City of San Diego

CONTRACTOR'S NAME:

ADDRESS: TELEPHONE NO.: ______ FAX NO.: ______ CITY CONTACT: JASON GRANI, 600 B Street Suite 800, MS 908A, San Diego, CA 92101-4520 Email: jgrani@sandiego.gov, Phone: 619-533-7525, Fax: 858-627-3297 CG/NB/egz

CONTRACT DOCUMENTS



FOR

NORTH CROWN POINT COMFORT STATION

VOLUME 1 OF 2

BID NO.:	K-12-5498-DBB-3-C
SAP NO. (WBS/IO/CC):	B-10088
CLIENT DEPARTMENT:	1102
COUNCIL DISTRICT:	2
PROJECT TYPE:	BE/BT

THIS CONTRACT IS SUBJECT TO THE FOLLOWING:

> THE CITY'S SUBCONTRACTING PARTICIPATION REQUIREMENTS FOR SLBE PROGRAM.

The engineering Specifications and Special Provisions direction of the following Professional Engineer or Lic	s contained herein have been prepared by or under the ensed Architect:
Professional Engineer or Licensed Architect	Seal:

The 2010 edition of the City of San Diego Standard Specifications for Public Works Construction ("The WHITEBOOK") now contains the following distinct Contract Documents:

- 1) *Equal Opportunity Contracting Program Requirements* This Contract Document sets forth the standard requirements for the City's equal opportunity contracting program. When additional requirements by the funding source e.g., federal or state agencies are physically included in the contract documents or by reference and there is a discrepancy, the funding source requirements shall govern unless specified otherwise in the Special Provisions.
- 2) City Supplement The City Supplement shall be used in conjunction with the Standard Specifications for Public Works Construction ("The GREENBOOK"), 2009 Edition. The specifications contained in City Supplement take precedence over the specifications contained in The GREENBOOK, 2009 Edition.

Certain parts of the City Supplement have been highlighted in yellow for the convenience of the users only and shall not affect the interpretation of the Contract.

To obtain The GREENBOOK contact the publisher at: <u>http://www.bnibooks.com</u>

The WHITEBOOK is available only in electronic format under Engineering Documents and References at: <u>http://www.sandiego.gov/engineering-cip/</u>

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REQUIRED DOCUMENTS SCHEDULE

This table is intended to serve as a convenient tool for listing forms and documents required at different times. It is neither exhaustive nor must be considered a Contract Document by itself. Therefore, the users must review the entire Contract Documents and become familiar with the required documentation and the submittal schedule associated with each document.

Bidder's attention is directed to the City's Municipal Code §22.0807(e),(3)-(5) for important information regarding required documentation.

The specified EOC forms are all available for download from the EOC Program's web site at:

http://www.sandiego.gov/eoc/forms/index.shtml

ITEM	WHEN	BY	WHAT	
1.	BID DUE DATE/TIME	ALL BIDDERS	Proposal (Bid) Form	
2.	BID DUE DATE/TIME	ALL BIDDERS	Bid Bond	
3.	BID DUE DATE/TIME	ALL BIDDERS	Non-collusion Affidavit to be Executed By Bidder and Submitted with Bid under 23 USC 112 and PCC 7106	
4.	BID DUE DATE/TIME	ALL BIDDERS	Contractors Certification of Pending Actions	
5.	BID DUE DATE/TIME	ALL BIDDERS	Equal Benefits Ordinance Certification of Compliance	
6.	BID DUE DATE/TIME	ALL BIDDERS	Form AA35 - List of Subcontractors	
7.	BID DUE DATE/TIME	ALL BIDDERS	Form AA40 - Named Equipment/Material Supplier List	
8.	WITHIN 3 WORKING DAYS OF BID OPENING	ALL BIDDERS	Proof of Valid DBE-MBE-WBE-DVBE Certification Status e.g., Certs.	
9.	WITHIN 3 WORKING DAYS OF BID OPENING	ALL BIDDERS	SLBE-ELBE Good Faith Documentations	
10.	WITHIN 3 WORKING DAYS OF BID OPENING	ALL BIDDERS	Form AA60 – List of Work Made Available	
11.	WITHIN 10 WORKING DAYS AFTER RECEIPT BY BIDDER OF CONTRACT FORMS	APPARENT LOW BIDDER	Names of the principle individual owners of the Apparent Low Bidder - In the event the firm is employee owned or publicly held, then the fact should be stated and the names of the firm's principals and officers shall be provided.	
12.	WITHIN 10 WORKING DAYS AFTER RECEIPT BY BIDDER OF CONTRACT FORMS	APPARENT LOW BIDDER	Form BB05 - Work Force Report	
13.	WITHIN 10 WORKING DAYS AFTER RECEIPT BY BIDDER OF CONTRACT FORMS	APPARENT LOW BIDDER	If the Contractor is a Joint Venture, the following information must be submitted: o Joint Venture Agreement o Joint Venture License	

REQUIRED DOCUMENTS SCHEDULE

ITEM	WHEN	BY	WHAT	
14.	WITHIN 10 WORKING DAYS AFTER RECEIPT BY BIDDER OF CONTRACT FORMS	APPARENT LOW BIDDER	Contract Forms	
15.	WITHIN 10 WORKING DAYS AFTER RECEIPT BY BIDDER OF CONTRACT FORMS	APPARENT LOW BIDDER	Contractor Certification - Drug-Free Workplace	
16.	WITHIN 10 WORKING DAYS AFTER RECEIPT BY BIDDER OF CONTRACT FORMS	APPARENT LOW BIDDER	Contractor Certification - American with Disabilities Act	
17.	WITHIN 10 WORKING DAYS AFTER RECEIPT BY BIDDER OF CONTRACT FORMS	APPARENT LOW BIDDER	Contractors Standards - Pledge of Compliance	
18.	BY 5th OF EACH MONTH	CONTRACTOR	Form CC20 - Monthly Employment Report	
19.	BY 5th OF EACH MONTH	CONTRACTOR	Form CC25 - Monthly Invoicing Report	
20.	PRIOR TO ACCEPTANCE	CONTRACTOR	Form CC10 - Contract Change Order (CCO)	
21.	PRIOR TO ACCEPTANCE	CONTRACTOR	Form CC15 - Final Summary Report	
22.	PRIOR TO ACCEPTANCE	CONTRACTOR	Affidavit of Disposal	

SPECIAL NOTICE SMALL LOCAL BUSINESS ENTERPRISES (SLBE) AND EMERGING LOCAL BUSINESS ENTERPRISES (ELBE) PROGRAM

- 1. **INTRODUCTION.** This contract is subject to the requirements of the SLBE Program as specified in the SLBE-ELBE section of the City's EOCP Requirements included in The WHITEBOOK.
 - **1.1.** The Bidders are required to review The WHITEBOOK and become familiar with the detailed specifications including the required documentation and the submittal schedule as related to SLBE-ELBE program.

2. AMENDMENTS TO THE CITY'S GENERAL EOCP REQUIREMENTS.

- **III.** Equal Employment Opportunity Outreach Program (A). DELETE in its entirety and SUBSTITUTE with the following:
 - A. Competitive Bids. If a contract is competitively solicited, the Apparent Low Bidder shall submit a *Work Force Report (Form BB05)* or an Equal Employment Opportunity (EEO) Plan, within 10 Working Days after receipt by the Bidder of Contract forms to the City for approval as specified in the Notice of Intent to Award letter from the City.

3. AMENDMENTS TO THE CITY'S EOCP SLBE-ELBE REQUIREMENTS.

- VIII. Subcontracting Efforts Review and Evaluation (2b)). DELETE in its entirety and SUBSTITUTE with the following:
 - b) "Make information of forthcoming opportunities available to SLBE-ELBE firms and arrange time for contracts and establish delivery schedules, where requirements permit, in a way that encourages and facilitates participation by SLBE-ELBE firms in the competitive process. This includes posting solicitations for bids or proposals for a minimum of 10 Working Days before the Bid or Proposal due date."

VIII. Subcontracting Efforts Review and Evaluation (3) and (4). DELETE in its entirety and SUBSTITUTE with the following:

3. Good Faith Effort Documentation Requirements

If the stated SLBE-ELBE subcontractor participation percentages are not met, the Bidder shall submit, within 3 Working Days of the Bid opening, information necessary to establish adequate good faith efforts were taken to meet the contract subcontractor participation percentages. The required documentation includes the following:

A. ADVERTISEMENT REQUIREMENTS

Advertisements for subcontract work must comply with the following requirements:

23. Advertisements must be published at least 10 Working Days prior to bid opening. Provide the names and dates of each publication of where the advertisement was published.

Note: The advertisement is not required to be published everyday for the 10 Working Days prior to bid opening.

- 24. There must be at least 2 advertisements published, 1 advertisement in a trade publication and 1 in a focus group publication. Additional advertising for SLBE-ELBE participation may be placed in newspapers, trade papers and on the Internet. For a listing of publications accepting advertisements, please visit the City's EOC home page at http://www.sandiego.gov/eoc/
 - 2.1 Newspaper advertisements must be in the Bids Wanted, Legal Notices section of the Classified Ads, Subcontracting Opportunities or Business Opportunities **NOT** the Employment Opportunities Section.
- 25. Advertisements must state which items or portions of work the Bidder is requesting subcontractor pricing.
 - 3.1 It is the Bidder's responsibility to demonstrate that enough work sufficient to meet the SLBE-ELBE subcontractor participation percentage was made available to SLBE-ELBE firms. The Bidder shall make as many items of Work available as possible to specified subcontracting participation meet percentage and at a minimum an amount of work equal to the specified subcontracting participation If necessary to reach the specified amount. subcontracting participation percentage, the Work shall include those items normally performed by the Bidder with its own forces or supplies and even items with a dollar value below 1/2 of 1% of the total Bid. Bidders shall utilize Form AA60 to demonstrate compliance with this requirement and submit the completed form with Good Faith Effort documentation.
- 26. Advertisements must state that Plans and Specifications are available at no cost to interested SLBE-ELBE firms and how to obtain them.
- 27. Advertisements must state that assistance is available from the Bidder for SLBE-ELBE Subcontractors in obtaining necessary equipment, supplies, or materials.
- 28. Advertisements must state that assistance is available from the Bidder for SLBE-ELBE firms in obtaining bonding, lines of credit, or insurance.
- 29. Bidders MUST provide proof of publication of each advertisement by providing the publication affidavit which must include a legible copy of the entire advertisement and the original ENTIRE page of the publication in which the advertisement appears.

B. SLBE-ELBE WRITTEN SOLICITATION REQUIREMENTS

Bidders must directly solicit SLBE-ELBE firms on the City's approved SLBE-ELBE list. Solicitations for Subcontractor or Supplier work must comply with the following requirements:

- 1. The solicitation must be dated and list the name of the SLBE-ELBE firm. Solicitations must be made to the SLBE-ELBE firms at least 10 Working Days prior to bid opening.
- 2. Solicitation must state which items or portions of work the Bidder is requesting subcontractor pricing.
 - 2.1 It is the Bidder's responsibility to demonstrate that enough work sufficient to meet the SLBE-ELBE subcontractor participation percentage was made available to SLBE-ELBE firms. The Bidder shall make as many items of Work available as possible to meet the specified subcontractor participation percentage and at a minimum an amount of work equal to the subcontractor participation amount. If necessary to reach the specified subcontracting participation percentage, the Work shall include those items normally performed by the Bidder with its own forces, supplies and even items with a dollar value below 1/2 of 1% of the total Bid. Bidders shall utilize Form AA60 to demonstrate compliance with this requirement and submit the completed form with Good Faith Effort documentation.
- 3. Solicitation must state that Plans and Specifications are available at no cost to interested SLBE-ELBE firms and how to obtain them.
- 4. Solicitations must state that assistance is available from the Bidder for SLBE-ELBE subcontractors in obtaining necessary equipment, supplies, or materials.
- 5. Solicitations must state that assistance is available from the Bidder for SLBE-ELBE firms in obtaining bonding, lines of credit, or insurance.
- 6. Bidder must solicit **ALL** SLBE-ELBE firms on the City's approved list, who have the NAICS code for the subcontract work sought by the Contractor.
- 7. Bidders must provide copies of **ALL** solicitations with one of the following forms of verification that the solicitations were sent:
 - a) If mailed: provide copies of the metered envelopes or certified mail receipts.
 - b) If faxed: provide copies of the fax transmittal confirmation sheet(s).
 - c) If emailed: provide copies of the email delivery confirmation sheet(s).

No credit shall be given for error messages, busy, cancelled, undeliverable, etc.

C. SLBE-ELBE WRITTEN SOLICITATION FOLLOW-UP REQUIREMENTS

Bidders must follow-up with all SLBE – ELBE firms that were notified of the subcontracting opportunities to determine their level of interest and commitment to bid the Project. When following up with the SLBE – ELBE firms, the Bidder must do the following:

- 1. Follow up communications must start no less than 5 Working Days prior to bid opening.
- 2. Bidders must follow up with all SLBE-ELBE firms in writing. Bidders must provide copies of **ALL** written follow up notices with one of the following forms of verification that the follow up notices were sent:
 - a) If mailed: provide copies of the metered envelopes or certified mail receipts.
 - b) If faxed: provide copies of the fax transmittal confirmation sheet(s).
 - c) If emailed: provide copies of the email delivery confirmation sheet(s).

No credit shall be given for error messages, busy, cancelled, undeliverable, etc.

- 3. Bidders must make at least 3 follow-up telephone calls to each SLBE ELBE firm at least 5 days prior to bid opening date. Bidders must submit a telephone log as identified below.
 - 3.1. Submit a telephone log, as proof of telephone call, with the following requirements: project name, name of person making the phone call, name of firm contacted, contact person's name, date of call, time of call, and details of conversation.

D. SUBCONTRACT AWARD SUMMARY

Bidders must act in good faith with interested SLBE-ELBE firms and may only reject bids for legitimate business reasons. The Bidder must submit the following documentation:

- 1. A **DETAILED** summary sheet which includes Bid item number, scope of work, Subcontractor or Supplier name, bid amount, certification type, Subcontractor or Supplier selection and reason for selection or non-selection of all the Subcontractor or Supplier that responded.
- 2. Copies of all Subcontractor or Suppliers bids received including bids for areas of work that were not included in the outreach and quotes from both certified and non-certified Subcontractors or Suppliers. Subcontractor bid amounts **MUST** match the bidlisted dollar amounts on form AA35 and AA40 submitted with Bidders sealed bid and the summary sheet dollar amounts **MUST** also match these amounts. If the Bidder decides to selfperform a scope of work, the Bidder **MUST** submit a detailed quote to show that the Bidder's price is competitive to the price

of the subcontractors that responded to outreach efforts. All dollar amounts and scopes of work on the Subcontractor or Supplier bid must not be altered by the prime Bidder. If a revision is necessary, a revised quote must be obtained and provided. All verbal quotes **MUST** be substantiated by corresponding written quote from the Subcontractor or Supplier.

E. OUTREACH ASSISTANCE REQUIREMENTS

Written notice of subcontractor opportunities must be forwarded to local organizations or groups to assist with outreach efforts. When contacting local organizations or groups, the Bidder **<u>must do</u>** the following:

- 1. Contact a minimum of 5 local organizations or groups to provide assistance in contacting, recruiting and using SLBE-ELBE firms by written notice. For a listing of organizations or groups offering assistance, please visit the City's EOC home page at <u>http://www.sandiego.gov/eoc/</u>
- 2. Written notice must indicate the date of the notice and name of the local organization or group. Written notices must be forwarded to the organizations or groups at least 10 Workings Days prior to bid opening.
- 3. Written notice must state which items or portions of work the Bidder is requesting subcontractor pricing.
 - 3.1 It is the Bidder's responsibility to demonstrate that enough work sufficient to meet the SLBE-ELBE subcontractor participation percentage was made available to SLBE-ELBE firms. The Bidder shall make as many items of Work available as possible to meet the subcontractor participation percentage, and at a minimum an amount of work equal to the subcontracting participation amount. If necessary to reach the subcontractor participation percentage, the work should include those items normally performed by the Bidder with its own forces, supplies and even items with a dollar value below 1/2 of 1% of the total bid. Bidders shall utilize Form AA60 to demonstrate compliance with this requirement and submit the completed form with Good Faith Effort documentation.
- 4. Written notice must state that Plans and Specifications are available at no cost to interested SLBE-ELBE firms and how to obtain them.
- 5. Written notice must state that assistance is available from the Bidder for SLBE-ELBE Subcontractors in obtaining necessary equipment, supplies, or materials.
- 6. Written notice must state that assistance is available from the Bidder for SLBE-ELBE firms in obtaining bonding, lines of credit, or insurance.

- 7. Bidders must provide copies of **ALL** notices with one of the following forms of verification that the notices were sent:
 - a) If mailed: provide copies of the metered envelopes or certified mail receipts.
 - b) If faxed: provide copies of the fax transmittal confirmation sheet(s).
 - c) If emailed: provide copies of the email delivery confirmation sheet(s)..

No credit shall be given for error messages, busy, cancelled, undeliverable, etc.

- 4. **SUBCONTRACTING PARTICIPATION PERCENTAGES.** The Bidders are encouraged to take positive steps to diversify and expand their subcontractor solicitation base and to offer contracting opportunities to all certified SLBE and ELBE Subcontractors.
 - **4.1.** The City has incorporated **mandatory** SLBE-ELBE subcontractor participation percentages to enhance competition and maximize subcontracting opportunities. For the purpose of achieving the mandatory subcontractor participation percentages, a recommended breakdown of the SLBE and ELBE subcontractor participation percentages based upon certified SLBE and ELBE firms has also been provided to achieve the mandatory subcontractor participation percentages:

1.	SLBE participation	11.6%
2.	ELBE participation	23.1%
3.	Total mandatory participation	34.7%

- **4.2.** For the purpose of achieving the subcontractor participation level (percentage), Additive, Deductive, and Allowance Bid Items will not be included in the calculation.
- 5. **PRE-BID CONFERENCE.** A Pre-Bid Conference is scheduled for this contract as specified in the Invitation to Bids. The purpose of this meeting is to inform Bidders of the submittal requirements and provisions relative to the SLBE Program. Bidders are strongly encouraged to attend the Pre-Bid Conference to better understand the Good Faith Effort requirements of this contract.
- 6. **MANDATORY CONDITIONS.** Bid will be declared <u>non-responsive</u> if the Bidder fails the following mandatory conditions.
 - **6.1.** Bidder's inclusion of SLBE-ELBE certified subcontractors at the overall mandatory participation percentage identified in this document; **OR**
 - **6.2.** Bidder's submission of Good Faith Effort documentation demonstrating the Bidder made a good faith effort to outreach to and include SLBE-ELBE Subcontractors required in this document within 3 Working Days of the Bid opening if the overall mandatory participation percentage is not met.
- 7. **BID DISCOUNT.** This contract is subject to the Bid Discount program as described in The WHITEBOOK, SLBE-ELBE Program Requirements, Section IV(2).
- **8. RESOURCES.** The current list of certified SLBE-ELBE firms can be found on the EOC Department website.

CITY OF SAN DIEGO, CALIFORNIA

INVITATION TO BIDS

1. RECEIPT AND OPENING OF BIDS: Bid(s) will be received at the Public Works Contracting Group at 1200 THIRD AVENUE, SUITE 200, SAN DIEGO, CA 92101 UNTIL 2:00 PM ON MAY 22, 2012 for performing work on the following project:

NORTH CROWN POINT COMFORT STATION

2. **DESCRIPTION OF WORK:** The Work involves furnishing all labor, materials, equipment, services, and other incidental works and appurtenances for the construction of the Project as described below:

Demolish Existing Comfort Station and build new comfort station in the same location.

The Work shall be performed in accordance with:

- Bid No. K-12-5498-DBB-3-C and Plans numbered 36161-01-D through 36161-29-D, inclusive.
- **3. ENGINEER'S ESTIMATE:** The Engineer's estimate of the most probable price for this contract is in the range of **\$500,001.00 to \$750,000.00**.
- 4. LOCATION OF WORK: The location of Work is Citywide unless specified otherwise as follows:

The project is located at the end of Moorland Dr on Corona Oriente Rd.

- 5. CONTRACT TIME: The Contract Time for completion of the Work shall be 110 Working Days.
- 6. CONTRACTOR'S LICENSE CLASSIFICATION: In accordance with the provisions of California Law, the Contractor shall possess valid appropriate license(s) at the time that the Bid is submitted. Failure to possess the specified license(s) shall render the Bid as non-responsive and shall act as a bar to award of the Contract to any Bidder not possessing required license(s) at the time of Bid.

The City has determined the following licensing classification(s) for this contract:

• CLASS B

7. PRE-BID CONFERENCE: There will be a Pre-Bid Conference to discuss the scope of the project, bidding requirements, and Equal Opportunity Contracting Program requirements and reporting procedures in the Public Works Contracting Group Conference Room at 1200 Third Avenue, Suite 200, San Diego, CA 92101 at 10:00 AM, on MAY 1, 2012. All potential bidders are encouraged to attend.

To request a copy of the agenda on an alternative format, or to request a sign language or oral interpreter for this meeting, call the Public Works Contracting Group at (619) 236-6000 at least 5 Working Days prior to the Pre-Bid Conference to ensure availability.

8. CITY PROJECT MANAGER CONTACT INFORMATION: See the cover of the Contract Documents.

9. REFERENCE STANDARDS: Except as otherwise noted or specified, the Work shall be completed in accordance with the following standards:

Document No.	Filed	Description	
PITS0504091	05-04-09	Standard Specifications for Public Works Construction (The GREENBOOK), 2009 Edition	
PITS090110-1	09-01-10	City of San Diego Standard Specifications for Public Works Construction (The WHITEBOOK), 2010 Update*	
AEC1231064	12-31-06	California Department of Transportation, Manual of Uniform Traffic Control Devices (MUTCD 2006)	
769023	09-11-84	Standard Federal Equal Employment Opportunity Construction Contract Specifications and the Equal Opportunity Clause	

NOTE: The City of San Diego Supplement, 2010 Update now consolidates various City Public Works Construction Standard Specifications which in the past were included in the Supplementary Special Provisions. The Bidders' attention is directed to this edition of the City Supplement for a close review to ensure no important information is missed for the preparation of the Bids.

2. STANDARD DRAWINGS

Document No.	Filed	Description
AEC1230163	12-31-06	City of San Diego Standard Drawings*
N/A	Varies	City Standard Drawings - Updates Approved For Use (when specified)*
AEC0925061	09-25-06	Caltrans 2006 U.S. Customary Unit Standard Plans

- **10.** NOTE: *Available online under Engineering Documents and References at: http://www.sandiego.gov/engineering-cip.
- **11. WAGE RATES**: Prevailing wages are not applicable to this project <u>unless specified otherwise</u> <u>on the cover page of these specifications and when included in these specifications</u>. See Funding Agency Provisions that follow this Invitation to Bid for more information.

Tony Heinrichs, Director Public Works Department

INSTRUCTIONS TO BIDDERS

1. **PREQUALIFICATION OF CONTRACTORS:** The contractor(s) who intend to submit Bid or Proposal in response to this invitation to bid, or RFP's for GRC or As-Needed Design-Build Task Orders valued over \$50,000, must be pre-qualified for the <u>total amount proposed</u>, <u>inclusive of all alternate bid items</u> or the specified Task Order limits prior to the date of Bid submittal.

Bids from contractors who have not been pre-qualified as applicable, and Bids that exceed the maximum dollar amount at which contractors are pre-qualified, will be deemed non-responsive and ineligible for award or a Task Order authorization. Complete information and prequalification questionnaires are available at:

http://www.sandiego.gov/engineering-cip/services/consultcontract/prequal.shtml

The completed questionnaire, financial statement, and bond letter or a copy of the contractor's SLBE-ELBE certification and bond letter, must be submitted no later than 2 weeks prior to the bid opening to the Public Works Department - Engineering & Capital Projects Prequalification Program, 1010 Second Avenue, Suite 1200, San Diego, CA 92101. For additional information or the answer to questions about the prequalification program, please contact David Stucky at 619-533-3474 or dstucky@sandiego.gov.

- **2. CONTRACTOR REGISTRATION:** Prospective bidder(s) as well as existing contractors and suppliers are required to register with the City's EOCP. Refer to 2-17, "CONTRACTOR REGISTRATION" for details.
- **3. CITY'S RESPONSES AND ADDENDA:** The City at its option, may respond to any or all questions submitted in writing, via letter, or FAX in the form of an addendum. No oral comment shall be of any force or effect with respect to this solicitation. The changes to the Contract Documents through addendum are made effective as though originally issued with the Bid. The Bidders shall acknowledge the receipt of Addenda on the form provided for this purpose in the Bid.
- 4. CITY'S RIGHTS RESERVED: The City reserves the right to cancel the Invitation to Bids at any time, and further reserves the right to reject submitted Bids, without giving any reason for such action, at its sole discretion and without liability. Costs incurred by the Bidder(s) as a result of preparing Bids under the Invitation to Bid shall be the sole responsibility of each bidder. The Invitation to Bid creates or imposes no obligation upon the City to enter a contract.
- **5. CONTRACT PRICING FORMAT:** This solicitation is for a Lump Sum contract with Unit Price provisions as set forth in the Bid Proposal Form(s), Volume 2 unless specified otherwise such as as-needed contracts e.g., GRC in the Contract Documents.
- 6. SUBMITTAL OF "OR EQUAL" ITEMS: See 4-1.6, "Trade Names or Equals."
- 7. AWARD PROCESS: The Award of this contract is contingent upon the Contractor's compliance with all conditions precedent to Award, including the submittal of acceptable insurance and surety bonds pursuant to San Diego Municipal Code § 22.3007. If the responsible Bid does not exceed the City's engineering estimate, the City will, in most cases, prepare contract documents for execution within 3 weeks of the date of the Bid opening and award the Contract within 5 Working Days of receipt of properly executed Contract, bond, and insurance documents.

This contract is deemed to be awarded, and effective, only upon the signing of the Contract by the Mayor or designee of the City.

- **8. SUBCONTRACT LIMITATIONS:** The Bidder's attention is directed to Standard Specifications for Public Works Construction, Section 2-3, "SUBCONTRACTS" which requires the Contractor to perform not less than the amount therein stipulated with its own forces. Failure to comply with these requirements may render the Bid **non-responsive** and ineligible for award.
- **9. AVAILABILITY OF PLANS AND SPECIFICATIONS:** Contract Documents may be obtained by visiting the City's website: <u>http://www.sandiego.gov/engineering-cip/services/consultcontract/advertising.shtml</u>. Plans and Specifications for this contract are also available for review in the office of the City Clerk or Public Works Contracting Group.
- **10. QUESTIONS:** Questions about the meaning or intent of the Contract Documents as related to the scope of Work and of technical nature shall be directed to the Project Manager prior to Bid opening. Interpretations or clarifications considered necessary by the Project Manager in response to such questions will be issued by Addenda, which will be uploaded to eBidboard (or mailed or delivered to all parties recorded by the City as having received the Contract Documents for Minor Construction contracts). Questions received less than 14 days prior to the date for opening of Bids **may not** be answered. Only questions answered by formal written addenda will be binding. Oral and other interpretations or clarifications will be without legal effect. It is the Bidder's responsibility to become informed of any addenda that have been issued and to include all such information in its Bid.

The Director (or designee), Public Works Department is the officer responsible for opening, examining, and declaring of competitive Bids submitted to the City for the acquisition, construction and completion of any public improvement except when otherwise set forth in these documents. Questions in these areas of responsibility (e.g., i.e. Pre-qualification, SCOPe information, bidding activities, bonds and insurance, etc. as related to this contract shall be addressed to the Contract Administration, Public Works Contracting Group, 1200 Third Avenue, Suite 200, San Diego, California, 92101, Telephone No. (619) 236-6000.

- **11. ELIGIBLE BIDDERS:** No person, firm, or corporation shall be allowed to make, file, or be interested in more than 1 Bid for the same work unless alternate Bids are called for. A person, firm or corporation who has submitted a sub-proposal to a Bidder, or who has quoted prices on materials to a Bidder, is not hereby disqualified from submitting a sub-proposal or quoting prices to other Bidders or from submitting a Bid in its own behalf.
- **12. SAN DIEGO BUSINESS TAX CERTIFICATE:** All Contractors, including Subcontractors, not already having a City of San Diego Business Tax Certificate for the work contemplated shall secure the appropriate certificate from the City Treasurer, Civic Center Plaza, first floor, before the Contract can be executed.
- **13. PROPOSAL FORMS:** Bid shall be made only upon the Bidding Documents i.e., Proposal form attached to and forming a part of the specifications. The signature of each person signing shall be in longhand. The entire specifications for the bid package do not need to be submitted with the bid. Bidder shall complete and submit, only, all pages in the "Bidding Document" Section (see Volume 2) as their Bid per the schedule given under "Required Documents," (see Volume 1). Bidder is requested to retain for their reference other portions of the Contract Documents that are not required to be submitted with the Bid.

Prices and notations shall be in ink or typewritten. All corrections (which have been initiated by the Contractor using erasures, strike out, line out, or "white-out") shall be typed or written in with ink adjacent thereto, and shall be initialed in ink by the person signing the bid proposal. Failure to initial all corrections made in the bidding documents shall cause the Bid to be rejected as non-responsive and ineligible for further consideration.

Blank spaces must be filled in, using figures. Bidder's failure to submit a price for any Bid item that requires the Bidder to submit a price shall render the Bid non-responsive and shall be cause for its rejection.

Bids shall not contain any recapitulation of the Work. Conditional Bids will be rejected. Alternative proposals will not be considered unless called for.

The Bid shall contain an acknowledgment of receipt of all addenda, the numbers of which shall be filled in on the Bid form. Failure to acknowledge addenda shall render the Bid non-responsive and shall be cause for its rejection.

The City may require any Bidder to furnish a statement of experience, financial responsibility, technical ability, equipment, and references.

Bids shall be enclosed in a sealed envelope and shall bear the title of the work and name of the Bidder and the appropriate State Contractors License designation which the Bidder holds.

Bids may be withdrawn by the Bidder prior to, but not after, the time fixed for opening of Bids.

14. BIDDERS' GUARANTEE OF GOOD FAITH (BID SECURITY): With the exception of the contracts valued \$5,000 or less, GRC and Design-Build contracts, and contracts subject to the Small and Local Business Program of \$250,000 or less e.g., ELBE contracts, each Bidder shall accompany its Bid with either a cashier's check upon some responsible bank, or a check upon such bank properly certified or an approved corporate surety bond payable to the City of San Diego, for an amount of not less than 10% of the aggregate sum of the Bid, which check or bond, and the monies represented thereby shall be held by the City as a guarantee that the Bidder, if awarded the contract, will in good faith enter into such contract and furnish the required final bonds.

The Bidder agrees that in case of Bidder's refusal or failure to execute this contract and give required final bonds, the money represented by a cashier's or certified check shall remain the property of the City, and if the Bidder shall fail to execute this contract, the Surety agrees that it will pay to the City damages which the City may suffer by reason of such failure, not exceeding the sum of 10% of the amount of the Bid. A Bid received without the specified bid security will result in return of the Bid without consideration.

15. AWARD OF CONTRACT OR REJECTION OF BIDS:

- a) This contract may be awarded to the lowest responsible and reliable Bidder (for Design-Build contracts refer to the RFP for the selection and award information). Bidders shall complete the entire Bid schedule (e.g., schedule of prices). Failure to submit a completed schedule shall be considered a non-responsive Bid and therefore the Bidder shall be considered non-responsible.
- b) The City reserves the right to reject any or all Bids, and to waive any informality or technicality in Bids received and any requirements of these specifications as to bidding procedure.
- c) Bidders will not be released on account of their errors of judgment. Bidders may be released only upon receipt by the City from the Bidder within 3 Working Days, excluding Saturdays, Sundays, and state holidays, after the opening of Bids, of written notice which includes proof of honest, credible, clerical error of material nature, free from fraud or fraudulent intent, and of evidence that reasonable care was observed in the preparation of the Bid.
- d) A non-selected Bidder may protest award of the Contract to the selected Bidder by submitting a written "Notice of Intent to Protest" including supporting documentation which shall be received by Public Works Department no later than 10 days after the City's announcement of the selected Bidder or no later than 10 days from the date that the City issues notice of designation of a Bidder as non-responsible in accordance with San Diego Municipal Code Chapter 2, §22.3029, "Protests of Contract Award."

- e) The City of San Diego will not discriminate with regard to race, religious creed, color, national origin, ancestry, physical handicap, marital status, sex or age, in the award of contracts.
- f) Each Bid package properly executed as required by these specifications shall constitute a firm offer, which may be accepted by the City within the time specified in the Invitation to Bids.
- g) The City reserves the right to evaluate all Bids and determine the lowest Bidder (or winner for Design-Build contracts) on the basis of any proposed alternates, additive items or options, at its discretion.
- **16. BID RESULTS:** The Bid opening by the City shall constitute the public announcement of the Apparent Low Bidder (or Apparent Winner in case of Design-Build contracts). In the event that the Apparent Low Bidder (or Apparent Winner in case of Design-Build contracts) is subsequently deemed non-responsive or non-responsible, a public announcement will be posted in the City's web page, with the name of the newly designated Apparent Low Bidder (or Apparent Winner in case of Design-Build contracts).

To obtain Bid results, either attend Bid opening, review the results on the City's web site, or provide a self-addressed, stamped envelope, referencing Bid number, and Bid tabulation will be mailed to you upon verification of extensions. Due to time constraints, Bid results cannot be given out over the telephone.

17. THE CONTRACT: The Bidder to whom award is made shall execute a written contract with the City of San Diego and furnish good and approved bonds and insurance certificates specified by the City within 10 Working Days after receipt by Bidder of a form of contract for execution unless an extension of time is granted to the Bidder in writing. If the Bidder takes longer than 10 Working Days to fulfill these requirements, then the additional time taken shall be added to the Bid guarantee. The Contract shall be made in the form adopted by the City, which includes the provision that no claim or suit whatsoever shall be made or brought by Contractor against any officer, agent, or employee of the City for or on account of anything done or omitted to be done in connection with this contract, nor shall any such officer, agent, or employee be liable hereunder. If the Bidder to whom the award is made fails to enter into the contract as herein provided, the award may be annulled and the Bidder's Guarantee of Good Faith will be subject to forfeiture. An award may be made to the next lowest responsible and reliable Bidder who shall fulfill every stipulation embraced herein as if it were the party to whom the first award was made.

For contracts that are not Design-Build, pursuant to the San Diego City Charter section 94, the City may only award a public works contract to the lowest responsible and reliable Bidder. The City will require the Apparent Low Bidder to (i) submit information to determine the Bidder's responsibility and reliability, (ii) execute the Contract in form provided by the City, and (iii) furnish good and approved bonds and insurance certificates specified by the City within 10 days, unless otherwise approved by the City, in writing after the Bidder receives notification from the City, designating the Bidder as the Apparent Low Bidder and formally requesting the above mentioned items.

The award of the Contract is contingent upon the satisfactory completion of the above mentioned items and becomes effective upon the signing of the Contract by the Mayor or designee. If the Apparent Low Bidder does not execute the Contract or submit required documents and information, the City may award the Contract to the next lowest responsible and reliable Bidder who shall fulfill every condition precedent to award. A corporation designated as the Apparent Low Bidder shall furnish evidence of its corporate existence and evidence that the officer signing the Contract and bond for the corporation is duly authorized to do so.

18. EXAMINATION OF PLANS, SPECIFICATIONS, AND SITE OF WORK: The Bidder shall examine carefully the Project Site, the Plans and Specifications, the GRC Unit Price Books if applicable, other materials as described in the Special Provisions, Section 2-7, and the proposal forms (e.g., Bidding Documents) therefore. The submission of a Bid or GRC Task Order Proposal shall be

conclusive evidence that the Bidder has investigated and is satisfied as to the conditions to be encountered, as to the character, quality, and scope of Work, the quantities of materials to be furnished, and as to the requirements of the Bidding Documents Proposal, Plans, and Specifications.

19. DRUG-FREE WORKPLACE:

a) General:

City projects are subject to City of San Diego Resolution No. R-277952 adopted on May 20, 1991. Bidders shall become aware of the provisions of Council Policy 100-17 which was established by Resolution No. R-277952. The policy applies equally to the Contractor and Subcontractors. The elements of the policy are outlined below.

b) Definitions:

"Drug-free workplace" means a site for the performance of work done in connection with a contract let by City of San Diego for the construction, maintenance, or repair of any facility or public work by an entity at which employees of the entity are prohibited from engaging in the unlawful manufacture, distribution, dispensation, possession, or use of a controlled substance in accordance with the requirements of this section.

"Employee" means the employee of a contractor directly engaged in the performance of work pursuant to a contract as described in Section 3, "City Contractor Requirements."

"Controlled substance" means a controlled substance in schedules I through V of Section 202 of the Controlled Substances Act (21 U.S.C. Sec. 812).

"Contractor" means the department, division, or other unit of a person or organization responsible to the contractor for the performance of a portion of the work under the contract.

c) City Contractor Requirements:

Every person or organization awarded a contract or grant by the City of San Diego for the provision of services shall certify to the City that it will provide a drug-free workplace by doing all following:

- a. Publishing a statement notifying employees that the unlawful manufacture, distribution, dispensation, possession, or use of a controlled substance is prohibited in the person's organization's workplace and specifying the actions that will be taken against employees for violations of the prohibition.
- b. Establishing a drug-free awareness program to inform employees about all of the following:
 - i. The dangers of drug abuse in the workplace.
 - ii. The person's or organization's policy of maintaining a drug-free workplace.
 - iii. Any available drug counseling, rehabilitation, and employee assistance programs.
 - iv. The penalties that may be imposed upon employees for drug abuse violations.
- c. Posting the statement required by subdivision (1) in a prominent place at contractor's main office. For projects large enough to necessitate a construction trailer at the job site, the required signage would also be posted at the Site.

The Contractor shall include in each subcontract agreement language which indicates the Subcontractor's agreement to abide by the provisions of subdivisions a) through c) above. The Contractors and Subcontractors shall be individually responsible for their own drug-free workplace programs.

Note: The requirements of a drug-free awareness program can be satisfied by periodic tailgate sessions covering the various aspects of drug-abuse education. Although an in-house employee assistance program is not required, contractors should be able to provide a listing of drug rehabilitation and counseling programs available in the community at large.

Questions about the City's Drug-free Workplace Policy shall be referred to the Contract Specialist, Public Works Department.

20. AMERICANS WITH DISABILITIES ACT:

- a) General: City projects are subject to City of San Diego Resolution No. R-282153 adopted on June 14, 1993. The Bidders shall become aware of the provisions of Council Policy 100-04 which was established by Resolution No. R-282153. The policy applies equally to the Contractor and all Subcontractors. The elements of the policy are outlined below.
- b) Definitions:

"Qualified individual with a disability" means an individual with a disability who satisfies the requisite skill, experience, education and other job-related requirements of the employment position such individual holds or desires, and who, with or without reasonable accommodation, can perform the essential functions of such position.

"Employee" means the employee of the Contractor directly engaged in the performance of Work.

- c) The City Requirements: Every person or organization entering into a contractual agreement with or receiving a grant from the City of San Diego shall certify to the City of San Diego that it will comply with the ADA by adhering to all of the provisions of the ADA listed below.
 - i. The Contractor shall not discriminate against qualified persons with disabilities in any aspects of employment, including recruitment, hiring, promotions, conditions and privileges of employment, training, compensation, benefits, discipline, layoffs, and termination of employment.
 - ii. No qualified individual with a disability may be excluded on the basis of disability, from participation in, or be denied the benefits of services, programs, or activities by the Contractor or Subcontractors providing services for the City.
 - iii. The Contractor shall post a statement addressing the requirements of the ADA in a prominent place at the worksite. The Contractor shall include in each subcontract agreement, language which indicates the Subcontractor's agreement to abide by the provisions of subdivisions (a) through (c) inclusive of Section 3. The Contractor and Subcontractors shall be individually responsible for their own ADA employment programs. Questions about the City's ADA Policy should be referred to the Contract Administrator.

21. CONTRACTOR STANDARDS – PLEDGE OF COMPLIANCE: The City contracts, including public works construction projects, are subject to City of San Diego Municipal Code §22.3224 as amended 11/24/08 by ordinance O-19808. Bidders shall become aware that the requirements apply to Contractors and Subcontractors for contracts greater than \$50,000 in value.

Upon award, amendment, renewal, or extension of such contracts, the Contractors shall complete a Pledge of Compliance attesting under penalty of perjury that they complied with the requirements of this section.

The Contractors shall ensure that their Subcontractors whose subcontracts are greater than \$50,000 in value complete a Pledge of Compliance attesting under penalty of perjury that they complied with the requirements of this section. Subcontractors may access the Pledge of Compliance at:

http://www.sandiego.gov/purchasing/pdf/contractor_standards_questionnaire.pdf.

The Contractors shall include in each subcontract agreement, language which requires Subcontractors to abide by the provisions of City of San Diego Municipal Code §22.3224. A sample provision is as follows:

"**Compliance with San Diego Municipal Code §22.3224**: Subcontractor acknowledges that it is familiar with the requirements of San Diego Municipal Code §22.3224 ("Contractor Standards"), and agrees to comply with requirements of that section. The Subcontractor further agrees to complete the Pledge of Compliance, incorporated herein by reference."

- 22. NOTICE OF LABOR COMPLIANCE PROGRAM APPROVAL: The City of San Diego received initial approval as a Labor Compliance Program on August 11, 2003. The Labor Compliance Program Manual is available at http://www.sandiego.gov/eoc/laborcompliance/#manual. The limited exemption from prevailing wages pursuant to Labor Code §1771.5(a) does not apply to contracts under jurisdiction of the Labor Compliance Program. Inquiries, questions, or assistance about the Labor Compliance Program should be directed to: Equal Opportunity Contracting Program, 1200 Third Ave., Suite 200 MS56P, San Diego, CA 92101, Tel. 619-236-6000.
- **23. PAYROLL RECORDS:** The Contractor's attention is directed to the City of San Diego Labor Compliance Program, Section IV, pages 4-7, and the State of California Labor Code §§ 1771.5(b) and 1776 (Stats. 1978, Ch. 1249). These require, in part, that project contractors and subcontractors maintain and furnish to the City, at a designated time, a certified copy of each weekly payroll containing a statement of compliance signed under penalty of perjury. The Contractor shall be responsible for the compliance with these provisions by his Subcontractors. The City shall withhold contract payments when payroll records are delinquent or inadequate, or when it is established after investigation that underpayment has occurred.
- **24. APPRENTICES ON PUBLIC WORKS:** The Contractor shall abide by the requirements of §§1777.5, 1777.6, and 1777.7 of the State of California Labor Code concerning the employment of apprentices by contractors and subcontractors performing public works contracts.
- **25. EQUAL BENEFITS:** This contract is subject to the City's Equal Benefits Ordinance (EBO), Chapter 2, Article 2, Division 43 of the San Diego Municipal Code (SDMC).

In accordance with the EBO, Bidders shall certify they will provide and maintain equal benefits as defined in SDMC §22.4302 for the duration of the Contract (SDMC §22.4304(f)). Failure to maintain equal benefits is a material breach of the Contract (SDMC §22.4304(e)). The Contractor shall notify employees of their equal benefits policy at the time of hire and during open enrollment periods and shall post a copy of the following statement in an area frequented by employees:

"During the performance of a contract with the City of San Diego, this employer will provide equal benefits to its employees with spouses and its employees with domestic partners."

The Contractor shall give the City access to documents and records sufficient for the City to verify the contractors are providing equal benefits and otherwise complying with EBO requirements.

Full text of the EBO and the Rules Implementing the Equal Benefits Ordinance are posted on the City's website at www.sandiego.gov/purchasing/ or can be requested from the Equal Benefits Program at (619) 533-3948.

26. LIMITED COMPETITION: Contracts designated with a Bid number beginning with "L" may only be bid by the Contractors on the approved SLBE-ELBE Construction Contractors List. For information regarding the SLBE-ELBE Construction Program and registration go to the City's web site: <u>http://www.sandiego.gov</u>.

27. PRE-AWARD ACTIVITIES:

<u>Pre-award Submittals</u> - The Apparent Low Bidder (or winner in case of Design-Build contracts) shall provide the information required within the time specified in "Required Documents Schedule," of this bid package. Failure to provide the information within the time specified may result in the Bid being rejected as **non-responsive**.

If the Bid is rejected as non-responsive, the Apparent Low Bidder (or winner in case of Design-Build contracts) shall forfeit the Bid Security required under Invitation to Bids, of this bid package. The decision that the Apparent Low Bidder (or winner in case of Design-Build contracts) is non-responsive for failure to provide the information required within the time specified shall be at the sole discretion of the City.

CONTRACT FORMS AGREEMENT

CONSTRUCTION CONTRACT

This contract is made and entered into between THE CITY OF SAN DIEGO, a municipal corporation, herein called "City", and <u>Delta Builders</u>, herein called "Contractor" for construction of NORTH CROWN POINT COMFORT STATION; Bid No.K-12-5498-DBB-3-C, in the amount of <u>THREE HUNDRED FORTY-NINE THOUSAND DOLLARS AND 00/100</u> (\$349,000.00), which is comprised of the Base Bid.

IN CONSIDERATION of the payments to be made hereunder and the mutual undertakings of the parties hereto, City and Contractor agree as follows:

- 1. The following are incorporated into this contract as though fully set forth herein:
 - (a) The attached Faithful Performance and Payment Bonds.
 - (b) The attached Proposal included in the Bid documents by the Contractor.
 - (c) That certain documents entitled <u>NORTH CROWN POINT COMFORT</u> <u>STATION</u>, on file in the Public Works Contracting Group as Document SAP No. (WBS/CC/IO) **B-10088**, as well as all matters referenced therein.
- 2. Contractor shall perform and be bound by all the terms and conditions of this contract and in strict conformity therewith shall perform and complete in a good and workmanlike manner **NORTH CROWN POINT COMFORT STATION;** Bid No. K-12-5498-DBB-3-C, San Diego, California.
- 3. For such performances, the City shall pay to Contractor the amounts set forth at the times and in the manner and with such additions or deductions as are provided for in this contract, and Contractor shall accept such payment in full satisfaction of all claims incident to such performances.
- 4. No claim or suit whatsoever shall be made or brought by Contractor against any officer, agent, or employee of the City for or on account of anything done or omitted to be done in connection with this contract, nor shall any such officer, agent, or employee be liable hereunder.
- 5. This contract is effective as of the date that the Mayor or designee signs the agreement.

CONTRACT FORMS (continued) AGREEMENT

IN WITNESS WHEREOF, this agreement is signed by the City of San Diego, acting by and through its Mayor or designee, pursuant to Resolution No. $\mathbf{R} - 307356$ authorizing such execution.

THE CITY OF SAN DIEGO

APPROVED AS TO FORM AND LEGALITY

By

Print Name:______ W. Downs Prior, Principal Contract Specialist

Date: 8/15/12

Jan I. Goldsmith, City Attorney

Bv Print Name: Deputy City Attorney Date

CONTRACTOR

nom By_

Print Name: MIR MOSHIRI

Title: PRESIDENT,

Date: 06 /12 / 20 / 2

City of San Diego License No.: <u>320110</u>00 195 State Contractor's License No.: <u>564852</u>

Issued in Triplicate

Bond No.: 024044061 Premium: \$6,235.00

CONTRACT FORMS (continued) PERFORMANCE BOND AND LABOR AND MATERIALMEN'S BOND

FAITHFUL PERFORMANCE BOND AND LABOR AND MATERIALMEN'S BOND:

Delta Builders

corporation, as principal, and <u>The Ohio Casualty Insurance Company</u>, a corporation authorized to do business in the State of California, as Surety, hereby obligate themselves, their successors and assigns, jointly and severally, to The City of San Diego a municipal corporation in the sum of <u>THREE HUNDRED FORTY-NINE THOUSAND DOLLARS AND</u> 00/100 (\$349,000.00), for the faithful performance of the annexed contract, and in the sum of <u>THREE HUNDRED FORTY-NINE THOUSAND 00/100</u> (\$349,000.00), for the benefit of laborers and materialmen designated below.

Conditions:

If the Principal shall faithfully perform the annexed contract <u>NORTH CROWN POINT</u> <u>COMFORT STATION</u>; <u>Bid No. K-12-5498-DBB-3-C</u>,San Diego, California then the obligation herein with respect to a faithful performance shall be void; otherwise it shall remain in full force.

If the Principal shall promptly pay all persons, firms and corporations furnishing materials for or performing labor in the execution of this contract, and shall pay all amounts due under the California Unemployment Insurance Act then the obligation herein with respect to laborers and materialmen shall be void; otherwise it shall remain in full force.

The obligation herein with respect to laborers and materialmen shall inure to the benefit of all persons, firms and corporations entitled to file claims under the provisions of Chapter 3 of Division 5 of Title I of the Government Code of the State of California or under the provisions of Section 3082 et seq. of the Civil Code of the State of California.

Changes in the terms of the annexed contract or specifications accompanying same or referred to therein shall not affect the Surety's obligation on this bond, and the Surety hereby waives notice of same.

CONTRACT FORMS (continued) PERFORMANCE BOND AND LABOR AND MATERIALMEN'S BOND

The Surety shall pay reasonable attorney's fees should suit be brought to enforce the provisions of this bond.

DatedJune 12	, 2012
Approved as to Form and Legality	Delta Builders Principal By
Jan I. Goldsmith, City Attorney	Printed Name of Person Signing for Principal
By 815 12 Deputy City Attorney	The Ohio Casualty Insurance Company Surety By Dana Michaelis Attorney-in-fact Dana Michaelis
Approved:	9920 Pacific Heights Blvd. #425 Local Address of Surety
By	San Diego, CA 92121 - Local Address (City, State) of Surciy 858-450-0582
	Local Telephone No. of Surety
	Bond No. 024044061

CALIFORNIA ALL-PURPOSE ACKNOWLEDGMENT

,

STATE OF CALIFORNIA	ſ			
County of <u>San Diego</u>				
On <u>June 12, 2012</u> before me,	Pam Davis, Notary Public , Here Insert Name and Title of the Officer			
personally appeared Dana Michaelis	Name(s) of Signer(s)			
PAM DAVIS Commission # 1818711 Notary Public - California San Diego County My Comm. Expires Oct 20, 2012	who proved to me on the basis of satisfactory evidence to be the person(x) whose name(x) is/xix subscribed to the within instrument and acknowledged to me that A&/she/the/y executed the same in A%/her/their authorized capacity(PeS), and that by A%/her/their signature(s) on the instrument the person(x), or the entity upon behalf of which the person(x) 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 Above	Signature Auto Paulo Signature of Notary Public Pam Davis			
Though the information below is not required by law, and could prevent fraudulent removal and Description of Attached Document	it may prove valuable to persons relying on the document reattachment of this form to another 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: Individual Corporate Officer — Title(s): Partner — Limited General Attorney in Fact Trustee Guardian or Conservator Other: Signer Is Representing:	Signer's Name: Individual Corporate Officer — Title(s): Partner — Limited General Attorney in Fact Trustee Guardian or Conservator Other: Signer Is Representing:			

CONTRACTOR CERTIFICATION

DRUG-FREE WORKPLACE

PROJECT TITLE: ______NORTH CROWN POINT COMFORT STATION

I hereby certify that I am familiar with the requirements of San Diego City Council Policy No. 100-17 regarding Drug-Free Workplace as outlined in INSTRUCTION TO BIDDERS, "Drug-Free Workplace", of the project specifications, and that;

(Name under which business is conducted)

has in place a drug-free workplace program that complies with said policy. I further certify that each subcontract agreement for this project contains language which indicates the subcontractor's agreement to abide by the provisions of subdivisions a) through c) of the policy as outlined.

Signed
Printed Name MIR MOSHIRI
Title PRESIDENT.

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CONTRACTOR CERTIFICATION

AMERICAN WITH DISABILITIES ACT (ADA) COMPLIANCE CERTIFICATION

PROJECT TITLE: _____ NORTH CROWN POINT COMFORT STATION

I hereby certify that I am familiar with the requirements of San Diego City Council Policy No. 100-4 regarding the American With Disabilities Act (ADA) outlined in the INSTRUCTION TO BIDDERS, "American With Disabilities Act", of the project specifications, and that;

(Name under which business is conducted)

has in place workplace program that complies with said policy. I further certify that each subcontract agreement for this project contains language which indicates the subcontractor's agreement to abide by the provisions of the policy as outlined.

Signed	when			
Printed Name	MIR.	MOSHIRI		
Title PRESIDENT				

CONTRACTOR CERTIFICATION

CONTRACTOR STANDARDS – PLEDGE OF COMPLIANCE

PROJECT TITLE: NORTH CROWN POINT COMFORT STATION

I declare under penalty of perjury that I am authorized to make this certification on behalf of _______, as Contractor, that I am familiar with the requirements of City of San Diego Municipal Code § 22.3224 regarding Contractor Standards as outlined in INSTRUCTION TO BIDDERS ("Contractor Standards"), of the project specifications,

I further certify that each of the Contractor's subcontractors whose subcontracts are greater than \$50,000 in value has completed a Pledge of Compliance attesting under penalty of perjury of having complied with City of San Diego Municipal Code § 22.3224.

Dated this $\underline{D6}$ Day of $\underline{2}$, $2\underline{02}$.
Signed
Printed Name MIL MOSHIR
Title PRESIDENT.

and that Contractor has complied with those requirements.

AFFIDAVIT OF DISPOSAL

WHEREAS, on the _____ DAY OF _____, 2___, the undersigned entered into and executed a contract with the City of San Diego, a municipal corporation, for:

NORTH CROWN POINT COMFORT STATION

(Project)

as particularly described in said contract and identified as Bid No. **K-12-5498-DBB-3-C**; SAP No. (WBS/IO/CC) **B-10088** and **WHEREAS**, the specifications of said contract requires the Contractor to affirm that "all brush, trash, debris, and surplus materials resulting from this project have been disposed of in a legal manner"; and **WHEREAS**, said contract has been completed and all surplus materials disposed of:

NOW, THEREFORE, in consideration of the final payment by the City of San Diego to said Contractor under the terms of said contract, the undersigned Contractor, does hereby affirm that all surplus materials as described in said contract have been disposed of at the following location(s)

and that they have been disposed of according to all applicable laws and regulations.

DAY OF	, 2	
	DAY OF	DAY OF , 2

by

Contractor

ATTEST:

State of _____ County of _____

On this _____ DAY OF _____, 2____, before the undersigned, a Notary Public in and for said County and State, duly commissioned and sworn, personally appeared ______ known to me to be the ______

Contractor named in the foregoing Release, and whose name is subscribed thereto, and acknowledged to me that said Contractor executed the said Release.

Notary Public in and for said County and State

SUPPLEMENTARY SPECIAL PROVISIONS (SSP)

THESE SUPPLEMENTARY SPECIAL PROVISIONS CONFORM TO THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION (THE GREENBOOK) CURRENTLY ADOPTED BY THE CITY, INCLUDING ITS CURRENT SUPPLEMENT AMENDMENTS (CITY SUPPLEMENTS INCLUDED IN THE WHITEBOOK), EXCEPT FOR THE FOLLOWING:

STYLE OF SPECIFICATIONS

The City is gradually standardizing the style and language of the standard specifications for the public works construction. The new style and language follows the Federal guidelines for "Plain Language" to the extent possible.

The use of this new style does not change the meaning of a specification not yet using this style. Where used in the Contract Documents, statement or command type phrases (i.e., active voice and imperative mood) refer to and are directed at the Bidder or Contractor as applicable. The specifications are written to the Bidder before award and the Contractor after. Before award, interpret sentences written in the imperative mood as starting with "The Bidder must" and interpret "you" as "the Bidder's." After award, interpret sentences written in the imperative mood as starting with "The Contractor must" and interpret "you" as "the Contractor's." Similarly, interpret "we" and "us" as "the City" and "our" as "the City's."

PART 1 – GENERAL PROVISIONS

SECTION 1 – TERMS, DEFINITIONS, ABBREVIATIONS, UNITS OF MEASURE, AND SYMBOLS

1-2 TERMS AND DEFINITIONS.

Agency – ADD the following:

Regulatory activities handled by the City of San Diego Developmental Services, Fire and Planning Departments, or any other City Department are not subject to the responsibilities of the City under this contract.

Certificate of Compliance – To the City Supplement, DELETE in its entirety and SUBSTITUTE with the following:

Certificate of Compliance – A written document signed and submitted by a supplier or manufacturer that certifies that the material or assembled material supplied to the Work site complies with the requirements of the Contract Documents.

Contract Documents – To the City Supplement, DELETE in its entirety and SUBSTITUTE with the following:

The Agreement, Addendum, Invitation to Bids, Instructions to Bidders, Special Notice page, funding agency provisions, Bid and documentation accompanying the Bid and any post-bid documentation submitted prior to the Notice of Award when attached as an exhibit to the Contract, Bonds, permits from jurisdictional regulatory agencies, Supplementary Special Provisions (SSP), City's EOCP Requirements, City Supplement, Plans, Standard Plans, Construction Documents, Reference Specifications listed in the Invitation to Bids or the RFP for Design-Build contracts, Request for Qualifications (RFQ), Statement of Qualifications (SOQ), Request for Proposals (RFP), modifications issued after the execution of the Contract e.g., Change Orders, Construction Manager At Risk's Guaranteed Maximum Price including written qualifications, assumptions and conditions thereto and Pre-construction Services Agreement.

AFFIDAVIT OF DISPOSAL

WHEREAS, on the _____ DAY OF _____, 2___, the undersigned entered into and executed a contract with the City of San Diego, a municipal corporation, for:

NORTH CROWN POINT COMFORT STATION

(Project)

as particularly described in said contract and identified as Bid No. **K-12-5498-DBB-3-C**; SAP No. (WBS/IO/CC) **B-10088** and **WHEREAS**, the specifications of said contract requires the Contractor to affirm that "all brush, trash, debris, and surplus materials resulting from this project have been disposed of in a legal manner"; and **WHEREAS**, said contract has been completed and all surplus materials disposed of:

NOW, THEREFORE, in consideration of the final payment by the City of San Diego to said Contractor under the terms of said contract, the undersigned Contractor, does hereby affirm that all surplus materials as described in said contract have been disposed of at the following location(s)

and that they have been disposed of according to all applicable laws and regulations.

DAY OF	, 2	
	DAY OF	DAY OF , 2

by

Contractor

ATTEST:

State of _____ County of _____

On this _____ DAY OF _____, 2____, before the undersigned, a Notary Public in and for said County and State, duly commissioned and sworn, personally appeared ______ known to me to be the ______

Contractor named in the foregoing Release, and whose name is subscribed thereto, and acknowledged to me that said Contractor executed the said Release.

Notary Public in and for said County and State

SUPPLEMENTARY SPECIAL PROVISIONS (SSP)

THESE SUPPLEMENTARY SPECIAL PROVISIONS CONFORM TO THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION (THE GREENBOOK) CURRENTLY ADOPTED BY THE CITY, INCLUDING ITS CURRENT SUPPLEMENT AMENDMENTS (CITY SUPPLEMENTS INCLUDED IN THE WHITEBOOK), EXCEPT FOR THE FOLLOWING:

STYLE OF SPECIFICATIONS

The City is gradually standardizing the style and language of the standard specifications for the public works construction. The new style and language follows the Federal guidelines for "Plain Language" to the extent possible.

The use of this new style does not change the meaning of a specification not yet using this style. Where used in the Contract Documents, statement or command type phrases (i.e., active voice and imperative mood) refer to and are directed at the Bidder or Contractor as applicable. The specifications are written to the Bidder before award and the Contractor after. Before award, interpret sentences written in the imperative mood as starting with "The Bidder must" and interpret "you" as "the Bidder's." After award, interpret sentences written in the imperative mood as starting with "The Contractor must" and interpret "you" as "the Contractor's." Similarly, interpret "we" and "us" as "the City" and "our" as "the City's."

PART 1 – GENERAL PROVISIONS

SECTION 1 – TERMS, DEFINITIONS, ABBREVIATIONS, UNITS OF MEASURE, AND SYMBOLS

1-2 TERMS AND DEFINITIONS.

Agency – ADD the following:

Regulatory activities handled by the City of San Diego Developmental Services, Fire and Planning Departments, or any other City Department are not subject to the responsibilities of the City under this contract.

Certificate of Compliance – To the City Supplement, DELETE in its entirety and SUBSTITUTE with the following:

Certificate of Compliance – A written document signed and submitted by a supplier or manufacturer that certifies that the material or assembled material supplied to the Work site complies with the requirements of the Contract Documents.

Contract Documents – To the City Supplement, DELETE in its entirety and SUBSTITUTE with the following:

The Agreement, Addendum, Invitation to Bids, Instructions to Bidders, Special Notice page, funding agency provisions, Bid and documentation accompanying the Bid and any post-bid documentation submitted prior to the Notice of Award when attached as an exhibit to the Contract, Bonds, permits from jurisdictional regulatory agencies, Supplementary Special Provisions (SSP), City's EOCP Requirements, City Supplement, Plans, Standard Plans, Construction Documents, Reference Specifications listed in the Invitation to Bids or the RFP for Design-Build contracts, Request for Qualifications (RFQ), Statement of Qualifications (SOQ), Request for Proposals (RFP), modifications issued after the execution of the Contract e.g., Change Orders, Construction Manager At Risk's Guaranteed Maximum Price including written qualifications, assumptions and conditions thereto and Pre-construction Services Agreement.

ADD: Limited Notice To Proceed – A written notice given from the City to the Contractor that authorizes the Contractor to start a limited amount of work that is not Construction Work, such as finalizing subcontract agreements, ordering materials, mobilization, furnishing a field office, and any

Normal Working Hours - To the City Supplement, ADD the following:

The Normal Working Hours shall be 7:00 AM to 3:30 PM.

Notice of Completion (NOC) – ADD the following:

See California Civil Code section 3093.

Samples - Physical examples which illustrate materials, equipment or workmanship and establish standards by which the Work will be evaluated.

SECTION 2 - SCOPE AND CONTROL OF WORK

2-1.2.2 Joint Venture Contractors. To the City Supplement, last paragraph, DELETE in its entirety and SUBSTITUTE with the following:

The Joint Venture shall designate an on-site representative and an alternate in writing. The on-site representative and the alternate shall have the full authority to bind all Joint Venture partners.

The Joint Venture shall provide a copy of the Joint Venture agreement and the Joint Venture license to the City within 10 Working Days after receipt by the Bidder of Contract forms.

2-3.1.2 Subcontractor List. ADD the following:

For Extra Work, the Contractor shall submit Form CC10, "CONTRACT CHANGE ORDER (CCO)" with each CCO proposal. Form CC10 is available for download from the EOCP site at: http://www.sandiego.gov/eoc/pdf/cc10.pdf

2-3.2 Self Performance. DELETE in its entirety and SUBSTITUTE with the following:

The Contractor shall perform, with its own organization, Contract work amounting to at least **50 percent** of the base bid alone or base bid and any additive or deductive alternate(s) that together when added or deducted form the basis of determining the Apparent Low Bidder as specified. The self performance percentage requirement will be waived for contracts when a "B" License is required or allowed.

2-3.3 Status of Subcontractors. ADD the following:

With every request for payment, the Contractor shall submit to the Engineer a breakdown showing monthly and cumulative amounts of the Work performed under Change Order by the Contractor and the Subcontractors. The reporting format shall be approved by the Engineer.

2-3.4 Subcontract Requirements. To the City Supplement, ADD the following paragraph:

The Contractor shall ensure that all of its Subcontractors are licensed at the time of the execution of their subcontract agreements. In the event a Subcontractor is not properly licensed, the Contractor shall cease payment to Subcontractor for all work performed when the Subcontractor was improperly licensed. Any payment made by the Contractor to a Subcontractor for work performed when the Subcontractor was unlicensed shall be returned to the City.

Where the Contract Documents require that a particular product be installed or applied by an applicator approved by the manufacturer, it is the Contractor's responsibility to ensure the Subcontractor or Supplier employed for such work is approved by the manufacturer.

2-5.2 Precedence of Contract Documents. To the City Supplement, DELETE in its entirety and SUBSTITUTE with the following:

2-5.2 Precedence of Contract Documents. DELETE in its entirety and SUBSTITUTE with the following:

If there is a conflict between any of the Contract Documents, the document highest in the order of precedence shall control. The order of precedence, from highest to lowest, shall be as follows:

- 1) Permits (i.e., issued by jurisdictional regulatory agencies)
- 2) Change Orders and Supplemental Agreements; whichever occurs last
- 3) Contract and Agreement
- 4) Addenda
- 5) Bid (e.g., price Proposal for <u>Design-Build</u> contracts)
- 6) Request for Proposal (RFP)
- 7) Invitation to Bid
- 8) Instruction to Bidders
- 9) Request for Qualifications (RFQ)
- 10) Special Provisions (i.e., City's EOCP Requirements, City Supplement, and Supplementary Special Provisions (SSP))
- 11) Plans
- 12) Construction Documents (for <u>Design-Build</u> contracts)
- 13) Standard Drawings
- 14) Reference Specifications (e.g., GREENBOOK)
- 15) Technical Proposal (for <u>Design-Build</u> contracts)
- 16) Statement of Qualifications (SOQ)

When additional requirements by the funding sources are physically or by reference incorporated in the Contract Documents, the funding source's requirements shall govern **unless specified otherwise**.

Figured dimensions shall take precedence over scaled dimensions. Detailed drawings shall take precedence over general drawings.

2-5.3.1 General. DELETE in its entirety and SUBSTITUTE with the following:

When required by the Contract Documents or when requested by the Engineer, the Contractor shall provide the submittals as specified in 2-5.3.2, 2-5.3.3, and 2-5.3.4 to the Engineer. Materials shall neither be furnished nor fabricated, nor shall any work for which submittals are required be performed before the required submittals have been reviewed and accepted by the Engineer. The payment for the submittals shall be included in the various Bid items. Neither review nor acceptance of submittals by the Engineer shall relieve the Contractor from responsibility for errors, omissions, or deviations from the Contract Documents, unless such deviations were specifically called to the attention of the Engineer in the letter of transmittal. The Contractor shall be responsible for the correctness of the submittals.

The Contractor shall allow a minimum of 20 working days for review of submittals unless otherwise specified in the Special Provisions. Each submittal shall be accompanied by a letter of transmittal.

2-5.4.1 General. ADD the following:

Source Identification e.g., RFI numbers and Change Order numbers as required to identify the source of the change to the Contract Documents shall be noted.

2-5.4.2 Asset Specific Red-lines. To the City Supplement, item (d), ADD the following:

- Dimensional changes to the drawings.
- Revisions to details shown on drawings.
- Depths of foundations below first floor.
- Locations and depths of underground utilities.
- Revisions to routing of piping and conduits.
- Revisions to electrical circuitry.
- Actual equipment locations.
- Duct size and routing.
- Locations of concealed internal utilities.
- \Changes made by Change Order.
- Details not on original Plans.

ADD the following:

h) Slurry Seal and Asphalt Overlay Red-Lines: The Contractor shall clearly record on the City provided forms in MS Excel format the actual dates and quantity of each Bid item applied to each street segment and comments regarding each segment. The Contractor shall record reasons if no work is performed.
2-6 WORK TO BE DONE. ADD the following:

In accordance with the provisions of California Law, the Contractor shall possess or require the Subcontractor(s) to possess valid appropriate license(s) for the Work being performed.

2-7 SUBSURFACE DATA. ADD the following:

In preparation of the Contract Documents, the designer has relied upon the following reports of explorations and tests of subsurface conditions at the Work Site:

1. Report of Geotechnical Design Services North Crown Point Comfort Station Replacement, dated October 8, 2010 by Ninyo & Moore G&E Sciences Consultants.

The report(s) listed above is(are) available for review by contacting the City Project Manager or visiting:

ftp://ftp.sannet.gov/OUT/ECP/2-7%20SUBSURFACE%20DATA/

2-9.1 Permanent Survey Markers. DELETE in its entirety and SUBSTITUTE with the following:

The Contractor shall notify the Engineer or the owner on a Private Contract, at least 7 days before starting the Work to allow for the preservation of survey markers, survey monuments, lot stakes (tagged), and benchmarks. The Engineer or the owner on a Private Contract, will, at its cost, file a Corner Record Form referencing survey monuments subject to disturbance in the Office of the County Surveyor prior to the start of construction and also prior to the completion of construction for the replacement of survey monuments. The Contractor shall not disturb or permanently cover survey markers, survey monuments, lot stakes (tagged), or benchmarks without the consent of the Engineer or the owner on a Private Contract. The Contractor shall bear the expense of uncovering and replacing any that may be disturbed without permission. Replacement shall be done only under the direction of the Engineer by a Registered Land Surveyor or a Registered Civil Engineer authorized to practice land surveying within the State of California. When a change is made in the finished elevation of the pavement of any roadway in which a permanent survey monument is located, the Contractor shall adjust the monument cover to the new grade within 7 days of finished paving unless otherwise specified in the Special Provisions.

2-9.2 Survey Services. DELETE in its entirety and SUBSTITUTE with the following:

The Contractor shall be responsible for all surveying services or as may be specified in these Special Provisions.

