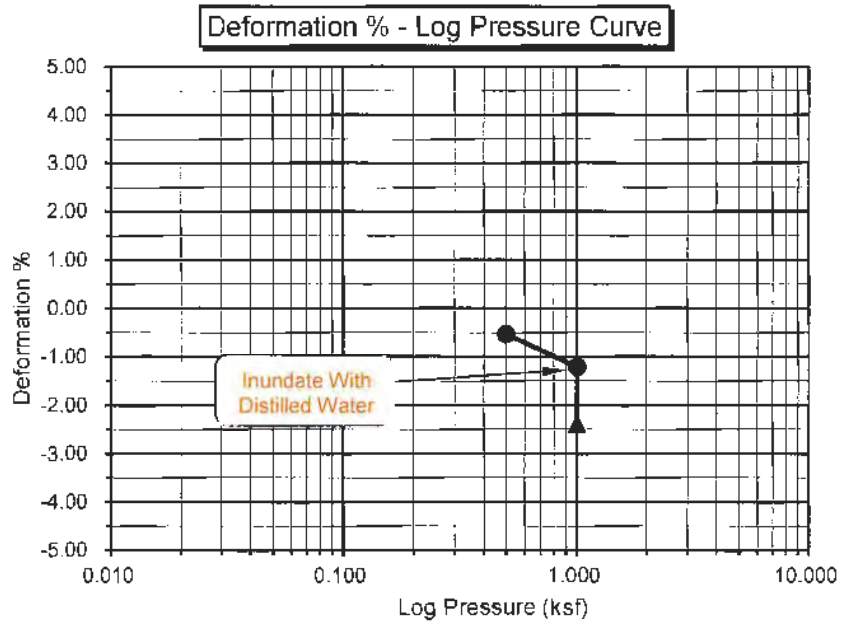
One-Dimensional Swell or Settlement Potential of Cohesive Soils (ASTM D 4546) – Method 'B'

Project Name: PBK/Costa Mesa FS No. 4 Training Center Tested By: M. Vinet Date: 5/29/23
 Project No.: 13893.001 Checked By: M. Vinet Date: 6/1/23
 Boring No.: LB-1 Sample Type: IN SITU
 Sample No.: R-3 Depth (ft.) 7.5
 Sample Description: Poorly Graded Sand with Silt (SP-SM), Yellowish Brown.
 Source and Type of Water Used for Inundation: Arrowhead (Distilled)
 ** Note: Loading After Wetting (Inundation) not Performed Using this Test Method.

Initial Dry Density (pcf):	92.3	Final Dry Density (pcf):	94.6
Initial Moisture (%):	4.6	Final Moisture (%):	22.8
Initial Height (in.):	1.0000	Initial Void ratio:	0.8258
Initial Dial Reading (in):	0.0000	Specific Gravity (assumed):	2.70
Inside Diameter of Ring (in):	2.416	Initial Degree of Saturation (%):	15.0

Pressure (p) (ksf)	Final Reading (in)	Apparent Thickness (in)	Load Compliance (%)	Swell (+) Settlement (-) % of Sample Thickness	Void Ratio	Corrected Deformation (%)
0.500	0.0053	0.9947	0.00	-0.53	0.8161	-0.53
1.000	0.0121	0.9879	0.00	-1.21	0.8037	-1.21
H2O	0.0239	0.9761	0.00	-2.39	0.7821	-2.39

Percent Swell / Settlement After Inundation = **-1.19**





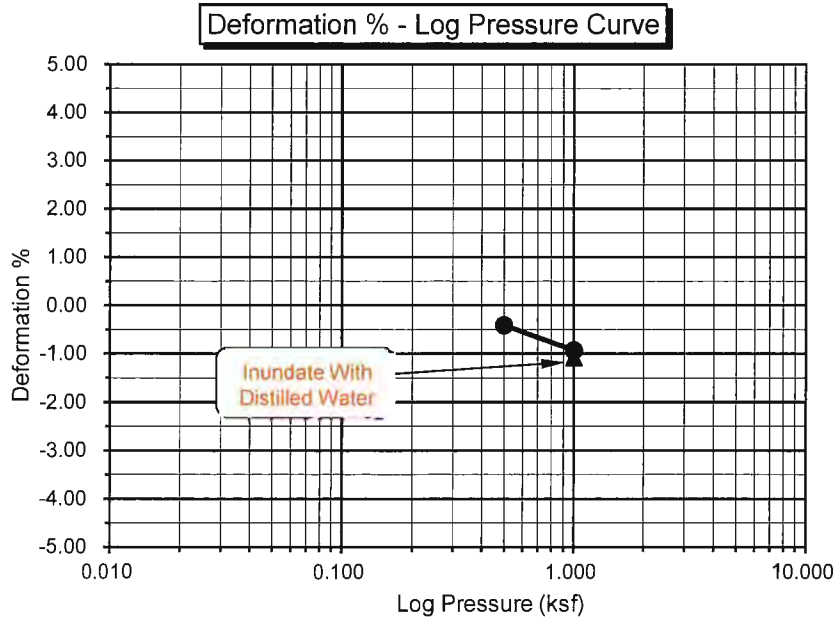
**One-Dimensional Swell or Settlement
Potential of Cohesive Soils
(ASTM D 4546) -- Method 'B'**

Project Name: PBK/Costa Mesa FS No. 4 Training Center Tested By: M. Vinet Date: 5/29/23
 Project No.: 13893.001 Checked By: M. Vinet Date: 6/1/23
 Boring No.: LB-2 Sample Type: IN SITU
 Sample No.: R-3 Depth (ft.) 7.5
 Sample Description: Lean Clay (CL), Dark Yellowish Brown.
 Source and Type of Water Used for Inundation: Arrowhead (Distilled)
 ** Note: Loading After Wetting (Inundation) not Performed Using this Test Method.

Initial Dry Density (pcf):	100.4	Final Dry Density (pcf):	101.4
Initial Moisture (%):	21.8	Final Moisture (%) :	24.3
Initial Height (in.):	1.0000	Initial Void ratio:	0.6797
Initial Dial Reading (in):	0.0000	Specific Gravity (assumed):	2.70
Inside Diameter of Ring (in):	2.416	Initial Degree of Saturation (%):	86.6

Pressure (p) (ksf)	Final Reading (in)	Apparent Thickness (in)	Load Compliance (%)	Swell (+) Settlement (-) % of Sample Thickness	Void Ratio	Corrected Deformation (%)
0.500	0.0041	0.9959	0.00	-0.41	0.6728	-0.41
1.000	0.0093	0.9907	0.00	-0.93	0.6641	-0.93
H2O	0.0107	0.9893	0.00	-1.07	0.6617	-1.07

Percent Swell / Settlement After Inundation = -0.14





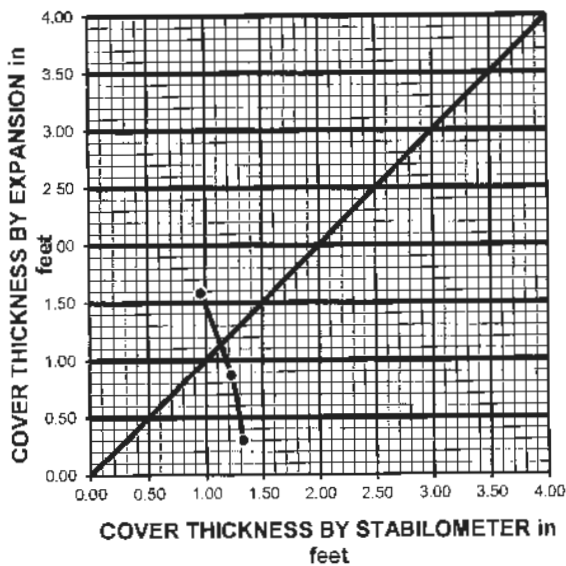
R-VALUE TEST RESULTS ASTM D 2844

Project Name:	PBK/Costa Mesa FS No. 4 Training Center	Date:	5/26/23
Project Number:	13893.001	Technician:	F. Mina
Boring Number:	LB-2	Depth (ft.):	0 - 5.0
Sample Number:	B-1		
Sample Description:	Sandy Lean Clay s(CL), Yellowish Brown.	Sample Location:	N/A

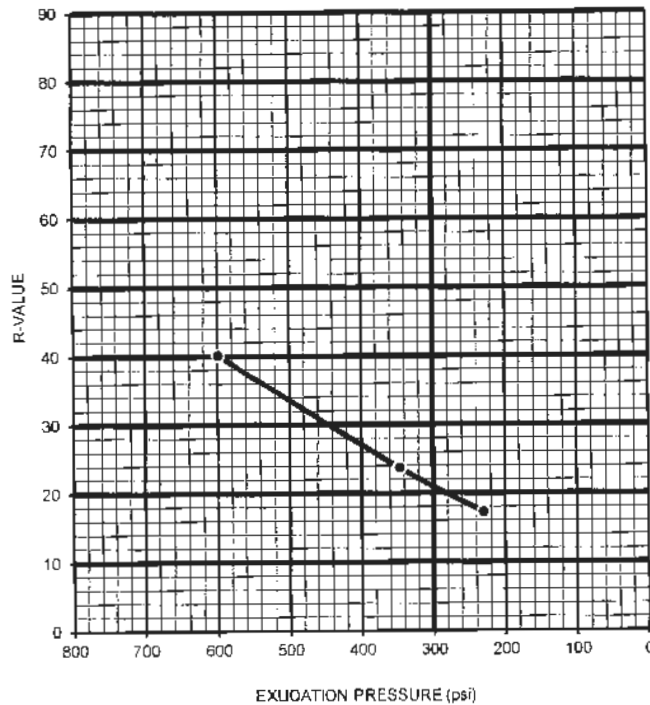
TEST SPECIMEN	A	B	C
MOISTURE AT COMPACTION %	10.4	11.5	12.5
HEIGHT OF SAMPLE, Inches	2.52	2.50	2.49
DRY DENSITY, pcf	121.1	116.3	115.4
COMPACTOR AIR PRESSURE, psi	165	185	150
EXUDATION PRESSURE, psi	599	346	230
EXPANSION, Inches x 10 ^{exp-4}	42	23	8
STABILITY Ph 2,000 lbs (160 psi)	82	110	120
TURNS DISPLACEMENT	3.55	3.67	4.00
R-VALUE UNCORRECTED	40	24	17
R-VALUE CORRECTED	40	24	17

DESIGN CALCULATION DATA	a	b	c
GRAVEL EQUIVALENT FACTOR	1.0	1.0	1.0
TRAFFIC INDEX	5.0	5.0	5.0
STABILOMETER THICKNESS, ft.	0.96	1.22	1.32
EXPANSION PRESSURE THICKNESS, ft.	1.58	0.87	0.30

EXPANSION PRESSURE CHART



EXUDATION PRESSURE CHART



R-VALUE BY EXPANSION:	30
R-VALUE BY EXUDATION:	21
EQUILIBRIUM R-VALUE:	21



**TESTS for SULFATE CONTENT
CHLORIDE CONTENT and pH of SOILS**

Project Name: PBK/Costa Mesa FS No. 4 Training Center

Tested By : M. Vinet Date: 06/01/23

Project No. : 13893.001

Data Input By: M. Vinet Date: 06/01/23

Boring No.	LB-2			
Sample No.	B-1			
Sample Depth (ft)	0 - 5.0			
Soil Identification:	Sandy Lean Clay s(CL)			
Wet Weight of Soil + Container (g)	100.00			
Dry Weight of Soil + Container (g)	100.00			
Weight of Container (g)	0.00			
Moisture Content (%)	0.00			
Weight of Soaked Soil (g)	100.00			

SULFATE CONTENT, DOT California Test 417, Part II

Beaker No.	1			
Crucible No.	1			
Furnace Temperature (°C)	850			
Time In / Time Out	Timer			
Duration of Combustion (min)	45			
Wt. of Crucible + Residue (g)	25.0410			
Wt. of Crucible (g)	25.0362			
Wt. of Residue (g) (A)	0.0048			
PPM of Sulfate (A) x 41150	197.52			
PPM of Sulfate, Dry Weight Basis	198			

CHLORIDE CONTENT, DOT California Test 422

ml of Extract For Titration (B)	30			
ml of AgNO3 Soln. Used in Titration (C)	0.6			
PPM of Chloride (C -0.2) * 100 * 30 / B	40			
PPM of Chloride, Dry Wt. Basis	40			

pH TEST, DOT California Test 643

pH Value	7.70			
Temperature °C	21.0			



SOIL RESISTIVITY TEST

DOT CA TEST 643

Project Name: PBK/Costa Mesa FS No. 4 Training Center

Tested By : M. Vinet Date: 06/01/23

Project No. : 13893.001

Data Input By: M. Vinet Date: 06/01/23

Boring No.: LB-2

Depth (ft.) : 0 - 5.0

Sample No. : B-1

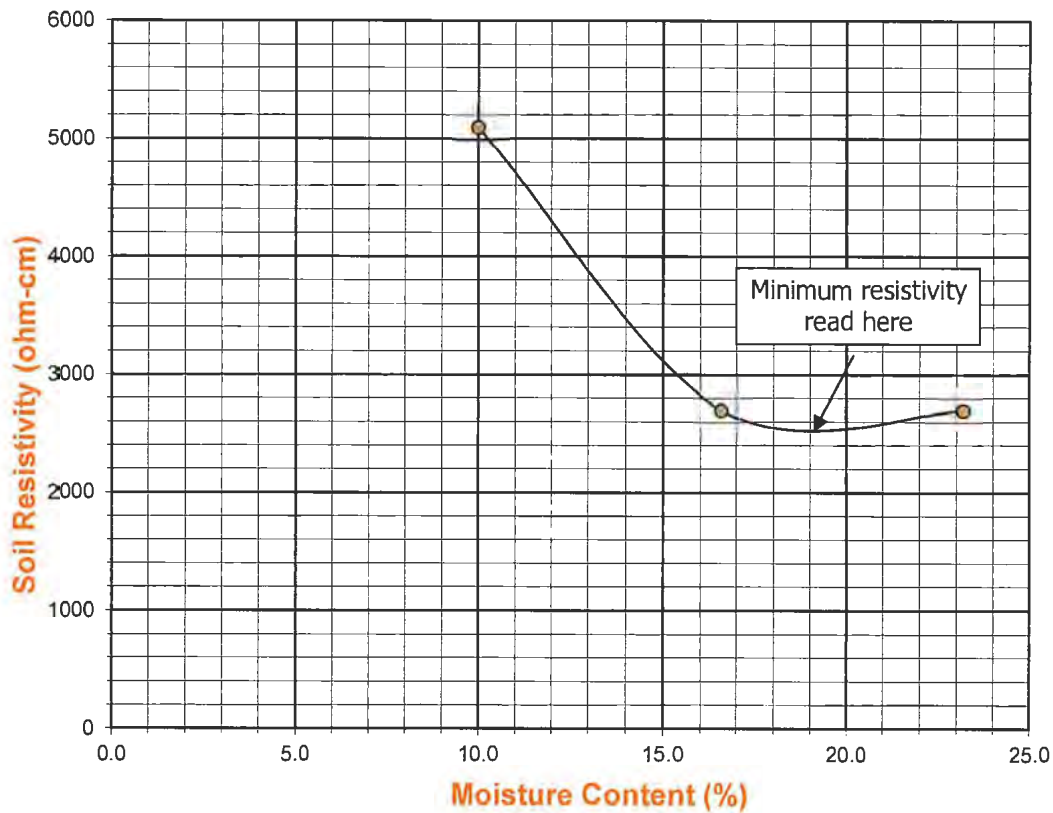
Soil Identification:* Sandy Lean Clay s(CL)

*California Test 643 requires soil specimens to consist only of portions of samples passing through the No. 8 US Standard Sieve before resistivity testing. Therefore, this test method may not be representative for coarser materials.

Specimen No.	Water Added (ml) (Wa)	Adjusted Moisture Content (MC)	Resistance Reading (ohm)	Soil Resistivity (ohm-cm)
1	50	10.00	5100	5100
2	83	16.60	2700	2700
3	116	23.20	2700	2700
4				
5				

Moisture Content (%) (Mci)	0.00
Wet Wt. of Soil + Cont. (g)	100.00
Dry Wt. of Soil + Cont. (g)	100.00
Wt. of Container (g)	0.00
Container No.	A
Initial Soil Wt. (g) (Wt)	500.00
Box Constant	1.000
$MC = (((1 + Mci / 100) \times (Wa / Wt + 1)) - 1) \times 100$	

Min. Resistivity (ohm-cm)	Moisture Content (%)	Sulfate Content (ppm)	Chloride Content (ppm)	Soil pH	
				pH	Temp. (°C)
DOT CA Test 643		DOT CA Test 417 Part II		DOT CA Test 643	
2500	19.0	198	40	7.70	21.0



APPENDIX C

SEISMIC

Determination of Site Class and Estimation of Shear Wave Velocity

Project: 13893.001 Costa Mesa FS No.4 Training Tower

Depth (ft)	di, Layer Thick (ft)	Field Blow Counts, Ni Corrected for Cs and sampler type Blows per foot (bpf)				Average Ni (bpf)	Ni Hammer Corr.	di / Ni
		LB-1	LB-2	LB-3	LB-4			
							1.3	
5	7.5	23	11	13	19	17	21	0.35
10	5	17	13	25	19	19	24	0.21
15	5	18	32	32	28	28	36	0.14
20	5	43	60	56	45	51	66	0.08
25	5	47	39	47		44	58	0.09
30	5	60		60		60	78	0.06
35	5	10		10		10	13	0.38
40	5			17		17	22	0.23
45	5			18		18	23	0.21
50	7.5			60		60	78	0.10
60	10			60	*Assumed based on blowcount at 50'	60	78	0.13
70	10			60		60	78	0.13
80	10			60		60	78	0.13
90	10			60		60	78	0.13
100	5			60		60	78	0.06
Summation	100							2.42
Navg = Sum(di) / Sum(di / Ni) =								41

Extract of ASCE 7-16 Table 20.3-1 Site Classification (2019 CBC 1613A.2.2):

Site Class	Soil Profile Name	Avg. N upper 100'		Vs30 (ft/sec)		Vs30 (m/s)		Site Avg N	Interpolated vs30 (ft/s)
		from	to	from	to	from	to		
A	Hard Rock	-	-	5000	10000	1524	3048		
B	Rock	-	-	2500	5000	762	1524		
C	VD soil & soft rock	50.001	100	1200	2500	366	762		
D	Stiff Soil	15	50	600	1200	183	366	41	1051
E	Soft Soil	0	14.999	0	600	0	183		
F		-	-			0	0		

SITE CLASS, Table 20.3-1: **D**

Estimation of Average Shear Wave Velocity in upper 100 ft (Vs30):

	ft/s	m/s
Approx. Vs30 (interpolation of Table 20.3-1) =	1051	320
Approx. Vs30 sands (Imai and Tonouchi, 1982) =	1126	343
Approx. Vs30 sands (Sykora and Stokoe, 1983) =	956	291
Approx. Vs30 (Maheswari, Boominathan, Dodagoudar, 2009) =	923	281



Latitude, Longitude: 33.6582, -117.9314

Estancia High School

Estancia High School
Baseball Field

Placentia Fire Station 4

Faith Worship
Community Church

Joann St

Afin-Arte Restoration
Darrell St

Google Darrell St

Map data ©2023

Date	5/9/2023, 2:27:32 PM
Design Code Reference Document	ASCE7-16
Risk Category	IV
Site Class	D - Stiff Soil

Type	Value	Description
S _S	1.367	MCE _R ground motion. (for 0.2 second period)
S ₁	0.49	MCE _R ground motion. (for 1.0s period)
S _{MS}	1.367	Site-modified spectral acceleration value
S _{M1}	null -See Section 11.4.8	Site-modified spectral acceleration value
S _{DS}	0.912	Numeric seismic design value at 0.2 second SA
S _{D1}	null -See Section 11.4.8	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	null -See Section 11.4.8	Seismic design category
F _a	1	Site amplification factor at 0.2 second
F _v	null -See Section 11.4.8	Site amplification factor at 1.0 second
PGA	0.593	MCE _G peak ground acceleration
F _{PGA}	1.1	Site amplification factor at PGA
PGA _M	0.652	Site modified peak ground acceleration
T _L	8	Long-period transition period in seconds
SsRT	1.367	Probabilistic risk-targeted ground motion. (0.2 second)
SsUH	1.498	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
SsD	2.51	Factored deterministic acceleration value. (0.2 second)
S1RT	0.49	Probabilistic risk-targeted ground motion. (1.0 second)
S1UH	0.532	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
S1D	0.823	Factored deterministic acceleration value. (1.0 second)
PGA _d	1.024	Factored deterministic acceleration value. (Peak Ground Acceleration)
PGA _{UH}	0.593	Uniform-hazard (2% probability of exceedance in 50 years) Peak Ground Acceleration
C _{RS}	0.913	Mapped value of the risk coefficient at short periods
C _{R1}	0.922	Mapped value of the risk coefficient at a period of 1 s
C _V	1.373	Vertical coefficient

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Unified Hazard Tool

Please do not use this tool to obtain ground motion parameter values for the design code reference documents covered by the [U.S. Seismic Design Maps web tools](#) (e.g., the International Building Code and the ASCE 7 or 41 Standard). The values returned by the two applications are not identical.