The payment for survey services shall be included in the various Bid items unless a Bid item for Survey Services has been provided.

2-10 AUTHORITY OF BOARD AND ENGINEER. ADD the following:

Regulating agencies of the City, such as Developmental Services, Fire and Planning Departments, enforce Legal Requirements and standards. These enforcement activities are not subject to the responsibilities of the Engineer under this Agreement.

2-11 INSPECTION. ADD the following:

The City may utilize field inspectors to assist the Engineer during construction in observing performance of the Contractor. The inspector is for the purpose of assisting the Engineer and shall not be confused with an inspector with a City regulatory agency or with a Special Inspector.

Code compliance testing (including all Geotechnical requirements) and inspections required by codes or ordinances, or by a plan approval authority, shall be the responsibility of and shall be paid by the Contractor, unless otherwise provided in the Contract Documents.

The Contractor's quality control testing and inspections shall be the sole responsibility of the Contractor and paid by the Contractor included in the Bid price.

ADD: 2-17 CONTRACTOR REGISTRATION. The Contractor, Subcontractors, and Suppliers shall register with the City's EOCP via Prism® i.e., the City's web-based contract compliance portal at: <u>https://pro.prismcompliance.com/contractor/plugins/pages/contractormenu.aspx</u>.

The Contractor shall ensure that proposed Subcontractors and Suppliers have completed the registration prior to Notice of Intent to Award. If the Contractor fails to have its Subcontractors and Suppliers registered after the NTP has been issued, the City will withhold a minimum of 10% in addition to the Retention from all invoices submitted until the Contractor and all listed Subcontractors and Suppliers are properly registered in PRISM.

SECTION 3 – CHANGES IN WORK

3-3.2.2 Basis for Establishing Costs. To the City Supplement, (a) Labor, 1st and 2nd paragraphs, DELETE in their entirety and SUBSTITUTE with the following:

The City reserves the right to request financial records of salaries for an employee, wages, bonuses and deductions to substantiate the actual cost of labor certified by a California licensed Certified Public Accountant. The Contractor shall use the City provided form i.e., "PUBLIC WORKS PAYROLL REPORTING FORM" which is available at http://www.sandiego.gov/eoc/pdf/payrollreport.pdf to list the labor rates of its personnel and Subcontractors who work on this Project. An initial submittal shall be made prior to NTP.

The payment for payroll records shall be included in the various Bid item unless a separate Bid item has been provided.

SECTION 4 - CONTROL OF MATERIALS

4-1.3.1 General. First paragraph, ADD the following:

Other standard items or materials typically accepted by Certificate of Compliance shall not require inspection at the source unless specified in the Special Provisions. For a list of these items or materials, the Contractor may refer to the Contract Documents.

4-1.3.4 Inspection Paid For By the Contractor. To the City Supplement, ADD the following:

The Contractor shall employ and pay for the services of qualified inspection entity to perform specialty inspection services as specified here:

Concrete, Reinforcing Steel, and Reinforced Masonry inspectors

4-1.3.5 Special Inspections. To the City Supplement, ADD the following:

Special Inspection and testing by the Special Inspectors shall meet the minimum requirements of the prevailing Codes and by the City's Development Services Department (DSD) and reference in http://www.sandiego.gov/development-services/industry/special.shtml

4-1.5 Certificates of Compliance. To the City Supplement, DELETE in its entirety and SUBSTITUTE with the following:

4-1.5 Certificates of Compliance. DELETE in its entirety and SUBSTITUTE with the following:

Certificates of Compliance shall be furnished to the Engineer prior to the use of any material or assembled material for which these Specifications so require or if so required by the Engineer.

The Engineer may waive the materials testing requirements of the Specifications and accept a Certificate of Compliance. Manufacturing test data may be required by the Engineer to be included with the submittal.

Materials used on the basis of a Certificate of Compliance may be sampled and tested at any time. The submission of a Certificate of Compliance shall not relieve the Contractor of responsibility for incorporating material in the Work which conforms to the requirements of the Contract Documents, and any material not conforming to the requirements will be subject to rejection whether in place or not.

When professional certification of performance criteria of materials, systems or equipment is required by the Contract Documents, the City shall be entitled to rely upon the accuracy and completeness of such calculations and certifications.

4-1.6 Trade Names or Equals. To the City Supplement, DELETE in its entirety and SUBSTITUTE with the following:

Whenever materials or equipment are indicated in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the naming of the item is intended to establish the type, function, and quality required. Unless stated otherwise, materials or equipment of other Suppliers may be accepted if sufficient information is submitted to the Engineer for review to determine whether the material or equipment proposed is equivalent or equal to that named.

- a) The Contractor shall submit its list of proposed substitutions for "an equal" ("or equal") item(s) **no later than 5 Working Days after the determination of the Apparent Low Bidder** and on a City form when provided by the City.
- b) The request for substitution shall include the following information:
 - i. Whether or not acceptance of the substitute for use in the Work will require a change in any of the Contract Documents to adopt the design to the proposed substitute.
 - ii. Whether or not incorporation or use of the substitute in connection with the Work is subject to payment of any license fee or royalty.
 - iii. All variations of the proposed substitute from the items originally specified will be identified.

- iv. Available maintenance, repair, and replacement service requirements. The manufacturer shall have a local service agency within 50 miles of the site which maintains properly trained personnel and adequate spare parts and is able to respond and complete repairs within 24 hours.
- v. Certification that the proposed substitute will perform adequately the functions and achieve the results called for by the general design, and be similar and of equal substance to that indicated, and be suited to the same use as that specified.
- c) There is no guaranteed time frame for the City's review of the substitution requests.
- d) The burden of proof as to the type, function, and quality of any such substitute product, material or equipment shall be upon the Contractor. The Engineer may require at the Contractor's expense additional data about the proposed substitute.
- e) If the Engineer takes no exceptions to the proposed substitution, it shall not relieve the Contractor from responsibility for the efficiency, sufficiency, quality, and performance of the substitute material or equipment, in the same manner and degree as the material and equipment specified by name.
- f) The lack of action(s) on the Engineer's side within the Contractor's requested time shall not constitute acceptance of the substitution.
- g) Acceptance by the Engineer of a substitute item shall not relieve the Contractor of the responsibility for full compliance with the Contract Documents.
- h) For the substitution review process or to have materials listed on the AML, refer to the AML standard review process.
- i) The Bid submittal shall be based on the material and equipment specified by name in the Contract. If the proposal is rejected by the Engineer, the Contractor shall not be entitled to either an extension in Contract Time, increase in the Contract Price, or both.
- j) As applicable, no Shop Drawing or Working Drawing submittals shall be made for a substitute item nor shall any substitute item be ordered, installed, or utilized without the Engineer's prior written.
- k) The Contractor shall reimburse the City for the charges of the Engineer for evaluating each proposed substitute.
- 1) For Design-Build contracts, one copy of all designer reviewed submittals shall be provided to the Engineer.

SECTION 6 - PROSECUTION, PROGRESS AND ACCEPTANCE OF WORK

6-1.2 Commencement of Work. To the GREENBOOK and the City Supplement, DELETE in its entirety and SUBSTITUTE with the following:

Unless specified otherwise, construction shall start within 5 Working Days after NTP and be diligently prosecuted to completion within the Contract Time. The Contractor shall not start any construction activity at the Site until the Pre-construction Meeting is held and the NTP has been issued by the Engineer.

Upon the Contractor's written request, the City may delay the NTP as follows:

- a) approval for and filing of the PRDs in accordance with 801, "STORM Up to 5 Working Days from the Pre-construction Meeting, or
- b) Up to 40 Working Days from the Limited NTP for the preparation, submittal, obtaining WATER POLLUTION CONTROL," or
- c) Up to 60 Working Days from the Limited NTP for the preparation, submittal, and approval of the TCP on "D-sheets" when specified in 7-10.2, "Traffic Control."

The Contractor shall notify SDG&E at least 10 Working Days prior to excavating within 10' of SDG&E Underground High Voltage Transmission Power Lines (i.e., 69 KV and higher).

For areas that do not require engineered TCP on D-sheets, the Contractor may at any time after the Pre-construction Meeting obtain a TCP Permit via Working Drawings or the City's over the counter process and start the Work. If the Contractor decides to commence the construction work before the completion of the D-sheet TCPs, the Contractor shall forfeit the 60 Working Days specified here. The D-sheet TCP shall be done concurrently and no additional time will be granted.

For paving Work, the Contractor shall coordinate the Work to facilitate the installation and protection of the new curb ramps and associated concrete work prior to commencing the asphalt overlay operations. The Work at a specific location shall not commence until all layouts and measurements are agreed upon by both the Contractor and the Engineer.

ADD: 6-1.8 Pre-construction Meeting. Within 20 Working Days from the Limited NTP the Engineer will schedule a mandatory pre-construction meeting (Pre-construction Meeting) with the Contractor. The agenda will include items such as NTP, design services and submittal and review process for Design-Build contracts, critical elements of the work schedule, submittal schedule, cost breakdown of major lump sum items, payment requests and processing, environmental and community concerns, coordination with the involved utility firms, the level of record project documents required and emergency telephone numbers for all representatives involved in the course of construction.

6-2.1 Moratoriums. To the City Supplement, ADD the following:

No Work shall be allowed in the areas where there is currently a moratorium issued by the City. The areas subject to moratorium are listed here:

a) Project Site from Memorial Day to Labor Day (inclusive).

ADD: 6-8.1 Completion. To the City Supplement, DELETE in its entirety and SUBSTITUTE with the following:

6-8.1 Completion. The Contractor shall submit a written assertion that the Work has been completed. If, in the Engineer's judgment, the Work has been completed in accordance with the Contract Documents, the Engineer will set forth in writing the date the Work was completed. This will be the date when the Contractor is relieved from responsibility to protect and maintain the Work.

6-8.2 Acceptance. To the City Supplement, DELETE in its entirety and SUBSTITUTE with the following:

6-8.2 Acceptance. Acceptance will occur after all of the requirements contained in the Contract Documents have been fulfilled. If, in the Engineer's judgment, the Contractor has fully performed the Contract, the Engineer will accept the Contractor's performance of the Contract.

6-8.3 Warranty. To the City Supplement, DELETE in its entirety and SUBSTITUTE with the following:

6-8.3 Warranty. Unless specified otherwise, the Work shall be warranted by the Contractor against defective workmanship and materials for a period of 1 year.

- a) The warranty period shall start on the date of completion of the Work as determined by the Engineer.
- b) The Contractor shall provide an unconditional warranty on all installed fiber optic cable for a minimum period of 2 years.
- c) The warranty period for the following items of the Work shall be 3 years:
 - 1. Work under Section 500 (requires Long Term Warranty Contract (LTWC))
 - 2. DWT Construction (requires manufacturer's warranty)
 - 3. LED signal modules (requires manufacturer's warranty)
 - 4. Private sewer pumps including the alarm panel and all other accessories. The Contractor shall provide the City and property owner a copy of the warranty. (requires manufacturer's warranty)

The Contractor shall involve the manufacturer in the installation and startup as needed to secure any extended warranty required.

- d) The warranty period for specific items covered under manufacturers' or suppliers' warranties shall commence on the date they are placed into service at the direction of or as approved by the Engineer in writing.
- e) All warranties, express or implied, from Subcontractors or Suppliers, of any tier, for the work performed and materials furnished shall be assigned, in writing, to the City, and such warranties shall be delivered to the Engineer prior to acceptance of the Contractor's performance of the Contract.
- f) The Contractor shall replace or repair defective Work in a manner satisfactory to the Engineer, after notice to do so from the Engineer, and within the time specified in the notice. If the Contractor fails to make such replacement or repairs within the time specified in the notice, the City may perform the replacement or repairs at the Contractor's expense. If the Contractor fails to reimburse the City for the actual costs, the Contractor's Surety shall be liable for the cost thereof.

- g) Nothing in this warranty is intended to limit any manufacturer's warranty which provides the City with greater warranty rights than set forth in this section or the Contract Documents.
- h) These specifications are not intended to constitute a period of limitations or waiver of any other rights or remedies City may have regarding the Contractor's other obligations under the Contract Documents or federal or state law.
- i) The Contractor shall respond and initiate corrective action within 24 hours of notice of nonconforming Work that poses an imminent threat to person or property.

6-9 LIQUIDATED DAMAGES. To the City Supplement, DELETE in its entirety and SUBSTITUTE with the following:

MODIFY to increase the daily value from \$250 to \$1,000 for contracts with a value of over \$100,000.

SECTION 7 - RESPONSIBILITIES OF THE CONTRACTOR

7-3 LIABILITY INSURANCE. DELETE in its entirety and SUBSTITUTE with the following:

The insurance provisions herein must not be construed to limit your indemnity obligations contained in this contract.

ADD: 7-3.1 Policies and Procedures.

- a) You must procure the insurance described below, at your sole cost and expense, to provide coverage against claims for loss including injuries to persons or damage to property, which may arise out of or in connection with the performance of the Work by you, your agents, representatives, officers, employees or subcontractors.
- b) Insurance coverage for property damage resulting from your operations is on a replacement cost valuation. The market value will not be accepted.
- c) You must maintain this insurance for the duration of this contract and at all times thereafter when you are correcting, removing, or replacing Work in accordance with this contract. Your liabilities under this contract, e.g., your indemnity obligations, will is not deemed limited to the insurance coverage required by this contract.
- d) Payment for insurance is included in the various items of Work as bid by you, and except as specifically agreed to by the City in writing, you are not entitled to any additional payment. Do not begin any work under this contract until you have provided and the City has approved all required insurance.
- e) Policies of insurance must provide that the City is entitled to 30 days (10 days for cancellation due to non-payment of premium) prior written notice of cancellation or non-renewal of the policy. Maintenance of specified insurance coverage is a material element of this contract. Your failure to maintain or renew coverage or to provide evidence of renewal during the term of this contract may be treated by the City as a material breach of contract.

ADD: 7-3.2 Types of Insurance.

7-3.2.1 Commercial General Liability Insurance.

- a) Commercial General Liability Insurance must be written on the current version of the ISO Occurrence form CG 00 01 07 98 or an equivalent form providing coverage at least as broad.
- b) The policy must cover liability arising from premises and operations, XCU (explosions, underground, and collapse), independent contractors, products/completed operations, personal injury and advertising injury, bodily injury, property damage, and liability assumed under an insured's contract (including the tort liability of another assumed in a business contract).
- c) There must be no endorsement or modification limiting the scope of coverage for either "insured vs. insured" claims or contractual liability. You must maintain the same or equivalent insurance for at least 10 years following completion of the Work.
- d) All costs of defense must be outside the policy limits. Policy coverage must be in liability limits of not less than the following:

Limits of Liability
\$2,000,000
\$2,000,000
\$1,000,000
\$1,000,000

7-3.2.2 Commercial Automobile Liability Insurance.

- a) You must provide a policy or policies of Commercial Automobile Liability Insurance written on the current version of the ISO form CA 00 01 12 90 or later version or equivalent form providing coverage at least as broad in the amount of \$1,000,000 combined single limit per accident, covering bodily injury and property damage for owned, non-owned, and hired automobiles ("Any Auto").
- b) All costs of defense must be outside the limits of the policy.

ADD: 7-3.3 Rating Requirements. Except for the State Compensation Insurance Fund, all insurance required by this contract as described herein must be carried only by responsible insurance companies with a rating of, or equivalent to, at least "A-, VI" by A.M. Best Company, that are authorized by the California Insurance Commissioner to do business in the State, and that have been approved by the City.

7-3.3.1 Non-Admitted Carriers. The City will accept insurance provided by non-admitted, "surplus lines" carriers only if the carrier is authorized to do business in the State and is included on the List of Eligible Surplus Lines Insurers (LESLI list).

All policies of insurance carried by non-admitted carriers must be subject to all of the requirements for policies of insurance provided by admitted carriers described herein.

ADD: 7-3.4 Evidence of Insurance. Furnish to the City documents e.g., certificates of insurance and endorsements evidencing the insurance required herein, and furnish renewal documentation prior to expiration of this insurance. Each required document must be signed by the insurer or a person authorized by the insurer to bind coverage on its behalf. We reserve the right to require complete, certified copies of all insurance policies required herein.

ADD: 7-3.5 Policy Endorsements.

7-3.5.1 Commercial General Liability Insurance.

7-3.5.1.1 Additional Insured.

- a) You must provide at your expense policy endorsement written on the current version of the ISO Occurrence form CG 20 10 11 85 or an equivalent form providing coverage at least as broad.
- b) To the fullest extent allowed by law e.g., California Insurance Code §11580.04, the policy must be endorsed to include the City and its respective elected officials, officers, employees, agents, and representatives as additional insured.
 - The additional insured coverage for projects for which the Engineer's Estimate is \$1,000,000 or more must include liability arising out of: (a) Ongoing operations performed by you or on your behalf, (b) Your products, (c) Your work, e.g., your completed operations performed by you or on your behalf, or (d) premises owned, leased, controlled, or used by you.
 - 2. The additional insured coverage for projects for which the Engineer's Estimate is less than \$1,000,000 must include liability arising out of: (a) Ongoing operations performed by you or on your behalf, (b) Your products, or (c) premises owned, leased, controlled, or used by you.

7-3.5.1.2 Primary and Non-Contributory Coverage. The policy must be endorsed to provide that the coverage with respect to operations, including the completed operations, if appropriate, of the Named Insured is primary to any insurance or self-insurance of the City and its elected officials, officers, employees, agents and representatives. Further, it must provide that any insurance maintained by the City and its elected officials, officers, employees, agents and representatives must be in excess of the Contractor's insurance and must not contribute to it.

7-3.5.1.3 Project General Aggregate Limit. The policy or policies must be endorsed to provide a Designated Construction Project General Aggregate Limit that will apply only to the Work. Only claims payments which arise from the Work must reduce the Designated Construction Project General Aggregate Limit. The Designated Construction Project General Aggregate Limit must be in addition to the aggregate limit provided for the products-completed operations hazard.

7-3.5.2 Commercial Automobile Liability Insurance.

7-3.5.2.1 Additional Insured. Unless the policy or policies of Commercial Auto Liability Insurance are written on an ISO form CA 00 01 12 90 or a later version of this form or equivalent form providing coverage at least as broad, the policy must be endorsed to include the City and its respective elected officials, officers, employees, agents, and representatives as additional insured, with respect to liability arising out of automobiles owned, leased, hired or borrowed by you or on your behalf. This endorsement is limited to the obligations permitted by California Insurance Code §11580.04.

ADD: 7-3.6 Deductibles and Self-Insured Retentions. You are responsible for the payment of all deductibles and self-insured retentions. Disclose deductibles and self-insured retentions to the City at the time the evidence of insurance is provided.

ADD: 7-3.7 Reservation of Rights. We reserve the right, from time to time, to review your insurance coverage, limits, deductibles and self-insured retentions to determine if they are acceptable to the City. We will reimburse you, without overhead, profit, or any other markup, for the cost of additional premium for any coverage requested by the Engineer but not required by this contract.

ADD: 7-3.8 Notice of Changes to Insurance. You must notify the City 30 days prior to any material change to the policies of insurance provided under this contract.

ADD: 7-3.9 Excess Insurance. Policies providing excess coverage must follow the form of the primary policy or policies e.g., all endorsements.

7-4 WORKERS' COMPENSATION INSURANCE. DELETE in its entirety and SUBSTITUTE with the following:

7-4.1 Workers' Compensation Insurance and Employers Liability Insurance.

- a) In accordance with the provisions of §3700 of the California Labor Code, you must provide at its expense Workers' Compensation Insurance and Employers Liability Insurance to protect you against all claims under applicable state workers compensation laws. The City, its elected officials, and employees will not be responsible for any claims in law or equity occasioned by your failure to comply with the requirements of this section.
- b) Limits for this insurance must be not less than the following:

Workers' Compensation	Statutory Employers Liability
Bodily Injury by Accident	\$1,000,000 each accident
Bodily Injury by Disease	\$1,000,000 each employee
Bodily Injury by Disease	\$1,000,000 policy limit

c) By signing and returning this contract you certify that you are aware of the provisions of §3700 of the Labor Code which require every employer to be insured against liability for worker's compensation or to undertake self-insurance in accordance with the provisions of that code and you will comply with such provisions before commencing the Work as required by § 1861 of the California Labor Code.

7-4.1.1 Waiver of Subrogation. The policy or policies must be endorsed to provide that the insurer will waive all rights of subrogation against the City, and its respective elected officials, officers, employees, agents, and representatives for losses paid under the terms of the policy or policies and which arise from work performed by the Named Insured for the City.

7-8.6 Water Pollution Control. ADD the following:

- a) The Project is subject to the Storm Water Pollution control requirements listed on the Plans or as specified in these specifications.
- b) For contracts subject to Construction General Permit (CGP), the Contractor's QSD shall verify the City's assessment prior to submittal through SMARTS.
- c) The Contractor's attention is directed to Section 801, "WATER POLLUTION CONTROL" and Contract Appendix "E" of these specifications for more information.

7-9 PROTECTION AND RESTORATION OF EXISTING IMPROVEMENTS. ADD the following:

In any emergency affecting the safety of persons or property, the Contractor shall act, at its discretion, to prevent threatened damage, injury or loss. Any change in Contract Price or Contract Time resulting from emergency work shall be determined as provided in SECTION 3, "CHANGES IN WORK."

7-10.1 Traffic and Access. To the City Supplement, 10th paragraph and agency list, DELETE in its entirety and SUBSTITUTE with the following:

The Contractor shall notify Metropolitan Transit System (MTS), a minimum of 5 Working Days prior to excavation, construction, or traffic control affecting bus stops. The Contractor shall notify the remaining agencies a minimum of two 2 Working Days prior to construction activities affecting the agencies:

Fire Department Dispatch	(Street or alley closure)	(858) 573-1300
Police Department Traffic	(Street or alley closure)	(858) 495-7800
Street Division/Electrical	(Traffic signals)	(619) 527-7500
U.S. Navy	(32nd Street Naval Station)	(619) 556-1319
Underground Service Alert	(Any excavation)	(800) 422-4133
MTS	(Street Closure and Bus Stops)	(619) 238-0100 Ext 6451

7-10.6 Traffic Plate Bridging. To the City Supplement, DELETE in its entirety and SUBSTITUTE with the following:

Transverse or longitudinal cuts, voids, trenches, holes, and excavations in the right-of-way that cannot be properly completed within 1 Working Day shall be protected by adequately designed barricades and structural steel plates [plates] that will support legal vehicle loads in such a way as to preserve unobstructed traffic flow.

The Contractor shall secure approval, in advance, from authorities concerning the use of any bridging proposed on the Work.

Plates shall conform to the following:

- a) The trench shall be adequately shored to support the bridging and traffic loads.
- b) Plates shall be designed for HS 20-44 truck loading in accordance with Caltrans Bridge Design Specifications Manual.

c) For the minimum thickness of plates refer to Table 7-10.6(A):

Trench Width	Minimum Plate Thickness
10" (0.25 m)	1/2" (13 mm)
1'-11" (0.58 m)	3/4" (19 mm)
2'-7" (0.80 m)	7/8" (22 mm)
3'-5" (1.04 m)	1" (25 mm)
5'-3" (1.6 m)	1 1/4" (32 mm)

Table 7-10.6(A) - Trench Width / Minimum Plate Thickness

For spans greater than 5'-3" (1.6 m), a structural design shall be prepared by a California Registered Civil Engineer and approved by the Engineer.

- d) Plates shall have a skid-resistant surface with a nominal Coefficient Of Friction (COF) of 0.35 as determined by California Test Method 342.
- e) Plates shall extend a minimum of 12" (300 mm) beyond the edges of the trench.
- f) Plates shall provide complete coverage to prevent any person, bicycle, motorcycle or motor vehicle from being endangered due to plate movement causing separations or gaps.
- g) Plates shall be secured against movement or displacement by using adjustable cleats, shims, welding, or other devices, and shall be installed in a manner that will minimize noise as traffic drives over them. Plates shall be installed using either Method (1) or (2):
 - i. Method 1 [For speeds greater than 45 mph (70 Km/hr)]: The pavement shall be cold planed to a depth equal to the thickness of the plate and to a width and length equal to the dimensions of the plate.
 - Method 2 [For Speeds less than 45 mph (70 Km/hr)]: Approach plate(s) and ending plate (if longitudinal placement) shall be attached to the roadway by a minimum of 2 dowels pre-drilled into the corners of the plate and drilled 2" (50 mm) into the pavement. Subsequent plates are butted to each other. Fine graded asphalt concrete shall be compacted to form ramps, maximum slope 8.5 % with a minimum 12" (305 mm) taper to cover all edges of the plates.

Alternative installation method may be submitted in accordance with 2-5.3, "Submittals" for the Engineer's approval.

h) The Contractor shall be responsible for maintenance of the plates, shoring, and asphalt concrete ramps or any other approved device used to secure the plates. The Contractor shall immediately mobilize necessary personnel and equipment after being notified by the Engineer, the City's station 38, or a member of the public of a repair needed e.g., plate movement, noise, anchors, and asphalt ramps. Failure to respond to the emergency request within 2 hours will be grounds for the City to perform necessary repairs that will be invoiced at actual cost including overhead or \$500 per incident, whichever is greater. Failure by the Contractor to comply may result in automatic grounds suspension of permit, Contract, or both.

i) When plates are removed, any damage to the pavement shall be repaired with fine graded asphalt concrete mix or slurry seal satisfactory to the Engineer.

Payment for traffic plate bridging shall be included in the various Bid items unless a Bid Item has been provided for steel plate bridging.

ADD: 7-15 INDEMNIFICATION AND HOLD HARMLESS AGREEMENT. The Contractor shall defend, indemnify, protect, and hold harmless the City, its agents, officers, and employees, from and against all claims asserted, or liability established for damages or injuries to any person or property resulting from the Contractor's action or failure to take the necessary measures to prevent such damages and injuries.

The Contractor shall be responsible for payment of any fines resulting from citations issued to the City by either the federal, state, or local environmental and safety enforcement agencies due to the Contractor's failure to abide by applicable safety, health, and environmental standards.

PART 2 - CONSTRUCTION MATERIALS

SECTION 207 – PIPE

ADD: 207-17.2.3 Pipe Manufacturer. Pipe, fittings, couplings, and joints as manufactured or distributed by J-M Manufacturing Company shall not be used on this contract.

SECTION 216 – DETECTABLE WARNING TILES

216-1.2 Materials. To the City Supplement, DELETE in its entirety and SUBSTITUTE with the following:

Materials for DWT specified herein shall be per the City's Approved Materials List (AML). The tiles shall have the manufacturer's logo stamped permanently on the product with identifying information such as model number and type.

- a) The Stainless Steel Cast in Place DWT shall be of 16 gauge Type 304L with an integral micro-texture non-slip surface stamped into the stainless steel plate on the top of the domes and in the field surface between the domes. It shall have an ultra violet stabilized coating.
- b) Vitrified Polymer Composite (VPC) Cast in Place DWT shall be an epoxy polymer composition with an ultra violet stabilized coating employing aluminum oxide particles in the truncated domes. VPC Product shall be provided with a 5-year manufacturer written warranty form materials and installation.
- c) For others materials and a complete listing of material physical property requirements refer to the City's AML.

PART 3 – CONSTRUCTION METHODS

SECTION 302 – ROADWAY SURFACING

ADD: 302-5.2 Pavement Restoration Adjacent to Trench. Pavement restoration adjacent to trench shall include the replacement of existing pavement adjacent to the proposed trench and outside the trench limits, that was previously broken or displaced.

Prior to the commencement of the Work, the Contractor shall meet with the Engineer and determine the limits of the pavement to be replaced. If the Contractor does not meet with the Engineer before removing the pavement, all replacement outside the limits of the proposed trench resurfacing shall be at the Contractor's expense.

Existing pavement shall be removed in accordance with Section 300-1.3.2. Prior to pavement restoration, existing subgrade shall be prepared in accordance with 301-1, "SUBGRADE PREPARATION." If any existing unsuitable subgrade as determined by the Engineer is encountered, it shall be replaced with imported backfill in accordance with 306-1.3.7, "Imported Backfill" prior to preparation.

302-5.2.1 Measurement and Payment. Payment for pavement restoration adjacent to trench will be made on a square foot basis as shown in the Bid in accordance with 302-6.8, "Measurement and Payment" for concrete streets or 302-5.9 "Measurement and Payment." Unless Bid includes separate Bid item(s), the following shall be included in the payment for pavement restoration adjacent to trench:

- a) saw-cutting existing edges,
- b) removal and disposal of existing pavement,
- c) subgrade preparation including imported backfill material,
- d) form work,
- e) placement, curing, and protection of new pavement, and
- f) place full depth AC per CSDSD SDG-107-Type "A".

302-6.8 Measurement and Payment. To the City Supplement, DELETE in its entirety.

302-13.4 Application. To the City Supplement, 2^{nd} paragraph, DELETE in its entirety and SUBSTITUTE with the following:

Sealant shall be applied from the bottom of the crack up to the surface in a manner which does not result in sealant bridging or pockets of entrapped air. The sealant shall be applied to a slightly overfilled condition and then leveled with a squeegee. The width of sealant remaining on the surface shall not exceed 1.5" on either side of the crack. Any debris blown onto adjacent gutters, sidewalks, parkways, medians, intersections or other areas shall be removed prior to the end of the Working Day.

ADD: PART 8 – ENVIRONMENTAL WORKS

SECTION 801 – WATER POLLUTION CONTROL

801-2.9 Post-Construction Requirements. To the City Supplement, 2nd paragraph, ADD the following:

The decal-disc inlet markers shall be "das Duracast Curb Marker®" or approved equal.

ADD the following:

The Contractor shall comply with the following post-construction requirements:

801-9.3 BMP Requirements. To the City Supplement, ADD the following:

d) WTAP shall be required when the Project exceeds the Maximum Disturbed Area Requirements unless the grading Work is performed in phases that do not exceed the limit shown on the Plans per phase.

SECTION 803 – ENCOUNTERING OR RELEASING HAZARDOUS SUBSTANCES

803-16 PAYMENT. To the City Supplement, DELETE in its entirety and SUBSTITUTE with the following:

Payment for waste management shall be included in the applicable Bid items as follows:

- a) Preparation of Hazardous Waste Management Plan and Reporting (LS)
- b) Monitoring, Testing, Sampling, Site Storage, and Handling of Soils Containing RCRA Hazardous Waste (TONS)
- c) Loading, Transportation, and Disposal of soils containing RCRA Hazardous Waste (TONS)
- d) Monitoring, Testing, Sampling, Site Storage and Handling of Petroleum Contaminated Soil (TONS)
- e) Loading, Transportation, and Disposal of Petroleum Contaminated Soil (TONS)
- f) Monitoring, Testing, Sampling Site Storage and Handling of Soils Containing Non-RCRA Hazardous Waste (TONS)
- g) Loading, Transportation, and Disposal of Soils Containing Non-RCRA Hazardous Waste (TONS)
- h) Testing, Sampling, Site Storage, Handling, Transportation, and Disposal of Containerized RCRA Hazardous Waste (55 Gal DRUMS)
- i) Testing, Sampling, Site Storage, Handling, Transportation, and Disposal of Containerized Non-RCRA Hazardous Waste (55 Gal DRUMS)
- j) Testing, Sampling, Site Storage, Handling, Transportation and Recycling/Disposal of Universal Waste (EACH)
- k) Testing, Sampling, Site Storage, Handling, Transportation and Recycling/Disposal of Regulated Waste (TONS)
- 1) Testing, Sampling, Site Storage, Handling, Transportation, and Disposal of RCRA Hazardous Waste Contaminated Ground Water (GAL)
- m) Testing, Sampling, Site Storage, Handling, Transportation, and Disposal of Non-RCRA Hazardous Waste Contaminated Ground Water (GAL)

Shorter testing time and availability of preliminary results may be required by the Engineer and paid as Extra Work.

SECTION 804 – SEWAGE SPILL PREVENTION

To the City Supplement, DELETE in its entirety and SUBSTITUTE with the following:

SECTION 804 – SEWAGE SPILL PREVENTION

804-1 GENERAL. The Contractor shall observe and comply with the City's policy of zero spills. The Contractor shall be liable for all damages and fines associated with sewage spills caused by improper support or damage to the existing sewer facilities.

The Contractor shall designate a person responsible for the development and enforcement of the Sewage Spill Response Plan, and for ensuring sewer spills are minimized to the maximum extent possible. The Contractor shall provide a status of all bypass related work at biweekly progress meetings as requested by the City.

804-2 SEWAGE SPILL PREVENTION AND RESPONSE PLAN. Prior to the start of construction, the Contractor shall develop and submit to the Engineer, for review and approval, a written Sewage Spill Prevention and Response Plan. The plan shall include sewage spill response plan, spill containment and cleanup plan, staging area, and sewage bypass and pumping plan.

The Sewage Spill Prevention and Response Plan shall be developed to respond to any construction related sewage spill(s). The plan shall include:

- a) Identifying all nearby environmentally-sensitive areas such as waterways, channels, catch basins and entrances to existing underground storm drains.
- b) Making arrangements for an emergency response unit, stationed at or near the Site, comprised of emergency response equipment and trained personnel to be immediately dispatched in the event of a sewage spill(s). This includes field biologists, archaeologists, or both if in an environmentally-sensitive area such as a canyon.
- c) Developing an emergency notification procedure that includes an emergency response team with telephone numbers and arrangements for backup personnel and equipment. The emergency response unit shall be able to dispatch to the Site 24 hours a day 7 days a week including weekends and holidays. The Contractor shall designate primary and secondary representatives, their respective phone numbers, pager numbers, and mobile phone numbers. These Contractor's representatives shall be accessible and available at all times to respond immediately to any sewer spill event.
- d) Identifying any property owners who may be affected e.g., the City Park and Recreation Department.

At the pre-construction meeting the Contractor will be provided with a list of the City representatives to contact in case of sewage spill(s). In case of a sewage spill(s), the Contractor shall immediately call the Sewage Spill Hotline number at (619) 527-5481 and shall act immediately without instructions from the City, to control the spill and take all appropriate steps to contain it in accordance with the Sewage Spill Prevention and Response Plan and 804-2.1, "Sewage Bypass and Pumping Plan." The Contractor shall immediately notify the City representatives of the spill and shall report Project name, location, Contractor name, Project Engineer, and Engineer names.

The Contractor shall, within 3 Working Days from the occurrence of the spill, submit to the Engineer a written report describing the following information related to the spill: the location; the nature and estimated volume; the date and time; the duration; the cause; the type of remedial and/or clean up measures taken (including erosion control measures) and the date and time of implementation; the corrective and/or preventive actions taken to avoid further spills; equipment used in spill response; and the environmentally-sensitive habitat such as a water body, if any, impacted and results of any necessary monitoring. The Contractor shall provide a list of who from the City was notified, date and time of notification, date and time the Contractor was notified of the spill, date and time the Contractor arrived on Site.

The Engineer may institute further corrective actions, as deemed necessary, to fully comply with existing laws, ordinances, codes, order or other pertinent regulations. In addition to any penalties provided by federal, state, and local laws, the Contractor shall be responsible for all costs incurred for the corrective actions including mitigation measures (habitat restoration, etc.) and obtaining after-the-fact permits if necessary, in environmentally sensitive areas. These permits include but are not limited to those from the City Planning Department Development Services, California Coastal Commission, U.S. Army Corps of Engineers and the California Department of Fish and Game.

It shall be the Contractor's responsibility to assure that all field forces, including Subcontractors, know and obey all safety and emergency procedures, including the Sewage Spill Prevention and Response Plan applicable to the work, to be maintained and followed at the Site. If in an environmentally sensitive area, such as canyon, stream, or lagoon, impacts shall be minimized. Crews shall be aware at the start of the job of any sensitive environmental habitats, breeding season restrictions, etc.

The Contractor shall prevent spills when working on sewer lines, such as when making temporary connection, when connecting new lines into the sewer system, ensuring no laterals are connected to mains being abandoned, ensuring diversions are appropriately installed, and diversions are completely removed when finished so there are no blockages. The Contractor shall not trap debris and discharge rock or debris downstream. Avoidance of streams is paramount unless authorized via permits.

The Contractor shall defend, indemnify, protect, and hold harmless the City, its agents, officers, and employees, from and against all claims asserted, or liability established for damages or injuries to any person or property resulting from any sewage spill caused or claimed to be caused by the Contractor's action or failure to take measures to prevent a spill. **The Contractor shall be responsible for payment of any fines assessed against the City for such sewage spills.** The Contractor's duty to indemnify and hold harmless shall not include any claims or liability arising from the established active or sole negligence or willful misconduct of the City, its agents, officers or employees.

The Contractor shall obtain and maintain an additional insurance coverage for Pollution Liability with its limits and requirements as set forth in 7-3.5.3, "Contractors Pollution Liability Insurance Endorsements." The limits and requirements for Pollution Liability shall be in an amount sufficient to cover potential losses from sudden and accidental pollution. Unless otherwise provided for in the Bid Proposal, all costs associated with the requirements for Sewage Spill Prevention and Response Plan, including additional insurance, shall be included in the prices for other related Bid items.

804-2.1 Sewage Bypass and Pumping Plan. The Contractor shall submit to the Engineer for approval, a Sewage Bypass and Pumping Plan at least 15 Working Days prior to implementation of flow diversion in compliance with the City's policy of "ZERO SPILLS." The Sewage Bypass and Pumping Plan shall indicate the sequence of diversion operations, all other operations the Contractor will establish to maintain wastewater service during the construction period, and a quality assurance and quality control plan for the diversion Work. The Sewage Bypass and Pumping Plan shall include an emergency response plan indicating the procedures, equipment, and activities that will be implemented in the event of an emergency shutdown or failure of the flow diversion equipment used for construction. The Contractor shall be responsible for implementation of the emergency plan in accordance with 804-2 "Sewage Spill Prevention and Response Plan".

The Contractor's Sewage Bypass and Pumping Plan shall be reviewed and approved by the Wastewater Collection Division of the City before flow can be diverted. No deviation from the approved Sewage Bypass and Pumping Plan will be allowed without prior approval from the Engineer.

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

The Contractor shall exercise care not to damage existing public and private improvements, interrupt existing services or facility operations which may cause a sewage spill(s). Any reasonably anticipated utility or improvement which is damaged by the Contractor shall be immediately repaired at the expense of the Contractor. In the event that the Contractor damages an existing utility or interrupts an existing service, which causes a sewage spill(s), the Contractor shall immediately call the emergency number at (619) 515-3525.

The Contractor shall exercise care not to damage any sensitive habitats or historic resources unless authorized via the discretionary permit and Mitigation, Monitoring and Reporting Program approved by the City.

The Contractor shall provide all facilities, labor, power, and appurtenances necessary to divert wastewater flows as necessary to allow proper installation of the pipeline and/or manhole linings.

The Contractor shall submit as part of their Sewage Bypass and Pumping Plan their monitoring procedure and frequency and shall continuously monitor the flow levels downstream and upstream of the flow diversion to detect any possible failure that may cause a sewage backup and spill(s). The Contractor shall maintain a log of the monitoring and provide daily copies to the Engineer in a manner acceptable to the Engineer.

The Contractor shall inspect and maintain the diversion system daily, including the back-up system. The Contractor shall submit with their Sewage Bypass and Pumping Plan their maintenance procedures and frequency. The Contractor shall maintain a log of all inspection, maintenance and repair records, and provide copies to the Engineer upon request in a manner acceptable to the Engineer.

The Contractor shall size the flow diversion system to handle the peak flow and shall include a 100% backup in the flow diversion system. The Contractor shall provide temporary means to maintain and handle the sewage flow in the existing system as required to complete the necessary construction. The Contractor shall utilize the flow diversion system to mitigate any additional wet weather flows, perform the necessary maintenance and repairs on the flow diversion system, and exercise and ensure the operation of the backup system. Each pump, including the backup pumps, shall be a complete unit with its own suction and discharge piping. The Contractor shall operate the backup flow diversion system for a minimum of 25% of the total diversion time on a weekly basis. The backup flow diversion system shall be fully installed, operational, and ready for immediate use. The diversion system shall be hydraulically tested with clean water prior to wastewater flow diversion. The Contractor shall demonstrate to the satisfaction of the Engineer that both the primary and backup flow diversion systems are fully functional and adequate, and shall certify the same, in writing, to the Engineer in a manner acceptable to the Engineer.

The Contractor shall provide one dedicated fuel tank for every single pump or generator, if fuel or generator driven pumps are used. The Contractor shall provide an emergency standby power generator, if electric power driven pumps are used. The Contractor shall provide a fuel level indicator outside each fuel tank. The Contractor shall continuously (while in use) monitor the fuel level in the tanks and ensure that the fuel level does not drop below a level equivalent of two hours of continuous flow diversion system operation. The Contractor shall take the necessary measures to ensure the fuel supply is protected against contamination. This includes but is not limited to fuel line water traps, fuel line filters, and protecting fuel stores from precipitation. The Contractor shall monitor all hoses and repair leaks immediately.

804-2.2 Payment. Unless a Bid item has been provided, full compensation for the Sewage Bypass and Pumping Plan, its implementation e.g., labor, facilities, equipments, power, appurtenances and incidental, shall be included in the payment for sewer main.

SECTION 805 – WATER DISCHARGES

805-2.7 Payment. To the City Supplement, DELETE in its entirety and SUBSTITUTE with the following:

Payment for dewatering will be made as follows:

- a) The Allowance Bid item for Permit and Discharge Fees shall cover the payment for fees and the associated expenses e.g., water samples and lab testing for obtaining permits.
- b) The payment for dewatering contaminated water containing hazardous substances and to bring the discharged water to the level that is in compliance with the permitting agencies' requirements and water quality standards will be included in the Allowance Bid item for "Dewatering Hazardous Contaminated Water."
- c) The payment for dewatering contaminated water containing non-hazardous substances will be included in the Lump Sum Bid item for "Dewatering Non-Hazardous Contaminated Water."
- d) For the payment for handling and disposal of the hazardous contamination, see 803-16, "Payment."
- e) The payment for preparing health and safety plan shall be included in the various Bid items unless a Bid Item has been provided.

SECTION 807 – RESOURCE DISCOVERIES

ADD: 807-1.1 Environmental Document. The City of San Diego Environmental Analysis Section (EAS) of the Development Services Department has prepared a CEQA Notice of Exemption for North Crown Point Comfort Station, WBS#B-10088, as referenced in the Contract Appendix. The Contractor shall comply with all requirements of the Notice of Exemption as set forth in Contract Appendix.

Unless a separate Bid item has been provided for compliance with the City's prepared environmental document e.g., MMRP, payment shall be included in the various Bid items.

END OF SUPPLEMENTARY SPECIAL PROVISIONS (SSP)

APPENDIX A

TECHNICAL SPECIFICATIONS NORTH CROWN POINT COMFORT STATION

NORTH CROWN POINT COMFORT STATION TECHNICAL SPECIFICATIONS

DIVISION 01 – GENERAL REQUIREMENTS

011000 SUMMARY 017300 EXECUTION

DIVISION 02 – SITE CONDITIONS

024116 STRUCTURE DEMOLITION

DIVISION 03 – CONCRETE

033000 CAST IN PLACE CONCRETE

DIVISION 04 – MASONRY

042200 CONCRETE UNIT MASONRY

DIVISION 05 – METALS

057000 ORNAMENTAL METAL

DIVISION 06 – WOOD, PLASTIC AND COMPOSITES

061000 ROUGH CARPENTRY 061600 SHEATHING

DIVISION 07 – THERMAL AND MOISTURE PROTECTION

074113 STANDING SEAM METAL ROOF PANELS

074600 SIDING

079200 JOINT SEALANTS

DIVISION 08 – OPENINGS

081123 HOLLOW METAL FRAMES

- 081743 FIBERGLASS REINFORCED PLASTIC FLUSH DOORS
- 083113 ACCESS DOORS AND FRAMES
- 087100 FINISH HARDWARE
- 089119 FIXED LOUVERS

DIVISION 09 – FINISHES

099600 HIGH PERFORMANCE COATINGS

DIVISION 10 – SPECIALTIES

101423 PANEL SIGNAGE102800 TOILET ACCESSORIES

DIVISION 22 – PLUMBING

- 220500 BASIC PLUMBING REQUIREMENTS
- 220523 GENERAL DUTY VALVES
- 220529 HANGERS AND SUPPORTS
- 221000 PLUMBING PIPING
- 221113 FACILITY WATER DISTRIBUTION PIPING
- 221313 FACILITY SANITARY SEWERS
- 224000 PLUMBING FIXTURES
- 225000 PLUMBING SPECIALTIES

DIVISION 26 – ELECTRICAL

260000 GENERAL ELECTRICAL REQUIREMENTS

DIVISION 31 – EARTHWORK

311000 SITE CLEARING

312000 EARTH MOVING

DIVISION 32 – EXTERIOR IMPROVEMENTS

- 321313 CONCRETE PAVING
- 321373 CONCRETE PAVING JOINT SEALERS
- 322350 TREE TRIMMING, REMOVAL AND PROTECTION
- 328100 IRRIGATION SYSTEMS
- 329000 LANDSCAPING

DIVISION 33 – UTILITIES

334100 STORM UTILITY DRAINAGE PIPING

END TABLE OF CONTENTS

SECTION 011000 - SUMMARY

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Project information.
 - 2. Work covered by Contract Documents.
 - 3. Access to site.
 - 4. Coordination with occupants.
 - 5. Work restrictions.
 - 6. Specification and drawing conventions.
 - 7. Miscellaneous provisions.

1.2 PROJECT INFORMATION

- A. Project Identification: North Crown Point New Comfort Station.
 - 1. Project Location: 3725 Corona Oriente Rd, San Diego, CA 92109.
- B. Owner: City of San Diego.
- C. Resident Engineer:
 - 1. Resident Engineer is the Owner's representative for this Project to serve as an advisor to Owner and to administer the Contract for Construction between Owner and Contractor.

1.3 WORK COVERED BY CONTRACT DOCUMENTS

- A. The Work of Project is defined by the Contract Documents and consists of the following:
 - 1. Demolish Existing Comfort Station and build new Comfort Station in the same location.

1.4 ACCESS TO SITE

- A. General: Contractor shall have limited use of Project site for construction operations as indicated on Drawings by the Contract limits and as indicated by requirements of this Section.
- B. Use of Site: Limit use of Project site to work in areas indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.
 - 1. Driveways and Walkways: Keep driveways and walkways serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.
 - a. Schedule deliveries to minimize use of driveways and entrances by construction operations.
 - b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

C. Condition of Existing Surrounding Site: Maintain portions of site affected by construction operations in a safe and usable condition throughout construction period. Repair damage caused by construction operations at the end of construction activities.

1.5 COORDINATION WITH OCCUPANTS

- A. Partial Owner Occupancy: Owner will occupy the premises during entire construction period, with the exception of areas under construction. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's operations. Maintain existing exits unless otherwise indicated.
 - 1. Maintain access to existing walkways, parking, and other adjacent occupied or used facilities. Do not close or obstruct walkways, or other occupied or used facilities without written permission from Owner and authorities having jurisdiction.
 - 2. Provide not less than 72 hours' notice to Owner of activities that will affect Owner's operations.

1.6 WORK RESTRICTIONS

- A. Work Restrictions, General: Comply with restrictions on construction operations.
 - 1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.
- B. On-Site Work Hours: Limit work in the existing building to normal business working hours of 7 a.m. to 3 p.m., Monday through Friday, unless otherwise indicated.
 - 1. Weekend Hours: Only with approval of Resident Engineer.
 - 2. Early Morning Hours: Only with approval of Resident Engineer.
 - 3. Hours for Utility Shutdowns: Coordinate with Resident Engineer.
 - 4. Hours for Demolition or noisy activity: Coordinate with Resident Engineer.
- C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:
 - 1. Notify Resident Engineer not less than two days in advance of proposed utility interruptions.
 - 2. Obtain Resident Engineer's written permission before proceeding with utility interruptions.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000

SECTION 017300 - EXECUTION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:
 - 1. Construction layout.
 - 2. Field engineering and surveying.
 - 3. Installation of the Work.
 - 4. Progress cleaning.
 - 5. Starting and adjusting.
 - 6. Protection of installed construction.
 - 7. Correction of the Work.
- B. Related Requirements:
 - 1. Section 011000 "Summary" for limits on use of Project site.
 - 2. Section 024119 "Selective Structure Demolition" for demolition and removal of selected portions of the building.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
 - 1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities and other construction affecting the Work.
 - 1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; underground electrical services, and other utilities.
- B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
 - 1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.

- 2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
- 3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
- C. 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 Resident Engineer 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 utilities and 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 the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, notify the Resident Engineer

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 Resident Engineer promptly.
- B. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.
- C. General: Engage a land surveyor 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 limits on use of Project site.
 - 3. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
 - 4. Inform installers of lines and levels to which they must comply.
 - 5. Check the location, level and plumb, of every major element as the Work progresses.
 - 6. Notify Resident Engineer when deviations from required lines and levels exceed allowable tolerances.
 - 7. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.

3.4 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.
- 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. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.
- F. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.
- G. 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.
- H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.
 - 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.
- I. 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.
- J. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.5 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
 - 1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
 - 2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F.
 - 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.

- a. Use containers intended for holding waste materials of type to be stored.
- B. Site: Maintain Project site free of waste materials and debris.
- C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
 - 1. Remove liquid spills promptly.
 - 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways.
- H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

3.6 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

END OF SECTION 017300

SECTION 024116 - STRUCTURE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

- 1. Demolition and removal of buildings and site improvements.
- 2. Removing below-grade construction.
- 3. Salvaging items for reuse by Owner.

B. Related Sections:

1. Section 311000 "Site Clearing" for site clearing and removal of above- and belowgrade site improvements not part of building demolition.

1.2 DEFINITIONS

- A. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and salvaged.
- B. Remove and Salvage: Carefully detach from existing construction, in a manner to prevent damage, and deliver to Owner. Include fasteners or brackets needed for reattachment elsewhere.

1.3 MATERIALS OWNERSHIP

- A. Unless otherwise indicated, demolition waste becomes property of Contractor.
- B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.
 - 1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

1.4 INFORMATIONAL SUBMITTALS

- A. Schedule of Building Demolition Activities: Indicate the following:
 - 1. Detailed sequence of demolition work, with starting and ending dates for each activity.
 - 2. Temporary interruption of utility services.
 - 3. Shutoff and capping or re-routing of utility services.
- B. Inventory: Submit a list of items to be removed and salvaged and deliver to Owner prior to start of demolition.
- C. Predemolition Photographs or Video: Show existing conditions of adjoining construction and site improvements, including finish surfaces that might be misconstrued as damage caused by demolition operations. Submit before the Work begins.
- D. Landfill Records: Indicate receipt and acceptance of wastes by a recycling facility and landfill facility to show compliance with CalGreen requirements.

1.5 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

- B. Standards: Comply with ANSI/ASSE A10.6 and NFPA 241.
- C. Predemolition Conference: Conduct conference at Project site.
 - 1. Inspect and discuss condition of construction to be demolished.
 - 2. Review and finalize building demolition schedule and verify availability of demolition personnel, equipment, and facilities needed to make progress and avoid delays.
 - 3. Review and finalize protection requirements.
 - 4. Review items to be salvaged and returned to Owner.

1.6 PROJECT CONDITIONS

- A. Buildings to be demolished will be vacated and their use discontinued before start of the Work.
- B. Owner assumes no responsibility for buildings and structures to be demolished.
 - 1. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
 - 2. Hazardous materials will be removed by Owner before start of the Work.
 - 3. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Resident Engineer and Owner. Hazardous materials will be removed by Owner under a separate contract.
- C. On-site storage or sale of removed items or materials is not permitted.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped before starting demolition operations.
- B. Review Project Record Documents of existing construction provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in Project Record Documents.
- C. Inventory and record the condition of items to be removed and salvaged. Provide photographs or video of conditions that might be misconstrued as damage caused by salvage operations.

3.2 PREPARATION

- A. Existing Utilities: Locate, identify, disconnect, and seal or cap off indicated utilities serving buildings and structures to be demolished.
 - 1. Arrange to shut off indicated utilities with utility companies.
 - 2. Cut off pipe or conduit a minimum of 24 inches below grade. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing according to requirements of authorities having jurisdiction.
- B. Existing Utilities: See plumbing and electrical Sections for shutting off, disconnecting, removing, and sealing or capping utilities. Do not start demolition work until utility disconnecting and sealing have been completed and verified in writing.

- C. Temporary Shoring: Provide and maintain interior and exterior shoring, bracing, or structural support to preserve stability and prevent unexpected movement or collapse of construction being demolished.
 - 1. Strengthen or add new supports when required during progress of demolition.

3.3 PROTECTION

- A. Existing Facilities: Protect adjacent walkways and other building facilities during demolition operations.
- B. Existing Utilities: Maintain utility services to remain and protect from damage during demolition operations.
- C. Temporary Protection: Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction and as indicated.
 - 1. Protect adjacent buildings and facilities from damage due to demolition activities.
 - 2. Protect existing site improvements, appurtenances, and landscaping to remain.
 - 3. Erect a plainly visible fence around drip line of individual trees or around perimeter drip line of groups of trees to remain.
 - 4. Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
- D. Remove temporary barriers and protections where hazards no longer exist. Where open excavations or other hazardous conditions remain, leave temporary barriers and protections in place.
- 3.4 DEMOLITION, GENERAL
 - A. General: Demolish indicated buildings and site improvements completely. Use methods required to complete the Work within limitations of governing regulations and as follows:
 - 1. Do not use cutting torches until work area is cleared of flammable materials. Maintain portable fire-suppression devices during flame-cutting operations.
 - 2. Maintain adequate ventilation when using cutting torches.
 - 3. Locate building demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
 - B. Site Access and Temporary Controls: Conduct building demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
 - 1. Do not close or obstruct streets, walks, walkways, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.
 - 2. Use water mist and other suitable methods to limit spread of dust and dirt. Comply with governing environmental-protection regulations. Do not use water when it may damage adjacent construction or create hazardous or objectionable conditions, such as ice, flooding, and pollution.
 - C. Explosives: Use of explosives is not permitted.

3.5 DEMOLITION BY MECHANICAL MEANS

- A. Proceed with demolition of structural framing members systematically, from higher to lower level. Complete building demolition operations above each floor or tier before disturbing supporting members on the next lower level.
- B. Remove debris from elevated portions of the building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
 - 1. Remove structural framing members and lower to ground by method suitable to minimize ground impact and dust generation.
- C. Below-Grade Construction: Demolish foundation and other below-grade construction.
 - 1. Remove below-grade construction, including foundation, and footings, completely.
- D. Existing Utilities: Protect existing utilities and reconnect to new structure when built.

3.6 SITE RESTORATION

- A. Below-Grade Areas: Rough grade below-grade areas ready for further excavation or new construction.
- B. Site Grading: Uniformly rough grade area of demolished construction to a smooth surface, free from irregular surface changes. Provide a smooth transition between adjacent existing grades and new grades.

3.7 REPAIRS

A. Promptly repair damage to site caused by demolition operations.

3.8 DISPOSAL OF DEMOLISHED MATERIALS

- A. Remove demolition waste materials from Project site. Comply with CBC CalGreen requirements for requirement to recycle 50% of project waste.
 - 1. Do not allow demolished materials to accumulate on-site.
 - 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- B. Do not burn demolished materials.

3.9 CLEANING

- A. Clean adjacent structures and improvements of dust, dirt, and debris caused by building demolition operations. Return adjacent areas to condition existing before building demolition operations began.
 - 1. Clean roadways of debris caused by debris transport.

END OF SECTION 024116

SECTION 033000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section specifies cast-in place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes.
- B. See Division 31 Section "Earth Moving" for drainage fill under slabs-on-grade.
- 1.2 SUBMITTALS
 - A. Shop Drawings: For steel reinforcement. Material test reports & certificates, and provide shop drawings for fabrication, bending and placement of concrete reinforcement. Comply with ACI Detailing Manual (SP66). Include special reinforcement required at openings through concrete structure. Include all accessories specified and required to support reinforcement. Obtain from General Contractor location of proposed construction joints and indicated on the shop drawings.
 - B. Product Data: For each type of product indicated.
 - C. Design Mixtures: For each concrete mixture.
- 1.3 QUALITY ASSURANCE
 - A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
 - B. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
 - 1. ACI 301, "Specification for Structural Concrete", Sections 1 through 5 and Section 7, "Lightweight Concrete".
 - 2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials".
 - C. Preinstallation Conference: Conduct conference at Project site.

PART 2 - PRODUCTS

- 2.1 FORM-FACING MATERIALS
 - A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
 - B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

2.2 STEEL REINFORCEMENT

- A. Recycled Content of Steel Products: Provide products with an average recycled content of steel products so postconsumer recycled content plus one-half of preconsumer recycled content is not less than 60 percent.
- B. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 and 75, deformed. And ASTM A 706/A 706M, Grade 60, deformed for welded reinforcing bars.
- C. Deformed-Steel Welded Wire Reinforcement: ASTM A 497, flat sheet.
- D. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice."

2.3 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:
 - 1. Portland Cement: ASTM C 150, Type IV may be acceptable to the engineer. Supplement with the following:
 - a. Fly Ash: ASTM C 618, Class C or F.
- B. Normal-Weight Aggregates: ASTM C 33, graded 3/4-inch nominal maximum coarseaggregate size.
 - 1. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- C. Water: Potable.
- D. Air-Entraining Admixture: ASTM C 260.
- E. Chemical Admixtures: The Xypex listed below is a required admixture. Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
 - 1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
 - 2. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
 - 3. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
 - 4. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
 - 5. Xypex C-500 1-20 lbs per yard

2.4 VAPOR RETARDERS

A. Plastic Vapor Retarder: ASTM E 1745, Class C or polyethylene sheet, ASTM D 4397, not less than 10 mils thick. Include manufacturer's recommended adhesive or pressure-sensitive joint tape.

2.5 CURING MATERIALS

- A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
- B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) when dry.
- C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- D. Water: Potable.
- E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, nondissipating certified by curing compound manufacturer to not interfere with bonding of floor covering.
- F. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.

2.6 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.
- 2.7 CONCRETE MIXTURES
 - A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.
 - B. Cementitious Materials: Use fly ash, pozzolan, as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 15 percent.
 - C. Proportion normal-weight concrete mixture as follows:
 - 1. Minimum Compressive Strength: As shown on drawings.
 - 2. Maximum Water-Cementitious Materials Ratio: 0.40 maximum.
 - 3. Slump Limit: 8 inches (200 mm) for concrete with verified slump of 2 to 4 inches (50 to 100 mm) before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch (25 mm).
 - 4. Air Content: 2 percent, plus or minus 1.5 percent at point of delivery for 3/4-inch (19-mm) nominal maximum aggregate size.
 - 5. Air Content: Do not allow air content of troweled finished floors to exceed 3 percent.
 - 6. Provide Required Xypex Admixture
2.8 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.9 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.
 - 1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 FORMWORK

- A. Design, erect, shore, brace, and maintain formwork according to ACI 301 to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- C. Chamfer exterior corners and edges of permanently exposed concrete.

3.2 EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

3.3 VAPOR RETARDERS

- A. Plastic Vapor Retarders: Place, protect, and repair vapor retarders according to ASTM E 1643 and manufacturer's written instructions.
 - 1. Lap joints 6 inches and seal with manufacturer's recommended tape.

3.4 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.
 - 1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.
- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.
 - 1. Weld reinforcing bars according to AWS D1.4, where indicated.
 - 2. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces

3.5 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Engineer.
- C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:
 - 1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch (3.2 mm). Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
 - 2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- (3.2-mm-) wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.
- D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
- 3.6 CONCRETE PLACEMENT
 - A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.
 - B. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
 - 1. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
 - C. Cold-Weather Placement: Comply with ACI 306.1.
 - D. Hot-Weather Placement: Comply with ACI 301.
- 3.7 FINISHING FORMED SURFACES
 - A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
 - 1. Apply to concrete surfaces not exposed to public view.

- B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
 - 1. Apply to concrete surfaces exposed to public view.
 - 2. Retain rubbed finish in first paragraph below with smooth-formed finish above.
- C. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

3.8 FINISHING FLOORS AND SLABS

- A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bullfloated or darbied. Use stiff brushes, brooms, or rakes to produce a profile amplitude of 1/4 inch (6 mm) in 1 direction.
 - 1. Apply scratch finish to surfaces to receive mortar setting beds for bonded cementitious floor finishes.
- C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.
 - 1. Apply float finish to surfaces intended to receive roofing, waterproofing membranes, or sand bed terrazzo.
- D. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
 - 1. Apply a trowel finish to surfaces intended as walking surfaces or for reception of floor coverings.
 - 2. Finish and measure surface so gap at any point between concrete surface and an unleveled, freestanding, 10-foot- (3.05-m-) long straightedge resting on 2 high spots and placed anywhere on the surface does not exceed 1/4 inch (6 mm)
- E. Trowel and Fine-Broom Finish: For sidewalks, and garage floors and ramps. While concrete is still plastic, slightly scarify surface with a fine broom.
 - 1. Comply with flatness and levelness tolerances for trowel finished floor surfaces.
- F. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, and ramps, and elsewhere as indicated.

3.9 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- C. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
 - 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days.
 - 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
 - 3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
 - a. After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer.
 - 4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.10 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by Resident Engineer. Remove and replace concrete that cannot be repaired and patched to Resident Engineer's approval.

3.11 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Contractor will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.
 - 1. Testing Services: Tests shall be performed according to ACI 301.

END OF SECTION 033000

SECTION 042200 - CONCRETE UNIT MASONRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

- 1. Concrete masonry units (CMU's).
- 2. Pre-faced concrete masonry units.
- 3. Steel reinforcing bars.

1.2 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: Contractor will engage a qualified independent testing agency to perform preconstruction testing indicated below. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.
 - 1. Concrete Masonry Unit Test: For each type of unit required, according to ASTM C 140 for compressive strength.
 - 2. Mortar Test (Property Specification): For each mix required, according to ASTM C 109/C 109M for compressive strength.
 - 3. Grout Test (Compressive Strength): For each mix required, according to ASTM C 1019.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For reinforcing steel. Detail bending and placement of unit masonry reinforcing bars. Comply with ACI 315, "Details and Detailing of Concrete Reinforcement." Show elevations of reinforced walls.
- C. Material Certificates: For each type and size of product indicated. For masonry units include data on material properties, material test reports substantiating compliance with requirements.
- D. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.
 - 1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C 109/C 109M for compressive strength, ASTM C 1506 for water retention, and ASTM C 91 for air content.
 - 2. Include test reports, according to ASTM C 1019, for grout mixes required to comply with compressive strength requirement.

1.4 QUALITY ASSURANCE

A. Masonry Standard: Comply with ACI 530.1/ASCE 6/TMS 602 unless modified by requirements in the Contract Documents.

1.5 PROJECT CONDITIONS

A. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

PART 2 - PRODUCTS

- 2.1 MASONRY UNITS, GENERAL
 - A. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated in the standard. Do not use units where such defects will be exposed in the completed Work.

2.2 CONCRETE MASONRY UNITS

- A. All blocks shall be single open-ended block to allow continuous reinforcing.
 - 1. At areas of high congestion, use double open-ended blocks to accommodate continuous reinforcing.
- B. Shapes: Provide shapes indicated and for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
- C. CMUs: ASTM C 90.
 - 1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of :
 - 2800 psi for net area compressive strength of masonry of 2000 psi; 1900 psi for net area compressive strength of masonry of 1500 psi;
 - 2. Density Classification: Medium weight.
- D. Pre-faced CMUs: Lightweight hollow concrete units complying with ASTM C 90, with manufacturer's standard smooth resinous facing complying with ASTM C 744.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated or equal:
 - 2. Size: Manufactured to dimensions specified in "CMUs" Paragraph, but with pre
 - a. Astra-Glaze-SW+ glazed masonry units.
 - 3. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 2800 psi. faced surfaces having 1/16-inch- wide returns of facing to create 1/4-inch- wide mortar joints with modular coursing.
 - 4. Colors and Patterns: Match Architect's samples.

2.3 MORTAR AND GROUT MATERIALS

A. Portland Cement: ASTM C 150, Type II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.

- B. Hydrated Lime: ASTM C 207, Type M.
- C. Mortar Cement: ASTM C 1329.
- D. Aggregate for Mortar: ASTM C 144.
- E. Aggregate for Grout: ASTM C 404.
- F. Water: Potable.
- 2.4 REINFORCEMENT
 - A. Uncoated Steel Reinforcing Bars: ASTM A 615/A 615M or ASTM A 996/A 996M, Grade 60 (Grade 420).
- 2.5 TIES AND ANCHORS
 - A. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated.
 - 1. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
 - B. Rigid Anchors: Fabricate from steel bars 1-1/2 inches (38 mm) wide by 1/4 inch (6.35 mm) thick by 24 inches (610 mm) long, with ends turned up 2 inches (51 mm) or with cross pins unless otherwise indicated.
 - C. Anchor Bolts: Headed steel bolts complying with ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with ASTM A 563 (ASTM A 563M) hex nuts and, where indicated, flat washers; hot-dip galvanized to comply with ASTM A 153/A 153M, Class C; of dimensions indicated.

2.6 MISCELLANEOUS MASONRY ACCESSORIES

- A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; formulated from neoprene.
- B. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D 2000, Designation M2AA-805 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.
- C. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).

2.7 MORTAR AND GROUT MIXES

- A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.
 - 1. Do not use calcium chloride in mortar or grout.
 - 2. Use Portland cement-lime, unless otherwise indicated.

- 3. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.
- B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.
- C. Mortar for Unit Masonry: Comply with ASTM C 270, Property Specification. Provide the following types of mortar for applications stated unless another type is indicated.
 - 1. For reinforced masonry, use Type M.
- D. Grout for Unit Masonry: Comply with ASTM C 476.
 - 1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with Table 7 in ACI 530.1/ASCE 6/TMS 602 for dimensions of grout spaces and pour height.
 - 2. Proportion grout in accordance with ASTM C 476, paragraph 4.2.2 for specified 28day compressive strength indicated, but not less than 2800 psi for f'm = 2000 psi and 2000 psi for f'm = 1500 psi.
 - 3. Provide grout with a slump of 8 to 11 inches (203 to 279 mm) as measured according to ASTM C 143/C 143M.

PART 3 - EXECUTION

3.1 TOLERANCES

- A. Dimensions and Locations of Elements:
 - 1. For dimensions in cross section or elevation do not vary by more than plus 1/2 inch (12 mm) or minus 1/4 inch (6 mm).
 - 2. For location of elements in plan do not vary from that indicated by more than plus or minus 1/2 inch (12 mm).
 - 3. For location of elements in elevation do not vary from that indicated by more than plus or minus 1/4 inch (6 mm) in a story height or 1/2 inch (12 mm) total.
- B. Lines and Levels:
 - 1. For bed joints and top surfaces of bearing walls do not vary from level by more than 1/4 inch in 10 feet (6 mm in 3 m), or 1/2 inch (12 mm) maximum.
 - 2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2 inch (12 mm) maximum.
 - 3. For vertical lines and surfaces do not vary from plumb by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2 inch (12 mm) maximum.

- 4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2 inch (12 mm) maximum.
- 5. For lines and surfaces do not vary from straight by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2 inch (12 mm) maximum.
- C. Joints:
 - 1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm), with a maximum thickness limited to 1/2 inch (12 mm).
 - 2. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch (9 mm) or minus 1/4 inch (6 mm).
 - 3. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm).

3.2 LAYING MASONRY WALLS

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.
- B. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.
- C. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond; do not use units with less than nominal 4-inch (100-mm) horizontal face dimensions at corners or jambs.
- D. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.
- E. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.

3.3 MORTAR BEDDING AND JOINTING

- A. Lay hollow CMUs as follows:
 - 1. With face shells fully bedded in mortar and with head joints of depth equal to bed joints.
 - 2. With webs fully bedded in mortar in all courses of piers, columns, and pilasters.
 - 3. With webs fully bedded in mortar in grouted masonry, including starting course on footings.

- 4. With entire units, including areas under cells, fully bedded in mortar at starting course on footings where cells are not grouted.
- B. Lay solid masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.
- C. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.
- D. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint) unless otherwise indicated.

3.4 REINFORCED UNIT MASONRY INSTALLATION

- A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.
 - 1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
 - 2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other loads that may be placed on them during construction.
- B. Placing Reinforcement: Comply with requirements in ACI 530.1/ASCE 6/TMS 602.
- C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.
 - 1. Comply with requirements in ACI 530.1/ASCE 6/TMS 602 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
 - 2. Limit height of vertical grout pours to not more than 64 inches (1621 mm).

3.5 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Contractor will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas, as needed to perform tests and inspections. Retesting of materials that fail to meet specified requirements shall be done at Contractor's expense.
- B. Inspections: Level 1 special inspections according to the "International Building Code."
 - 1. Begin masonry construction only after inspectors have verified proportions of siteprepared mortar.
 - 2. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.

- 3. Place grout only after inspectors have verified proportions of site-prepared grout.
- C. Testing Frequency: One set of tests for each 5000 sq. ft. of wall area or portion thereof.
- D. Concrete Masonry Unit Test: For each type of unit provided, according to ASTM C 140 for compressive strength.
- E. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C 780.
- F. Mortar Test (Property Specification): For each mix provided, according to ASTM C 780. Test mortar for mortar air content and [compressive strength.
- G. Grout Test (Compressive Strength): For each mix provided, according to ASTM C 1019.
- 3.6 REPAIRING, POINTING, AND CLEANING
 - A. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.
 - B. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
 - 1. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes.
 - 2. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2A applicable to type of stain on exposed surfaces.
- 3.7 MASONRY WASTE DISPOSAL
 - A. Waste Disposal as Fill Material: Dispose of clean masonry waste, including excess or soilcontaminated sand, waste mortar, and broken masonry units, by crushing and mixing with fill material as fill is placed.
 - 1. Do not dispose of masonry waste as fill within 18 inches (450 mm) of finished grade.
 - B. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above, and other masonry waste, and legally dispose of off Owners property. Comply with CalGreen requirements for recycling construction waste.

END OF SECTION 042200

SECTION 057000 - ORNAMENTAL METAL

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Decorative ventilation grilles and frames, w/ stainless steel woven wire cloth.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated, including finishing materials.
- B. Shop Drawings: Show fabrication and installation details for decorative metal.
 - 1. Include plans, elevations, component details, and attachments to other work.
 - 2. Indicate materials and profiles of each decorative metal member, fittings, joinery, finishes, fasteners, anchorages, and accessory items.
 - 3. Samples of welded joints showing quality of workmanship and color matching of materials.

1.3 QUALITY ASSURANCE

- A. Fabricator Qualifications: A firm experienced in producing decorative metal similar to that indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- B. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1/D1.1M, "Structural Welding Code Steel."
 - 2. AWS D1.6, "Structural Welding Code Stainless Steel."
- 1.4 DELIVERY, STORAGE, AND HANDLING
 - A. Store decorative metal in a well-ventilated area, away from uncured concrete and masonry, and protected from weather, moisture, soiling, abrasion, extreme temperatures, and humidity.
 - B. Deliver and store cast-metal products in wooden crates surrounded by sufficient packing material to ensure that products will not be cracked or otherwise damaged.
- 1.5 PROJECT CONDITIONS
 - A. Field Measurements: Verify actual locations of walls and other construction contiguous with decorative metal by field measurements before fabrication and indicate measurements on Shop Drawings.

1.6 COORDINATION

A. Coordinate installation of anchorages for decorative metal items. 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.

PART 2 - PRODUCTS

- 2.1 METALS, GENERAL
 - A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. Provide materials without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.

- 2.2 STAINLESS STEEL
 - A. Wire Cloth:
 - 1. <u>Manufacturers</u>: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. <u>McNichols Company</u>.
 - b. The Western Group.
 - 2. Wire Cloth: ¹/₄" diameter wire, 1" opening, Stainless Steel Type 316.
- 2.3 STEEL AND IRON
 - A. Tubing: ASTM A 500 (cold formed) or ASTM A 513, Type 5 (mandrel drawn).
 - B. Bars: Hot-rolled, carbon steel complying with ASTM A 29/A 29M, Grade 1010.
 - C. Plates, Shapes, and Bars: ASTM A 36/A 36M.
 - D. Cast Iron: Either gray iron, ASTM A 48/A 48M, or malleable iron, ASTM A 47/A 47M unless otherwise indicated.
 - E. Steel Sheet, Cold Rolled: ASTM A 1008/A 1008M, either commercial steel or structural steel, exposed.
- 2.4 FASTENERS
 - A. Fastener Materials: Unless otherwise indicated, provide the following:
 - 1. Stainless-Steel Items: Type 304 stainless-steel fasteners.
 - 2. Galvanized-Steel Items: Plated steel fasteners complying with ASTM B 633, Class Fe/Zn 25 for electrodeposited zinc coating.
 - 3. Dissimilar Metals: Type 304 stainless-steel fasteners.
 - B. Fasteners for Anchoring to Other Construction: Unless otherwise indicated, select fasteners of type, grade, and class required to produce connections suitable for anchoring indicated items to other types of construction indicated.
 - C. Provide concealed fasteners for interconnecting components and for attaching decorative metal items to other work unless otherwise indicated.
 - D. Anchors, General: Anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.

2.5 MISCELLANEOUS MATERIALS

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
 - 1. For aluminum, provide type and alloy as recommended by producer of metal to be welded and as required for color match, strength, and compatibility in fabricated items.
- B. Etching Cleaner for Galvanized Metal: Complying with MPI#25.
- C. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

- D. Universal Shop Primer for Ferrous Metal: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.
 - 1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.
- E. Epoxy Zinc-Rich Primer: Complying with MPI#20 and compatible with topcoat.

2.6 FABRICATION, GENERAL

- A. Assemble items in the shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.
- B. Form decorative metal to required shapes and sizes, true to line and level with true curves and accurate angles and surfaces. Finish exposed surfaces to smooth, sharp, well-defined lines and arris.
- C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- D. Mill joints to a tight, hairline fit. Cope or miter corner joints. Fabricate connections that will be exposed to weather in a manner to exclude water.
- E. Provide weep holes where water may accumulate. Locate weep holes in inconspicuous locations.
- F. Provide necessary rebates, lugs, and brackets to assemble units and to attach to other work. Cut, reinforce, drill, and tap as needed to receive finish hardware, screws, and similar items unless otherwise indicated.
- G. Comply with AWS for recommended practices in shop welding. Weld behind finished surfaces without distorting or discoloring exposed side. Clean exposed welded joints of flux, and dress exposed and contact surfaces.
 - 1. Where welding cannot be concealed behind finished surfaces, finish joints to comply with NOMMA's "Voluntary Joint Finish Standards" Type 2 Welds: completely sanded joint, some undercutting and pinholes okay.
- H. Provide castings that are sound and free of warp, cracks, blowholes, or other defects that impair strength or appearance. Grind, wire brush, sandblast, and buff castings to remove seams, gate marks, casting flash, and other casting marks.

2.7 DECORATIVE MECHANICAL GRILLES

- A. Fabricate decorative grilles from woven wire $\operatorname{cloth} \frac{1}{4}$ " diameter wire with 1" opening.
- B. Fabricate grille frames from extruded aluminum with regular hook strip edge, and to sizes and shapes indicated. Miter frame members at corners and connect with concealed splice plates welded to back of frames.
- 2.8 FINISHES, GENERAL
 - A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
 - B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

2.9 STEEL AND IRON FINISHES

- A. Galvanizing: Hot-dip galvanize products made from rolled, pressed, and forged steel shapes, castings, plates, bars, and strips indicated to be galvanized to comply with ASTM A 123/A 123M.
 - 1. Hot-dip galvanize steel and iron hardware indicated to be galvanized to comply with ASTM A 153/A 153M.
 - 2. Do not quench or apply post-galvanizing treatments that might interfere with paint adhesion.
 - 3. Fill vent and drain holes that will be exposed in finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.
- B. Preparing Galvanized Items for Shop Priming: After galvanizing, thoroughly clean decorative metal of grease, dirt, oil, flux, and other foreign matter, and treat with etching cleaner.
- C. Primer Application: Apply shop primer to prepared surfaces of items unless otherwise indicated. Comply with requirements in SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting. Primer need not be applied to surfaces to be embedded in concrete or masonry.
 - 1. Shop prime uncoated ferrous-metal surfaces with universal shop primer.

PART 3 - EXECUTION

- 3.1 EXAMINATION
 - A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of decorative metal.
 - B. Proceed with installation only after unsatisfactory conditions have been corrected.
- 3.2 INSTALLATION, GENERAL
 - A. Provide anchorage devices and fasteners where needed to secure decorative metal to inplace construction.
 - B. Perform cutting, drilling, and fitting required to install decorative metal. Set products accurately in location, alignment, and elevation, measured from established lines and levels. Provide temporary bracing or anchors in formwork for items to be built into concrete, masonry, or similar construction.
 - C. Fit exposed connections accurately together to form tight, hairline joints or, where indicated, uniform reveals and spaces for sealants and joint fillers. Where cutting, welding, and grinding are required for proper shop fitting and jointing of decorative metal, restore finishes to eliminate evidence of such corrective work.
 - D. Do not cut or abrade finishes that cannot be completely restored in the field. Return items with such finishes to the shop for required alterations, followed by complete refinishing, or provide new units as required.
 - E. Install concealed gaskets, joint fillers, insulation, and flashings as work progresses.
 - F. Restore protective coverings that have been damaged during shipment or installation. Remove protective coverings only when there is no possibility of damage from other work yet to be performed at same location.
 - 1. Retain protective coverings intact; remove coverings simultaneously from similarly finished items to preclude nonuniform oxidation and discoloration.

G. Field Welding: Comply with applicable AWS specification for procedures of manual shielded metal arc welding and requirements for welding and for finishing welded connections in "Fabrication, General" Article. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations.

3.3 INSTALLING DECORATIVE VENTILATION GRILLES

- A. Mount decorative grilles at heights and in positions indicated, adjusting ductwork to be centered on grilles if any.
 - 1. Secure to framing and blocking with specified fasteners.

3.4 CLEANING AND PROTECTION

- A. Unless otherwise indicated, clean metals by washing thoroughly with clean water and soap, rinsing with clean water, and drying with soft cloths.
- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.
- C. Protect finishes of decorative metal from damage during construction period with temporary protective coverings approved by decorative metal fabricator. Remove protective covering at time of Substantial Completion.
- D. Restore finishes damaged during installation and construction period so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit, or provide new units.

END OF SECTION 057000

SECTION 061000 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Framing with dimension lumber.
 - 2. Framing with timber.
 - 3. Framing with engineered wood products.
 - 4. Wood blocking and nailers.
- B. Related Sections include the following:
 - 1. Division 06 Section "Sheathing."

1.2 DEFINITIONS

- A. Exposed Framing: Framing not concealed by other construction.
- B. Dimension Lumber: Lumber of 2 inches nominal or greater but less than 5 inches nominal in least dimension.
- C. Timber: Lumber of 5 inches nominal or greater in least dimension.
- D. Lumber grading agencies, and the abbreviations used to reference them, include the following:
 - 1. NeLMA: Northeastern Lumber Manufacturers' Association.
 - 2. NLGA: National Lumber Grades Authority.
 - 3. RIS: Redwood Inspection Service.
 - 4. SPIB: The Southern Pine Inspection Bureau.
 - 5. WCLIB: West Coast Lumber Inspection Bureau.
 - 6. WWPA: Western Wood Products Association.

1.3 SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
 - 1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
 - 2. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
 - 3. Include copies of warranties from chemical treatment manufacturers for each type of treatment.
- B. Material Certificates:
 - 1. For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the ALSC Board of Review.

- 2. For parallams specified to comply with I level 2.9 E and ESR-1387.
- 3. Fasteners: all fasteners to be hot dipped galvanized or stainless steel.
- 4. Framing connectors: all connectors shall be stainless steel.
- C. Research/Evaluation Reports: For the following, showing compliance with building code in effect for Project:
 - 1. Wood-preservative-treated wood.
 - 2. Engineered wood products.
 - 3. Power-driven fasteners.
 - 4. Powder-actuated fasteners.
 - 5. Expansion anchors.
 - 6. Metal framing anchors.
- 1.4 QUALITY ASSURANCE
 - A. Source Limitations for Engineered Wood Products: Obtain each type of engineered wood product through one source from a single manufacturer.
- 1.5 DELIVERY, STORAGE, AND HANDLING
 - A. Stack lumber flat with spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

- 2.1 WOOD PRODUCTS, GENERAL
 - A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
 - 1. Factory mark each piece of lumber with grade stamp of grading agency.
 - 2. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
 - 3. Provide dressed lumber, S4S, unless otherwise indicated.
 - B. Engineered Wood Products: Provide engineered wood products acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that show compliance with building code in effect for Project.
 - 1. Allowable Design Stresses: Provide engineered wood products with allowable design stresses, as published by manufacturer that meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

2.2 WOOD-PRESERVATIVE-TREATED LUMBER

- A. Preservative Treatment by Pressure Process: AWPA C2.
 - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.

- 2. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.
- B. Kiln-dry lumber and timber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
 - 1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece.
- D. Application: Treat all rough carpentry
- 2.3 DIMENSION LUMBER FRAMING
 - A. Maximum Moisture Content: 15 percent for 2-inch nominal thickness or less, 19 percent for more than 2-inch nominal thickness.
 - B. Species and Grade for Structural Drawings.
- 2.4 TIMBER FRAMING
 - A. Provide timber framing complying with the requirements according to the structural drawings.
- 2.5 ENGINEERED WOOD PRODUCTS
 - A. Parallel-Strand Lumber: Structural composite lumber made from wood strand elements with grain primarily parallel to member lengths, evaluated and monitored according to ASTM D 5456 and manufactured with an exterior-type adhesive complying with ASTM D 2559.
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Weyerhaeuser Company.
 - 3. Extreme Fiber Stress in Bending, Edgewise: 2900 psi for 12-inch nominal- depth members.
 - 4. Modulus of Elasticity, Edgewise: 2,200,000 psi.
- 2.6 MISCELLANEOUS LUMBER
 - A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
 - 1. Blocking.
 - 2. Nailers.
 - 3. Cants.
 - 4. Furring.
 - 5. Grounds.

- B. For items of dimension lumber size, provide species and grade per structural drawings.
- 2.7 FASTENERS
 - A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.
 - 1. Provide all fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M or Type 304 stainless steel.

2.8 METAL FRAMING ANCHORS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- C. Basis-of-Design Products: Subject to compliance with requirements, provide stainless steel manufactured by the following:
 - 1. Simpson Strong-Tie Co., Inc.
- D. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer that meet or exceed those. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.
- E. Stainless-Steel Sheet: ASTM A 666, Type 304.
 - 1. Use for all locations.
- 2.9 MISCELLANEOUS MATERIALS
 - A. Sill-Sealer Gaskets: Glass-fiber-resilient insulation, fabricated in strip form, for use as a sill sealer; 1-inch nominal thickness, compressible to 1/32 inch; selected from manufacturer's standard widths to suit width of sill members indicated.
 - B. Sill-Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to suit width of sill members indicated.
 - C. Flexible Flashing: Self-adhesive, rubberized-asphalt compound, bonded to a high-density, polyethylene film to produce an overall thickness of not less than 0.025 inch.
 - D. Adhesives for Gluing Furring and Sleepers to Concrete or Masonry: Formulation complying with ASTM D 3498 that is approved for use indicated by adhesive manufacturer.
 - 1. Use adhesives that have a VOC content of 70 > g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - E. Water-Repellent Preservative: NWWDA-tested and -accepted formulation containing 3iodo-2-propynyl butyl carbamate, combined with an insecticide containing chloropyrifos as its active ingredient.

PART 3 - EXECUTION

- 3.1 INSTALLATION, GENERAL
 - A. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry to other construction; scribe and cope as needed for accurate fit. Locate nailers, blocking, and similar supports to comply with requirements for attaching other construction.

- B. Framing Standard: Comply with AF&PA's "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- C. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.
- D. Metal Framing Anchors: Install metal framing to comply with manufacturer's written instructions.
- E. Do not splice structural members between supports, unless otherwise indicated.
- F. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
 - 1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches o.c.
- G. Sort and select lumber so that natural characteristics will not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- H. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.
 - 1. Use inorganic boron for items that are continuously protected from liquid water.
 - 2. Use copper naphthenate for items not continuously protected from liquid water.
- I. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
 - 1. NES NER-272 for power-driven fasteners.
 - 2. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.
 - 3. Table 23-II-B-1, "Nailing Schedule," and Table 23-II-B-2, "Wood Structural Panel Roof Sheathing Nailing Schedule," in ICBO's Uniform Building Code.
 - 4. Table 2305.2, "Fastening Schedule," in BOCA's BOCA National Building Code.
 - 5. Table 2306.1, "Fastening Schedule," in SBCCI's Standard Building Code.
 - 6. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's International Residential Code for One- and Two-Family Dwellings.
 - 7. Table 602.3(1), "Fastener Schedule for Structural Members," and Table 602.3(2), "Alternate Attachments," in ICC's International One- and Two-Family Dwelling Code.
- J. Use common wire nails, unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood; do not countersink nail heads, unless otherwise indicated.
- K. For exposed work, arrange fasteners in straight rows parallel with edges of members, with fasteners evenly spaced, and with adjacent rows staggered.
 - 1. Comply with indicated fastener patterns where applicable.
 - 2. Use finishing nails, unless otherwise indicated.

3.2 WOOD BLOCKING, AND NAILER INSTALLATION

- A. Install where indicated and where required for screeding or attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.
- B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces, unless otherwise indicated.
- C. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.
- D. Provide permanent grounds of dressed, pressure-preservative-treated, key-beveled lumber not less than 1-1/2 inches wide and of thickness required to bring face of ground to exact thickness of finish material. Remove temporary grounds when no longer required.

3.3 WOOD FURRING INSTALLATION

- A. Install level and plumb with closure strips at edges and openings. Shim with wood as required for tolerance of finish work.
- B. Furring to Receive Plywood or Hardboard Paneling: Install 1-by-3-inch nominal- size furring horizontally and vertically at 24 inches.
- C. Furring to Receive Gypsum Board Plaster Lath: Install 1-by-2-inch nominal- size furring vertically at 16 inches 400 mm o.c.

3.4 WALL AND PARTITION FRAMING INSTALLATION

- A. General: Provide single bottom plate and double top plates using members of 2-inch nominal thickness whose widths equal that of studs, except single top plate may be used for non-load-bearing partitions. Fasten plates to supporting construction, unless otherwise indicated.
 - 1. For walls, provide wood studs spaced 16 inches o.c., unless otherwise indicated.
 - 2. Provide continuous horizontal blocking at midheight of partitions more than 96 inches high, using members of 2-inch nominal thickness and of same width as wall or partitions.
- B. Construct corners and intersections with three or more studs.
- C. Frame openings with multiple studs and headers. Provide nailed header members of thickness equal to width of studs. Support headers on jamb studs.
 - 1. For non-load-bearing partitions, provide double-jamb studs and headers not less than 4-inch nominal depth for openings 48 inches and less in width, 6-inch nominal depth for openings 48 to 72 inches in width, 8-inch nominal depth for openings 72 to 120 inches in width, and not less than 10-inch nominal depth for openings 10 to 12 feet in width.

3.5 RAFTER FRAMING INSTALLATION

- A. Rafters: Notch to fit exterior wall plates and use metal framing anchors. Double rafters to form headers and trimmers at openings in roof framing, if any, and support with metal hangers. Where rafters abut at ridge, place directly opposite each other and nail to ridge member or use metal ridge hangers.
 - 1. At valleys, provide double-valley rafters of size indicated or, if not indicated, of same thickness as regular rafters and 2 inches deeper. Bevel ends of jack rafters for full bearing against valley rafters.

- 2. At hips, provide hip rafter of size indicated or, if not indicated, of same thickness as regular rafters and 2 inches deeper. Bevel ends of jack rafters for full bearing against hip rafter.
- B. Provide special framing as indicated for eaves, overhangs, dormers, and similar conditions, if any.
- 3.6 TIMBER FRAMING INSTALLATION
 - A. Install timber with crown edge up and provide not less than 4 inches of bearing on supports. Provide continuous members, unless otherwise indicated; tie together over supports as indicated if not continuous.
 - B. Where beams or girders are framed into pockets of exterior concrete or masonry walls, provide 1/2-inch air space at sides and ends of wood members.
 - C. Install wood posts using metal anchors indicated.
 - D. Treat ends of timber beams and posts exposed to weather by dipping in water-repellent preservative for 15 minutes.
- 3.7 **PROTECTION**
 - A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.
 - B. Protect rough carpentry from weather. If, despite protection, rough carpentry becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 061000

SECTION 061600 - SHEATHING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Roof sheathing.
 - 2. Building paper.
 - 3. Building wrap.
 - 4. Sheathing joint-and-penetration treatment.
 - 5. Flexible flashing at openings in sheathing.
- B. Related Sections include the following:
 - 1. Division 06 Section Rough Carpentry

1.2 SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
 - 1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Indicate type of preservative used and net amount of preservative retained.
 - 2. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
 - 3. Include copies of warranties from chemical treatment manufacturers for each type of treatment.
- B. Research/Evaluation Reports: For the following, showing compliance with building code in effect for Project:
 - 1. Preservative-treated plywood.
- 1.3 DELIVERY, STORAGE, AND HANDLING
 - A. Stack plywood and other panels flat with spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

- 2.1 WOOD PANEL PRODUCTS, GENERAL
 - A. Plywood: as specified on plans.
 - B. Thickness: As needed to comply with requirements specified, but not less than thickness indicated.
 - C. Factory mark panels to indicate compliance with applicable standard.
- 2.2 PRESERVATIVE-TREATED SHEATHING
 - A. Preservative Treatment by Pressure Process: AWPA C9.
 - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.

- B. Mark sheathing with appropriate classification marking of an inspection agency acceptable to authorities having jurisdiction.
- C. Application: Treat all sheathing.
- 2.3 ROOF SHEATHING
 - A. Plywood Roof Sheathing: Exterior, Structural I sheathing.
 - 1. Span Rating: Not less than 40/20.
 - 2. Nominal Thickness: Not less than 19/32 inch.
- 2.4 FASTENERS
 - A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.
 - 1. Provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M or Type 304 stainless steel.
 - B. Nails, Brads, and Staples: ASTM F 1667.
 - C. Power-Driven Fasteners: NES NER-272.
 - D. Wood Screws: ASME B18.6.1.
 - E. Screws for Fastening Wood Structural Panels to Cold-Formed Metal Framing: ASTM C 954, except with wafer heads and reamer wings, length as recommended by screw manufacturer for material being fastened.
 - 1. For wall and roof sheathing panels, provide screws with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117.

2.5 MISCELLANEOUS MATERIALS

- A. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, rubberized-asphalt compound, bonded to a high-density, cross-laminated polyethylene film to produce an overall thickness of not less than 0.030 inch.
 - 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - 2. Products: Subject to compliance with requirements, provide one of the following:
 - a. Carlisle Coatings & Waterproofing; CCW-705-TWF Thru-Wall Flashing.
 - b. MFM Building Products Corp.; Window Wrap.
 - c. Polyguard Products, Inc.; Polyguard 300.
- B. Primer for Flexible Flashing: Product recommended by manufacturer of flexible flashing for substrate.

PART 3 - EXECUTION

- 3.1 INSTALLATION, GENERAL
 - A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
 - B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction, unless otherwise indicated.

- C. Securely attach to substrate by fastening as indicated, complying with the following:
 - 1. NES NER-272 for power-driven fasteners.
 - 2. Table 2304.9.1, "Fastening Schedule," in ICC's "International Building Code."
 - 3. Table 23-II-B-1, "Nailing Schedule," and Table 23-II-B-2, "Wood Structural Panel Roof Sheathing Nailing Schedule," in ICBO's "Uniform Building Code."
 - 4. Table 2305.2, "Fastening Schedule," in BOCA's "BOCA National Building Code."
 - 5. Table 2306.1, "Fastening Schedule," in SBCCI's "Standard Building Code."
 - Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's "International Residential Code for One- and Two-Family Dwellings."
 - Table 602.3(1), "Fastener Schedule for Structural Members," and Table 602.3(2), "Alternate Attachments," in ICC's "International One- and Two-Family Dwelling Code."
- D. Use common wire nails, unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections. Install fasteners without splitting wood.
- E. Coordinate roof sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.
- F. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.
- G. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

3.2 SHEATHING JOINT-AND-PENETRATION TREATMENT

- A. Seal sheathing joints according to sheathing manufacturer's written instructions.
 - 1. Apply elastomeric sealant to joints and fasteners and trowel flat. Apply sufficient quantity of sealant to completely cover joints and fasteners after troweling. Seal other penetrations and openings.
 - 2. Apply glass-fiber sheathing tape to glass-mat gypsum sheathing board joints, and apply and trowel silicone emulsion sealant to embed entire face of tape in sealant. Apply sealant to exposed fasteners with a trowel so fasteners are completely covered. Seal other penetrations and openings.
 - 3. Apply sheathing tape to joints between foam-plastic sheathing panels and at items penetrating sheathing. Apply at upstanding flashing to overlap both flashing and sheathing.

3.3 FLEXIBLE FLASHING INSTALLATION

- A. Apply flexible flashing where indicated to comply with manufacturers written instructions.
 - 1. Prime substrates as recommended by flashing manufacturer.
 - 2. Lap seams and junctures with other materials at least 4 inches, except that at flashing flanges of other construction, laps need not exceed flange width.

- 3. Lap flashing over weather-resistant building paper at bottom and sides of openings.
- 4. Lap weather-resistant building paper over flashing at heads of openings.
- 5. After flashing has been applied, roll surfaces with a hard rubber or metal roller to ensure that flashing is completely adhered to substrates.

3.4 PROTECTION

A. Protect sheathing by covering exposed exterior surface of sheathing with weather-resistant sheathing paper securely fastened to framing. Apply covering immediately after sheathing is installed.

END OF SECTION 061600

SECTION 074113 - STANDING SEAM METAL ROOF PANELS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes standing seam metal roof panels, flashing and trim, underlayment, and cover board.

1.2 SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of panel and accessory.
- B. Shop Drawings:
 - 1. Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.
 - 2. Accessories: Include details of the flashing, trim, and anchorage systems, at a scale of not less than 1-1/2 inches per 12 inches.
- C. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below.
 - 1. Metal Panels: 12 inches long by actual panel width.
- D. Qualification Data: For Installer.
- E. Product Test Reports: For each product, for tests performed by a qualified testing agency.
- F. Field quality-control reports.
- G. Sample Warranties: For special warranties.
- 1.3 CLOSEOUT SUBMITTALS
 - A. Maintenance Data: For metal panels to include in maintenance manuals.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
- 1.5 DELIVERY, STORAGE, AND HANDLING
 - A. Deliver components, metal panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.
 - B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.
 - C. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness, with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.
 - D. Retain strippable protective covering on metal panels during installation.

1.6 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal panels to be performed according to manufacturers' written instructions and warranty requirements.

1.7 COORDINATION

- A. Coordinate sizes and locations of roof curbs, equipment supports, and roof penetrations with actual equipment provided.
- B. Coordinate metal panel installation with rain drainage work, flashing, trim, construction of soffits, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.8 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including rupturing, cracking, or puncturing.
 - b. Deterioration of metals and other materials beyond normal weathering.
 - 2. Warranty Period: Two years from date of Substantial Completion.
- B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
 - 1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 - 2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- B. Fire Rating: UL Class A rated assembly.
- C. Energy Performance: Provide roof panels that comply with "cool-roof" energy requirements of State of California.
- D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

2.2 STANDING-SEAM METAL ROOF PANELS

- A. General: Provide factory-formed metal roof panels designed to be installed by lapping and interconnecting raised side edges of adjacent panels with joint type indicated and mechanically attaching panels to supports using concealed clips in side laps. Include clips, cleats, pressure plates, and accessories required for weathertight installation.
 - 1. Steel Panel Systems: Unless more stringent requirements are indicated, comply with ASTM E 1514.
 - 2. Aluminum Panel Systems: Unless more stringent requirements are indicated, comply with ASTM E 1637.
- B. Clipless, Integral-Standing-Seam Metal Roof Panels: Formed with integral ribs at panel edges and a flat pan between ribs; designed for sequential installation by mechanically attaching panels to supports using screw fasteners located under concealed side of panels and lapping and interconnecting side edges of adjacent panels.
 - 1. <u>Basis-of-Design Product</u>: Subject to compliance with requirements, provide Firestone Metal Products, LLC, Una-clad UC-4 or comparable product by one of the following:
 - a. <u>Dimensional Metals, Inc</u>.
 - b. Englert, Inc.
 - c. <u>Metal-Fab Manufacturing, LLC</u>.
 - d. <u>Metal Sales Manufacturing Company</u>.
 - 2. Metallic-Coated Steel Sheet: Zinc-coated (galvanized) steel sheet complying with ASTM A 653/A 653M, G90 coating designation, or aluminum-zinc alloy-coated steel sheet complying with ASTM A 792/A 792M, Class AZ50 coating designation; structural quality. Prepainted by the coil-coating process to comply with ASTM A 755/A 755M.
 - a. Nominal Thickness: 0.028 inch.
 - b. Exterior Finish: Two-coat fluoropolymer.
 - c. Color: As indicated, or if not indicated as selected by Project Engineer from manufacturer's full range.
 - 3. Panel Coverage: 9.75 inches.
 - 4. Panel Height: 1.5 inches.
- 2.3 UNDERLAYMENT MATERIALS
 - A. Self-Adhering, High-Temperature Underlayment: Provide self-adhering, cold-applied, sheet underlayment, a minimum of 30 mils thick, consisting of slip-resistant, polyethylene-film top surface laminated to a layer of butyl or SBS-modified asphalt adhesive, with release-paper backing. Provide primer when recommended by underlayment manufacturer.
 - 1. Thermal Stability: Stable after testing at 240 deg F; ASTM D 1970.
 - 2. Low-Temperature Flexibility: Passes after testing at minus 20 deg F; ASTM D 1970.
 - 3. <u>Basis-of-Design Product</u>: Subject to compliance with requirements, provide Firestone Metal Products, LLC, Clad-guard SA Metal Roofing Underlayment or comparable product by one of the following:

- a. <u>Carlisle Residential, a division of Carlisle Construction Materials;</u> WIP 300HT.
- b. <u>Grace Construction Products, a unit of W. R. Grace & Co.;</u> Grace Ice and Water Shield HT.
- c. <u>Henry Company</u>; Blueskin PE200 HT.
- d. <u>Kirsch Building Products, LLC;</u> Sharkskin Ultra SA.
- e. <u>Metal-Fab Manufacturing, LLC;</u> MetShield.
- f. <u>Owens Corning</u>; WeatherLock Metal High Temperature Underlayment.

2.4 MISCELLANEOUS MATERIALS

- A. Miscellaneous Metal Subframing and Furring: ASTM C 645; cold-formed, metallic-coated steel sheet, ASTM A 653/A 653M, G90 coating designation or ASTM A 792/A 792M, Class AZ50 coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal panel system.
- B. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.
 - 1. Closures: Provide closures at eaves and ridges, fabricated of same metal as metal panels.
 - 2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
 - 3. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefinfoam or closed-cell laminated polyethylene; minimum 1-inch-thick, flexible closure strips; cut or premolded to match metal panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
- C. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers. Finish flashing and trim with same finish system as adjacent metal panels.
- D. Panel Fasteners: Self-tapping screws designed to withstand design loads.
- E. Panel Sealants: Provide sealant type recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.
 - 1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.
 - 2. Joint Sealant: ASTM C 920; elastomeric polyurethane or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal panels and remain weathertight; and as recommended in writing by metal panel manufacturer.
 - 3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C 1311.

2.5 FABRICATION

A. General: Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.

- B. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.
- C. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.
 - 1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
 - 2. Seams: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
 - 3. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate sealant and to comply with SMACNA standards.
 - 4. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
 - 5. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by metal panel manufacturer.
 - a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal panel manufacturer for application, but not less than thickness of metal being secured.

2.6 FINISHES

- A. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in same piece are unacceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- C. Steel Panels and Accessories:
 - 1. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 2. Concealed Finish: Apply pretreatment and manufacturer's standard white or lightcolored acrylic or polyester backer finish consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal panel supports, and other conditions affecting performance of the Work.
 - 1. Examine primary and secondary roof framing to verify that rafters, purlins, angles, channels, and other structural panel support members and anchorages have been installed within alignment tolerances required by metal roof panel manufacturer.

- 2. Examine solid roof sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal roof panel manufacturer.
 - a. Verify that air- or water-resistive barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.
- B. Examine roughing-in for components and systems penetrating metal panels to verify actual locations of penetrations relative to seam locations of metal panels before installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C 754 and metal panel manufacturer's written recommendations.
- 3.3 INSULATION/COVER BOARD INSTALLATION
 - A. Install per manufacturer's instructions, using recommended fasteners and plates or adhesives.
 - B. Neatly fit insulation to all roof penetrations, projections and nailers.
 - C. Install no more insulation than can be covered with underlayment membrane and completed before the end of the day's work, or before onset of inclement weather.
- 3.4 UNDERLAYMENT INSTALLATION
 - A. Self-Adhering Sheet Underlayment: Apply primer if required by manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation. Apply at locations indicated, wrinkle free, in shingle fashion to shed water, and with end laps of not less than 6 inches staggered 24 inches between courses. Overlap side edges not less than 3-1/2 inches. Roll laps with roller. Cover underlayment within 14 days.
 - 1. Apply over the entire roof surface.
- 3.5 METAL PANEL INSTALLATION
 - A. General: Install metal panels according to manufacturer's written instructions in orientation, sizes, and locations indicated. Install panels perpendicular to supports unless otherwise indicated. Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.
 - 1. Shim or otherwise plumb substrates receiving metal panels.
 - 2. Flash and seal metal panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by metal panels are installed.
 - 3. Install screw fasteners in predrilled holes.
 - 4. Locate and space fastenings in uniform vertical and horizontal alignment.
 - 5. Install flashing and trim as metal panel work proceeds.
 - 6. Install panels in continuous lengths without horizontal splices or laps.
 - 7. Align bottoms of metal panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.

- 8. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.
- B. Fasteners:
 - 1. Steel Panels: Use stainless-steel fasteners.
- C. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal panel manufacturer.
- D. Standing-Seam Metal Roof Panel Installation: Fasten metal roof panels to supports per manufacturer's instructions at each standing-seam joint at location, spacing, and with fasteners recommended in writing by manufacturer.
 - 1. Install pressure plates at locations indicated in manufacturer's written installation instructions.
 - 2. Snap Joint: Nest standing seams and fasten together by interlocking and completely engaging factory-applied sealant.
 - 3. Watertight Installation:
 - a. Apply a continuous ribbon of sealant or tape to seal joints of metal panels, using sealant or tape as recommend in writing by manufacturer as needed to make panels watertight.
 - b. Provide sealant or tape between panels and protruding equipment, vents, and accessories.
 - c. At panel splices, nest panels with minimum 6-inch end lap, sealed with sealant and fastened together by interlocking clamping plates.
- E. Clipless Metal Panel Installation: Fasten metal panels to supports with screw fasteners at each lapped joint at location and spacing recommended by manufacturer.
- F. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.
 - 1. Install components required for a complete metal panel system including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Provide types indicated by metal roof panel manufacturers; or, if not indicated, types recommended by metal roof panel manufacturer.
- G. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
 - 1. Install exposed flashing and trim that is without buckling and tool marks, and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and achieve waterproof and weather-resistant performance.
 - 2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

- H. Pipe Flashing: Form flashing around pipe penetration and metal roof panels. Fasten and seal to metal roof panels as recommended by manufacturer.
- 3.6 FIELD QUALITY CONTROL
 - A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect metal roof panel installation, including accessories. Report results in writing.
 - B. Remove and replace applications of metal roof panels where tests and inspections indicate that they do not comply with specified requirements.
 - C. Additional tests and inspections, at Contractor's expense, are performed to determine compliance of replaced or additional work with specified requirements.
 - D. Prepare test and inspection reports.
- 3.7 CLEANING AND PROTECTION
 - A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.
 - B. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 074113

SECTION 074600 - SIDING

PART 1 - GENERAL

- 1.1 SUMMARY
 - A. Section Includes:
 - 1. Fiber-cement siding.
 - 2. Fiber-cement soffit.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Samples for Verification: For each type, color, texture, and pattern required.
 - 1. 12-inch-long-by-actual-width Sample of siding.
 - 2. 12-inch-long-by-actual-width Sample of soffit.
- C. Product Certificates: For each type of siding and soffit, from manufacturer.
- D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for fiber-cement siding.
- E. Research/Evaluation Reports: For each type of siding required, from the ICC.
- F. Warranty: Sample of special warranty.
- 1.3 CLOSEOUT SUBMITTALS
 - A. Maintenance Data: For each type of siding and soffit and related accessories to include in maintenance manuals.
- 1.4 QUALITY ASSURANCE
 - A. Labeling: Provide fiber-cement siding that is tested and labeled according to ASTM C 1186 by a qualified testing agency acceptable to authorities having jurisdiction.
 - B. Source Limitations: Obtain each type, color, texture, and pattern of siding and soffit, including related accessories, from single source from single manufacturer.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store materials in a dry, well-ventilated, weathertight place.

1.6 COORDINATION

A. Coordinate installation with flashings and other adjoining construction to ensure proper sequencing.

1.7 WARRANTY

- A. Special Warranty: Standard form in which manufacturer agrees to repair or replace siding and soffit that fail(s) in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including cracking, and deforming.
 - b. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
2. Warranty Period: Minimum 25 years from date of Substantial Completion.

PART 2 - PRODUCTS

- 2.1 FACTORY FINISHED FIBER-CEMENT SIDING
 - A. General: ASTM C 1186, Type A, Grade II, fiber-cement board, noncombustible when tested according to ASTM E 136; with a flame-spread index of 25 or less when tested according to ASTM E 84.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Cemplank.
 - b. CertainTeed Corp.
 - c. James Hardie.
 - 2. Panel Texture: 48-inch-wide sheets with stucco texture.
 - 3. Factory Pre-finishing: Manufacturer's standard finish.
- 2.2 FACTORY FINISHED FIBER-CEMENT SOFFIT
 - A. General: ASTM C 1186, Type A, Grade II, fiber-cement board, noncombustible when tested according to ASTM E 136; with a flame-spread index of 25 or less when tested according to ASTM E 84.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Cemplank.
 - b. CertainTeed Corp.
 - c. James Hardie.
 - B. Pattern: 24-inch-wide sheets with stucco texture.
 - C. Ventilation: Provide unperforated soffit.
 - D. Factory Priming: Manufacturer's standard acrylic primer.
 - E. Colors: As indicated, or if not indicated, as selected by Project Engineer from manufacturer's full range of industry colors.

2.3 ACCESSORIES

- A. Decorative Accessories: Provide the following fiber-cement decorative accessories as indicated:
 - 1. Moldings and trim.
- B. Colors for Decorative Accessories: As indicated, or if not indicated, as selected by Project Engineer from manufacturer's full range of industry colors.
- C. Flashing: Provide flashing as needed for a water resistant installation or where indicated.
- D. Fasteners:
 - 1. For fastening to metal, use ribbed bugle-head screws of sufficient length to penetrate a minimum of 1/4 inch (6 mm), or three screw-threads, into substrate.
 - 2. For fastening fiber cement, use hot-dip galvanized or stainless-steel fasteners.

PART 3 - EXECUTION

- 3.1 EXAMINATION
 - A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of siding and soffit and related accessories.
 - B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean substrates of projections and substances detrimental to application.
- 3.3 INSTALLATION
 - A. General: Comply with siding and soffit manufacturer's written installation instructions applicable to products and applications indicated unless more stringent requirements apply.
 - 1. Do not install damaged components.
 - B. Install fiber-cement siding and soffit and related accessories.
 - 1. Install fasteners no more than 24 inches o.c.
 - C. Install joint sealants as specified in Division 07 Section "Joint Sealants" and to produce a weathertight installation.

3.4 ADJUSTING AND CLEANING

- A. Remove damaged, improperly installed, or otherwise defective materials and replace with new materials complying with specified requirements.
- B. Clean finished surfaces according to manufacturer's written instructions and maintain in a clean condition during construction.

SECTION 079200 - JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes sealants for the following applications, including those specified by reference to this Section:
 - 1. Exterior joints in the following vertical surfaces and nontraffic horizontal surfaces:
 - a. Control and expansion joints in cast-in-place concrete.
 - b. Control and expansion joints in unit masonry.
 - c. Joints between metal panels.
 - d. Joints between different materials listed above.
 - e. Perimeter joints between materials listed above and frames of doors.
 - f. Control and expansion joints overhead surfaces.
 - g. Other joints as indicated.
 - 2. Interior joints in the following vertical surfaces and horizontal nontraffic surfaces:
 - a. Control and expansion joints on exposed interior surfaces of exterior walls.
 - b. Perimeter joints of exterior openings.
 - c. Joints between plumbing fixtures and adjoining walls, floors, and counters.
 - d. Other joints as indicated.
 - 3. Interior joints in the following horizontal traffic surfaces:
 - a. Control and expansion joints in cast-in-place concrete slabs.
 - b. Other joints as indicated.

1.2 PERFORMANCE REQUIREMENTS

- A. Provide elastomeric joint sealants that establish and maintain watertight and airtight continuous joint seals without staining or deteriorating joint substrates.
- B. VOC Content of Sealants: Provide products that comply with the limits for VOC content when calculated according to Rule 67.21, County of San Diego Air Pollution Control District.

1.3 SUBMITTALS

- A. Product Data: For each joint-sealant product indicated.
- B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.
- C. Samples for Verification: For each type and color of joint sealant required. Install joint sealants in 1/2-inch-wide joints formed between two 6-inch-long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.
- D. Product Certificates: Signed by manufacturers of joint sealants certifying that products furnished comply with requirements and are suitable for the use indicated.
- E. Product Test Reports: From a qualified testing agency indicating sealants comply with requirements, based on comprehensive testing of current product formulations.

1.4 QUALITY ASSURANCE

- A. Field-Adhesion Testing: Before installing sealants, field test their adhesion to Project joint substrates as follows:
 - 1. Conduct field tests for each application indicated below:
 - a. Each kind of sealant and joint substrate indicated.
 - b. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.
 - 1) For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
 - 2. Report whether sealant failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. For sealants that fail adhesively, retest until satisfactory adhesion is obtained.
 - 3. Evaluation of Preconstruction Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing, in absence of other indications of noncompliance with requirements, will be considered satisfactory. Do not use sealants that fail to adhere to joint substrates during testing.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration date, pot life, curing time, and mixing instructions for multicomponent materials.
- B. Store and handle materials in compliance with manufacturer's written instructions to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Do not proceed with installation of joint sealants under the following conditions:
 - 1. When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer.
 - 2. When joint substrates are wet.
- B. Joint-Width Conditions: Do not proceed with installation of joint sealants where joint widths are less than those allowed by joint sealant manufacturer for applications indicated.
- C. Joint-Substrate Conditions: Do not proceed with installation of joint sealants until contaminants capable of interfering with adhesion are removed from joint substrates.

PART 2 - PRODUCTS

2.1 PRODUCTS AND MANUFACTURERS

A. Products: Subject to compliance with requirements, provide one of the products indicated for each type in the sealant schedules at the end of Part 3.

2.2 MATERIALS, GENERAL

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. Colors of Exposed Joint Sealants: As selected by Project Engineer from manufacturer's full range for this characteristic.
- 2.3 ELASTOMERIC JOINT SEALANTS
 - A. Elastomeric Sealant Standard: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant in the Elastomeric Joint-Sealant Schedule at the end of Part 3, including those referencing ASTM C 920 classifications for type, grade, class, and uses.
 - B. Additional Movement Capability: Where additional movement capability is specified in the Elastomeric Joint-Sealant Schedule, provide products with the capability, when tested for adhesion and cohesion under maximum cyclic movement per ASTM C 719, to withstand the specified percentage change in the joint width existing at the time of installation and remain in compliance with other requirements of ASTM C 920 for uses indicated.
 - C. Stain-Test-Response Characteristics: Where elastomeric sealants are specified in the Elastomeric Joint-Sealant Schedule to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.
 - D. Suitability for Contact with Food: Where elastomeric sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.
- 2.4 LATEX JOINT SEALANTS
 - A. Latex Sealant Standard: Comply with ASTM C 834 for each product of this description indicated in the Latex Joint-Sealant Schedule at the end of Part 3.
- 2.5 JOINT-SEALANT BACKING
 - A. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
 - B. Cylindrical Sealant Backings: ASTM C 1330, of type indicated below and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance:
 - 1. Type C: Closed-cell material with a surface skin.
 - C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

2.6 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants with joint substrates.
- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

- 3.1 EXAMINATION
 - A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.
 - B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint sealant manufacturer's written instructions and the following requirements:
 - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
 - a. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air.
 - 2. Remove laitance and form-release agents from concrete.
 - 3. Clean nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.
- B. Joint Priming: Prime joint substrates where recommended in writing by joint sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations of ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Install sealant backings of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 - 1. Do not leave gaps between ends of sealant backings.
 - 2. Do not stretch, twist, puncture, or tear sealant backings.
 - 3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
- D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and back of joints.

- E. Install sealants by proven techniques to comply with the following and at the same time backings are installed:
 - 1. Place sealants so they directly contact and fully wet joint substrates.
 - 2. Completely fill recesses provided for each joint configuration.
 - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
 - 1. Remove excess sealants from surfaces adjacent to joint.
 - 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
 - 3. Provide concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.

3.4 CLEANING

A. Clean off excess sealants or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.5 **PROTECTION**

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from the original work.

3.6 JOINT-SEALANT SCHEDULE

- A. Low-Modulus Nonacid-Curing Silicone Sealant: Where joint sealants of this type are indicated, provide products complying with the following:
 - 1. Products: Provide one of the following
 - a. 790; Dow Corning.
 - b. Silpruf; GE Silicones.
 - c. 864; Pecora Corporation.
 - d. 890; Pecora Corporation.
 - e. Spectrem 1; Tremco.
 - 2. Type and Grade: S (single component) and NS (nonsag).
 - 3. Class: 25.
 - 4. Additional Movement Capability: 50 percent movement in extension and 50 percent movement in compression for a total of 100 percent movement.
 - 5. Use Related to Exposure: NT (nontraffic).

- 6. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated, O.
 - a. Use O Joint Substrates: Coated glass, color anodic aluminum, aluminum coated with a high-performance coating, galvanized steel, masonry, ceramic tile, and wood.
- 7. Stain-Test-Response Characteristics: Nonstaining to porous substrates per ASTM C 1248.
- 8. Applications:
 - a. Exterior vertical and non-traffic horizontal joints. Interior control and expansion joints.
- B. Mildew-Resistant Silicone Sealant: Where joint sealants of this type are indicated, provide products formulated with fungicide that are intended for sealing interior ceramic tile joints and other nonporous substrates that are subject to in-service exposures of high humidity and temperature extremes, and that comply with the following:
 - 1. Products: Provide one of the following
 - a. 786 Mildew Resistant; Dow Corning.
 - b. Sanitary 1700; GE Silicones.
 - c. 898 Silicone Sanitary Sealant; Pecora Corporation.
 - d. Tremsil 600 White; Tremco.
 - 2. Type and Grade: S (single component) and NS (nonsag).
 - 3. Class: 25.
 - 4. Use Related to Exposure: NT (nontraffic).
 - 5. Uses Related to Joint Substrates: G, A, and, as applicable to joint substrates indicated, O.
 - 6. Application: Ceramic wall tile.
- C. Single-Component Nonsag Urethane Sealant: Where joint sealants of this type are indicated, provide products complying with the following:
 - 1. Products: Provide one of the following
 - a. Vulkem 116; Mameco International.
 - b. Vulkem 230; Mameco International.
 - c. Sikaflex 1a; Sika Corporation.
 - d. NP 1; Sonneborn Building Products Div., ChemRex Inc.
 - 2. Type and Grade: S (single component) and NS (nonsag).
 - 3. Class: 25.
 - 4. Use Related to Exposure: T (traffic)
 - 5. Uses Related to Joint Substrates: M, A, and, as applicable to joint substrates indicated, O.

- D. Latex Sealant: Where joint sealants of this type are indicated, provide products complying with the following:
 - 1. Products: Provide one of the following
 - a. Chem-Calk 600; Bostik Inc.
 - b. AC-20; Pecora Corporation.
 - c. Sonolac; Sonneborn Building Products Div., ChemRex, Inc.
 - d. Tremflex 834; Tremco.
 - 2. Applications:
 - a. Interior non-moving vertical joints.
- E. Acrylic or Terpolymer Acrylic Base Sealant: Where joint sealants of this type are indicated, provide products complying with the following:
 - 1. Products: Provide one of the following:
 - a. Mono; Tremco.
 - b. One part acrylic sealant; DAP.
 - 2. Chemical curing, self-leveling, non-sagging, homogeneous and free from lumps, capable of being continuously immersed in water, non-staining and non-bleeding.
 - 3. Movement: Plus or minus 12.5%
 - 4. Applicatons:
 - a. Horizontal non-traffic-bearing surfaces.
- F. Polyurethane Joint Sealant: Where joint sealants of this type are indicated, provide products complying with the following:
 - 1. Products: Provide one of the following:
 - a. THC-900: Tremco
 - b. Vulcem 245; Mameco
 - 2. Standards: ASTM C920 and Federal Specifications TT-S-00227E
 - 3. Type: I
 - 4. Class: A
 - 5. Movement: Plus or minus 25%.
 - 6. Applications:
 - a. Horizontal traffic-bearing surfaces.
- G. Three-part Epoxidized Polyurethane Terpolymer Sealant: Where joint sealants of this type are indicated, provide products complying with the following:
 - 1. Products: Provide one of the following:
 - a. Dymeric; Tremco.
 - b. Vulkem 227; Mameco

- 2. Type: II
- 3. Federal SpecificationsTT-S-00227E Class: A
- 4. ASTM C920
 - a. Type I
 - b. Grade NS
 - c. Class 25
- 5. Uses Related to Joint Substrates: NT, M, A, and, as applicable to joint substrates indicated, O.
- 6. Applications:
 - a. Vertical surfaces.

SECTION 081213 - HOLLOW METAL FRAMES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes hollow-metal frames.
- B. Related Requirements:
 - 1. Section 081743 "Fiberglass Reinforced Plastic Doors" for FRP door assemblies.
 - 2. Section 087100 "Finish Hardware"

1.2 DEFINITIONS

A. Minimum Thickness: Minimum thickness of base metal without coatings according to NAAMM-HMMA 803 or SDI A250.8.

1.3 COORDINATION

A. Coordinate anchorage installation for hollow-metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, and finishes.
- B. Shop Drawings: Include the following:
 - 1. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
 - 2. Locations of reinforcement and preparations for hardware.
 - 3. Details of each different wall opening condition.
 - 4. Details of anchorages, joints, field splices, and connections.
- C. Schedule: Provide a schedule of hollow-metal work prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with final Door Hardware Schedule.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver hollow-metal work palletized, packaged, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.
 - 1. Provide additional protection to prevent damage to factory-finished units.
- B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.
- C. Store hollow-metal work vertically under cover at Project site with head up. Place on minimum 4-inch- high wood blocking. Provide minimum 1/4-inch space between each unit to permit air circulation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. <u>Manufacturers</u>: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. <u>Amweld International, LLC</u>.
 - 2. <u>Ceco Door Products</u>; an Assa Abloy Group company.
 - 3. <u>Curries Company</u>; an Assa Abloy Group company.
 - 4. <u>Custom Metal Products</u>.
 - 5. <u>Deansteel</u>.
 - 6. <u>DKS Steel Door & Frame Sys. Inc</u>.
 - 7. <u>Door Components, Inc</u>.
 - 8. <u>Hollow Metal Xpress</u>.
 - 9. <u>LaForce, Inc</u>.
 - 10. Megamet Industries, Inc.
 - 11. <u>Mesker Door Inc</u>.
 - 12. MPI Group, LLC (The).
 - 13. <u>National Custom Hollow Metal</u>.
 - 14. <u>Premier Products, Inc</u>.
 - 15. <u>Republic Doors and Frames</u>.
 - 16. Rocky Mountain Metals, Inc.
 - 17. <u>Security Metal Products Corp</u>.
 - 18. <u>Steelcraft</u>; an Ingersoll-Rand company.
 - 19. <u>Stiles Custom Metal, Inc</u>.
 - 20. <u>Titan Metal Products, Inc</u>.
- B. Source Limitations: Obtain hollow-metal work from single source from single manufacturer.

2.2 EXTERIOR HOLLOW-METAL FRAMES

- A. Construct exterior frames to comply with the standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.
- B. Heavy-Duty Frames: SDI A250.8, Level 2.
 - 1. Physical Performance: Level B according to SDI A250.4.
 - 2. Materials: Metallic-coated steel sheet, minimum thickness of 0.053 inch with minimum A40 coating.
 - 3. Construction: Full profile welded.
 - 4. Exposed Finish: Prime.

2.3 FRAME ANCHORS

- A. Jamb Anchors:
 - 1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042 inch thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.177 inch thick.
 - 2. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch thick.
- B. Floor Anchors: Formed from same material as frames, minimum thickness of 0.042 inch, and as follows:
 - 1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.

2.4 MATERIALS

- A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- B. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B.
- C. Frame Anchors: ASTM A 879/A 879M, Commercial Steel (CS), 04Z coating designation; mill phosphatized.
 - 1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot-dip galvanized according to ASTM A 153/A 153M, Class B.
- D. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.
- E. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow-metal frames of type indicated.

2.5 FABRICATION

- A. Fabricate hollow-metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for metal thickness. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.
- B. Hollow-Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
 - 1. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
 - 2. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.
 - 3. Floor Anchors: Weld anchors to bottoms of jambs with at least four spot welds per anchor; however, for slip-on drywall frames, provide anchor clips or countersunk holes at bottoms of jambs.
 - 4. Jamb Anchors: Provide number and spacing of anchors as follows:
 - a. Postinstalled Expansion Type: Locate anchors not more than 6 inches from top and bottom of frame. Space anchors not more than 26 inches o.c.

- C. Hardware Preparation: Factory prepare hollow-metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to SDI A250.6, the Door Hardware Schedule, and templates.
 - 1. Reinforce frames to receive nontemplated, mortised, and surface-mounted hardware.
 - 2. Comply with applicable requirements in SDI A250.6 and BHMA A156.115 for preparation of hollow-metal work for hardware.

2.6 STEEL FINISHES

- A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.
 - 1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with SDI A250.10; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.
- B. Drill and tap frames to receive nontemplated, mortised, and surface-mounted hardware.
- 3.3 INSTALLATION
 - A. General: Install hollow-metal work plumb, rigid, properly aligned, and securely fastened in place. Comply with Drawings and manufacturer's written instructions.
 - B. Hollow-Metal Frames: Install hollow-metal frames of size and profile indicated. Comply with SDI A250.11 or NAAMM-HMMA 840 as required by standards specified.
 - 1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
 - a. Remove temporary braces necessary for installation only after frames have been properly set and secured.
 - b. Check plumb, square, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
 - 2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.
 - a. Floor anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.
 - 3. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout.

- 4. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
- 5. Installation Tolerances: Adjust hollow-metal door frames for squareness, alignment, twist, and plumb to the following tolerances:
 - a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 - b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
 - c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.

3.4 ADJUSTING AND CLEANING

- A. Final Adjustments: Remove and replace defective work, including hollow-metal work that is warped, bowed, or otherwise unacceptable.
- B. Remove grout and other bonding material from hollow-metal work immediately after installation.
- C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.
- D. Metallic-Coated Surface Touchup: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.
- E. Touchup Painting: Cleaning and touchup painting of abraded areas of paint are specified in painting Sections.

SECTION 081743 – FIBERGLASS REINFORCED PLASTIC FLUSH DOORS

PART 1 - GENERAL

- 1.1 SECTION INCLUDES
 - A. Fiberglass reinforced polyester (FRP) flush doors.
- 1.2 RELATED SECTIONS
 - A. Section 087100 Finish Hardware.
- 1.3 REFERENCES
 - A. AAMA 920-03 Specification for Operating Cycle Performance of Side-Hinged Exterior Door Systems.
 - B. ANSI A250.4 Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors and Hardware Reinforcings.
 - C. ASTM E 1886 Performance of Exterior Protective Systems.
 - D. ASTM E 1996 Impact Performance of Exterior Protective Systems
 - E. NWWDA T.M. 7-90 Cycle Slam Test Method
 - F. SFBC 3603.2 (b)(5) Forced Entry Resistance Test.
- 1.4 PERFORMANCE REQUIREMENTS
 - A. General: Provide door assemblies that have been designed and fabricated to comply with specified Performance requirements, as demonstrated by testing manufacturer's corresponding standard systems.
 - B. Indoor air quality testing per ASTM D 6670-01: GREENGUARD Environmental Institute Certified including GREENGUARD for Children and Schools Certification.
 - C. Swinging Door Cycle Test, Doors and Frames, ANSI A250.4: Minimum of 25,000,000 cycles.
 - D. Cycle Slam Test Method, NWWDA T.M. 7-90: Minimum 5,000,000 Cycles.
 - E. Surface Burning Characteristics, FRP Doors and Panels, ASTM E 84:
 - 1. Flame Spread: Maximum of 200, Class C.
 - 2. Smoke Developed: Maximum of 450, Class C.
- 1.5 SUBMITTALS
 - A. Product Data: Submit manufacturer's product data, including description of materials, components, fabrication, finishes, and installation.
 - B. Shop Drawings: Submit manufacturer's shop drawings, including elevations, sections, and details, indicating dimensions, tolerances, materials, fabrication, doors, panels, framing, hardware schedule, and finish.
 - C. Test Reports: Submit certified test reports from qualified independent testing agency indicating doors comply with specified performance requirements.
 - D. Maintenance Manual: Submit manufacturer's maintenance and cleaning instructions for doors, including maintenance and operating instructions for hardware.
 - E. Warranty: Submit manufacturer's standard warranty.

1.6 QUALITY ASSURANCE

- A. Manufacturer's Qualifications:
 - 1. Continuously engaged in manufacturing of doors of similar type to that specified, with a minimum of 15 years successful experience.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying opening door mark and manufacturer.
- B. Storage: Store materials in clean, dry area indoors in accordance with manufacturer's instructions.
- C. Handling: Protect materials and finish from damage during handling and installation.

1.8 WARRANTY

- A. Warrant doors, frames, and factory hardware against failure in materials and workmanship, including excessive deflection, faulty operation, defects in hardware installation, and deterioration of finish or construction in excess of normal weathering.
- B. Warranty Period: Ten years starting on date of shipment. In addition, a limited lifetime (while the door is in its specified application in its original installation) warranty covering: failure of corner joinery, core deterioration, delamination or bubbling of door skin.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. <u>Basis-of-Design Product</u>: Subject to compliance with requirements, provide Special-Lite SL-17 Flush Doors with fiberglass reinforced polyester (FRP) face sheets or a comparable product by one of the following:
 - 1. REBCO Inc.
 - 2. Edgewater
 - 3. Simon Door.
 - 4. Commercial Door Systems.
- B. Source Limitations: Obtain doors from single manufacturer.

2.2 FRP FLUSH DOORS

- A. Construction:
 - 1. Door Thickness: 1-3/4 inches.
 - 2. Stiles and Rails: Aluminum extrusions made from prime-equivalent billet that is produced from 100% reprocessed 6063-T5 alloy recovered from industrial processes, minimum of 2-5/16-inch depth.
 - 3. Corners: Mitered.
 - 4. Provide joinery of 3/8-inch diameter full-width tie rods through extruded splines top and bottom integral to standard tubular shaped stiles and rails reinforced to accept hardware as specified.
 - 5. Securing Internal Door Extrusions: 3/16-inch angle blocks and locking hex nuts for joinery. Welds, glue, or other methods are not acceptable.

- 6. Furnish extruded stiles and rails with integral reglets to accept face sheets. Lock face sheets into place to permit flush appearance.
- 7. Rail caps or other face sheet capture methods are not acceptable.
- 8. Extrude top and bottom rail legs for interlocking continuous weather bar.
- 9. Meeting Stiles: Pile brush weatherseals. Extrude meeting stile to include integral pocket to accept pile brush weatherseals.
- 10. Bottom of Door: Install bottom weather bar with nylon brush weatherstripping into extruded interlocking edge of bottom rail.
- 11. Glue: Use of glue to bond sheet to core or extrusions is not acceptable.
- B. Face Sheet:
 - 1. Material: FRP, 0.120-inch thickness, finish color throughout.
 - 2. Protective coating: Abuse-resistant engineered surface. Provide FRP protective coating.
 - 3. Texture: Pebble.
 - 4. Color: As selected from Manufacturer's standard colors.
 - 5. Adhesion: The use of glue to bond face sheet to foam core is prohibited.
- C. Core:
 - 1. Material: Poured-in-place polyurethane foam.
 - 2. Density: Minimum of 5 pounds per cubic foot.
- D. Cutouts:
 - 1. Manufacture doors with cutouts for required vision lites, louvers, and panels.
 - 2. Factory install vision lites, louvers, and panels.
- E. Hardware:
 - 1. Premachine doors in accordance with templates from specified hardware manufacturers and hardware schedule.
 - 2. Factory install hardware.
- 2.3 FABRICATION
 - A. Sizes and Profiles: Required sizes for door and frame units, and profile requirements shall be as indicated on the Drawings.
 - B. Coordination of Fabrication: Field measure before fabrication and show recorded measurements on shop drawings.
 - C. Assembly:
 - 1. Complete cutting, fitting, forming, drilling, and grinding of metal before assembly.
 - 2. Remove burrs from cut edges.
 - D. Welding: Welding of doors or frames is not acceptable.

- E. Fit:
 - 1. Maintain continuity of line and accurate relation of planes and angles.
 - 2. Secure attachments and support at mechanical joints with hairline fit at contacting members.

2.7 HARDWARE

- A. Premachine doors in accordance with templates from specified hardware manufacturers and hardware schedule.
- B. Factory install hardware.
- C. Hardware Schedule: As specified in Section 087100.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas to receive doors. Notify Resident Engineer of conditions that would adversely affect installation or subsequent use. Do not proceed with installation until unsatisfactory conditions are corrected.
- 3.2 PREPARATION
 - A. Ensure openings to receive frames are plumb, level, square, and in tolerance.
- 3.3 INSTALLATION
 - A. Install doors in accordance with manufacturer's instructions.
 - B. Install doors plumb, level, square, true to line, and without warp or rack.
 - C. Repair minor damages to finish in accordance with manufacturer's instructions and as approved by Resident Engineer.
 - D. Remove and replace damaged components that cannot be successfully repaired as determined by Resident Engineer.
- 3.5 ADJUSTING
 - A. Adjust doors, hinges, and locksets for smooth operation without binding.
- 3.6 CLEANING
 - A. Clean doors promptly after installation in accordance with manufacturer's instructions.
 - B. Do not use harsh cleaning materials or methods that would damage finish.
- 3.7 PROTECTION
 - A. Protect installed doors to ensure that, except for normal weathering, doors will be without damage or deterioration at time of substantial completion.

SECTION 083113 - ACCESS DOORS AND FRAMES

PART 1 - GENERAL

- 1.1 SUMMARY
 - A. Section includes access doors and frames for walls.
- 1.2 SUBMITTALS
 - A. Product Data: For each type of product.
 - 1. Include construction details, materials, individual components and profiles, and finishes.
 - B. Shop Drawings:
 - 1. Include plans, elevations, sections, details, and attachments to other work.
 - 2. Detail fabrication and installation of access doors and frames for each type of substrate.

PART 2 - PRODUCTS

2.1 ACCESS DOORS AND FRAMES FOR WALLS AND CEILINGS

- A. <u>Manufacturers</u>: Subject to compliance with requirements, provide products by one of the following:
 - 1. <u>Babcock-Davis</u>.
 - 2. <u>Elmdor/Stoneman Manufacturing Co.; Div. of Acorn Engineering Co.</u>
 - 3. J. L. Industries, Inc.; Div. of Activar Construction Products Group.
 - 4. <u>Karp Associates, Inc</u>.
 - 5. Larsen's Manufacturing Company.
 - 6. <u>Milcor Inc</u>.
 - 7. <u>Nystrom, Inc</u>.
- B. Source Limitations: Obtain each type of access door and frame from single source from single manufacturer.
- C. Medium-Security Flush Access Doors:
 - 1. Assembly Description: Fabricate door to fit flush to frame. Provide manufacturer's standard-width exposed flange, proportional to door size.
 - 2. Locations: Wall.
 - 3. Door Size: 9" x 9".
 - 4. Stainless-Steel Sheet for Door: Nominal 0.109 inch, 12 gage.
 - a. Finish: No. 4.
 - 5. Frame Material: Same material, thickness, and finish as door.
 - 6. Hinges: Manufacturer's standard security hinge.
 - 7. Hardware: Tamper-resistant lock.
- D. Hardware:
 - 1. Lock: Cylinder furnished by manufacturer.

2.2 MATERIALS

- A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- B. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum G60 or A60 metallic coating.
- C. Frame Anchors: Same type as door face.
- D. Inserts, Bolts, and Anchor Fasteners: Hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.

2.3 FABRICATION

- A. General: Provide access door and frame assemblies manufactured as integral units ready for installation.
- B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.
- C. Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access doors to types of supports indicated.
 - 1. Provide mounting holes in frames for attachment of units to metal or wood framing.
- D. Latching Mechanisms: Furnish number required to hold doors in flush, smooth plane when closed.

2.4 FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- D. Stainless-Steel Finishes:
 - 1. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
 - 2. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.
 - a. Run grain of directional finishes with long dimension of each piece.
 - b. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
 - c. Directional Satin Finish: No. 4.
- E. Steel and Metallic-Coated-Steel Finishes:
 - 1. Factory Prime: Apply manufacturer's standard, fast-curing, lead- and chromate-free, universal primer immediately after surface preparation and pretreatment.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
- 3.2 INSTALLATION
 - A. Comply with manufacturer's written instructions for installing access doors and frames.
 - B. Install doors flush with adjacent finish surfaces or recessed to receive finish material.

3.3 ADJUSTING

- A. Adjust doors and hardware, after installation, for proper operation.
- B. Remove and replace doors and frames that are warped, bowed, or otherwise damaged.

SECTION 087100 -- FINISH HARDWARE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Door Hardware.
 - 2. Cylinders for doors fabricated with locking hardware.
- B. Related Sections:
 - 1. Section 081123 Hollow Metal Frames.
 - 2. Section 081743 Fiberglass Reinforced Plastic Doors
- C. Specific Omissions: Hardware for the following is specified or indicated elsewhere.
 - 1. Signs, except where scheduled.
 - 2. Toilet accessories, including grab bars.
- 1.2 **REFERENCES**:
 - A. Use date of standard in effect as of Bid date.
 - B. American National Standards Institute ANSI 156.18 Materials and Finishes.
 - C. ANSI A117.1 Specifications for making buildings and facilities usable by physically handicapped people.
 - D. ADA Americans with Disabilities Act of 1990
 - E. BHMA Builders Hardware Manufacturers Association
 - F. DHI Door and Hardware Institute
 - G. NFPA National Fire Protection Association
 - 1. NFPA 80 Fire Doors and Windows
 - 2. NFPA 101 Life Safety Code
 - 3. NFPA 105 Smoke and Draft Control Door Assemblies
 - 4. NFPA 252 Fire Tests of Door Assemblies
 - H. UL Underwriters Laboratories
 - 1. UL10C Fire Tests of Door Assemblies (Positive Pressure)
 - 2. UL 305 Panic Hardware
 - I. WHI Warnock Hersey Incorporated
 - J. State of California Building Code
 - K. SDI Steel Door Institute
 - L. WDI Wood Door Institute
 - M. AWI Architectural Woodwork Institute
 - N. NAAM National Association of Architectural Metal Manufacturers

1.3 SUBMITTALS & SUBSTITUTIONS

- A. SUBMITTALS: Submit six copies of schedule per Division 1. Organize vertically formatted schedule into "Hardware Sets" with index of doors and headings, indicating complete designations of every item required for each door or opening. Include following information:
 - 1. Type, style, function, size, quantity and finish of hardware items.

Use BHMA Finish codes per ANSI A156.18.

- 2. Name, part number and manufacturer of each item.
- 3. Fastenings and other pertinent information.
- 4. Location of hardware set coordinated with floor plans and door schedule.
- 5. Explanation of abbreviations, symbols, and codes contained in schedule.
- 6. Mounting locations for hardware.
- 7. Door and frame sizes, materials and degrees of swing.
- 8. List of manufacturers used and their nearest representative with address and phone number.
- 9. Catalog cuts.
- 10. Manufacturer's technical data and installation instructions for electronic hardware.
- 11. Date of jobsite visit.
- B. Bid and submit manufacturer's updated/improved item if scheduled item is discontinued.
- C. Make substitution requests in accordance with Division 1. Include product data and indicate benefit to the Project. Furnish operating samples on request.
- D. Furnish as-built/as-installed schedule with closeout documents, including keying schedule, wiring/riser diagrams, manufacturers' installation, adjustment and maintenance information, and supplier's final inspection report.

1.4 QUALITY ASSURANCE:

- A. Qualifications:
 - 1. Hardware supplier: direct factory contract supplier who employs a certified architectural hardware consultant (AHC), available at reasonable times during course Work for project hardware consultation to Owner, Resident Engineer and Contractor.
 - (1) Responsible for detailing, scheduling and ordering of finish hardware.
- B. Hardware: New, free of defects, blemishes and excessive play. Obtain each kind of hardware, latch and locksets, exit devices, hinges and closers, from one manufacturer.
- C. Exit Doors: Operable from inside with single motion without the use of a key or special knowledge or effort.

1.5 DELIVERY, STORAGE AND HANDLING:

- A. Delivery: coordinate delivery to appropriate locations (shop or field).
 - 1. Permanent keys and cores: secured delivery direct to Owner's representative.
- B. Acceptance at Site: Items individually packaged in manufacturers' original containers, complete with proper fasteners and related pieces. Clearly mark packages to indicate contents, locations in hardware schedule and door numbers.