Please also see the new [USGS Earthquake Hazard Toolbox](#) for access to the most recent NSHMs for the conterminous U.S. and Hawaii.

^ Input

Edition

Dynamic: Conterminous U.S. 2014 (u...

Spectral Period

Peak Ground Acceleration

Latitude

Decimal degrees

33.6582

Time Horizon

Return period in years

2475

Longitude

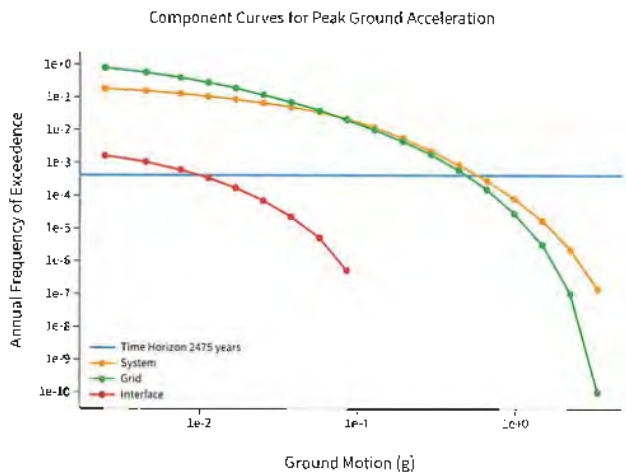
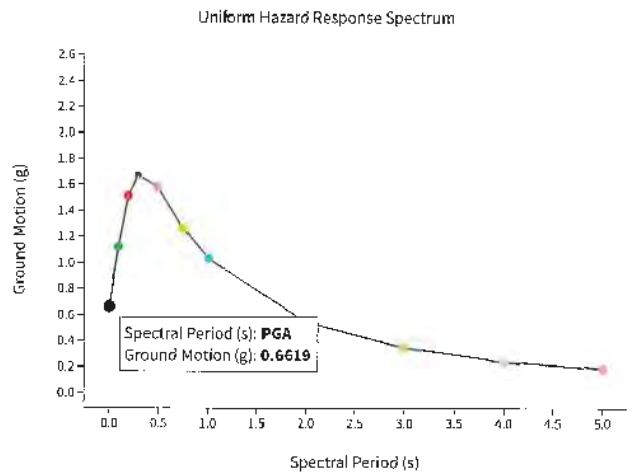
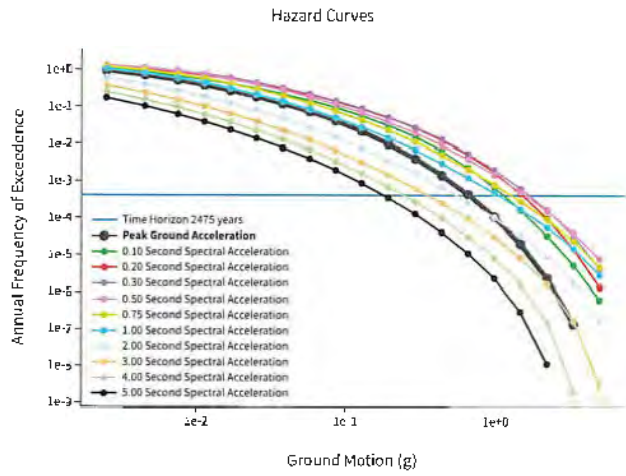
Decimal degrees, negative values for western longitudes

-117.9314

Site Class

259 m/s (Site class D)

^ Hazard Curve

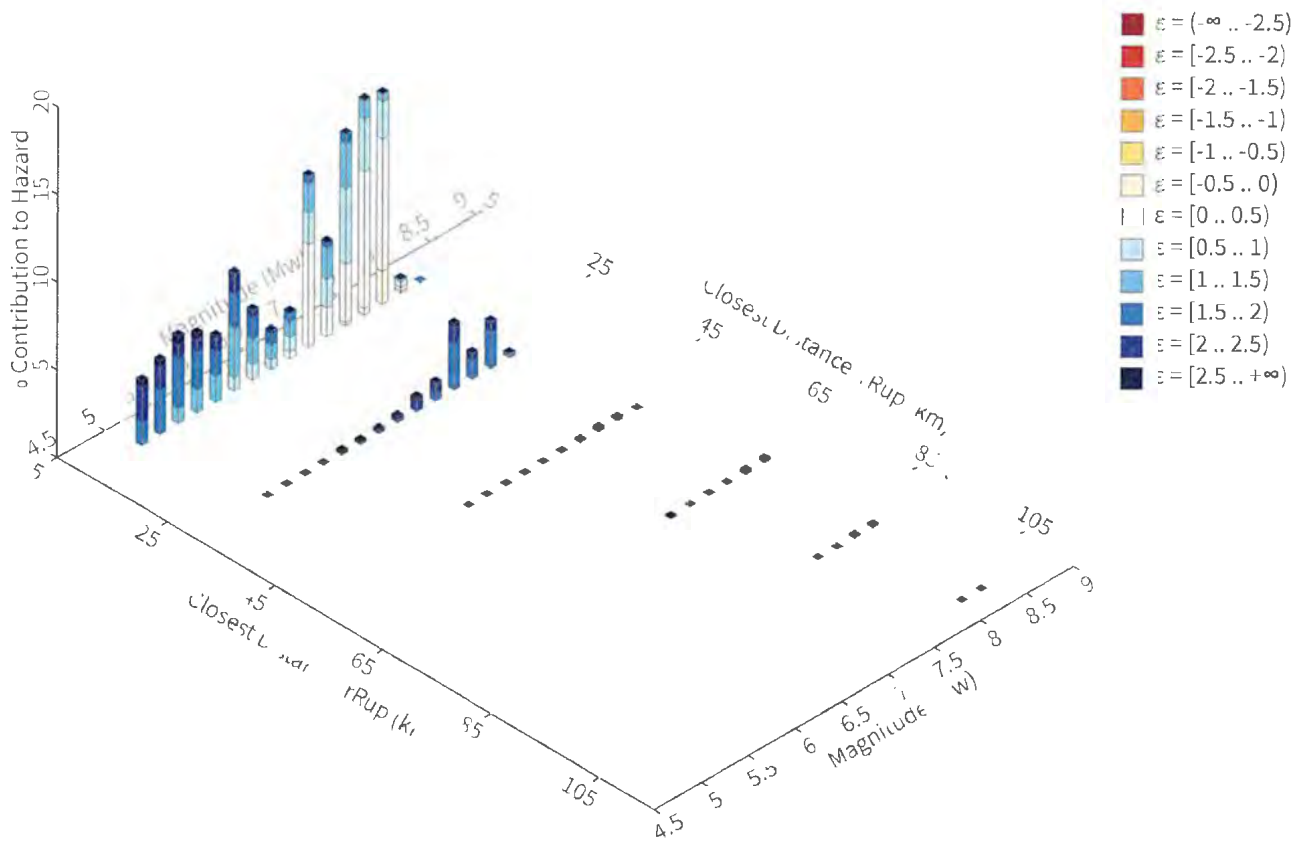


[View Raw Data](#)

^ Deaggregation

Component

Total



Summary statistics for, Deaggregation: Total

Deaggregation targets

Return period: 2475 yrs
Exceedance rate: 0.0004040404 yr⁻¹
PGA ground motion: 0.66192213 g

Recovered targets

Return period: 2917.9392 yrs
Exceedance rate: 0.00034270762 yr⁻¹

Totals

Binned: 100 %
Residual: 0 %
Trace: 0.05 %

Mean (over all sources)

m: 6.8
r: 9.88 km
ε₀: 1.17 σ

Mode (largest m-r bin)

m: 7.5
r: 4.35 km
ε₀: 0.51 σ
Contribution: 12.27 %

Mode (largest m-r-ε₀ bin)

m: 7.5
r: 3.57 km
ε₀: 0.34 σ
Contribution: 7.79 %

Discretization

r: min = 0.0, max = 1000.0, Δ = 20.0 km
m: min = 4.4, max = 9.4, Δ = 0.2
ε: min = -3.0, max = 3.0, Δ = 0.5 σ

Epsilon keys

ε0: [-∞ .. -2.5)
ε1: [-2.5 .. -2.0)
ε2: [-2.0 .. -1.5)
ε3: [-1.5 .. -1.0)
ε4: [-1.0 .. -0.5)
ε5: [-0.5 .. 0.0)
ε6: [0.0 .. 0.5)
ε7: [0.5 .. 1.0)
ε8: [1.0 .. 1.5)
ε9: [1.5 .. 2.0)
ε10: [2.0 .. 2.5)
ε11: [2.5 .. +∞]

Deaggregation Contributors

Source Set	Source	Type	r	m	ϵ_0	lon	lat	az	%
UC33brAvg_FM32		System							35.42
	Newport-Inglewood alt 2 [0]		3.53	7.45	0.43	117.956°W	33.638°N	224.91	13.74
	San Joaquin Hills [0]		3.54	6.96	0.39	117.934°W	33.674°N	352.17	7.86
	Compton [0]		13.05	7.34	1.09	118.043°W	33.702°N	295.48	4.39
	Palos Verdes [6]		21.40	7.45	1.84	118.129°W	33.559°N	238.98	2.69
	Newport-Inglewood (Offshore) [0]		7.70	6.54	1.36	117.915°W	33.591°N	168.20	1.88
UC33brAvg_FM31		System							31.53
	Newport-Inglewood alt 1 [0]		3.61	7.43	0.51	117.958°W	33.639°N	228.47	10.12
	San Joaquin Hills [0]		3.54	7.52	0.32	117.934°W	33.674°N	352.17	7.89
	Compton [0]		13.05	7.27	1.12	118.043°W	33.702°N	295.48	4.22
	Palos Verdes [6]		21.40	7.28	1.94	118.129°W	33.559°N	238.98	2.64
	Newport-Inglewood (Offshore) [0]		7.70	6.45	1.39	117.915°W	33.591°N	168.20	2.07
UC33brAvg_FM31 (opt)		Grid							16.55
	PointSourceFinite: -117.931, 33.726		8.80	5.69	1.66	117.931°W	33.726°N	0.00	2.74
	PointSourceFinite: -117.931, 33.726		8.80	5.69	1.66	117.931°W	33.726°N	0.00	2.74
	PointSourceFinite: -117.931, 33.708		7.38	5.69	1.45	117.931°W	33.708°N	0.00	2.52
	PointSourceFinite: -117.931, 33.708		7.38	5.69	1.45	117.931°W	33.708°N	0.00	2.52
UC33brAvg_FM32 (opt)		Grid							16.49
	PointSourceFinite: -117.931, 33.726		8.81	5.69	1.66	117.931°W	33.726°N	0.00	2.76
	PointSourceFinite: -117.931, 33.726		8.81	5.69	1.66	117.931°W	33.726°N	0.00	2.76
	PointSourceFinite: -117.931, 33.708		7.41	5.67	1.46	117.931°W	33.708°N	0.00	2.42
	PointSourceFinite: -117.931, 33.708		7.41	5.67	1.46	117.931°W	33.708°N	0.00	2.42
	PointSourceFinite: -117.931, 33.744		10.34	5.71	1.84	117.931°W	33.744°N	0.00	1.02
	PointSourceFinite: -117.931, 33.744		10.34	5.71	1.84	117.931°W	33.744°N	0.00	1.02

Liquefaction Susceptibility Analysis: SPT Method

Leighton

Youd and Idriss (2001), Martin and Lew (1999)

Description: Costa Mesa FS No. 4 Training Center ; Case 1; PGAm 0.652; design GW 30; No overex 0

Project No.: 13893.001

May 2023

General Boring Information:

Boring No.	Existing GW Depth (ft)	Design GW Depth (ft)	Design Fill Height (ft)	Overex. depth bgs (ft)	Ground Surface Elev (ft)
LB-1	98	30		0	82
LB-2	98	30		0	81
LB-3	98	30		0	80
LB-4	98	30		0	81

Boring Location Coordinates	
X (ft)	Y (ft)
105.5	248.54
282.11	220.41
206.41	114.42
270.87	138.01

General Parameters:
$a_{max} = 0.65g$
$M_w = 7.5$
MSF eq: 1
MSF = 1.00
Hammer Efficiency = 84
$C_F = 1.40$
$C_B = 1$
C_S for SPT? TRUE
Unlined, but room for liner
Rod Stickup (feet) = 3
Ring sample correction = 0.65

Summary of Liquefaction Susceptibility Analysis: SPT Method

Liquefaction Method: Youd and Idriss (2001). Seismic Settlement Method: Tokimatsu and Seed (1987) and Martin and Lew (1999).

Project: Costa Mesa FS No. 4 Training Center ; Case 1; PGAm 0.652; design GW 30; No overex 0

Project No.: 13893.001

Boring No.	Approx. Layer Depth (ft)	SPT Depth (ft)	Approx Layer Thickness (ft)	Plasticity (n=non susc. to #q)	Estimated Fines Cont (%)	γ_i (pcf)	N_m or B (blows/ft)	Sampler Type (enter 2 if mod CA Ring)	C_s	N_m (corrected for C_s and ring → SPT) (blows/ft)	Exist σ_{vo}' (psf)	$(N_1)_{60}$	$(N_1)_{SUCS}$	$CRR_{7.5}$	Design σ_{vo}' (psf)	$CSR_{7.5}$	CSR_M	Liquefaction Factor of Safety	$(N_1)_{SUCS}$ (for Settlement) (blows/ft)	Dry Sand Strain (%) (Tok/Seed 87)	Sal Sand Strain (%) (Tok/Seed 87)	Seismic Sett. of Layer (in.)	Cummulative Seismic Settlement (in.)
LB-1	0 to 3.8	2.5	3.8		95	120	21	2	1	13.7	300	24.4	34.2	>Range	300	0.42	0.42	NonLiq	34.2	0.03		0.01	0.4
LB-1	3.8 to 6.3	5	2.5		95	120	38	2	1	24.7	600	44.1	57.9	>Range	600	0.42	0.42	NonLiq	57.9	0.02		0.01	0.4
LB-1	6.3 to 8.8	7.5	2.5		9	120	17	2	1	11.1	900	18.9	19.7	0.212	900	0.42	0.42	NonLiq	19.7	0.43		0.13	0.4
LB-1	8.8 to 12.5	10	3.8		5	120	28	2	1	18.2	1200	28.6	28.6	0.391	1200	0.41	0.41	NonLiq	28.6	0.28		0.13	0.3
LB-1	12.5 to 17.5	15	5.0		5	120	18	1	1.3	23.4	1800	30.0	30.0	0.466	1800	0.41	0.41	NonLiq	30.0	0.16		0.10	0.1
LB-1	17.5 to 22.5	20	5.0		25	120	71	2	1	46.2	2400	57.3	68.1	>Range	2400	0.40	0.40	NonLiq	68.1	0.02		0.01	0.0
LB-1	22.5 to 27.5	25	5.0		35	120	47	1	1.3	61.1	3000	67.8	86.4	>Range	3000	0.40	0.40	NonLiq	86.4	0.02		0.01	0.0
LB-1	27.5 to 30.0	30	2.5		35	120	100	2	1	65.0	3600	69.3	88.2	>Range	3600	0.39	0.39	NonLiq	88.2	0.02		0.01	0.0
LB-1	30.0 to 32.5	30	2.5		35	120	100	2	1	65.0	3600	69.3	88.2	>Range	3600	0.39	0.39	NonLiq	88.2			0.00	0.0
LB-1	32.5 to 37.0	35	4.5	n	94	120	11	1	1.12	12.3	4200	12.2	19.6	>Range	3888	0.41	0.41	NonLiq	19.6			0.00	0.0
LB-2	0 to 3.8	2.5	3.8		80	120	17	2	1	11.1	300	19.7	28.7	0.395	300	0.42	0.42	NonLiq	28.7	0.07		0.03	0.2
LB-2	3.8 to 6.3	5	2.5		80	120	18	2	1	11.7	600	20.9	30.1	>Range	600	0.42	0.42	NonLiq	30.1	0.14		0.04	0.2
LB-2	6.3 to 8.8	7.5	2.5		95	120	22	2	1	14.3	900	24.4	34.3	>Range	900	0.42	0.42	NonLiq	34.3	0.07		0.02	0.1
LB-2	8.8 to 12.5	10	3.8		95	120	21	2	1	13.7	1200	21.4	30.7	>Range	1200	0.41	0.41	NonLiq	30.7	0.15		0.07	0.1
LB-2	12.5 to 17.5	15	5.0		30	120	32	1	1.3	41.6	1800	53.3	66.3	>Range	1800	0.41	0.41	NonLiq	66.3	0.02		0.01	0.0
LB-2	17.5 to 22.5	20	5.0		20	120	100	2	1	65.0	2400	80.6	90.7	>Range	2400	0.40	0.40	NonLiq	90.7	0.02		0.01	0.0
LB-2	22.5 to 27.0	25	4.5		5	120	39	1	1.3	50.7	3000	56.3	56.3	>Range	3000	0.40	0.40	NonLiq	56.3	0.03		0.02	0.0
LB-3	0 to 3.8	2.5	3.8		95	120	28	2	1	18.2	300	32.5	44.0	>Range	300	0.42	0.42	NonLiq	44.0	0.01		0.00	0.1
LB-3	3.8 to 6.3	5	2.5		70	120	22	2	1	14.3	600	25.5	35.6	>Range	600	0.42	0.42	NonLiq	35.6	0.10		0.03	0.1
LB-3	6.3 to 8.8	7.5	2.5		85	120	35	2	1	22.8	900	38.8	51.6	>Range	900	0.42	0.42	NonLiq	51.6	0.02		0.00	0.1
LB-3	8.8 to 12.5	10	3.8		25	120	41	2	1	26.7	1200	41.8	50.9	>Range	1200	0.41	0.41	NonLiq	50.9	0.02		0.01	0.1
LB-3	12.5 to 17.5	15	5.0		15	120	32	1	1.3	41.6	1800	53.3	58.4	>Range	1800	0.41	0.41	NonLiq	58.4	0.02		0.01	0.0
LB-3	17.5 to 22.5	20	5.0		15	120	93	2	1	60.5	2400	75.0	81.1	>Range	2400	0.40	0.40	NonLiq	81.1	0.02		0.01	0.0
LB-3	22.5 to 27.5	25	5.0		15	120	47	1	1.3	61.1	3000	67.8	73.6	>Range	3000	0.40	0.40	NonLiq	73.6	0.03		0.02	0.0
LB-3	27.5 to 30.0	30	2.5		10	120	100	2	1	65.0	3600	69.3	71.7	>Range	3600	0.39	0.39	NonLiq	71.7	0.02		0.01	0.0
LB-3	30.0 to 32.5	30	2.5		10	120	100	2	1	65.0	3600	69.3	71.7	>Range	3600	0.39	0.39	NonLiq	71.7			0.00	0.0
LB-3	32.5 to 37.5	35	5.0	n	95	120	10	1	1.11	11.1	4200	10.9	18.1	>Range	3888	0.41	0.41	NonLiq	18.1			0.00	0.0
LB-3	37.5 to 42.5	40	5.0	n	99	120	29	2	1	18.9	4800	17.4	25.9	>Range	4176	0.41	0.41	NonLiq	25.9			0.00	0.0
LB-3	42.5 to 47.5	45	5.0	n	95	120	18	1	1.19	21.3	5400	18.6	27.3	>Range	4464	0.41	0.41	NonLiq	27.3			0.00	0.0
LB-3	47.5 to 52.0	50	4.5		5	120	100	2	1	65.0	6000	53.7	53.7	>Range	4752	0.41	0.41	NonLiq	53.7			0.00	0.0
LB-4	0 to 3.8	2.5	3.8		95	120	30	2	1	19.5	300	34.8	46.8	>Range	300	0.42	0.42	NonLiq	46.8	0.01		0.00	0.1
LB-4	3.8 to 6.3	5	2.5		95	120	30	2	1	19.5	600	34.8	46.8	>Range	600	0.42	0.42	NonLiq	46.8	0.02		0.01	0.1
LB-4	6.3 to 8.8	7.5	2.5		15	120	20	2	1	13.0	900	22.2	25.7	0.307	900	0.42	0.42	NonLiq	25.7	0.18		0.05	0.1
LB-4	8.8 to 12.5	10	3.8		95	120	31	2	1	20.2	1200	31.6	43.0	>Range	1200	0.41	0.41	NonLiq	43.0	0.03		0.01	0.0