- C. Storage: Provide locked storage area for hardware, protect from moisture, sunlight, chemicals, etc.
- 1.6 **PROJECT CONDITIONS**:
 - A. Where exact types of hardware specified are not adaptable to finished shape or size of members requiring hardware, provide suitable types having as nearly as practical as the same operation and quality as type specified, subject to Resident Engineer's approval.
- 1.7 SEQUENCING AND COORDINATION:
 - A. Coordinate with concrete.
 - B. Reinforce walls.
 - C. Coordinate finish floor materials and floor-mounted hardware.
 - D. Furnish manufacturer templates to door and frame fabricators.
 - E. Use hardware consultant to check Shop Drawings for doors and entrances to confirm that adequate provisions will be made for proper hardware installation.
 - 1. Confirm that door manufacturers furnish necessary UBC-7-2 compliant seal packages.

1.8 WARRANTY:

- A. Part of respective manufacturers' regular terms of sale. Provide manufacturers' warranties:
 - 1. Closers: Ten years mechanical, two years electrical.
 - 2. Exit Devices: Three years.
 - 3. Hinges: Life of Building.
 - 4. Other Hardware: Two years.

1.9 COMMISSIONING:

- A. Test door hardware operation with climate control system and stairwell pressurization system both at rest and while in full operation.
- B. Test electrical, electronic and electro-pneumatic hardware systems for satisfactory operation.
- C. Test hardware interfaced with fire/life-safety system for proper operation and release.

PART 2 - PRODUCTS

- 2.1 MANUFACTURERS:
 - A. Listed acceptable alternate manufacturers: submit for review products with equivalent function and features of scheduled products.

ITEM:	MANUFACTURER:	ACCEPTABLE SUB:
Hinges	(IVE) Ives	Bommer, Stanley
Key System	(BES) Best	Owner's Standard
Locks	(SCH) Schlage	Owner's Standard
Closers	(LCN) LCN	Norton 7500-forged arms
Silencers	(IVE) Ives	Hager
Push & Pull Plates	(IVE) Ives	Hager, Rockwood
Kickplates	(IVE) Ives	Hager, Rockwood
Stops & Holders	(IVE)Ives	Trimco, Rockwood
Thresholds	(NGP) National Guard	Pemko, Reese
Seals & Bottoms	(NGP) National Guard	Pemko, Reese

- B. Provide hardware items required to complete the work in accordance with these specifications and manufacturers' instructions.
 - 1. Include items inadvertently omitted from this specification. Note these items in submittal for review.
 - 2. Where scheduled item is now obsolete, bid and furnish manufacturers updated item at no additional cost to the project.
- 2.2 HANGING MEANS:
 - A. Conventional Hinges: Hinge open widths minimum, but, of sufficient throw to permit maximum door swing. Stainless steel pins and concealed bearings with stainless steel fasteners.
 - 1. Three hinges per leaf to 7 foot, 6 inch height. Add one for each additional 30 inches in height, or any fraction thereof.
 - 2. Extra heavy weight hinges on doors over 3 foot, 5 inches in width.
 - 3. Outswinging exterior doors: non-ferrous with non-removable (NRP) stainless steel pins.
 - 4. Non-ferrous material exteriors and at doors subject to corrosive atmospheric conditions.
 - 5. Provide shims and shimming instructions for proper door adjustment.
- 2.3 LOCKSETS, LATCHSETS, DEADBOLTS:
 - A. Mortise and Cylindrical Locksets: as scheduled.
 - 1. Chassis: cold-rolled steel, handing field-changeable without disassembly.
 - 2. Lever Trim: through-bolted, Schlage 06A and Rhodes as scheduled. Filled hollow tube design unacceptable.
 - 3. Thumbturns: accessible design not requiring pinching or twisting motions to operate.
 - 4. Deadbolts: stainless steel 1-inch throw.
 - 5. Strikes: 16 gage curved steel, bronze or brass with 1 inch deep box construction, lips of sufficient length to clear trim and protect clothing.
 - 6. Scheduled Lock Series and Design: Schlage L series, Schlage ND series.
 - 7. Certifications:
 - a. ANSI A156.13, 1994, Grade 1 Operational, Grade 1 Security.
 - b. ANSI A.156.2-2003 Grade 1, UL Listed.

2.4 CLOSERS

- A. General: One manufacturer for closer units throughout the Work.
- B. Surface Closers:
 - 1. Full rack-and-pinion type cylinder with removable non-ferrous cover and cast iron body. Double heat-treated pinion shaft, single piece forged piston, chrome-silicon steel spring.
 - 2. ISO 2000 certified. Units stamped with date-of-manufacture code.
 - 3. Thru-bolts at wood doors unless doors are provided with closer blocking. Non-sized, non-handed, and adjustable.
 - 4. Plates, brackets and special templating when needed for interface with particular header, door and wall conditions and neighboring hardware.

- 5. Opening pressure: Exterior doors 5 lb., interior doors 5 lb., labeled fire doors 5 lb or up to 15 lbs with permission from the Authority Having Jurisdiction..
- 6. Separate adjusting valves for closing speed, latching speed and backcheck, fourth valve for delayed action where scheduled.
- 7. Closers, interior and exterior are to have a special rust inhibitor on the body and arms.
- 8. Provide non corrosive fasteners of brass bronze or stainless steel.
- 9. Non-flaming fluid will not fuel door or floor covering fires.
- 10. Accepted: LCN 4041 Series, Norton 7500 with forged arms.
- 2.5 OTHER HARDWARE
 - A. Flush Bolts: Low operating force design with stainless steel fasteners.
 - B. Kick Plates: Four beveled edges, .050 inches minimum thickness, height and width as scheduled. Sheet-metal screws of stainless steel to match other hardware.
 - C. Door Stops: Provide stops to protect walls, casework or other hardware with stainless steel fasteners.
 - 1. Seals: Finished to match adjacent frame color.
 - 2. Fire-rated Doors, Brush Seals: UL10C/UBC-7-2 compliant. Coordinate with selected door manufacturers and selected frame manufacturer's requirements. Where rigid housed brush seals are scheduled in this section and the selected door manufacturer only requires an adhesive mounted resilient seal, furnish rigid housed seal at minimum, or both the rigid housed seal and the adhesive applied seal if necessary to fulfill door manufacturer's requirement. Adhesive applied seal alone is deemed insufficient for this project where rigid housed seals are scheduled.
 - 3. Fire-rated Doors, Intumescent Seals: Furnish fire-labeled opening assembly complete and in full compliance with UL10C/UBC-7-2. Furnished by selected door manufacturer, these seals vary in requirement by door type and door manufacture. Adhesive applied intumescent strips are not acceptable, use concealed-in-door-edge type.
 - D. Thresholds: As scheduled and per details. Minimum wall thickness of .162 with a non slip surface, anchored with machine screw and metal anchors. Substitute products: certify that the products equal or exceed specified material's thickness. Proposed substitutions: submit for approval.
 - 1. Set in full bed of butyl-rubber or polyisobutylene mastic sealant complying with requirements in Division 7 "Thermal and Moisture Protection". Non-ferrous ¹/₄ inch fasteners and lead expansion shield anchors, or Red-Head #SFS-1420 (or approved equivalent) Flat Head Sleeve Anchors (SS/FHSL).
 - 2. Provide manufacturer's non skid surface.
 - F. Fasteners: Generally, exposed screws to be Phillips or Robertson drive. Provide stainless steel, plated brass or plated bronze fasteners.

Silencers: Interior hollow metal frames, 3 for single doors, 4 for pairs of doors. Omit where adhesive mounted seal occurs. Leave no unfilled/uncovered pre-punched silencer holes.

- 2.6 FINISH:
 - A. Stain Nickel, BHMA 626, brass/bronze base, brushed chrome plated and BHMA 630, Brushed Stainless Steel.
 - B. Door closers: Powder coated to Stain Chrome.

C. Aluminum items: match predominant adjacent material in clear anodized finish. Seals to coordinate with frame color.

2.7 KEYING REQUIREMENTS:

- A. Key Systems: Where indicated in the hardware sets provide the Best interchangeable core in small format in the keyway of record . Where indicated in the hardware sets provide small format interchangeable core in keyway of record, in small format keyed to the existing system in the keyway of record. Key blanks available only from factory-direct sources, not available from after-market key blank manufacturers. For estimate use factory GMK charge. Initiate and conduct meeting(s) with Owner to determine system keyway(s) and structure, furnish Owner's written approval of the system.
 - 1. Existing factory registered master key system. Meet with the owner to determine the continuation of the system and establish the keying nomenclature.
 - 2. Construction keying: brass keyed-alike temporary cores plus 5 operating keys and 2 construction control keys. Temporary cores and keys remain property of hardware supplier.
- B. Keys: Four Keys per cylinder, one Master and Control..
- C. Locksets and cylinders: keyed at factory of lock manufacturer where permanent records are maintained. Locks and cylinders same manufacturer.
- D. Permanent keys and cores: secured shipment direct from point of origination to Owner's representative.
- E. Bitting List: Secured shipment direct from point of origination to Owner upon completion.

PART 3 - EXECUTION

- 3.1 ACCEPTABLE INSTALLERS:
 - A. Factory trained, certified, and carries a factory-issued card certifying that person as a "Certified Installer". Alternative: can demonstrate suitably equivalent competence and experience.
- 3.2 PREPARATION:
 - A. Ensure that walls and frames are square and plumb before hardware installation.
 - B. Locate hardware per SDI-100 and applicable building, fire, life-safety, accessibility, and security codes.
 - 1. Notify Resident Engineer of any code conflicts before ordering material.
 - 2. Where new hardware is to be installed near existing doors/hardware scheduled to remain, match locations of existing hardware.
- 3.3 INSTALLATION
 - A. Install hardware per manufacturer's instructions and recommendations. Do not install surface-mounted items until finishes have been completed on substrate. Set units level, plumb and true to line and location. Adjust and reinforce attachment substrate for proper installation and operation.
 - 1. Gaskets: install jamb-applied gaskets before closers, overhead stops, rim strikes, etc. Install sweeps across bottoms of doors before astragals, cope sweeps around bottom pivots, trim astragals to tops of sweeps.
 - 2. When hardware is to be attached to existing metal surface and insufficient reinforcement exists, use RivNuts, NutSerts or similar anchoring device for screws.

- B. Locate floor stops not more than 4 inches from the wall.
- C. Drill pilot holes for fasteners in wood doors and/or frames.
- D. Lubricate and adjust existing hardware scheduled to remain. Carefully remove and give to Owner items not scheduled for reuse.

3.4 ADJUSTING

- A. Adjust and check for proper operation and function. Replace units, which cannot be adjusted to operate freely and smoothly.
 - 1. Hardware damaged by improper installation or adjustment methods to be repaired or replaced to Owner's satisfaction.
- B. Inspection: Use hardware supplier. Include suppliers with closeout documents.
- C. Follow-up inspection: Installer to provide letter of agreement to Owner that approximately 6 months after substantial completion, installer will visit Project with representatives of the manufacturers of the locking devices and door closers to accomplish following:
 - 1. Re-adjust hardware.
 - 2. Evaluate maintenance procedures and recommend changes or additions, and instruct Owner's personnel.
 - 3. Identify items that have deteriorated or failed.
 - 4. Submit written report identifying problems and likely future problems.

3.5 DEMONSTRATION:

A. Demonstrate electrical, electronic and pneumatic hardware systems, including adjustment and maintenance procedures.

3.6 **PROTECTION/CLEANING**:

- A. Cover installed hardware, protect from paint, cleaning agents, weathering, carts/barrows, etc. Remove covering materials and clean hardware just prior to substantial completion.
- B. Clean adjacent wall, frame and door surfaces soiled from installation/reinstallation process.

3.7 SCHEDULE OF FINISH HARDWARE

- A. See door schedule in drawings for hardware set assignments.
- B. Manufacturers and their abbreviations used in this schedule:
 - BES BestIVE H. B. IvesLCN LCN ClosersNGP National Guard ProductsSCH Schlage Lock Company

SPECWORKS # 106834-B7R53CO1U

	Heading 001					
	1 SGL DOOR 102	EXTERIOR / RESTROOM 102				
	1 SGL DOOR 110	EXTERIOR / RESTROOM 110				
	3'0" x 6'8" x 1-3/4" x FIBR x H	MF x NON-RTD				
	Each Assembly to have:					
1	EA CONTINUOUS HINGE	700	630	IVE		
1	EA MORTISE DEADBOLT	L496L X 09-611"OCCUPIED X L583-363 TURN	626	SCH		
		LEVER				
1	EA MORTISE CYLINDER	1E64-7 PIN X SCHLAGE CAM	626	BES		
1	EA PUSH PLATE	8200 3" X 12"	626	IVE		
1	EA PUSH PLATE	8200 3" X 12"	630	IVE		
1	EA SURFACE CLOSER	4041 SPECIAL RUST INHIB ON BODY/ARM	689	LCN		
1	EA FLOOR STOP & HOLDE	ER FS446	626	IVE		
	MOUNT PUSH PLATE AND P	USH/PULL SET ABOVE THE DEADBOLT OUTSID	E			
	CYLINDER/INDICATOR AND	D INSIDE TURN LEVER				
	Heading 002					
	I SGL DOOR 103	EXTERIOR / RESTROOM 103				
	I SGL DOOR 104	EXTERIOR / RESTROOM 104				
	I SGL DOOR 105	EXTERIOR / RESTROOM 105				
	I SGL DOOR 10/	EXTERIOR / RESTROOM 10/				
	I SGL DOOR 108	EXTERIOR / RESTROOM 108				
	$1 \qquad \text{SGL} \qquad \text{DOOK} \ 109$	EATERIOR / RESTROOM 109 ME y NON DTD				
	$24 \times 00 \times 1-3/4 \times FIDK \times \Pi$	MIF X NON-KID				
1	EACONTINUOUS HINGE	700	620	IVE		
1	EA MORTISE DEADROLT	100 14061 X 00 611"OCCUPIED X I 583 363 TURN I EVE	P626	SCH		
1	EA MORTISE DEADBOLT	1E64-7 PIN X SCHLAGE CAM	626	BES		
1	FA PUSH PLATE	8200 3" X 12"	626	IVF		
1	EA PUSH PLATE	8200 3" X 12"	630	IVE		
1	EA SURFACE CLOSER	4041 SPECIAL RUST INHIB ON BODY/ARM	689	LCN		
1	EA FLOOR STOP & HOLDE	SR FS446	626	IVE		
	MOUNT PUSH PLATE AND PUSH/PUIL SET AROVE THE DEADROLT OUTSIDE					
	CYLINDER/INDICATOR AND	DINSIDE TURN LEVER	2			
	Heading 003					
	1 SGL DOOR 101	EXTERIOR / ELECTRICAL				
	3'0" x 6'8" x 1-3/4" x FIBR x H	MF x NON-RTD				
	Each Assembly to have:					
1	EA CONTINUOUS HINGE	700	630	IVE		
1	EA STOREROOM LOCK	L9480T 06A LESS OUTSIDE LEVER/ROSE	626	SCH		
1	EA MORTISE CYLINDER	1E64-7 PIN X SCHLAGE CAM	626	BES		
1	EA DOOR PULL	VR900	630	IVE		
2	EA JAMB SEALS	600	AL	NGP		
1	EA OVERHEAD HOLDER	814H	630	GLY		
1	SET HEAD SEAL	706A	AL	NGP		
1	EA DRIP CAP	16A	CL	NGP		
1	EA DOOR SHOE	618	AL	NGP		

Heading 004

	1 PR DOOR 100	EXTERIOR / MAINTENANCE/STORAGE				
	6'0" x 6'8" x 1-3/4" x FIBR x HMF x NON-RTD					
	Each Assembly to have:					
2	EA CONTINUOUS HING	E 700	630	IVE		
1	SET AUTO FLUSH BOLT	FB31P	630	IVE		
1	EA DUST PROOF STRIK	E DP2	626	IVE		
1	EA STOREROOM LOCK	L9480T 06A LESS OUTSIDE LEVER/ROSE	626	SCH		
1	EA MORTISE CYLINDEF	R 1E64-7 PIN X SCHLAGE CAM	626	BES		
1	EA DOOR PULL	VR900LLP	630	IVE		
1	EA ASTRAGAL	158NA CUT FOR LOCK FRONT	CL	NGP		
2	EA JAMB SEALS	600	AL	NGP		
2	EA OVERHEAD HOLDEI	R 814H	630	GLY		
1	SET HEAD SEAL	706A	AL	NGP		
2	EA DOOR SWEEP	C627A	CL	NGP		
1	EA THRESHOLD	613 MS&A	AL	NGP		
	Heading 005					

1 SGL DOOR 106 EXTERIOR / PLUMBING CHASE 2'4" x 6'8" x 1-3/4" x FIBR x HMF x NON-RTD Each Assembly to have: 1 EA CONTINUOUS HINGE 700 630 IVE EA STOREROOM LOCK L9480T 06A LESS OUTSIDE LEVER/ROSE SCH 1 626 EA MORTISE CYLINDER 1E64-7 PIN X SCHLAGE CAM 626 1 BES EA DOOR PULL VR900 630 IVE 1 2 EA JAMB SEALS 600 AL NGP 1 EA OVERHEAD HOLDER 814H 630 GLY SET HEAD SEAL 1 706A AL NGP 1 EA DRIP CAP 16A CL NGP 1 EA DOOR SHOE 618 AL NGP

SECTION 089119 - FIXED LOUVERS

PART 1 - GENERAL

- 1.1 SUMMARY
 - A. Section Includes:
 - 1. Fixed, extruded-aluminum louvers.
- 1.2 DEFINITIONS
 - A. Louver Terminology: Definitions of terms for metal louvers contained in AMCA 501 apply to this Section unless otherwise defined in this Section or in referenced standards.
 - B. Horizontal Louver: Louver with horizontal blades (i.e., the axes of the blades are horizontal).
 - C. Drainable-Blade Louver: Louver with blades having gutters that collect water and drain it to channels in jambs and mullions, which carry it to bottom of unit and away from opening.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. For louvers specified to bear AMCA seal, include printed catalog pages showing specified models with appropriate AMCA Certified Ratings Seals.
- B. Shop Drawings: For louvers and accessories. Include plans, elevations, sections, details, and attachments to other work. Show frame profiles and blade profiles, angles, and spacing.
 - 1. Show weep paths, gaskets, flashing, sealant, and other means of preventing water intrusion.
 - 2. Show mullion profiles and locations.
- C. Samples: For each type of metal finish required.

1.4 FIELD CONDITIONS

A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain louvers from single source from a single manufacturer where indicated to be of same type, design, or factory-applied color finish.

2.2 FIXED, EXTRUDED-ALUMINUM LOUVERS

- A. Horizontal, Drainable-Blade Louver:
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. <u>Air Balance Inc.; a Mestek company</u>.
 - b. <u>Air Flow Company, Inc</u>.
 - c. Airolite Company, LLC (The).
 - d. <u>American Warming and Ventilating; a Mestek company</u>.
 - e. <u>Architectural Louvers; Harray, LLC</u>.

- f. <u>Construction Specialties, Inc</u>.
- g. <u>Greenheck Fan Corporation</u>.
- h. <u>Industrial Louvers, Inc</u>.
- i. Louvers & Dampers; a division of Mestek, Inc.
- j. <u>Metal Form Manufacturing, Inc</u>.
- k. NCA Manufacturing, Inc.
- l. <u>Nystrom, Inc</u>.
- m. <u>Reliable Products, Inc</u>.
- n. Ruskin Company; Tomkins PLC.
- o. <u>Vent Products Co., Inc</u>.
- 2. Louver Depth: 4 inches.
- 3. Frame and Blade Nominal Thickness: Not less than 0.080 inch.
- 4. Mullion Type: Exposed.
- 5. Louver Performance Ratings:
 - a. Free Area: Not less than 7.0 sq. ft. for 48-inch- wide by 48-inch- high louver.
 - b. Point of Beginning Water Penetration: Not less than 900 fpm.
- 6. AMCA Seal: Mark units with AMCA Certified Ratings Seal.

2.3 LOUVER SCREENS

- A. General: Provide screen at each exterior louver.
 - 1. Screen Location for Fixed Louvers: Interior face.
 - 2. Screening Type: Bird screening.
- B. Secure screen frames to louver frames with stainless-steel machine screws, spaced a maximum of 6 inches from each corner and at 12 inches o.c.
- C. Louver Screen Frames: Fabricate with mitered corners to louver sizes indicated.
 - 1. Metal: Same type and form of metal as indicated for louver to which screens are attached
 - 2. Finish: Mill finish unless otherwise indicated.
 - 3. Type: Rewirable frames with a driven spline or insert.
- D. Louver Screening for Aluminum Louvers:
 - 1. Bird Screening: Aluminum, 1/2-inch- square mesh, 0.063-inch wire.

2.4 MATERIALS

- A. Aluminum Extrusions: ASTM B 221, Alloy 6063-T5, T-52, or T6.
- B. Aluminum Sheet: ASTM B 209 Alloy 3003 or 5005 with temper as required for forming, or as otherwise recommended by metal producer for required finish.
- C. Fasteners: Use types and sizes to suit unit installation conditions.
 - 1. Use tamper-resistant screws for exposed fasteners unless otherwise indicated.
 - 2. For fastening aluminum, use aluminum or 300 series stainless-steel fasteners.
 - 3. For color-finished louvers, use fasteners with heads that match color of louvers.

D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

2.5 FABRICATION

- A. Factory assemble louvers to minimize field splicing and assembly. Disassemble units as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.
- B. Vertical Assemblies: Where height of louver units exceeds fabrication and handling limitations, fabricate units to permit field-bolted assembly with close-fitting joints in jambs and mullions, reinforced with splice plates.
- C. Maintain equal louver blade spacing to produce uniform appearance.
- D. Fabricate frames, including integral sills, to fit in openings of sizes indicated, with allowances made for fabrication and installation tolerances, adjoining material tolerances, and perimeter sealant joints.
 - 1. Frame Type: Channel unless otherwise indicated.
- E. Include supports, anchorages, and accessories required for complete assembly.
 - 1. Exposed Mullions: Where indicated, provide units with exposed mullions of same width and depth as louver frame. Where length of louver exceeds fabrication and handling limitations, provide interlocking split mullions designed to permit expansion and contraction.

2.6 ALUMINUM FINISHES

- A. Finish louvers after assembly.
- B. High-Performance Organic Finish: Three-coat fluoropolymer finish complying with AAMA 2605 and containing not less than 50 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 1. Color and Gloss: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and openings, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Coordinate setting drawings, diagrams, templates, instructions, and directions for installation of anchorages that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to Project site.
- 3.3 INSTALLATION
 - A. Locate and place louvers level, plumb, and at indicated alignment with adjacent work.
 - B. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weathertight connection.
 - C. Form closely fitted joints with exposed connections accurately located and secured.
 - D. Provide perimeter reveals and openings of uniform width for sealants and joint fillers, as indicated.

- E. Protect unpainted galvanized and nonferrous-metal surfaces that are in contact with concrete, masonry, or dissimilar metals from corrosion and galvanic action by applying a heavy coating of bituminous paint or by separating surfaces with waterproof gaskets or nonmetallic flashing.
- F. Install concealed gaskets, flashings, joint fillers, and insulation as louver installation progresses, where weathertight louver joints are required. Comply with Section 079200 "Joint Sealants" for sealants applied during louver installation.

3.4 ADJUSTING AND CLEANING

- A. Clean exposed louver surfaces that are not protected by temporary covering, to remove fingerprints and soil during construction period. Do not let soil accumulate during construction period.
- B. Before final inspection, clean exposed surfaces with water and a mild soap or detergent not harmful to finishes. Thoroughly rinse surfaces and dry.
- C. Restore louvers damaged during installation and construction so no evidence remains of corrective work. If results of restoration are unsuccessful, as determined by Architect, remove damaged units and replace with new units.
 - 1. Touch up minor abrasions in finishes with air-dried coating that matches color and gloss of, and is compatible with, factory-applied finish coating.

SECTION 099600 - HIGH-PERFORMANCE COATINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes surface preparation and application of high-performance coating systems on the following substrates:
 - 1. Interior Substrates:
 - a. Concrete, horizontal floor surfaces.
 - b. Concrete masonry units (CMU) and metal ceiling surfaces.
 - 2. Exterior Substrates:
 - a. Concrete masonry units (CMU) anti-graffiti.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated. Include preparation requirements and application instructions.
- B. Samples for Verification: For each type of coating system and in each color and gloss of topcoat indicated.
 - 1. Submit Samples on rigid backing, 8 inches square.
 - 2. Step coats on Samples to show each coat required for system.
 - 3. Label each coat of each Sample.
 - 4. Label each Sample for location and application area.
- C. Product List: For each product indicated, include the following:
 - 1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
 - 2. VOC content.
- 1.3 WARRANTY
 - A. Manufacturer's Material Warranty for Concrete Masonry Unit Application: Manufacturer agrees to repair or replace coatings that fail in materials within specified warranty period. Recommended cleaning products must be used during this period.
 - 1. Failures after graffiti removal include, but are not limited to, the following:
 - a. Yellowing.
 - b. Shadowing.
 - c. Ghosting.
 - d. Chemical Staining.
 - 2. Warranty Period:
 - a. 10 years from date of Substantial Completion.
- 1.4 DELIVERY, STORAGE, AND HANDLING
 - A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.
- 1. Maintain containers in clean condition, free of foreign materials and residue.
- 2. Remove rags and waste from storage areas daily.

1.5 FIELD CONDITIONS

- A. Apply coatings only when temperature of surfaces to be coated and surrounding air temperatures are between 50 and 95 deg F.
- B. Do not apply coatings when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. <u>Manufacturers</u>: <u>Basis-of-Design Manufacturer</u>: Subject to compliance with requirements, provide products by Monopole, Inc., or comparable products by one of the following:
 - 1. Rainguard.
 - 2. America Polymers.
- B. Products: Subject to compliance with requirements, provide products equal to those listed in other Part 3 coating schedule for the paint category indicated.

2.2 HIGH-PERFORMANCE COATINGS, GENERAL

- A. Material Compatibility:
 - 1. Provide materials for use within each coating system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 - 2. For each coat in a coating system, provide products recommended in writing by manufacturers of topcoat for use in coating system and on substrate indicated.
 - 3. Provide products of same manufacturer for each coat in a coating system.
- B. VOC Content: Products shall comply with VOC limits of authorities having jurisdiction and, for interior coatings applied at project site, the following VOC limits, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - 1. Prime Coatings: 90 g/L.
 - 2. Intermediate and Top Coatings: 0 g/L.
- C. Low-Emitting Materials: Interior coatings 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. Sheen: As indicated, or if not indicated as selected by Resident Engineer from manufacturer's full range.
- E. Colors: As indicated in color schedule, or if not indicated as selected by Resident Engineer from manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
 - 1. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 - a. Concrete: 12 percent.
- B. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- C. Proceed with coating application only after unsatisfactory conditions have been corrected.
 - 1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection.
- C. Clean substrates of substances that could impair bond of coatings, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
 - 1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce coating systems indicated.
- D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces to be coated exceeds that permitted in manufacturer's written instructions.
 - 1. Clean surfaces with pressurized water. Use pressure range of 1500 to 4000 psi at 6 to 12 inches.
- E. Masonry Substrates: Remove efflorescence and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces or if alkalinity of mortar joints exceed that permitted in manufacturer's written instructions.
- F. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied coatings.
- G. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.
- H. Steel Substrates: Remove rust, and loose mill scale. Clean using methods recommended in writing by paint manufacturer.
- 3.3 APPLICATION, GENERAL
 - A. Apply high-performance coatings according to manufacturer's written instructions and recommendations.
 - 1. Use applicators and techniques suited for coating and substrate indicated.

- 2. Coat surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, coat surfaces behind permanently fixed equipment or furniture with prime coat only.
- 3. Do not apply coatings over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
- B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of the same material are to be applied. Tint undercoats to match color of finish coat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through final coat, apply additional coats until cured film has a uniform coating finish, color, and appearance.
- D. Apply coatings to produce surface films without cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections. Produce sharp glass lines and color breaks.

3.4 CONCRETE FLOOR APPLICATION

- A. Apply per manufacturer's instructions using recommended applicator devices.
- B. Apply prime coat using a short nap foam roller at coverage rates as follow:
 - 1. Smooth surfaces: 275-300 sq. ft./gallon.
 - 2. Rough surfaces: 175-225 sq. ft./gallon.
- C. Allow prime coat to cure for 4-6 hours; then apply intermediate coat at approximate spread rate of 230 sq. ft./gallon.
- D. Broadcast sand into wet intermediate coat at approximate rate of 8-10 lbs per 100 sq. ft.
- E. Apply topcoat at approximate spread rate of 175 sq. ft./gallon.
- 3.5 INTERIOR CONCRETE MASONRY UNIT AND METAL SURFACES APPLICATION
 - A. Apply per manufacturer's instructions using recommended applicator devices.
 - B. Apply prime coat using a short nap foam roller at coverage rates as follow:
 - 1. Smooth surfaces: 275-300 sq. ft./gallon.
 - 2. Rough surfaces: 175-225 sq. ft./gallon.
 - C. After required cure time, apply two intermediate coats of acrylic paint. Allow paint to fully cure (up to 2 weeks) before applying topcoat.
 - 1. Test sample topcoat prior to final application.
 - 2. Allow test sample to cure 4 days in direct sunlight before proceeding with final topcoat application.
 - 3. Topcoat sample shall exhibit no amber color change in order to proceed with final topcoat application.
 - 4. If amber appearance occurs on topcoat sample, repeat sampling process as required until no "ambering" is evident before proceeding with final topcoat application.
 - D. Apply two topcoats at approximate rate of 200-250 sq. ft./gallon.
- 3.6 EXTERIOR CONCRETE MASONRY UNIT APPLICATION
 - A. Apply per manufacturer's instructions using recommended applicator devices.

- B. Apply the specified minimum number of coats or more as recommended by manufacturer's published instructions, in the quantity of coatings and coverage rates per coat established by preliminary tests. Total quantity shall not be less than the rate recommended for the involved surface in manufacturer's technical data.
- C. Install each coat by airless spray with nominal 20 psi nozzle pressure. Obtain complete coverage of each coat. Indicate areas that are coated when application is stopped for lunch or at the end of the day.
- 3.7 FIELD QUALITY CONTROL
 - A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test coatings for dry film thickness.
 - 1. Contractor shall touch up and restore coated surfaces damaged by testing.
 - 2. If test results show that dry film thickness of applied coating does not comply with coating manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with coating manufacturer's written recommendations.

3.8 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing coating application, clean spattered surfaces. Remove spattered coatings by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from coating operation. Correct damage by cleaning, repairing, replacing, and recoating, as approved by Resident Engineer, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced coated surfaces.

3.9 INTERIOR HIGH-PERFORMANCE COATING SCHEDULE

- A. Concrete Substrates, Horizontal Floor Surfaces.
 - 1. Prime Coat: Monochem 21
 - 2. Intermediate Coat: Permashield 200
 - 3. While still wet, broadcast across floor surface 30 mesh silica sand.
 - 4. Topcoat: Permashield 200
- B. CMU and Metal Surface Substrates:
 - 1. Prime Coat: Monochem 21
 - 2. First Intermediate Coat: Acrylic paint, fully cured.
 - 3. Second Intermediate Coat: Acrylic paint, fully cured.
 - 4. First Topcoat: Permashield Premium.
 - 5. Second Topcoat: Permashield Premium.

3.10 EXTERIOR HIGH-PERFORMANCE COATING SCHEDULE

- A. CMU Substrates Anti-graffiti:
 - 1. Prime Coat: Aquaseal ME12
 - 2. Intermediate Coat: Permashield Base 6100
 - 3. First Topcoat: Permashield Premium Item 5600 for matte finish
 - 4. Second Topcoat: Permashield Premium Item 5600 for matte finish

END OF SECTION 099600

SECTION 101423 - PANEL SIGNAGE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Panel signs.
 - 2. Room-identification signs.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For panel signs.
 - 1. Include fabrication and installation details and attachments to other work.
 - 2. Show sign mounting heights, locations of supplementary supports to be provided by others, and accessories.
 - 3. Show message list, typestyles, graphic elements, including raised characters and Braille, and layout for each sign.
- C. Samples for Initial Selection: For each type of sign assembly, exposed component, and exposed finish.
 - 1. Include representative Samples of available typestyles and graphic symbols.
- D. Samples for Verification: For each type of sign assembly showing all components and with the required finish(es), in manufacturer's standard size unless otherwise indicated and as follows:
 - 1. Panel Signs: Full-size Sample.
 - 2. Room-Identification Signs: Full-size Sample.
- E. Sign Schedule: Use same designations specified or indicated on Drawings or in a sign schedule.

1.3 FIELD CONDITIONS

A. Field Measurements: Verify locations of anchorage devices embedded in permanent construction by other installers by field measurements before fabrication, and indicate measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Accessibility Standard: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities for signs.

2.2 SIGNS

- A. <u>Basis-of-Design Product</u>: Subject to compliance with requirements, provide product indicated or equal:
- B. Exterior and Interior Panel Signs and Room-Identification Signs: Sign with smooth, uniform surfaces; with message and characters having uniform faces, sharp corners, and precisely formed lines and profiles; and as follows:

- 1. Basis-of-Design Product: APCO Metal Etch Signs Kevin Immel 760-732-3800.
- 2. Solid-Sheet Sign zinc metal alloy sheet with finish specified in "Surface Finish and Applied Graphics" Subparagraph below and as follows:
 - a. Thickness: Manufacturer's standard for size of sign.
 - b. Etched and Filled Graphics: Sign face etched or routed to receive enamelpaint infill.
- 3. Frame: Entire perimeter.
 - a. Material: Plastic.
 - b. Frame Depth: Manufacturer's standard
 - c. Profile: Rounded.
 - d. Corner Condition in Elevation: Square.
 - e. Finish and Color: As selected by Architect from manufacturer's full range.
- 4. Mounting: Manufacturer's standard method for substrates indicated with concealed anchors.
- 5. Text and Typeface: Accessible raised characters and Braille. Finish raised characters to contrast with background color, and finish Braille to match background color.

2.3 ACCESSORIES

- A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of signage, noncorrosive and compatible with each material joined, and complying with the following:
 - 1. Use concealed fasteners and anchors unless indicated to be exposed.
 - 2. For exterior exposure, furnish nonferrous-metal devices unless otherwise indicated.
 - 3. Exposed Metal-Fastener Components, General:
 - a. Fabricated from same basic metal and finish of fastened metal unless otherwise indicated.
 - 4. Sign Mounting Fasteners:
 - a. Concealed Studs: Concealed (blind), threaded studs welded or brazed to back of sign material or screwed into back of sign assembly, unless otherwise indicated.
 - b. Projecting Studs: Threaded studs with sleeve spacer, welded or brazed to back of sign material or screwed into back of sign assembly, unless otherwise indicated.

2.4 FABRICATION

- A. General: Provide manufacturer's standard sign assemblies according to requirements indicated.
 - 1. Preassemble signs and assemblies in the shop to greatest extent possible. Disassemble signs and assemblies only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation; apply markings in locations concealed from view after final assembly.
 - 2. Mill joints to a tight, hairline fit. Form assemblies and joints exposed to weather to resist water penetration and retention.

- 3. Conceal connections if possible; otherwise, locate connections where they are inconspicuous.
- 4. Internally brace signs for stability and for securing fasteners.
- 5. Provide rebates, lugs, and brackets necessary to assemble components and to attach to existing work. Drill and tap for required fasteners. Use concealed fasteners where possible; use exposed fasteners that match sign finish.

2.5 GENERAL FINISH REQUIREMENTS

- A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of signage work.
- B. Verify that sign-support surfaces are within tolerances to accommodate signs without gaps or irregularities between backs of signs and support surfaces unless otherwise indicated.
- C. Verify that anchor inserts are correctly sized and located to accommodate signs.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Install signs using mounting methods indicated and according to manufacturer's written instructions.
 - 1. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.
 - 2. Install signs so they do not protrude or obstruct according to the accessibility standard.
 - 3. Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.
 - 4. Corrosion Protection: Coat concealed surfaces of exterior aluminum in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.
- B. Room-Identification Signs and Other Accessible Signage: Install in locations on walls as indicated and according to accessibility standard.
- C. Mounting Methods:
 - 1. Concealed Studs: Using a template, drill holes in substrate aligning with studs on back of sign. Remove loose debris from hole and substrate surface.
 - a. Masonry Substrates: Fill holes with adhesive. Leave recess space in hole for displaced adhesive. Place sign in position and push until flush to surface, embedding studs in holes. Temporarily support sign in position until adhesive fully sets.

- b. Thin or Hollow Surfaces: Place sign in position and flush to surface, install washers and nuts on studs projecting through opposite side of surface, and tighten.
- 2. Two-Face Tape: Clean bond-breaking materials from substrate surface and remove loose debris. Apply tape strips symmetrically to back of sign and of suitable quantity to support weight of sign without slippage. Keep strips away from edges to prevent visibility at sign edges. Place sign in position, and push to engage tape adhesive.

3.3 ADJUSTING AND CLEANING

- A. Remove and replace damaged or deformed signs and signs that do not comply with specified requirements. Replace signs with damaged or deteriorated finishes or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.
- B. Remove temporary protective coverings and strippable films as signs are installed.
- C. On completion of installation, clean exposed surfaces of signs according to manufacturer's written instructions, and touch up minor nicks and abrasions in finish. Maintain signs in a clean condition during construction and protect from damage until acceptance by Owner.

END OF SECTION 101423

SECTION 102800 – TOILET ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Public-use washroom accessories.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include the following:
 - 1. Construction details and dimensions.
 - 2. Anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
 - 3. Material and finish descriptions.
 - 4. Features that will be included for Project.
 - 5. Manufacturer's warranty.
- B. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.
 - 1. Identify locations using room designations indicated.
 - 2. Identify products using designations indicated.

1.3 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For toilet and bath accessories to include in maintenance manuals.
- 1.4 QUALITY ASSURANCE
 - A. Source Limitations: For products listed together in the same Part 2 articles, obtain products from single source from single manufacturer.
- 1.5 COORDINATION
 - A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.
 - B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

PART 2 - PRODUCTS

- 2.1 MATERIALS
 - A. Stainless Steel: ASTM A 666, Type 304, 0.031-inch minimum nominal thickness unless otherwise indicated.
 - B. Steel Sheet: ASTM A 1008/A 1008M, Designation CS (cold rolled, commercial steel), 0.036-inch minimum nominal thickness.
 - C. Galvanized-Steel Sheet: ASTM A 653/A 653M, with G60 hot-dip zinc coating.
 - D. Galvanized-Steel Mounting Devices: ASTM A 153/A 153M, hot-dip galvanized after fabrication.

- E. Fasteners: Screws, bolts, and other devices of same material as accessory unit and tamperand-theft resistant where exposed, and of galvanized steel where concealed.
- F. Mirrors: ASTM C 1503, Mirror Glazing Quality, clear-glass mirrors, nominal 6.0 mm thick.

2.2 PUBLIC-USE WASHROOM ACCESSORIES

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - 1. A & J Washroom Accessories, Inc.
 - 2. American Specialties, Inc.
 - 3. Bobrick Washroom Equipment, Inc.
 - 4. Bradley Corporation.
 - 5. GAMCO Specialty Accessories; a division of Bobrick Washroom Equipment, Inc.
 - 6. Tubular Specialties Manufacturing, Inc.
- C. Toilet Tissue (Roll) Dispenser :
 - 1. Basis-of-Design Product: Aslin Industries TPD0250SR-SS.
 - 2. Description: Triple-roll dispenser.
 - 3. Mounting: Surface mounted.
 - 4. Operation: Slow rolling with neoprene friction sleeve.
 - 5. Capacity: Designed for 4-1/2- or 5-inch- diameter tissue rolls.
 - 6. Material and Finish: Stainless steel, No. 4 finish (satin.
- D. Liquid-Soap Dispenser:
 - 1. Basis-of-Design Product: Bobrick 2111.
 - 2. Description: Designed for dispensing soap in liquid or lotion form.
 - 3. Mounting: Vertically oriented, surface mounted.
 - 4. Capacity: 40-fl. Oz.
 - 5. Lockset: Tumbler type.
- E. Grab Bar:
 - 1. Basis-of-Design Product: Bobrick 5806 Series.
 - 2. Mounting: Flanges with concealed fasteners.
 - 3. Material: Stainless steel, 0.05 inch thick.
 - a. Finish: Smooth, No. 4 finish (satin) on ends and slip-resistant texture in grip area.
 - 4. Outside Diameter: 1-1/2 inches.
 - 5. Configuration and Length: As indicated.

- F. Warm-Air Dryer:
 - 1. Basis-of-Design Product: Fastaire, model HD-03.
 - 2. Mounting: Surface mounted within chase, with remote blower unit.
 - 3. Operation: Touch-button activated with timed power cut-off switch.
 - a. Operation Time: 30 to 40 seconds.
 - 4. Furnish without heating element.
 - 5. Electrical Requirements: 115 V, 20 A, 2300 W.
- G. Diaper-Changing Station:
 - 1. Basis-of-Design Product: Koala Kare KB200-00.
 - 2. Description: Horizontal unit that opens by folding down from stored position and with child-protection strap.
 - a. Engineered to support a minimum of 250-lb static load when opened.
 - 3. Mounting: Surface mounted, with unit projecting not more than 4 inches from wall when closed.
 - 4. Operation: By pneumatic shock-absorbing mechanism.
 - 5. Material and Finish: Polypropylene in manufacturer's standard color.
 - 6. Liner Dispenser: Built in.

2.3 FABRICATION

- A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.
- B. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Resident Engineer.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.
- B. Grab Bars: Install to withstand a downward load of at least 250 lbf, when tested according to ASTM F 446.

3.2 ADJUSTING AND CLEANING

- A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.
- B. Remove temporary labels and protective coatings.
- C. Clean and polish exposed surfaces according to manufacturer's written recommendations.

END OF SECTION 102800

SECTION 220500 - BASIC PLUMBING REQUIREMENTS, MATERIALS AND METHODS

PART 1 - GENERAL

- 1.1 RELATED DOCUMENTS
 - A. Provisions of this Section shall also apply to all Division 22 work.

1.2 DEFINITIONS

- A. "Contract Documents" constitute the drawings, specifications, general conditions, project manuals, etc., prepared by engineer (or other design professional in association with Engineer) for contractor's bid or contractor's negotiations with the Owner. The Division 22 drawings and specifications prepared by the Engineer are not Construction Documents.
- B. "Construction Documents", "construction drawings", and similar terms for Division 22 work refer to installation diagrams, shop drawings and coordination drawings prepared by the contractor using the design intent indicated on the Engineer's contract documents. These specifications detail the contractor's responsibility for "Engineering by Contractor" and for preparation of construction documents.
- C. "(N)" indicates "new" equipment to be provided under this contract.
- D. "(E)" indicates "existing" equipment on site which may or may not need to be relocated as part of this work.
- E. "(R)" indicates existing equipment to be relocated as part of this work.
- F. "Furnish" means to "supply" and usually refers to an item of equipment.
- G. "Install" means to "set in place, connect and place in full operational order".
- H. "Provide" means to "furnish and install".
- I. "Equal" or "Equivalent" means "meets the specifications of the referenced product or item in all significant aspects". Significant aspects shall be as determined by the Owner's Representative.
- J. "Work by other(s) divisions", "re:____ Division", and similar expressions means work to be performed under the contract documents, but not necessarily under the division or section of the work on which the note appears. It is the contractors' sole responsibility to coordinate the work of the contract between his/her suppliers, subcontractors and employees. If clarification is required, consult Owner's Representative before submitting bid.
- K. By inference, any reference to a "contractor" or "sub-contractor" means the entity, which has contracted with the Owner for the work of the Contract Documents.
- L. "Engineer" means the design professional firm, which has preferred these contract documents. All questions, submittals, etc. of this division shall be routed to the Engineer (through proper contractual channels).

1.3 COORDINATION WITHIN DIVISION 22

- A. Contract Documents:
 - 1. General: The Contract Documents are diagrammatic showing certain physical relationships, which must be established within Division 22 work and its interface with other work. Such establishment is the exclusive responsibility of the Contractor. Drawings shall not be scaled for the purpose of establishing dimensions, clearances or material quantities.
 - 2. Supplemental Instructions: The exact location for some items in this Specification may not be shown on the Drawings. The location of such items may be established by the Owner's Representative during the progress of the work.

- 3. Discrepancies:
 - a. Examine Drawings and Specifications of all Divisions of the work.
 - b. Report any discrepancies to the Owner's Representative and obtain written instructions before proceeding.
 - c. Should there be a conflict within or between the Specifications or Drawings, the most stringent or higher quality requirements shall apply.
 - d. Items called for either in the Specifications or on the Drawings shall be required as if called for in both.
- 4. Constructability:
 - a. Examine Drawings and Specifications of all Divisions of the work.
 - b. Report any issues to the Owner's Representative which may prevent installation of Division 22 work in accordance with the Contract Documents and the original construction contract.
- B. Contractor shall be responsible for providing proper documentation of equipment product data and shop drawings to all entities providing service.
- C. Coordination Drawings: Prepare coordination drawings to scale of 1/4" = 1'-0" or larger, detailing major elements, components, and systems of mechanical equipment (i.e. equipment rooms, and exterior equipment areas) and materials in relationship with other system, installations, and building components. Indicate locations where space is limited for installation and access and where sequencing and coordination of installations are important to the efficient flow of the work, including (but not necessarily limited to) the following:
 - 1. Indicate all major piping, electrical equipment and conduits, structural, and architectural elements in these areas as well.
 - 2. Sizes and locations of required concrete pads, piers, curbs, and bases.
 - 3. Provide all necessary sections and elements for clarification.
 - 4. Indicate all seismic restraint and support systems to be used for all mechanical equipment throughout the project.
 - 5. Ductwork and piping transitions from rooftop units to shafts or horizontal ducts.
 - 6. Failure to produce or submit coordination drawings does not dismiss the Contractor's responsibility for translating the design intent of the Contract Documents into Construction Drawings.
- D. CAD Drawings: For the purposes of facilitating the Contractor's shop drawings and record drawings, electronic AutoCAD drawings are available from the Engineer to the awarded Contractor. Coordinate with Owner's Representative.
- E. Existing Conditions:
 - 1. Before submitting proposals for this work, each Bidder shall be familiar with plans and specifications and shall have examined the premises and understood the conditions under which he/she will be obliged to operate in performing his/her contract.
 - 2. No allowance will be made subsequently in this connection, on behalf of the Contractor, for any error through negligence on his/her part.
 - 3. Drawings of existing conditions may be available. Contractor is strongly encouraged to obtain relevant drawings to assist in his/her performance of the contract.

- F. Utility Connections:
 - 1. Coordinate the connection of plumbing system with utilities and services.
 - 2. Comply with regulations of utility suppliers.
 - 3. The contract documents indicate the available information on existing utilities and services, and on new services (if any) to be provided to the project by utility companies and agencies.
 - a. Notify the Owner's Representative immediately if discrepancies are found.
 - 4. Coordinate mechanical utility interruptions one week in advance in writing with the Owner's Representative and the Utility Company.
 - a. Plan work so that duration of the interruption is kept to a minimum.

1.4 COORDINATION WITH OTHER DIVISIONS

- A. General:
 - 1. Coordinate the Division 22 work with the progress of the work of the other trades.
 - 2. Complete the entire installation as soon as the condition of the building will permit.
 - 3. Contractor is responsible for coordination of his/her work with Owner's facility staff engaged in building automation, commissioning of systems, fire alarm system, etc.
- B. Coordination with electrical work: Refer to Division 26.
- C. Cutting and Patching: Refer Part 3 of this section.
- D. Chases, Inserts and Openings:
 - 1. Provide measurements, drawings, and layouts so that opening, inserts and chases in new construction can be built and coordinated as construction progresses.
 - 2. Check sizes and locations of openings provided.
 - 3. Any cutting and patching made necessary by failure to provide measurements, drawings, and layouts at the proper time shall be done at no additional cost to the Owner.
- E. Support Dimensions: Provide dimensions and drawings so that concrete bases and other equipment supports to be provided under other Sections of the Specifications can be built at the proper time.

1.5 DEMOLITION AND WORK IN EXISTING AREA

- A. Remove existing equipment and materials as required.
- B. Verify the size and location of all existing services and utility lines prior to connection. The drawings show diagrammatically the approximate location of utilities where information is available, but the drawings are not exact as to quantity, extent or location. Exercise extreme caution during all phases of the work to locate, identify and protect existing services and utilities. Record the location of, and repair damage as required to existing services and utilities which are encountered as a result of work under this contract.
- C. Do work in a manner which will not cause inconvenience or danger to the occupants of the building, nor interfere with the other occupants; activities.
- D. Make all necessary alterations and additions to connect the existing with the new work so that when the work is complete, it will be in satisfactory operable condition. Provide all cutting and patching including concrete saw cutting and core drilling as required. Obtain approval from the structural engineer prior to performing concrete saw cutting or core drilling operations.

- E. All equipment and materials removed shall be legally disposed of off-site, unless otherwise noted.
- 1.6 ENGINEERING BY CONTRACTOR
 - A. The construction of this building requires the Contractor to design several systems or subsystems. All such designs shall be the complete responsibility of the Contractor.
 - B. Systems or subsystems which require responsibility by the Contractor and submitted to the Engineer for review include, but are not limited to:
 - 1. Equipment and piping supports, not detailed in the drawings.
 - 2. Pipe hangers and anchors not specified in these documents, or catalogued by the manufacturer.
 - 3. Underground piping distribution systems.
- 1.7 REGULATORY REQUIREMENTS
 - A. General:
 - 1. Regulatory Compliance: Work performed under this Division shall comply with the latest currently adopted editions of Codes and Regulations including, but not limited to those listed below.
 - 2. Minimum Requirements: The requirements of the Drawings and Specifications are the minimum that will be allowed, unless such requirements are exceeded by applicable codes or Regulations, in which case the Code or Regulation requirement shall govern.
 - 3. Code Changes: Should a code change occur between time of proposal and date of permit issue, and the Contractor has unnecessarily delayed the acquisition of permits, the contractor shall hold the Owner free from additional expense resulting from such Code change.
 - B. Codes: Comply With the Currently Adopted (At Time of Contract Award) Following Codes:
 - 1. City of San Diego Municipal Code, Ordinances and Regulations.
 - 2. The City of San Diego Fire-Rescue Department Regulations and Requirements.
 - 3. California Codes of Regulations, (CCR), Title 24, Latest Edition.
 - 4. California Building Code (CBC), Latest Edition.
 - 5. California Mechanical Code (CMC), Latest Edition.
 - 6. California Plumbing Code (CPC), Latest Edition.
 - 7. California Electric Code (CEC), Latest Edition.
 - 8. California Fire Code (CFC), Latest Edition.
 - 9. The City of San Diego Department of Health Services Regulations and Requirements.
 - 10. City of San Diego Public Works Department Regulations and Requirements.
 - 11. City of San Diego Industrial Waste Division Regulations and Requirements.
 - 12. National Electric Code (NEC), Latest Edition.
 - 13. California Energy Commission, Title 24.
 - 14. State Elevator Safety Regulations (SESR).
 - 15. National Fire Protection Association NFPA-101, Life Safety Code, Latest Edition for JCAHO accreditation.

- 16. Occupational Safety and Health Administration Regulations and Requirements (OSHA).
- 17. California Occupational Safety and Health Administration Regulations and Requirements (CAL-OSHA).
- 18. South Coast Air Quality Management District Regulations and Requirements (SCAQMD).
- 19. American Disability Act Regulations and Requirements (ADA).
- 20. State of California Water Resources Control
- C. Comply With the Latest Editions of Applicable Regulations and Standards, Including:
 - 1. National Fire Protection Associations (NFPA).
 - 2. Underwriter's Laboratories, Inc. (UL).
 - 3. American National Standards Institute (ANSI).
 - 4. American Society of Testing Materials (ASTM).
 - 5. American Society of Mechanical Engineers (ASME).
 - 6. American Welding Society Code (AWSC).
 - 7. American Water Works Association (AWWA).
 - 8. Compressed Gas Association (CGA).
 - 9. Cast Iron Soil Pipe Institute (CISPI).
 - 10. Manufacturers Standardization Society (MSS).
 - 11. National Bureau of Standards (NBS).
 - 12. Plumbing and Drainage Institute (PDI).
 - 13. Sheet Metal and Air Conditioning Contractors National Association (SMACNA).
- D. Requirements of Local Utility Companies: Comply with rules and regulations of local utility companies. Include in bid the cost of all valves, valve boxes, meter boxes, meters and such accessory equipment, which will be required for the project.
- E. Additional Regulations: Follow additional regulations which appear in individual Sections of these Specifications.
- F. Contradictions: Where codes are contradictory, follow the most stringent, unless otherwise indicated in Plans or Specifications. The Owner's Representative shall determine which is most stringent.
- G. Contract Documents Not in Compliance:
 - 1. Where it is not noted that the Drawings and Specifications do not comply with the minimum requirements of the codes, either notify the Owner's Representative in writing during the Bidding Period of the revisions required to meet Code Requirements. After entering into contract, Contractor will be held to complete all work necessary to meet Code Requirements without additional expense to the Owner.
 - 2. Follow Drawings and Specifications where they are superior to Code Requirements.
- H. Permits:
 - 1. Contractor shall pay for and obtain all permits required by authorities and agencies having jurisdiction for the work in this Division.
 - 2. Post permits as required.

- I. Inspections and Tests:
 - 1. Arrange for all required inspections and tests.
 - 2. Pay all charges.
 - 3. Notify the Owner's Representative in writing 72 hours before tests.
 - 4. Submit one copy for Owners record of permits. Licenses, inspection reports and test reports.

1.8 EQUIVALENTS AND SUBSTITUTIONS

- A. Basis for Design: The manufacturer's name and product listed on the drawings, or listed first of several names in these Specifications, is used as a basis for design to establish space requirements, a standard of quality and performance.
- B. Equivalents: Products of one or more other manufacturer's names listed in these Specifications following the words "or equivalent by, or equal" may be selected, subject to paragraph below titled "Contractor's Responsibility for Equivalent and Substitutions."
- C. Other Options:
 - 1. For products specified by naming only one manufacturer, refer to paragraph below under "Substitutions".
 - 2. For products specified only by performance characteristics or reference standards, select any manufacturer meeting the requirements.
- D. Substitutions: Requests for acceptance of a product of manufacturer's name not listed in these specifications will be considered if any one of the following conditions is met:
 - 1. The named product is not available because of strikes or discontinuance of manufacture and the proposed product is equivalent to the named product.
 - 2. The proposed product is superior to the named product, in the opinion of the Owner's representative.
 - 3. The proposed product is equivalent to the named product and its use will be to the advantage of the Owner, by the Owner receiving an equitable credit or cost savings. The Owner's Representative reserves the right to reject any substitution.
 - 4. Submit proposed substitutions with bid along with alternate price, complete descriptive data and a comparison of the substitute manufacturer's product with specified product. Request for acceptance of a product of manufacturer's name not listed in these specifications, is subject to the paragraph titled "Contractor's Responsibility Equivalents and Substitutions".
- E. Contractor's Responsibility for Equivalents and Substitutions:
 - 1. Items submitted as a substitution to the basis of design or listed general equivalents shall be identified as such and shall include a written request for substitution indicating the following:
 - a. Contract price adjustment.
 - b. Contract time adjustment.
 - c. Item by item breakdown of differences between basis of design and substituted item.
 - d. Operation, maintenance and energy cost difference.

- 2. Products of manufacturer must match the features, construction, performance and size of those selected for design. Standard catalogued may require certain modifications to meet specified requirements.
- 3. All substitutions must meet the recommendations of the 2010 Consultant's Guide to Park Design and Development.
- 4. The responsibility for providing that specified requirements have been met remains with the manufacturer and contractor. Should the substituted item fail to perform in accordance with the Specifications, replace same with the originally specified item without extra cost to the contract.
- 5. When requesting review of an equivalent or substituted product, submit a comparison chart listing features, construction, performance and sizes of named product versus equivalent or substituted product.
- 6. Submittals for review of an equivalent or substituted product will be reviewed for acceptability when all the above requirements have been met. Contractor shall be responsible for all costs incurred by the Architect and Engineer for review of equivalency beyond initial review.
- 7. Coordinate the installation of the product with all trades.
- 8. Contractor shall be responsible for changes in electric wiring, materials and for all other additional costs of construction by all trades involved to accommodate the product to perform same as product used on the "Basis of Design".
- 9. Coordination of General Equivalents and Substitutions: Where Contract Documents permit selection from general equivalents, or where substitutions are authorized, coordinate clearance and other interface requirements with mechanical and other work.
- 10. Provide necessary additional items so that selected or substituted item operates equivalent to the Basis of Design and properly fits in the available space allocated for the Basis of Design.
- 11. Contractor is responsible for assuring that piping, conduit, duct, flue and other service locations for general equivalents or substitutions do not cause access, service or operational difficulties any greater than would be encountered with the Basis of Design.
- 12. Failure to comply with these requirements will result in immediate rejection of the request for substitution.

1.9 GENERAL SUBMITTAL REQUIREMENTS

- A. Coordination and Sequencing:
 - 1. Coordinate submittals 3 weeks (minimum) prior to expected order date so that work will not be delayed by submittals.
 - 2. Do not submit product data, or allow its use on the project until compliance, with requirement of Contract Documents has been confirmed by Contractor.
 - 3. Submittal is for information and record, unless otherwise indicated, and is not a change order request.
 - 4. Submitting contractor is responsible for routing reviewed submittals to all parties affected including but not limited to electrical, building automation and temperature control, and test and balance subcontractors.

- 5. Make submittals for group of similar products or materials such as valves, fixtures, pumps, insulation, etc., or area of work complete and at one time, not in piecemeal fashion.
- 6. Identify submittals with Architect's project name and number, with item designation as indicated on drawings, and referenced to applicable paragraphs of the specifications. Submit in brochure form.
- 7. Submittals of products needed at start of Project for its installation, or those requiring a long lead time for assembly or manufacturing, should be submitted before the others.
- B. Preparations of Submittals:
 - 1. Provide permanent marking on each submittal to identify project, date, Contractor, Subcontractor, Supplier, submittal name and similar information to distinguish it from other submittals.
 - 2. Indicate any portions of work, which deviate from the Contract Documents.
 - a. Explain the reasons for the deviations.
 - b. Show how such deviations coordinate with interfacing portions of other work.
 - 3. Show Contractor's executed review and approval marking.
 - 4. Provide space for the Owner's Representative "Action" marking.
 - 5. Submittals, which are received from sources other than through Contractor's office, will be returned "Without Action".
 - 6. Submittals shall be presented in a neat and legible fashion and shall be returned "Without Action" if presented in any other fashion.
- C. Quantities: Submit six (6) copies.
 - 1. Multiple System Items: Where a required submittal relates to an operational item of equipment used in more than one system, increase the number of final copies as necessary to complete the Maintenance Manuals for each system.
 - 2. General Distribution:
 - a. Provide additional distribution of submittals (not included in foregoing copy submittal requirements) to Subcontractors, Suppliers, Fabricators, Installers, Governing Authorities and others as necessary for proper performance of the work.
 - b. Include such additional copies in transmittal to Owner's Representative where required to receive "Action" marking before final distribution.
 - 1. Show such distributions on transmittal forms.
- D. Response to Submittals: Where standard product data have been submitted, it is recognized:
 - 1. That the Submitter has determined that the products fulfill the specified requirements.
 - 2. That the submittal is for the Owner's Representative information only, but will be returned with appropriate action where observed to be not in compliance with the requirements.
- E. If more than two submittals (either for shop drawings, as-builts drawings, or test and balance reports) are made by the contractor due to the incompletion, non-compliance, errors, omissions, etc. the Owner reserves the right to charge the contractor for subsequent reviews by their consultants. Such extra fees shall be deducted from payments by the Owner to the Contractor.

1.10 SPECIFIC CATEGORY SUBMITTAL REQUIREMENTS

- A. Manufacturer's Data:
 - 1. Where pre-printed data covers more than one distinct product, size, type, material, trim, accessory group or other variation, mark submitted copy with black ink to indicate which of the variations is to be provided.
 - 2. Delete or mark-put significant portions of pre-printed data, which are not applicable.
 - 3. Where operating ranges are shown, mark data to show portion of range required for project application.
 - 4. For Each Product, Include the Following:
 - a. Sizes.
 - b. Weights.
 - c. Speeds.
 - d. Capacities.
 - e. Piping and electrical connection sizes and locations.
 - f. Statements of compliance with the required standards and regulations.
 - g. Performance data.
 - h. Manufacturer's specifications and installation instructions.
- B. Shop Drawings:
 - 1. Prepare plumbing shop drawings, except diagrams, to accurate scale.
 - a. Show clearance dimensions at critical locations.
 - b. Show dimensions of spaces required for operation and maintenance.
 - c. Show interfaces with other, work, including structural support.
- C. Test Reports:
 - 1. Submit test reports, which have been signed and dated by the firm performing the test.
 - 2. Prepare test reports in the manner specified in the standard or regulation governing the test procedure (if any) as indicated.
- D. Required Equipment and Shop Drawing Submittals:
 - 1. Provide a submittal schedule with bid.
 - 2. Provide equipment submittals for each item of equipment specified or scheduled in the Contract Documents.
 - 3. Submittal schedule shall show each item of equipment, applicable section of the Specifications where it is described, applicable drawing number and schedule name where it is scheduled, date of Contractor's proposed submittal to the Owner's Representative, required date to receive submittal from the Owner's Representative and schedule order date.
 - 4. Provide a Mechanical Shop Drawing Schedule for submission to the Owner's Representative with the Submittal Schedule. Refer to Paragraph 1.03 Coordination Within Division 22 above.

1.11 COMPATIBILITY

- A. General: Provide products, which are compatible with other products of the mechanical work, and with other work, requiring interface with the mechanical work.
- B. Power Characteristics: Where power characteristics are not stated in Division 22 Sections, refer to the Sections of Division 26 and the Electrical Drawings for the power characteristics of each power driven item of mechanical equipment. Coordinate available power with Electrical Contractor before ordering equipment. Mechanical Contractor shall be responsible for ordering equipment to meet the available power characteristics. If there is a conflict between Division 22 documents and Division 26 documents, provide a written notification to the Owner's Representative for direction. Do not order equipment prior to determining the proper electrical service. No contract cost adjustment will be allowed for equipment ordered in conflict with the available power characteristics.

1.12 RECORD DRAWINGS

- A. Drawings:
 - 1. Record of Project Progress: Purchase from the Architect a complete set of reproducible contract drawings and maintain drawings available at the job site for inspection. Keep an accurate, legible and continuously updated record of installed locations and all project revisions other than revised drawings issued by the Architect, including source and date of authorization. Utilize only contract drawing symbols for recording the work. Drawing notations to be sufficiently clear in the representation of the work, for utilization by a CADD operator (drafts person) who is not necessarily familiar with the installed work.
 - 2. Record of Installation: At the conclusion of the work, deliver one (1) set of blue prints of the progress drawings to the Owner's Representative for review. Following the review, Contractor shall have incorporated by a competent CADD operator all of the installed data represented on the project progress drawings.
 - 3. Include in Record Drawings the Following:
 - a. Revisions, including sketches, bulletins, change orders, written addenda and directives, clarifications and responses generated by requests for information (RFIs), regardless of source of the revision.
 - b. Location and configuration of equipment with related housekeeping pads.
 - c. Location of fixtures, drains and appurtenances.
 - d. Physical routing of piping, underground, exposed, and above ceiling with locations of valves and accessories plainly marked and identified.
 - e. Location of piping below building and on exterior, valves, manholes, appurtenances and stub outs dimensioned from buildings and permanent structures, both horizontally and vertically.
 - f. Location of wall and ceiling access panels.
- B. Acceptance: As a condition for acceptance of the work, deliver two (2) sets of Auto CAD Latest Version CDs and one set of signed and dated reproducible drawings to the Owner's Representative and obtain a receipt.
- 1.13 OPERATING AND MAINTENANCE DATA
 - A. Submission:
 - 1. Submit three typed and bound copies of Operating and Maintenance (O&M) Manuals prior to scheduling systems demonstrations for the Owner's Representative.

- 2. Bind each Maintenance Manual in one or more vinyl covered, 3-ring binders, with pockets for folded drawings.
 - a. Mark the spine of each binder with system identification and volume number.
- B. Required Contents:
 - 1. Manuals shall have index with tab dividers for each major equipment section to facilitate locating information on a specific piece of equipment.
 - 2. Identify data within each section with drawing code numbers as they appear on Drawings and Specifications. Include as a minimum the following data:
 - a. Alphabetical list of system components, with the name, address and 24 hour telephone number of the company responsible for servicing each item during the first year of operation. Include point of contact for company.
 - b. Operating instructions for complete system including:
 - 1. Emergency procedures for fire and failure of major equipment.
 - 2. Major start, operation and shut down procedures.
 - c. Maintenance Instructions for Each Piece of Equipment Including:
 - 1. Equipment lists.
 - 2. Proper lubricants and lubricating instructions for each piece of equipment.
 - 3. Necessary cleaning, replacement and/or adjustment schedule.
 - 4. Product data.
 - 5. Installation instructions.
 - 6. Parts list.
 - d. Marked or changed prints locating concealed parts and variations from the original system design (as-built drawings).
 - e. Valve schedule and associated piping schematics.
 - f. Copies of any extended equipment warranties which are greater than one year.

1.14 WARRANTIES

- A. The warranty period is two years after Date of Acceptance.
 - 1. During this period, provide labor and materials as required to repair or replace defects in the mechanical system at no additional cost to the Owner. Provide certificate with O&M Manual submittal, which guarantees same-day service response to Owners call for all such warranty service.
 - 2. Provide certificate for such items of equipment, which have warranties in excess of one year. Insert copies in O&M Manuals.
 - 3. Provide extended manufacturers warranties to cover two full years from date of acceptance if standard warranty starts any time prior to that date.
 - 4. At time of bid, submit additional costs or extended warranties for principal equipment (e.g. domestic water pressure booster pump, vacuum pump, air compressor, etc.).

1.15 SYSTEM ACCEPTANCE

- A. Acceptance shall be contingent upon completion of final review and correction of all deficiencies. Satisfactory completion of the operational tests, which shall demonstrate compliance with all performance criteria, and the requirements of the Contract Documents.
- B. Request a Final Review Prior to System Acceptance After Completion of the Following:
 - 1. Installation of all systems required by Contract Documents.
 - 2. Submission and acceptance of service manuals.
 - 3. Identification.
 - 4. Cleaning.
 - 5. Satisfactory operation of all systems for a period of one week.

1.16 MANDATORY GOVERNING PROVISION

- A. Omissions of words or phrases, such as "the Contractor shall", in conformity with", "shall be", "as noted on the Drawings", "according to the Drawings", "an", "the", and 'all" are intentional.
- B. Omitted words or phrases shall be supplied by inference.

1.17 TEMPORARY FACILITIES

- A. Light, heat, power, etc.
 - 1. Contractor shall be responsible for providing temporary electricity, heat and other facilities.
 - 2. Contractor shall be responsible for maintaining the equipment in an as-new condition. Equipment will not be turned over to the Owner until it is brought up to as-new condition.

1.18 SAFETY PROVISIONS

- A. Equipment Nameplates: provide power-oriented plumbing equipment with a permanent nameplate attached by the manufacturer, indicating:
 - 1. The manufacturer.
 - 2. Product name.
 - 3. Model number.
 - 4. Serial number.
 - 5. Speed.
 - 6. Capacity.
 - 7. Power characteristics.
 - 8. Labels of testing, or inspecting agencies.
 - 9. Other similar data.
- B. Where manufacturer affixed nameplate is not available, Contractor shall fabricate and attach nameplate.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

A. Uniformity: Material and equipment of same type or classification shall be the product of the same Manufacturer, wherever possible.

- B. Application: Do not install any material or equipment in an application not recommended by the Manufacturer.
- C. Weatherproof Equipment: Equipment installed outdoors shall be designed for this purpose or shall be housed in a weatherproof enclosure. Enclosure shall be sheet metal, ventilated or insulated as required with hinged access doors, hardware and lock.
- 2.2 ACCESS PANELS
 - A. For panels not specified in Division 08, comply with the following:
 - 1. Manufacturers:
 - a. Design Basis: Milcor Division, Inryco, Inc.
 - b. Other Acceptable Manufacturers:
 - 1. Birmingham Ornamental Iron Co.
 - 2. Karp Associates, Inc.
 - 3. Wilkenson Co., Inc.
 - 4. Zurn.
 - B. Construction:
 - 1. Doors: 14 gauge steel.
 - 2. Frames: 16 gauge steel.
 - 3. Fire Rating: Equivalent to construction in which installed.
 - 4. Latches: Flush or concealed 1/4 turn.
 - 5. Finish: Compatible with finish of construction in which installed.

2.3 FIRE STOPPING MATERIAL

- A. Manufacturers:
 - 1. Design Basis: 3M.
 - 2. Other Acceptable Manufacturers:
 - a. GE.
 - b. Metalines.
- B. General Requirements:
 - 1. Products to be used shall have been tested in accordance with ASTM E 814-88, and be listed in the UL Fire Resistance Directory.
- C. Bare Piping:
 - 1. Model: FD 150, or CP-25.
- D. Insulated Piping:
 - 1. Model: CP-25 or FS-195, Intumescent.
 - 3. "No-sag" or "self-leveling" as required.
- E. Accessories:
 - 1. Provide fasteners, restricting collars, backing materials, and protective coatings as required to comply with the UL system listing.

2.4 WATERPROOFING

- A. Wherever work must penetrate waterproofing, do so with care. Openings waterproofing shall be absolutely watertight in a manner acceptable to the Resident Engineer.
- B. Pipes through Roof: Refer to Architectural Detail for pipe flashing.
- C. Pipes through Waterproof Slabs or Walls: Use waterproof sleeves or "Link-Seal" gaskets.
- D. In no case shall the effective height of flashing be less than 5".
- E. Heavily coat all roof penetrations with roofing mastic.

PART 3 - EXECUTION

- 3.1 INSTALLATION GENERAL REQUIREMENTS
 - A. Furnish, apply, install, connect, erect, clean, and condition manufactured materials and equipment as recommended in manufacturer's printed directions (maintained on job site during installation).
 - B. Provide all attachment devices and materials necessary to secure materials together or to other materials.
 - C. Make allowance for ample and normal expansion and contraction for all building components and piping systems that are subject to such.
 - D. Install materials only when conditions of temperature, moisture, humidity and conditions of adjacent building components are conductive to achieving the best installation results.
 - E. Erect, install and secure components in a structurally sound and appropriate manner.
 - F. Where necessary, temporarily brace, shore, or otherwise support members until final connections are installed.
 - G. Leave all temporary bracing, shoring, or other structural supports in place as long as practical for safety and to maintain proper alignment.
 - H. Handle materials in a manner to prevent scratching, abrading, distortion, chipping, breaking, or other disfigurement.
 - I. Conduct work in a manner to avoid injury or damage to previously placed work.
 - J. Any work so impaired or damaged shall be replaced at no expense to Owner.
 - K. Fabricate and install materials true to line, plumb and level.
 - L. Leave finished surfaces smooth and flat, free from wrinkles, wraps, scratches, dents and other imperfections.
 - M. Furnish materials in longest practical lengths and largest practical sizes to avoid all unnecessary jointing.
 - N. Make all joints secure, tightly fitted, and as inconspicuous as possible by the best, accepted practice in joinery and fabrication.
 - O. Consult the Owner's Representative for mounting height or position of any unit not specifically indicated or located on Drawings or specified in Specifications.
 - P. Job mixed multi-component materials used in the work shall be mixed in such regulated and properly sized batches that material can be used before it begins to "set".
 - Q. Mixing of a partially "set" batch with another batch of fresh materials will not be accepted and entire batch shall be discarded and removed from site.

- R. Clean all mixing tools and appliances that can be contaminated prior to mixing of fresh materials.
- S. In addition to the above, refer to each Section of the Specifications for additional installation requirements for the proper completion of all work.

3.2 COORDINATION OF PLUMBING INSTALLATION

- A. Inspection and Preparation:
 - 1. Examine the work interfacing with plumbing work, and the conditions under which the work will be preformed, and notify the Owner's Representative of conditions detrimental to the proper completion of the work at original contract price.
 - 2. Do not proceed with the work until unsatisfactory conditions have been corrected.
- B. Layout:
 - 1. Layout the plumbing work in conformity with the Contract Drawings, Coordination Drawings and other Shop Drawings, product data and similar requirements so that the entire plumbing system will perform as an integrated system, properly interfaced with other work recognizing that portions of the work are shown only in diagrammatic form.
 - 2. Where coordination requirements conflict with individual system requirements, comply with the Owner's Representative decision on resolution of the conflict.
 - 3. Take necessary field measurements to determine space and connection requirements.
 - 4. Provide sizes and shapes of equipment so the final installation conforms to the intent of the Contract Documents.
 - 5. Provide necessary fittings to create offsets as required to coordinate with building structure and other trades, even if fittings are not shown on the Contract Drawings.
- C. Integrate plumbing work in ceiling spaces with the ceiling suspension system, light fixtures and other work, so that required performance of each will be achieved.

3.3 PRODUCT INSTALLATION

- A. Manufacturer's instructions:
 - 1. Except where more stringent requirements are indicated, comply with the product manufacturer's instructions and recommendations.
 - 2. Consult with manufacturer's technical representatives, who are recognized as technical experts, for specific instructions on special projects conditions.
 - 3. If conflict exists, notify the Owner's in writing and obtain his instruction before proceeding with the work in question.
- B. Movement of Equipment:
 - 1. Wherever possible, arrange for the movement and positioning of equipment so that enclosing partitions, walls and roofs will not be delayed or need to be removed.
 - 2. Otherwise, advise Contractor of opening requirements to be maintained for the subsequent entry of equipment.
- C. Heavy Equipment:
 - 1. Coordinate the movement of heavy items with shoring and bracing so that the building structure will not be overloaded during the movement and installation.

- 2. Where plumbing products to be installed on the existing roof are too heavy to be hand-carried, do not transport across the existing roof deck. Position by crane or other device so as to avoid overloading or otherwise damaging the roof deck.
- D. Clearances:
 - 1. Install Piping:
 - a. Straight and true.
 - b. Aligned with other work.
 - c. Close to walls and overhead structure (allowing for insulation).
 - d. Concealed, where possible, in occupied spaces.
 - e. Out-of-the-way with maximum passageway and headroom remaining in each space.
 - 2. Do not obstruct windows, doors and other openings.
 - 3. Coordinate location of piping systems required to slope for drainage (over other service lines and ductwork).

E. Access:

- 1. Provide For Removal, Without Damage To Other Parts, Of:
 - a. Seals.
 - b. Shafts.
 - c. Gaskets.
 - d. Filters.
 - e. Strainers.
 - f. Control components.
 - g. Other parts requiring periodic replacement or maintenance.
- 2. Connect equipment for ease of disconnecting with minimum of interference with other work.
- 3. Provide unions where required.
- 4. Locate operating and control equipment and devices for easy access.
- 5. Provide access panels where equipment or devices are concealed by non-accessible finishes and similar work.

3.4 **PROTECTION OF WORK**

- A. Provide protection against dust migration, rain, wind, storms, frost, or heat, so as to maintain all work, materials, apparatus and fixtures free from injury or damage.
- B. At end of each day's work, cover all new work likely to be damaged.
- C. Do not interrupt the integrity of the building security overnight.
- D. All pipe ends, valves and equipment left unconnected shall be capped, plugged or otherwise properly protected to prevent damage and the intrusion of foreign matter.
- E. Any equipment or piping systems found to have been damaged or contaminated above "MILL" or "SHOP" conditions shall be replaced or cleaned to the Owner's Representative satisfaction.
- F. Provide initial water seal fill for all waste P-traps or similar traps.

3.5 PROTECTION OF POTABLE WATER SYSTEMS

- A. All temporary water connections shall be made with an approved back flow preventer.
- B. All hose bibs shall have as a minimum, a vacuum breaker, to prevent back flow.
- C. Direct connections to hydronic systems shall only be made through a reduced pressure back flow preventer.

3.6 OBJECTIONABLE NOISE AND VIBRATION

- A. Mechanical equipment and piping system shall operate without objectionable noise and vibration, as determined by the judgment of the Owner's Representative.
- B. If objectionable noise and vibration should be produced, make necessary changes or additions required to produce satisfactory result without additional cost to the Owner.

3.7 CLOSING-IN OF UN-INSPECTED WORK

- A. Do not allow or cause any work to be covered up or enclosed until inspected, tested and approved.
- B. Should any work be enclosed or covered up before such inspection and test, Contractor shall, at his/her own expense, uncover work and after it has been inspected, tested and approved, make repairs with such materials as necessary to restore his/her work and that of other Divisions to original and proper condition.

3.8 CLEANING

- A. After installation is complete, clean all systems as indicated below.
- B. Piping and Equipment To Be Insulated: Clean exterior thoroughly to remove rust, plaster, cement and dirt before insulation is applied.
- C. Piping and Equipment Remain Un-insulated: Clean exterior thoroughly to remove rust, plaster, cement, dirt and other foreign substances.
- D. Piping and Equipment To Be Painted: Clean exterior to be exposed in completed structure. Remove rust, plaster, cement and dirt by wire brushing. Remove grease, oil and other foreign materials by wiping with clean rags and suitable solvents.
- E. During Progress of Work: Carefully clean up the premises and keep all portions of the building free of debris.
- F. Chrome Or Nickel Plated Work: Thoroughly polish.

3.9 DAMAGE RESPONSIBILITY

A. Contractor shall be responsible for damage to the grounds, buildings or equipment and the loss of refrigerants, fuels or gases, caused by leaks or breaks in pipes for equipment furnished or installed under this Division.

3.10 PRELIMINARY OPERATION

A. The Owner's Representative reserves the right to operate portions of the mechanical system on a preliminary basis without voiding the guarantee or relieving the Contractor of his/her responsibilities.

3.11 OPERATIONAL TESTS

A. Before operational tests are performed, demonstrate to the Owner's Representative that systems and components are complete and fully charged with operating fluid and lubricants. Systems shall be operable and capable of maintaining continuous uninterrupted operation during the operating and demonstration period.

- B. After systems have been completely installed, connections made, and tests completed, operate the systems continuously for a period of five working days during the hours of a normal working day.
- C. Rotating equipment shall be in dynamic balance and alignment.
- D. Tests required in various sections herein shall be completed.
- E. Notify the Owner's Representative, in writing, two weeks in advance of this operational period.
- F. This operational test may be concurrent with instruction of the Owner's operating personnel.

3.12 CUTTING AND PATCHING

- A. Provide measurements, drawings, and layouts to installers of other work so that required openings may be provided as construction progresses. Any cutting and patching made necessary by failure to provide this information shall be done at no increase in the contract amount.
- B. All cutting and patching of existing work required for work in Division 22 is included in Division 22. Cutting and patching is not work of Division 22, except as provided in Paragraph 3.02 A. of this Section.
- C. Where possible, mark openings to be cut on existing construction. Otherwise, provide measurements, drawings, and layouts to the trade doing the cutting so that openings may be provided as construction progresses.
- D. Cutting Concrete:
 - 1. Where authorized, cut openings through concrete for pipe penetration and similar services by core drilling or sawing.
 - 2. Do not cut by hammer-driven chisel or drill.
- E. Cutting:
 - 1. Cut openings in accordance with layouts, measurements or drawings of the installer of work requiring openings. Cut openings in concrete by core drilling or sawing; not by hammer-driven chisel or drill.
 - 2. Coordinate the location of all openings with structural drawings. Report any discrepancies to Resident Engineer. Do not proceed with work until discrepancies have been resolved.
 - 3. Do not endanger or damage other work through the procedures and processes of cutting to accommodate mechanical work.
 - 4. Review the proposed cutting with the Installer of the work to be cut, and comply with his recommendations to minimize damage.
 - 5. Where necessary, engage the original Installer or other specialists to execute the cutting in the recommended manner.
- F. Patching:
 - 1. Where patching is required to restore other work because of either cutting or other damage inflicted during the installation of mechanical work, engage experienced craftsmen to complete the patching of the other work.
 - 2. Restore the other work in every respect, including the elimination of visual defects in exposed finishes.

- 3. All openings in fire rated construction shall be patched and sealed with U.L. approved sealant to maintain the fire integrity of the structure.
- G. Perform Cutting, and Patching Required To:
 - 1. Uncover work to provide installation of ill-timed work.
 - 2. Remove and replace defective work.
 - 3. Remove and replace work not conforming to requirements of the Contract Documents.
 - 4. Remove samples of installed work as specified for testing.
 - 5. Install equipment and materials in existing structures.
 - 6. Upon written instructions from Resident Engineer, uncover and restore work to provide Resident Engineer observation of concealed work.
- H. Painting:
 - 1. Prepare all surfaces for painting by another Division. Piping joints to be clear and free of dirt, excess joint sealant, caulking or solders.
 - 2. Comply with requirements of Painting Sections of this Specification.
- I. Structural Limitations:
 - 1. Do not cut or drill into structural framing, walls, floors, decks, and other members intended to withstand stress, except with the Owner's Representative's written authorization.
 - a. Provide lintels, columns, braces and other temporary and permanent supports made by cutting.
 - b. Submit shop drawings of permanent supports.
 - c. Do not penetrate legs of structural "T's" or any other location where prestressed structural chords are likely to be encountered when cutting or drilling.

3.13 WALL/CEILING ACCESS PANELS/DOORS

- A. Access Panels/Doors in plaster or gypsum board shall be furnished and installed under Division 08 at locations where required for access to:
 - 1. Valves.
 - 2. Control devices.
 - 3. Any other device or equipment requiring maintenance, adjustment or service.
- B. Coordinate work of various sections herein, to group valves, etc. with the work of others to minimize the quantity of access panels/doors.
- C. Wall/ceiling access panels/doors must be minimum 18" x 18" to allow access to valves and any other items for servicing, and minimum 30" x 30" to allow removal of any equipment with electric motors.
- 3.14 SLEEVES
 - A. Provide sleeves for piping passing through walls, floors, and roofs.
 - B. Set pipe sleeves and inserts in place before concrete is poured. Coordinate the placing of these items to avoid delaying concrete placing operations.

- C. Locate chases, shafts, and openings required for the installation of the mechanical work during framing of the structure. Do any additional cutting and boring required due to improperly located or omitted openings without additional cost to the Owner under the supervision of the Owner's Representative. For such additional floor openings, in lieu of pipe sleeves, apply 3M Fire Barrier Watertight Silicone Sealant 3000 WT
- D. Coat surface of all sleeves in contact with concrete, masonry or soil with two coats of coal tar bitumastic paint.
- E. Provide Sleeves as Follows:

Location	Sleeve Length
Interior Concrete or Concrete Block Walls	Schedule 10 or heavier, black steel pipe.
Interior Gypsum Walls	Adjustable galvanized sheet metal with 2" lap along the longitudinal seam, wall flanges and plaster lip. 2" and smaller -22 gauge, 3" through 6" -20 gauge, 8" and larger -18 gauge.
Membrane Waterproof Floor and Roof Construction	Galvanized cast iron body with flashing clamp, threaded for sleeve riser. (J.R. Smith 1760, Ancon, Zurn, Josam or equal.)
Non-membrane Floor Construction	Schedule 10 or heavier black steel pipe.
Exterior Concrete or Concrete Block Walls Below Grade	 Schedule 40 galvanized steel pipe with a continuously welded water stop of ¼" steel plate, hot-dipped galvanized after fabrication. Provide modular mechanical-type seal consisting of interlocking synthetic rubber links, with bolts, shaped to continuously fill the annular space between the conduit and sleeve. Tightening of bolts to form a watertight seal. Install per manufacturer's directions. Thunderline Corporation "Link Seal" sealant assembly or equal by Metraflex "MetraSeal." Allow for the overall diameter of the mechanical seal device when spacing the sleeves or openings for pipe penetrations.

F. Length of Sleeves as Follows:

Location	Sleeve Length
Floors	Equal to depth of floor construction including finish. Extend minimum of 1" above finished floor level within partitions, mechanical rooms, pipe chases and finished areas. Extend sleeves for non-metallic piping beyond floors or construction as required by local State Fire Marshall.
Walls	Schedule 40 black steel sleeves in concrete or concrete block walls equal to depth of construction. Extend sheetmetal sleeves in gypsum walls ¹ / ₂ " beyond both sides of the wall assembly. Equal to depth of construction. Extend sleeves for non-metallic piping beyond walls or construction as required by State Fire Marshall.
END OF SECTION 220500	

SECTION 220523 GENERAL DUTY VALVES FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 SUBMITTALS

- A. Refer to Section 220500 BASIC PLUMBING REQUIREMENTS, MATERIALS AND METHODS.
- B. Manufacturer's Data: Submit Manufacturer's Product Data Including:
 - 1. Dimensions.
 - 2. Sizes.
 - 3. End connections.
 - 4. Weights.
 - 5. Installation instructions.
 - 6. Instructions on repacking and repairing valves.
 - 7. Range of flow for balancing valves and plug valves.
 - 8. Service pressure and temperatures.
 - 9. Component materials.

PART 2 - PRODUCTS

- 2.1 VALVES TYPES AND SIZES
 - A. General:
 - 1. Provide all valves of first quality of approved manufacturer, have proper clearances, and be tight at the specified test pressure. All pressure ratings are in psi working pressure, unless otherwise indicated.
 - 2. Mark on each valve provided with the maker's name or brand, the figure or list number, and the guaranteed working pressure cast on the body and cast or stamped on the bonnet.
 - 3. All gate and globe valves suitable for repacking under pressure. Regardless of service, valves not acceptable when designed for less than 125 pounds per square inch working pressure.
 - 4. All valves must be of the product of one manufacturer, except for special application.
 - 5. Figure numbers of manufacturers are listed to indicate the types selected for design, performance and standard of quality.
 - 6. All valves installed in insulated pipe shall have 2" stem extension and the following features:
 - a. Ball valves: Shall have extended operating handle of non-thermalconductive material, 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.
 - B. Manufacturer:
 - 1. Ball Valves: Nibco or equivalent by Milwaukee, Walworth, Hammond, Jenkins or Dynaquip.

2.2 BALL VALVES

A. Ball Valves 2" and Smaller: Full port, two-piece, threaded bronze body, Type 316 stainless steel stem and ball, reinforced TFE seat ring, extended blowout stem with vapor seal and protective sleeve for insulated piping, lever or tee handle, 150 lb. SWP. Nibco T-585-70-66.

PART 3 - EXECUTION

3.1 GENERAL

- A. Install valves with stems pointing up, and as close to vertical as possible.
- B. Install valves at each piece of equipment, fixture or appliance so that the supply and return services can be shut off to remove the item and associated piping specialties without draining the remainder of the piping system.
- C. Install valves where required for proper operation of piping and equipment, including valves in branch lines where necessary to isolate sections of piping.
 - 1. Locate valves so as to be accessible.
- D. Provide drain valves at main shut-off valves, low points of piping and apparatus.
- E. Provide separate support where necessary.
- F. Install valves so bypass valves are accessible.
- G. All valves of a given type shall be of one manufacturer.
- H. Provide unions or flanges on piping at inlet and outlet of all equipment or apparatus. Install unions and flanges in accessible locations.

3.2 CHECK VALVE INSTALLATION

- A. Swing and Wafer Check Valves:
 - 1. Install only in horizontal lines unless absolutely impractical. If installed vertically, flow shall be upwards.

END OF SECTION 220523

SECTION 220529 -HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

- 1.19 DESCRIPTION
 - A. General: Provide pipe support systems, complete as required per Contract Document.
 - B. Furnish materials, equipment and methods for support of piping systems which are generally common to the various Sections of this Division of the Specifications.
 - C. Other Applicable Sections: Applicable portions of Division 220500 BASIC PLUMBING REQUIREMENTS, MATERIALS AND METHODS, apply to the work of this Section.
- 1.20 STANDARDS
 - A. Comply with MSS Standard Practice SP-69, published by Manufacturer's Standardization Society of the Valve and Fitting Industry for type and size and ANSI Code for pressure piping.

1.21 SUBMITTALS

- A. Refer to Section 220500 BASIC PLUMBING REQUIREMENTS, MATERIALS AND METHODS.
- B. Submit Manufacturer's Product Data on the Following:
 - 1. Hangers other than clevis type.
 - 2. Anchors.
 - 3. Supports.
 - 4. Attachments.
 - 5. Guides.
- C. Submit structural calculations on trapeze type supports.

PART 2 - PRODUCTS

2.1 PIPE HANGERS

- A. Manufacturer: Tolco or equivalent by Grinnell, Secur Strut or Superstrut. Figure numbers of manufacturers are listed to indicate a standard of quality and type.
- B. Pipe Hanger for Non-Insulated Pipe Pipe Sizes 1/2" to 2" Inclusive: Adjustable zinc plated carbon steel swivel ring hanger with 1/4" thick felt lining. Each hanger designed for maximum recommended load with a safety factor of 5. Tolco Figure 2F.
- C. Pipe Hanger for Non-Insulated Pipe Pipe Sizes 2-1/2" and Larger: Heavy duty adjustable black carbon steel clevis hanger with 1/4" thick. Each hanger designed for maximum recommended load with a safety factor of 5. Tolco Figure 1F.
- D. Trapeze Type Hanger:
 - 1. Provide trapeze type hanger where three or more lines run parallel at same elevation and grade in same direction.
 - 2. Hanger consisting of metal framing steel channels, single or double as required with clamps for pipes, supported by rods and attached to the building at inserts or anchors. Provide pipe isolators for all non-insulated pipes. Sizes of channels, rods and inserts shall be adequate to carry the weight of piping with a minimum safety factor of 3. Tolco Figure A12HS.

E. Hanger Rods: Solid carbon steel, threaded ends or continuous thread. Rods designed for maximum recommended load with a safety factor of 5. Tolco Figure 103 or 100.

Pipe Size	Rod Size
1/2" to 2" Inclusive	3/8"
2-1/2", 3"	1/2"
4" to 8" Inclusive	5/8"

- F. Support for Horizontal Piping:
 - 1. Auxiliary Steel: Install steel shapes fastened to the structural steel beams, columns or structural walls for supporting pipe. Auxiliary steel supports shall conform to requirements of ASTM A36.
 - 2. Alternate: Contractor shall have the option to use pre-engineering support systems of electro-galvanized steel products such as Unistrut, Superstrut or equivalent. Mixture of support system manufacturer's product not permitted.
 - 3. Fasteners: Use types specified herein as best suited for anchoring auxiliary steel, miscellaneous metal supports and pipe supports into structure materials at intended point of installation.
- G. Adjustable Beam Clamps: Fee and Mason Fig. 246 or Super-Strut Fig. CM-754 (where this type is not adaptable, an approved top beam, side beam, or channel clamp by Fee and Mason or Super-Strut, will be acceptable).
- H. Riser Clamps for Steel or Cast Iron Piping: Heavy duty carbon steel. Each clamp designed for maximum load with a safety factor of 5.
- I. Riser Clamp for Copper Piping: Heavy duty carbon steel, with felt or plastic liner. Each clamp designed for maximum recommended load with a minimum safety factor of 5.
- J. Pipe Slides: heavy Duty carbon steel tee, stainless steel slide plate, carbon steel base with filled Teflon pad, carbon steel guides and hold-down lugs. For support of pipe where horizontal movement due to expansion and contraction occur. Tolco Figure 426.
- K. Pipe Guides and Anchors:
 - 1. Guides: Heavy duty carbon steel with hinged outer housing and inner spider attachments. Tolco Figure 421.
 - 2. Anchors: Fabricated heavy duty ASTM A-36 carbon steel. Each anchor designed to withstand not less than 5 times the anchor load.
- L. Pipe Isolators: Permanently attached felt lined hangers. Provide isolators at each support for all non-insulating piping.
- M. Concrete Insert (for Cast-in-place Normal Weight Concrete): Universal type, black malleable iron body and nut. Each insert and nut designed for maximum recommended load with a safety factor of 5. Tolco Figure 309. Verify usage with Project Structural Engineer.
- N. Hanger Support (for Metal Deck with Lightweight Concrete): 1-5/8" x 13/16" electrogalvanized channel. Install channel continuous over a minimum of 5 metal deck flutes and limit loading to 200 lbs. Maximum or as required by Structural engineer. Submit layout of system showing locations and weights to be supported. Test 50% of hangers for twice the load. Unistrut P4100HS, Secure Strut, Superstrut or equal.
- 2.2 PIPE ANCHORS
 - A. Manufacturers:
 - 1. Design Basis: Tolco
 - 2. Other Acceptable Manufacturers: Keflex, Flexonics.
 - B. Model AC with threaded ends and welded angle brackets for steel pipe.
 - C. Anchors may be field similar to manufactured products specified.
- 2.3 PIPE GUIDES
 - A. Manufacturers:
 - 1. Basis of Design: Tolco.
 - 2. Other Acceptable Manufacturers: Grinnell, B-line.
 - B. Any of the Following:
 - 1. Spider Type: Figure 421.
 - 2. Roller Type: 2 sets of rollers on opposite sides of pipe.
 - 3. Light Duty, 1-1/2" and Smaller Copper: U bolt or channel strut clamp (B2417) allowing clearance from O.D. of pipe or insulation.

PART 3 - EXECUTION

- 3.1 INSTALLATION OF PIPE SUPPORTS
 - A. Support suspended piping with approved hangers and rods, attached to concrete insert, expansion shields, beam clamps, clips, etc.
 - B. Do not hang pipe from roof steel decks or light steel members unless approved by Project Structural Engineer. Submit for Review the Following:
 - 1. Type of insert proposed.
 - 2. Layout of system showing weights to be supported for loads exceeding 250 lbs.
 - C. Support vertical pipes so that they cannot be displaced. Maximum vertical steel and copper pipe spacing shall follow the horizontal pipe maximum spacing as listed below, unless otherwise noted on the drawings.
 - D. Space hangers and supports for horizontal steel pipes according to the following schedule, unless otherwise noted on the drawings or required by local code.

<u>Pipe Size</u>	Maximum Spacing
3/4" and Smaller	6 ft. o.c.
1" to 2"	8 ft. o.c.
2-1/2" and Larger	10 ft. o.c.

E. Space hangers and supports for horizontal copper tubing according to the following schedule:

<u>Tube Size</u>	Maximum Spacing
1-1/2" and Smaller	6 ft. o.c.
2" and Larger	10 ft. o.c.

F. Soil, Waste, Vent and Down Spouts: Hanger rod sizes shall be as follows:

1-1/2" to 2" Pipe	3/8" Rod
2-1/2" to 3-1/2" Pipe	1/2" Rod
4" to 5" Pipe	5/8" Rod

- G. Space hangers and supports for horizontal no-hub piping as follows:
 - 1. Immediately adjacent to each coupling and at each branch connection with maximum spacing not to exceed 4 ft. o.c.
 - 2. Where multiple couplings occur in a closely spaced assembly a 16 gauge continuous sheet metal half sleeve strapped to the pipe on 4 foot centers may be provided in lieu of the hangers or supports at each coupling. The sleeve to be strapped to the pipe on 4 foot centers and provided with hangers or supports on 10 foot centers.
 - 3. No-hub pipe and fittings shall be suitable braced to prevent horizontal movement.
- H. Provide pipe anchors where indicated or as required for proper anchorage of pipelines, including channels, plates, etc. Make suitable provision for temperature differences when anchors are attached to pipelines, care being taken to avoid burning of pipes in welding straps to pipe. Where pipes are anchored to steel beams, weld to a base tee and secure to structural base. Where pipes are anchored to concrete structure, secure anchor and base with expansion shields.
- I. Provide felt lining at each hanger or support for all nonferrous piping.
- J. Provide seismic restraints on hangers.
- K. Support vertical piping with riser clamps secured to the piping and resting on the building structure.
- L. Arrange all pipe supports to prevent excessive deflection and to avoid excessive bending stresses or place undue load on inserts or anchors.
- M. Use of makeshift devices such as wire, rope, wood, tape, etc., is prohibited for anchoring or fastening pipes.
- N. Powder driven anchors not permitted without approval by the Project Structural Engineer.

END OF SECTION 220529

SECTION 221000 - PLUMBING PIPING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Provide potable water and sanitary piping as indicated on the Drawings and as specified, complete.
- B. Furnish materials and perform labor required to complete this work for a complete and operable facility, including, but not limited to, the following:
 - 1. Plumbing fixtures, trim, carriers and accessories.
 - 2. Sanitary drainage, waste and vent systems with piping, sewage ejectors, drains, and accessories.
 - 3. Domestic and hot water system with controls, piping, valves, and accessories.
 - 4. Seismic bracing of piping and equipment.
 - 5. Rough-ins and final connections to equipment furnished under other sections.
 - 6. Line and low voltage wiring, conduit and accessories as required for work under this section.
 - 7. Identification of piping systems and equipment.
 - 8. Excavation and backfill as required for work under this section.
 - 9. Shop drawings, wiring diagrams, equipment data, record drawings, and operating manuals.
 - 10. Hangers, anchors, sleeves, chases, metal supports, channels, and vibration isolation, as required for work under this section.
 - 11. Cleaning, patching, repairing, and painting as required for work under this section.
 - 12. Permits and fees.
 - 13. Testing, adjusting of completed work, inspections, and instruction.
- 1.2 GENERAL REQUIREMENTS
 - A. Conform to all applicable requirements specified under Section 220500 BASIC PLUMBING REQUIREMENTS, MATERIALS AND METHODS.
 - B. Conform to all applicable rules and regulations of local and state codes.
 - C. Conform to all applicable electrical requirements specified under Division 16.
- 1.3 STANDARDS Materials shall comply with the following standards:
 - A. American Society of Mechanical Engineers:
 - 1. ASME/ANSI B16.22 Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
 - 2. ANSI/ASME B40.1 Gauges Pressure Indicating Dial Type Elastic Element.
 - 3. ASME/BPVC SEC VII D1 Boiler and Pressure Vessel Code: Section VIII Pressure Vessels, Division 1.
 - B. American Society for Testing and Materials:
 - 1. ASTM A-74 Cast iron:
 - 2. ASTM A-888 Cast iron pipe fittings.

- 3. ASTM A 167 Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip
- 4. ASTM A 269 Seamless and Welded Austenitic Stainless Steel Tubing for General Service
- 5. ASTM A 403/A 403M Wrought Austenitic Stainless Steel Piping Fittings.
- 6. ASTM B 43 Seamless Red Brass Pipe, Standard Sizes.
- 7. ASTM B-88/B-88A Seamless Copper Water Tube, Copper Pipe Type K, L, M:
- 8. ASTM B 280 Seamless Copper Tube for Air Conditioning and Refrigeration Field Service.
- 9. ASTM B306 DWV Piping.
- 10. ASTM C-564 Cast iron pipe couplings
- C. Copper Development Association:
 - 1. CDA 404/0 Copper Development Association, "Copper Tube Handbook."
- D. Manufacturers Standardization Society of the Valve and Fittings Industry, Inc.:
 - 1. MSS SP-58 "Pipe Hangers and Supports Materials, Design and Manufacture."
 - 2. MSS SP-69 "Pipe Hangers and Supports Selection and Application."
 - 3. MSS SP-89 "Pipe Hangers and Supports Fabrication and Installation Practices."
- E. Comply with latest applicable NFPA Standards including:
 - 1. NFPA No. 30 Flammable and Combustible Liquids Code.
 - 2. NFPA No. 54 National Fuel Gas Code.
 - 3. NFPA No. 110 Emergency and Standby Power Systems.
- F. Sheet Metal and Air Conditioning Contractors' National Association, Inc.:
 - 1. SMACNA GFSR Guidelines for Seismic Restraints of Mechanical Systems and Plumbing Piping Systems.
- G. Underwriters Laboratory (UL) Applicable requirements and labeling.
- H. Manufacturers; Standards: In addition to the standards listed above, the laboratory gas and vacuum systems and their installation shall be in accordance with the manufacturer's published recommendations, instructions and specifications.

1.4 SUBMITTALS

- A. Shop Drawings and Product Data:
 - 1. Refer to Division 220500, BASIC PLUMBING REQUIREMENTS, for procedures.
 - 2. The Following List Includes the Required Shop Drawings That Shall Be Submitted:
 - a. Pressure reducing valves.
 - b. Backflow preventers.
 - c. Water hammer arresters.
 - d. Plumbing fixtures, accessories and trim.
 - e. Piping.

- 3. Shop Drawings: The piping contractor shall submit detailed shop drawings which thoroughly define the types and locations of piping, valves, wiring and related construction for each system specified. Details shall be adequate to illustrate that the components have been thoroughly coordinated and shall properly function as a complete system. Drawings shall clearly define components, materials, and clearances and shall show the intended layout and anchorage of all items of equipment and appurtenances, and relationships of the specified systems to other parts of the work including clearances for maintenance and operation. Shop drawings shall also include a complete description of seismic restraints and other precautions which may be necessary to the seismic zone within which the project occurs, as established by the governing codes.
 - a. System Equipment List: A complete list of all equipment and materials comprising each system, including manufacturer's descriptive and technical literature, performance charts and curves, catalog cuts, and installation instructions.
 - b. Spare Parts Roster: Recommended spare parts data shall be provided for each system specified. Data shall include a list of the parts recommended by the manufacturer to be replaced after 1 and 3 years of service, with current unit prices and sources of supply.
 - c. Framed Operating Instructions:
 - 1. The Contractor shall submit explanatory diagrams, instruction, simplified wiring and control diagrams showing the complete layout of the system, names and telephone numbers of emergency and service contacts, and any other information intended to be framed under glass or in laminated plastic.
 - 2. Condensed operating instructions shall also be provided in the same format, explaining preventive maintenance procedures, methods of checking the system for normal safe operation, and procedures for safely starting and stopping the system.
 - 3. Approved material shall be posted in location as directed by the Engineer. The framed instructions shall be posted before final acceptance testing of the system.

1.5 QUALITY ASSURANCE

A. Materials and Installation shall be by a third party entity for all testing and certifying.

PART 2 - PRODUCTS

2.1 DOMESTIC WATER PIPING

- A. Above ground inside buildings, size 3" and under.
 - 1. Pipe: Copper tube, hard temper, Type L, ASTM B8B.
 - 2. Fittings: Wrought copper, or cast bronze.
 - 3. Solder: Shall be lead free.
- B. Underground: ASTM B-88 Type K seamless copper tubing, hard temper, cold drawn. Wrap pipe and fittings with 10 mil thick, extruded high density polyethylene tape over primer with 55% overwrap and encase in watertight, 8 mil thick, low-density polyethylene (LLDPE) plastic tube with overwrap per AWWA Standard C105. Wrap and secure joints of plastic tubes per manufacturers' recommendations to prevent any soil contact with piping. Coat all bare metal appurtenances such as bolts, rods, joint harnesses, etc. with two layers of wax tape. Provide clean sand backfill to a depth of 6" in all directions.

- C. Use approved fittings for connections between dissimilar pipe systems.
- 2.2 DOMESTIC WATER PRESSURE REDUCING VALVE STATION
 - A. Manufacturer: Wilkins Model 500 YSBR, Watts Model UB5-Set, or equal (no known equal).
 - B. Seal: Renewable, stainless steel.
 - C. Wye Strainer: Bronze.
 - D. Diaphragm: High temperature resistant.

2.3 SANITARY SOIL, WASTE, VENT AND DRAIN PIPING

- A. Pipe and Fittings:
 - Above Ground, Sizes 1-1/2" and Smaller: Schedule 40, ASTM A-53, Grade A or B, galvanized steel pipe with ANSI B16.12 cast iron screwed drainage fittings or service weight, ASTM A-888, cast iron hubless soil pipe and fittings with heavy duty stainless steel no-hub couplings or Type DWV, ASTM B-306, seamless, hard temper, cold drawn copper tubing with ANSI B16.29/B16.23 copper solder sweat drainage fittings. (Exception: DWV copper tube and fittings not to be used on branch lines serving urinals, blood gas analyzers or film processors.)
 - Above Ground, Sizes 2" and Larger: Service weight, ASTM A-888, cast iron hubless soil pipe and fittings with heavy duty stainless steel no-hub couplings or Type DWV, ASTM B-306, seamless, hard temper, cold drawn copper tubing with ANSI B16.29/B16.23 copper solder sweat drainage fittings. (Exception: DWV copper tube and fittings not to be used on branch lines serving urinals, blood gas analyzers or film processors.)
 - 3. Underground: Extra heavy weight, ASTM A-74, cast iron bell and spigot soil pipe and fittings with ASTM C-564 neoprene compression joints. Coat pipe and fittings with hot applied coal tar enamel and encase in water tight 8 mil thick, low-density polyethylene (LLDPE) plastic tube with overwrap per AWWA Standard C105. Wrap and secure joints of plastic tubes per manufacturers' recommendations to prevent any soil contact with piping. Coat all bare metal appurtenances such bolts, rods, joint harnesses, etc., with two layers of wax tape. Provide clean sand backfill to a depth of 6" in all directions.
- B. Vent Pipe Above Ground:
 - 1. Sizes 1-1/2" and Smaller: Schedule 40, ASTM A-53, Grade A or B, galvanized steel pipe with ANSI B16.12 cast iron screwed drainage fittings or Type DWV, ASTM B-306, seamless, hard temper, cold drawn copper tubing with ANSI B16.29/B16.23 copper solder sweat drainage fittings.
 - 2. Sizes 2" and Larger: Service weight, ASTM A-888, no-hub cast iron soil pipe and fittings with heavy duty stainless steel no-hub couplings or Type DWV, ASTM B-306, seamless, hard temper, cold drawn copper tubing with ANSI B16.29/B16.23 copper solder sweat drainage fittings.
- C. Indirect Drain: Type M, ASTM B-88, seamless hard temper, cold drawn copper tubing with ANSI B16.29 wrought copper solder sweat drainage fittings.
- D. Cast Iron Soil Pipe Hubless Couplings: Heavy duty, 24 gauge, Type 304 18-8 chromium nickel stainless steel shield and clamp assembly with ASTM C564 neoprene sealing sleeve torqued to a minimum of 100 inch/lbs. Coupling shall be Factory Mutual approved per Standard 1680, Class I and installed per manufacturer's recommendations. Clamp-All "Hi-Torq 80", Anaco or equal.

- E. Joining for Copper DWV or Type M Tubing and Fittings: Silvabrite Bridgit, Stay-Safe 50 or equal lead free solder.
- F. Soil and vent exposed in finished spaces: DWV copper with DWV fittings.
- 2.4 HEAVY DUTY NO HUB COUPLINGS
 - A. 1-1/2", 2", 3" and 4": 3" wide 304 stainless steel shield; (4) minimum stainless steel clamps; fixed and "floating" eyelet.
 - B. 5" and over: 4" wide 304 stainless steel shield, with six (6) stainless steel clamps mounted in series.
 - C. Torque to minimum 30 inch pounds per manufacturer's recommendation.
 - D. Husky Series 4000 or equivalent by Clamp-All.

2.5 SOIL AND VENT PIPING PRODUCTS

- A. Use approved fittings for connections between dissimilar pipe systems.
- B. Manufacturers:
 - 1. Design basis: JR Smith.
 - 2. Other acceptable manufacturers:
 - a. Josam
 - b. Wade
 - c. Zurn
- C. Cleanout plugs:
 - 1. Material: Cast bronze or brass.
 - 2. Type: Countersunk.
 - 3. Threads: ANSI B2.1.
- D. Wall cleanout covers:
 - 1. Manufacturer: Josam or Zurn.
 - 2. Type: Frameless, round, low profile plate.
 - 3. Material: Stainless steel or chrome plated brass.
 - 4. Attachment: Single exposed flush screw.
 - 5. Finish:
 - a. Non-painted surfaces: Bright polished.
 - b. Surfaces to be Painted: Prime coat.
- E. Vandal-proof caps:
 - 1. Model: 1741.
 - 2. Material: Duco cast iron.
 - 3. Attachment: Recessed allen set screw.

PART 3 - EXECUTION

- 3.1 GENERAL
 - A. Testing: Test in accordance with the applicable Plumbing Code.
 - B. Connections to equipment furnished under other sections:
 - 1. Make final connections to all equipment shown on drawings as connected to supply and/or drain piping.
 - 2. Furnish all devices necessary for final connection, including:
 - a. Tail pieces.
 - b. Stops.
 - c. Supplies.
 - d. Traps.
 - C. Corrosion protection:
 - 1. Provide isolation between concrete or mortar and any copper pipe.
 - 2. All below grade piping shall be adequately protected from corrosion.
 - D. Comply with Section 220529 HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT for pipe support requirements.

3.2 INSTALLATION OF DOMESTIC WATER PIPING AND PRODUCTS

- A. Install all horizontal water piping level and parallel to building construction (except piping noted to be drained down slope toward drain at 1" in 40 feet). Make any changes in direction with fittings, don't kink or bend. All vertical piping to be plumb. Provide dielectric isolation between uninsulated pipe and hangers. Provide plastic grommets when going through metal studs. Tape is not acceptable for dielectric isolation.
- A. Backflow preventer:
 - 1. Provide backflow preventer requirements as follows:
 - a. Reduced pressure at cooling towers, and make-up for hydronic systems.
 - b. Vacuum breaker at all hose bibbs.
 - c. Reduced pressure at water entry to the building.
 - d. Double check on irrigation systems.
 - e. Stainless steel reduced pressure on water lines to carbonated beverage dispensers.
 - f. Reduced pressure at industrial cold water.
- B. Water hammer arrestors: Install arresters as required per PDI Stds WH-201. At minimum any branch line connected to a flush valve shall have one arrestor. Size and locate as per PDI Std. WH-201. Provide access panel at each location.
- C. Disinfection:
 - 1. After installation of all fixtures served, fill all domestic water lines with a chlorinewater solution of 50 parts per million minimum.
 - 2. Hold solution in pipe for at least 24 hours.

- 3. Open and close all valves 3 times during chlorination.
- 4. Waste chlorine solution from each outlet.
- 5. Measure solution at end. If not 10 ppm, repeat.

3.2 INSTALLATION OF SOIL AND VENT PIPING

- A. Couplings:
 - 1. Provide heavy duty couplings on the following:
 - 2. All no hub piping.
 - 3. Provide standard duty couplings on the following:
 - 4. Vent piping.
 - 5. Coordinate vent terminations with HVAC Contractor to maintain clearance around equipment and a minimum of 15' clearance from outside air intakes.
 - 6. Extend vent piping to elevation of adjacent roof well or screen wall top.
- B. Gaskets: Install gaskets in accordance with manufacturer's recommendations for the use of lubricants, cements, and other special installation requirements.
- C. Joint adapters: Make joints between cast iron pipe and other types of pipe with standard manufactured cast iron adapters and fittings.
- D. Cleaning piping:
 - 1. Clear the interior of pipe of dirt and other superfluous material as the work progresses.
 - 2. Place plugs in the end of uncompleted pipe at the end of the day or whenever work stops.
- E. Test plugs:
 - 1. Provide test plugs in floor drains and roof drains at the time of installation.
 - 2. Leave test plugs in place for the duration of construction until sewer or drainage system is complete.
- F. Vent flashing:
 - 1. Provide 4 lb. sheet lead (24" x 24" minimum).
 - 2. Extend lead 5" above the vent and turned down into vent pipe.
 - 3. Refer to Section 74113 for roof system components.
- G. Vent location: Do not install vents within 2 ft. of roof edge, parapet, wall line, or an "on-the-roof structure".
- H. Neutralizing pit: Provide solid unexcavated earth or concrete support under concrete sump.

3.3 FIELD QUALITY CONTROL

- A. Plumbing Piping Systems Leak Tests:
 - 1. Potable Water Piping:
 - a. General: After completion of the Work, but before final acceptance is made, Contractor shall run a test over a four-hour period of time to prove that the capacity and performance of all apparatus fittings and the system as a whole meets the requirements of the Specifications.

- b. Pressure Tests: Make pressure tests in the presence of the Owner's Representative.
 - 1. Below-Grade Potable Water Service: After the pipe is laid, the joints completed, and the trench partially backfilled, leaving the joints exposed for examination, the newly laid piping or any valved section of piping shall, unless otherwise specified, be subjected for four (4) hours to a pressure of 200 psig pressure at the points of reading. All exposed pipe, joints, fittings, and valves shall be examined during the open trench test. Use a Bristol recording device, data disc to be given to Owner's Representative after successful completion of test. Joints showing visible leakage shall be made tight. Defective pipe, fittings, or valves that fail the pressure test, shall be retested at no additional cost to the Owner until the test results are approved by the Owner's Representative.
 - 2. Cold and hot water services within the building shall be tested at 120 psi for a period of 4 hours. Any joints showing visible leakage shall be cut out and remade; peening of joints shall not be permitted. Sections of pipework containing remade joints shall be retested. Tests shall be carried out using Bristol recording device. Data disc shall be given to the Owner's Representative after successful completion of test.
- 2. Sanitary Piping:
 - a. Make pressure tests in the presence of the Owner's Representative.
 - b. All waste drainage piping, including branch bends and ferrule joints, shall be tested by closing all openings before any fixtures are set and filling the entire system with water, or by air pressure tests as specified below and approved by the Owner's Representative.
 - c. All underground piping shall be tested hydraulically at a minimum static head of 10 feet. Leakage at any point in the system shall be cause for rejection.
 - d. All aboveground piping shall be tested hydraulically by closing all openings in the piping system, except the highest opening above the roof, and by filling the system to the point of overflowing. In no case shall the pressure exerted on the system be less than 10 feet of head. Leakage at any joint shall be cause for rejection. If the leaking joint can be adjusted to stop leakage, the Owner's Representative, pending his approval of the type of adjustment, may accept the joint. If not accepted by the Owner's Representative, Contractor shall replace as approved at no additional cost to the Owner.
 - e. When it is impractical to test hydraulically, air test may be substituted for hydraulic testing. Air shall be forced into the closed system at a uniform pressure to balance a column of mercury 10 inches in height or a pressure of 5 pounds per square inch.
 - f. Under any of the previously described tests, the air or water pressure shall remain constant, after stabilization, for not less than fifteen (15) minutes without any further addition of air or water.
- B. Disinfection of Domestic Cold Water Systems:
 - 1. General: All newly installed water systems and lines shall be disinfected by a Contractor-furnished commercial water line chlorinator. The commercial chlorinator shall also take water samples for bacteriological analysis. These samples shall be submitted to a California state licensed testing laboratory by the chlorinator.

- 2. Incurred Costs: All expenses that may result from the disinfection and testing of water systems and lines, and the taking and analysis of water samples shall be borne by Contractor.
- 3. Advance Notice: Contractor shall notify the Owner's Representative in writing, at least 72 hours in advance of all disinfection and testing procedures. All disinfection and testing procedures shall occur in the presence of an EH&S representative. Notification shall include location, number of chlorinations and tests, day and time.
- 4. Labor and Materials: Contractor's chlorinator shall furnish labor, equipment, materials and transportation needed to correctly disinfect and test domestic and laboratory hot/cold water systems and fire lines and to take water samples for bacteriological analysis. This includes all items needed to facilitate the introduction of the disinfecting agent into the water systems/lines such as service cocks and valves.
- 5. Disinfecting Agents: Chlorine is approved for water system disinfection and may be used in gaseous or liquid form. Other types of disinfecting agents may be used only with the prior approval of the Owner's Representative.
- 6. Disinfecting Procedure: The disinfection of water systems and lines shall be in accordance with the requirements of Title 22, California Code of Regulations (CCR) and the American Water Works Association (AWWA) standards. The Disinfecting Procedure Shall Include the Following:
 - a. Post signs on all water outlets of the system being disinfected reading "Water System Being Chlorinated Do Not Drink" or a similar warning.
 - b. With system full of water and under "main" pressure, open all faucets to permit simultaneous trickle flow.
 - c. Introduce the disinfectant into the system until a test of the water at each outlet shows a free chlorine residual concentration of:
 - 1. 25 Parts per Million (ppm): This chlorine concentration shall be held in the pipes for a 24 hour period.
 - 2. 100 ppm: This chlorine concentration shall be held in the pipes for a 3 hour period.
 - d. The test made of the water after the retention time shall indicate a chlorine residual concentration of not less than half of the original concentration. Repeat the disinfection procedure until this standard is attained.
 - e. After satisfactory completion of the above test, flush out system until diethyl-pphenylenediamine (DPD) tests at the water outlets reveal that the free chlorine residual is less than 0.5 ppm or equal to the flushing water chlorine residual.
- 7. Water Samples for Bacteriological Analysis:
 - a. Water samples for bacteriological analysis, shall be collected by Contractor's chlorinator in sample bottles prepared as required by Title 22, CCR and AWWA standards. Samples shall be taken from a representative number of water outlets so as to ensure an accurate sampling of the water system/line. Water samples shall be taken in the presence of an EH&S representative (The Owner may also collect a sample).
 - b. The water samples shall be delivered by Contractor's chlorinator in a timely manner to a California state approved water analysis laboratory. The samples must test negative for coliform organisms and less than 500 for a Standard Plate Count (HPLC).

- c. If the results are positive, the above steps 6(a) through 6(f) shall be repeated. Two consecutive negative tests must be obtained prior to using the water system.
- 8. Final Results: Submit a copy of the laboratory analysis to Owner's Representative and EH&S. If the analysis results do not meet the standards specified, the disinfecting procedure shall be repeated until the specified standards are met, at no additional cost to the Owner. The complete procedure may take up to 4 days if negative results are obtained. This procedure will be longer if the results are positive.

3.4 ADJUSTMENT AND CLEANING

A. Potable Water Piping: After piping is erected, flush all piping before sterilizing the potable water system.

END OF SECTION 221000

SECTION 221113 - FACILITY WATER DISTRIBUTION PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes water-distribution piping and related components outside the building for water service.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Detail precast concrete vault assemblies and indicate dimensions, method of field assembly, and components.
- C. Field quality-control test reports.
- D. Operation and maintenance data.
- 1.3 QUALITY ASSURANCE
 - A. Regulatory Requirements:
 - 1. Comply with requirements of utility company supplying water. Include tapping of water mains and backflow prevention.
 - 2. Comply with standards of authorities having jurisdiction for potable-water-service piping, including materials, installation, testing, and disinfection.
 - 3. Comply with standards of authorities having jurisdiction for fire-suppression waterservice piping, including materials, hose threads, installation, and testing.
 - B. Piping materials shall bear label, stamp, or other markings of specified testing agency.
 - C. Comply with ASTM F 645 for selection, design, and installation of thermoplastic water piping.
 - D. Comply with FMG's "Approval Guide" or UL's "Fire Protection Equipment Directory" for fire-service-main products.
 - E. NFPA Compliance: Comply with NFPA 24 for materials, installations, tests, flushing, and valve and hydrant supervision for fire-service-main piping for fire suppression.
 - F. NSF Compliance:
 - 1. Comply with NSF 14 for plastic potable-water-service piping.
 - 2. Comply with NSF 61 for materials for water-service piping and specialties for domestic water.

1.4 **PROJECT CONDITIONS**

- A. Interruption of Existing Water-Distribution 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 water-distribution service according to requirements indicated:
 - 1. Notify Construction Manager no fewer than two days in advance of proposed interruption of service.
 - 2. Do not proceed with interruption of water-distribution service without Construction Manager's written permission.

1.5 COORDINATION

A. Coordinate connection to water main with utility company.

PART 2 - PRODUCTS

- 2.1 PIPE AND FITTINGS
 - A. PVC, AWWA Pipe: AWWA C900, Class 200, with bell end with gasket, and with spigot end.
 - 1. Comply with UL 1285 for fire-service mains if indicated.
 - 2. PVC Fabricated Fittings: AWWA C900, Class 200, with bell-and-spigot or doublebell ends. Include elastomeric gasket in each bell.
 - 3. PVC Molded Fittings: AWWA C907, Class 150, with bell-and-spigot or double-bell ends. Include elastomeric gasket in each bell.
 - 4. Push-on-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.
 - a. Gaskets: AWWA C111, rubber.
 - 5. Mechanical-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.
 - a. Glands, Gaskets, and Bolts: AWWA C111, ductile- or gray-iron glands, rubber gaskets, and steel bolts.
 - B. PVC Pipe smaller than 4 inches:
 - 1. ASTM D1785, Schedule 80, with SDR as necessary to provide 200 psi minimum pressure.
 - 2. Fittings shall conform to ASTM D2467, Schedule 80. Pipe and fittings shall be of the same PVC plastic material and shall be one of the following pipe/fitting combinations, as marked on the pipe and fitting, respectively: PVC 1220/PVC 12; PVC 2120/PVC II; PVC 2116/PVC II.
 - 3. Solvent cement for joining shall conform to ASTM D2564.

2.2 JOINING MATERIALS

- A. Brazing Filler Metals: AWS A5.8, BCuP Series.
- B. Bonding Adhesive for Fiberglass Piping: As recommended by fiberglass piping manufacturer.
- C. Plastic Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.

2.3 PIPING SPECIALTIES

- A. Transition Fittings: Manufactured fitting or coupling same size as, with pressure rating at least equal to and ends compatible with, piping to be joined.
- B. Tubular-Sleeve Pipe Couplings:
 - 1. Description: Metal, bolted, sleeve-type, reducing or transition coupling, with center sleeve, gaskets, end rings, and bolt fasteners and with ends of same sizes as piping to be joined.
 - a. Standard: AWWA C219.

2.4 GATE VALVES

- A. AWWA, Cast-Iron Gate Valves:
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Mueller A-2360 or a comparable product by one of the following:
 - a. American AVK Co.; Valves & Fittings Div.
 - b. American Cast Iron Pipe Co.; American Flow Control Div.
 - c. American Cast Iron Pipe Co.; Waterous Co. Subsidiary.
 - d. Crane Co.; Crane Valve Group; Stockham Div.
 - e. East Jordan Iron Works, Inc.
 - f. McWane, Inc.; Clow Valve Co. Div. (Oskaloosa).
 - g. McWane, Inc.; Kennedy Valve Div.
 - h. McWane, Inc.; M & H Valve Company Div.
 - i. McWane, Inc.; Tyler Pipe Div.; Utilities Div.
 - j. Mueller Co.; Water Products Div.
 - k. NIBCO INC.
 - l. U.S. Pipe and Foundry Company.
 - 2. Nonrising-Stem, Metal-Seated Gate Valves:
 - a. Description: Gray- or ductile-iron body and bonnet; with cast-iron or bronze double-disc gate, bronze gate rings, bronze stem, and stem nut.
 - 1) Standard: AWWA C500.
 - 2) Minimum Pressure Rating: 200 psig.
 - 3) End Connections: Mechanical joint.
 - 4) Interior Coating: Complying with AWWA C550.
 - 3. Nonrising-Stem, Resilient-Seated Gate Valves:
 - a. Description: Gray- or ductile-iron body and bonnet; with bronze or gray- or ductile-iron gate, resilient seats, bronze stem, and stem nut.
 - 1) Standard: AWWA C509.
 - 2) Minimum Pressure Rating: 200 psig.
 - 3) End Connections: Mechanical joint.
 - 4) Interior Coating: Complying with AWWA C550.
 - 4. Nonrising-Stem, High-Pressure, Resilient-Seated Gate Valves:
 - a. Description: Ductile-iron body and bonnet; with bronze or ductile-iron gate, resilient seats, bronze stem, and stem nut.
 - 1) Standard: AWWA C509.
 - 2) Minimum Pressure Rating: 250 psig.
 - 3) End Connections: Push on or mechanical joint.
 - 4) Interior Coating: Complying with AWWA C550.

- 5. OS&Y, Rising-Stem, Metal-Seated Gate Valves:
 - a. Description: Cast- or ductile-iron body and bonnet, with cast-iron double disc, bronze disc and seat rings, and bronze stem.
 - 1) Standard: AWWA C500.
 - 2) Minimum Pressure Rating: 200 psig.
 - 3) End Connections: Flanged.
- 6. OS&Y, Rising-Stem, Resilient-Seated Gate Valves:
 - a. Description: Cast- or ductile-iron body and bonnet, with bronze or gray- or ductile-iron gate, resilient seats, and bronze stem.
 - 1) Standard: AWWA C509.
 - 2) Minimum Pressure Rating: 200 psig.
 - 3) End Connections: Flanged.

2.5 GATE VALVE ACCESSORIES AND SPECIALTIES

- A. Tapping-Sleeve Assemblies:
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Mueller H-304 or a comparable product by one of the following:
 - a. American Cast Iron Pipe Co.; Waterous Co. Subsidiary.
 - b. East Jordan Iron Works, Inc.
 - c. Flowserve.
 - d. McWane, Inc.; Clow Valve Co. Div. (Oskaloosa).
 - e. McWane, Inc.; Kennedy Valve Div.
 - f. McWane, Inc.; M & H Valve Company Div.
 - g. Mueller Co.; Water Products Div.
 - h. U.S. Pipe and Foundry Company.
 - 2. Description: Sleeve and valve compatible with drilling machine.
 - a. Standard: MSS SP-60.
 - b. Tapping Sleeve: Cast- or ductile-iron or stainless-steel, two-piece bolted sleeve with flanged outlet for new branch connection. Include sleeve matching size and type of pipe material being tapped and with recessed flange for branch valve.
 - c. Valve: AWWA, cast-iron, nonrising-stem, resilient-seated gate valve with one raised face flange mating tapping-sleeve flange.
- B. Valve Boxes: Comply with AWWA M44 for cast-iron valve boxes. Include top section, adjustable extension of length required for depth of burial of valve, plug with lettering "WATER," and bottom section with base that fits over valve and with a barrel approximately 5 inches in diameter.
 - 1. Operating Wrenches: Steel, tee-handle with one pointed end, stem of length to operate deepest buried valve, and socket matching valve operating nut.

C. Indicator Posts: UL 789, FMG-approved, vertical-type, cast-iron body with operating wrench, extension rod, and adjustable cast-iron barrel of length required for depth of burial of valve.

2.6 BACKFLOW PREVENTERS

- A. Double-Check, Backflow-Prevention Assemblies:
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide AMES 3000SS or a comparable product by one of the following:
 - a. Ames Fire & Waterworks; a division of Watts Regulator Co.
 - b. Conbraco Industries, Inc.
 - c. FEBCO; SPX Valves & Controls.
 - d. Flomatic Corporation.
 - e. Watts Water Technologies, Inc.
 - f. Zurn Plumbing Products Group; Wilkins Water Control Products Div.
 - 2. Accessories: Ball valves with threaded ends on inlet and outlet of NPS 2 and smaller; OS&Y gate valves with flanged ends on inlet and outlet of NPS 2-1/2 and larger.

PART 3 - EXECUTION

3.1 EARTHWORK

- A. Refer to Division 31 Section "Earth Moving" for excavating, trenching, and backfilling.
- 3.2 PIPING APPLICATIONS
 - A. General: Use pipe, fittings, and joining methods for piping systems according to the following applications.
 - B. Transition couplings and special fittings with pressure ratings at least equal to piping pressure rating may be used, unless otherwise indicated.
 - C. Do not use flanges or unions for underground piping.
 - D. Flanges, unions, and special fittings may be used, instead of joints indicated, on aboveground piping and piping in vaults.
 - E. Underground water-service piping NPS 3/4 to NPS 3 shall be PolyVinyl Chloride (PVC) plastic piping [ASTM D1785] Schedule 80 with SDR as necessary to provide 200 psi minimum pressure. Fittings shall conform to ASTM D2467, Schedule 80. Pipe and fittings shall be of the same PVC plastic material and shall be one of the following pipe/fitting combinations, as marked on the pipe and fitting, respectively: PVC 1220/PVC 12; PVC 2120/PVC II; PVC 2116/PVC II. Solvent cement for joining shall conform to ASTM D2564.

3.3 VALVE APPLICATIONS

- A. General Application: Use mechanical-joint-end valves for NPS 3 and larger underground installation. Use threaded- or flanged-end valves for installation in vaults. Use UL/FMG, nonrising-stem gate valves for installation with indicator posts. Use corporation valves and curb valves with ends compatible with piping, for NPS 2 and smaller installation.
- B. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:
 - 1. Underground Valves, NPS 3 and Larger: AWWA, cast-iron, nonrising-stem, high-pressure, resilient-seated gate valves with valve box.

- 2. Use the following for valves in vaults and aboveground:
 - a. Gate Valves, NPS 2 and Smaller: cast iron, nonrising stem.
 - b. Gate Valves, NPS 3 and Larger: AWWA, cast iron, OS&Y rising stem, resilient seated.

3.4 PIPING INSTALLATION

- A. Water-Main Connection: Arrange with utility company for tap of size and in location indicated in water main.
- B. Water-Main Connection: Tap water main according to requirements of water utility company and of size and in location indicated.
- C. Make connections larger than NPS 2 with tapping machine according to the following:
 - 1. Install tapping sleeve and tapping valve according to MSS SP-60.
 - 2. Install tapping sleeve on pipe to be tapped. Position flanged outlet for gate valve.
 - 3. Use tapping machine compatible with valve and tapping sleeve; cut hole in main. Remove tapping machine and connect water-service piping.
 - 4. Install gate valve onto tapping sleeve. Comply with MSS SP-60. Install valve with stem pointing up and with valve box.
- D. Make connections NPS 2 and smaller with drilling machine according to the following:
 - 1. Install service-saddle assemblies and corporation valves in size, quantity, and arrangement required by utility company standards.
 - 2. Install service-saddle assemblies on water-service pipe to be tapped. Position outlets for corporation valves.
 - 3. Use drilling machine compatible with service-saddle assemblies and corporation valves. Drill hole in main. Remove drilling machine and connect water-service piping.
 - 4. Install corporation valves into service-saddle assemblies.
 - 5. Install manifold for multiple taps in water main.
 - 6. Install curb valve in water-service piping with head pointing up and with service box.
- E. Comply with NFPA 24 for fire-service-main piping materials and installation.
 - 1. Install copper tube and fittings according to CDA's "Copper Tube Handbook."
- F. Install ductile-iron, water-service piping according to AWWA C600 and AWWA M41.
- G. Install PE pipe according to ASTM D 2774 and ASTM F 645.
- H. Install PVC, AWWA pipe according to ASTM F 645 and AWWA M23.
- I. Bury piping with depth of cover over top at least 36 inches, with top at least 12 inches below level of maximum frost penetration.
- J. Extend water-service piping and connect to water-supply source and building-water-piping systems at outside face of building wall in locations and pipe sizes indicated.
 - 1. Terminate water-service piping at building wall until building-water-piping systems are installed. Terminate piping with caps, plugs, or flanges as required for piping material. Make connections to building-water-piping systems when those systems are installed.
- K. Sleeves are specified in Division 22 Section "Common Work Results for Plumbing."

- L. Install underground piping with restrained joints at horizontal and vertical changes in direction. Use restrained-joint piping, thrust blocks, anchors, tie-rods and clamps, and other supports.
- 3.5 JOINT CONSTRUCTION
 - A. Make pipe joints according to the following:
 - 1. Ductile-Iron Piping, Gasketed Joints for Water-Service Piping: AWWA C600 and AWWA M41.
 - 2. Ductile-Iron Piping, Gasketed Joints for Fire-Service-Main Piping: UL 194.
 - 3. Ductile-Iron Piping, Grooved Joints: Cut-groove pipe. Assemble joints with grooved-end, ductile-iron-piping couplings, gaskets, lubricant, and bolts according to coupling manufacturer's written instructions.
 - 4. PE Piping Insert-Fitting Joints: Use plastic insert fittings and fasteners according to fitting manufacturer's written instructions.
 - 5. PVC Piping Gasketed Joints: Use joining materials according to AWWA C900. Construct joints with elastomeric seals and lubricant according to ASTM D 2774 or ASTM D 3139 and pipe manufacturer's written instructions.
 - 6. Dissimilar Materials Piping Joints: Use adapters compatible with both piping materials, with OD, and with system working pressure.

3.6 ANCHORAGE INSTALLATION

- A. Anchorage, General: Install water-distribution piping with restrained joints. Anchorages and restrained-joint types that may be used include the following:
 - 1. Concrete thrust blocks.
 - 2. Locking mechanical joints.
 - 3. Set-screw mechanical retainer glands.
 - 4. Bolted flanged joints.
 - 5. Heat-fused joints.
 - 6. Pipe clamps and tie rods.
- B. Install anchorages for tees, plugs and caps, bends, crosses, valves, and hydrant branches. Include anchorages for the following piping systems:
 - 1. Gasketed-Joint, Ductile-Iron, Water-Service Piping: According to AWWA C600.
 - 2. Gasketed-Joint, PVC Water-Service Piping: According to AWWA M23.
 - 3. Fire-Service-Main Piping: According to NFPA 24.
- C. Apply full coat of asphalt or other acceptable corrosion-resistant material to surfaces of installed ferrous anchorage devices.

3.7 VALVE INSTALLATION

- A. AWWA Gate Valves: Comply with AWWA C600 and AWWA M44. Install each underground valve with stem pointing up and with valve box.
- B. UL/FMG, Gate Valves: Comply with NFPA 24. Install each underground valve and valves in vaults with stem pointing up and with vertical cast-iron indicator post.
- C. MSS Valves: Install as component of connected piping system.

- D. Corporation Valves and Curb Valves: Install each underground curb valve with head pointed up and with service box.
- 3.8 BACKFLOW PREVENTER INSTALLATION
 - A. Install backflow preventers of type, size, and capacity indicated. Include valves and test cocks. Install according to requirements of plumbing and health department and authorities having jurisdiction.
 - B. Do not install backflow preventers that have relief drain in vault or in other spaces subject to flooding.
 - C. Do not install bypass piping around backflow preventers.
 - D. Support NPS 2-1/2 and larger backflow preventers, valves, and piping near floor and on brick or concrete piers.

3.9 CONNECTIONS

- A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Connect water-distribution piping to existing onsite water lateral. Use service clamp and corporation valve.
- C. Connect water-distribution piping to interior domestic water and fire-suppression piping.
- D. Connect waste piping from concrete vault drains to sanitary sewerage system. See Division 22 Section "Facility Sanitary Sewers" for connection to sanitary-sewer piping.
- 3.10 FIELD QUALITY CONTROL
 - A. Piping Tests: Conduct piping tests before joints are covered and after concrete thrust blocks have hardened sufficiently. Fill pipeline 24 hours before testing and apply test pressure to stabilize system. Use only potable water.
 - B. Hydrostatic Tests: Test at not less than one-and-one-half times working pressure for two hours.
 - 1. Increase pressure in 50-psig increments and inspect each joint between increments. Hold at test pressure for 1 hour; decrease to 0 psig. Slowly increase again to test pressure and hold for 1 more hour. Maximum allowable leakage is 2 quarts per hour per 100 joints. Remake leaking joints with new materials and repeat test until leakage is within allowed limits.
 - C. Prepare reports of testing activities.

3.11 IDENTIFICATION

- A. Install continuous underground detectable warning tape during backfilling of trench for underground water-distribution piping. Locate below finished grade, directly over piping. Underground warning tapes are specified in Division 31 Section "Earth Moving."
- B. Permanently attach equipment nameplate or marker indicating plastic water-service piping, on main electrical meter panel.
- 3.12 CLEANING
 - A. Clean and disinfect water-distribution piping as follows:
 - 1. Purge new water-distribution piping systems and parts of existing systems that have been altered, extended, or repaired before use.

- 2. Use purging and disinfecting procedure prescribed by authorities having jurisdiction or, if method is not prescribed by authorities having jurisdiction, use procedure described in NFPA 24 for flushing of piping. Flush piping system with clean, potable water until dirty water does not appear at points of outlet.
- 3. Use purging and disinfecting procedure prescribed by authorities having jurisdiction or, if method is not prescribed by authorities having jurisdiction, use procedure described in AWWA C651 or do as follows:
 - a. Fill system or part of system with water/chlorine solution containing at least 50 ppm of chlorine; isolate and allow to stand for 24 hours.
 - b. Drain system or part of system of previous solution and refill with water/chlorine solution containing at least 200 ppm of chlorine; isolate and allow to stand for 3 hours.
 - c. After standing time, flush system with clean, potable water until no chlorine remains in water coming from system.
 - d. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedure if biological examination shows evidence of contamination.
- B. Prepare reports of purging and disinfecting activities.

END OF SECTION 221113

SECTION 221313 - FACILITY SANITARY SEWERS

PART 1 - GENERAL

- 1.1 SUMMARY
 - A. Section Includes:
 - 1. Pipe and fittings.
 - 2. Cleanouts.

1.2 SUBMITTALS

- A. Product Data: For expansion joints.
- B. Shop Drawings: For manholes. Include plans, elevations, sections, details, and frames and covers.
- C. Product Certificates: For each type of cast-iron soil pipe and fitting, from manufacturer.
- D. Field quality-control reports.

PART 2 - PRODUCTS

- 2.1 PVC PIPE AND FITTINGS
 - A. PVC Corrugated Sewer Piping:
 - 1. Pipe: ASTM F 949, PVC corrugated pipe with bell-and-spigot ends for gasketed joints.
 - 2. Fittings: ASTM F 949, PVC molded or fabricated, socket type.
 - 3. Gaskets: ASTM F 477, elastomeric seals.
 - B. PVC Type PSM Sewer Piping:
 - 1. Pipe: ASTM D 3034, SDR 35, PVC Type PSM sewer pipe with bell-and-spigot ends for gasketed joints.
 - 2. Fittings: ASTM D 3034, PVC with bell ends.
 - 3. Gaskets: ASTM F 477, elastomeric seals.

2.2 NONPRESSURE-TYPE TRANSITION COUPLINGS

- A. Comply with ASTM C 1173, elastomeric, sleeve-type, reducing or transition coupling, for joining underground nonpressure piping. Include ends of same sizes as piping to be joined and corrosion-resistant-metal tension band and tightening mechanism on each end.
- B. Sleeve Materials:
 - 1. For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
 - 2. For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.
- C. Ring-Type, Flexible Couplings: Elastomeric compression seal with dimensions to fit inside bell of larger pipe and for spigot of smaller pipe to fit inside ring.
- 2.3 CLEANOUTS
 - A. Cast-Iron Cleanouts: ASME A112.36.2M, round, gray-iron housing with clamping device and round, secured, scoriated, gray-iron cover. Include gray-iron ferrule with inside calk or spigot connection and countersunk, tapered-thread, brass closure plug.
 - 1. Top-Loading Classification(s): Heavy Duty.