Boring No.	Approx. Layer Depth (ft)	SPT Depth (ft)	Approx Layer Thickness (ft)	Plasticity (n _r =non susc. to liq.)	Estimated Fines Cont (%)	γ _t (pcf)	N _m or B (blows/ft)	Sampler Type (enter 2 if mod CA Ring)	Cs	N _m (corrected for Cs and ring->SPT) (blows/ft)	Exist σ _{vo} ⁺ (psf)	(N ₁) ₆₀	(N ₁) _{60CS}	CRR _{7.5}	Design σ _{vo} ⁺ (psf)	CSR _{7.5}	CSR _M	Liquefaction Factor of Safety	(N ₁) _{60CS} (for Settlement) (blows/ft)	Dry Sand Strain (%) (Tok/ Seed 87)	Sat Sand Strain (%) (Tok/ Seed 87)	Seismic Sett. of Layer (in.)	Cummulative Seismic Settlement (in.)
LB-4	12.5 to 17.5	15	5.0		30	120	28	1	1.3	36.4	1800	46.7	58.6	>Range	1800	0.41	0.41	NonLiq	58.6	0.02		0.01	0.0
LB-4	17.5 to 22.0	20	4.5		20	120	85	2	1	55.3	2400	68.5	77.6	>Range	2400	0.40	0.40	NonLiq	77.6	0.02		0.01	0.0

Liquefaction Susceptibility Analysis: SPT Method

Leighton

Youd and Idriss (2001), Martin and Lew (1999)

Description: Costa Mesa FS No. 4 Training Center ; Case 3; PGAm 0.652; design GW 30; Overex./scarify 5

Project No.: 13893.001

May 2023

General Boring Information:

Boring No.	Existing GW Depth (ft)	Design GW Depth (ft)	Design Fill Height (ft)	Overex. depth bgs (ft)	Ground Surface Elev (ft)
LB-1	98	30		5	82
LB-2	98	30		5	81
LB-3	98	30		5	80
LB-4	98	30		5	81

Boring Location Coordinates	
X (ft)	Y (ft)
105.5	248.54
282.11	220.41
206.41	114.42
270.87	138.01

General Parameters:
$a_{max} = 0.65g$
$M_w = 7.5$
MSF eq: 1
MSF = 1.00
Hammer Efficiency = 84
$C_E = 1.40$
$C_B = 1$
C_S for SPT? TRUE
Unlined, but room for liner
Rod Stickup (feet) = 3
Ring sample correction = 0.65

Summary of Liquefaction Susceptibility Analysis: SPT Method

Liquefaction Method: Youd and Idriss (2001), Seismic Settlement Method: Tokimatsu and Seed (1987) and Martin and Lew (1999).

Project: Costa Mesa FS No. 4 Training Center ; Case 3; PGAm 0.652; design GW 30; Overex./scarify 5

Project No.: 13893.001

Boring No.	Approx. Layer Depth (ft)	SPT Depth (ft)	Approx Layer Thickness (ft)	Plasticity (n ^o =non susc. to liq.)	Estimated Fines Cont (%)	γ _t (pcf)	N _m or B (blows/ft)	Sampler Type (enter 2 if mod CA Ring)	Cs	N _m (corrected for Cs and ring->SPT) (blows/ft)	Exist σ _{vo} ' (psf)	(N ₁) ₆₀	(N ₁) _{60CS}	CRR _{7.5}	Design σ _{vo} ' (psf)	CSR _{7.5}	CSR _M	Liquefaction Factor of Safety	(N ₁) _{60CS} (for Settlement)	Dry Sand Strain (%) (ToK/Seed 87)	Sat Sand Strain (%) (ToK/Seed 87)	Seismic Sett. of Layer (in.)	Cummulative Seismic Settlement (in.)
LB-1	0 to 3.8	2.5	3.8	OX	95	120	50	1	1.3	65.0	300	116.0	144.2	>Range	300	0.42	0.42	NonLiq	144.2	0.00		0.00	0.4
LB-1	3.8 to 5.0	5	1.3	OX	95	120	50	1	1.3	65.0	600	116.0	144.2	>Range	600	0.42	0.42	NonLiq	144.2	0.00		0.00	0.4
LB-1	5.0 to 6.3	5	1.3		95	120	38	2	1	24.7	600	44.1	57.9	>Range	600	0.42	0.42	NonLiq	57.9	0.02		0.00	0.4
LB-1	6.3 to 8.8	7.5	2.5		9	120	17	2	1	11.1	900	18.9	19.7	0.212	900	0.42	0.42	NonLiq	19.7	0.43		0.13	0.4
LB-1	8.8 to 12.5	10	3.8		5	120	28	2	1	18.2	1200	28.6	28.6	0.391	1200	0.41	0.41	NonLiq	28.6	0.28		0.13	0.3
LB-1	12.5 to 17.5	15	5.0		5	120	18	1	1.3	23.4	1800	30.0	30.0	0.466	1800	0.41	0.41	NonLiq	30.0	0.16		0.10	0.1
LB-1	17.5 to 22.5	20	5.0		25	120	71	2	1	46.2	2400	57.3	68.1	>Range	2400	0.40	0.40	NonLiq	68.1	0.02		0.01	0.0
LB-1	22.5 to 27.5	25	5.0		35	120	47	1	1.3	61.1	3000	67.8	86.4	>Range	3000	0.40	0.40	NonLiq	86.4	0.02		0.01	0.0
LB-1	27.5 to 30.0	30	2.5		35	120	100	2	1	65.0	3600	69.3	88.2	>Range	3600	0.39	0.39	NonLiq	88.2	0.02		0.01	0.0
LB-1	30.0 to 32.5	30	2.5		35	120	100	2	1	65.0	3600	69.3	88.2	>Range	3600	0.39	0.39	NonLiq	88.2			0.00	0.0
LB-1	32.5 to 37.0	35	4.5	n	94	120	11	1	1.12	12.3	4200	12.2	19.6	>Range	3888	0.41	0.41	NonLiq	19.6			0.00	0.0
LB-2	0 to 3.8	2.5	3.8	OX	80	120	50	1	1.3	65.0	300	116.0	144.2	>Range	300	0.42	0.42	NonLiq	144.2	0.00		0.00	0.1
LB-2	3.8 to 5.0	5	1.3	OX	80	120	50	1	1.3	65.0	600	116.0	144.2	>Range	600	0.42	0.42	NonLiq	144.2	0.00		0.00	0.1
LB-2	5.0 to 6.3	5	1.3		80	120	18	2	1	11.7	600	20.9	30.1	>Range	600	0.42	0.42	NonLiq	30.1	0.14		0.02	0.1
LB-2	6.3 to 8.8	7.5	2.5		95	120	22	2	1	14.3	900	24.4	34.3	>Range	900	0.42	0.42	NonLiq	34.3	0.07		0.02	0.1
LB-2	8.8 to 12.5	10	3.8		95	120	21	2	1	13.7	1200	21.4	30.7	>Range	1200	0.41	0.41	NonLiq	30.7	0.15		0.07	0.1
LB-2	12.5 to 17.5	15	5.0		30	120	32	1	1.3	41.6	1800	53.3	66.3	>Range	1800	0.41	0.41	NonLiq	66.3	0.02		0.01	0.0
LB-2	17.5 to 22.5	20	5.0		20	120	100	2	1	65.0	2400	80.6	90.7	>Range	2400	0.40	0.40	NonLiq	90.7	0.02		0.01	0.0
LB-2	22.5 to 27.0	25	4.5		5	120	39	1	1.3	50.7	3000	56.3	56.3	>Range	3000	0.40	0.40	NonLiq	56.3	0.03		0.02	0.0
LB-3	0 to 3.8	2.5	3.8	OX	95	120	50	1	1.3	65.0	300	116.0	144.2	>Range	300	0.42	0.42	NonLiq	144.2	0.00		0.00	0.1
LB-3	3.8 to 5.0	5	1.3	OX	70	120	50	1	1.3	65.0	600	116.0	144.2	>Range	600	0.42	0.42	NonLiq	144.2	0.00		0.00	0.1
LB-3	5.0 to 6.3	5	1.3		70	120	22	2	1	14.3	600	25.5	35.6	>Range	600	0.42	0.42	NonLiq	35.6	0.10		0.02	0.1
LB-3	6.3 to 8.8	7.5	2.5		85	120	35	2	1	22.8	900	38.8	51.6	>Range	900	0.42	0.42	NonLiq	51.6	0.02		0.00	0.1
LB-3	8.8 to 12.5	10	3.8		25	120	41	2	1	26.7	1200	41.8	50.9	>Range	1200	0.41	0.41	NonLiq	50.9	0.02		0.01	0.1
LB-3	12.5 to 17.5	15	5.0		15	120	32	1	1.3	41.6	1800	53.3	58.4	>Range	1800	0.41	0.41	NonLiq	58.4	0.02		0.01	0.0
LB-3	17.5 to 22.5	20	5.0		15	120	93	2	1	60.5	2400	75.0	81.1	>Range	2400	0.40	0.40	NonLiq	81.1	0.02		0.01	0.0
LB-3	22.5 to 27.5	25	5.0		15	120	47	1	1.3	61.1	3000	67.8	73.6	>Range	3000	0.40	0.40	NonLiq	73.6	0.03		0.02	0.0
LB-3	27.5 to 30.0	30	2.5		10	120	100	2	1	65.0	3600	69.3	71.7	>Range	3600	0.39	0.39	NonLiq	71.7	0.02		0.01	0.0
LB-3	30.0 to 32.5	30	2.5		10	120	100	2	1	65.0	3600	69.3	71.7	>Range	3600	0.39	0.39	NonLiq	71.7			0.00	0.0
LB-3	32.5 to 37.5	35	5.0	n	95	120	10	1	1.11	11.1	4200	10.9	18.1	>Range	3888	0.41	0.41	NonLiq	18.1			0.00	0.0
LB-3	37.5 to 42.5	40	5.0	n	99	120	29	2	1	18.9	4800	17.4	25.9	>Range	4176	0.41	0.41	NonLiq	25.9			0.00	0.0
LB-3	42.5 to 47.5	45	5.0	n	95	120	18	1	1.19	21.3	5400	18.6	27.3	>Range	4464	0.41	0.41	NonLiq	27.3			0.00	0.0
LB-3	47.5 to 52.0	50	4.5		5	120	100	2	1	65.0	6000	53.7	53.7	>Range	4752	0.41	0.41	NonLiq	53.7			0.00	0.0
LB-4	0 to 3.8	2.5	3.8	OX	95	120	50	1	1.3	65.0	300	116.0	144.2	>Range	300	0.42	0.42	NonLiq	144.2	0.00		0.00	0.1

Boring No.	Approx. Layer Depth (ft)	SPT Depth (ft)	Approx Layer Thickness (ft)	Plasticity ("n"-non susc. to liq.)	Estimated Fines Cont (%)	γ_t (pcf)	Sampler Type (enter 2 if mod CA Ring)			N_m (corrected for Cs and ring->SPT) (blows/ft)	Exist σ_{vo}' (psf)	$(N_1)_{80}$	$(N_1)_{80CS}$	Design $CRR_{7.5}$	Design σ_{ve}' (psf)	Design $CSR_{7.5}$	Design CSR_M	Liquefaction Factor of Safety	$(N_1)_{80CS}$ (for Settlement) (blows/ft)	Dry Sand Strain (%) (Tok/ Seed 87)	Sat Sand Strain (%) (Tok/ Seed 87)	Seismic Sett. of Layer (in.)	Cummulative Seismic Settlement (in.)
							N_m of B	Cs	Cs														
LB-4	3.8 to 5.0	5	1.3	OX	95	120	50	1	1.3	65.0	600	116.0	144.2	>Range	600	0.42	0.42	NonLiq	144.2	0.00		0.00	0.1
LB-4	5.0 to 6.3	5	1.3		95	120	30	2	1	19.5	600	34.8	46.8	>Range	600	0.42	0.42	NonLiq	46.8	0.02		0.00	0.1
LB-4	6.3 to 8.8	7.5	2.5		15	120	20	2	1	13.0	900	22.2	25.7	0.307	900	0.42	0.42	NonLiq	25.7	0.18		0.05	0.1
LB-4	8.8 to 12.5	10	3.8		95	120	31	2	1	20.2	1200	31.6	43.0	>Range	1200	0.41	0.41	NonLiq	43.0	0.03		0.01	0.0
LB-4	12.5 to 17.5	15	5.0		30	120	28	1	1.3	36.4	1800	46.7	58.6	>Range	1800	0.41	0.41	NonLiq	58.6	0.02		0.01	0.0
LB-4	17.5 to 22.0	20	4.5		20	120	85	2	1	55.3	2400	68.5	77.6	>Range	2400	0.40	0.40	NonLiq	77.6	0.02		0.01	0.0



APPENDIX D

GENERAL EARTHWORK AND GRADING SPECIFICATIONS FOR ROUGH GRADING

LEIGHTON CONSULTING, INC.

GENERAL EARTHWORK AND GRADING SPECIFICATIONS FOR ROUGH GRADING

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1.0 General

- 1.1 Intent: These General Earthwork and Grading Specifications are for the grading and earthwork shown on the approved grading plan(s) and/or indicated in the geotechnical report(s). These Specifications are a part of the recommendations contained in the geotechnical report(s). In case of conflict, the specific recommendations in the geotechnical report shall supersede these more general Specifications. Observations of the earthwork by the project Geotechnical Consultant during the course of grading may result in new or revised recommendations that could supersede these specifications or the recommendations in the geotechnical report(s).
- 1.2 The Geotechnical Consultant of Record: Prior to commencement of work, the owner shall employ the Geotechnical Consultant of Record (Geotechnical Consultant). The Geotechnical Consultants shall be responsible for reviewing the approved geotechnical report(s) and accepting the adequacy of the preliminary geotechnical findings, conclusions, and recommendations prior to the commencement of the grading.

Prior to commencement of grading, the Geotechnical Consultant shall review the "work plan" prepared by the Earthwork Contractor (Contractor) and schedule sufficient personnel to perform the appropriate level of observation, mapping, and compaction testing.

During the grading and earthwork operations, the Geotechnical Consultant shall observe, map, and document the subsurface exposures to verify the geotechnical design assumptions. If the observed conditions are found to be significantly different than the interpreted assumptions during the design phase, the Geotechnical Consultant shall inform the owner, recommend appropriate changes in design to accommodate the observed conditions, and notify the review agency where required. Subsurface areas to be geotechnically observed, mapped, elevations recorded, and/or tested include natural ground after it has been cleared for receiving fill but before fill is placed, bottoms of all "remedial removal" areas, all key bottoms, and benches made on sloping ground to receive fill.

The Geotechnical Consultant shall observe the moisture-conditioning and processing of the subgrade and fill materials and perform relative compaction testing of fill to determine the attained level of compaction. The Geotechnical Consultant shall provide the test results to the owner and the Contractor on a routine and frequent basis.

LEIGHTON CONSULTING, INC.
General Earthwork and Grading Specifications

- 1.3 The Earthwork Contractor: The Earthwork Contractor (Contractor) shall be qualified, experienced, and knowledgeable in earthwork logistics, preparation and processing of ground to receive fill, moisture-conditioning and processing of fill, and compacting fill. The Contractor shall review and accept the plans, geotechnical report(s), and these Specifications prior to commencement of grading. The

Contractor shall be solely responsible for performing the grading in accordance with the plans and specifications.

The Contractor shall prepare and submit to the owner and the Geotechnical Consultant a work plan that indicates the sequence of earthwork grading, the number of "spreads" of work and the estimated quantities of daily earthwork contemplated for the site prior to commencement of grading. The Contractor shall inform the owner and the Geotechnical Consultant of changes in work schedules and updates to the work plan at least 24 hours in advance of such changes so that appropriate observations and tests can be planned and accomplished. The Contractor shall not assume that the Geotechnical Consultant is aware of all grading operations.

The Contractor shall have the sole responsibility to provide adequate equipment and methods to accomplish the earthwork in accordance with the applicable grading codes and agency ordinances, these Specifications, and the recommendations in the approved geotechnical report(s) and grading plan(s). If, in the opinion of the Geotechnical Consultant, unsatisfactory conditions, such as unsuitable soil, improper moisture condition, inadequate compaction, insufficient buttress key size, adverse weather, etc., are resulting in a quality of work less than required in these specifications, the Geotechnical Consultant shall reject the work and may recommend to the owner that construction be stopped until the conditions are rectified.

2.0 Preparation of Areas to be Filled

- 2.1 Clearing and Grubbing: Vegetation, such as brush, grass, roots, and other deleterious material shall be sufficiently removed and properly disposed of in a method acceptable to the owner, governing agencies, and the Geotechnical Consultant.

The Geotechnical Consultant shall evaluate the extent of these removals depending on specific site conditions. Earth fill material shall not contain more than 1 percent of organic materials (by volume). No fill lift shall contain more than 5 percent of organic matter. Nesting of the organic materials shall not be allowed.

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If potentially hazardous materials are encountered, the Contractor shall stop work in the affected area, and a hazardous material specialist shall be informed immediately for proper evaluation and handling of these materials prior to continuing to work in that area.

As presently defined by the State of California, most refined petroleum products (gasoline, diesel fuel, motor oil, grease, coolant, etc.) have chemical constituents that are considered to be hazardous waste. As such, the indiscriminate dumping or spillage of these fluids onto the ground may constitute a misdemeanor, punishable by fines and/or imprisonment, and shall not be allowed.