2. Sewer Pipe Fitting and Riser to Cleanout: ASTM A 74, Service class, cast-iron soil pipe and fittings.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Excavating, trenching, and backfilling are specified in Division 31 Section "Earth Moving."

3.2 PIPING INSTALLATION

- A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground sanitary sewer piping. Location and arrangement of piping layout take into account design considerations. Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.
- B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for using lubricants, cements, and other installation requirements.
- C. Install manholes for changes in direction unless fittings are indicated. Use fittings for branch connections unless direct tap into existing sewer is indicated.
- D. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.
- E. When installing pipe under streets or other obstructions that cannot be disturbed, use pipejacking process of microtunneling.
- F. Install gravity-flow, nonpressure, drainage piping according to the following:
 - 1. Install piping pitched down in direction of flow, at minimum slope of 2% percent unless otherwise indicated.
 - 2. Install piping NPS 6 and larger with restrained joints at tee fittings and at changes in direction. Use corrosion-resistant rods, pipe or fitting manufacturer's proprietary restraint system, or cast-in-place-concrete supports or anchors.
 - 3. Install piping with 36-inch minimum cover.
 - 4. Install PVC corrugated sewer piping according to ASTM D 2321 and ASTM F 1668.
 - 5. Install PVC Type PSM sewer piping according to ASTM D 2321 and ASTM F 1668.
- G. Install corrosion-protection piping encasement over the following underground metal piping according to ASTM A 674 or AWWA C105:
 - 1. Expansion joints.
- H. Clear interior of piping and manholes of dirt and superfluous material as work progresses. Maintain swab or drag in piping, and pull past each joint as it is completed. Place plug in end of incomplete piping at end of day and when work stops.

3.3 PIPE JOINT CONSTRUCTION

- A. Join gravity-flow, nonpressure, drainage piping according to the following:
 - 1. Join PVC corrugated sewer piping according to ASTM D 2321.
 - 2. Join PVC Type PSM sewer piping according to ASTM D 2321 and ASTM D 3034 for elastomeric-seal joints or ASTM D 3034 for elastomeric-gasket joints.

- 3. Join dissimilar pipe materials with nonpressure-type, rigid couplings.
- B. Pipe couplings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.
 - 1. Use nonpressure flexible couplings where required to join gravity-flow, nonpressure sewer piping unless otherwise indicated.
 - a. Unshielded flexible couplings for pipes of same or slightly different OD.
 - b. Unshielded, increaser/reducer-pattern, flexible couplings for pipes with different OD.
 - c. Ring-type flexible couplings for piping of different sizes where annular space between smaller piping's OD and larger piping's ID permits installation.

3.4 MANHOLE INSTALLATION

- A. General: Install manholes complete with appurtenances and accessories indicated.
- B. Install precast concrete manhole sections with sealants according to ASTM C 891.
- C. Install FRP manholes according to manufacturer's written instructions.
- D. Form continuous concrete channels and benches between inlets and outlet.
- E. Set tops of frames and covers flush with finished surface of manholes that occur in pavements. Set tops 3 inches above finished surface elsewhere unless otherwise indicated.
- F. Install manhole-cover inserts in frame and immediately below cover.

3.5 CONCRETE PLACEMENT

A. Place cast-in-place concrete according to ACI 318.

3.6 CLEANOUT INSTALLATION

- A. Install cleanouts and riser extensions from sewer pipes to cleanouts at grade. Use cast-iron soil pipe fittings in sewer pipes at branches for cleanouts, and use cast-iron soil pipe for riser extensions to cleanouts. Install piping so cleanouts open in direction of flow in sewer pipe.
 - 1. Use Medium-Duty, top-loading classification cleanouts in earth or paved foot-traffic areas.
 - 2. Use Heavy-Duty, top-loading classification cleanouts in vehicle-traffic service and parking lot areas.
- B. Set cleanout frames and covers in earth in cast-in-place-concrete block, 18 by 18 by 12 inches deep. Set with tops 1 inch above surrounding grade.
- C. Set cleanout frames and covers in concrete pavement and roads with tops flush with pavement surface.

3.7 CONNECTIONS

- A. Connect nonpressure, gravity-flow drainage piping to building's sanitary building drains specified in Division 22 Section "Facility Sanitary Sewers."
- B. Make connections to existing piping and underground manholes.
 - 1. Use commercially manufactured wye fittings for piping branch connections. Remove section of existing pipe, install wye fitting into existing piping, and encase entire wye fitting plus 6-inch overlap with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi.

- 2. Make branch connections from side into existing piping, NPS 4 to NPS 20. Remove section of existing pipe, install wye fitting into existing piping, and encase entire wye with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi.
- 3. Make branch connections from side into existing piping, NPS 21 or larger, or to underground manholes by cutting opening into existing unit large enough to allow 3 inches of concrete to be packed around entering connection. Cut end of connection pipe passing through pipe or structure wall to conform to shape of and be flush with inside wall unless otherwise indicated. On outside of pipe or manhole wall, encase entering connection in 6 inches of concrete for minimum length of 12 inches to provide additional support of collar from connection to undisturbed ground.
 - a. Use concrete that will attain a minimum 28-day compressive strength of 3000 psi unless otherwise indicated.
 - b. Use epoxy-bonding compound as interface between new and existing concrete and piping materials.
- 4. Protect existing piping and manholes to prevent concrete or debris from entering while making tap connections. Remove debris or other extraneous material that may accumulate.

3.8 IDENTIFICATION

- A. Materials and their installation are specified in Division 31 Section "Earth Moving." Arrange for installation of green warning tapes directly over piping and at outside edges of underground manholes.
 - 1. Use detectable warning tape over ferrous piping.
 - 2. Use detectable warning tape over nonferrous piping and over edges of underground manholes.
- 3.9 FIELD QUALITY CONTROL
 - A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of Project.
 - 1. Submit separate report for each system inspection.
 - 2. Defects requiring correction include the following:
 - a. Alignment: Less than full diameter of inside of pipe is visible between structures.
 - b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
 - c. Damage: Crushed, broken, cracked, or otherwise damaged piping.
 - d. Infiltration: Water leakage into piping.
 - e. Exfiltration: Water leakage from or around piping.
 - 3. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
 - 4. Reinspect and repeat procedure until results are satisfactory.
 - B. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.
 - 1. Do not enclose, cover, or put into service before inspection and approval.

- 2. Test completed piping systems according to requirements of authorities having jurisdiction.
- 3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours' advance notice.
- 4. Submit separate report for each test.
- 5. Hydrostatic Tests: Test sanitary sewerage according to requirements of authorities having jurisdiction and the following:
 - a. Fill sewer piping with water. Test with pressure of at least 10-foot head of water, and maintain such pressure without leakage for at least 15 minutes.
 - b. Close openings in system and fill with water.
 - c. Purge air and refill with water.
 - d. Disconnect water supply.
 - e. Test and inspect joints for leaks.
- 6. Air Tests: Test sanitary sewerage according to requirements of authorities having jurisdiction, UNI-B-6, and the following:
 - a. Option: Test plastic gravity sewer piping according to ASTM F 1417.
 - b. Option: Test concrete gravity sewer piping according to ASTM C 924.
- 7. Manholes: Perform hydraulic test according to ASTM C 969.
- C. Leaks and loss in test pressure constitute defects that must be repaired.
- D. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.
- 3.10 CLEANING
 - A. Clean dirt and superfluous material from interior of piping. Flush with potable water.

END OF SECTION 221313

SECTION 224000 - PLUMBING FIXTURES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Provide plumbing fixtures and trim as shown on the Drawings and as specified including fastenings, accessory features, and other items which are necessary to make a complete installation.

1.2 REFERENCE STANDARDS

A. In addition to codes listed in Section 220500 BASIC PLUMBING REQUIREMENTS, MATERIALS AND METHODS, fixtures shall conform to current commercial standards for sanitary cast iron enameled ware and staple vitreous china plumbing fixtures recommended by the U.S. Department of Commerce.

1.3 SUBMITTALS

- A. Shop Drawings and Product Data:
 - 1. Refer to Section 220500 BASIC PLUMBING REQUIREMENTS, MATERIALS AND METHODS, for procedures.
 - 2. Shop drawings to be submitted include all plumbing fixtures and trims, accessories, appliances, appurtenances, equipment and support and indicated materials and finishes, dimensions, construction details, and flow-control rates for each type of fixture indicated.

1.4 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Protection of Fixtures and Trim: Protect the plumbing fixtures and accessories during construction. Replace at no cost to Owner any fixture or accessory that is marred, scratched, defaced, or broken.

PART 2 - PRODUCTS

- 2.1 GENERAL
 - A. Provide factory fabricated fixtures.
 - B. Provide trim, carriers, valves and accessories as required for complete installation.
 - C. All fixtures are wall mounted unless otherwise noted.
 - A. Plumbing Fixtures:
 - 1. Accessible plumbing fixtures shall comply will all of the requirements of CBC Section 1115B.
 - 2. Heights and location of all fixtures shall be according to CBC Sections 1115B.4 and Table 1115B-1.
 - 3. Fixtures controls shall comply with CBC Section 1115B.4 and Table 1115B.4.4.4 for showers, 1115B.4.3.1 for lavatories, 1115B.4.1.5 for toilets and 1115B.4.2.3 for urinals.
 - 4. Sinks shall not exceed 6-1/2" in depth, CBC Section 1115B.4.7.1.
 - B. Refer to Drawings for plumbing fixture schedule.
 - C. Comply with State of California Water Conservation requirements for new plumbing fixtures: W.C.=1.6 gpf and lavs = 0.5 gpm maximum.

PART 3 - EXECUTION

- 3.1 INSTALLATION
 - A. General: Install each fixture with trap, easily removable for servicing and cleaning.
 - B. Provide chrome plated, rigid or flexible supplies to fixtures with stops, reducers and escutcheons.
 - C. Finish wall and floor penetrations when exposed to view in finished areas with set screw type, chrome plated brass escutcheons.
 - D. Set plumbing fixtures level and plumb, spaced in accordance with dimensioned Drawings, and securely install to be rigid.
 - E. Install wall mounted lavatories, urinals and water closets with wall carriers mounted to the floor.
 - F. Cover fixture bolts with china bolt caps of the same color as the fixture and set in place with plaster of paris.
 - G. Securely anchor flush valves behind or within walls to be rigid and not subject to movement due to push or pull action on the valve.
 - H. Fixture mounting heights:
 - 1. Refer to Architectural drawings.
- 3.2 ADJUSTING AND CLEANING
 - A. Cleaning:
 - 1. Clean strainers, traps, aerators, and valves of debris, sand and dirt.
 - 2. At completion, thoroughly clean plumbing fixtures and equipment.
 - B. Adjusting: After cleaning and flushing operations are accomplished, adjust flush valves, faucets, showers for proper flow.
- 3.3 PROTECTION
 - A. Protect fixtures and related components from damage before, during, and after installation to date of Final Acceptance or Owner move-in. Provide protective coverings or other protection as required.
 - B. Inspect each installed unit for damage to finish. If feasible, restore and match finish to original at site; otherwise, remove fixture and replace with new unit.
 - C. Feasibility and match to be judged by Resident Engineer.
 - D. Remove cracked or dented units and replace with new units.
- 3.4 INSTALLATION OF PIPING, VALVES AND EQUIPMENT
 - A. General: Refer to Section 220500 BASIC PLUMBING REQUIREMENTS, MATERIALS AND METHODS.
 - B. Pitch: Run all horizontal sanitary and drain piping smaller than 4" at a uniform grade of not less than 1/4" per foot. Run all horizontal sanitary and drain piping 4" and larger at a uniform grade of not less than 1/8" per foot unless otherwise noted on the drawings.
 - C. Water piping within walls and rough-ins for fixtures and equipment: Provide copper plated steel support system soldered to piping and secured to building construction so that pipes cannot be displaced. Provide trisolator or fire retardant closed cell elastomeric material between support system and building construction or other piping. Holdrite or equivalent.

- D. Waste and vent piping within walls and rough-ins for fixtures and equipment: Provide copper plated steel support system for copper DWV piping or galvanized steel support system for cast iron or galvanized piping. Secure supports to piping and building construction so that pipes cannot be displaced. Provide felt strip isolation between dissimilar metals. Provide trisolator for fire retardant closed cell elastomeric material between support system and building construction or other piping. Holdrite or equivalent.
- E. Piping through walls serving fixtures, equipment and outlets. Provide temporary plastic sleeve installed around piping serving plumbing fixtures, equipment and outlets to provide clearance between the pipe and drywall or plaster construction at the point of pipe penetration. After the plumbing rough-in and drywall installation is completed, the plastic sleeve shall be removed and Type GR fire retardant sponge material installed to seal the pipe penetration. Specialty Products Acousto-sleeve or equivalent.
- F. Underground piping: No-hub soil pipe not permitted.
- G. Unions and flanges: Provide on piping to inlet and outlet of all apparatus and equipment to facilitate removal of equipment, and downstream of all shutoff valves.
- H. Water hammer arresters: Install water hammer arresters at all quick closing valves such as flush valves, float valves, solenoid valves, etc. Size and locate all water hammer arresters as recommended by PDI Manual WH 201.
- I. Non-potable water outlets: Identify each non-potable water outlet with a permanent engraved beveled edge bakelite name plate reading "DANGER UNSAFE WATER DO NOT DRINK".

3.5 PLUMBING FIXTURES INSTALLATION

- A. Installation: Set fixtures level and in proper alignment with respect to walls and floors, and sets of fixtures equally spaced. Install supplies in proper alignment with fixtures and with each other. Install flush valves in alignment with the fixture without vertical or horizontal offsets.
- B. Grouting: Grout all wall mounted fixtures watertight where fixture is in contact with wall with flexible white mildew resistant silicone caulking. Grout all floor mounted fixtures with plaster of Paris.
- C. Caulking: Caulk all deck mounted trim at the time of assembly, including fixture and casework mounted. Caulk all self-rimming sinks installed in casework.
- D. Trim: Make up trim with care and with the proper tools in order that no tool marks show after installation.
- E. Fixture backing: Provide backing for wall hung fixtures other than for those with supports or carriers.
 - 1. Stud walls: Install 1/4" x 6" wide steel flat backing plate to the inside web of the studs and secured to at least three studs by welding or bolting.
 - 2. Concrete walls: Securely fasten steel brackets with heavy expansion shields and bolts of proper length.

3.6 CLEANOUTS

- A. Size: Cleanouts of same nominal size as pipe they serve except where they occur in piping 4" and larger, in which case they shall be 4" in size.
- B. Accessibility: Make all cleanouts accessible. Use graphite on all cleanouts with all threads being thoroughly greased after acceptable pressure test.

- C. Locations:
 - 1. At all horizontal offsets.
 - 2. At ends of all lines more than 5' in length.
 - 3. At 100' maximum intervals in all horizontal runs within the buildings lines, unless otherwise shown on the drawings.
 - 4. At base of all stacks.
 - 5. For cleanouts in finished portions of building, locations subject to Owner's representative's approval before installation.

3.7 DISINFECTION OF WATER SYSTEMS

- A. General: Disinfect all hot and cold water systems per AWWA Standard C651-92 and the following.
- B. Qualification, performance requirement, supervision and testing: Work performed and certified by an independent contractor, selected by this Contractor and approved by the Owner's representative. Work will not be acceptable if performed by the installing contractor of the plumbing and piping system or any subcontractor of the installing contractor. Perform disinfection under supervision of the Owner's Representative. Give two days notice. Disinfection shall be subject to written approval upon receipt of satisfactory laboratory test results.
- C. Certification: Submit four certificates stating (1) system capacity, (2) disinfectant used, (3) time and rate applied, and (4) resultant residuals in parts per million at completion of work.
- D. Disinfecting agent: Use chlorine solution of type approved for water system disinfection.
- E. Preparation:
 - 1. Service cock: Provide service cock or valve within 3' of supply main for introducing disinfecting agent into lines.
 - 2. Flushing: Leave each fixture for outlet wide open after final pressure tests until flow shows only clear water.
 - 3. Domestic hot water temperature: Reduce to that of cold water system during disinfecting procedure.
- F. Procedure:
 - 1. Flushing: With system full of water and under main pressure, open all outlets.
 - 2. Inject disinfectant through service cock at slow, even, continuous rate until orthotolidine test at each outlet shows chlorine residual concentration of more than 50 parts per million (ppm).
 - 3. Close all outlets and valves including service valve at main and injection cock. Maintain for 24 hours.
 - 4. Test: Orthotolidine test, after 24 hour period, shall indicate minimum chlorine residual concentration of 50 ppm. If not, repeat disinfection procedure until this standard is attained.
 - 5. Final flushing: After satisfactory completion of above test, flush out system until orthotolidine tests show maximum chlorine residual of 0.6 ppm.
- G. Bacteriological analysis of water: After final flushing, analyze water samples to test negative for coil-aerogene organisms. Analysis to indicate total plate count less than 100 bacteria per cc or equal to control sample.

H. Final approval: If analysis results are not satisfactory, repeat disinfection procedure until specified standards are met.

3.8 TESTING AND ADJUSTING

- A. General: Adjust each piece of equipment and all systems to insure proper functioning of controls, elimination of noise and vibration, and left in first-class operating condition.
- B. Defective work: Remove and replace any piece of apparatus, work, or material failing any tests. Retest portion of work replaced by Contractor at his own expense.
- C. Notice: Provide 48 hour notice that piping is ready for testing. Test in accordance with all local and state ordinances.
- D. Protection: Isolate all equipment subject to damage from test pressure. Make no test against a service valve or meter.
- E. Tests:
 - 1. Domestic and industrial water systems: Test with water at a hydrostatic pressure of 200 psi.
 - 2. Sanitary, sewer, waste, vent, acid waste, acid vent, drain and storm water systems: Fill piping with water, to top of highest point, at not less than 5 psi.
 - 3. Duration: Maintain all tests, unless otherwise noted, without leaks or pressure loss for a minimum period of 8 hours.
- F. Flow test: Conduct flow test on all fixture drains, roof drains, floor drains, area drains, floor sinks, etc., prior to building occupancy. Allow full flow of water into each drain for 15 minutes and check for leaks, stoppage or sluggish flow. Clean drains where necessary. Test must be witnessed by the Owner's Representative.
- G. Perform operational tests on all machinery and devices to determine compliance with specifications. Equipment to function quietly and efficiently. Repair or correct undue noise or vibration caused by malfunctioning of piping and equipment before acceptance.

3.9 LABELS AND IDENTIFICATION

A. Provide valve tags, piping systems and equipment identifications as specified in Section 220500.

END OF SECTION 224000

SECTION 225000 - PLUMBING SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following plumbing specialties:
 - 1. Backflow preventers.
 - 2. Water regulators.
 - 3. Strainers.
 - 4. Miscellaneous piping specialties.
 - 5. Sleeve penetration systems.
 - 6. Flashing materials.
 - 7. Cleanouts.
 - 8. Solids interceptors.
 - 9. Floor drains.

1.2 DEFINITIONS

A. Don't use plastic above grade.

1.3 PERFORMANCE REQUIREMENTS

- A. Provide components and installation capable of producing piping systems with following minimum working-pressure ratings, unless otherwise indicated:
 - 1. Domestic Water Piping: 125 psig.
 - 2. Sanitary Waste and Vent Piping: 10-foot head of water.

1.4 SUBMITTALS

- A. Product Data: Include rated capacities and shipping, installed, and operating weights. Indicate materials, finishes, dimensions, required clearances, and methods of assembly of components; and piping and wiring connections for the following:
 - 1. Backflow preventers and water regulators.
 - 2. Strainers.
 - 3. Water hammer arresters.
 - 4. Hose bibs.
 - 5. Vent caps and roof flashing assemblies.
 - 6. Solids interceptors.
 - 7. Sleeve penetration systems.
 - 8. Floor drains.
- B. Shop Drawings: Diagram power, signal, and control wiring.
- C. Field test reports.
- D. Maintenance Data: For plumbing specialties to include in maintenance manuals. Include the following:

- 1. Backflow preventers and water regulators.
- 2. Water filters.
- 3. Trap seal primer valves and systems.
- 4. Solids interceptors.
- 1.5 QUALITY ASSURANCE
 - A. Product Options: Drawings indicate size, profiles, and dimensional requirements of plumbing specialties and are based on the specific system indicated.
 - B. Plumbing specialties shall bear label, stamp, or other markings of specified testing agency.
 - C. 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.
 - D. ASME Compliance: Comply with ASME B31.9, "Building Services Piping," for piping materials and installation.
 - E. NSF Compliance:
 - 1. Comply with NSF 14, "Plastics Piping Components and Related Materials," for plastic domestic water piping components. Include marking "NSF-pw" on plastic potable-water piping and "NSF-dwv" on plastic drain, waste, and vent piping.
 - 2. Comply with NSF 61, "Drinking Water System Components--Health Effects, Sections 1 through 9," for potable domestic water plumbing specialties.

PART 2 - PRODUCTS

- 2.1 MANUFACTURERS
 - A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the products specified.
 - B. Products: Subject to compliance with requirements, provide one of the products specified.
 - C. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the manufacturers specified.
 - D. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.
- 2.2 BACKFLOW PREVENTERS
 - A. Manufacturers:
 - 1. Cla-Val Co.
 - 2. Mueller Co.; Hersey Meters Div.
 - 3. Sparco, Inc.
 - 4. Watts Industries, Inc.; Water Products Div.
 - 5. Zurn Industries, Inc.; Wilkins Div.
 - 6. Febco
 - B. General: ASSE standard, backflow preventers.
 - 1. NPS 2 and Smaller: Bronze body with threaded ends.

- 2. Interior Components: Corrosion-resistant materials.
- 3. Exterior Finish: Polished chrome plate if used in chrome-plated piping system.
- 4. Strainer: On inlet, if indicated.
- C. Reduced-Pressure-Principle Backflow Preventers: ASSE 1013, suitable for continuous pressure application. Include outside screw and yoke gate valves on inlet and outlet, and strainer on inlet; test cocks; and pressure-differential relief valve with ASME A112.1.2 airgap fitting located between two positive-seating check valves.
 - 1. Pressure Loss: 12 psig maximum, through middle 1/3 of flow range.
- 2.3 WATER REGULATORS
 - A. Manufacturers:
 - 1. BERMAD.
 - 2. Cla-Val Co.
 - 3. Honeywell Braukmann.
 - 4. Watts Industries, Inc.; Water Products Div.
 - 5. Zurn Industries, Inc.; Wilkins Div.
 - 6. Powers Regulator Co.
 - B. General: ASSE 1003, water regulators, rated for initial working pressure of 150 psig minimum. Include integral factory-installed or separate field-installed, Y-pattern strainer.
 - 1. NPS 2 and Smaller: Bronze body with threaded ends.
 - a. General-Duty Service: Single-seated, direct operated, unless otherwise indicated.
 - 2. Interior Components: Corrosion-resistant materials.
 - 3. Exterior Finish: Polished chrome plate if used in chrome-plated piping system.
- 2.4 STRAINERS
 - A. Strainers: Y-pattern, unless otherwise indicated, and full size of connecting piping. Include ASTM A 666, Type 304, stainless-steel screens with 3/64-inch round perforations, unless otherwise indicated.
 - 1. Pressure Rating: 125-psig minimum steam working pressure, unless otherwise indicated.
 - 2. NPS 2 and Smaller: Bronze body, with female threaded ends.
 - 3. Y-Pattern Strainers: Screwed screen retainer with centered blowdown.
 - a. Drain: Pipe plug

2.5 MISCELLANEOUS PIPING SPECIALTIES

- A. Water Hammer Arresters: ASSE 1010 or PDI-WH 201, piston type with pressurized metaltube cushioning chamber. Sizes indicated are based on ASSE 1010, Sizes AA and A through F or PDI-WH 201, Sizes A through F.
 - 4. Manufacturers:
 - a. Amtrol, Inc.
 - b. Josam Co.
 - c. Precision Plumbing Products, Inc.

- d. Sioux Chief Manufacturing Co., Inc.
- e. Watts Industries, Inc.; Drainage Products Div.
- f. Watts Industries, Inc.; Water Products Div.
- g. Zurn Industries, Inc.; Wilkins Div.
- B. Hose Bibbs: Bronze body with replaceable seat disc complying with ASME A112.18.1M for compression-type faucets. Include NPS 3/4 threaded or solder-joint inlet, of design suitable for pressure of at least 125 psig; integral nonremovable, drainable hose-connection vacuum breaker; and garden-hose threads complying with ASME B1.20.7 on outlet.
 - 1. Finish for Service Areas: Rough brass.
 - 2. Operation for Service Areas: Operating key.
 - 3. Include operating key with each operating-key hose bibb.
 - 4. Include [integral] wall flange with each chrome- or nickel-plated hose bibb.
- C. Vent Caps: Cast-iron body with threaded or hub inlet and vandal-proof design. Include vented hood and set-screws to secure to vent pipe.

2.6 SLEEVE PENETRATION SYSTEMS

- A. Manufacturers:
 - 1. ProSet Systems, Inc.
- B. Description: UL 1479, through-penetration firestop assembly consisting of sleeve and stack fitting with firestopping plug.
 - 1. 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.
 - 2. Stack Fitting: ASTM A 48, gray-iron, hubless-pattern, wye-branch stack fitting with neoprene O-ring at base and gray-iron plug in thermal-release harness in branch. Include PVC protective cap for plug.
 - a. Special Coating: Include corrosion-resistant interior coating on fittings for plastic vent stacks.

2.7 FLASHING MATERIALS

A. Furnish and install on each pipe passing through the roof, a "Stoneman" No. 1110-7, or approved equal, six pound, seamless lead flashing assembly. Flashing shall have reinforced boot and be complete with cast iron counter flashing sleeve and Permaseal waterproofing compound. All vent pipes shall be terminated 7" above the roof.

2.8 CLEANOUTS

- A. Cleanouts, Comply with ASME A112.36.2M.
- B. Wall Cleanouts: J.R. Smith Fig. 4472, series with chrome plated cover and screws.
- 2.9 SOLIDS INTERCEPTORS
 - A. Refer to drawings for plumbing fixture schedule.
 - 1. Products:
 - a. Josam Co.;
 - b. Smith, Jay R. Mfg. Co.;

- c. Tyler Pipe, Wade Div.;
- d. Watts Industries, Inc., Drainage Products Div.;
- e. Zurn Industries, Inc., Specification Drainage Operation;

2.10 FLOOR DRAINS

- A. Refer to drawings for plumbing fixture schedule.
 - 2. Products:
 - a. Josam Co.;
 - b. Smith, Jay R. Mfg. Co.;
 - c. Tyler Pipe, Wade Div.;
 - d. Watts Industries, Inc., Drainage Products Div.;
 - e. Zurn Industries, Inc., Specification Drainage Operation;

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Refer to Division 22 Section "Basic Plumbing Requirements" for piping joining materials, joint construction, and basic installation requirements.
- B. Install backflow preventers in each water supply to mechanical equipment and systems and to other equipment and water systems that may be sources of contamination. Comply with authorities having jurisdiction.
 - 1. Locate backflow preventers in same room as connected equipment or system.
 - 2. Install drain for backflow preventers with atmospheric-vent drain connection with air-gap fitting, fixed air-gap fitting, or equivalent positive pipe separation of at least two pipe diameters in drain piping and pipe to floor drain. Locate air-gap device attached to or under backflow preventer. Simple air breaks are not acceptable for this application.
 - 3. Do not install bypass piping around backflow preventers.
- C. Install pressure regulators with inlet and outlet shutoff valves and balance valve bypass. Install pressure gages on inlet and outlet.
- D. Install strainers on supply side of each control valve, pressure regulator, and solenoid valve.
- E. 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.
 - 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.
 - 4. Locate at base of each vertical soil and waste stack.
- F. Install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall, for cleanouts located in concealed piping.
- G. Install flashing flange and clamping device with each stack and cleanout passing through floors with waterproof membrane.
- H. Install vent flashing sleeves on stacks passing through roof. Secure over stack flashing according to manufacturer's written instructions.
- I. Install interceptors, including trapping, and 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.
- J. Fasten wall-hanging plumbing specialties securely to supports attached to building substrate if supports are specified and to building wall construction if no support is indicated.
- K. Install individual shutoff valve in each water supply to plumbing specialties. Use ball, gate, or globe valve if specific valve is not indicated. Install shutoff valves in accessible locations. Refer to Division 22 Section "General Duty Valves" for general-duty ball, butterfly, check, gate, and globe valves.
- L. Install traps on plumbing specialty drain outlets. Omit traps on indirect wastes unless trap is indicated.
- M. Install escutcheons at wall, floor, and ceiling penetrations in exposed finished locations and within cabinets and millwork. Use deep-pattern escutcheons if required to conceal protruding pipe fittings.

3.2 CONNECTIONS

- A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install piping adjacent to equipment to allow service and maintenance.
- C. Connect plumbing specialties to piping specified in other Division 22 Sections.
- D. Ground equipment.
- E. Tighten electrical connectors and terminals according to manufacturer's published torquetightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.
- F. Connect plumbing specialties and devices that require power according to Division 26 Sections.
- G. Interceptor Connections: Connect piping, flow-control fittings, and accessories.
 - 1. Solids Interceptors: Connect inlet and outlet.
- 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-lb/sq. ft., 0.0938-inch thickness or thicker. Solder joints of lead sheets 4-lb/sq. ft., 0.0625-inch thickness or thinner.
 - 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.
 - 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.

3.4 LABELING AND IDENTIFYING

- A. Equipment Nameplates and Signs: Install engraved plastic-laminate equipment nameplate or sign on or near each backflow preventer, [trap seal primer system] and solid interceptor.
 - 1. Text: 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.

3.5 PROTECTION

- A. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.
- B. Place plugs in ends of uncompleted piping at end of each day or when work stops.
- 3.6 DEMONSTRATION
 - A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain interceptors.

SECTION 260000 - ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.1 SCOPE:

- A. Work Included: All labor, materials, appliances, tools, equipment necessary for and incidental to performing all operations in connection with furnishing, delivery and installation of the work of this Section, complete, as shown on the drawings and/or specified herein. Work includes, but is not necessarily limited to the following:
 - 1. Examine all other sections for work related to those other sections and required to be included as work under this section.
 - 2. Examine the general provisions and requirements for electrical work.

1.2 GENERAL SUMMARY OF ELECTRICAL WORK:

- A. These specifications and drawings are intended to cover a complete operation of systems. The omission of expressed references to any item of labor or material for the proper execution of the work in accordance with present practice of the trade shall not relieve the Contractor from providing such additional labor and materials.
- B. This specification, the drawings and General Conditions over the complete furnishing and installation of the electrical system and all related work including, but not limited to the following:
 - 1. Coordinate with SDG&E underground conduits, handholes and transformer pads
 - 2. Install new panels and meter cabinets.
 - 3. Install new lighting and receptacles.
- 1.3 WORK NOT INCLUDED:
 - A. The furnishing and/or installation of electrical motors are by Mechanical Division 23.
 - B. The painting of any conduits, equipment or devices, unless specifically noted otherwise.
- 1.4 COORDINATION:
 - A. Examine all other sections of these specifications and drawings to determine the complete scope of the electrical work and coordinate all of the electrical work required for the entire project. Provide the correct electrical service to each piece of electrical equipment, and check and coordinate the required electrical service and controls with the actual equipment provided under the other sections of the project.
- 1.5 INTERPRETATION OF DRAWING:
 - A. These drawings showing the layout of the electrical system indicate approximate locations of outlets, apparatus and equipment. The runs of feeders and branch circuits shown on the drawings are schematic only and are not intended to shown the exact routing and location of conduits and conduit termination.

1.6 ORDINANCES AND REGULATIONS:

- A. All work and materials shall be in full accordance with the latest rules of the Municipal Agency, the National Board of Fire Underwriters and State of California Code of Regulations (CCR) Title 24.
- B. Nothing in these plans and specifications is to be construed as permitting work not conforming to these codes.

- 1.7 PERMITS AND INSPECTIONS:
 - A. Apply and pay for all permits required by any of the legally constituted public authorities for the installation or construction of the work included under this Division.

1.8 REFERENCE STANDARDS:

A. Materials and workmanship shall conform to the editions of the following standards, codes, or specifications in effect on the date of this specification, unless otherwise specified.

Codes and Regulations of the Jurisdictional Authorities

CEC 2007 California Electrical Code (CCR Title 24 Part 3), based on the 2005 National Electrical Code.

California Code of Regulations (CCR) Title 24 Parts 1 through 12.

- NEMA National Electrical Manufacturers Association applicable standards
- NFPA National Fire Protection Association applicable sections referenced by CCR Title 24
- UL Underwriter's Laboratories, Inc. applicable standards
- B. UL Label: All electrical materials and equipment falling within the scope of the underwriters' standards shall bear the UL Label.

1.9 EXAMINATION OF DRAWINGS AND SITE:

A. Contractor shall carefully examine the site and existing building, shall compare the drawings with the existing electrical installations, and shall thoroughly familiarize himself with all existing conditions within the scope of this work.

1.10 SEQUENCING AND SCHEDULING OF WORK:

A. Coordinate work with the work of the other trades, so that the work may proceed as expeditiously as possible.

1.11 ELECTRICAL CHARACTERISTICS:

A. Electrical characteristics for this project are 120/240 volts, one phase, 3wire, 60 hertz.

PART 2 - PRODUCTS

2.1 MATERIALS:

- A. All material shall be new unless specifically noted otherwise.
- 2.2 OUTLET BOXES:
 - A. Outlet boxes shall be used as pull boxes wherever possible, and junction boxes or pull boxes shall be installed only as required by the drawings or specifications, or as directed.
 - B. Unless otherwise specified or noted on the drawings, boxes for the various outlets shall be as follows:
 - 1. For any exposed wiring device box, use PVC. No cast aluminum or metal boxes.
 - 2. All exterior light fixtures junction boxes will be PVC only. No cast aluminum or metal boxes.
 - 3. All outside outlets will be recessed stainless steel box with flush, lockable cover and a 20 amp GFCI receptacle.
 - 4. Inside wiring device boxes and junction boxes will be at least 4 inches square by 1-1/8 inch deep.

- 5. Flat wiring will not be used.
- C. All outlet boxes shall be accurately placed and securely fastened to the structure independent of the conduit.
- 2.3 PVC BOXES:
 - A. Outlet boxes installed on fan units, mechanical equipment boxes are required shall be PVC with threaded plugged conduit openings and a gasket cover plate specifically designed for the box use and intend function. PVC boxes shall be Rayco or approved equal.
- 2.4 RECEPTACLES:
 - A. Ground fault interrupter (GFCI) type duplex receptacles shall be rated for 20 ampere, 120 volt, and shall be installed as specified for standard duplex receptacles. GFCI receptacles shall be Leviton, Hubbell, Bryant or Pass & Seymour as required.
- 2.5 CONNECTORS TERMINAL LUGS AND FITTINGS:
 - A. All connectors shall be UL listed for the intended use.
 - B. For #10 AWG and smaller conductor cable: Tin-plated copper pressure connectors with nonflammable, self-extinguishing insulation grip with temperature rating equal to that of conductor insulation.
 - C. For #8 AWG to #4/0 AWG conductor cable: Tin-plated copper compression connectors and terminal lugs with nylon insulating sleeve for insulation grip.
- 2.6 INSULATING TAPE:
 - A. Plastic tape: Vinyl plastic tape with rubber-based pressure-sensitive adhesive, pliable at zero degrees F.
 - B. Rubber tape: Silicone-rubber tape with silicone pressure-sensitive adhesive.
 - C. Acceptable Manufacturers: Minnesota Mining and Minerals Co. (3M) #33 or an approved equal.
- 2.7 PVC CONDUIT:
 - A. All conduit exposed to salt air to be PVC schedule 80. Couplings and connectors shall be PVC schedule 80.
- 2.8 RIGID & EMT CONDUIT:
 - A. All conduit exposed to salt air to be PVC coated.
- 2.9 FLEXIBLE METALLIC CONDUIT:
 - A. Flexible conduit exposed to weather or located in wet or damp locations shall be the weatherproof type with an extruded polyvinyl chloride jacket, as manufactured by American Brass Company, Columbia, Anaconda or Electri-Flex Co.
 - B. Only on motor connections and fixture tails, not over 6 feet in length.
- 2.10 WIRE AND CABLE:
 - A. Furnish and install Anaconda, General Cable, General Electric, Habirshaw, Okonite, Paranite, Phelps-Dodge, Cerro, Collyer, Rome or Triangle Wire and Cable. All wire shall be delivered to the job in unbroken packages, and each package shall bear the Underwriters' and Manufacturer's labels, showing the date of manufacture and the maximum allowable voltage.
 - B. Conductors shall be soft drawn annealed copper, ninety-eight (98%) percent conductivity, continuous from outlet to outlet, without welds, splices or joints.

- C. All wiring shall be Stranded, copper THHN type, including all #12 AWG wire.
- D. Except for control circuits will be #14 AWG stranded. No solid wire.
- E. One neutral for every one circuit pulled.
- 2.11 INSULATION:
 - A. Conductors of the follow types shall be used in the following locations:
 - 1. Indoor branch circuit and feeder cables in all sizes shall have "THHN" " 600-volt insulation unless noted otherwise.
 - B. All conductors supplied under the scope of this project shall be insulated for 600 volts minimum. Wire and cable shall meet the applicable requirements of CEC and UL 83 for the type of insulation, jacket, and conductor specified or indicated. Wires and cables manufactured more than 12 months prior to date of delivery to the site shall not be used.
 - C. Temperature rating: comply with CEC 110.14(C).
 - D. Color-Coding of Secondary Phase Conductors: Use the following colors:
 - 1. 120/240-V Conductors:
 - a. Phase A: Black
 - b. Phase B: Red
 - c. Neutral: White
 - d. Ground: Green

2.12 PANELBOARDS:

- A. Supply 10% spare breaker space.
- B. provide (1) ³/₄" conduit for each three spares.
- C. All circuit breakers to have name plates adjacent to each device. See section Marking and Name plates.
- D. Enclosure:
 - 1. UL 50.
 - 2. Code gauge galvanized steel, surface or flush mounted as indicated on floor plan. Sturdy, rigid chassis assembly shall assure accurate alignment of interior with panel front. Gutter space shall meet or exceed UL and NEC.
 - 3. Type:
 - a. Outdoor locations: NEMA 3R.
 - 4. Interior components mounted on backplate of reinforced steel for rigid support and accurate alignment.
 - 5. Provide flush-type lock/latch handle in accordance with UL 50; screw fastenings will not be accepted in lieu of latch.
 - 6. Provision for enclosure grounding.
 - 7. Provide two (2) keys for each panelboard. All panelboards shall be keyed alike.
- E. Busbars:
 - 1. ASTM B187.

- 2. 98-percent-conductivity copper.
- 3. Contact surface silver-plated or tin-plated.
- 4. Rating of neutral and ground bus: Equal to that of phase bus, unless specifically noted otherwise.
- 5. Neutral bus mounted on insulating block.
- 6. Neutral and ground bus equipped with integral mechanical connectors.
- F. Incoming:
 - 1. Type of service: 120/240 volts as shown.
 - 2. Type of main: circuit breakers as shown, conforming to requirements specified, located at top or bottom as necessary.
 - 3. Branch circuit: Circuit breaker or integrally fused circuit breaker as shown, conforming to requirements specified, with number of circuits as shown.
 - 4. Circuit breaker: Trip device coordinated with that of upstream circuit breakers to provide selective tripping.
 - 5. Suitable for service entrance where necessary and indicated.
 - 6. Oversize Lug Provide Oversize lug within panel enclosure as shown on drawings for special applications where feeder size is oversized to compensate for voltage drop.
 - 7. All panelboards shall be fully rated to withstand the short circuit current available. Series rated panelboards are not acceptable.
 - 8. All panelboards shall be configured exactly as shown on the contract drawings. "Backfed main" arrangements are not acceptable.

2.13 MARKING AND NAME PLATES:

- A. Name plates minimum 1" high x 3" wide by 3/32 inch thick matte white laminated phenolic nameplates with ¹/₄" white characters engraved in the plastic for all items for all electrical equipment including, but not limited to, panel boards, feeder circuit breakers, time switches, disconnect switches, exposed pull or junction boxes. Name plates will be attached with 2 cadmium-plated screws
- B. Provide wire marker on each conductor in electrical panel pull box, outlet, and junction box. If more than one neutral conductor is present, mark each related circuit and panel number.
- C. Label outside of all cover plates of wiring devices and junction boxes with circuit and panel number. Each branch circuit device cover plate will be labeled (engraved or silk screen) to indicate the branch circuit and panel number. Devices will include, but not limited to, the following: toggle switches and receptacles.

PART 3 - EXECUTION

- 3.1 INSTALLATION:
 - A. All work shall be in conformance with recognized practices of the National Electrical Contractors Association (NECA) NECA 1 Standard Practices for Good Workmanship in Electrical Contracting.
 - 1. The Contractor shall perform all cutting and patching of construction work that may be required for the proper installation of the electrical work. All patching shall be of the same materials, workmanship, and finish as, and shall accurately match all surrounding work.

- 2. All work shall be done under the Owner's instructions, and, when so required, by the trade which performed the original work.
- B. Electrical outlets, devices and equipment furnished by disciplines under the scope of this project shall be installed and fully connected to the electric circuits.
 - 1. The Contractor shall furnish the necessary flexible conduit, connectors, cords, and other equipment that may be required for the proper connection of equipment.
 - 2. The Contractor shall furnish and install conduit, wiring, and connections required by the heating ventilating and air conditioning system for line and low voltage devices as required.

3.2 LOCATIONS AND DIMENSIONS:

- A. Install all material and equipment in such a manner as to avoid obstructions, preserve clearances, maintain code spacing and keep openings and passageways clear.
- B. These drawings are diagrammatic to the extent that many offsets, bends, fittings and exact locations are not shown. Determine the best methods, exact locations and routes for installation and note any conflicts or obstructions. The locations shown for conduits, outlets, materials and equipment may be refined to meet the architectural, structural and mechanical conditions with the approval of the Owner.
 - C. OUTLET BOXES:
- A. Outlet boxes shall be installed. All devices shall be installed in outlet boxes sized per CEC according to the conductor fill. Where oversized boxes are necessary due to the number of conductors, the contractor shall furnish the required box size.
- B. Outlet boxes shall be independently supported to framing, ceiling slabs or other structures in an approved manner. Conduit shall not be the sole support of outlet boxes.

3.3 EQUIPMENT GROUNDING:

- A. Comply with CEC and local amendments.
- B. A green insulated copper ground wire, sized per CEC shall be provided with each feeder or branch circuit of operating over 50 volts to ground. This ground wire shall be used for the grounding of all equipment.
- C. Ground conductors for branch circuit wiring shall be attached at each outlet to the back of the box using drilled and tapped holes and washer head screws, 6-32 or larger.
- D. Each panelboard, switchboard, pullbox or any other enclosure in which several ground wires are terminated shall be equipped with a ground bus secured to the interior of the enclosure. The bus ampacity shall be equal to the phase bus size and shall have a separate lug for each ground conductor. No more than one conductor shall be installed per lug.

3.4 FLEXIBLE METALLIC CONDUIT:

- A. Final connections of conduit systems to all motors and direct wired vibrating equipment (including transformers) for interior and exterior locations not to exceed three (3) foot length.
- B. Light fixture connections in accessible locations (6 feet maximum)
- 3.5 INSTALLING WIRE:
 - A. All circuit and feeder wires shall be continuous from switch to terminal or farthest outlet. No joints shall be made except in pull, junction or outlet boxes, or in panel or switchboard.

- B. All branch circuit and fixture wiring joints, splices and tapes for conductors #10 and smaller shall be made with UL listed connectors listed for 600 volts. Connector bodies shall consist of a cone shape expandable coil spring insert, insulated with Teflon or plastic shell. The connectors shall be the "Wing Nut" as manufactured by "Ideal Industries" or "Scotchlok" as manufactured by Minnesota Mining Manufacturing Company.
- C. Make all connections and splices necessary to properly install and complete the work. All splices shall be taped. All connections and splices shall be electrically and mechanically perfect, and in strict accordance with all Code requirements.

SECTION 311000 - SITE CLEARING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Clearing and Grubbing.
 - 2. Removing above-grade site improvements.
 - 3. Temporary erosion- and sedimentation-control measures.

1.2 MATERIAL OWNERSHIP

A. Except for stripped topsoil and other materials indicated to be stockpiled or otherwise remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

1.3 PROJECT CONDITIONS

- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.
 - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
 - 2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.
- B. Salvable Improvements: Carefully remove items indicated to be salvaged and store on Owner's premises where indicated on plans.
- C. Utility Locator Service: Notify utility locator service for area where Project is located before site clearing.
- D. Do not commence site clearing operations until temporary erosion- and sedimentationcontrol and plant-protection measures are in place.
- E. The following practices are prohibited within protection zones:
 - 1. Storage of construction materials, debris, or excavated material.
 - 2. Parking vehicles or equipment.
 - 3. Foot traffic.
 - 4. Erection of sheds or structures.
 - 5. Impoundment of water.
 - 6. Excavation or other digging unless otherwise indicated.
 - 7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Satisfactory Soil Material: Requirements for satisfactory soil material are specified in Division 31 Section "Earth Moving."
 - 1. Obtain approved borrow soil material off-site when satisfactory soil material is not available on-site.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect and maintain benchmarks and survey control points from disturbance during construction.
- B. Locate and clearly identify trees, shrubs, and other vegetation to remain or to be relocated.
- C. Protect existing site improvements to remain from damage during construction.
 - 1. Restore damaged improvements to their original condition, as acceptable to Owner.

3.2 TEMPORARY EROSION AND SEDIMENTATION CONTROL

- A. Provide temporary erosion- and sedimentation-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings and requirements of authorities having jurisdiction.
- B. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.
- C. Inspect, maintain, and repair erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
- D. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.3 TREE AND PLANT PROTECTION

- A. General: Protect trees and plants remaining on-site according to requirements in Division 32 Section "Tree Trimming, Removal and Protection."
- B. Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations, in a manner approved by Resident Engineer.

3.4 CLEARING AND GRUBBING

- A. Remove obstructions, trees, shrubs, and other vegetation to permit installation of new construction.
 - 1. Grind down stumps and remove roots, obstructions, and debris to a depth of 18 inches below exposed subgrade.
 - 2. Use only hand methods for grubbing within protection zones.
- B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.
 - 1. Place fill material in horizontal layers not exceeding a loose depth of 8 inches, and compact each layer to a density equal to adjacent original ground.

3.5 SITE IMPROVEMENTS

- A. Remove existing above-grade improvements as indicated and necessary to facilitate new construction.
- 3.6 DISPOSAL OF SURPLUS AND WASTE MATERIALS
 - A. Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property.

All site clearing debris shall be recycled per the requirements of CalGreen Building Code. Separate recyclable materials produced during site clearing from other non-recyclable materials. Store or stockpile without intermixing with other materials and transport them to recycling facilities. Do not interfere with other Project work.

SECTION 312000 - EARTH MOVING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Preparing subgrades for slabs-on-grade, walks, and pavements.
 - 2. Excavating and backfilling for structures.
 - 3. Drainage course for concrete slabs-on-grade.
 - 4. Subbase course for concrete walks, pavements.
 - 5. Subbase course and base course for asphalt paving.
 - 6. Excavating and backfilling for utility trenches.

1.2 DEFINITIONS

- A. Backfill: Soil material used to fill an excavation.
 - 1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
 - 2. Final Backfill: Backfill placed over initial backfill to fill a trench.
- B. Base Course: Aggregate layer placed between the subbase course and hot-mix asphalt paving.
- C. Bedding Course: Aggregate layer placed over the excavated subgrade in a trench before laying pipe.
- D. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.
- E. Drainage Course: Aggregate layer supporting the slab-on-grade that also minimizes upward capillary flow of pore water.
- F. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.
 - 1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Resident Engineer. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
 - 2. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Resident Engineer. Unauthorized excavation, as well as remedial work directed by Resident Engineer, shall be without additional compensation.
- G. Fill: Soil materials used to raise existing grades.
- H. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.
- I. Subbase Course: Aggregate layer placed between the subgrade and base course for hot-mix asphalt pavement, or aggregate layer placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.
- J. Subgrade: Uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, drainage course, or topsoil materials.

K. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.3 QUALITY ASSURANCE

A. Preexcavation Conference: Conduct conference at Project site.

1.4 PROJECT CONDITIONS

- A. Utility Locator Service: Notify utility locator service for area where Project is located before beginning earth moving operations.
- B. Do not commence earth moving operations until plant-protection measures specified in Division 32 Section "Tree Trimming, Removal and Protection" are in place.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

- A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.
- B. Satisfactory Soils: Soil Classification Groups GW, GP, GM, SW, SP, and SM according to ASTM D 2487, or a combination of these groups; free of rock or gravel larger than 3 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.
 - 1. Liquid Limit:
 - 2. Plasticity Index:
- C. Unsatisfactory Soils: Soil Classification Groups GC, SC, CL, ML, OL, CH, MH, OH, and PT according to ASTM D 2487, or a combination of these groups.
 - 1. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.
- D. Subbase Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve.
- E. Base Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 95 percent passing a 1-1/2-inch sieve and not more than 8 percent passing a No. 200 sieve.
- F. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve.
- G. Bedding Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; except with 100 percent passing a 1-inch sieve and not more than 8 percent passing a No. 200 sieve.
- H. Drainage Course: Narrowly graded mixture of washed crushed stone, or crushed or uncrushed gravel; ASTM D 448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2-inch sieve and 0 to 5 percent passing a No. 8 sieve.

2.2 ACCESSORIES

A. Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility; colored to comply with local practice or requirements of authorities having jurisdiction.

B. Detectable Warning Tape: Acid- and alkali-resistant, polyethylene 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 the 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 to comply with local practice or requirements of authorities having jurisdiction.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth moving operations.
- B. Protect and maintain erosion and sedimentation controls during earth moving operations.
- C. Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary protection before placing subsequent materials.

3.2 EXCAVATION, GENERAL

- A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.
 - 1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.

3.3 EXCAVATION FOR STRUCTURES

- A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch. If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.
 - 1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.
- B. Excavations at Edges of Tree- and Plant-Protection Zones:
 - 1. Excavate by hand to indicated lines, cross sections, elevations, and subgrades. Use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.
 - 2. Cut and protect roots according to requirements in Division 32 Section "Tree Trimming, Removal and Protection."

3.4 EXCAVATION FOR WALKS AND PAVEMENTS

- A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.
- 3.5 EXCAVATION FOR UTILITY TRENCHES
 - A. Excavate trenches to indicated gradients, lines, depths, and elevations.
 - B. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit unless otherwise indicated.

- 1. Clearance: 12 inches each side of pipe or conduit.
- C. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.
 - 1. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material, 4 inches deeper elsewhere, to allow for bedding course.
- D. Trenches in Tree- and Plant-Protection Zones:
 - 1. Hand-excavate to indicated lines, cross sections, elevations, and subgrades. Use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.
 - 2. Do not cut main lateral roots or taproots; cut only smaller roots that interfere with installation of utilities.
 - 3. Cut and protect roots according to requirements in Division 32 Section "Tree Trimming, Removal and Protection."

3.6 SUBGRADE INSPECTION

- A. Proof-roll subgrade below the building slabs and pavements with a pneumatic-tired dump truck to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
- B. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Resident Engineer, without additional compensation.

3.7 UNAUTHORIZED EXCAVATION

- A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill, with 28-day compressive strength of 2500 psi, may be used when approved by Resident Engineer.
 - 1. Fill unauthorized excavations under other construction, pipe, or conduit as directed by Resident Engineer.
- 3.8 STORAGE OF SOIL MATERIALS
 - A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
 - 1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.9 UTILITY TRENCH BACKFILL

- A. Place backfill on subgrades free of mud, frost, snow, or ice.
- B. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.
- C. Trenches under Footings: Backfill trenches excavated under footings and within 18 inches of bottom of footings with satisfactory soil; fill with concrete to elevation of bottom of footings. Concrete is specified in Division 03 Section "Cast-in-Place Concrete."

- D. Trenches under Roadways: Provide 4-inch thick, concrete-base slab support for piping or conduit below surface of roadways. After installing and testing, completely encase piping or conduit in a minimum of 6 inches of concrete before backfilling or placing roadway subbase course. Concrete is specified in Division 03 Section "Cast-in-Place Concrete."
- E. Place and compact initial backfill of satisfactory soil, free of particles larger than 1 inch in any dimension, to a height of 12 inches over the pipe or conduit.
 - 1. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.
- F. Place and compact final backfill of satisfactory soil to final subgrade elevation.
- G. Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.
- 3.10 SOIL FILL
 - A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.
 - B. Place and compact fill material in layers to required elevations as follows:
 - 1. Under grass and planted areas, use satisfactory soil material.
 - 2. Under walks and pavements, use satisfactory soil material.
 - 3. Under steps and ramps, use engineered fill.
 - 4. Under building slabs, use engineered fill.
 - 5. Under footings and foundations, use engineered fill.
- 3.11 SOIL MOISTURE CONTROL
 - A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.
 - 1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
 - 2. Remove and replace, or scarify and air dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

3.12 COMPACTION OF SOIL BACKFILLS AND FILLS

- A. Place backfill and fill soil materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.
- B. Place backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.
- C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D 1557:
 - 1. Under structures, building slabs, steps, and pavements, scarify and recompact top 12 inches of existing subgrade and each layer of backfill or fill soil material at 95 percent.
 - 2. Under walkways, scarify and recompact top 12 inches below subgrade and compact each layer of backfill or fill soil material at 95 percent.

- 3. Under turf or unpaved areas, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 85 percent.
- 4. For utility trenches, compact each layer of initial and final backfill soil material at 85 percent.

3.13 GRADING

- A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
- B. Site Rough Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:
 - 1. Turf or Unpaved Areas: Plus or minus 1 inch.
 - 2. Walks: Plus or minus 1 inch.
 - 3. Pavements: Plus or minus 1/2 inch.
- C. Grading inside Building Lines: Finish subgrade to a tolerance of 1/2 inch when tested with a 10-foot straightedge.

3.14 SUBBASE AND BASE COURSES UNDER PAVEMENTS AND WALKS

- A. Place subbase course and base course on subgrades free of mud, frost, snow, or ice.
- B. On prepared subgrade, place subbase course and base course under pavements and walks as follows:
 - 1. Shape subbase course and base course to required crown elevations and cross-slope grades.
 - 2. Place subbase course and base course that exceeds 6 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches thick or less than 3 inches thick.
 - 3. Compact subbase course and base course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D 1557.

3.15 FIELD QUALITY CONTROL

- A. Testing Agency: Contractor will engage a qualified geotechnical engineering testing agency to perform tests and inspections.
- B. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earth moving only after test results for previously completed work comply with requirements.
- C. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Resident Engineer.
- D. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil materials to depth required; recompact and retest until specified compaction is obtained.

3.16 PROTECTION

- A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
- B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
- C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
 - 1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.17 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Remove surplus satisfactory soil and waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.

SECTION 321313 - CONCRETE PAVING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Driveway.
 - 2. Parking lots.
 - 3. Curbs and gutters.
 - 4. Walks.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples: For each exposed product and for each color and texture specified.
- C. Other Action Submittals:
 - 1. Design Mixtures: For each concrete paving mixture. Include alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

1.3 QUALITY ASSURANCE

- A. Ready-Mix-Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
- B. ACI Publications: Comply with ACI 301 unless otherwise indicated.

PART 2 - PRODUCTS

2.1 STEEL REINFORCEMENT

- A. Recycled Content: Provide steel reinforcement with an average recycled content of steel so postconsumer recycled content plus one-half of preconsumer recycled content is not less than 25 percent.
- B. Plain-Steel Welded Wire Reinforcement: ASTM A 185/A 185M, fabricated from as-drawn steel wire into flat sheets.
- C. Deformed-Steel Welded Wire Reinforcement: ASTM A 497/A 497M, flat sheet.
- D. Reinforcing Bars: ASTM A 615/A 615M, Grade 60; deformed.
- E. Plain-Steel Wire: ASTM A 82/A 82M, as drawn.
- F. Deformed-Steel Wire: ASTM A 496/A 496M.
- G. Dowel Bars: ASTM A 615/A 615M, Grade 60 plain-steel bars; zinc coated (galvanized) after fabrication according to ASTM A 767/A 767M, Class I coating. Cut bars true to length with ends square and free of burrs.
- H. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars, welded wire reinforcement, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete of greater compressive strength than concrete specified.

2.2 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of same type, brand, and source throughout Project:
 - 1. Portland Cement: ASTM C 150, gray portland cement Type II. Supplement with the following:
 - a. Fly Ash: ASTM C 618, Class F.
 - b. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.
- B. Normal-Weight Aggregates: ASTM C 33, Class 4S, uniformly graded. Provide aggregates from a single source.
- C. Water: Potable and complying with ASTM C 94/C 94M.
- D. Air-Entraining Admixture: ASTM C 260.
- E. Chemical Admixtures: Admixtures certified by manufacturer to be compatible with other admixtures and to contain not more than 0.1 percent water-soluble chloride ions by mass of cementitious material.

2.3 RELATED MATERIALS

- A. Joint Fillers: ASTM D 1752, cork or self-expanding cork in preformed strips.
- B. Slip-Resistive Aggregate Finish: Factory-graded, packaged, rustproof, nonglazing, abrasive aggregate of fused aluminum-oxide granules or crushed emery aggregate containing not less than 50 percent aluminum oxide and not less than 20 percent ferric oxide; unaffected by freezing, moisture, and cleaning materials.

2.4 CONCRETE MIXTURES

- A. Prepare design mixtures, proportioned according to ACI 301, with the following properties:
 - 1. Compressive Strength (28 Days): 3000 psi.
 - 2. Maximum Water-Cementitious Materials Ratio at Point of Placement: 0.45.
 - 3. Slump Limit: 4 inches, plus or minus 1 inch.
 - 4. Air Content: 5-1/2 percent plus or minus 1.5 percent.
- B. Chemical Admixtures: Use admixtures according to manufacturer's written instructions.
- C. Synthetic Fiber: Uniformly disperse in concrete mixture at manufacturer's recommended rate, but not less than 1.0 lb/cu. yd.
- D. Color Pigment: Add color pigment to concrete mixture according to manufacturer's written instructions.

2.5 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Furnish batch certificates for each batch discharged and used in the Work.

PART 3 - EXECUTION

3.1 EXAMINATION AND PREPARATION

A. Proof-roll prepared subbase surface below concrete paving to identify soft pockets and areas of excess yielding.

- B. Remove loose material from compacted subbase surface immediately before placing concrete.
- 3.2 EDGE FORMS AND SCREED CONSTRUCTION
 - A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.
 - B. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

3.3 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

3.4 JOINTS

- A. General: Form construction, isolation, and contraction joints and tool edges true to line, with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline unless otherwise indicated.
- B. Construction Joints: Set construction joints at side and end terminations of paving and at locations where paving operations are stopped for more than one-half hour unless paving terminates at isolation joints.
- C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, other fixed objects, and where indicated.
- D. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness to match jointing of existing adjacent concrete paving:
- E. Edging: After initial floating, tool edges of paving, gutters, curbs, and joints in concrete with an edging tool to a 1/4-inch radius. Repeat tooling of edges after applying surface finishes. Eliminate edging-tool marks on concrete surfaces.

3.5 CONCRETE PLACEMENT

- A. Moisten subbase to provide a uniform dampened condition at time concrete is placed.
- B. Comply with ACI 301 requirements for measuring, mixing, transporting, placing, and consolidating concrete.
- C. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.
- D. Screed paving surface with a straightedge and strike off.
- E. Commence initial floating using bull floats or darbies to impart an open-textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.

3.6 FLOAT FINISHING

- A. General: Do not add water to concrete surfaces during finishing operations.
- B. Float Finish: Begin the second floating operation when bleed-water sheen has disappeared and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.
 - 1. Burlap Finish: Drag a seamless strip of damp burlap across float-finished concrete, perpendicular to line of traffic, to provide a uniform, gritty texture.

- 2. Medium-to-Fine-Textured Broom Finish: Draw a soft-bristle broom across floatfinished concrete surface perpendicular to line of traffic to provide a uniform, fineline texture.
- 3. Medium-to-Coarse-Textured Broom Finish: Provide a coarse finish by striating float-finished concrete surface 1/16 to 1/8 inch deep with a stiff-bristled broom, perpendicular to line of traffic.
- C. Slip-Resistive Aggregate Finish: Before final floating, spread slip-resistive aggregate finish on paving surface according to manufacturer's written instructions.
 - 1. Cure concrete with curing compound recommended by slip-resistive aggregate manufacturer. Apply curing compound immediately after final finishing.
 - 2. After curing, lightly work surface with a steel wire brush or abrasive stone and water to expose nonslip aggregate.

3.7 CONCRETE PROTECTION AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.
- B. Comply with ACI 306.1 for cold-weather protection.
- C. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete but before float finishing.
- D. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.
- E. Curing Methods: Cure concrete by moisture curing, moisture-retaining-cover curing, curing compound or a combination of these.

3.8 PAVING TOLERANCES

- A. Comply with tolerances in ACI 117 and as follows:
 - 1. Elevation: 3/4 inch.
 - 2. Thickness: Plus 3/8 inch, minus 1/4 inch.
 - 3. Surface: Gap below 10-foot- long, unleveled straightedge not to exceed 1/2 inch.
 - 4. Joint Spacing: 3 inches.
 - 5. Contraction Joint Depth: Plus 1/4 inch, no minus.
 - 6. Joint Width: Plus 1/8 inch, no minus.
- 3.9 REPAIRS AND PROTECTION
 - A. Remove and replace concrete paving that is broken, damaged, or defective or that does not comply with requirements in this Section. Remove work in complete sections from joint to joint unless otherwise approved by Resident Engineer.
 - B. Protect concrete paving from damage. Exclude traffic from paving for at least 14 days after placement. When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.
 - C. Maintain concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep paving not more than two days before date scheduled for Substantial Completion inspections.

SECTION 321373 - CONCRETE PAVING JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Cold-applied joint sealants.
 - 2. Hot-applied joint sealants.

1.2 PRECONSTRUCTION TESTING

A. Preconstruction Compatibility and Adhesion Testing: Submit to joint-sealant manufacturers, eight, Samples of materials that will contact or affect joint sealants. Use ASTM C 1087 to determine whether priming and other specific joint-preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.

1.3 SUBMITTALS

- A. Product Data: For each joint-sealant product indicated.
- B. Samples: For each kind and color of joint sealant required.
- C. Pavement-Joint-Sealant Schedule: Include the following information:
 - 1. Joint-sealant application, joint location, and designation.
 - 2. Joint-sealant manufacturer and product name.
 - 3. Joint-sealant formulation.
 - 4. Joint-sealant color.
- D. Product certificates.
- E. Product test reports.
- F. Preconstruction compatibility and adhesion test reports.

1.4 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021.
- B. Preinstallation Conference: Conduct conference at Project site.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Compatibility: Provide joint sealants, backing materials, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer based on testing and field experience.
- B. Colors of Exposed Joint Sealants: Match Architect's samples.
- 2.2 COLD-APPLIED JOINT SEALANTS
 - A. Single-Component, Self-Leveling, Silicone Joint Sealant for Concrete: ASTM D 5893, Type SL.
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

- a. Crafco Inc., an ERGON company; RoadSaver Silicone SL.
- b. Dow Corning Corporation; 890-SL.
- c. Pecora Corporation; 300 SL.

2.3 JOINT-SEALANT BACKER MATERIALS

- A. Round Backer Rods for Cold- and Hot-Applied Joint Sealants: ASTM D 5249, Type 1, of diameter and density required to control sealant depth and prevent bottom-side adhesion of sealant.
- B. Round Backer Rods for Cold-Applied Joint Sealants: ASTM D 5249, Type 3, of diameter and density required to control joint-sealant depth and prevent bottom-side adhesion of sealant.
- C. Backer Strips for Cold- and Hot-Applied Joint Sealants: ASTM D 5249; Type 2; of thickness and width required to control joint-sealant depth, prevent bottom-side adhesion of sealant, and fill remainder of joint opening under sealant.

2.4 PRIMERS

A. Primers: Product recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated unless more stringent requirements apply.
- B. Cleaning of Joints: Clean out joints immediately before installing joint sealants.
- C. Joint-Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- D. Install joint-sealant backings of kind indicated to support joint sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 - 1. Do not leave gaps between ends of joint-sealant backings.
 - 2. Do not stretch, twist, puncture, or tear joint-sealant backings.
 - 3. Remove absorbent joint-sealant backings that have become wet before sealant application and replace them with dry materials.
- E. Install joint sealants using proven techniques that comply with the following and at the same time backings are installed:
 - 1. Place joint sealants so they directly contact and fully wet joint substrates.
 - 2. Completely fill recesses in each joint configuration.
 - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- F. Tooling of Nonsag Joint Sealants: Immediately after joint-sealant application and before skinning or curing begins, tool sealants according to the following requirements to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint:

- 1. Remove excess joint sealant from surfaces adjacent to joints.
- 2. Use tooling agents that are approved in writing by joint-sealant manufacturer and that do not discolor sealants or adjacent surfaces.
- G. Provide joint configuration to comply with joint-sealant manufacturer's written instructions unless otherwise indicated.
- H. Clean off excess joint sealant or sealant smears adjacent to joints as the Work progresses, by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

SECTION 322350 - TREE TRIMMING, REMOVAL AND PROTECTION

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work includes, but is not necessarily limited to, tree trimming, removal, and protection of existing trees, as shown on drawings and described below.
- 1.2 RELATED WORK DESCRIBED ELSEWHERE
 - A. Site Clearing: Section 311000
 - B. Earthmoving: Section 312000
- 1.3 QUALITY ASSURANCE
 - A. Scheduling: Prior to beginning work described in this section, the Geotechnical Engineer and Resident Engineer shall review on-site all portions of the work, its extent, and proposed methods of execution. Do not begin any work without review and approval of Resident Engineer.
 - B. Staff: All tree trimming shall be done by qualified tree arborist, with a minimum of five years of prior experience in similar work, and subject to Resident Engineer's approval.
- 1.4 REFERENCES
 - A. Codes and Regulations
 - 1. Applicable regulations, including CAL-OSHA, regarding protection of persons and property.
 - 2. City requirements regarding tree removal and disposal, including permits.
 - B. Referenced Standard: "Tree Maintenance and Protection Recommendations," prepared by Ralph Osterling Consultants Inc., dated November 7, 1988.
- 1.5 SUBMITTALS
 - A. Materials List: Within 30 days, submit complete list of proposed materials for work of this section.
 - B. Shop Drawings: Within 30 days, submit shop drawings showing details of tree protection methods proposed, including barricades, temporary irrigation system, and aeration method.

PART 2 - MATERIALS

- 2.1 TREE DRY WELL ASSEMBLY
 - A. Provide dry well assemblies at all trees designated on drawings.
 - B. Dry Well Materials
 - 1. Soil Fill: Granular, sandy loam soil material, approved by Resident Engineer.
 - 2. Gravel: Gap graded gravel, 1/4" minimum 1/2" maximum, free of deleterious substances.
 - 3. Filter Fabric: Mirafi 140N or equal.
 - 4. Vent Pipe: 4" diameter PVC, SDR 35, with Resident Engineer approved grate cover. Provide perforations at 4" on center, placed at each quadrant of pipe diameter.

2.2 TEMPORARY IRRIGATION SYSTEM

A. Provide PVC, Schedule 40, temporary irrigation system, located above grade, and connected to existing irrigation supply system. Select heads as necessary to provide adequate coverage, and as approved by Resident Engineer. Provide all necessary manual control valves, backflow preventor valves, and related components necessary for a complete system.

2.3 FERTILIZER

- A. Provide commercial quality nitrogen fertilizer approved by Resident Engineer.
- 2.4 OTHER PRODUCTS
 - A. Provide all other products necessary for complete installation and operation. Such products shall be subject to the review of the Resident Engineer.

PART 3 – EXECUTION\

3.1 SURFACE CONDITIONS

- A. Inspection
 - 1. Prior to all work of this Section, carefully inspect the installed work of all other trades and verify that such work is complete to the point where this installation may properly commence.
 - 2. Verify that all tree trimming be performed in strict accordance with all pertinent codes and regulations and the requirements of these Specifications.
 - 3. Confirm tree trimming/removal designations, verifying extent of modification necessary for each tree.
- B. Discrepancies
 - 1. In the event of discrepancy, immediately notify the Resident Engineer.
 - 2. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2 TREE WORK PROCEDURES

- A. Marking
 - 1. Per Resident Engineer's direction and as shown on drawings, clearly mark all trees to be removed.
 - 2. Designate, by a different method, those trees requiring thinning.
- B. Protection
 - 1. Prior to beginning any work in proximity of existing trees, install tree protection barriers.
 - 2. Barriers shall be as shown on drawings or Resident Engineer approved equal.
 - 3. Following earthwork operations, provide wood chip mulch 4 to 6 inches deep beneath entire on-site tree drip line.
 - 4. Do not permit material storage, vehicle parking, or construction operations within tree drip line.