- 2.2 Processing: Existing ground that has been declared satisfactory for support of fill by the Geotechnical Consultant shall be scarified to a minimum depth of 6 inches. Existing ground that is not satisfactory shall be overexcavated as specified in the following section. Scarification shall continue until soils are broken down and free of large clay lumps or clods and the working surface is reasonably uniform, flat, and free of uneven features that would inhibit uniform compaction.
- 2.3 Overexcavation: In addition to removals and overexcavations recommended in the approved geotechnical report(s) and the grading plan, soft, loose, dry, saturated, spongy, organic-rich, highly fractured or otherwise unsuitable ground shall be overexcavated to competent ground as evaluated by the Geotechnical Consultant during grading.
- 2.4 Benching: Where fills are to be placed on ground with slopes steeper than 5:1 (horizontal to vertical units), the ground shall be stepped or benched. Please see the Standard Details for a graphic illustration. The lowest bench or key shall be a minimum of 15 feet wide and at least 2 feet deep, into competent material as evaluated by the Geotechnical Consultant. Other benches shall be excavated a minimum height of 4 feet into competent material or as otherwise recommended by the Geotechnical Consultant. Fill placed on ground sloping flatter than 5:1 shall also be benched or otherwise overexcavated to provide a flat subgrade for the fill.
- 2.5 Evaluation/Acceptance of Fill Areas: All areas to receive fill, including removal and processed areas, key bottoms, and benches, shall be observed, mapped, elevations recorded, and/or tested prior to being accepted by the Geotechnical Consultant as suitable to receive fill. The Contractor shall obtain a written acceptance from the Geotechnical Consultant prior to fill placement. A licensed surveyor shall provide the survey control for determining elevations of processed areas, keys, and benches.

3.0 Fill Material

- 3.1 General: Material to be used as fill shall be essentially free of organic matter and other deleterious substances evaluated and accepted by the Geotechnical Consultant prior to placement. Soils of poor quality, such as those with unacceptable gradation, high expansion potential, or low strength shall be placed in areas acceptable to the Geotechnical Consultant or mixed with other soils to achieve satisfactory fill material.
- 3.2 Oversize: Oversize material defined as rock, or other irreducible material with a maximum dimension greater than 8 inches, shall not be buried or placed in fill unless location, materials, and placement methods are specifically accepted by the Geotechnical Consultant. Placement operations shall be such that nesting of oversized material does not occur and such that oversize material is completely surrounded by compacted or densified fill. Oversize material shall not be placed within 10 vertical feet of finish grade or within 2 feet of future utilities or underground construction.
- 3.3 Import: If importing of fill material is required for grading, proposed import material shall meet the requirements of Section 3.1. The potential import source shall be given to the Geotechnical Consultant at least 48 hours (2 working days) before importing begins so that its suitability can be determined and appropriate tests performed.

4.0 Fill Placement and Compaction

- 4.1 Fill Layers: Approved fill material shall be placed in areas prepared to receive fill (per Section 3.0) in near-horizontal layers not exceeding 8 inches in loose thickness. The Geotechnical Consultant may accept thicker layers if testing indicates the grading procedures can adequately compact the thicker layers. Each layer shall be spread evenly and mixed thoroughly to attain relative uniformity of material and moisture throughout.
- 4.2 Fill Moisture Conditioning: Fill soils shall be watered, dried back, blended, and/or mixed, as necessary to attain a relatively uniform moisture content at or slightly over optimum. Maximum density and optimum soil moisture content tests shall be performed in accordance with the American Society of Testing and Materials (ASTM Test Method D1557-91).

LEIGHTON CONSULTING, INC.
General Earthwork and Grading Specifications

- 4.3 Compaction of Fill: After each layer has been moisture-conditioned, mixed, and evenly spread, it shall be uniformly compacted to not less than 90 percent of maximum dry density (ASTM Test Method D1557-91). Compaction equipment shall be adequately sized and be either specifically designed for soil compaction or of proven reliability to efficiently achieve the specified level of compaction with uniformity.
- 4.4 Compaction of Fill Slopes: In addition to normal compaction procedures specified above, compaction of slopes shall be accomplished by backrolling of slopes with sheepsfoot rollers at increments of 3 to 4 feet in fill elevation, or by other methods producing satisfactory results acceptable to the Geotechnical Consultant. Upon completion of grading, relative compaction of the fill, out to the slope face, shall be at least 90 percent of maximum density per ASTM Test Method D1557-91.
- 4.5 Compaction Testing: Field tests for moisture content and relative compaction of the fill soils shall be performed by the Geotechnical Consultant. Location and frequency of tests shall be at the Consultant's discretion based on field conditions encountered. Compaction test locations will not necessarily be selected on a random basis. Test locations shall be selected to verify adequacy of compaction levels in areas that are judged to be prone to inadequate compaction (such as close to slope faces and at the fill/bedrock benches).
- 4.6 Frequency of Compaction Testing: Tests shall be taken at intervals not exceeding 2 feet in vertical rise and/or 1,000 cubic yards of compacted fill soils embankment. In addition, as a guideline, at least one test shall be taken on slope faces for each 5,000 square feet of slope face and/or each 10 feet of vertical height of slope. The Contractor shall assure that fill construction is such that the testing schedule can be accomplished by the Geotechnical Consultant. The Contractor shall stop or slow down the earthwork construction if these minimum standards are not met.
- 4.7 Compaction Test Locations: The Geotechnical Consultant shall document the approximate elevation and horizontal coordinates of each test location. The Contractor shall coordinate with the project surveyor to assure that sufficient grade stakes are established so that the Geotechnical Consultant can determine the test locations with sufficient accuracy. At a minimum, two grade stakes within a horizontal distance of 100 feet and vertically less than 5 feet apart from potential test locations shall be provided.

5.0 Subdrain Installation

Subdrain systems shall be installed in accordance with the approved geotechnical report(s), the grading plan, and the Standard Details. The Geotechnical Consultant may recommend additional subdrains and/or changes in subdrain extent, location, grade, or material depending on conditions encountered during grading. All subdrains shall be surveyed by a land surveyor/civil engineer for line and grade after installation and prior to burial. Sufficient time should be allowed by the Contractor for these surveys.

6.0 Excavation

Excavations, as well as over-excavation for remedial purposes, shall be evaluated by the Geotechnical Consultant during grading. Remedial removal depths shown on geotechnical plans are estimates only. The actual extent of removal shall be determined by the Geotechnical Consultant based on the field evaluation of exposed conditions during grading. Where fill-over-cut slopes are to be graded, the cut portion of the slope shall be made, evaluated, and accepted by the Geotechnical Consultant prior to placement of materials for construction of the fill portion of the slope, unless otherwise recommended by the Geotechnical Consultant.

7.0 Trench Backfills

7.1 Safety: The Contractor shall follow all OSHA and Cal/OSHA requirements for safety of trench excavations.

7.2 Bedding and Backfill: All bedding and backfill of utility trenches shall be done in accordance with the applicable provisions of Standard Specifications of Public Works Construction. Bedding material shall have a Sand Equivalent greater than 30 ($SE > 30$). The bedding shall be placed to 1 foot over the top of the conduit and densified by jetting. Backfill shall be placed and densified to a minimum of 90 percent of maximum from 1 foot above the top of the conduit to the surface.

The Geotechnical Consultant shall test the trench backfill for relative compaction. At least one test should be made for every 300 feet of trench and 2 feet of fill.

7.3 Lift Thickness: Lift thickness of trench backfill shall not exceed those allowed in the Standard Specifications of Public Works Construction unless the Contractor can demonstrate to the Geotechnical Consultant that the fill lift can be compacted to the minimum relative compaction by his alternative equipment and method.

7.4 Observation and Testing: The jetting of the bedding around the conduits shall be observed by the Geotechnical Consultant.



APPENDIX E

GBA'S IMPORTANT INFORMATION ABOUT THIS GEOTECHNICAL-ENGINEERING REPORT

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 site-wide-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*.



Telephone: 301/565-2733

e-mail: info@geoprofessional.org www.geoprofessional.org



CITY OF COSTA MESA

P.O. BOX 12000 77 FAIR DRIVE CALIFORNIA 92628-1200

FROM THE DEPARTMENT OF PUBLIC WORKS/ ENGINEERING DIVISION

DATE: February 2, 2024

TO: ALL PROSPECTIVE BIDDERS

SUBJECT: ADDENDUM NO. 1: FIRE STATION NO. 4 - TRAINING FACILITY (SITE IMPROVEMENTS) - CITY PROJECT NO. 23-04

Please forward this addendum to the appropriate individual as soon as possible. To assist our office in confirming the delivery of this addendum, please sign acknowledging receipt herein and e-mail a copy of this sheet to Janet.Zuazo@costamesaca.com. **A COPY WILL NOT BE SENT BY MAIL.**

Received by: _____

Company: _____

All bidders shall register with PlanetBids.com in order to retrieve addenda. It is the responsibility of each prospective bidder to check the City's PlanetBids.com portal at: <https://www.planetbids.com/portal/portal.cfm?CompanyID=45476> on a DAILY basis through the close of bids for any applicable addenda or updates.

This addendum, effective on this date, addresses the following items:

MANDATORY PRE-BID JOB WALK DATE: 10:30 A.M., Monday, January 23rd, 2024. **COMPLETE**

PLANET BIDS OPENING DATE: 2:00 P.M., Tuesday, February 13th, 2024. **NO CHANGE**

CLARIFICATIONS TO PROPOSAL:

The Building Approved Plans and WQMP for Fire Station No. 4 Training Facility (Site Improvements) at 2300 Placentia Av. Costa Mesa have been uploaded to Planet Bids.

Revisions and subsequent changes have been made to the Plans and WQMP as part of Addendum No. 1 dated 01/29/24.

Please acknowledge receipt of the attached Addendum #1 specification changes on the Proposal Page "P-5" in your bid submittal and by email per instruction in the first page of this addendum.

Attachment 1: Stamped Fire Station 4_Training Facility Plans (Site Improvements)

Attachment 2: Stamped WQMP

Hector Soriano
Associate Engineer



CITY OF COSTA MESA

P.O. BOX 12000 77 FAIR DRIVE CALIFORNIA 92628-1200

FROM THE DEPARTMENT OF PUBLIC WORKS/ ENGINEERING DIVISION

DATE: February 6, 2024

TO: ALL PROSPECTIVE BIDDERS

SUBJECT: ADDENDUM NO. 2: FIRE STATION NO. 4 - TRAINING FACILITY (SITE IMPROVEMENTS) - CITY PROJECT NO. 23-04

Please forward this addendum to the appropriate individual as soon as possible. To assist our office in confirming the delivery of this addendum, please sign acknowledging receipt herein and e-mail a copy of this sheet to Janet.Zuazo@costamesaca.com. **A COPY WILL NOT BE SENT BY MAIL.**

Received by: _____

Company: _____

All bidders shall register with PlanetBids.com in order to retrieve addenda. It is the responsibility of each prospective bidder to check the City's PlanetBids.com portal at: <https://www.planetbids.com/portal/portal.cfm?CompanyID=45476> on a DAILY basis through the close of bids for any applicable addenda or updates.

This addendum, effective on this date, addresses the following items:

MANDATORY PRE-BID JOB WALK DATE: 10:30 A.M., Monday, January 23rd, 2024. **COMPLETE**

PLANET BIDS OPENING DATE: 4:00 P.M., Thursday, February 15th, 2024. **EXTENDED**

CLARIFICATIONS TO PROPOSAL:

Revisions, additions, and subsequent changes have been made to the Plans, Asbestos and Lead-Based Paint and Lead-Glazed Ceramic Tile Survey Report and Project Specifications as part of Addendum No. 2 dated 02/06/24. Changes for Fire Station No. 4 Training Facility (Site Improvements) at 2300 Placentia Av. Costa Mesa have been uploaded to Planet Bids and include the summary of changes below:

1. TECHNICAL SPECIFICATIONS

- 1.1 SECTION 01 33 00 – SUBMITTAL PROCEDURES
 - A. Article 1.15, Paragraph A: Change Item 1 to read "PV System".
 - B. Article 1.15, Paragraph A: Delete Items 2 and 3.
- 1.2 SECTION 02 41 16 – BUILDING DEMOLITION
 - C. Add the attached Section 02 41 16 in its entirety.
- 1.3 SECTION 02 41 19 – SELECTIVE DEMOLITION
 - A. Add the attached Section 02 41 19 in its entirety.
- 1.4 SECTION 02 80 00 – FACILITY REMEDIATION
 - A. Add the attached Section 02 80 00 in its entirety.

2. PROJECT PLANS

ARCHITECTURAL

1.5 DRAWING T1 – TITLE SHEET

- A. Replace this drawing with the attached Drawing T1 in its entirety.

CIVIL

1.6 Drawing CU-1 – COMPOSITE UTILITY PLAN

- A. Replace this drawing with the attached Drawing CU-1 in its entirety.

ELECTRICAL

1.7 DRAWING E1.1 – SITE PLAN

- A. Replace this drawing with the attached Drawing E1.1 in its entirety.

WHP TRAINING TOWER

1.8 WHP TOWER DRAWINGS S0, S1, 0 THROUGH 6

- A. WHP Tower drawings are attached for reference.

3. RESPONSES TO PROSPECTIVE BIDDER'S QUESTIONS:

The following questions were received at the pre-proposal meeting and through Planet Bids with subsequent answers and clarifications:

1. Is this project covered under the Community Workforce Agreement? Is there any PLA /CWA requirement?

Answer: Yes. Refer to Project Specifications for more information.

2. Could you please post responsibility matrix?

Answer: Refer to Plans and Project Specifications to determine General Contractor scope and responsibility matrix.

3. Is there any pre-qualification requirement for GCs and/or MPE contractors?

Answer: No. Refer to Project Specifications for more information.

4. I see we missed the mandatory pre-bid meeting and we're still hoping to bid on it. Will there be any others that we can attend by chance?

Answer: The project had only one Mandatory Job Walk on 01/23/24 as a requirement to Bid.

5. Is there a location at the yard or city facilities to dispose extra soil generated from site activities?

Answer: Refer to project specifications, its exhibits and plans to identify storage and staging areas.

6. As indicated in the Geotechnical report, only slot excavation be permitted for excavation around the building.

Answer: Refer project plans and Specifications for additional information.

7. Will Solar panels be provided by the GC?

Answer: Refer to Project Specifications and Plans for scope and submittal requirements.

8. Can you post the job walk sign-in sheet?

Answer:

9. are Fire alarm and Fire protection not in scope?

Answer: Refer to Addenda No. 2, Technical Specifications for additional clarifications.

10. Will utilities need to be capped?

Answer:

11. Where will the conduit be running from the 3-phase panel? Will it be mounted on the roof of the Warehouse, wall, or hanging through a rod?

Answer: *Conduit is to be attached to the underside of the roof structure.*

12. Do both of the car ports have solar panels?

Answer: *Only one structure has solar panels. Refer to Solar PV Plan Sheet E1.2 of the project plans.*

13. What is the scope of work of the General Contractor inside the tower?

Answer: *Refer to Legend & General Notes of sheet A1.1. of the project plans. Additionally, refer to project specifications, addenda and plans for additional information.*

14. Clarify that the metal side of the tower will also be demoed with the cinder block side of the tower.

Answer: *All existing tower components and its footing are subject to demolition. Refer to Note 12 under Legend & General Notes of sheet A1.1D of the project plans; refer to project plans specifications for additional details.*

15. What is the deadline for the references? (Costa Mesa)

Answer: *Construction Project References must be included in the Bid Submittal on page P-5 of the project specs.*

16. What will the General Contractor be in charge of when it comes to the tower?

Answer: *Refer to Legend & General Notes of sheet A1.1. of the project plans.*

17. When will be the notice to proceed issued?

Answer: *The Notice to Proceed will be determined after City Council Approval.*

18. Will anything in the existing tower need to be salvageable?

Answer: *Refer to Removal and Relocation Layout Exhibit "D" of the project specs; additionally, refer to project specs and plans for additional information.*

19. Plans don't show a route where to run a trench for the home run to connect the Solar Carport to the Main Switchboard in the Warehouse. Are there any suggestions for the trench needed? There is a call for the (N) Pump House only but not for the Solar Carport.

20. On E1.1 the water pump shows the location of an electric trench MSB-5, will the plans show the trench location of the mounted solar panels line DPB-8 and EVP-2 as well?

Answer: *Proposed electric trenching routes have been updated on sheet CU-1 of this Addenda No. 2 as reference. The Contractor shall propose to the City the best trench route in coordination with the City and other utility agencies to avoid interference with existing utilities or other structures.*

Please acknowledge receipt of the attached Addendum #1 specification changes on the Proposal Page "P-5" in your bid submittal and by email per instruction in the first page of this addendum.

Attachment 1: Addendum No. 2 – Technical Specifications and Plans modifications.

Attachment 2: Asbestos and Lead-Based Paint and Lead-Glazed Ceramic Tile Survey Report



Hector Soriano
Associate Engineer

EXHIBIT C

BONDS

BIDDER'S BOND TO ACCOMPANY PROPOSAL AND SUBMITTED TO CITY CLERK

(Required if the bidder desires to submit bond instead of a certified or cashier's check.)

KNOW ALL PEOPLE BY THESE PRESENTS:

That we, Caliba Inc. as principals, and Employers Mutual Casualty Company as surety, are held and firmly bound unto the City of Costa Mesa, a municipal corporation, organized under the laws of the State of California and situated in Orange County in the sum of Ten percent of amount bid (\$ 10%) to be paid to the City, its successors and assigns, 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 is the certain proposal of the above bounden, Caliba Inc., if accepted by the City of Costa Mesa, and if the above bounden, Caliba Inc., his heirs, executors, administrators, successors and assigns, shall duly enter into and execute a contract for such construction, and shall execute and deliver the CERTIFICATE OF INSURANCE and the LABOR AND MATERIAL and the FAITHFUL PERFORMANCE BONDS described within fourteen (14) days from the date of the mailing of a notice of the above bounden, Caliba Inc., by and from the City, that said contract is ready for execution, then this obligation shall become null and void; otherwise it shall be and remain in full force and virtue.

IN WITNESS WHEREOF:

We hereunto set our hands and seals this 6th day of February, 2024.

Caliba Inc.
Adam Othman
President/CEO

Employers Mutual Casualty Company
Adriana Valenzuela, Attorney-in-Fact

Contractor/ Principal
(Notary Acknowledgement to be attached)

Surety/Power of Attorney
(Notary Acknowledgement to be attached)

JO
Bidder's Initials

STATE OF CALIFORNIA
DEPARTMENT OF INSURANCE
SAN FRANCISCO

№ 07690

Amended
Certificate of Authority

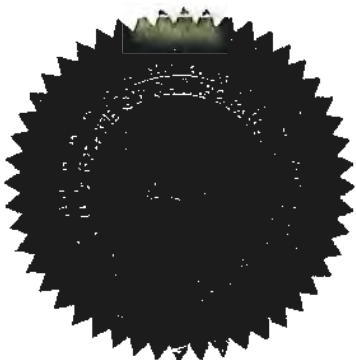
THIS IS TO CERTIFY THAT, Pursuant to the Insurance Code of the State of California,

Employers Mutual Casualty Company

of Des Moines, Iowa, organized under the laws of Iowa, subject to its Articles of Incorporation or other fundamental organizational documents, is hereby authorized to transact within the State, subject to all provisions of this Certificate, the following classes of insurance: Fire, Marine, Surety, Disability, Plate Glass, Liability, Workers' Compensation, Common Carrier Liability, Boiler and Machinery, Burglary, Sprinkler, Team and Vehicle, Automobile, Aircraft, and Miscellaneous as such classes are now or may hereafter be defined in the Insurance Laws of the State of California.

THIS CERTIFICATE is expressly conditioned upon the holder hereof now and hereafter being in full compliance with all, and not in violation of any, of the applicable laws and lawful requirements made under authority of the laws of the State of California as long as such laws or requirements are in effect and applicable, and as such laws and requirements now are, or may hereafter be changed or amended.

IN WITNESS WHEREOF, effective as of the 4th day of March, 2003, I have hereunto set my hand and caused my official seal to be affixed this 4th day of March, 2003.



By

John Garamendi
Insurance Commissioner
Victoria S. Sidbury
for: Ida Zodrow - Acting Chief Deputy

NOTICE:

Qualification with the Secretary of State must be accomplished as required by the California Corporations Code promptly after issuance of this Certificate of Authority. Failure to do so will be a violation of Insurance Code Section 701 and will be grounds for revoking this Certificate of Authority pursuant to the covenants made in the application therefor and the conditions contained herein.



P.O. Box 712 • Des Moines, Iowa 50306-0712

POWER OF ATTORNEY APPOINTING INDIVIDUAL ATTORNEY-IN-FACT

KNOW ALL MEN BY THESE PRESENTS, that:

- 1. Employers Mutual Casualty Company, an Iowa Corporation
- 2. EMCASCO Insurance Company, an Iowa Corporation
- 3. Union Insurance Company of Providence, an Iowa Corporation
- 4. Illinois EMCASCO Insurance Company, an Iowa Corporation
- 5. Dakota Fire Insurance Company, a North Dakota Corporation
- 6. EMC Property & Casualty Company, an Iowa Corporation

hereinafter referred to severally as "Company" and collectively as "Companies", each does, by these presents, make, constitute and appoint:

Adriana Valenzuela

its true and lawful attorney-in-fact, with full power and authority conferred to sign, seal, and execute the Bid Bond

In an amount not exceeding Twenty Million Dollars\$20,000,000.00

and to bind each Company thereby as fully and to the same extent as if such instruments were signed by the duly authorized officers of each such Company, and all of the acts of said attorney pursuant to the authority hereby given are hereby ratified and confirmed.

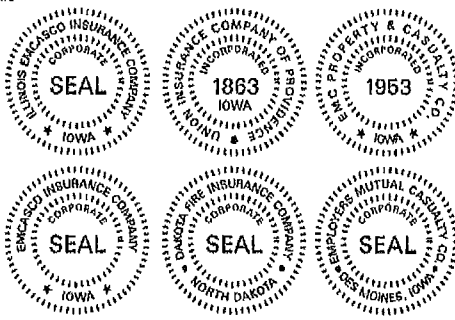
AUTHORITY FOR POWER OF ATTORNEY

This Power-of-Attorney is made and executed pursuant to and by the authority of the following resolution of the Boards of Directors of each of the Companies at the first regularly scheduled meeting of each company duly called and held in 1999:

RESOLVED: The President and Chief Executive Officer, any Vice President, the Treasurer and the Secretary of Employers Mutual Casualty Company shall have power and authority to (1) appoint attorneys-in-fact and authorize them to execute on behalf of each Company and attach the seal of the Company thereto, bonds and undertakings, recognizances, contracts of indemnity and other writings obligatory in the nature thereof; and (2) to remove any such attorney-in-fact at any time and revoke the power and authority given to him or her. Attorneys-in-fact shall have power and authority, subject to the terms and limitations of the power-of-attorney issued to them, to execute and deliver on behalf of the Company, and to attach the seal of the Company thereto, bonds and undertakings, recognizances, contracts of indemnity and other writings obligatory in the nature thereof, and any such instrument executed by any such attorney-in-fact shall be fully and in all respects binding upon the Company. Certification as to the validity of any power-of-attorney authorized herein made by an officer of Employers Mutual Casualty Company shall be fully and in all respects binding upon this Company. The facsimile or mechanically reproduced signature of such officer, whether made heretofore or hereafter, wherever appearing upon a certified copy of any power-of-attorney of the Company, shall be valid and binding upon the Company with the same force and effect as though manually affixed.

IN WITNESS THEREOF, the Companies have caused these presents to be signed for each by their officers as shown, and the Corporate seals to be hereto affixed this 22nd day of September, 2022.

Seals



Scott R. Jean

Scott R. Jean, President & CEO of Company 1; Chairman, President & CEO of Companies 2, 3, 4, 5 & 6

Todd Strother

Todd Strother, Executive Vice President Chief Legal Officer & Secretary of Companies 1, 2, 3, 4, 5 & 6

On this 22nd day of September, 2022 before me a Notary Public in and for the State of Iowa, personally appeared Scott R. Jean and Todd Strother, who, being by me duly sworn, did say that they are, and are known to me to be the CEO, Chairman, President, Executive Vice President, Chief Legal Officer and/or Secretary, respectively, of each of the Companies above; that the seals affixed to this instrument are the seals of said corporations; that said instrument was signed and sealed on behalf of each of the Companies by authority of their respective Boards of Directors; and that the said Scott R. Jean and Todd Strother, as such officers, acknowledged the execution of said instrument to be their voluntary act and deed, and the voluntary act and deed of each of the Companies.

My Commission Expires October 10, 2025.

Kathy Loveridge

Notary Public in and for the State of Iowa



CERTIFICATE

I, Ryan J. Springer, Vice President of the Companies, do hereby certify that the foregoing resolution of the Boards of Directors by each of the Companies, and this Power of Attorney issued pursuant thereto on 22nd day of September, 2022, are true and correct and are still in full force and effect.

In Testimony Whereof I have subscribed my name and affixed the facsimile seal of each Company this 6th day of February, 2024.

Ryan J. Springer

Vice President

CALIFORNIA ALL-PURPOSE ACKNOWLEDGMENT

CIVIL CODE § 1189

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

State of California)
County of San Bernardino)

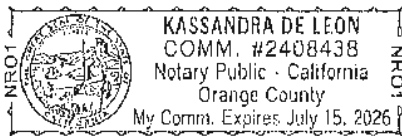
On FEB 06 2024 before me, Kassandra De Leon, Notary Public
Date Here Insert Name and Title of the Officer

personally appeared Adriana Valenzuela
Name(s) of Signer(s)

who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in h/s/her/their authorized capacity(ies), and that by h/s/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

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

WITNESS my hand and official seal.



Signature [Handwritten Signature]
Signature of Notary Public

Place Notary Seal Above

OPTIONAL

Though this section is optional, completing this information can deter alteration of the document or fraudulent reattachment of this form to an unintended document.

Description of Attached Document

Title or Type of Document: _____
Document Date: _____ Number of Pages: _____
Signer(s) Other Than Named Above: _____

Capacity(ies) Claimed by Signer(s)

Signer's Name: _____
 Corporate Officer -- Title(s): _____
 Partner -- Limited General
 Individual Attorney in Fact
 Trustee Guardian or Conservator
 Other: _____
Signer Is Representing: _____

Signer's Name: _____
 Corporate Officer -- Title(s): _____
 Partner -- Limited General
 Individual Attorney in Fact
 Trustee Guardian or Conservator
 Other: _____
Signer Is Representing: _____

CALIFORNIA ACKNOWLEDGMENT

CIVIL CODE § 1189

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

State of California }
County of ORANGE }

On 8 February 2024 before me, Jo-an Guino Reeves, Notary Public
Date Here Insert Name and Title of the Officer
personally appeared Adam Othman
Name(s) of Signer(s)

who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within Instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the Instrument.

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

WITNESS my hand and official seal.



Place Notary Seal and/or Stamp Above

Signature [Handwritten Signature]
Signature of Notary Public

OPTIONAL

Completing this information can deter alteration of the document or fraudulent reattachment of this form to an unintended document.

Description of Attached Document

Title or Type of Document: _____

Document Date: _____ Number of Pages: _____

Signer(s) Other Than Named Above: _____

Capacity(ies) Claimed by Signer(s)

Signer's Name: _____ Signer's Name: _____

Corporate Officer – Title(s): _____ Corporate Officer – Title(s): _____

Partner – Limited General Partner – Limited General

Individual Attorney in Fact Individual Attorney in Fact

Trustee Guardian or Conservator Trustee Guardian or Conservator

Other: _____ Other: _____

Signer is Representing: _____ Signer is Representing: _____

BIDDER'S BOND TO ACCOMPANY PROPOSAL AND SUBMITTED TO CITY CLERK

(Required if the bidder desires to submit bond instead of a certified or cashier's check.)

KNOW ALL PEOPLE BY THESE PRESENTS:

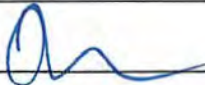
That we, Caliba Inc. as principals, and Employers Mutual Casualty Company as surety, are held and firmly bound unto the City of Costa Mesa, a municipal corporation, organized under the laws of the State of California and situated in Orange County in the sum of Ten percent of amount bid (\$ 10%) to be paid to the City, its successors and assigns, 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.

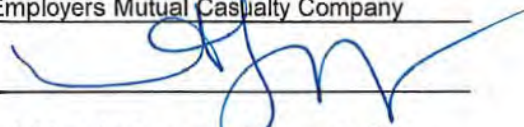
THE CONDITION OF THIS OBLIGATION IS SUCH,

That is the certain proposal of the above bounden, Caliba Inc., if accepted by the City of Costa Mesa, and if the above bounden, Caliba Inc., his heirs, executors, administrators, successors and assigns, shall duly enter into and execute a contract for such construction, and shall execute and deliver the CERTIFICATE OF INSURANCE and the LABOR AND MATERIAL and the FAITHFUL PERFORMANCE BONDS described within fourteen (14) days from the date of the mailing of a notice of the above bounden, Caliba Inc., by and from the City, that said contract is ready for execution, then this obligation shall become null and void; otherwise it shall be and remain in full force and virtue.

IN WITNESS WHEREOF:

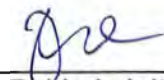
We hereunto set our hands and seals this 6th day of February, 2024.

Caliba Inc.
Adam Othman 
President/CEO

Employers Mutual Casualty Company

Adriana Valenzuela, Attorney-in-Fact

Contractor/ Principal
(Notary Acknowledgement to be attached)

Surety/Power of Attorney
(Notary Acknowledgment to be attached)


Bidder's Initials

STATE OF CALIFORNIA
DEPARTMENT OF INSURANCE
SAN FRANCISCO

№ 07690

Amended
Certificate of Authority

THIS IS TO CERTIFY THAT, Pursuant to the Insurance Code of the State of California,

Employers Mutual Casualty Company

of Des Moines, Iowa, organized under the laws of Iowa, subject to its Articles of Incorporation or other fundamental organizational documents, is hereby authorized to transact within the State, subject to all provisions of this Certificate, the following classes of insurance: Fire, Marine, Surety, Disability, Plate Glass, Liability, Workers' Compensation, Common Carrier Liability, Boiler and Machinery, Burglary, Sprinkler, Team and Vehicle, Automobile, Aircraft, and Miscellaneous as such classes are now or may hereafter be defined in the Insurance Laws of the State of California.

THIS CERTIFICATE is expressly conditioned upon the holder hereof now and hereafter being in full compliance with all, and not in violation of any, of the applicable laws and lawful requirements made under authority of the laws of the State of California as long as such laws or requirements are in effect and applicable, and as such laws and requirements now are, or may hereafter be changed or amended.

IN WITNESS WHEREOF, effective as of the 4th day of March, 2003, I have hereunto set my hand and caused my official seal to be affixed this 4th day of March, 2003.



By

John Garamendi
Insurance Commissioner
Victoria S. Sidbury
Victoria S. Sidbury
for Ida Zedrow - Acting Chief Deputy

NOTICE:

Qualification with the Secretary of State must be accomplished as required by the California Corporations Code promptly after issuance of this Certificate of Authority. Failure to do so will be a violation of Insurance Code Section 701 and will be grounds for revoking this Certificate of Authority pursuant to the covenants made in the application therefor and the conditions contained herein.



P.O. Box 712 • Des Moines, Iowa 50306-0712

POWER OF ATTORNEY APPOINTING INDIVIDUAL ATTORNEY-IN-FACT

KNOW ALL MEN BY THESE PRESENTS, that:

- 1. Employers Mutual Casualty Company, an Iowa Corporation
- 2. EMCASCO Insurance Company, an Iowa Corporation
- 3. Union Insurance Company of Providence, an Iowa Corporation
- 4. Illinois EMCASCO Insurance Company, an Iowa Corporation
- 5. Dakota Fire Insurance Company, a North Dakota Corporation
- 6. EMC Property & Casualty Company, an Iowa Corporation

hereinafter referred to severally as "Company" and collectively as "Companies", each does, by these presents, make, constitute and appoint:

Adriana Valenzuela

its true and lawful attorney-in-fact, with full power and authority conferred to sign, seal, and execute the Bid Bond

In an amount not exceeding Twenty Million Dollars\$20,000,000.00

and to bind each Company thereby as fully and to the same extent as if such instruments were signed by the duly authorized officers of each such Company, and all of the acts of said attorney pursuant to the authority hereby given are hereby ratified and confirmed.

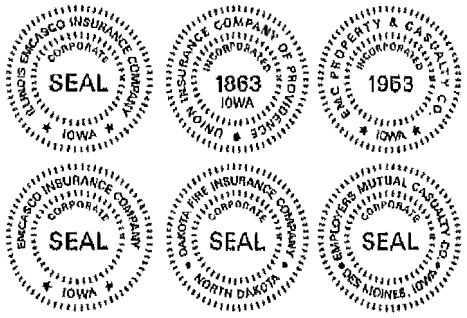
AUTHORITY FOR POWER OF ATTORNEY

This Power-of-Attorney is made and executed pursuant to and by the authority of the following resolution of the Boards of Directors of each of the Companies at the first regularly scheduled meeting of each company duly called and held in 1999:

RESOLVED: The President and Chief Executive Officer, any Vice President, the Treasurer and the Secretary of Employers Mutual Casualty Company shall have power and authority to (1) appoint attorneys-in-fact and authorize them to execute on behalf of each Company and attach the seal of the Company thereto, bonds and undertakings, recognizances, contracts of indemnity and other writings obligatory in the nature thereof; and (2) to remove any such attorney-in-fact at any time and revoke the power and authority given to him or her. Attorneys-in-fact shall have power and authority, subject to the terms and limitations of the power-of-attorney issued to them, to execute and deliver on behalf of the Company, and to attach the seal of the Company thereto, bonds and undertakings, recognizances, contracts of indemnity and other writings obligatory in the nature thereof, and any such instrument executed by any such attorney-in-fact shall be fully and in all respects binding upon the Company. Certification as to the validity of any power-of-attorney authorized herein made by an officer of Employers Mutual Casualty Company shall be fully and in all respects binding upon this Company. The facsimile or mechanically reproduced signature of such officer, whether made heretofore or hereafter, wherever appearing upon a certified copy of any power-of-attorney of the Company, shall be valid and binding upon the Company with the same force and effect as though manually affixed.

IN WITNESS THEREOF, the Companies have caused these presents to be signed for each by their officers as shown, and the Corporate seals to be hereto affixed this 22nd day of September, 2022.

Seals



Scott R. Jean
 Scott R. Jean, President & CEO
 of Company 1; Chairman, President
 & CEO of Companies 2, 3, 4, 5 & 6

Todd Strother
 Todd Strother, Executive Vice President
 Chief Legal Officer & Secretary of
 Companies 1, 2, 3, 4, 5 & 6

On this 22nd day of September, 2022 before me a Notary Public in and for the State of Iowa, personally appeared Scott R. Jean and Todd Strother, who, being by me duly sworn, did say that they are, and are known to me to be the CEO, Chairman, President, Executive Vice President, Chief Legal Officer and/or Secretary, respectively, of each of the Companies above; that the seals affixed to this instrument are the seals of said corporations; that said instrument was signed and sealed on behalf of each of the Companies by authority of their respective Boards of Directors; and that the said Scott R. Jean and Todd Strother, as such officers, acknowledged the execution of said instrument to be their voluntary act and deed, and the voluntary act and deed of each of the Companies.

My Commission Expires October 10, 2025.

Kathy Loveridge

 Notary Public in and for the State of Iowa



CERTIFICATE

I, Ryan J. Springer, Vice President of the Companies, do hereby certify that the foregoing resolution of the Boards of Directors by each of the Companies, and this Power of Attorney issued pursuant thereto on 22nd day of September, 2022, are true and correct and are still in full force and effect.

In Testimony Whereof I have subscribed my name and affixed the facsimile seal of each Company this 6th day of February, 2024.

Ryan J. Springer

 Vice President

CALIFORNIA ALL-PURPOSE ACKNOWLEDGMENT

CIVIL CODE § 1189

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

State of California)
County of San Bernardino)

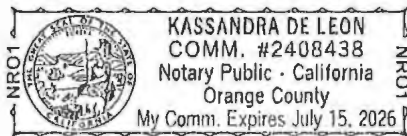
On FEB 06 2024 before me, Kassandra De Leon, Notary Public
Date Here Insert Name and Title of the Officer

personally appeared Adriana Valenzuela
Name(s) of Signer(s)

who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in h/s/her/their authorized capacity(ies), and that by h/s/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

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

WITNESS my hand and official seal.



Signature [Handwritten Signature]
Signature of Notary Public

Place Notary Seal Above

OPTIONAL

Though this section is optional, completing this information can deter alteration of the document or fraudulent reattachment of this form to an unintended document.

Description of Attached Document

Title or Type of Document: _____
Document Date: _____ Number of Pages: _____
Signer(s) Other Than Named Above: _____

Capacity(ies) Claimed by Signer(s)

Signer's Name: _____
 Corporate Officer — Title(s): _____
 Partner — Limited General
 Individual Attorney in Fact
 Trustee Guardian or Conservator
 Other: _____
Signer Is Representing: _____

Signer's Name: _____
 Corporate Officer — Title(s): _____
 Partner — Limited General
 Individual Attorney in Fact
 Trustee Guardian or Conservator
 Other: _____
Signer Is Representing: _____

CALIFORNIA ACKNOWLEDGMENT

CIVIL CODE § 1189



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

State of California }
County of ORANGE

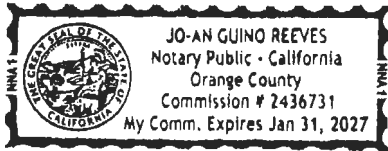
On 8 February 2024 before me, Jo-an Guino Reeves, Notary Public
Date Here Insert Name and Title of the Officer

personally appeared Adam Othman
Name(s) of Signer(s)

who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

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

WITNESS my hand and official seal.



Place Notary Seal and/or Stamp Above

Signature [Handwritten Signature]
Signature of Notary Public

OPTIONAL

Completing this information can deter alteration of the document or fraudulent reattachment of this form to an unintended document.

Description of Attached Document

Title or Type of Document: _____

Document Date: _____ Number of Pages: _____

Signer(s) Other Than Named Above: _____

Capacity(ies) Claimed by Signer(s)

Signer's Name: _____

Signer's Name: _____

Corporate Officer – Title(s): _____

Corporate Officer – Title(s): _____

Partner – Limited General

Partner – Limited General

Individual Attorney in Fact

Individual Attorney in Fact

Trustee Guardian or Conservator

Trustee Guardian or Conservator

Other: _____

Other: _____

Signer is Representing: _____

Signer is Representing: _____



EXHIBIT D

DRUG-FREE WORKPLACE POLICY

DRUG-FREE WORKPLACE POLICY

CONTRACTOR, upon notification of contract award, shall establish a Drug-Free Awareness Program to inform employees of the dangers of drug abuse in the workplace, the penalties that may be imposed upon employees for drug abuse violations occurring in the workplace, and the employee assistance programs available to employees. Each employee engaged in the performance of a CITY contract must be notified of this Drug-Free Awareness Program, and must abide by its terms. Failure to establish a program, notify employees, or inform CITY of a drug-related workplace conviction will constitute a material breach of contract and cause for immediate termination of the contract by CITY.

CONTRACTOR shall conform to all the requirements of CITY'S Policy No. 100-5. A copy of this policy is attached to the sample contract agreement as an attachment in the Project Specifications.