- C. Tree Trimming
 - 1. Remove all deadwood along trunks and major scaffold limbs. Scaffold limbs are defined as those that make up the main supporting framework of the tree canopy. Within free-branching crown areas, remove all accessible major deadwood, defined as wood with a minimum diameter of 1-1/2 inches at its intersection with a live lateral.
 - 2. Where designated on drawings, thin crowns by approximately 25 to 30 percent. When thinning to compensate for root loss, crown reduction should approximate root loss or disturbance. However, do not reduce crown by more than 40 percent.
 - 3. Where designated on drawings, reduce by approximately 25-30 percent the overall size of trees by cutting back major scaffold limbs.
 - 4. All pruning cuts shall be made to live wood and sound lateral limbs. Final cuts shall be relatively flush but shall not remove the shoulder rings. Heading-back or stub-cutting shall not be allowed.
 - 5. All removed branches shall be cut back to their point of origin or to a lateral large enough to assume the terminal role.
 - 6. All pruning shall consider the overall structural strength of the tree.
 - 7. Trees shall be shaped to a natural and characteristic form.
- D. Root Trimming
 - 1. Where grading will expose or remove existing root structure, obtain direction from Resident Engineer prior to proceeding with actual grading/root removal.
 - 2. Adjust tree crown as specified above.
 - 3. Broken or severed roots exposed or disturbed during excavation shall be cut back to within 1-2 inches of the soil. Pruning cuts shall be made obliquely with the cut facing down. The exposed root ends shall be covered with moist soil or organic mulch to keep the roots cool and moist.
 - 4. Where tree has had more than 20 percent of its root system disturbed, it shall receive nitrogen fertilizer applied at the rate of 2 lbs. per 1,000 square feet at frequency established by Resident Engineer. Irrigate as directed by Resident Engineer.
- E. Stump Removal
 - 1. All tree stumps shall be removed mechanically with a stump grinder.
 - 2. Stumps shall be cut as near to ground level as possible and ground to a minimum of 6 inches below grade.
- F. Understory and Shrub Removal: Remove all understory shrubs including roots.
- G. Tree Dry Well Assembly Installation
 - 1. Where fill exceeding 6 inches in depth is placed over existing grade, provide dry well assembly as shown on drawings and as specified.
 - 2. Provide dry well approximately 3 to 5 feet in diameter surrounding tree trunk, extending down to original grade.
 - 3. Provide radiating aeration channels, 12 inches wide by 6 inches deep, extending from trunk dry well outward to drip line. Space at 45 degrees.

- 4. Aeration channel shall be filled with specified gravel wrapped in filler fabric. Slope channel to drain away from tree at 2 to 3 percent.
- 5. Provide perforated PVC piping at end of each channel, extending vertically from original grade to 2 inches above new grade.
- 6. Fill with specified fill soil, sloping to drain away from tree trunk.
- 3.3 CLEAN-UP
 - A. Remove all debris and trash from site.
 - B. All wood chips, leaves, stump products and other organic materials shall be removed from site.
 - C. Dispose of all debris and waste in an approved manner at an off-site location.
- 3.4 MAINTENANCE
 - A. Adjust and maintain temporary irrigation system as required by Resident Engineer for a period of 90 days after project completion.

SECTION 328100 - IRRIGATION SYSTEMS

PART 1 - GENERAL

- 1.1 GENERAL CONDITIONS:
 - A. The General Conditions, and Special Conditions are a part of this section and the contract for this work and apply to this section as fully as if repeated herein.
- 1.2 SCOPE:
 - A. The work includes all services, labor, materials, transportation and equipment necessary to perform the work as shown and/or noted on the drawings and/or as specified.
- 1.3 QUALIFICATIONS:
 - A. Work shall be performed in accordance with the best standards of practice relating to various trades under continuous supervision of a qualified foreperson, capable of interpreting plans and specifications. All work shall be performed by a licensed landscape contractor.
- 1.4 SUBMITTALS:
 - A. Submit a list of all irrigation equipment to be used, and manufacturer's brochures, maintenance manuals, warrantees and operating instructions, within 30 days of notice to proceed. List shall include the following items:
 - 1. Quick Coupling Valves and Accessories
 - 2. Remote Control Valves
 - 3. Each Type of Sprinkler and Nozzle, and Accessories
 - 4. Filter Fabric
 - 5. Spring Check Valves and Swing Check Valves
 - 6. Sprinkler Swing Joints/ Flexible Risers
 - 7. Ball Valves and Gate Valves
 - 8. PVC Pipe (Pressure and Non-Pressure Types)
 - 9. Electrical Conduit
 - 10. Valve Boxes
 - 11. Trench Marker Warning Tape
 - 12. Irrigation Control Wire
 - 13. Waterproof Control Wire Connectors
 - 14. Valve I.D. Tags
 - 15. Pressure Regulators
 - 16. Filter Assemblies
 - 17. PVC SCH 80 Nipples and PVC SCH 80 Fittings
 - 18. PVC SCH 40 Fittings
 - 19. PVC Solvent Cement and Primer

- 20. Copper Pipe and Fittings
- 21. Brass Pipe and Fittings
- 22. Galvanized Steel Pipe and Fittings
- 23. PVC Electrical Conduit
- 24. Spring and Swing Check Valves
- 1.5 GUARANTEE:
 - A. Furnish guarantee for a period of one (1) year from the date of final acceptance, including non-settling of the backfill in trenches and excavations, which if occurs, shall be corrected by the Contractor at no additional expense to the Owner, including repairs and/or replacement of any damaged material.
- 1.6 SITE OBSERVATION VISITS:
 - A. In all cases where site observation visits of the irrigation system work are required including portions of the work specified to be performed under the direction and/ or site observation of the Resident Engineer, the Contractor shall notify the Resident Engineer at least five (5) days in advance of the time such site observations and/ or directions are required.
 - B. Site observation will be required for the following parts of the work at the sole option of the Resident Engineer. Copies of all correspondence and punch lists shall be submitted to the Owner.
 - 1. Upon installation and testing of main lines and lateral lines; when pipes and connections are installed and are to be submitted to pressure tests. Do not cover any pressure lines and lateral lines until they have been reviewed and direction to proceed has been issued by the Resident Engineer.
 - 2. Upon installation and testing of service and control systems, including any pressure regulators, filters, valves, sensors, automatic controllers, quick coupling valves, and control valves and wires.
 - 3. When the sprinkler system are completed, but prior to planting, the Contractor in the presence of the Resident Engineer, shall perform an operational/coverage test to determine if the coverage of water afforded the planting areas is complete and adequate. The Contractor shall furnish all materials and perform all work required to correct any inadequacies, without additional cost to the Owner.
 - 4. A final site observation visit by the Resident Engineer and performance test shall be conducted at the same time as the final site observation of the specified landscape maintenance period work.
 - C. All irrigation shall be installed to the satisfaction of the Resident Engineer prior to acceptance of final grading.
- 1.7 TESTING:
 - A. All PVC mains and their connections shall be subjected to a pressure test at 125 psi (minimum) for a period of 4 hours and shall be watertight. If leaks develop, repair leaking causes and repeat test until entire system is proven watertight. All control valves and shut-off valves shall be installed prior to testing. Set up for testing whole site at one time. All testing shall be in the presence of the Resident Engineer unless otherwise authorized.
 - B. All installed irrigation control wiring shall be visually observed by the Resident Engineer.
 - C. Approval shall be received before backfilling any trench. Do not cover any wires, lines or fittings until they have been observed by the Resident Engineer.

1.8 RECORD DRAWINGS:

- A. Before final acceptance of work, before the final walk through, the Contractor shall provide a record set of full size drawings showing locations of all irrigation system work as specified below. Information shall be on bond media and suitable for reproduction purposes. All lettering shall be a consistent 1/4" height. Where occurs, all items changed/ relocated from original drawings shall be so indicated with the same symbol in the new location, the original symbol erased. All notes/ callouts pertaining to the item shall be directed to new location. All work shall be neat, in black ink and subject to the satisfaction of the Resident Engineer prior to final acceptance.
- B. All valves shall be numbered by controller and station designation and corresponding numbers shall be shown on the record drawings. All lateral lines designating which system and remote control valve they belong to shall be clearly indicated.
- C. All mainline pipe or irrigation equipment including PVC lateral lines, sleeves (number, size and depth/s), conduits (number, size and depth/s), in-line check valves, filter assemblies, flush valves, air relief valves, spring and swing check valves, pressure regulators, irrigation controllers, controller circuit panel and circuit numbers, backflow preventers, remote control valves, shut-off valves, sensors, valve boxes, irrigation control wire runs, spare wire stub-outs, control wire splice/pull box/handhole locations, and quick coupling valves shall be located by two (2) measured dimensions, to the nearest one-half foot. Dimensions shall be given from permanent objects such as buildings, sidewalks, face of curbs, walls, structures and driveways. All changes in direction, location and depth of mainline and lateral line shall be noted exactly as installed.
- D. For each automatic controller, prepare a color-coded chart (or charts) showing the valves, mainline, and systems serviced by that particular controller. All valves shall be numbered to match the operation schedule and the drawings. Only those areas controlled by that controller shall be shown. This chart (or charts) shall be a plot plan, entire or partial, showing building, walks, roads and walls. A photostatic print of this plan, reduced as necessary and legible in all details, shall be made to a size of 11"x17". This print shall be approved by the Resident Engineer prior to hermetically sealing in plastic. This shall then be attached to a surface adjacent to the controller in a location and manner coordinated with the Owner.
- E. Immediately upon the installation of any buried pipe or equipment, the Contractor shall indicate on the progress record drawings the locations of said pipe or equipment. The progress record drawings shall be made available at any time for review at a location at the site designated by the Owner. Contractor's maintenance period shall not begin until the record drawings have been indicated complete to Owner.
- F. Record drawings shall be signed and dated by the Contractor attesting to and certifying the accuracy of the record drawings. Each sheet of record drawings shall be labeled with "Asbuilt irrigation plan", company name, address and phone number.

1.9 OPERATION AND MAINTENANCE MANUALS AND GUARANTEES:

- A. Prepare and deliver to the Resident Engineer within ten calendar days prior to completion of construction, two (2) 3 ring hard cover binders containing the following information:
 - 1. Index sheet stating contractor's address and telephone number, list of equipment with name and addresses of local manufacturers' representatives and irrigation distribution outlets.
 - 2. Catalog and parts sheets on all material and equipment.
 - 3. Guarantee statement. The start of the guarantee period shall be the date the irrigation system is accepted by the Owner.
 - 4. Complete operating and maintenance instruction for all major equipment.

- B. In addition to the above mentioned maintenance manuals, provide the Owner's maintenance personnel with instructions for maintaining major equipment and show evidence in writing to the Resident Engineer at the conclusion of the project that this has been rendered.
- 1.10 GENERAL REQUIREMENTS:
 - A. Code requirements shall be those of state and municipal codes and regulations locally governing this work, providing that any requirements of the drawings and specifications, not conflicting therewith, but exceeding the code requirements, shall govern unless written permission to the contrary is granted by the Resident Engineer.
 - B. Extreme care shall be exercised at all times by the Contractor in excavating and working in the project area due to existing utilities. Contractor shall be fully responsible for expenses incurred in the repair of damages caused by his/ her operation. Any repairs shall be made immediately, with the damaged product replaced in kind.
 - C. Contractor shall obtain and pay for any and all City plumbing permits and all inspections required by the City.
 - D. Plans and specifications are available at the job site. Contractor shall thoroughly examine these plans and specifications prior to the installation of the work and shall arrange and coordinate the work of this section with the work of other contractors to the extent that the installation is accomplished without undue delay. Contractor shall call to the attention of the Owner conflicts between the work of this section and that of other contractors/ trades.
 - E. Plan locations of valves, controllers, sensors, pipe lines, electrical conduit/ control wire routes, and other equipment are diagrammatic and indicate the spacing and relative locations of all installations. Final locations shall be determined by final site conditions and plantings. See also notes on drawings for direction.
 - F. All lines shall have a minimum clearance of 3" from each other and 6" from lines of other trades. Parallel lines shall not be installed directly over one another. Pipe clearance shall be enough to complete a repair of any pipe fitting, pipe, sprinkler assembly, valve assembly or any other equipment. No piping shall pass within, through, or under valve boxes except to the valve connected to.
 - G. Points of connection shall be approximately as shown on drawings. Connect new piping and valves and provide all flanges, adapters or other necessary fittings for connection.
 - H. Permission to shut off any existing in-use water line must be obtained 48 hours in advance, in writing from the Owner. The Contractor shall receive instructions from the Owner as to the exact length of time of each shut-off.
 - I. Contractor shall acquaint himself with all site conditions and proposed site conditions as indicated on the plans and specifications prior to construction. Discrepancies or conflicts shall immediately be brought to the attention of the Resident Engineer, prior to proceeding.
 - J. Prior to starting any work, Contractor shall obtain a reading of existing available water pressure (no flow condition) at each designated point of connection and immediately submit written verification of pressure with date and time of recording to Resident Engineer. Any differences to stated pressure on plans and readings may cause changes directed by Resident Engineer. Failure of Contractor to provide stated information in the manner above will cause the Contractor to bear full responsibility in cost, installation and equipment changes or additions for any changes necessary for a full functioning irrigation system.

PART 2 - PRODUCTS

- 2.1 STANDARD PRODUCTS:
 - A. Materials furnished under this specification shall be new (unused), standard products of manufacturers regularly engaged in the production of such materials, and shall be the manufacturers' latest standard design that complies with drawings and/ or specification requirements, and performs properly.
- 2.2 POLYVINYL CHLORIDE PIPE:
 - A. All plastic piping and waterline sleeving shall be Type I, Grade 2 (impact modified) designated as polyvinyl chloride (PVC). Pacific Products, Pacific Western Pipe, Swanson or approved equivalent.
 - B. PVC plastic pressure supply lines (for piping upstream of control valves and quick coupling valves): all piping 2" and larger in size shall be Class 315. All piping 1 ¹/₂" and smaller shall be PVC SCH 40.
 - C. PVC Plastic non-pressure lateral lines (for piping downstream of remote control valves): all pipe shall be PVC SCH 40.
 - D. Sleeving shall be Schedule 40 PVC. All sleeves shall extend a minimum of 3" past hardscape edges at each end. Size shall be minimum 2 times the diameter of pipe to be sleeved.
 - E. Wire conduits and sweeps shall be Schedule 40 grey PVC. Size shall be minimum 2" diameter unless otherwise noted on drawings; separate from pipe sleeves.
 - F. Furnish plastic pipe continuously and permanently marked with following information: manufacturer's name or trade mark, size, class and type of pipe, working pressure at 73.4 degrees f., And National Sanitation Foundation (NSF) rating.
 - G. All plastic pipe shall conform to Commercial Standards CS256-63.
- 2.3 TRENCH MARKER WARNING TAPE:
 - A. The trench marker warning tape for mainline shall be 3" wide detectable type, similar to type manufactured by Christy Enterprises, Inc.
 - B. The trench marker warning tape for wire shall be 3" wide non-detectable type, similar to type manufactured by Christy Enterprises, Inc.
- 2.4 GALVANIZED STEEL PIPE:
 - A. Galvanized steel pipe shall be SCH 40.
- 2.5 BRASS PIPE:
 - A. Brass pipe shall be IPS standard weight 125 pounds, 85% red brass.
- 2.6 COPPER PIPE:
 - A. Copper pipe shall be Type K hard copper.
- 2.7 FITTINGS AND CONNECTIONS:
 - A. Polyvinyl chloride pipe fittings and connections: Type I, Grade I, SCH 40, high impact molded fittings, manufactured from virgin compounds as specified for piping tapered socket or molded thread type, suitable for either solvent weld or screwed connections. Machine threaded fittings and plastic saddle and flange fittings are not acceptable. Furnish fittings permanently marked with following information: nominal pipe size, type and schedule of material, and National Sanitation Foundation (NSF) seal of approval. PVC fittings shall conform to ASTM D2464 and D2466.

- B. Galvanized steel fittings shall be SCH 40.
- C. Brass pipe fittings and connections: standard 125 pound class 85% red brass fittings and connections, IPS threaded.
- D. Copper pipe fittings and connections: standard 125 pound class 85% red brass fittings and connections, IPS threaded.
- E. Dielectric Fittings: dielectric fittings shall be used for dissimilar metal connections.
- F. PVC SCH 80 risers and nipples: Type I, Grade I, Schedule 80, high impact molded, manufactured from virgin compounds as specified for piping and conforming to ASTM D-2464. Threaded ends shall be molded threads only. Machined threads are not acceptable. Dura or approved equivalent.
- 2.8 PVC PLASTIC UNIONS:
 - A. Unions at valve assemblies shall be PVC SCH 80, molded and threaded inlet and outlet.
- 2.9 SOLVENT CEMENTS AND THREAD LUBRICANT:
 - A. Solvent cements shall comply with ASTM D2564. Socket joints shall be made per recommended procedures for joining PVC plastic pipe and fittings with PVC solvent cement and primer by the pipe and fitting manufacturer and procedures outlined in the appendix of ASTM D2564
 - B. Thread lubricant shall be Teflon ribbon-type, or approved equivalent, suitable for threaded installations as per manufacturer's recommendations. No liquid pipe sealant shall be used; if found, on assemblies they will be subject to be dismantled and reinstalled with specified thread sealant.
- 2.10 AUTOMATIC CONTROL WIRE AND WIRE SPLICE CONNECTORS:
 - A. Electric wiring runs from controller to the automatic control valves shall be solid, 14 gauge, single conductor, copper wire, 4/64 inch insulation, direct bury type.
 - B. Control valve wire colors shall be as noted on the plan notes, for each controller. Spare control wires shall be green in color.
 - C. Wire splice connectors for control wires shall be waterproof, similar to 'Dri-Splice' as manufactured by Spears or Rain Bird 'Pen-Tite' connectors. Only one type, one manufacturer, shall be used on project to maintain consistency.
- 2.11 REMOTE CONTROL VALVES:
 - A. Remote control valves shall be as specified in the irrigation legend.
- 2.12 VALVE BOXES:
 - A. All valve boxes shall be commercial grade, green colored plastic valve boxes with lockable, bolt-down type green lids; by Ametek, Carson-Brooks or approved equivalent. Provide stainless steel bolt and washer for locking each valve box. Sizes shall be as follows:
 - 1. For remote control valve: 12"x18" rectangular valve box.
 - 2. For in-line check valves: 10" diameter round plastic valve box.
 - 3. For quick coupling valve: 10" diameter round plastic valve box.
 - 4. For wire splice/wire pull box: 10" diameter round plastic box.
 - 5. For pipe and wire stub outs: 10" diameter round plastic box.
 - 6. For marking each end of sleeves: 10" diameter round plastic box.
- 7. For ball valves: 10" diameter round plastic box.
- 8. For spare wire box: 10" diameter round plastic box.
- 2.13 SPRINKLER HEADS:
 - A. Sprinkler heads shall be of the types and sizes with diameter (or radius) of throw, pressure, nozzle discharge and/or other designations indicated on the drawings. All sprinkler heads of the same type and size shall be of the same manufacturer.
 - 2.14 QUICK COUPLING VALVES:
 - A. Quick coupling valves shall be 1" size brass, two piece type, vinyl cover, lockable, as specified in the irrigation legend.
- 2.15 BALL VALVES:
 - A. Ball valves shall be as specified in the irrigation legend.
- 2.16 IN-LINE CHECK VALVES:
 - A. In-line check valves shall be as specified in the irrigation legend.
- 2.17 CHECK VALVES:
 - A. Check valves shall be maintenance free and constructed of heavy duty Type I PVC with stainless steel and neoprene internal parts. Valves shall prevent low head drainage quickly and positively after RCV shut-off. Valves shall have a female IPS threaded inlet and outlet. Spring check valves similar to Hunter HCV or Valcon ADV; swing check valves similar to King Bros. KSC-T.
- 2.18 CONCRETE FOOTINGS:
 - A. Concrete footings shall be 2,000 p.s.i. Concrete at 28 days, 5 sack minimum mix, natural color.
- 2.19 VALVE I.D. TAGS:
 - A. Valve I.D. Tags shall be Christy Enterprises Standard yellow Valve I.D. Tags.
- 2.20 SPRINKLER SWING JOINTS AND RISERS:
 - A. Sprinkler swing joints and flexible risers shall be as noted on details.
- 2.21 EXTRA EQUIPMENT:
 - A. Contractor shall provide to the Owner two (2) weeks prior to the end of the project:
 - 1. Five (5) extra sprinkler heads, nozzles, and screens of each type used on the project.
 - 2. One (1) quick coupling valve swivel hose ell and key to match quick coupling valve used.
- PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS:

- A. All scaled dimensions on drawings are approximate. Before proceeding with any work, Contractor shall carefully check and verify all dimensions and quantities and shall immediately inform Owner of discrepancies between drawings and specifications and actual conditions. No work shall be conducted where discrepancies occur, until approval has been given by the Owner.
- B. Locations of irrigation equipment on drawings are diagrammatic and approximate only and shall be changed and adjusted as necessary and as directed to meet existing conditions and obtain complete water coverage. Locate and stake all work and obtain approval by the Owner before any installations.

- C. Install and extend system as shown on the drawings, and as necessary to carry out the intent of the drawings and specifications.
- D. Locate existing lines, valves and other underground utilities before digging trenches.
- E. Structures, paving, curbs and shovel cut edges, and large trees shall be installed or indicated before installation of sprinkler system laterals, heads, and valve boxes.
- F. Stub out spare wires where indicated on plan.
- G. Install valve box at each end of sleeves and/or conduits.
- 3.2 INSTALLATION OF IRRIGATION SYSTEM:
 - A. Excavation and backfilling of trenches:
 - 1. Excavate trenches, prepare subgrade, and backfill to line and grade with sufficient room for pipe fittings, testing and inspecting operations. Do not backfill until the pipe system has been subjected to a hydrostatic test as specified. Do not cover any installed control wiring until it has been visually observed by the Resident Engineer.
 - 2. Cover over pipe in landscape areas from finish grade:
 - a. PVC pressure line 18" min., 24" max.
 - b. PVC non-pressure line

1.	6" Pop-ups, bubblers	12" min., 18" max.
2.	12" Pop-ups	18"

3. Cover over pipe under finish grade of pavement:

1.	Pressure line	24" min., 30" max.
2.	Non-pressure line	18" min., 24" max.

Note: sleeves shall be installed at same depths as type of line passing through sleeves.

- 4. Backfill 6" beneath and 6" above supply line shall be free of rocks, clods, debris, etc. 1" in diameter or larger.
- 5. Deposit topsoil on one side of trench and subsoil on the opposite side, then install irrigation lines and test each section. Replace topsoil to the uppermost section of trench.
- B. Repair any leaks and replace all defective pipe or fittings until lines meet test requirements. Do not cover any lines until they have been checked and approved for tightness, quality of workmanship, and materials.
- C. Backfill trenches, after approval of piping, with suitable and approved material, tamping soil around pipe, and thoroughly compacting all planter trench fills until 90% relative compaction, and 95% relative compaction under paving areas has been achieved.
- D. Backfill material for trenches for lateral lines, mainlines and conduits shall be an approved soil, free from rocks and clods, sharp objects, debris and trash.

3.3 INSTALLATION OF POLYVINYL CHLORIDE PIPE:

- A. Because of the nature of plastic pipe and fittings, exercise caution in handling, loading and storing, to avoid damage.
- B. The pipe and fittings shall be stored under cover until using, and shall be transported in a vehicle with a bed long enough to allow the length of pipe to lay flat so as not to be subjected to undue bending or concentrated external load at any point.

- C. All pipe that has been dented or damaged shall be discarded unless such dent or damaged section is cut out and pipe rejoined with a coupling.
- D. Trench depth shall be as specified above from the finish grade to the top of the pipe. The bottom of the trench shall be free of rocks, clods, and other sharp-edged objects.
- E. All pipe ends and fittings shall be wiped with "MEK" primer, before welding solvent is applied. Welded joints shall be given a minimum of 15 minutes to set before moving or handling. Remove all burrs and all excess material before fitting and gluing together.
- F. Pipe shall be snaked from side-to-side of trench bottom to allow for expansion and contraction.
- G. Center load pipe at 10' intervals with small amount of backfill to prevent arching and slipping under pressure. Leave joints cleanly exposed for site observation during testing.
- H. No water shall be permitted in the pipe until a period of at least 24 hours has elapsed for solvent weld setting and curing.
- I. Plastic to metal joints shall be made with plastic female adapters, metal nipple hand tightened, plus one turn with a strap wrench. Use Teflon tape on all male threaded pipe and fittings, as per manufacturer's recommendations. No liquid pipe sealant shall be used on this project.
- J. Plastic to plastic joints shall be solvent-weld, assembled per pipe manufacturer's specifications and using solvent recommended by pipe manufacturer only.
- K. All PVC piping under pavement shall be installed with a detectable trench marker warning tape placed 6" below finish grade and directly over the piping.
- 3.4 INSTALLATION OF GALVANIZED STEEL PIPE:
 - A. Install galvanized steel pipe and fittings as shown on the irrigation plans, using thread sealant specified.
- 3.5 INSTALLATION OF BRASS PIPE:
 - A. Cut brass piping by power hacksaw, circular cutting machine using an abrasive wheel, or hand hacksaw. No piping shall be cut with metallic wheel cutter of any description. Ream and remove rough edges of burrs so smooth and unobstructed flow is obtained.
 - B. Carefully and smoothly place thread lubricant, such as Teflon tape, on male thread only. Tighten screwed joints with tongs or wrenches. Caulking or any type of pipe joint compound is not permitted.
- 3.6 INSTALLATION OF COPPER PIPE:
 - A. Where necessary, cut copper pipe by hacksaw or circular cutting machine. Remove burrs and rough edges; solder together pipe and fittings per pipe manufacturer's recommendations. Threaded connections shall be made with ribbon Teflon tape. No liquid pipe sealant shall be used on this project.
- 3.7 REMOTE CONTROL WIRING INSTALLATION:
 - A. Direct burial control wire sizes and types shall be as shown and as specified. Provide separate wire colors for each controller (ie., green for "A", orange for "B", etc. in multiple controller projects).
 - B. Provide one control wire and one common ground wire to service each valve in system. Provide 4' minimum expansion loop at each valve to permit removal and maintenance of valves. Expansion loop shall be formed by coiling wire around a ³/₄" diameter pipe and withdrawing it from pipe.

- C. Install control wires in planters at least 18" below finish grade and a minimum of 4" from any pipe or fittings except at terminal points.
- D. Install control wires in conduit where passing through or on structure, or under pavement or vehicular access roads.
- E. As a part of the work, the Contractor shall run a spare red control wire on each wire run from the controller to each furthest RCV served by each controller, in addition to the spare wire stub outs indicated on plans.
- F. Wire splices in the run between the controller and valves shall not be allowed. Wire splices at end connections shall be done according to manufacturer's instructions.
- G. Numbering and tagging: identify direct burial control wires at each automatic valve and at the terminal strips of the controller with corresponding valve station numbers shown on the drawings. Tag wires inside each valve box with Christy Enterprises standard yellow I.D. Tags. Tag wires at the terminal strips with 3M Scotchcode SER wire markers or approved equivalent. Identify spare wires by capping ends with waterproof connectors and tagging with an I.D. Tag marked "SP". Place in valve box.
- 3.8 REMOTE CONTROL VALVE INSTALLATION:
- A. Install master control valves in locations approximately as shown on the drawings, with 4" distance from top of flow control stem to valve box lid. Fit with plastic valve box and cover as shown in the detail drawings.
- 3.9 VALVE BOX INSTALLATION:
 - A. Install valve boxes as shown in the drawings. Install locking bolt and washer for each valve box lid.
- 3.10 SPRINKLER HEAD INSTALLATION:
 - A. Install all sprinkler heads as shown in drawings, and per manufacturer's instructions.
 - B. Nozzle size of all heads shall be adjusted to suit any particular conditions of the area. This shall be done after the system has been thoroughly tested, immediately after written notification by the Resident Engineer to do so.
 - C. Install PVC lateral lines and fittings. Prior to the installation of the sprinkler heads, a full head of water shall be used to flush out the system. After system is thoroughly flushed, install sprinklers. After sprinklers are flushed, install nozzles. Adjust nozzle radius as required to provide water coverage without overspray onto structures, pavement or walls.
- 3.11 QUICK COUPLING VALVE INSTALLATION:
 - A. Install quick coupling valves as detailed and as directed.
- 3.12 ANTI-DRAIN SPRING CHECK VALVE AND SWING CHECK VALVE INSTALLATION:
 - A. Install check valves as shown in detail drawings, and as directed by manufacturer's instructions.
- 3.13 CONCRETE FOOTING INSTALLATION:
 - A. Concrete footings shall be placed on 95% minimum compacted or undisturbed sub-grade. Construct to shapes specified.

3.14 CLEAN-UP:

A. As project progresses, Contractor shall maintain all areas daily in a neat manner and remove unsightly debris as necessary. After completion of project, Contractor shall remove all debris and containers used in accomplishing work. Contractor shall sweep and clean all sidewalks, asphalt, and concrete areas, and clean all vertical surfaces affected by his work.

END OF SECTION 328100

SECTION 329000 - LANDSCAPING

PART 1 - GENERAL

- 1.1 GENERAL CONDITIONS:
 - A. The General Conditions and Special Conditions are a part of this section and the contract for this work and apply to this section as fully as if repeated herein.
- 1.2 SUMMARY:
 - A. The work includes all services, labor, materials, transportation and equipment necessary to perform the work as shown and noted on the drawings and specified.
- 1.3 SUBMITTALS:
 - A. Contractor shall submit list of soil amendments, fertilizers, plant materials, with quantities of each.
- 1.4 GUARANTEES AND REPLACEMENTS:
 - A. Shrubs and groundcovers shall be guaranteed to remain healthy and vigorously growing for 90 days, from date of final acceptance of project.
 - B. All trees that have been supplied and installed under this Contract shall be guaranteed to live in a healthy condition for a period of one (1) year from date of final acceptance of project.
 - C. All plants found to be dead and all plants not in a vigorous condition noted within the Guarantee Period shall be replaced within (14) calendar days.
 - D. Plants used for replacement shall be the same kind and size as specified in the plant list. They shall be furnished, planted and fertilized as originally specified.
- 1.5 SITE OBSERVATION VISITS:
 - A. Site observation visits herein specified shall be made by the Resident Engineer. The Contractor shall request site observation in advance of the time observation is required.
 - B. Site observation will be required for the following parts of the work:
 - 1 Incorporation of soil conditioner and fertilizer into the soil.
 - 2 Upon the completion of grading prior to planting.
 - 3 Approval of plant materials.
 - 4 When shrubs are spotted in place for planting, but before planting holes are excavated.
 - 5 When planting, and all other indicated or specified work, except the Maintenance Period, has been completed. Acceptance and written approval shall establish beginning of the Maintenance Period.
 - 6 Final site observation visit at the completion of the ninety (90) day Maintenance Period. This site observation visit shall establish the beginning date for the guarantee period of plant material.
 - C. Acceptance: Upon completion of the final site observation visit and the work of this section, the Contractor will be notified in writing (1) whether the work is acceptable; (2) of any requirements necessary for completion and acceptance.
 - D. This Contractor or his authorized representative shall be on the site at the time of each site observation visit by the Resident Engineer.

1.6 MAINTENANCE:

- A. The Maintenance Period begins on the first day after all landscape and irrigation work on this project is complete, checked, accepted and written approval from the Resident Engineer is given to begin the Maintenance Period, and shall continue thereafter for no less than ninety (90) continuous calendar days.
- B. The Contractor or his authorized representative shall be on the site at the time of each site observation visit by the Resident Engineer.
- C. The Contractor shall continuously maintain all involved areas of the Contract during the progress of the work and during the Maintenance Period until the Final Acceptance of the work.
- D. Regular planting maintenance operations shall begin immediately after each plant is planted. Plants shall be kept in a healthy, growing condition and in a visually pleasing appearance by watering, pruning, trimming, fertilizing, restaking, pest and disease controlling, spraying, weeding, cleaning-up and any other necessary operation of maintenance. Landscape areas shall be kept free of weeds, noxious grass, and all other undesired vegetative growth and debris. All plants found to be dead or in an impaired condition shall be replaced immediately.
- E. The Contract completion date of the Contract Maintenance Period will be extended, when in the opinion of the Resident Engineer, improper maintenance and/or possible poor or unhealthy condition of planted material or are evident at the termination of the scheduled Maintenance Period. The Contractor shall be responsible for additional maintenance of the work at no change in Contract price until all of the work is completed and acceptable.
- F. The Contractor shall be responsible for maintaining adequate protection of the areas. Damaged areas shall be repaired immediately at the Contractor's expense.
- 1.7 GENERAL REQUIREMENTS:
 - A. The term "Planting Area" shall mean all areas to be planted with shrubs and groundcovers.
 - B. Actual planting shall be performed during those periods when weather and soil conditions are suitable in accordance with locally accepted horticultural practice.
 - C. All rock and other growth or debris accumulated during the duration of the project shall be removed from the site.
 - D. Upon completion of all grading operations, soil samples (3 locations min.) shall be taken by the contractor and analyzed by a soil laboratory. The results of these tests are to be reviewed by the Resident Engineer for any required modifications to specified soil preparation.
 - E. Prior to excavation for planting or placing of plant materials, locate all underground utility lines still in use and take proper precautions to avoid damage to such improvements. In the event of a conflict between such lines and plant locations, notify the Resident Engineer who shall arrange for the re-location of one or the other. The Contractor assumes all responsibility for making any and all repairs for damages resulting from work as herein specified.
 - F. Grading and soil preparation work shall be performed only during the period when beneficial and optimum results may be obtained. If the moisture content of the soil should reach such a level that working it would destroy soil structure, spreading and grading operations shall be suspended until the moisture content is increased or reduced to acceptable levels and the desired results are likely to be obtained.
 - G. All scaled dimensions are approximate. Before proceeding with any work, carefully check and verify all dimensions and immediately inform the Resident Engineer of any discrepancy between the drawings and/or specifications and actual conditions.

- H. Quantities for plant materials are shown for convenience only, and not guaranteed. Check and verify count and supply sufficient number to fulfill intent of drawings. Certify any clarifications with the Resident Engineer.
- I. Adequately stake, barricade, and protect all irrigation equipment, manholes, utility lines, and other existing property during all phases of the soil amending planting and grading operations.
- 1.8 PLANT MATERIAL SELECTION:
 - A. Shrub Samples: Typical samples, three each of all varieties and sizes (5 gallon and under) shrubs of all plant materials shall be submitted for approval at the site a minimum of three days prior to planting operations. Approved samples shall remain on the site and shall be maintained by the Contractor as standards of comparison for plant materials to be furnished. Samples will be incorporated into the work.

1.9 REJECTION AND SUBSTITUTION:

- A. All plants not conforming to the requirements herein specified and on the drawings shall be considered defective and such plants, whether in place or not, shall be marked as rejected and be immediately removed from the site of the work and replaced with acceptable plant materials. The plant materials shall meet all applicable inspections required by law. All plants shall be of the species, variety, size, age, flower color and condition as specified herein and/or as indicated on the drawings. Under no condition will there be any substitution of plant species, variety, or reduced sizes for those listed on the accompanying drawings, except with the express written consent of the Resident Engineer.
- B. All utilities (water and electricity) used during the installation of the landscaping and irrigation systems for this project shall be paid for by the Owner.
- 1.10 INVOICING OF PLANT MATERIALS AND SOIL PREPARATION CONFORMANCE TEST:
 - A. A sample of the soil amendments shall be delivered to the Resident Engineer within thirty-five (35) days after recording of the Contract for review and comment (approval/disapproval).
 - B. Upon delivery of materials and/or completion of all soil conditioning and grading, but prior to initiating planting operations, the Resident Engineer, with the signed copies of required certificates, trip slips, and invoices for soil preparation materials, shall invoice such material, comparing the total quantities of each material furnished against the total area to each operation. If the minimum rates of application have not been met, the Resident Engineer will require the distribution of additional quantities of these materials to fulfill the minimum application requirements specified.
 - C. After installation of plant materials, but prior to the pre-maintenance site observation visit, the Resident Engineer, with the heretofore specified signed copies of the required certifications, trip slips, and invoices for the plant materials and related items, shall invoice such material, comparing the total area and/or the amounts specified. If the minimum amounts have not been furnished, the Resident Engineer will require the installation of additional materials to fulfill the minimum requirements specified.

PART 2 - PRODUCTS

- 2.1 SOIL AMENDMENT AND FERTILIZER:
 - A. Soil conditioner shall be "Numex lif" "by John Deere, or approved equivalent.
 - B. Iron Sulphate 20% Iron by volume. WARNING: Fertilizers containing chelated iron will stain concrete surfaces. The Contractor shall take care not to stain concrete and shall be responsible for removing all iron stains from concrete, at no additional cost to the Owner.

- C. Pre-plant Fertilizer (6-24-24 BX+) by "Best", or approved equivalent.
- D. Post-plant Fertilizer (19-6-12) controlled release by "Best", or approved equivalent.
- E. Gypsum Commercially packaged, free flowing gypsum containing not less than 95% by volume of calcium sulphate as active ingredient.
- F. Soil Sulphur Agricultural soil Sulphur, 90% elemental min. Tiger 90GR or approved equivalent (NO POWDER SOIL SUPLHUR).
- G. Wetting Agent NAIAD or equal.

2.2 PLANTING BACKFILL:

A. Planting backfill shall be a thoroughly blended mixture of excavated soil from the planting pits and soil amendments at the following mixture:

Soil Conditioner	40%
On Site Soil	60%
Iron Sulphate	2 lbs./cu. yd.
Pre-plant Fertilizer	3 lbs./cu. yd.
Gypsum	10 lbs./cu. yd.
Soil Sulphur	10 lbs. / 1000 s. f.
Wetting Agent	2 oz / gal.

2.3 PLANT MATERIALS:

- A. Nomenclature: The scientific and common names of plants herein specified conform with the approved names given in "A Checklist of Woody Ornamental Plants of California", published by the University of California, College of Agriculture, Publication 4091 (1979). See list of plant material on drawings.
- B. Container stock (1 gal., 5 gal., 15 gal. boxes) shall have grown in containers for at least six months, but not over two years. No container plants that have cracked or broken balls of earth, when taken from the container, shall be planted, except upon special approval. No trees with damaged roots or broken balls shall be planted.
- C. Pruning shall not be done, prior to delivery, except by written approval by the Resident Engineer.
- D. Inspection of Plant Materials, required by City, County or State authorities, shall be a responsibility of the Contractor, and where necessary he shall secure permits or certifications prior to delivery of plants to site.
- E. Plants shall be subject to approval or rejection, at the project site at any time before or during progress of work, for size, variety, condition, latent defects and injuries. Rejected plants shall be removed from the project site immediately.
- F. Substitutions will not be permitted except that if proof is submitted that any plant specified is not obtainable, a proposal will be substituted subject to Resident Engineer's written approval.
- G. Quantities shall be furnished as needed to complete work shown on drawings.
- H. The Resident Engineer reserves the right to check root condition of any species, particularly those grown from seed, and if found defective, to reject the plants represented by the defective sample.
- I. Identify plant species or varieties correctly on legible, weatherproof labels attached securely to the plant material. There shall be a minimum of one labeled plant for each 25 plants in a lot.
- J. Groundcover plants shall be healthy vigorous rooted cuttings grown in flats until transplanting.

2.4 PLANTING TABLETS:

- A. Use Agriform (20-10-5) blue chip tablet. 21 gram size for shrubs.
- 2.5 BARK MULCH:
 - A. Clean, graded pea size (1/4"-1/2") fir or pine bark chips.
- 2.6 ROOT BARRIERS
 - A. Root Barriers shall provide a multi-year root control system consisting of herbicidal (Trifluralin 17%) time-release nodules permanently attached to a permeable Geotextile fabric. Biobarrier by Typar, or equal

PART 3 - EXECUTION

3.1 SOIL CONDITIONING, FERTILIZING AND ROTOTILLING:

A. After the areas have been graded, the following rates of soil conditioning and amendment materials shall be evenly spread over all planting areas and shall be thoroughly scarified to an average depth of six (6) inches by rototilling a minimum of two (2) alternating passes.

1.	Iron Sulphate:	20 lbs. per 1,000 sq. ft.
2.	Soil Conditioner:	3 cu. yd. per 1,000 sq. ft
3.	Pre-plant Fertilizer:	30 lbs. per 1,000 sq. ft.
4.	Gypsum:	10 lbs./cu. yd.
5.	Soil Sulphur:	10 lbs. / 1000 s. f.
6.	Wetting Agent:	2 oz / gal.

- B. Rate of application is for bidding purposes only. Soil test may reduce or increase total soil amendment yardage. Adjustment (plus or minus may be necessary.) Contractor shall obtain at least three soil tests of final grade at site and submit results to Resident Engineer for interpretation and recommendation. The Contractor shall submit a binding unit price for each itemized soil amendment which will be used to determine changes to the contract amount in the event of modifications to rates of applications as specified herein.
- C. The thoroughness and completeness of the rototilling and incorporation of the soil conditioners/amendments shall be acceptable to the Resident Engineer.
- 3.2 DEEP WATERING:
 - A. After complete installation and testing of the Irrigation system, all areas shall be deep watered and compacted and settled by continuous application of irrigation water until the soil is moist to a minimum depth of 8".
 - B. Care shall be taken that the rate of application of water does not cause erosion or sluffing of soils.
 - C. All depressions, voids, erosion scars and settled trenches generated by the deep watering shall be filled with conditioned topsoil and brought to finish grade.
- 3.3 FINISH GRADING:
 - A. Finish grades shall be as indicated on the civil engineer's drawings and landscape drawings.
 - B. Finish grades shall be measured as the final water compacted and settled surface grades and shall be within plus or minus 0.1 foot of the spot elevations and grade lines indicated on the drawing.
 - C. Finish grades shall be measured at the top surface of surface materials.

- D. Molding and rounding of the grades shall be provided at all changes in slope.
- E. All undulations and irregularities in the planting surfaces resulting from tillage, rototilling and all other operations shall be leveled and floated out before planting operations are initiated.
- F. The Contractor shall take every precaution to protect and avoid damage to sprinkler heads, irrigation lines, and other underground utilities during his grading and conditioning operations.
- G. Final finish grades shall insure positive drainage of the site with all surface drainage away from buildings, walls, and toward roadways, drains and catch basins.
- H. Final grades shall be acceptable to the Resident Engineer before planting operations will be allowed to begin.
- I. Planting surfaces shall be graded with no less than 1 percent surface slope for positive drainage.

3.4 PLANTING:

A. The layout of locations for plants and outlines of groundcover to be planted shall be approved on the site by the Resident Engineer, prior to their planting. All such locations shall be checked for possible interference with existing underground piping, prior to excavation of holes. If underground construction or utility lines are encountered in the excavation of planting areas, other locations for the planting may be selected by the Resident Engineer. Damage to existing utilities shall be the responsibility of the Contractor.

3.5 PLANTING SHRUBS

- A. Planting holes shall be of size as shown on the drawings.
- B. Excavation shall include the stripping and stacking of all acceptable soil encountered within the areas to be excavated for plant pits and planting beds. Protect all areas that are to be trucked over and upon which soil is to be temporarily stacked pending its re-use for the fillings of holes, pits and beds.
- C. Excess soil, generated from the planting holes shall be removed from the site, or distributed thereon with, and only with, approval of the Resident Engineer.
- D. All used containers shall be removed to the storage area or from the site.
- E. The plants shall be planted at approved locations with the heretofore specified conditioner and soil planting backfill.
- F. The plants shall be placed in the planting pits on the backfill material which has been hand tamped and water settled to the rootball base levels prior to the placement of the plants. After setting the plants, the remaining backfill material shall be carefully tamped and settled around each rootball to fill all voids.
- G. Each shrub shall be placed in the center of the hole and shall be set plumb and held rigidly in position until the planting backfill has been tamped from around each root ball.
- H. <u>All plants shall be set at such a level that after settling they bear the same relationship to the surrounding finish grade as they bore to the soil line grade in the container.</u>
- I. Planting tablets shall be placed in each tree or shrub planting hole at the following rates:

1-21 gram tablet per 1 gallon container.

2-21 gram tablets per 5 gallon container.

J. No plant will be accepted if the rootball is broken or cracked, either before, during or after the process of installation.

- K. All plants shall be thoroughly watered into the full depth of each plant hole immediately after planting.
- L. Pruning after planting shall be required on all trees, shrubs and vines when necessary to provide the specified or approved standard shapes, form and/or sizes characteristic to each plant. Pruning may include thinning, topping, and/or cutting and shall be under the direction of the Resident Engineer. Cuts over 3/4 inch in diameter shall be painted with an approved tree sealant.

3.7 PLANTING GROUNDCOVERS:

- A. Groundcovers shall be planted in the areas indicated on the drawings. The groundcover plants shall be rooted cuttings grown in flats, and shall remain in those flats until transplanting.
- B. All groundcover plants shall be planted with soil around roots in staggered rows, evenly spaced at the intervals called out on the drawings.
- C. The groundcover plants shall be planted sufficiently deep to cover all roots and a 5 gram planting tablet shall be placed in each planting hole and shall be immediately sprinkled after planting until the entire area is soaked to the full depth of all holes. Keep 5 gram tablet 1" away from roots of flat plants.
- 3.12 BARK MULCH:
 - A. All areas with shrubs and groundcovers shall receive a 2" deep minimum layer of bark mulch over the entire surface in planting areas less than 3:1.

3.11 ROOT BARRIERS

- A Install root barrier where trees are planted within 60 inches of paving or other hardscape elements, such as walls, curbs, and walkways unless otherwise shown on Drawings.
- B. Align root barrier vertically and run it linearly along and adjacent to the paving or other hardscape elements to be protected from invasive roots.
- C. Install root barrier continuously for a distance of ten (10) feet in each direction from the tree trunk, for a total distance of 20 feet per tree. If trees are spaced closer, use a single continuous piece of root barrier.
- D. Position top of root barrier per manufacturer's recommendations.
- E. Overlap root barrier a minimum of 12 inches at joints.
- F. Do not distort or bend root barrier during construction activities.
- G. Do not install root barrier surrounding the root ball of tree.

3.12 POST FERTILIZATION:

- A. Post Fertilization for all areas (19-6-12) shall occur 45 days after planting at a rate of 15 lbs. per 1,000 sq. ft.
- 3.13 CLEAN UP:
 - A. As project progresses, Contractor shall maintain all areas in a neat manner and remove unsightly debris as necessary. After completion of project, Contractor shall remove all debris and containers used in accomplishing work. He shall sweep and clean all sidewalks, asphalt, and concrete areas adjacent to plantings.

END OF SECTION 329000

SECTION 334100 - STORM UTILITY DRAINAGE PIPING

PART 1 - GENERAL

- 1.1 SUMMARY
 - A. Section Includes:
 - 1. Pipe and fittings.
 - 2. Catch basins.
- 1.2 ACTION SUBMITTALS
 - A. Product Data: For each type of product indicated.
 - B. Shop Drawings:
 - 1. Catch basin: Include plans, elevations, sections, details, frames, covers, and grates.
- 1.3 INFORMATIONAL SUBMITTALS
 - A. Coordination Drawings: Show pipe sizes, locations, and elevations. Show other piping in same trench and clearances from storm drainage system piping. Indicate interface and spatial relationship between manholes, piping, and proximate structures.
 - B. Profile Drawings: Show system piping in elevation. Draw profiles at horizontal scale of not less than 1 inch equals 50 and vertical scale of not less than 1 inch equals 5 feet. Indicate manholes and piping. Show types, sizes, materials, and elevations of other utilities crossing system piping.
 - C. Product Certificates: For each type of cast-iron soil pipe and fitting, from manufacturer.
 - D. Field quality-control reports.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Do not store plastic manholes, pipe, and fittings in direct sunlight.
- B. Protect pipe, pipe fittings, and seals from dirt and damage.
- C. Handle manholes according to manufacturer's written rigging instructions.
- D. Handle catch basins according to manufacturer's written rigging instructions.

1.5 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 Resident Engineer no fewer than two days in advance of proposed interruption of service.
 - 2. Do not proceed with interruption of service without Resident Engineer's written permission.

PART 2 - PRODUCTS

2.1 PVC PIPE AND FITTINGS

- A. PVC Gravity Sewer Piping:
 - 1. Pipe and Fittings: ASTM F 679, SDR-35, PVC gravity sewer pipe with bell-and-spigot ends and with integral ASTM F 477, elastomeric seals for gasketed joints.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Excavation, trenching, and backfilling are specified in Division 31 Section "Earth Moving."

3.2 PIPING INSTALLATION

- A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground storm drainage piping. Location and arrangement of piping layout take into account design considerations. Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.
- B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements.
- C. Install manholes for changes in direction unless fittings are indicated. Use fittings for branch connections unless direct tap into existing sewer is indicated.
- D. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.
- E. Install gravity-flow, nonpressure drainage piping according to the following:
 - 1. Install piping pitched down in direction of flow.
 - 2. Install piping NPS 6 and larger with restrained joints at tee fittings and at changes in direction. Use corrosion-resistant rods, pipe or fitting manufacturer's proprietary restraint system, or cast-in-place concrete supports or anchors.
 - 3. Install piping with 36-inch minimum cover.
 - 4. Install ductile-iron piping and special fittings according to AWWA C600 or AWWA M41.
 - 5. Install PVC profile gravity sewer piping according to ASTM D 2321 and ASTM F 1668.

3.3 CATCH BASIN INSTALLATION

- A. Construct catch basins to sizes and shapes indicated.
- B. Set frames and grates to elevations indicated.

3.4 CONNECTIONS

- A. Make connections to existing piping and underground manholes.
 - 1. Use commercially manufactured wye fittings for piping branch connections. Remove section of existing pipe; install wye fitting into existing piping; and encase entire wye fitting, plus 6-inch overlap, with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi.
 - 2. Make branch connections from side into existing piping, NPS 4 to NPS 20. Remove section of existing pipe, install wye fitting into existing piping, and encase entire wye with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi.

- 3. Make branch connections from side into existing piping, NPS 21 or larger, or to underground manholes and structures by cutting into existing unit and creating an opening large enough to allow 3 inches of concrete to be packed around entering connection. Cut end of connection pipe passing through pipe or structure wall to conform to shape of and be flush with inside wall unless otherwise indicated. On outside of pipe, manhole, or structure wall, encase entering connection in 6 inches of concrete for minimum length of 12 inches to provide additional support of collar from connection to undisturbed ground.
 - a. Use concrete that will attain a minimum 28-day compressive strength of 3000 psi unless otherwise indicated.
 - b. Use epoxy-bonding compound as interface between new and existing concrete and piping materials.
- 4. Protect existing piping, manholes, and structures to prevent concrete or debris from entering while making tap connections. Remove debris or other extraneous material that may accumulate.
- B. Pipe couplings, expansion joints, and deflection fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.
 - 1. Use nonpressure-type flexible couplings where required to join gravity-flow, nonpressure sewer piping unless otherwise indicated.
 - a. Unshielded flexible couplings for same or minor difference OD pipes.
 - b. Unshielded, increaser/reducer-pattern, flexible couplings for pipes with different OD.
 - c. Ring-type flexible couplings for piping of different sizes where annular space between smaller piping's OD and larger piping's ID permits installation.

3.5 IDENTIFICATION

- A. Materials and their installation are specified in Division 31 Section "Earth Moving." Arrange for installation of green warning tape directly over piping and at outside edge of underground structures.
 - 1. Use warning tape or detectable warning tape over ferrous piping.
 - 2. Use detectable warning tape over nonferrous piping and over edges of underground structures.

3.6 FIELD QUALITY CONTROL

- A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of Project.
 - 1. Submit separate reports for each system inspection.
 - 2. Defects requiring correction include the following:
 - a. Alignment: Less than full diameter of inside of pipe is visible between structures.
 - b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
 - c. Damage: Crushed, broken, cracked, or otherwise damaged piping.

- d. Infiltration: Water leakage into piping.
- e. Exfiltration: Water leakage from or around piping.
- 3. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
- 4. Reinspect and repeat procedure until results are satisfactory.
- B. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.
 - 1. Do not enclose, cover, or put into service before inspection and approval.
 - 2. Test completed piping systems according to requirements of authorities having jurisdiction.
 - 3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours' advance notice.
 - 4. Submit separate report for each test.
 - 5. Gravity-Flow Storm Drainage Piping: Test according to requirements of authorities having jurisdiction, UNI-B-6, and the following:
 - a. Exception: Piping with soiltight joints unless required by authorities having jurisdiction.
 - b. Option: Test plastic piping according to ASTM F 1417.
 - c. Option: Test concrete piping according to ASTM C 924.
- C. Leaks and loss in test pressure constitute defects that must be repaired.
- D. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.
- 3.7 CLEANING
 - A. Clean interior of piping of dirt and superfluous materials. Flush with water.

END OF SECTION 334100

APPENDIX B

CEQA NOTICE OF EXEMPTION

NOTICE OF EXEMPTION

(Check one or both)

TO:

X RECORDER/COUNTY CLERK P.O. BOX 1750, MS A-33 1600 PACIFIC HWY, ROOM 260 SAN DIEGO, CA 92101-2422 OFFICE OF PLANNING AND RESEARCH 1400 TENTH STREET, ROOM 121 SACRAMENTO, CA 95814

FROM: CITY OF SAN DIEGO DEVELOPMENT SERVICES DEPARTMENT 1222 FIRST AVENUE, MS 501 SAN DIEGO, CA 92101

PROJECT NO.: WBS #B-10088 PROJECT TITLE: North Crown Point Comfort Station

PROJECT LOCATION-SPECIFIC: Crown Point Shores at the terminus of Moorland Drive east of Crown Point Drive within Mission Bay Park.

PROJECT LOCATION-CITY/COUNTY: San Diego/San Diego

DESCRIPTION OF NATURE AND PURPOSE OF THE PROJECT: MAYOR APPROVAL for the removal and replacement of an existing 680 sq ft comfort station with a new 660 sq ft comfort station which meets the Americans with Disabilities Act (ADA) requirements. The new comfort station will be a single story masonry structure with a metal roof. Adjacent concrete walkways will also be removed and replaced in order to provide an accessible walkway to the comfort station. All construction will take place within the developed grass park area in the same location as the existing structure above fill material and would not result in any adverse effects on the environment.

<u>NAME OF PUBLIC AGENCY APPROVING PROJECT:</u> City of San Diego <u>NAME OF PERSON OR AGENCY CARRYING OUT PROJECT:</u> City of San Diego, E&CP Dept/Ali Darvishi, 600 B Street, Suite 800 (MS 908A), San Diego, CA 92101, 619 533-5328

EXEMPT STATUS: (CHECK ONE)

- () MINISTERIAL (SEC. 21080(b)(1); 15268);
- (x) CATEGORICAL EXEMPTION: 15301(L) EXISTING FACILITIES-DEMOLITION & 15302 (REPLACEMENT OR RECONSTRUCTION)
- () STATUTORY EXEMPTIONS:

<u>REASONS WHY PROJECT IS EXEMPT:</u> The City of San Diego conducted an Initial Study which determined that this project does not involve impacts to any resources under CEQA that would proclude the use of a categorical exemption. The potential presence of archaeological resources was analyzed and determined that the "Area of Potential Effect" is entirely within areas disturbed during dredging activities to create Mission Bay beginning as early as 1928 but mainly between 1946 and 1961. Results of a bathymetric survey of Mission Bay prepared by Merkel & Associates (October 2007) provided additional supporting documentation indicating the disturbed nature of the project area. The project will replace an existing comfort station with a new facility in the same location and with no expansion in size or use and involves only minimal alteration to the site for demolition of the existing structure and replacement of walkways with an ADA compliant accessible path for the facility. This project meets the criteria set forth in CEQA Section 15301 which allows for the demolition and removal of individual small structures and Section 15302 which allows for replacement or reconstruction of existing structures where the new structure will be located on the same site having substantially the same purpose and capacity involving negligible or no expansion of use; and where the exceptions listed in CEQA Section 15300.2 would not apply.

LEAD AGENCY CONTACT PERSON: MYRA HERRMANN

TELEPHONE: (619) 446-5372

IF FILED BY APPLICANT:

- 1. ATTACH CERTIFIED DOCUMENT OF EXEMPTION FINDING.
- HAS A NOTICE OF EXEMPTION BEEN FILED BY THE PUBLIC AGENCY APPROVING THE PROJECT?
 () YES
 () NO

IT IS HEREBY CERTIFIED THAT THE CITY OF SAN DIEGO HAS DETERMINED THE ABOVE ACTIVITY TO BE EXEMPT FROM

SENIOR PLANNER SIGNATURE/TITLE

CHECK ONE: (X) SIGNED BY LEAD AGENCY () SIGNED BY APPLICANT

DATE RECEIVED FOR FILING WITH COUNTY CLERK OR OPR:

DATE

March 3, 2011

APPENDIX C

LOCATION MAP



APPENDIX D

SAMPLE CITY INVOICE

Circof	City of San Diana Field Engineering Dir. 9485 Asra Drive SD CA 02123					Contractor's Name:					
Droject Name:			Contractor's Address:								
SADN	Project Name:					Contractor's Audress:					
City D	(WDSHORCE)										
City Purchase Order No.			Contract	or's Phone			Invoice No.				
Resider	ar Lugineer (KL):					Contractor's Fax #: Invoice Date:					
RE Pho	paef:	RE Far#:				Contact Name:			Billing Period:		
Item #	Item Description		Contra	ct Authorizat	ion	Previou:	Estimate	This E	stimate	Totals (o Date
		Unit	Qty	Price	Extension	%/QTY	Amount	% / QTY	Amount	%/QTY	Amount
1	2 Parallel 4" PVC C900	LF	1,380	\$34.00	\$46,920.00						
2	48" Primary Steel Casing	LF	500	\$1,000.00	\$500,000.00						
3	2 Parallel 12" Secondary Steel	LF	1,120	\$53.00	\$59,360.00						
4	Construction and Rehab of PS 49	LS	1	\$150,000.00	\$150,000.00						
5	Demo	LS	1	\$14,000.00	\$14,000.00						
6	Install 6" High Chain Link Fence	LS	1	\$5,600.00	\$5,600.00						
7	General Site Restoration	LS	i	\$3,700.00	\$3,700.00						
8	10" Gravity Sewer	LF	10	\$292.00	\$2,920.00						
9	4" Blow Off Values	EA	2	\$9,800.00	\$19,600,00						
10	Bonds	LS	1	\$16,000.00	\$16,000,00						
11	Field Orders	AL	1	\$0,000	\$80,000,00						
III	Field Order 1	LS	5,500	\$1.00	\$5 500 00						
11.2	Field Order 2	LS	7 500	\$1.00	\$7 500.00						
11.3	Field Order 3	1.5	10,000	\$1.00	\$10,000,00						
11.4	Field Order 4	LS	6 500	\$1.00	\$6 500.00						
12	Certified Payroll	1.5	1	\$1,400,00	\$1,400,00						
	CHANCE OF DEFES		-	44,466.66	22,100.00						
Change	Order 1	4 900					<u> </u>	<u> </u>	<u> </u>		
Trem: 1	4	4,070			\$11 250 00						
Tram 5	Dadnet Rid Itam 3	LE	120	\$53.00	(\$6.360.00)						
Change	e Order 2	160 480	110	-9.0.00	[90,000.00]						
Items 1	3				\$95,000,00						
Item 4	Deduct Bid Item 1	LF	380	-\$340.00	(\$12,920,00)						
Item 5-	Encrease bid Item 9	LF	8	\$9,800.00	\$78,400.00						
Change	e Order 3 (Close Out)	-121,500									
Item II	Deduct Bid Item 3		53	-500.00	(\$26,500.00)						
Item 2	Deduct Bid Item 4	LS		45,000.00	(\$45,000.00)						
Items 3	-9		1	-50,500.00	(\$50,500.00)						
	SUMMARY							Total This	s -	Total Billed	\$0.02
A. Original Contract Amount							Rei	tention and	Vor Escre	w Payment Sche	dule
B. Approved Change Order 1 Thru 3							Total Rete	ution Requ	ired as of	this billing	
C. Total Authorized Amount (A+B)							Previous F	Cotention U	Vithheld in	PO or in Escrow	
D. Total Billed to Date							Add1 Amt to Withhold in PO/Transfer in Escrew				
F. Jan. Tatal Patentian (SR) of Di-				<u> </u>			Australia Polycon to Contractor from DO/Reserve				
E. Less Total Revenues (176 of D)							ALLEY TO KE	usase to Co	Management I	on Poresciow:	
C. Reymant Das Lass Retention						Contract	anter Simologia en J Datas				
U P	ment Lore Less Retenitori					Committee	or arguatu	re and Dat			
III. NOD	namme Automized Amount							1	1	1	

APPENDIX E

NORTH CROWN POINT - NEW COMFORT STATION STORM WATER POLLUTION CONTROL PLAN

STORM WATER POLLUTION CONTROL PLAN

North Crown Point - New Comfort Station Mission Bay Park San Diego, CA 92109

This Document Shall Be Retained At the Construction Site Throughout the Duration of Construction of This Project.

TABLE OF CONTENTS

A. Storm Water Pollution Control Plan

- 1.0 Notice to Contractor
- 2.0 General Site Information
- 3.0 Erosion & Sediment Controls
- 4.0 Inspection and Maintenance
- 5.0 Materials Management Plan
- 6.0 Spill Prevention and Response Procedures
- 7.0 Control of Non-storm Water Discharges
- 8.0 Post-Construction BMPs
- B. Vicinity Map
- C. Erosion Control Plan(s) and Details
- D. Signatory Authorization Delegation Form
- E. Inspection Report
- F. SWPCP Modification Report
- G. Monthly Training Log
- H. Permit Eligibility Documentation

TAB A

1.0 Notice to the Contractor

The contractor shall give a two-week advance notice to the North Crown Point - New Comfort Station Representative prior to starting the work. The Contractor is responsible for implementing all storm water measures and erosion control practices required by this Storm Water Pollution Control Plan (SWPCP). Contractor participation in this program is mandatory.

The contractor is responsible for managing storm water discharges from the site in accordance with this SWPCP and any additional specifications provided by the owner. The contractor shall also provide a "qualified" inspector to perform the inspections. The contractor shall be responsible for any enforcement action taken by Federal, State, and/or Local authorities, including cost of fines, construction delays, and remedial actions resulting from the contractor's failure to comply with this SWPCP.

It shall be the responsibility of the contractor to make the necessary changes to the SWPCP when it is necessary.

The contractor shall maintain a copy of the SWPCP on-site at all times. The contractor shall insert all completed forms in their respective sections. In the event that an inspector should request review of the documents and/or inspection of the construction site, the contractor shall allow such review and inspection. The contractor shall agree to comply with any and all requests made by the inspector from the above listed agency. The contractor is also required to supply the owner will all original SWPCP documentation at the end of the project. The owner is to retain a copy of the SWPCP for a minimum of five (5) years.

2.0 General Site Information

A. Site Information

Project Name: North Crown Point - New Comfort Station Address: Mission Bay Park, San Diego, CA 92109 Latitude/Longitude: 32.78751, -117.23258 Total disturbed area: 0.14 Acres Expected duration of the project: 6 months Expected completion date for the project: TBD

The total acreage of the site is 0.14 acres. This project is not required to be permitted under the states general permit for storm water discharges from construction activities; however, the local agency does require that this SWPCP be implemented by the owner and his/her contractor(s). By providing this SWPCP document, the owner is requesting the contractor follow the guidelines, Best Management Practices, and good housekeeping procedures set forth in this SWPCP.

B. Existing & Proposed Drainage Conditions

The existing North Crown Point Comfort Station is located at the east end of Moorland Drive in the Crown Point area in Mission Bay Park in San Diego. The comfort station is surrounded by concrete flatwork, and grassy park areas. The comfort station is located approximately 250 feet east of the beach. The elevation of the comfort station is approximately 9 feet above mean sea level (MSL). Existing Site topography may be described as relatively flat. The total project area is approximately 0.14 acres. No storm drain system exists within the project perimeter.

This proposed project consists of the demolition of the existing comfort station and the construction of a new American Disability Association (ADA) compliant comfort station which will generally be within the same footprint as the existing comfort station. New hardscape and landscape will also be part of the project. No new underground utilities are proposed for this project.

The average annual rainfall for the San Diego area is about 10.77 inches.

C. Runoff Coefficients:

The existing pervious area for the 0.14-acre site is approximately 0.028 acres (20%); the existing impervious area is approximately 0.14 acres (80%). The runoff coefficient, C, for this site is calculated using accepted values for pervious and impervious land from the San Diego County Hydrology Manual. A C=0.35 will be used for pervious areas and a C=0.87 will be used for impervious areas:

The pre-developed weighted runoff coefficient C is determined as follows:

C= (Pervious Area * 0.35 + Impervious Area * 0.87)/ Total Area

C= (0.028 * 0.35 + 0.109* 0.87)/ 0.137= 0.76

The proposed pervious area for the 0.14-acre site is approximately 0.039 acres (29%); the proposed impervious area is approximately 0.14 acres (100%). The runoff coefficient, C, for this site is calculated using accepted values for pervious and impervious land from the San Diego County Hydrology Manual. A C=0.35 will be used for pervious areas and a C=0.87 will be used for impervious areas:

Post-construction weighted runoff coefficient C is determined as follows:

C= (Pervious Area * 0.30 + Impervious Area * 0.90)/ Total Area

C= (0.039 * 0.35 + 0.098 * 0.87)/ 0.137= 0.72

D. Existing Soil Conditions

The following site soils information has been provided according to the "Geotechnical Design Services North Crown Point Comfort Station Replacement, San Diego, California" prepared by Ninyo & Moore, dated October 8, 2010.

Regional Geologic Setting

"The project area is situated in the coastal foothill section of the Peninsular Ranges Geomorphic Province. This geomorphic province encompasses an area that extends approximately 900 miles from the Transverse Ranges and the Los Angeles Basin south to the southern tip of Baja California (Norris and Webb, 1990; Harden, 1998). The province varies in width from approximately 30 to 100 miles. In general, the province consists of rugged mountains underlain by Jurassic metavolcanic and metasedimentary rocks, and Cretaceous igneous rocks of the southern California batholith." (Page 3)

"The Peninsular Ranges Province is traversed by a group of sub-parallel faults and fault zones trending approximately northwest. Several of these faults, shown on Figure 3, are considered active faults. The Rose Canyon, Elsinore, San Jacinto, and San Andreas faults are active fault systems located east and northeast of the project area, and the Coronado Bank, San Diego Trough, and San Clemente faults are active faults located west of the project area. The Rose Canyon Fault, the nearest active fault, has been mapped approximately 1½ miles east of the project site. Major tectonic activity associated with these and other faults within this regional tectonic framework consists primarily of right-lateral, strike-slip movement. Further discussion of faulting relative to the site is provided in the Faulting and Seismicity section of this report." (Page 3)

Site Geology

"The earth unit encountered during our subsurface exploration consisted of artificial fill (Kennedy and Tan, 2008)." (Page 3)

Fill

"Fill materials were encountered in each of our borings from the ground surface and extending to the total depths explored (up to approximately 5 feet). As encountered, these materials generally consisted of brown and gray, damp to wet, loose to medium dense, silty sand." (Page 4)

Groundwater

"Groundwater was not encountered during our subsurface exploration. Based on the coastal location of the site and proximity to Mission Bay, groundwater should be anticipated near the sea level. Fluctuations in the groundwater level and perched conditions may occur due to variations in ground surface topography, subsurface geologic conditions and structure, rainfall, irrigation, tidal fluctuations, and other factors." (Page 4)

Conclusions

"The project site is underlain by fill. The existing fill is undocumented and not considered suitable for structural support in its current condition. Recommendations for the remedial grading of this material are presented in the following sections. Based on our subsurface exploration, excavation of the subsurface materials should generally be feasible with heavyduty excavation equipment in good working condition." (Page 6)

"Based on the coastal location of the site, groundwater should be anticipated at or slightly above the sea level. In addition, significant fluctuations in the groundwater level and perched conditions may occur due to variations in subsurface stratification, rainfall, irrigation practices, and other factors that may not have been evident at the time of our fieldwork. The contractor should be prepared to take appropriate measures to address the potential presence of groundwater in excavations, including dewatering. Materials excavated from below the groundwater table will be in a wet condition and will need to be moisture-conditioned and/or mixed before reuse for structural backfill." (Page 6)

E. Ultimate Point of Discharge & 303d Listed Waterways

The site drains into the Mission Bay. Mission Bay is a 303d listed waterway impacted for bacteria indicators, eutrophic and lead.

It is imperative that no sediment laden storm water leaves the construction site and enters the storm water conveyance.

The contractor shall provide secondary containment on all portable restrooms brought on site shall be responsible for maintaining all BMPs to prevent sediment laden storm water from leaving the site.

F. Hazardous/Toxic Wastes Storage and Spill History for the Site

To the best of the owner's knowledge, the project site does not contain any hazardous substances or toxic wastes.