Bidder's Initials

EXHIBIT E
CERTIFICATES OF INSURANCE



CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY)
4/2/2024

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

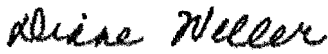
PRODUCER Alliant Insurance Services, Inc. 18100 Von Karman Ave 10th Fl Irvine CA 92612	CONTACT NAME: Soham Naik	
	PHONE (A/C, No, Ext): 949-527-9818	FAX (A/C, No): 949-756-2713
E-MAIL ADDRESS: soham.naik@alliant.com		
INSURER(S) AFFORDING COVERAGE		NAIC #
License#: OC36861 CALIINC-06	INSURER A: Trumbull Insurance Company	27120
	INSURER B: Hartford Casualty Insurance Co	29424
	INSURER C: Hartford Fire Insurance Compan	19682
	INSURER D: Sentinel Insurance Company Ltd	11000
	INSURER E:	
	INSURER F:	

COVERAGES **CERTIFICATE NUMBER:** 1710884703 **REVISION NUMBER:**

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

INSR LTR	TYPE OF INSURANCE	ADDL SUBR INSD WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS
C	<input checked="" type="checkbox"/> COMMERCIAL GENERAL LIABILITY <input type="checkbox"/> CLAIMS-MADE <input checked="" type="checkbox"/> OCCUR GEN'L AGGREGATE LIMIT APPLIES PER: <input type="checkbox"/> POLICY <input checked="" type="checkbox"/> PRO-JECT <input type="checkbox"/> LOC OTHER:	Y Y	72 UEA CL3543	2/1/2024	2/1/2025	EACH OCCURRENCE \$ 1,000,000 DAMAGE TO RENTED PREMISES (Ea occurrence) \$ 300,000 MED EXP (Any one person) \$ 5,000 PERSONAL & ADV INJURY \$ 1,000,000 GENERAL AGGREGATE \$ 2,000,000 PRODUCTS - COMP/OP AGG \$ 2,000,000 \$
A	AUTOMOBILE LIABILITY <input checked="" type="checkbox"/> ANY AUTO <input type="checkbox"/> OWNED AUTOS ONLY <input type="checkbox"/> SCHEDULED AUTOS <input type="checkbox"/> HIRED AUTOS ONLY <input type="checkbox"/> NON-OWNED AUTOS ONLY	Y Y	72 UEA CL3542	2/1/2024	2/1/2025	COMBINED SINGLE LIMIT (Ea accident) \$ 1,000,000 BODILY INJURY (Per person) \$ BODILY INJURY (Per accident) \$ PROPERTY DAMAGE (Per accident) \$ \$
B	<input type="checkbox"/> UMBRELLA LIAB <input checked="" type="checkbox"/> OCCUR <input checked="" type="checkbox"/> EXCESS LIAB <input type="checkbox"/> CLAIMS-MADE DED RETENTION \$	Y Y	72 HHA CL3850	2/1/2024	2/1/2025	EACH OCCURRENCE \$ 4,000,000 AGGREGATE \$ 4,000,000 \$
D	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory In NH) If yes, describe under DESCRIPTION OF OPERATIONS below	Y/N N N/A	72 WEA BC6ZPL	2/1/2024	2/1/2025	<input checked="" type="checkbox"/> PER STATUTE <input type="checkbox"/> OTH-ER E.L. EACH ACCIDENT \$ 1,000,000 E.L. DISEASE - EA EMPLOYEE \$ 1,000,000 E.L. DISEASE - POLICY LIMIT \$ 1,000,000

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)
Re: Caliba Project #C 1062, City Project No. 23-04, Fire Station No. 4 Training Tower and Site Improvements.
City of Costa Mesa and their elected and appointed boards, officers, agents, employees are named as Additional Insured per the attached endorsements on Primary and Non-Contributory basis. Waiver of Subrogation applies per attached endorsements. Thirty (30) Days Notice of Cancellation Applies/Non-Renewal - Ten (10) Days Notice For Non-Payment of Premium.

CERTIFICATE HOLDER City of Costa Mesa 77 Fair Drive Costa Mesa CA 92626	CANCELLATION SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS. AUTHORIZED REPRESENTATIVE 
---	--



THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

ADDITIONAL INSURED - OWNERS, LESSEES OR CONTRACTORS - OPTION I

This endorsement modifies insurance provided under the following:

COMMERCIAL GENERAL LIABILITY COVERAGE PART

SCHEDULE

Name Of Additional Insured Person(s) Or Organization(s):	Designated Project(s) Or Location(s) Of Covered Operations:
Where Required By A Written Contract	Per Agreement or Contract
Information required to complete this Schedule, if not shown above, will be shown in the Declarations.	

A. With respect to those person(s) or organization(s) shown in the Schedule above when you have agreed in a written contract or written agreement to provide insurance such as is afforded under this policy to them, Subparagraph **f.**, **Any Other Party**, under the **Additional Insureds When Required By Written Contract, Written Agreement Or Permit Paragraph of Section II – Who Is An Insured** is replaced with the following:

f. Any Other Party

Any other person or organization who is not an insured under Paragraphs **a.** through **e.** above, but only with respect to liability for "bodily injury", "property damage" or "personal and advertising injury" caused, in whole or in part, by your acts or omissions or the acts or omissions of those acting on your behalf:

(1) In the performance of your ongoing operations for such additional insured at the project(s) or location(s) designated in the Schedule;

(2) In connection with your premises owned by or rented to you and shown in the Schedule; or

(3) In connection with "your work" for the additional insured at the project(s) or location(s) designated in the Schedule and included within the "products-completed operations hazard", but only if:

(a) The written contract or written agreement requires you to provide such coverage to such additional insured at the project(s) or location(s) designated in the Schedule; and

(b) This Coverage Part provides coverage for "bodily injury" or "property damage" included within the "products-completed operations hazard".

The insurance afforded to the additional insured shown in the Schedule applies:

(1) Only if the "bodily injury" or "property damage" occurs, or the "personal and advertising injury" offense is committed:

(a) During the policy period; and

(b) Subsequent to the execution of such written contract or written agreement; and

- (c) Prior to the expiration of the period of time that the written contract or written agreement requires such insurance be provided to the additional insured.

- (2) Only to the extent permitted by law; and
- (3) Will not be broader than that which you are required by the written contract or written agreement to provide for such additional insured.

With respect to the insurance afforded to the person(s) or organization(s) that are additional insureds under this endorsement, the following additional exclusion applies:

This insurance does not apply to "bodily injury", "property damage" or "personal and advertising injury" arising out of the rendering of, or the failure to render, any professional architectural, engineering or surveying services, including:

- (1) The preparing, approving, or failing to prepare or approve maps, shop drawings, opinions, reports, surveys, field orders, change orders, designs or specifications; or
- (2) Supervisory, inspection, architectural or engineering activities.

The limits of insurance that apply to the additional insured shown in the Schedule are described in the Limits Of Insurance section.

How this insurance applies when other insurance is available to the additional insured is described in the Other Insurance Condition in **Section IV – Commercial General Liability Conditions**, except as otherwise amended below.

B. With respect to insurance provided to the person(s) or organization(s) that are additional insureds under this endorsement, the **When You Add Others As An Additional Insured To This Insurance** subparagraph, under the **Other Insurance** Condition of **Section IV – Commercial General Liability Conditions** is replaced with the following:

When You Add Others As An Additional Insured To This Insurance

(a) Primary Insurance When Required By Contract

This insurance is primary if you have agreed in a written contract or written agreement that this insurance be primary. If other insurance is also primary, we will share with all that other insurance by the method described in Paragraph (c) below. This insurance does not apply to other insurance to which the additional insured in the Schedule has been added as an additional insured.

(b) Primary And Non-Contributory To Other Insurance When Required By Contract

This insurance is primary to and will not seek contribution from any other insurance available to an additional insured under your policy provided that:

- (i) The additional insured in the Schedule is a Named Insured under such other insurance; and
- (ii) You have agreed in a written contract or written agreement that this insurance would be primary and would not seek contribution from any other insurance available to the additional insured in the Schedule.

(c) Method Of Sharing

If all of the other insurance permits contribution by equal shares, we will follow this method also. Under this approach, each insurer contributes equal amounts until it has paid its applicable limit of insurance or none of the loss remains, whichever comes first.

If any of the other insurance does not permit contribution by equal shares, we will contribute by limits. Under this method, each insurer's share is based on the ratio of its applicable limit of insurance to the total applicable limits of insurance of all insurers.

All other terms and conditions in the policy remain unchanged.

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

ADDITIONAL INSURED - OWNERS, LESSEES OR CONTRACTORS - SCHEDULED PERSON OR ORGANIZATION

This endorsement modifies insurance provided under the following:

COMMERCIAL GENERAL LIABILITY COVERAGE PART

SCHEDULE

Name Of Additional Insured Person(s) Or Organization(s)	Location(s) Of Covered Operations
Where Required By A Written Contract	Per Agreement or Contract
Information required to complete this Schedule, if not shown above, will be shown in the Declarations.	

A. Section II – Who Is An Insured is amended to include as an additional insured the person(s) or organization(s) shown in the Schedule, but only with respect to liability for "bodily injury", "property damage" or "personal and advertising injury" caused, in whole or in part, by:

1. Your acts or omissions; or
2. The acts or omissions of those acting on your behalf;

in the performance of your ongoing operations for the additional insured(s) at the location(s) designated above.

However:

1. The insurance afforded to such additional insured only applies to the extent permitted by law; and
2. If coverage provided to the additional insured is required by a contract or agreement, the insurance afforded to such additional insured will not be broader than that which you are required by the contract or agreement to provide for such additional insured.

B. With respect to the insurance afforded to these additional insureds, the following additional exclusions apply:

This insurance does not apply to "bodily injury" or "property damage" occurring after:

1. All work, including materials, parts or equipment furnished in connection with such work, on the project (other than service, maintenance or repairs) to be performed by or on behalf of the additional insured(s) at the location of the covered operations has been completed; or
2. That portion of "your work" out of which the injury or damage arises has been put to its intended use by any person or organization other than another contractor or subcontractor engaged in performing operations for a principal as a part of the same project.

C. With respect to the insurance afforded to these additional insureds, the following is added to **Section III – Limits Of Insurance:**

If coverage provided to the additional insured is required by a contract or agreement, the most we will pay on behalf of the additional insured is the amount of insurance:

1. Required by the contract or agreement; or

2. Available under the applicable Limits of Insurance shown in the Declarations; whichever is less.

This endorsement shall not increase the applicable Limits of Insurance shown in the Declarations.



THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

CONTRACTORS BROAD FORM ENDORSEMENT

This endorsement modifies insurance provided under the following:

COMMERCIAL GENERAL LIABILITY COVERAGE PART

INDEX

1.	Alienated Premises Coverage.....	1
2.	Damage To Your Work	1
3.	That Particular Part.....	1
4.	Contractors Limited Professional Liability.....	2
5.	Per Project and Per Location General Aggregate Limits Of Insurance.....	2
6.	Medical Payments Coverage - Including Products - Completed Operations	3
7.	Injury To Employee's Reputation With Respect To Incidental Medical Malpractice	3
8.	Bodily Injury Employee Suits.....	4
9.	Consolidated Insurance (Wrap-Up) Programs.....	4
10.	Access Or Disclosure Of Confidential Or Personal Information And Data-Related Liability	5
11.	Supplementary Payments.....	5
12.	Two Or More Coverage Parts Or Policies Issued By Us.....	6
13.	Notice of Cancellation to Certificate Holders.....	6
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1. ALIENATED PREMISES COVERAGE

Exclusion j. Damage To Property of Section I - Coverage A is amended as follows:

a. The following exception to the exclusion is deleted:

Paragraph (2) of this exclusion does not apply if the premises are "your work" and were never occupied, rented or held for rental by you.

b. This exception is replaced by the following:

Paragraph (2) of this exclusion does not apply if the premises are "your work".

2. DAMAGE TO YOUR WORK

A. Section I - Coverage A - Bodily Injury And Property Damage Liability, Paragraph 1. Insuring Agreement is amended to add the following:

f. Damages because of "property damage" include damages the insured becomes legally obligated to pay because of "property damage" to "your work" or caused by "your work", and such "property damage" shall be deemed to be caused by an "occurrence", if not intended or expected from the standpoint

of the insured, regardless of whether the "property damage" arises from breach of contract.

B. Exclusion I. Damage To Your Work of Section I - Coverage A is replaced by the following:

I. Damage to Your Work

"Property damage" to that particular part of "your work" that must be restored, repaired or replaced because "your work" was incorrectly performed and included in the "products-completed operations hazard".

This exclusion does not apply if the damaged work or the work performed incorrectly was performed on your behalf by a subcontractor.

This Paragraph 2.B. does not apply if **Exclusion I. Damage To Your Work** has been otherwise modified by endorsement.

3. THAT PARTICULAR PART

This Paragraph 3. applies to **Exclusion j. Damage to Property**, subparagraphs (5), and (6), **Exclusion k. Damage to Your Product**, and **Exclusion I. Damage to Your Work**.

When performing operations as a "general contractor", the term that particular part shall not mean the entire construction, improvement or renovation project. For purposes of this provision, the term "general contractor" means the contractor signing the prime construction contract for a construction, erection, improvement or renovation project and that has main responsibility for such project including hiring all of the subcontractors and suppliers.

4. CONTRACTORS LIMITED PROFESSIONAL LIABILITY

The following exclusion is added to Paragraph 2., Exclusions of Section I - Coverage A - Bodily Injury And Property Damage Liability, and to Paragraph 2., Exclusions of Section I - Coverage B - Personal And Advertising Injury Liability:

This insurance does not apply to "bodily injury", "property damage" or "personal and advertising injury" arising out of the rendering of or failure to render any professional services by you with respect to your providing engineering, architectural or surveying services in your capacity as an engineer, architect or surveyor.

Professional services include:

- (1) The preparing, approving, or failing to prepare or approve, maps, shop drawings, opinions, reports, surveys, field orders, change orders, or drawings and specifications; and
- (2) Supervisory or inspection activities performed as a part of any related architectural or engineering activities.

This exclusion applies even if the claims against any insured allege negligence or other wrongdoing in the supervision, hiring, employment, training or monitoring of others by that insured, if the "occurrence" which caused the "bodily injury" or "property damage", or the offense which caused the "personal and advertising injury", involved the rendering of or failure to render any professional services by you with respect to your providing engineering, architectural or surveying services in your capacity as an engineer, architect or surveyor.

This exclusion does not apply to your operations in connection with construction work performed by you or on your behalf.

However, this exception to the exclusion will not apply if you are in the business or profession of providing the professional services described above independent from the construction work performed by you or on your behalf.

In the event this insurance applies to any injury, damage, loss, cost or expense covered by Professional Liability insurance issued by a company unaffiliated with us, then the insurance

afforded under this Coverage Part is excess over such other valid and collectible Professional Liability insurance (including any deductible or self-insured retention portion thereof), and any other valid and collectible insurance available to the insured whether primary, excess, contingent or on any other basis.

5. PER PROJECT AND PER LOCATION GENERAL AGGREGATE LIMITS OF INSURANCE

A. For all sums which the insured becomes legally obligated to pay as damages caused by "occurrences" under Section I - Coverage A, and for all medical expenses caused by accidents under Section I - Coverage C, which can be attributed only to ongoing operations at a single "project" or a single "location";

1. A separate Per Project General Aggregate Limit or a separate Per Location General Aggregate Limit applies to each "project" or "location", whichever is applicable. The Per Project General Aggregate Limit and Per Location General Aggregate Limit is equal to the amount of the General Aggregate Limit shown in the Declarations.
2. The Per Project General Aggregate Limit or the Per Location General Aggregate Limit, whichever applies, is the most we will pay for the sum of all damages under Coverage A, except damages because of "bodily injury" or "property damage" included in the "products-completed operations hazard", and for medical expenses under Coverage C regardless of the number of;
 - a. Insureds;
 - b. Claims made or "suits" brought; or
 - c. Persons or organizations making claims or bringing "suits".
3. Any payments made under Coverage A for damages or under Coverage C for medical expenses shall reduce the Per Project General Aggregate Limit for that "project" or the Per Location General Aggregate for that "location", whichever applies. Such payments shall not reduce the General Aggregate Limit shown in the Declarations, the Per Project General Aggregate Limit for any other "project", or the Per Location General Aggregate Limit for any other "location".
4. The limits shown in the Declarations for Each Occurrence, Damage To Premises Rented To You and Medical Expense continue to apply. However, instead of

being subject to the General Aggregate Limit shown in the Declarations, such limits will be subject to the applicable Per Project General Aggregate Limit if attributable only to ongoing operations at a single "project" or the Per Location General Aggregate if attributable only to ongoing operations at a single "location".

B. For all sums which the insured becomes legally obligated to pay as damages caused by "occurrences" under **Section I - Coverage A** and for all medical expenses caused by accidents under **Section I - Coverage C**, which cannot be attributed only to ongoing operations at a single "project" or a single "location";

1. Any payments made under **Coverage A** for damages or under **Coverage C** for medical expenses shall reduce the amount available under the General Aggregate Limit or the Products-Completed Operations Aggregate Limit, whichever is applicable; and
2. Such payments shall not reduce any Per Project General Aggregate Limit or any Per Location General Aggregate Limit.

C. When coverage for liability arising out of the "products-completed operations hazard" is provided, any payments for damages because of "bodily injury" or "property damage" included in the "products-completed operations hazard" will reduce the Products-Completed Operations Aggregate Limit, and not reduce the General Aggregate Limit, or any Per Project General Aggregate Limit or any Per Location General Aggregate Limit.

D. The provisions of **Section III - Limits Of Insurance** not otherwise modified by this endorsement shall continue to apply as stipulated.

E. For the purposes of Paragraph 5., the following definitions apply:

"Project" means a premises an insured does not own or rent and where such insured performs construction-related operations. Each "project" involving the same or connecting lots, or premises whose connection is separated by a street, roadway, waterway, railroad or right-of-way shall be considered a single "project".

1. If a "project" has been abandoned and then restarted, or if the authorized contracting parties deviate from plans, blueprints, designs, specifications or timetables, the "project" shall be considered a single "project". "Project" does not include a premises that is a "location".

2. "Location" means a premises an insured owns or rents and where such insured performs business operations other than construction-related operations. Each "location" involving the same or connecting lots, or premises whose connection is separated by a street, roadway, waterway or right-of-way railroad shall be considered a single "location." "Location" does not include a premises that is a "project".

This provision does not apply if the Per Project and the Per Location General Aggregate Limit has been otherwise modified by endorsement.

6. MEDICAL PAYMENTS COVERAGE - INCLUDING PRODUCTS-COMPLETED OPERATIONS

Paragraph 1.a. of the **Insuring Agreement - Coverage C** is replaced by the following:

1. Insuring Agreement

- a. We will pay medical expenses as described below for "bodily injury" caused by an accident:

- (1) On premises you own or rent;
- (2) On ways next to premises you own or rent;
- (3) Because of your operations; or
- (4) Included within the definition of the "products-completed operations hazard;"

provided that:

- (1) The accident takes place in the "coverage territory" and during the policy period;
- (2) The expenses are incurred and reported to us within three years of the date of the accident; and
- (3) The injured person submits to examination, at our expense, by physicians of our choice as often as we reasonably require.

7. INJURY TO EMPLOYEE'S REPUTATION WITH RESPECT TO INCIDENTAL MEDICAL MALPRACTICE

A. The following is added to Paragraph 1.e. of the **Insuring Agreement - Coverage A**:

- (3) With respect to incidental medical malpractice, "bodily injury" includes damages claimed for injury to emotions or reputation of an "employee" arising out of the rendering or failure to render professional health care services as a physician, dentist, nurse, emergency medical technician or paramedic services.

B. The following exclusion is added to Coverage B - Personal and Advertising Injury:

"Personal and advertising injury arising out of the rendering or failure to render professional health care services as a physician, dentist, nurse, emergency medical technician or paramedic.

8. BODILY INJURY EMPLOYEE SUITS

- A. "Bodily injury" as listed in Paragraph 2.a.(1) of Section II - Who Is An Insured, does not apply to 2.a.(1)(a) through 2.a.(1)(c).
- B. Part a. of Paragraph 4. Nonowned Watercraft in Section II - Who Is An Insured does not apply.

9. CONSOLIDATED INSURANCE (WRAP-UP) PROGRAMS

The following exclusion is added to Section I Coverage A:

This insurance does not apply to any "bodily injury" or "property damage" arising out of any "wrap project or premises" where an insured under this policy is or was also an insured under one or more commercial general liability (CGL) policies (including any umbrella or excess policies that include the commercial general liability policy(ies) as underlying insurance) included within a "consolidated insurance (wrap-up) program." This exclusion applies even if the limits of insurance for such "consolidated insurance (wrap-up) program" are exhausted or not collected for any reason, including bankruptcy or insolvency of the insurer providing coverage for the "consolidated insurance (wrap-up) program". This exclusion also applies if the CGL coverage afforded under the "consolidated insurance (wrap-up) program" is narrower in scope than the coverage provided by this policy.

This exclusion does not apply to:

A. Products-Completed Operations Hazard Exception

"Bodily injury" or "property damage" arising out of an "insured's operations" at or in connection with a "wrap project or premises" when such "bodily injury" or "property damage" commences after the "products-completed operations hazard" coverage or any completed operations extension coverage provided by the applicable "consolidated insurance (wrap-up) program" has ended or is no longer in effect.

B. Off-Site Location Exception

"Bodily injury" or "property damage" resulting from an "insured's operations" at or in connection with a "wrap project or premises" at a location to which the applicable "consolidated insurance (wrap-up) program" does not apply.

C. Repair Work And Punch List Work Exception

"Bodily injury" or "property damage" resulting from "repair work" or "punch list work" at a "wrap project or premises" but only when the applicable "consolidated insurance (wrap-up) program" does not apply or no longer applies to such "repair work" or "punch list work".

This exception does not apply to the cost of performing such "repair work" or "punch list work", or to the "repair work" or "punch list work" itself.

D. Additional Insured Extension

"Bodily injury" or "property damage" for which you are solely an additional insured under the "consolidated insurance (wrap-up) program".

The coverage provided under Paragraphs 9.A through 9.D. above is subject to all terms, conditions and exclusions of this policy.

For purposes of Paragraph 9, the following definitions apply:

"Consolidated insurance (wrap-up) program" means any agreement or arrangement, including any contractor-controlled, owner-controlled, project-specific or similar insurance program under which one or more contractor(s) working on a specified project are insured under one or more commercial general liability (CGL) policies (including any umbrella or excess policies that include the commercial general liability policy(ies) as underlying insurance) issued by a specified carrier for injury or damage arising out of operations conducted in connection with or necessary or incidental to the project.

"Insured's operations" means all operations performed by a named insured (and not sub-contracted or performed by others on the insured's behalf).

"Punch list work" means the "insured's operations" at or in connection with a "wrap project or premises" in order to complete the work called for in an insured's contract for the "wrap project or premises".

"Repair work" means the "insured's operations" that are service, maintenance, correction, repair, replacement work, or periodic inspection performed by an insured at or in connection with a "wrap project or premises", in order to replace or repair an insured's completed work.

"Wrap project or premises" means any premises or construction, erection, improvement or renovation project subject to a "consolidated insurance (wrap-up) program".

10. ACCESS OR DISCLOSURE OF CONFIDENTIAL OR PERSONAL INFORMATION AND DATA-RELATED LIABILITY

A. Exclusion p. of Section I - Coverage A - Bodily Injury And Property Damage Liability is replaced by the following:

p. Access Or Disclosure Of Confidential Or Personal Information And Data-Related Liability

Damages arising out of:

- (1) Any access to or disclosure of any person's or organization's confidential or personal information, including patents, trade secrets, processing methods, customer lists, financial information, credit card information, health information or any other type of nonpublic information; or
- (2) the loss of, loss of use of, damage to, corruption of, inability to access, or inability to manipulate "electronic data" that does not result from physical injury to tangible property.

This exclusion applies even if damages are claimed for notification costs, credit monitoring expenses, forensic expenses, public relations expenses or any other loss, cost or expense incurred by you or others arising out of that which is described in Paragraph (1) or (2) above.

However, unless Paragraph (1) above applies, this exclusion does not apply to liability for damages because of "bodily injury".

B. Exclusion w. of Section 1 - Coverage B - Personal and Advertising Injury is replaced by the following: :

w. Access Or Disclosure Of Confidential Or Personal Information

"Personal and advertising injury" arising out of any access to or disclosure of any person's or organization's confidential or personal information, including patents, trade secrets, processing methods, customer lists, financial information, credit card information, health information or any other type of nonpublic information.

This exclusion applies even if damages are claimed for notification costs, credit monitoring expenses, forensic expenses, public relations expenses or any other loss, cost or expense incurred by you or others arising out of any access to or disclosure of any person's or organization's confidential or personal information.

C. The following Paragraph is added to Section III - Limits Of Insurance:

Subject to Paragraph 5. Each Occurrence Limit, the most we will pay under Coverage A for "property damage" because of all loss of "electronic data" arising out of any one "occurrence" is \$100,000, unless modified by endorsement.

D. The following definition is added to Section V - Definitions:

"Electronic data" means information, facts or programs:

- a. Stored as or on;
- b. Created or used on; or
- c. Transmitted to or from;

computer software, (including systems and applications software) hard or floppy disks, CD-ROMS, tapes, drives, cells, data processing devices or any other media which are used with electronically controlled equipment.

E. For the purposes of the coverage provided by this provision, the definition of "property damage" in Section V - Definitions is replaced by the following:

"Property damage" means:

- a. Physical injury to tangible property, including all resulting loss of use of that property. All such loss of use shall be deemed to occur at the time of the physical injury that caused it;
- b. Loss of use of tangible property that is not physically injured. All such loss of use shall be deemed to occur at the time of the "occurrence" that caused it; or
- c. Loss of, loss of use of, damage to, corruption of, inability to access, or inability to properly manipulate "electronic data", resulting from physical injury to tangible property. All such loss of "electronic data" shall be deemed to occur at the time of the "occurrence" that caused it.

For the purposes of this insurance, "electronic data" is not tangible property.

11. SUPPLEMENTARY PAYMENTS

In the **Supplementary Payments - Coverages A and B** provision:

The limit for the cost of bail bonds is increased to \$2,500.

12. TWO OR MORE COVERAGE PARTS OR POLICIES ISSUED BY US

If this policy and any other policy issued to an insured by us or any affiliated company provides coverage that applies to the same claim or damages, the maximum applicable limit(s) of liability or limit of insurance under all the policies will not exceed the highest applicable limit of liability or limit of insurance under any one policy. This condition does not apply to any policy issued by us or an affiliated company specifically written to apply as excess insurance over this policy.

13. NOTICE OF CANCELLATION TO CERTIFICATE HOLDER(S)

This policy is subject to the following additional Conditions:

- A. If this policy is cancelled by the Company, other than for nonpayment of premium, notice of such cancellation will be provided at least thirty (30) days in advance of the cancellation effective date to the certificate holder(s) with mailing addresses on file with the agent of record or the Company.
- B. If this policy is cancelled by the Company for nonpayment of premium, or by the insured, notice of such cancellation will be provided within (10) days of the cancellation effective date to the certificate holder(s) with mailing addresses on file with the agent of record or the Company.

If notice is mailed, proof of mailing to the last known mailing address of the certificate holder(s) on file with the agent of record or the Company will be sufficient proof of notice.

Any notification rights provided by this endorsement apply only to active certificate holder(s) who were issued a certificate of insurance applicable to this policy's term.

Failure to provide such notice to the certificate holder(s) will not amend or extend the date the cancellation becomes effective, nor will it negate cancellation of the policy. Failure to send notice shall impose no liability of any kind upon the Company or its agents or representatives.

14. CONTRACTUAL LIABILITY COVERAGE FOR PERSONAL AND ADVERTISING INJURY

Exclusion e. of SECTION I - COVERAGE B PERSONAL AND ADVERTISING INJURY LIABILITY is replaced by the following:

This insurance does not apply to:

e. Contractual Liability

"Personal and advertising injury" for which the insured has assumed liability in a contract or agreement. This exclusion does not apply to liability for damages:

- (1) That the insured would have in the absence of the contract or agreement; or

- (2) Assumed in a contract or agreement that is an "insured contract", provided the "personal and advertising injury" occurs subsequent to the execution of the contract or agreement. Solely for the purposes of liability assumed in an "insured contract", reasonable attorney fees and necessary litigation expenses incurred by or for a party other than an insured are deemed to be damages because of "personal and advertising injury", provided:

- (a) Liability to such party for, or for the cost of, that party's defense has also been assumed in the same "insured contract"; and
- (b) Such attorney fees and litigation expenses are for defense of that party against a civil or alternative dispute resolution proceeding in which damages to which this insurance applies are alleged.

15. INSURED CONTRACT DEFINITION

a. INSURED CONTRACT-CONSTRUCTION OPERATIONS AND MUNICIPAL WORK

Paragraph d. of the definition of "insured contract" in **Section V - Definitions** is deleted and replaced by the following:

An obligation, as required by ordinance, to indemnify a municipality.

b. CONTRACTUAL LIABILITY

Paragraph f. of the definition of "insured contract" is deleted and replaced by the following:

That part of any other contract or agreement pertaining to your business (including an indemnification of a municipality in connection with work performed for a municipality) under which you assume the tort liability of another party to pay for "bodily injury", "property damage", or "personal and advertising injury" to a third person or organization. Tort liability means a liability that would be imposed by law in the absence of any contract or agreement.

Paragraph f. includes that part of any contract or agreement that indemnifies a railroad for "bodily injury", "property damage", or "personal and advertising injury" arising out of construction or demolition operations, within 50 feet of any railroad property and affecting any railroad bridge or trestle, tracks, road-beds, tunnel, underpass or crossing.

However, Paragraph f. does not include that part of any contract or agreement:

- (1) That indemnifies an architect, engineer or surveyor for injury or damage arising out of:

- (a) Preparing, approving, or failing to prepare or approve, maps, shop drawings, opinions, reports, surveys, field orders, change orders or drawings and specifications; or
- (b) Giving directions or instructions, or failing to give them, if that is the primary cause of the injury or damage; or

- (2) Under which the insured, if an architect, engineer or surveyor, assumes liability for an injury or damage arising out of the insured's rendering or failure to render professional services, including those listed in (1) above and supervisory, inspection, architectural or engineering activities.

All other terms and conditions in the policy remain unchanged.

impair them. At our request, the insured will bring "suit" or transfer those rights to us and help us enforce them.

b. Waiver Of Rights Of Recovery (Waiver Of Subrogation)

If the insured has waived any rights of recovery against any person or organization for all or part of any payment, including Supplementary Payments, we have made under this Coverage Part, we also waive that right, provided the insured waived their rights of recovery against such person or organization in a contract, agreement or permit that was executed prior to the injury or damage.

9. When We Do Not Renew

If we decide not to renew this Coverage Part, we will mail or deliver to the first Named Insured shown in the Declarations written notice of the nonrenewal not less than 30 days before the expiration date.

If notice is mailed, proof of mailing will be sufficient proof of notice.

SECTION V – DEFINITIONS

1. **"Advertisement"** means the widespread public dissemination of information or images that has the purpose of inducing the sale of goods, products or services through:

- a. (1) Radio;
- (2) Television;
- (3) Billboard;
- (4) Magazine;
- (5) Newspaper; or

b. Any other publication that is given widespread public distribution.

However, "advertisement" does not include:

- a. The design, printed material, information or images contained in, on or upon the packaging or labeling of any goods or products; or
- b. An interactive conversation between or among persons through a computer network.

2. **"Advertising idea"** means any idea for an "advertisement".

3. **"Asbestos hazard"** means an exposure or threat of exposure to the actual or alleged properties of asbestos and includes the mere presence of asbestos in any form.

4. **"Auto"** means:

- a. A land motor vehicle, trailer or semitrailer designed for travel on public roads, including any attached machinery or equipment; or
- b. Any other land vehicle that is subject to a compulsory or financial responsibility law or

other motor vehicle insurance law where it is licensed or principally garaged.

However, "auto" does not include "mobile equipment".

5. **"Bodily injury"** means physical:

- a. Injury;
- b. Sickness; or
- c. Disease

sustained by a person and, if arising out of the above, mental anguish or death at any time.

6. **"Coverage territory"** means:

- a. The United States of America (including its territories and possessions), Puerto Rico and Canada;
- b. International waters or airspace, but only if the injury or damage occurs in the course of travel or transportation between any places included in a. above; or
- c. All other parts of the world if the injury or damage arises out of:
 - (1) Goods or products made or sold by you in the territory described in a. above;
 - (2) The activities of a person whose home is in the territory described in a. above, but is away for a short time on your business; or
 - (3) "Personal and advertising injury" offenses that take place through the Internet or similar electronic means of communication

provided the insured's responsibility to pay damages is determined in the United States of America (including its territories and possessions), Puerto Rico or Canada, in a "suit" on the merits according to the substantive law in such territory or in a settlement we agree to.

7. **"Employee"** includes a "leased worker". "Employee" does not include a "temporary worker".

8. **"Employment-Related Practices"** means:

- a. Refusal to employ that person;
- b. Termination of that person's employment; or
- c. Employment-related practices, policies, acts or omissions, such as coercion, demotion, evaluation, reassignment, discipline, defamation, harassment, humiliation, discrimination or malicious prosecution directed at that person.

9. **"Executive officer"** means a person holding any of the officer positions created by your charter, constitution, by-laws or any other similar governing document.

10. **"Hostile fire"** means one which becomes uncontrollable or breaks out from where it was intended to be.

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

COMMERCIAL AUTOMOBILE BROAD FORM ENDORSEMENT

This endorsement modifies insurance provided under the following:

BUSINESS AUTO COVERAGE FORM

To the extent that the provisions of this endorsement provide broader benefits to the "insured" than other provisions of the Coverage Form, the provisions of this endorsement apply.

1. BROAD FORM INSURED

Paragraph .1. - WHO IS AN INSURED - of Section II - Liability Coverage is amended to add the following:

d. Subsidiaries and Newly Acquired or Formed Organizations

The Named Insured shown in the Declarations is amended to include:

- (1) Any legal business entity other than a partnership or joint venture, formed as a subsidiary in which you have an ownership interest of more than 50% on the effective date of the Coverage Form. However, the Named Insured does not include any subsidiary that is an "insured" under any other automobile policy or would be an "insured" under such a policy but for its termination or the exhaustion of its Limit of Insurance.
- (2) Any organization that is acquired or formed by you and over which you maintain majority ownership. However, the Named Insured does not include any newly formed or acquired organization:
 - (a) That is a partnership or joint venture,
 - (b) That is an "insured" under any other policy,
 - (c) That has exhausted its Limit of Insurance under any other policy, or
 - (d) 180 days or more after its acquisition or formation by you, unless you have given us notice of the acquisition or formation.

Coverage does not apply to "bodily injury" or "property damage" that results from an "accident" that occurred before you formed or acquired the organization.

e. Employees as Insureds

- (1). Any "employee" of yours while using a covered "auto" you don't own, hire or borrow in your business or your personal affairs.

f. Lessors as Insureds

- (1). The lessor of a covered "auto" while the "auto" is leased to you under a written agreement if:
 - (a) The agreement requires you to provide direct primary insurance for the lessor and
 - (b) The "auto" is leased without a driver.

Such a leased "auto" will be considered a covered "auto" you own and not a covered "auto" you hire.

g. Additional Insured if Required by Contract

- (1) When you have agreed, in a written contract or written agreement, that a person or organization be added as an additional insured on your business auto policy, such person or organization is an "insured", but only to the extent such person or organization is liable for "bodily injury" or "property damage" caused by the conduct of an "insured" under paragraphs a. or b. of Who Is An Insured with regard to the ownership, maintenance or use of a covered "auto."

The insurance afforded to any such additional insured applies only if the "bodily injury" or "property damage" occurs:

 - (a) During the policy period, and
 - (b) Subsequent to the execution of such written contract, and

(c) Prior to the expiration of the period of time that the written contract requires such insurance be provided to the additional insured.

(2) How Limits Apply

If you have agreed in a written contract or written agreement that another person or organization be added as an additional insured on your policy, the most we will pay on behalf of such additional insured is the lesser of:

(a) The limits of insurance specified in the written contract or written agreement; or

(b) The Limits of Insurance shown in the Declarations.

Such amount shall be a part of and not in addition to Limits of Insurance shown in the Declarations and described in this Section.

(3) Additional Insureds Other Insurance

If we cover a claim or "suit" under this Coverage Part that may also be covered by other insurance available to an additional insured, such additional insured must submit such claim or "suit" to the other insurer for defense and indemnity.

However, this provision does not apply to the extent that you have agreed in a written contract or written agreement that this insurance is primary and non-contributory with the additional insured's own insurance.

(4) Duties in The Event Of Accident, Claim, Suit or Loss

If you have agreed in a written contract or written agreement that another person or organization be added as an additional insured on your policy, the additional insured shall be required to comply with the provisions in LOSS CONDITIONS 2. - DUTIES IN THE EVENT OF ACCIDENT, CLAIM, SUIT OR LOSS - OF SECTION IV - BUSINESS AUTO CONDITIONS, in the same manner as the Named Insured.

2. Primary and Non-Contributory if Required by Contract

Only with respect to insurance provided to an additional insured in A.1.g. - Additional Insured If Required by Contract, the following provisions apply:

(1) Primary Insurance When Required By Contract

This insurance is primary if you have agreed in a written contract or written agreement that this insurance be primary. If other insurance is also primary, we will share with all that other insurance by the method described in Other Insurance 5.d.

(2) Primary And Non-Contributory To Other Insurance When Required By Contract

If you have agreed in a written contract or written agreement that this insurance is primary and non-contributory with the additional insured's own insurance, this insurance is primary and we will not seek contribution from that other insurance.

Paragraphs (1) and (2) do not apply to other insurance to which the additional insured has been added as an additional insured.

When this insurance is excess, we will have no duty to defend the insured against any "suit" if any other insurer has a duty to defend the insured against that "suit". If no other insurer defends, we will undertake to do so, but we will be entitled to the insured's rights against all those other insurers.

When this insurance is excess over other insurance, we will pay only our share of the amount of the loss, if any, that exceeds the sum of:

(1) The total amount that all such other insurance would pay for the loss in the absence of this insurance; and

(2) The total of all deductible and self-insured amounts under all that other insurance.

We will share the remaining loss, if any, by the method described in SECTION IV- Business Auto Conditions, B. General Conditions, Other Insurance 5.d.

3. AUTOS RENTED BY EMPLOYEES

Any "auto" hired or rented by your "employee" on your behalf and at your direction will be considered an "auto" you hire.

The SECTION IV- Business Auto Conditions, B. General Conditions, 5. OTHER INSURANCE Condition is amended by adding the following:

e. If an "employee's" personal insurance also applies on an excess basis to a covered "auto" hired or rented by your "employee" on your behalf and at your direction, this insurance will be primary to the "employee's" personal insurance.

4. AMENDED FELLOW EMPLOYEE EXCLUSION

EXCLUSION 5. - FELLOW EMPLOYEE - of SECTION II - LIABILITY COVERAGE does not apply if you have workers' compensation insurance in-force covering all of your "employees".

Coverage is excess over any other collectible insurance.

5. HIRED AUTO PHYSICAL DAMAGE COVERAGE

If hired "autos" are covered "autos" for Liability Coverage and if Comprehensive, Specified Causes of Loss, or Collision coverages are provided under this Coverage Form for any "auto" you own, then the Physical Damage Coverages provided are extended to "autos" you hire or borrow, subject to the following limit.

The most we will pay for "loss" to any hired "auto" is:

- (1) \$100,000;
- (2) The actual cash value of the damaged or stolen property at the time of the "loss"; or
- (3) The cost of repairing or replacing the damaged or stolen property,

whichever is smallest, minus a deductible. The deductible will be equal to the largest deductible applicable to any owned "auto" for that coverage. No deductible applies to "loss" caused by fire or lightning. Hired Auto Physical Damage coverage is excess over any other collectible insurance. Subject to the above limit, deductible and excess provisions, we will provide coverage equal to the broadest coverage applicable to any covered "auto" you own.

We will also cover loss of use of the hired "auto" if it results from an "accident", you are legally liable and the lessor incurs an actual financial loss, subject to a maximum of \$1000 per "accident".

This extension of coverage does not apply to any "auto" you hire or borrow from any of your "employees", partners (if you are a partnership), members (if you are a limited liability company), or members of their households.

6. PHYSICAL DAMAGE - ADDITIONAL TEMPORARY TRANSPORTATION EXPENSE COVERAGE

Paragraph A.4.a. of SECTION III - PHYSICAL DAMAGE COVERAGE is amended to provide a limit of \$50 per day and a maximum limit of \$1,000.

7. LOAN/LEASE GAP COVERAGE

Under SECTION III - PHYSICAL DAMAGE COVERAGE, in the event of a total "loss" to a covered "auto", we will pay your additional legal

obligation for any difference between the actual cash value of the "auto" at the time of the "loss" and the "outstanding balance" of the loan/lease.

"Outstanding balance" means the amount you owe on the loan/lease at the time of "loss" less any amounts representing taxes; overdue payments; penalties, interest or charges resulting from overdue payments; additional mileage charges; excess wear and tear charges; lease termination fees; security deposits not returned by the lessor; costs for extended warranties, credit life Insurance, health, accident or disability insurance purchased with the loan or lease; and carry-over balances from previous loans or leases.

8. AIRBAG COVERAGE

Under Paragraph B. EXCLUSIONS - of SECTION III - PHYSICAL DAMAGE COVERAGE, the following is added:

The exclusion relating to mechanical breakdown does not apply to the accidental discharge of an airbag.

9. ELECTRONIC EQUIPMENT - BROADENED COVERAGE

a. The exceptions to Paragraphs B.4 - EXCLUSIONS - of SECTION III - PHYSICAL DAMAGE COVERAGE are replaced by the following:

Exclusions 4.c. and 4.d. do not apply to equipment designed to be operated solely by use of the power from the "auto's" electrical system that, at the time of "loss", is:

- (1) Permanently installed in or upon the covered "auto";
- (2) Removable from a housing unit which is permanently installed in or upon the covered "auto";
- (3) An integral part of the same unit housing any electronic equipment described in Paragraphs (1) and (2) above; or
- (4) Necessary for the normal operation of the covered "auto" or the monitoring of the covered "auto's" operating system.

b. Section III, Physical Damage Coverage, Limit of Insurance, Paragraph C.2. is amended to add the following:

\$1,500 is the most we will pay for "loss" in any one "accident" to all electronic equipment (other than equipment designed solely for the reproduction of sound, and accessories used with such equipment) that reproduces, receives or transmits audio, visual or data signals which, at the time of "loss", is:

- (1) Permanently installed in or upon the covered "auto" in a housing, opening or other location that is not normally used by the "auto" manufacturer for the installation of such equipment;
- (2) Removable from a permanently installed housing unit as described in Paragraph 2.a. above or is an integral part of that equipment; or
- (3) An integral part of such equipment.

c. For each covered "auto", should loss be limited to electronic equipment only, our obligation to pay for, repair, return or replace damaged or stolen electronic equipment will be reduced by the applicable deductible shown in the Declarations, or \$250, whichever deductible is less.

10. EXTRA EXPENSE - BROADENED COVERAGE

Under Paragraph A. - COVERAGE - of SECTION III - PHYSICAL DAMAGE COVERAGE, we will pay for the expense of returning a stolen covered "auto" to you.

11. GLASS REPAIR - WAIVER OF DEDUCTIBLE

Under Paragraph D. - DEDUCTIBLE - of SECTION III - PHYSICAL DAMAGE COVERAGE, the following is added:

No deductible applies to glass damage if the glass is repaired rather than replaced.

12. TWO OR MORE DEDUCTIBLES

Under Paragraph D. - DEDUCTIBLE - of SECTION III - PHYSICAL DAMAGE COVERAGE, the following is added:

If another Hartford Financial Services Group, Inc. company policy or coverage form that is not an automobile policy or coverage form applies to the same "accident", the following applies:

- (1) If the deductible under this Business Auto Coverage Form is the smaller (or smallest) deductible, it will be waived;
- (2) If the deductible under this Business Auto Coverage Form is not the smaller (or smallest) deductible, it will be reduced by the amount of the smaller (or smallest) deductible.

13. AMENDED DUTIES IN THE EVENT OF ACCIDENT, CLAIM, SUIT OR LOSS

The requirement in LOSS CONDITIONS 2.a. - DUTIES IN THE EVENT OF ACCIDENT, CLAIM, SUIT OR LOSS - of SECTION IV - BUSINESS AUTO CONDITIONS that you must notify us of an "accident" applies only when the "accident" is known to:

- (1) You, if you are an individual;

- (2) A partner, if you are a partnership;
- (3) A member, if you are a limited liability company; or
- (4) An executive officer or insurance manager, if you are a corporation.

14. UNINTENTIONAL FAILURE TO DISCLOSE HAZARDS

If you unintentionally fail to disclose any hazards existing at the inception date of your policy, we will not deny coverage under this Coverage Form because of such failure.

15. HIRED AUTO - COVERAGE TERRITORY

SECTION IV, BUSINESS AUTO CONDITIONS, PARAGRAPH B. GENERAL CONDITIONS, 7. - POLICY PERIOD, COVERAGE TERRITORY - is added to include the following:

- (6) For short-term hired "autos", the coverage territory with respect to Liability Coverage is anywhere in the world provided that if the "insured's" responsibility to pay damages for "bodily injury" or "property damage" is determined in a "suit," the "suit" is brought in the United States of America, the territories and possessions of the United States of America, Puerto Rico or Canada or in a settlement we agree to.

16. WAIVER OF SUBROGATION

Paragraph 5. TRANSFER OF RIGHTS OF RECOVERY AGAINST OTHERS TO US - of SECTION IV - BUSINESS AUTO CONDITIONS A. Loss Conditions is amended by adding the following:

We waive any right of recovery we may have against any person or organization with whom you have a written contract that requires such waiver because of payments we make for damages under this Coverage Form.

17. RESULTANT MENTAL ANGUISH COVERAGE

The definition of "bodily injury" in SECTION V-DEFINITIONS, C. is replaced by the following:

"Bodily injury" means bodily injury, sickness or disease sustained by any person, including mental anguish or death resulting from any of these.

18. EXTENDED CANCELLATION CONDITION

Paragraph 2. of the COMMON POLICY CONDITIONS - CANCELLATION - applies except as follows:

If we cancel for any reason other than nonpayment of premium, we will mail or deliver to the first Named Insured written notice of cancellation at least 60 days before the effective date of cancellation.

19. HYBRID, ELECTRIC, OR NATURAL GAS VEHICLE PAYMENT COVERAGE

In the event of a total loss to a "non-hybrid" auto for which Comprehensive, Specified Causes of Loss, or Collision coverages are provided under this Coverage Form, then such Physical Damage Coverages are amended as follows:

- a. If the auto is replaced with a "hybrid" auto or an auto powered solely by electricity or natural gas, we will pay an additional 10%, to a maximum of \$2,500, of the "non-hybrid" auto's actual cash value or replacement cost, whichever is less,
- b. The auto must be replaced and a copy of a bill of sale or new lease agreement received by us within 60 calendar days of the date of "loss,"
- c. Regardless of the number of autos deemed a total loss, the most we will pay under this Hybrid, Electric, or Natural Gas Vehicle Payment Coverage provision for any one "loss" is \$10,000.

For the purposes of the coverage provision,

- a. A "non-hybrid" auto is defined as an auto that uses only an internal combustion engine to move the auto but does not include autos powered solely by electricity or natural gas.

- b. A "hybrid" auto is defined as an auto with an internal combustion engine and one or more electric motors; and that uses the internal combustion engine and one or more electric motors to move the auto, or the internal combustion engine to charge one or more electric motors, which move the auto.

20. VEHICLE WRAP COVERAGE

In the event of a total loss to an "auto" for which Comprehensive, Specified Causes of Loss, or Collision coverages are provided under this Coverage Form, then such Physical Damage Coverages are amended to add the following:

In addition to the actual cash value of the "auto", we will pay up to \$1,000 for vinyl vehicle wraps which are displayed on the covered "auto" at the time of total loss. Regardless of the number of autos deemed a total loss, the most we will pay under this Vehicle Wrap Coverage provision for any one "loss" is \$5,000. For purposes of this coverage provision, signs or other graphics painted or magnetically affixed to the vehicle are not considered vehicle wraps.



THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

**WAIVER OF OUR RIGHT TO RECOVER FROM
OTHERS ENDORSEMENT - CALIFORNIA**

We have the right to recover our payments from anyone liable for an injury covered by this policy. We will not enforce our right against the person or organization named in the Schedule. (This agreement applies only to the extent that you perform work under a written contract that requires you to obtain this agreement from us.)

You must maintain payroll records accurately segregating the remuneration of your employees while engaged in the work described in the Schedule.

The additional premium for this endorsement shall be _____ % of the California workers' compensation premium otherwise due on such remuneration.

SCHEDULE

Person or Organization

Job Description

Where Required By A Written Contract

As per Agreement or Contract

Countersigned by _____
Authorized Representative

FINAL CONTRACT AMOUNTS THAT EXCEED THE ORIGINAL CONTRACT AMOUNT WILL BE CHARGED ADDITIONAL PREMIUM AND FEE. INCLUDE THESE CHARGES IN YOUR CHANGE ORDERS

Executed in Two Original Counterparts
Bond Number 1001203159

FAITHFUL PERFORMANCE BOND
PUBLIC WORK

(The premium charge on this bond is \$ 41,860.80 , being at the rate of \$ 18.00 per thousand of the contract price)

KNOW ALL MEN BY THESE PRESENTS:

THAT, WHEREAS the CITY OF COSTA MESA, 77 Fair Drive, Costa Mesa, California 92626, has entered into a contract dated August 25th , 20 23 , which is hereby incorporated by reference herein, with Jahnke & Sons Construction, Inc. dba WHP Training Towers hereinafter designated as the "Principal," for the work described as follows:

Pre-Fabricated Training Towers & Installation at FS#4

_____ ; and
WHEREAS, said Principal is required by the terms of said contract to furnish a bond for the faithful performance of said contract.

NOW, THEREFORE, We the Principal, and American Contractors Indemnity Company a corporation organized and existing under the laws of the State of California and duly authorized to transact business under the laws of the State of California, as Surety, are held and firmly bound unto the CITY OF COSTA MESA in the penal sum of Two Million, Three Hundred Twenty Five Thousand, Six Hundred and 13/100 Dollars (\$ 2,325,600.13), lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, and successors, jointly and severally, firmly by these presents.

The Condition Of This Obligation Is Such, That, if the above bounden Principal, his or its heirs, executors, administrators, successors or assigns, shall in all things stand to and abide by, and well and truly keep and perform the covenants, condition and agreements in the said contract and any alteration thereof made as therein provided, or his 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 OF COSTA MESA, 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 the said Surety, for value received, hereby stipulates and agrees that no change, extension or alteration or addition to the terms of the contract or to the work to be performed thereunder or the specifications accompanying the same shall in any wise affect its obligations on this bond, and it does hereby give notice of any such change, extension of time, alteration or addition to the terms of the contract or to the specifications.

WITNESS WHEREOF We have hereunto set our hands and seals this 6th September , 2023
Jahnke & Sons Construction, Inc. dba WHP Training Towers

By: [Signature]
William M. Jahnke, President
American Contractors Indemnity Company

By: [Signature]
Jeremy Crawford, Attorney-In-Fact



FINAL CONTRACT AMOUNTS THAT EXCEED THE ORIGINAL CONTRACT AMOUNT WILL BE CHARGED ADDITIONAL PREMIUM AND FEE. INCLUDE THESE CHARGES IN YOUR CHANGE ORDERS.

Executed in Two Original Counterparts
Bond No. 1001203159

**LABOR AND MATERIALS PAYMENT BOND
TO ACCOMPANY CONTRACT PUBLIC WORK**

WHEREAS, the City of Costa Mesa, State of California, has awarded to Jahnke & Sons Construction, Inc. dba WHP Training Towers, hereinafter designated as the "Principal", a contract for the project known as: Pre-Fabricated Training Towers & Installation at FS#4 in the City of Costa Mesa, in strict conformity with the contract on file with the Costa Mesa City Clerk, which is incorporated herein by this reference.

WHEREAS, Principal has executed or is about to execute the contract and the terms thereof and California Civil Code section 9554 require the furnishing of a bond, providing that if Principal or any of Principal's subcontractors fails to pay for any materials, provisions, or other supplies used in, upon, for, or about the performance of the work agreed to be done, or for any work or labor done thereon of any kind, the Surety on this bond will pay the same to the extent hereinafter set forth.

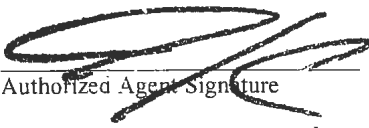
NOW, THEREFORE, We, the undersigned Principal, and American Contractors Indemnity Company, duly authorized to transact business under the laws of the State of California, as Surety (referred to herein as "Surety"), are held and firmly bound unto the City of Costa Mesa, in the sum of Two Million, Three Hundred Twenty Five Thousand, Six Hundred and 13/100 Dollars (\$2,325,600.13) lawful money of the United States of America, said sum being equal to 100% of the estimated amount payable to the City of Costa Mesa under the terms of the contract, for which payment well and truly to be made, we bind ourselves, our heirs, executors, executors, and administrators, successors and assigns, jointly and severally, firmly by these present.


THE CONDITION OF THIS OBLIGATION IS SUCH, that, if the Principal or the Principal's subcontractors fail to pay for any materials, provisions, or other supplies, implements or machinery used in, upon, for, or about the performance of the work contracted to be done, or for any other work or labor thereon of any kind, or for amounts due under the Unemployment Insurance Code with respect to such work or labor, or for any amounts required to be deducted, withheld and paid over to the Employment Development Department from the wages of employees of the Principal and subcontractors pursuant to Section 13020 of the Unemployment Insurance Code with respect to such work and labor, then the Surety will pay for the same, in an amount not exceeding the sum specified in this Bond, and also, in case suit is brought to enforce the obligations of this Bond, a reasonable attorneys' fees, to be fixed by the Court as required by the provisions of Section 9554 of the California Civil Code.

This bond shall inure to the benefit of any and all persons, companies and corporations entitled to file claims under Section 9100 of the California Civil Code, so as to give a right of action to them or their assigns in any suit brought upon this bond. 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 thereunder or the specifications accompanying the same shall in any way 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, this instrument has been duly executed by the above-named Principal and Surety, on the 6th day of September, 2023.

American Contractors Indemnity Company
Name of Surety
801 S. Figueroa St, Suite 700
Los Angeles, CA 90017
Address of Surety

By: 
Authorized Agent Signature
Jeremy Crawford, Attorney-In-Fact
Print Name and Title

Jahnke & Sons Construction, Inc. dba WHP Training Towers
Name of Contractor (Principal)
By: 
William M. Jahnke, President



TOKIO MARINE
HCC

POWER OF ATTORNEY
AMERICAN CONTRACTORS INDEMNITY COMPANY TEXAS BONDING COMPANY
UNITED STATES SURETY COMPANY U.S. SPECIALTY INSURANCE COMPANY

KNOW ALL MEN BY THESE PRESENTS: That American Contractors Indemnity Company, a California corporation, Texas Bonding Company, an assumed name of American Contractors Indemnity Company, United States Surety Company, a Maryland corporation and U.S. Specialty Insurance Company, a Texas corporation (collectively, the "Companies"), do by these presents make, constitute and appoint:

Jeremy Crawford, Michael D. Williams, William J. Nemec, Tanya Fukushima, William Gerber, Bradford J. Quiri, Amanda M. Quigley, or Andrea Haight of Golden Valley, Minnesota

its true and lawful Attorney(s)-in-fact, each in their separate capacity if more than one is named above, with full power and authority hereby conferred in its name, place and stead, to execute, acknowledge and deliver **any and all bonds, recognizances, undertakings or other instruments or contracts of suretyship to include riders, amendments, and consents of surety, providing the bond penalty does not exceed** ***** Five Million and 00/100 ***** Dollars (**\$5,000,000.00**). This Power of Attorney shall expire without further action on January 31st, 2024. This Power of Attorney is granted under and by authority of the following resolutions adopted by the Boards of Directors of the Companies:

Be it Resolved, that the President, any Vice-President, any Assistant Vice-President, any Secretary or any Assistant Secretary shall be and is hereby vested with full power and authority to appoint any one or more suitable persons as Attorney(s)-in-Fact to represent and act for and on behalf of the Company subject to the following provisions:

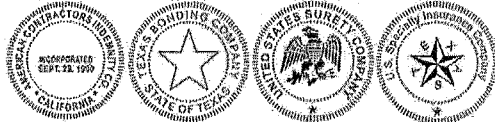
Attorney-in-Fact may be given full power and authority for and in the name of and on behalf of the Company, to execute, acknowledge and deliver, any and all bonds, recognizances, contracts, agreements or indemnity and other conditional or obligatory undertakings, including any and all consents for the release of retained percentages and/or final estimates on engineering and construction contracts, and any and all notices and documents canceling or terminating the Company's liability thereunder, and any such instruments so executed by any such Attorney-in-Fact shall be binding upon the Company as if signed by the President and sealed and effected by the Corporate Secretary.

Be it Resolved, that the signature of any authorized officer and seal of the Company heretofore or hereafter affixed to any power of attorney or any certificate relating thereto by facsimile, and any power of attorney or certificate bearing facsimile signature or facsimile seal shall be valid and binding upon the Company with respect to any bond or undertaking to which it is attached.

IN WITNESS WHEREOF, The Companies have caused this instrument to be signed and their corporate seals to be hereto affixed, this 23rd day of September, 2021.

AMERICAN CONTRACTORS INDEMNITY COMPANY TEXAS BONDING COMPANY
UNITED STATES SURETY COMPANY U.S. SPECIALTY INSURANCE COMPANY

State of California
County of Los Angeles



By: [Signature]
Daniel P. Aguilar, Vice President

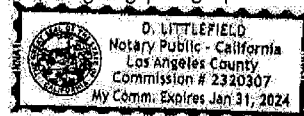
A Notary Public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document

On this 23rd day of September, 2021, before me, D. Littlefield, a notary public, personally appeared Daniel P. Aguilar, Vice President of American Contractors Indemnity Company, Texas Bonding Company, United States Surety Company and U.S. Specialty Insurance Company who proved to me on the basis of satisfactory evidence to be the person whose name is subscribed to the within instrument and acknowledged to me that he executed the same in his authorized capacity, and that by his signature on the instrument the person, or the entity upon behalf of which the person acted, executed the instrument.

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

WITNESS my hand and official seal.

Signature [Signature] (seal)



I, Kio Lo, Assistant Secretary of American Contractors Indemnity Company, Texas Bonding Company, United States Surety Company and U.S. Specialty Insurance Company, do hereby certify that the above and foregoing is a true and correct copy of a Power of Attorney, executed by said Companies, which is still in full force and effect; furthermore, the resolutions of the Boards of Directors, set out in the Power of Attorney are in full force and effect.

In Witness Whereof, I have hereunto set my hand and affixed the seals of said Companies at Los Angeles, California this _____ day of September, 2023

Corporate Seals
Bond No. 1001203169
Agency No. 19903 - PDF POA



[Signature]
Kio Lo, Assistant Secretary