3.0 Erosion & Sediment Controls

A. Erosion & Sediment Controls

For details of proposed Erosion and Sediment Control details, refer to Tab C.

Permanent Stabilization Practices for the site(s) will include:

- Land clearing activities shall occur only in areas where earthwork or other new construction activities will be performed and shall progress as earthwork is needed.
- o Permanent seeding of all unpaved areas using hydroseeding,

hydromulching, or similar techniques.

o Mulching (straw or wood) any exposed soil areas.

Temporary Stabilization Practices for the site(s) will include:

- o Scheduling to minimize possibilities for storm water contamination.
- Temporary seeding with a hydroseeding technique and irrigating as needed. A biodegradable bonded fiber matrix would also be acceptable.
- Installation of silt fence, gravel bags, and/or fiber rolls at construction limits, existing inlets, and within existing drainage channels.
- o Walkway sweeping to remove any sediment tracked off-site
- Continuous water application to disturbed soils during grading activities by water trucks.
- Soil proof rolling with heavy machinery to compact soil.

Permanent Structural Practices for the site(s) will include:

• Landscaping/Seeding

Temporary Structural Practices for the site(s) will include:

- Silt fence, gravel bag berms, fiber rolls along the limits of construction
- Entrance/ Outlet Tire Wash
- Designated Materials Storage/Laydown area(s)
- o Secondary containment on portable toilets
- Secondary containment on any fuel tanks (including generators). Note containment volume shall be a minimum of 110% the volume of the tank. (Note: 1ft³=7.48 gal). Secondary containment shall have an impervious liner.

Sequence of BMP Installation Onsite

Note that the activities and sequences shown herein are representational only, and they are presented here for the sole purpose of providing a general idea of work anticipated to be performed on the project. The actual means, methods, and sequence of activities to be used on the site are the sole responsibility of the contractor, who is responsible to revise and amend this list as necessary so that it accurately reflects the sequence and schedule of activities the contractor plans to use in conducting work on this project.

• Prior to the start of demolition or earth moving activities onsite, the contractor shall install all applicable perimeter controls (silt fence/gravel bags/fiber rolls) and the construction entrance/exit per the Erosion Control Plan(s). The contractor shall also install protection around any existing inlets, which are to remain within the immediate area of the

project and within the public right-of-way.

- Clearing and grubbing shall be done only in areas where earthwork will be performed and only in areas where construction is planned to commence within 14 days after the clearing and grubbing.
- Disturbed areas of the site where construction activity has ceased for more than 14 days shall be temporarily stabilized with hydroseeding, hydromulching, or with a biodegradable bonded fiber matrix.
- Install inlet/outlet protection at the locations of all grate inlets, curb inlets, and at the ends of all exposed storm drain pipe.
- Prior to the installation of hardscape, the contractor shall familiarize himself with the BMPs related to these activities and implement applicable BMPs as needed.
- Begin final stabilization with landscaping, mulching, and seeding as the project progresses and final grading is complete.
- Remove silt fence/gravel bags only after stabilization of all surfaces is complete.
- Remove temporary construction entrance/exit last and pave or landscape as required by the plans.

Emergency Erosion & Sediment Control Materials

During the non-rainy season, the discharger is responsible for ensuring that adequate sediment control materials are available onsite to control sediment discharges at the downgrade perimeter and operational inlets in the event of a predicted storm.

Supplemental Pre-Rain Event Activities

Prior to a predicted rainfall event, the contractor shall walk the site and perform a pre-storm inspection with the form included under Tab E. Any non-compliant items found shall be repaired immediately and appropriately. Any soil stock piles shall have appropriate perimeter protection, such as silt fence. Catch basins shall be protected with gravel bag barriers or equivalent. The site shall be checked for hazardous products such as, but not limited to, paint cans and fuel tanks. All containers shall be protected and any spills or leaks shall be appropriately cleaned up prior to the start of the storm. Refer to the Materials Management Plan and Spill Prevention & Response Procedures sections of this SWPCP for additional information on protecting storm water from coming into contact with hazardous materials on site. The contractor is responsible for inspecting the site once every 24 hours during extended rainfall events.

B. Other Controls

Off-site Vehicle Tracking of Sediments

A stabilized construction exit/ outlet tire wash will be provided to help reduce vehicle tracking of sediments. The paved streets adjacent to the site entrance will be inspected daily and swept as necessary to remove any excess mud, dirt, or rock tracked from the site. Dump trucks hauling material from the construction site will be covered with a tarpaulin. The contractor is responsible for seeing that these procedures are followed.

Excavation Spoils Materials

Excavation spoils materials are expected to be generated during the excavation and/or demolition of the existing building. These materials must be properly managed to prevent them from contributing to storm water discharges. The materials generated from the development will be managed by the following methods:

- o Mixed with on-site fill
- o Hauled off-site to an appropriately permitted facility

Dust Control

Minimizing wind erosion and controlling dust will be accomplished by one or more of the following methods:

- Frequent watering by a water truck
- Covering finished slopes with hydroseeding, bonded fiber matrix, landscaping with mulching as needed
- o Proof rolling of exposed soils to provide compaction of soils

4.0 Inspection and Maintenance Procedures

The following inspection and maintenance practices will be used to maintain erosion and sediment controls and stabilization measures:

- 1. All erosion control measures will be inspected once every seven (7) days and prestorm, post-storm and once every 24 hours during extended storm events.
- 2. All measures will be maintained in good working order; if repairs or other measures are found to be necessary, they will be initiated within 24 hours of the inspection report.
- 3. Built up sediment will be removed from silt fence when it has reached one-third the height of the fence.

- 4. Silt fences will be inspected for depth of sediment, tears, etc., to see if the fabric is securely attached to the fence posts/wood stakes, and to see that the fence posts/wood stakes are securely in the ground.
- 5. Temporary and permanent seeding and all other stabilization measures will be inspected for bare spots, washouts, and healthy growth.
- 6. A maintenance inspection report will be made after each inspection. Copies of the report forms to be completed by the inspector are included in this SWPCP.
- 7. Personnel selected for the inspection and maintenance responsibilities will receive training from the jobsite superintendent. They will be trained in all the inspection and maintenance practices necessary for keeping the erosion and sediment controls that are used onsite in good working order. They will also be trained in the completion of, initiation of actions required by, and the filing of the inspection forms. Documentation of this personnel training will be kept onsite in the SWPCP.
- 8. Disturbed areas and materials storage areas will be inspected for evidence of or potential for pollutants entering the storm water.
- 9. Report oil or chemical spills to the USEPA National Response Center at 1-800-424-8802 within 24 hours of any noncompliance that will endanger public health or the environment. Follow up with a written report within five (5) days of the noncompliance event. The following events require 24 hour reporting:
 - Any unanticipated bypass which exceeds any effluent limitation in the permit
 - Any upset which exceeds any effluent limitation in the permit
 - A violation of maximum daily discharge limitation for any of the pollutants listed by the EPA in the permit.
- 10. Releases of hazardous substances or oil in excess of reportable quantities (as established per 40 CFR 110, 40, CFR 117 or 40 CFR 302) must be reported.

11. The contractor/jobsite superintendent shall keep a working copy of the Erosion Control Plan(s) hanging on a wall in the jobsite trailer. He/She will be responsible for documenting the following items on this "working" Erosion Control Plan(s):

Location of:

- o Jobsite trailer
- Solid waste containers/dumpsters
- o Portable restrooms
- Material laydown area(s)
- o Storage containers
- Vehicle service area(s)

• Concrete truck washout area(s)

Note: Should any of the above items move throughout the duration of the project, the date of initial installation, date of movement & new location should all be documented on the plan.

Changes to and Installation dates for:

- Construction entrance/exit or entrance/outlet tire wash
- o Silt fence, gravel bags, or fiber roll locations
- Existing inlet protection
- Proposed inlet protection
- Temporary/Permanent seeding and/or landscaping

Note: Changes to any of the above listed items shall have a corresponding SWPCP Modification Form filled out in the SWPCP ledger. Refer to Tab F for this form.

Once any erosion control measures are installed, the maintenance and inspection procedures above shall begin. The contractor should be aware that the inspection forms become an integral part of the SWPCP and shall be made readily available to the government inspection officials, the owner's engineer, and the owner for review upon request during visits to the project site.

A qualified inspector is someone trained in selecting, installing and inspecting construction site erosion and sediment control best management practices. They should also have read and understood all portions of this SWPCP. Training may have been provided by the civil engineer, the inspector's employer, and/or other formal or informal training class. Note on the Inspection Form, the inspector's qualifications will include all training classes. Job title, unless he/she is a registered civil engineer, is not sufficient.

The individual(s) responsible for pre-storm, post-storm, and storm event BMP inspections, and the qualified person(s) assigned responsibility to ensure full compliance with the permit and implementation of all elements of the SWPCP, including the preparation of the annual compliance evaluation and the elimination of all unauthorized discharges are:

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Company:	• · · · ·
Responsibilities:	
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Phone #:	Emergency Phone #:
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5.0 Materials Management Plan

A. Materials Covered

The following materials or substances are expected to be present on the site(s) during construction (Note: This list is not all-inclusive and the Materials Management Plan must be modified to address additional materials used at the site. Contact the owner's engineer.):

Concrete/Additives/Wastes	Cleaning solvents
Detergents	Petroleum base products
Paints/Solvents	Pesticides
Acids	Fertilizers
Solid and Construction Wastes	Sanitary Wastes
Soil stabilization additives	Onsite/Off Site Vehicles & Equipment

E. Material Management Practices

The following are material management practices that will be used to reduce the risk of spills or other accidental exposure of materials and substances to storm water runoff. The jobsite superintendent will be responsible for ensuring that these procedures are followed:

1. Good Housekeeping

The following good housekeeping practices will be followed onsite during the construction project:

- An effort will be made to store only enough products required to do the job.
- All materials stored onsite will be stored in a neat, orderly manner and, if possible, under a roof or in a containment area. At minimum, all containers will be stored with their lids on when not in use. Drip pans shall be provided under all dispensers.
- Products will be kept in their original containers with the original manufacturer's label in legible condition.
- Substances will not be mixed with one another unless recommended by the manufacturer.
- Whenever possible, all of the product will be used up before disposing of the container.
- Manufacturer's recommendations for proper use and disposal will be followed.
- The jobsite superintendent will be responsible for daily inspections to ensure proper use and disposal of materials.
- 2. Hazardous Products

These practices will be used to reduce the risks associated with hazardous materials. Material Safety Data Sheets (MSDSs) for each substance with hazardous properties that is used on the jobsite(s) will be obtained and used for the proper management of potential wastes that may result from these products. An MSDS will be posted in the immediate area where such product is stored and/or used and another copy of each MSDS will be maintained in a file at the jobsite construction trailer office. Each employee who must handle a substance with hazardous properties will be instructed on the use of MSDS sheets and the specific information in the applicable MSDS for the product he/she is using, particularly regarding spill control techniques.

- Products will be kept in original containers with the original labels in legible condition.
- Original labels and MSDSs will be produced and used for each material.
- If surplus product must be disposed of, manufacturer's or local/state/federal recommended methods for proper disposal will be followed.
- 3. Hazardous Wastes

All hazardous waste materials will be disposed of by the contractor in the manner specified by local, state, and/or federal regulations and by the manufacturer of such products. Site personnel will be instructed in these practices by the jobsite superintendent, who will also be responsible for seeing that these practices are followed. Note that the State of California requires a specially licensed contractor be used for appropriate removal and disposal of hazardous materials. The contractor shall be sure that he or his subcontractors are appropriately licensed. Specific requirements for hazardous material handling and waste disposal are addressed in the project specifications.

4. Product Specific Practices

The following product specific practices will be followed on the jobsite.

o Petroleum Products

All onsite vehicles will be monitored for leaks and receive regular preventative maintenance to reduce the chance of leakage. Petroleum products will be stored in tightly sealed containers which are clearly labeled. Any petroleum storage tanks used onsite will have a dike or berm containment structure constructed around it to contain any spills which may occur (containment volume to be 110% of volume stored). The dike or bermed area shall be lined with an impervious material such as a heavy duty plastic sheet. Drip pans shall be provided for all dispensers. Any asphalt substances used on site will be applied according to the manufacturer's recommendations.

o Fertilizers

Fertilizers will be applied only in the minimum amounts recommended by the manufacturer. Once applied, fertilizer will be worked into the soil to limit exposure to storm water. Storage will be in a covered shed. The contents of any partially used bags of fertilizer will be transferred to a sealable plastic bin to avoid spills. The bin shall be labeled appropriately.

o Paints, Paint Solvents, and Cleaning Solvents

All containers will be tightly sealed and stored when not in use. Excess paint and solvents will not be discharged to the storm drain system but will be properly disposed of according to manufacturer's instructions and local/state/federal regulations.

o Concrete Wastes

Concrete trucks will be allowed to wash out or discharge surplus concrete or drum wash water on the site, but only in either (1) specifically designated diked areas which have been prepared to prevent contact between the concrete and/or washout and storm water which will be discharged from the site or (2) in locations where waste concrete can be poured into forms to make riprap or other useful concrete products.

The hardened residue from the concrete washout diked areas will be disposed of in the same manner as other non-hazardous construction waste materials or may be broken up and used on site as deemed appropriate by the contractor and geotechnical engineer. The jobsite superintendent will be responsible for seeing that these procedures are followed.

All concrete washout areas will be located in an area where the likelihood of the area contributing to storm water discharge is negligible. If required, additional BMPs must be implemented to prevent concrete wastes from contributing to storm water discharges. The location of the concrete washout area(s) must be identified, by the contractor/jobsite

superintendent, on the jobsite copy of the Erosion Control Plan(s) in this SWPCP.

o Solid and Construction Wastes

All waste materials will be collected and stored in a securely lidded metal dumpster rented from a local waste management company, which must be a solid waste company licensed to do business in the City of San Diego, in the State of California. The dumpster will comply with all local and state solid waste management regulations.

All trash and construction debris from the site will be deposited in the dumpster. The dumpster will be emptied a minimum of twice per week or more if necessary, and the trash will be hauled to a landfill approved by the City of San Diego, in the State of California. No construction waste materials will be buried onsite. All personnel will be instructed regarding the correct procedures for waste disposal. Additional specific requirements are addressed in the project specifications.

All waste dumpsters and roll-off containers will be located in an area where the likelihood of the containers contributing to storm water discharges is negligible. If required, additional BMPs such as gravel bags around the base must be implemented to prevent wastes from contributing to storm water discharges. The location of the waste dumpsters must be identified on the Erosion Control Plan(s) on the jobsite copy of this SWPCP, by the contractor/jobsite superintendent, at the time these items are placed the project site(s).

o Sanitary Wastes

All sanitary waste will be collected from the portable units a minimum of one time per week, by a licensed portable facility provider, in compliance with local and state regulations.

All sanitary waste units will be located in an area where the likelihood of the unit contributing to storm water discharges is negligible. If required, additional BMPs must be implemented, such as containment trays (provided by the rental company) or special containment created with 2"x4" lumber, impervious plastic, and gravel. Contact the civil engineer for a detail, if needed. The location of the sanitary waste units must be identified on the jobsite copy of the Erosion Control Plan(s), in this SWPCP, by the contractor/jobsite superintendent.

o Contaminated Soils

Any contaminated soils (resulting from spills of materials with hazardous properties) which may result from construction activities will be contained and cleaned up immediately in accordance with the procedures given in the Materials Management Plan and in accordance with applicable state and federal regulations.

5. On-site/Off-Site Vehicles & Equipment

The following vehicles and equipment are expected to be present onsite during construction:

Backhoes	Maintainer
Boom lifts	Tractors
Cranes	Trucks
Dozers	Rollers
Excavators	Scrapers
Forklifts	Graders
Loaders	Generators

A stabilized construction exit or entrance/outlet tire wash will be provided to help reduce vehicle tracking of sediments. The paved roads adjacent to the site entrance will be inspected daily and swept as necessary to remove any excess mud, dirt, or rock tracked from the site. Dump trucks hauling material from the construction site will be covered with a tarpaulin. The jobsite superintendent will be responsible for seeing that these procedures are followed. Refer to Petroleum Products section above for additional BMPs associated with vehicles and equipment.

6.0 Spill Prevention and Response Procedures

The contractor will train personnel in the proper handling and clean up of spilled materials. No spilled hazardous materials or hazardous wastes will be allowed to come in contact with storm water discharges. If such contact occurs, the contaminated storm water discharge will be contained onsite until appropriate measures in compliance with state and federal regulations are taken to dispose of such contaminated storm water. It shall be the responsibility of the jobsite superintendent to properly train all personnel in spill prevention and clean up procedures.

- A. In order to minimize the potential for a spill of hazardous materials to come into contact with storm water, the following steps will be implemented:
 - 1) All materials with hazardous properties (such as pesticides, petroleum products, fertilizers, detergents, construction chemicals, acids, paints,

paint solvents, cleaning solvents, additives for soil stabilization, concrete curing compounds and additives, etc.) will be stored in a secure location, with their lids on, preferably under cover, when not in use.

- 2) The minimum practical quantity of all such materials will be kept on the jobsite.
- 3) A spill control and containment kit (containing for example: absorbent materials, acid neutralizing powder, brooms, dust pans, mops, rags, gloves, goggles, plastic and metal trash containers, etc.) will be provided and maintained at the storage site.
- 4) Manufacturer's recommended methods for spill cleanup will be clearly posted and site personnel will be trained regarding these procedures and the location of the information and cleanup supplies.
- B. In the event of a spill, the following procedures should be followed:
 - 1) All spills will be cleaned up immediately after discovery.
 - 2) The spill area will be kept well ventilated and personnel will wear appropriate protective clothing to prevent injury from contact with the hazardous substances.
 - 3) The project manager and the Engineer of Record will be notified immediately. However, if it is a spill of toxic or hazardous materials, in amounts that exceed Reportable Quantities of certain substances (Refer to Section 4.0 Item 11 for code sections), it should immediately be reported to the USEPA National Response Center at 1-800-424-8802. Local, state, and/or federal government agencies should otherwise be notified accordingly, regardless of the size of the spill.
 - 4) If the spill exceeds a Reportable Quantity, the SWPCP must be modified within seven (7) calendar days of knowledge of the discharge to provide a description of the release, the circumstances leading to the release, and the date of the release. The plans must identify measures to prevent the recurrence of such releases and to respond to such releases. A form has been provided in this SWPCP for this requirement.
- C. The jobsite superintendent will be the spill prevention and response coordinator. He will designate the individuals who will receive spill prevention and response training. These individuals will each become responsible for a particular phase of prevention and response. The names of these personnel will be posted in the material storage area and in the jobsite trailer.

7.0 Control of Non-Storm Water Discharges

Certain types of non-storm water discharges have the potential to be released from the site. These types of discharges will be allowed under the conditions that no pollutants will be allowed to come in contact with the water prior to or after its discharge. The control measures, which have been outlined previously in this SWPCP, will be strictly

followed to ensure that no contamination of these non-storm water discharges takes place. It is prohibited to discharge sediment laden water, which will cause or contribute to an exceedance of the applicable water quality standards for the basin the project is located within, from a dewatering site or sediment basin into any receiving water or storm drain without filtration or equivalent treatment.

Authorized non-storm water discharges may include those from de-chlorinated potable water sources such as:

- Fire hydrant flushing,
- o Irrigation of vegetative erosion control measures,
- Pipe flushing and testing,
- Water to control dust,
- o Uncontaminated ground water from dewatering, and
- Other discharges not subject to a separate general NPDES permit adopted by the San Diego RWQCB.

8.0 Post-Construction Storm Water Management

A. Final Stabilization

All disturbed areas of the construction site must be stabilized.

- All soil disturbing activities are complete.
- Temporary erosion and sediment control measures have been removed or will be removed at the appropriate time.
- All areas of the construction site not otherwise covered by permanent pavement or structure have been stabilized with a uniform perennial vegetative cover with a density of 70% or equivalent measures have been employed.
- B. Runoff from Sidewalk/ Walkway Areas

Storm water runoff from sildewalks/ walkways will be collected in curb and gutter and transported to curb inlets prior to exiting the site. Storm water from driveways will not come into contact with non-stabilized soil once paving has been completed. Runoff from sidewalks will enter into stabilized landscape areas. The owner and/or his/her agent shall be responsible for the inspection of sprinkler heads for over spray and request maintenance should they be found to be malfunctioning.

C. Landscaping

Landscaping shall be well maintained. Landscape maintenance crews shall be instructed such that debris from the site is not swept, blown or washed into the storm drains inlets. Any areas where landscaping has died or failed to grow in shall be replanted and

appropriately stabilized. The owner and/or his/her agent will be responsible for regular inspection of the landscaping.

D. Interior Drains, Inlets, and Sinks

All interior drains, inlets and sinks shall be connected to the sanitary sewer system to prevent contamination of storm water in the storm drain system. The sanitary sewer facilities shall be maintained to prevent any spills from occurring.

E. Roof Runoff

Roof runoff will be collected by gutters (or equivalent), directed into downspouts, and allowed to sheet flowed to stabilized landscape areas for infiltration to groundwater. Roof drains shall be regularly maintained to prevent clogging.

8.1 Inspection and Maintenance of Post-construction BMPs

A. Landscape Area Maintenance

Landscape area maintenance will be set up as required in the project specifications. The landscape areas shall also be checked for erosion, and if erosion is encountered, arrangements shall be made to have the area re-landscaped and stabilized as needed.

TAB B



North Crown Point Comfort Station

TAB C





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NOTE: NO POTENTIAL RUN-OFF FROM OFF-SITE AREAS IS ANTICIPATED FOR THIS PROJECT.

 THE CONTRACTOR SHALL OBTAIN, READ, AND IMPLEMENT ALL PORTIONS OF THE STORM WATER POLLUTION PREVENTION PLAN (SWPPP) or STORM WATER POLLUTION CONTROL PLAN (SWPCP). THE CONTRACTOR IS RESPONSIBLE FOR DOING WEEKLY, PRE-STORM, MID-STORM, AND POST-STORM INSPECTIONS IN ACCORDANCE WITH THE SWPPP/SWPCP. THE CONTRACTOR IS RESPONSIBLE FOR TRAINING SUBCONTRACTORS AT LEAST ONCE A MONTH OR AS NEW SUBCONTRACTORS MOBILIZE ONSITE. TRAINING SHALL BE RECORDED IN THE SWPPP/SWPCP. PRIOR TO THE START OF DEMOLITION OR EARTHMOVING ACTIVITIES, THE CONTRACTOR SHALL INSTALL ALL PERIMETER CONTROLS AND THE CONSTRUCTION ENTRACTOR SHALL INSTALL ALL PROTECTION AROUND ANY EXISTING INLETS WITHIN THE PROJECT AREA AND PUBLIC RIGHT-OF-WAY. DURING THE NON-RAINY SEASON, THE CONTRACTOR SHALL STORE ADEQUATE SEDIMENT CONTROL MATERIALS ONSITE TO CONTROL DISCHARGES AT THE DOWNGRADE PERIMETER AND OPERATIONAL INLETS IN THE EVENT OF A PREDICTED STORM. EQUIPMENT AND WORKERS SHALL BE AVAILABLE FOR EMERGENCY WORK AT ALL TIMES DURING THE RAINY SEASON. ALL NECESSARY MATERIALS SHALL BE STOCKPILED ONSITE AT CONVENIENT LOCATIONS TO FACILITATE THE RAPID INSTALLATION/CONSTRUCTION OF TEMPORARY EROSION CONTROL MEASURES WHEN RAIN IS IMMINENT. CLEARING AND GRUBING SHALL BE DONE ONLY IN AREAS WHERE EARTHWORK WHEN RAIN IS IMMINENT. CLEARING AND GRUBING SHALL BE DONE ONLY IN AREAS WHERE EARTHWORK WHEN RAIN IS IMMINENT. DISTURBED AREAS OF THE SITE WHERE CONSTRUCTION ACTIVITIES HAVE CEASED FOR MORE THAN 14 DAYS AFTER CLEARING AND GRUBBING OPERATIONS HAVE CEASED. DISTURBED AREAS OF THE SITE WHERE CONSTRUCTION ACTIVITIES HAVE CEASED FOR MORE THAN 14 DAYS AFTER CLEARING AND GRUBBING OPERATIONS HAVE CEASED. DISTURBED AREAS OF THE SITE WHERE CONSTRUCTION ACTIVITIES HAVE CEASED FOR MORE THAN 14 DAYS AFTER CLEARING AND GRUBBING OPERATIONS HAVE CEASED. DISTURBED AREAS OF THE SITE WHERE CONSTRUCTION ACTIVITIES HAVE CEASED FOR MORE T		EROSION CONTROL NOTES
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	LEGEND						
	<u>SYMBOL</u>	DESCRIPTION	<u>BMP*</u>	LOCATION			
$\langle 1 \rangle$	88	SILT FENCE	SE-1	AS INDICATED, AND AT TOES OF ALL SLOPES GREATER THAN 15 FT. HIGH			
2		GRAVEL BAGS	SE-6	AS INDICATED, AND AT TOPS AND TOES OF ALL SLOPES, INCLUDING TEMPORARY SLOPES			
$\langle 3 \rangle$	F R	FIBER ROLLS	SE-5	AS INDICATED, AND AT TOPS AND TOES OF ALL SLOPES, INCLUDING TEMPORARY SLOPES			
4	$\rightarrow \rightarrow \rightarrow$	TOP AND TOE OF SLOPE DIVERSION DITCH	EC-9	AS INDICATED, AND AS REQUIRED TO DIRECT RUNOFF TOWARDS STORM DRAIN			
5		ENTRANCE/ EXIT TIRE WASH	TC-3	AS INDICATED, AND AT ANY OTHER ACCESS POINTS FOR CONSTRUCTION VEHICLES			
TYP.		STORM DRAIN INLET PROTECTION	SE-10	ALL STORM DRAIN INLETS			

*REFERS TO CALIFORNIA STORMWATER BMP HANDBOOK - CONSTRUCTION (NOVEMBER 2009)

		NOTE: STAGING AND LA RESIDENT ENGINE AREAS; 1. LOCATION C 2. CONSTRUCT 3. EQUIPMENT 4. CLEANING A 5. SPILL CONT 6. CONTAINMEN 7. SPILL OR N 8. POTABLE TO 9. CONCRETE	YDOWN AREA ER. THIS SHA ON MATERIAL AND VEHICLE ND MAINTENA ROL. IT MATERIALS ON STORMWA DILET. FRUCK WASH.	TO BE ALL INCL WATER S LOADIN STORAG NCE OF S. TER DISG	DETERM LUDE FO STORAGE IG AND GE. CONST	IINED BY LLOWING UNLOADIN RUCTION S.	THE CITY MINIMUM NG. EQUIPMENT.
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Scheduling



Description and Purpose

Scheduling is the development of a written plan that includes sequencing of construction activities and the implementation of BMPs such as erosion control and sediment control while taking local climate (rainfall, wind, etc.) into consideration. The purpose is to reduce the amount and duration of soil exposed to erosion by wind, rain, runoff, and vehicle tracking, and to perform the construction activities and control practices in accordance with the planned schedule.

Suitable Applications

Proper sequencing of construction activities to reduce erosion potential should be incorporated into the schedule of every construction project especially during rainy season. Use of other, more costly yet less effective, erosion and sediment control BMPs may often be reduced through proper construction sequencing.

Limitations

 Environmental constraints such as nesting season prohibitions reduce the full capabilities of this BMP.

Implementation

- Avoid rainy periods. Schedule major grading operations during dry months when practical. Allow enough time before rainfall begins to stabilize the soil with vegetation or physical means or to install sediment trapping devices.
- Plan the project and develop a schedule showing each phase

Categories

EC	Erosion Control	\checkmark	
SE	Sediment Control	×	
тс	Tracking Control	×	
WE	Wind Erosion Control	×	
NS	Non-Stormwater		
	Management Control		
WM	Waste Management and Materials Pollution Control		
Legend:			
☑ F	Primary Objective		

Secondary Objective

Targeted Constituents

Sediment	\checkmark
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None



of construction. Clearly show how the rainy season relates to soil disturbing and restabilization activities. Incorporate the construction schedule into the SWPPP.

- Include on the schedule, details on the rainy season implementation and deployment of:
 - Erosion control BMPs
 - Sediment control BMPs
 - Tracking control BMPs
 - Wind erosion control BMPs
 - Non-stormwater BMPs
 - Waste management and materials pollution control BMPs
- Include dates for activities that may require non-stormwater discharges such as dewatering, sawcutting, grinding, drilling, boring, crushing, blasting, painting, hydro-demolition, mortar mixing, pavement cleaning, etc.
- Work out the sequencing and timetable for the start and completion of each item such as site clearing and grubbing, grading, excavation, paving, foundation pouring utilities installation, etc., to minimize the active construction area during the rainy season.
 - Sequence trenching activities so that most open portions are closed before new trenching begins.
 - Incorporate staged seeding and re-vegetation of graded slopes as work progresses.
 - Schedule establishment of permanent vegetation during appropriate planting time for specified vegetation.
- Non-active areas should be stabilized as soon as practical after the cessation of soil disturbing activities or one day prior to the onset of precipitation.
- Monitor the weather forecast for rainfall.
- When rainfall is predicted, adjust the construction schedule to allow the implementation of soil stabilization and sediment treatment controls on all disturbed areas prior to the onset of rain.
- Be prepared year round to deploy erosion control and sediment control BMPs. Erosion may be caused during dry seasons by un-seasonal rainfall, wind, and vehicle tracking. Keep the site stabilized year round, and retain and maintain rainy season sediment trapping devices in operational condition.
- Apply permanent erosion control to areas deemed substantially complete during the project's defined seeding window.

Costs

Construction scheduling to reduce erosion may increase other construction costs due to reduced economies of scale in performing site grading. The cost effectiveness of scheduling techniques should be compared with the other less effective erosion and sedimentation controls to achieve a cost effective balance.

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Inspection and Maintenance

- Verify that work is progressing in accordance with the schedule. If progress deviates, take corrective actions.
- Amend the schedule when changes are warranted.
- Amend the schedule prior to the rainy season to show updated information on the deployment and implementation of construction site BMPs.

References

Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities Developing Pollution Prevention Plans and Best Management Practices (EPA 832-R-92-005), U.S. Environmental Protection Agency, Office of Water, September 1992.



Description and Purpose

Soil binding consists of application and maintenance of a soil stabilizer to exposed soil surfaces. Soil binders are materials applied to the soil surface to temporarily prevent water and wind induced erosion of exposed soils on construction sites.

Suitable Applications

Soil binders are typically applied to disturbed areas requiring temporary protection. Because soil binders, when used as a stand-alone practice, can often be incorporated into the soil, they are a good alternative to mulches in areas where grading activities will soon resume. Soil binders are commonly used in the following areas:

- Rough graded soils that will be inactive for a short period of time
- Soil stockpiles
- Temporary haul roads prior to placement of crushed rock
- Compacted soil road base
- Construction staging, materials storage, and layout areas

Limitations

Soil binders are temporary in nature and may need reapplication.

Categories

EC	Erosion Control	$\overline{\mathbf{A}}$
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	×
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	
Leg	end:	
\checkmark	Primary Category	
×	Secondary Category	

Targeted Constituents

Sediment	\checkmark
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

- EC-3 Hydraulic Mulch EC-4 Hydroseeding EC-6 Straw Mulch EC-7 Geotextiles and Mats
- EC-8 Wood Mulching



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- Soil binders require a minimum curing time until fully effective, as prescribed by the manufacturer. Curing time may be 24 hours or longer. Soil binders may need reapplication after a storm event.
- Soil binders will generally experience spot failures during heavy rainfall events. If runoff
 penetrates the soil at the top of a slope treated with a soil binder, it is likely that the runoff
 will undercut the stabilized soil layer and discharge at a point further down slope.
- Plant-material-based soil binders do not generally hold up to pedestrian or vehicular traffic across treated areas as well as polymeric emulsion blends or cementitious-based binders.
- Soil binders may not sufficiently penetrate compacted soils.
- Some soil binders are soil texture specific in terms of their effectiveness. For example, polyacrylamides (PAMs) work very well on silt and clayey soils but their performance decreases dramatically in sandy soils.
- Some soil binders may not perform well with low relative humidity. Under rainy conditions, some agents may become slippery or leach out of the soil.
- Soil binders may not cure if low temperatures occur within 24 hours of application.
- The water quality impacts of some chemical soil binders are relatively unknown and some may have water quality impacts due to their chemical makeup.

Implementation

General Considerations

- Soil binders should conform to local municipality specifications and requirements.
- Site soil types will dictate appropriate soil binders to be used.
- A soil binder must be environmentally benign (non-toxic to plant and animal life), easy to apply, easy to maintain, economical, and should not stain paved or painted surfaces. Soil binders should not pollute stormwater when cured. Obtain a Material Safety Data Sheet (MSDS) from the manufacturer to ensure non-toxicity.
- Stormwater runoff from PAM treated soils should pass through one of the following sediment control BMP prior to discharging to surface waters.
 - When the total drainage area is greater than or equal to 5 acres, PAM treated areas should drain to a sediment basin.
 - Areas less than 5 acres should drain to sediment control BMPs, such as a sediment trap, or a series of check dams. The total number of check dams used should be maximized to achieve the greatest amount of settlement of sediment prior to discharging from the site. Each check dam should be spaced evenly in the drainage channel through which stormwater flows are discharged off site.
- Performance of soil binders depends on temperature, humidity, and traffic across treated areas.

- Avoid over spray onto roads, sidewalks, drainage channels, existing vegetation, etc.
- Additional guidance on the comparison and selection of temporary slope stabilization methods is provided in Appendix F of the Handbook.

Selecting a Soil Binder

Properties of common soil binders used for erosion control are provided on Table 1 at the end of this Fact Sheet. Use Table 1 to select an appropriate soil binder. Refer to WE-1, Wind Erosion Control, for dust control soil binders.

Factors to consider when selecting a soil binder include the following:

- Suitability to situation Consider where the soil binder will be applied, if it needs a high
 resistance to leaching or abrasion, and whether it needs to be compatible with any existing
 vegetation. Determine the length of time soil stabilization will be needed, and if the soil
 binder will be placed in an area where it will degrade rapidly. In general, slope steepness is
 not a discriminating factor for the listed soil binders.
- Soil types and surface materials Fines and moisture content are key properties of surface materials. Consider a soil binder's ability to penetrate, likelihood of leaching, and ability to form a surface crust on the surface materials.
- Frequency of application The frequency of application is related to the functional longevity of the binder, which can be affected by subgrade conditions, surface type, climate, and maintenance schedule.
- Frequent applications could lead to high costs. Application frequency may be minimized if the soil binder has good penetration, low evaporation, and good longevity. Consider also that frequent application will require frequent equipment clean up.

Plant-Material-Based (Short Lived, <6 months) Binders

<u>Guar:</u> Guar is a non-toxic, biodegradable, natural galactomannan-based hydrocolloid treated with dispersant agents for easy field mixing. It should be mixed with water at the rate of 11 to 15 lb per 1,000 gallons. Recommended minimum application rates are as follows:

Slope (H:V):	Flat	4:1	3:1	2:1	1:1
lb/acre:	40	45	50	60	70

Application Rates for Guar Soil Stabilizer

<u>Psyllium</u>: Psyllium is composed of the finely ground muciloid coating of plantago seeds that is applied as a dry powder or in a wet slurry to the surface of the soil. It dries to form a firm but rewettable membrane that binds soil particles together, but permits germination and growth of seed. Psyllium requires 12 to 18 hours drying time. Application rates should be from 80 to 200 lb/acre, with enough water in solution to allow for a uniform slurry flow.

<u>Starch:</u> Starch is non-ionic, cold water soluble (pre-gelatinized) granular cornstarch. The material is mixed with water and applied at the rate of 150 lb/acre. Approximate drying time is 9 to 12 hours.

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Plant-Material-Based (Long Lived, 6-12 months) Binders

<u>Pitch and Rosin Emulsion:</u> Generally, a non-ionic pitch and rosin emulsion has a minimum solids content of 48%. The rosin should be a minimum of 26% of the total solids content. The soil stabilizer should be non-corrosive, water dilutable emulsion that upon application cures to a water insoluble binding and cementing agent. For soil erosion control applications, the emulsion is diluted and should be applied as follows:

- For clayey soil: 5 parts water to 1 part emulsion
- For sandy soil: 10 parts water to 1 part emulsion

Application can be by water truck or hydraulic seeder with the emulsion and product mixture applied at the rate specified by the manufacturer.

Polymeric Emulsion Blend Binders

<u>Acrylic Copolymers and Polymers:</u> Polymeric soil stabilizers should consist of a liquid or solid polymer or copolymer with an acrylic base that contains a minimum of 55% solids. The polymeric compound should be handled and mixed in a manner that will not cause foaming or should contain an anti-foaming agent. The polymeric emulsion should not exceed its shelf life or expiration date; manufacturers should provide the expiration date. Polymeric soil stabilizer should be readily miscible in water, non-injurious to seed or animal life, non-flammable, should provide surface soil stabilization for various soil types without totally inhibiting water infiltration, and should not re-emulsify when cured. The applied compound typically requires 12 to 24 hours drying time. Liquid copolymer should be diluted at a rate of 10 parts water to 1 part polymer and the mixture applied to soil at a rate of 1,175 gallons/acre.

<u>Liquid Polymers of Methacrylates and Acrylates:</u> This material consists of a tackifier/sealer that is a liquid polymer of methacrylates and acrylates. It is an aqueous 100% acrylic emulsion blend of 40% solids by volume that is free from styrene, acetate, vinyl, ethoxylated surfactants or silicates. For soil stabilization applications, it is diluted with water in accordance with the manufacturer's recommendations, and applied with a hydraulic seeder at the rate of 20 gallons/acre. Drying time is 12 to 18 hours after application.

<u>Copolymers of Sodium Acrylates and Acrylamides:</u> These materials are non-toxic, dry powders that are copolymers of sodium acrylate and acrylamide. They are mixed with water and applied to the soil surface for erosion control at rates that are determined by slope gradient:

Slope Gradient (H:V)	lb/acre
Flat to 5:1	3.0 - 5.0
5:1 to 3:1	5.0 - 10.0
2:1 to 1:1	10.0 - 20.0

<u>Poly-Acrylamide (PAM) and Copolymer of Acrylamide</u>: Linear copolymer polyacrylamide for use as a soil binder is packaged as a dry flowable solid, as a liquid. Refer to the manufacturer's recommendation for dilution and application rates as they vary based on liquid or dry form, site conditions and climate.

• Limitations specific to PAM are as follows:

- Do not use PAM on a slope that flows into a water body without passing through a sediment trap or sediment basin.
- The specific PAM copolymer formulation must be anionic. Cationic PAM should not be used in any application because of known aquatic toxicity problems. Only the highest drinking water grade PAM, certified for compliance with ANSI/NSF Standard 60 for drinking water treatment, should be used for soil applications.
- PAM designated for erosion and sediment control should be "water soluble" or "linear" or "non-cross linked".
- PAM should not be used as a stand-alone BMP to protect against water-based erosion. When combined with mulch, its effectiveness increases dramatically.

<u>Hydro-Colloid Polymers</u>: Hydro-Colloid Polymers are various combinations of dry flowable poly-acrylamides, copolymers and hydro-colloid polymers that are mixed with water and applied to the soil surface at rates of 55 to 60 lb/acre. Drying times are 0 to 4 hours.

Cementitious-Based Binders

<u>Gypsum</u>: This is a formulated gypsum based product that readily mixes with water and mulch to form a thin protective crust on the soil surface. It is composed of high purity gypsum that is ground, calcined and processed into calcium sulfate hemihydrate with a minimum purity of 86%. It is mixed in a hydraulic seeder and applied at rates 4,000 to 12,000 lb/acre. Drying time is 4 to 8 hours.

Applying Soil Binders

After selecting an appropriate soil binder, the untreated soil surface must be prepared before applying the soil binder. The untreated soil surface must contain sufficient moisture to assist the agent in achieving uniform distribution. In general, the following steps should be followed:

- Follow manufacturer's written recommendations for application rates, pre-wetting of application area, and cleaning of equipment after use.
- Prior to application, roughen embankment and fill areas.
- Consider the drying time for the selected soil binder and apply with sufficient time before anticipated rainfall. Soil binders should not be applied during or immediately before rainfall.
- Avoid over spray onto roads, sidewalks, drainage channels, sound walls, existing vegetation, etc.
- Soil binders should not be applied to frozen soil, areas with standing water, under freezing or rainy conditions, or when the temperature is below 40°F during the curing period.
- More than one treatment is often necessary, although the second treatment may be diluted or have a lower application rate.
- Generally, soil binders require a minimum curing time of 24 hours before they are fully effective. Refer to manufacturer's instructions for specific cure time.

- For liquid agents:
 - Crown or slope ground to avoid ponding.
 - Uniformly pre-wet ground at 0.03 to 0.3 gal/yd² or according to manufacturer's recommendations.
 - Apply solution under pressure. Overlap solution 6 to 12 in.
 - Allow treated area to cure for the time recommended by the manufacturer; typically at least 24 hours.
 - Apply second treatment before first treatment becomes ineffective, using 50% application rate.
 - In low humidities, reactivate chemicals by re-wetting with water at 0.1 to 0.2 gal/yd².

Costs

Costs vary according to the soil stabilizer selected for implementation. The following are approximate installed costs:

Soil Binder	Cost per Acre (2000) ¹	Estimated Cost per Acre (2009) ²
Plant-Material-Based (Short Lived) Binders	\$700-\$900	\$770-\$990
Plant-Material-Based (Long Lived) Binders	\$1,200-\$1,500	\$1,320-\$1,650
Polymeric Emulsion Blend Binders	\$700 -\$1,500	\$770-\$1,650
Cementitious-Based Binders	\$800-\$1,200	\$880-\$1,350

1. Source: Erosion Control Pilot Study Report, Caltrans, June 2000.

2. 2009 costs reflect a 10% escalation over year 2000 costs. Escalation based on informal survey of industry trends. Note: Expected cost increase is offset by competitive economic conditions.

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Areas where erosion is evident should be repaired and BMPs re-applied as soon as possible. Care should be exercised to minimize the damage to protected areas while making repairs, as any area damaged will require re-application of BMPs.
- Reapply the selected soil binder as needed to maintain effectiveness.

Table 1 Properties of Soil Binders for Erosion Control				
	Binder Type			
Evaluation Criteria	Plant Material Based (Short Lived)	Plant Material Based (Long Lived)	Polymeric Emulsion Blends	Cementitious- Based Binders
Relative Cost	Low	Moderate to High	Low to High	Low to Moderate
Resistance to Leaching	High	High	Low to Moderate	Moderate
Resistance to Abrasion	Moderate	Low	Moderate to High	Moderate to High
Longevity	Short to Medium	Medium	Medium to Long	Medium
Minimum Curing Time before Rain	9 to 18 hours	19 to 24 hours	o to 24 hours	4 to 8 hours
Compatibility with Existing Vegetation	Good	Poor	Poor	Poor
Mode of Degradation	Biodegradable	Biodegradable	Photodegradable/ Chemically Degradable	Photodegradable/ Chemically Degradable
Labor Intensive	No	No	No	No
Specialized Application Equipment	Water Truck or Hydraulic Mulcher	Water Truck or Hydraulic Mulcher	Water Truck or Hydraulic Mulcher	Water Truck or Hydraulic Mulcher
Liquid/Powder	Powder	Liquid	Liquid/Powder	Powder
Surface Crusting	Yes, but dissolves on rewetting	Yes	Yes, but dissolves on rewetting	Yes
Clean Up	Water	Water	Water	Water
Erosion Control Application Rate	Varies (1)	Varies (1)	Varies (1)	4,000 to 12,000 lbs/acre

(1) See Implementation for specific rates.

References

Erosion Control Pilot Study Report, State of California Department of Transportation (Caltrans), June 2000.

Manual of Standards of Erosion and Sediment Control Measures, Association of Bay Area Governments, May 1995.

Sedimentation and Erosion Control, An Inventory of Current Practices Draft, US EPA, April 1990.

Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Guidance Document: Soil Stabilization for Temporary Slopes, State of California Department of Transportation (Caltrans), November 1999.

Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.



Description and Purpose

Straw mulch consists of placing a uniform layer of straw and incorporating it into the soil with a studded roller or crimper, or anchoring it with a tackifier or stabilizing emulsion. Straw mulch protects the soil surface from the impact of rain drops, preventing soil particles from becoming dislodged.

Suitable Applications

Straw mulch is suitable for disturbed areas requiring temporary protection until permanent stabilization is established. Straw mulch can be specified for the following applications:

- As a stand-alone BMP on disturbed areas until soils can be prepared for permanent vegetation. The longevity of straw mulch is typically less than six months.
- Applied in combination with temporary seeding strategies -
- Applied in combination with permanent seeding strategies to enhance plant establishment and final soil stabilization
- Applied around containerized plantings to control erosion until the plants become established to provide permanent stabilization

Limitations

Availability of straw and straw blowing equipment may be limited just prior to the rainy season and prior to storms due to high demand.

Categories

EC	Erosion Control	\checkmark
SE	Sediment Control	
тс	Tracking Control	
WE	Wind Erosion Control	×
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	
Leg	end:	
\checkmark	Primary Category	
×	Secondary Category	

Targeted Constituents

Sediment	\checkmark
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

- EC-3 Hydraulic Mulch
- EC-4 Hydroseeding
- EC-5 Soil Binders
- EC-7 Geotextiles and Mats
- EC-8 Wood Mulching
- EC-14 Compost Blanket



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- There is a potential for introduction of weed seed and unwanted plant material if weed-free agricultural straw is not specified.
- Straw mulch applied by hand is more time intensive and potentially costly.
- Wind may limit application of straw and blow straw into undesired locations.
- May have to be removed prior to permanent seeding or prior to further earthwork.
- "Punching" of straw does not work in sandy soils, necessitating the use of tackifiers.
- Potential fugitive dust control issues associated with straw applications can occur. Application of a stabilizing emulsion or a water stream at the same time straw is being blown can reduce this problem.
- Use of plastic netting should be avoided in areas where wildlife may be entrapped and may be prohibited for projects in certain areas with sensitive wildlife species, especially reptiles and amphibians.

Implementation

- Straw should be derived from weed-free wheat, rice, or barley. Where required by the plans, specifications, permits, or environmental documents, native grass straw should be used.
- Use tackifier to anchor straw mulch to the soil on slopes.
- Crimping, punch roller-type rollers, or track walking may also be used to incorporate straw mulch into the soil on slopes. Track walking can be used where other methods are impractical.
- Avoid placing straw onto roads, sidewalks, drainage channels, sound walls, existing vegetation, etc.
- Straw mulch with tackifier should not be applied during or immediately before rainfall.
- Additional guidance on the comparison and selection of temporary slope stabilization methods is provided in Appendix F of the Handbook.

Application Procedures

- When using a tackifier to anchor the straw mulch, roughen embankment or fill areas by rolling with a crimping or punching-type roller or by track walking before placing the straw mulch. Track walking should only be used where rolling is impractical.
- Apply straw at a rate of between 3,000 and 4,000 lb/acre, either by machine or by hand distribution and provide 100% ground cover. A lighter application is used for flat surfaces and a heavier application is used for slopes.
- Evenly distribute straw mulch on the soil surface.
- Anchoring straw mulch to the soil surface by "punching" it into the soil mechanically (incorporating) can be used in lieu of a tackifier.

- Methods for holding the straw mulch in place depend upon the slope steepness, accessibility, soil conditions, and longevity.
 - A tackifier acts to glue the straw fibers together and to the soil surface. The tackifier should be selected based on longevity and ability to hold the fibers in place. A tackifier is typically applied at a rate of 125 lb/acre. In windy conditions, the rates are typically 180 lb/acre.
 - On very small areas, a spade or shovel can be used to punch in straw mulch.
 - On slopes with soils that are stable enough and of sufficient gradient to safely support construction equipment without contributing to compaction and instability problems, straw can be "punched" into the ground using a knife blade roller or a straight bladed coulter, known commercially as a "crimper."

Costs

Average annual cost for installation and maintenance is included in the table below. Application by hand is more time intensive and potentially more costly.

ВМР	Unit Cost per Acre
Straw mulch, crimped or punched	\$2,458-\$5,375
Straw mulch with tackifier	\$1,823-\$4,802

Source: Caltrans Soil Stabilization BMP Research for Erosion and Sediment Controls, July 2007

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Areas where erosion is evident should be repaired and BMPs re-applied as soon as possible. Care should be exercised to minimize the damage to protected areas while making repairs, as any area damaged will require re-application of BMPs.
- The key consideration in inspection and maintenance is that the straw needs to last long enough to achieve erosion control objectives. Straw mulch as a stand-alone BMP is temporary and is not suited for long-term erosion control.
- Maintain an unbroken, temporary mulched ground cover while disturbed soil areas are inactive. Repair any damaged ground cover and re-mulch exposed areas.
- Reapplication of straw mulch and tackifier may be required to maintain effective soil stabilization over disturbed areas and slopes.

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References

Soil Stabilization BMP Research for Erosion and Sediment Controls: Cost Survey Technical Memorandum, State of California Department of Transportation (Caltrans), July 2007.

Erosion and Sediment Control Manual, Oregon Department of Environmental Quality, February 2005.

Controlling Erosion of Construction Sites, Agricultural Information Bulletin #347, U.S. Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS) (formerly Soil Conservation Service – SCS).

Guides for Erosion and Sediment Control in California, USDA Soils Conservation Service, January 1991.

Manual of Standards of Erosion and Sediment Control Measures, Association of Bay Area Governments, May 1995.

Soil Erosion by Water, Agricultural Information Bulletin #513, U.S. Department of Agriculture, Soil Conservation Service.

Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Stormwater Management of the Puget Sound Basin, Technical Manual, Publication #91-75, Washington State Department of Ecology, February 1992.

Water Quality Management Plan for the Lake Tahoe Region, Volume II, Handbook of Management Practices, Tahoe Regional Planning Agency, November 1988.

Wood Mulching



Description and Purpose

Wood mulching consists of applying a mixture of shredded wood mulch, bark or compost to disturbed soils. The primary function of wood mulching is to reduce erosion by protecting bare soil from rainfall impact, increasing infiltration, and reducing runoff.

Suitable Applications

Wood mulching is suitable for disturbed soil areas requiring temporary protection until permanent stabilization is established.

Limitations

- Not suitable for use on slopes steeper than 3:1 (H:V). Best suited to flat areas or gentle slopes or 5:1 (H:V) or flatter.
- Wood mulch and compost may introduce unwanted species.
- Not suitable for areas exposed to concentrated flows.
- May need to be removed prior to further earthwork.

Implementation

Mulch Selection

There are many types of mulches. Selection of the appropriate type of mulch should be based on the type of application, site conditions, and compatibility with planned or future uses.

Application Procedures

Prior to application, after existing vegetation has been

Categories EC Frosion Control

20		
SE	Sediment Control	
тс	Tracking Control	
WE	Wind Erosion Control	×
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	
Lege	nd:	
Ø₽	Primary Obiective	

Secondary Objective

Targeted Constituents

Sediment	\checkmark
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

- EC-3 Hydraulic Mulch
- EC-4 Hydroseeding
- EC-5 Soil Binders
- EC-6 Straw Mulch
- EC-7 Geotextiles and Mats



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removed, roughen embankment and fill areas by rolling with a device such as a punching type roller or by track walking. The construction application procedures for mulches vary significantly depending upon the type of mulching method specified. Two methods are highlighted here:

- Green Material: This type of mulch is produced by the recycling of vegetation trimmings such as grass, shredded shrubs, and trees. Methods of application are generally by hand although pneumatic methods are available.
 - Green material can be used as a temporary ground cover with or without seeding.
 - The green material should be evenly distributed on site to a depth of not more than 2 in.
- Shredded Wood: Suitable for ground cover in ornamental or revegetated plantings.
 - Shredded wood/bark is conditionally suitable. See note under limitations. -
 - Distribute by hand or use pneumatic methods. -
 - Evenly distribute the mulch across the soil surface to a depth of 2 to 3 in. -
- Avoid mulch placement onto roads, sidewalks, drainage channels, existing vegetation, etc.

Costs

Average annual cost for installation and maintenance (3-4 months useful life) is around \$4,000 per acre, but cost can increase if the source is not close to the project site.

Inspection and Maintenance

- Inspect BMPs prior to forecast rain, daily during extended rain events, after rain events, weekly during the rainy season, and at two-week intervals during the non-rainy season.
- Areas where erosion is evident shall be repaired and BMPs reapplied as soon as possible. Care should be exercised to minimize the damage to protected areas while making repairs, as any area damaged will require reapplication of BMPs.
- Regardless of the mulching technique selected, the key consideration in inspection and maintenance is that the mulch needs to last long enough to achieve erosion control objectives. If the mulch is applied as a stand alone erosion control method over disturbed areas (without seed), it should last the length of time the site will remain barren or until final re-grading and revegetation.
- Where vegetation is not the ultimate cover, such as ornamental and landscape applications of bark or wood chips, inspection and maintenance should focus on longevity and integrity of the mulch.
- Reapply mulch when bare earth becomes visible.

References

Controlling Erosion of Construction Sites Agriculture Information Bulletin #347, U.S. Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS) (formerly Soil Conservation Service – SCS).

Guides for Erosion and Sediment Control in California, USDA Soils Conservation Service, January 1991.

Manual of Standards of Erosion and Sediment Control Measures, Association of Bay Area Governments, May 1995.

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Sedimentation and Erosion Control, An Inventory of Current Practices Draft, U.S. EPA, April 1990.

Soil Erosion by Water Agricultural Information Bulletin #513, U.S. Department of Agriculture, Soil Conservation Service.

Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Water Quality Management Plan for the Lake Tahoe Region, Volume II, Handbook of Management Practices, Tahoe Regional Planning Agency, November 1988.

Non-Vegetative Stabilization



Description and Purpose

Non-vegetative stabilization methods are used for temporary or permanent stabilization of areas prone to erosion and should be used only where vegetative options are not feasible; examples include:

- Areas of vehicular or pedestrian traffic such as roads or paths;
- Arid environments where vegetation would not provide timely ground coverage, or would require excessive irrigation;
- Rocky substrate, infertile or droughty soils where vegetation would be difficult to establish; and
- Areas where vegetation will not grow adequately within the construction time frame.

There are several non-vegetative stabilization methods and selection should be based on site-specific conditions.

Decomposed Granite (DG) is a permanent erosion protection method that consists of a layer of stabilized decomposed granite placed over an erodible surface.

Degradable Mulches of various types (see EC-3, EC-6, EC-8) can be used for temporary non-vegetative stabilization; examples include straw mulch, compost, wood chips or hydraulic mulch.

Geotextiles and Mats can be used for temporary non-vegetative stabilization (see EC-7). These BMPs are typically manufactured

Categories

Ø	Primary Category	
Leg	end:	
WM	Waste Management and Materials Pollution Control	
NS	Non-Stormwater Management Control	
WE	Wind Erosion Control	×
TR	Tracking Control	
SE	Sediment Control	×
EC	Erosion Control	\checkmark

Secondary Category

Targeted Constituents

Sediment	\checkmark
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None



from degradable or synthetic materials and are designed and specified based on their functional longevity, i.e., how long they will persist and provide erosion protection. All geotextiles and mats should be replaced when they exceed their functional longevity or when permanent stabilization methods are instituted.

Gravel Mulch is a non-degradable erosion control product that is composed of washed and screened coarse to very coarse gravel, 16 mm to 64 mm (0.6" - 2.5"), similar to an AASHTO No. 3 coarse aggregate.

Rock Slope Protection consists of utilizing large rock or rip-rap (4"- 24") to stabilize slopes with a high erosion potential and those subject to scour along waterways.

Soil Binders can be used for temporary non-vegetative stabilization (see EC-5). The key to their use is functional longevity. In most cases, the soil binder will need to be routinely monitored and re-applied to maintain an erosion-resistant coverage.

Suitable Applications

Non-vegetated stabilization methods are suitable for use on disturbed soil areas and on material stockpiles that need to be temporarily or permanently protected from erosion by water and wind. Non-vegetated stabilization should only be utilized when vegetation cannot be established in the required timeframe, due to soil or climactic conditions, or where vegetation may be a potential fire hazard.

Decomposed Granite (DG) and Gravel Mulch are suitable for use in areas where vegetation establishment is difficult, on flat surfaces, trails and pathways, and when used in conjunction with a stabilizer or tackifier, on shallow slopes (i.e., 10:1 [H:V]). DG and gravel can also be used on shallow rocky slopes where vegetation cannot be established for permanent erosion control.

Degradable Mulches can be used to cover and protect soil surfaces from erosion both in temporary and permanent applications. In many cases, the use of mulches by themselves requires routine inspection and re-application. See EC-3 Hydraulic Mulch, EC-6 Straw Mulch, EC-8 Wood Mulch, or EC-14 Compost Blankets for more information.

Geotextiles and Mats can be used as a temporary stand-alone soil stabilization method. Depending on material selection, geotextiles and mats can be a short-term (3 mos - 1 year) or long-term (1-2 years) temporary stabilization method. For more information on geotextiles and mats see EC-7 Geotextiles and Mats.

Rock Slope Protection can be used when the slopes are subject to scour or have a high erosion potential, such as slopes adjacent to flowing waterways or slopes subject to overflow from detention facilities (spillways).

Soil Binders can be used for temporary stabilization of stockpiles and disturbed areas not subject to heavy traffic. See EC-5 Soil Binders for more information.

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Limitations

General

 Refer to EC-3, EC-6, EC-8, and EC-14 for limitations on use of mulches. Refer to EC-7 for limitations on use of geotextiles and mats. Refer to EC-5 for limitations on use of Soil Binders.

Decomposed Granite

- Not available in some geographic regions.
- If not tackified, material may be susceptible to erosion even on slight slopes (e.g., 30:1 [H:V]).
- Installed costs may be more expensive than vegetative stabilization methods.

Gravel Mulch

- Availability is limited in some geographic regions.
- If not properly screened and washed, can contain fine material that can erode and/or create dust problems.
- If inadequately sized, material may be susceptible to erosion on sloped areas.
- Pore spaces fill with dirt and debris over time; may provide a growing medium for weeds.

Rock Slope Protection

- Installation is labor intensive.
- Installed costs can be significantly higher than vegetative stabilization methods.
- Rounded stones may not be used on slopes greater than 2:1 [H:V].

Implementation

General

Non-vegetated stabilization should be used in accordance with the following general guidance:

- Should be used in conjunction with other BMPs, including drainage, erosion controls and sediment controls.
- Refer to EC-3, EC-6, EC-8, and EC-14 for implementation details for mulches. Refer to EC-7 for implementation details for geotextiles and mats. Refer to EC-5 for implementation details for soil binders.
- Non-vegetated stabilization measures should be implemented as soon as the disturbance in the areas they are intended to protect has ceased.
- Additional guidance on the comparison and selection of temporary slope stabilization methods is provided in Appendix F of the Handbook.

Decomposed Granite Stabilization

• If used for a road or path should be installed on a prepared base.

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- Should be mixed with a stabilizer if used for roads or pathways, or on slope applications.
- Though porous it is recommended to prevent standing water on or next to a decomposed granite road or pathway.

Gravel Mulch

- Should be sized based on slope, rainfall, and upgradient run-on conditions. Stone size should be increased as potential for erosion increases (steeper slopes, high intensity rainfall).
- If permanent, a weed control fabric should be placed prior to installation.
- Should be installed at a minimum 2" depth.
- Should completely cover all exposed surfaces.

Rock Slope Protection

- Rock slope protection installation should follow Caltrans Standard Specification 72-2: Rock Slope Protection. Refer to the specification for rock conformity requirements and installation methods.
- When using rock slope protection, rock size and installation method should be specified by an Engineer.
- A geotextile fabric should be placed prior to installation.

Costs

Costs are highly variable depending not only on technique chosen, but also on materials chosen within specific techniques. In addition, availability of certain materials will vary by region/location, which will also affect the cost. Costs of mulches, geotextiles and mats, and soil binders are presented in their respective fact sheets. Costs for decomposed granite, gravel mulch stabilization and rock slope protection may be higher depending on location and availability of materials. Caltrans has provided an estimate for gravel mulch of \$10 - \$15/yd² in flat areas and \$11 - \$23/yd² on side slopes.

Inspection and Maintenance

General

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- For permanent installation, require inspection periodically and after major storm events to look for signs of erosion or damage to the stabilization.
- All damage should be repaired immediately.
- Refer to EC-3, EC-6, EC-8, and EC-14 for inspection and maintenance requirements for mulches. Refer to EC-7 for inspection and maintenance requirements for geotextiles and mats. Refer to EC-5 for inspection and maintenance requirements for soil binders.

Decomposed Granite and Gravel Mulch Stabilization

- Rake out and add decomposed granite or gravel as needed to areas subject to rill erosion. Inspect upgradient drainage controls and repair/modify as necessary.
- Should remain stable under loose surface material. Any significant problem areas should be repaired to restore uniformity to the installation.

References

Arid Zone Forestry: A Guide for Field Technicians. Food and Agriculture Organization of the United Nations, 1989.

Design of Roadside Channels with Flexible Linings, Hydraulic Engineering Circular Number 15, Third Edition, Federal Highway Administration, 2007.

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Standard Specification 72-2: Rock Slope Protection. California Department of Transportation, 2006.

Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Silt Fence



Description and Purpose

A silt fence is made of a woven geotextile that has been entrenched, attached to supporting poles, and sometimes backed by a plastic or wire mesh for support. The silt fence detains sediment-laden water, promoting sedimentation behind the fence.

Suitable Applications

Silt fences are suitable for perimeter control, placed below areas where sheet flows discharge from the site. They could also be used as interior controls below disturbed areas where runoff may occur in the form of sheet and rill erosion and around inlets within disturbed areas (SE-10). Silt fences are generally ineffective in locations where the flow is concentrated and are only applicable for sheet or overland flows. Silt fences are most effective when used in combination with erosion controls. Suitable applications include:

- Along the perimeter of a project.
- Below the toe or down slope of exposed and erodible slopes.
- Along streams and channels.
- Around temporary spoil areas and stockpiles.
- Around inlets.
- Below other small cleared areas.

Categories

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ЭE	Sediment Control	V	
тс	Tracking Control		
WE	Wind Erosion Control		
NS	Non-Stormwater		
	Management Control		
WM	Waste Management and		
	Materials Pollution Control		
Legend:			
Primary Category			
×	Secondary Category		

Targeted Constituents

Sediment	\checkmark
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

SE-5 Fiber Rolls SE-6 Gravel Bag Berm SE-8 Sandbag Barrier SE-10 Storm Drain Inlet Protection SE-14 Biofilter Bags



Limitations

- Do not use in streams, channels, drain inlets, or anywhere flow is concentrated.
- Do not use in locations where ponded water may cause a flooding hazard. Runoff typically ponds temporarily on the upstream side of silt fence.
- Do not use silt fence to divert water flows or place across any contour line. Fences not constructed on a level contour, or fences used to divert flow will concentrate flows resulting in additional erosion and possibly overtopping or failure of the silt fence.
- Improperly installed fences are subject to failure from undercutting, overtopping, or collapsing.
- Not effective unless trenched and keyed in.
- Not intended for use as mid-slope protection on slopes greater than 4:1 (H:V).
- Do not use on slopes subject to creeping, slumping, or landslides.

Implementation

General

A silt fence is a temporary sediment barrier consisting of woven geotextile stretched across and attached to supporting posts, trenched-in, and, depending upon the strength of fabric used, supported with plastic or wire mesh fence. Silt fences trap sediment by intercepting and detaining small amounts of sediment-laden runoff from disturbed areas in order to promote sedimentation behind the fence.

The following layout and installation guidance can improve performance and should be followed:

- Use principally in areas where sheet flow occurs.
- Install along a level contour, so water does not pond more than 1.5 ft at any point along the silt fence.
- The maximum length of slope draining to any point along the silt fence should be 200 ft or less.
- The maximum slope perpendicular to the fence line should be 1:1.
- Provide sufficient room for runoff to pond behind the fence and to allow sediment removal equipment to pass between the silt fence and toes of slopes or other obstructions. About 1200 ft² of ponding area should be provided for every acre draining to the fence.
- Turn the ends of the filter fence uphill to prevent stormwater from flowing around the fence.
- Leave an undisturbed or stabilized area immediately down slope from the fence where feasible.

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Silt Fence

- Silt fences should remain in place until the disturbed area is permanently stabilized, after which, the silt fence should be removed and properly disposed.
- Silt fence should be used in combination with erosion source controls up slope in order to
 provide the most effective sediment control.
- Be aware of local regulations regarding the type and installation requirements of silt fence, which may differ from those presented in this fact sheet.

Design and Layout

The fence should be supported by a plastic or wire mesh if the fabric selected does not have sufficient strength and bursting strength characteristics for the planned application (as recommended by the fabric manufacturer). Woven geotextile material should contain ultraviolet inhibitors and stabilizers to provide a minimum of six months of expected usable construction life at a temperature range of 0 $^{\circ}$ F to 120 $^{\circ}$ F.

- Layout in accordance with attached figures.
- For slopes steeper than 2:1 (H:V) and that contain a high number of rocks or large dirt clods that tend to dislodge, it may be necessary to install additional protection immediately adjacent to the bottom of the slope, prior to installing silt fence. Additional protection may be a chain link fence or a cable fence.
- For slopes adjacent to sensitive receiving waters or Environmentally Sensitive Areas (ESAs), silt fence should be used in conjunction with erosion control BMPs.

Standard vs. Heavy Duty Silt Fence

Standard Silt Fence

- Generally applicable in cases where the slope of area draining to the silt fence is 4:1 (H:V) or less.
- Used for shorter durations, typically 5 months or less
- Area draining to fence produces moderate sediment loads.

Heavy Duty Silt Fence

- Use is generally limited to 8 months or less.
- Area draining to fence produces moderate sediment loads.
- Heavy duty silt fence usually has 1 or more of the following characteristics, not possessed by standard silt fence.
 - Fence fabric has higher tensile strength.
 - \circ Fabric is reinforced with wire backing or additional support.
 - \circ $\,$ Posts are spaced closer than pre-manufactured, standard silt fence products.
 - Posts are metal (steel or aluminum)

Materials

Standard Silt Fence

 Silt fence material should be woven geotextile with a minimum width of 36 in. and a minimum tensile strength of 100 lb force. The fabric should conform to the requirements in ASTM designation D4632 and should have an integral reinforcement layer. The

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reinforcement layer should be a polypropylene, or equivalent, net provided by the manufacturer. The permittivity of the fabric should be between 0.1 sec⁻¹ and 0.15 sec⁻¹ in conformance with the requirements in ASTM designation D4491.

- Wood stakes should be commercial quality lumber of the size and shape shown on the plans. Each stake should be free from decay, splits or cracks longer than the thickness of the stake or other defects that would weaken the stakes and cause the stakes to be structurally unsuitable.
- Staples used to fasten the fence fabric to the stakes should be not less than 1.75 in. long and should be fabricated from 15 gauge or heavier wire. The wire used to fasten the tops of the stakes together when joining two sections of fence should be 9 gauge or heavier wire. Galvanizing of the fastening wire will not be required.

Heavy-Duty Silt Fence

Some silt fence has a wire backing to provide additional support, and there are products that
may use prefabricated plastic holders for the silt fence and use metal posts or bar
reinforcement instead of wood stakes. If bar reinforcement is used in lieu of wood stakes,
use number four or greater bar. Provide end protection for any exposed bar reinforcement
for health and safety purposes.

Installation Guidelines – Traditional Method

Silt fences are to be constructed on a level contour. Sufficient area should exist behind the fence for ponding to occur without flooding or overtopping the fence.

- A trench should be excavated approximately 6 in. wide and 6 in. deep along the line of the proposed silt fence (trenches should not be excavated wider or deeper than necessary for proper silt fence installation).
- Bottom of the silt fence should be keyed-in a minimum of 12 in.
- Posts should be spaced a maximum of 6 ft apart and driven securely into the ground a minimum of 18 in. or 12 in. below the bottom of the trench.
- When standard strength geotextile is used, a plastic or wire mesh support fence should be fastened securely to the upslope side of posts using heavy-duty wire staples at least 1 in. long. The mesh should extend into the trench.
- When extra-strength geotextile and closer post spacing are used, the mesh support fence may be eliminated.
- Woven geotextile should be purchased in a long roll, then cut to the length of the barrier.
 When joints are necessary, geotextile should be spliced together only at a support post, with a minimum 6 in. overlap and both ends securely fastened to the post.
- The trench should be backfilled with native material and compacted.
- Construct silt fences with a setback of at least 3 ft from the toe of a slope. Where, due to specific site conditions, a 3 ft setback is not available, the silt fence may be constructed at the

toe of the slope, but should be constructed as far from the toe of the slope as practicable. Silt fences close to the toe of the slope will be less effective and more difficult to maintain.

- Construct the length of each reach so that the change in base elevation along the reach does not exceed 1/3 the height of the barrier; in no case should the reach exceed 500 ft.
- Cross barriers should be a minimum of ¹/₃ and a maximum of ¹/₂ the height of the linear barrier.
- See typical installation details at the end of this fact sheet.

Installation Guidelines - Static Slicing Method

- Static Slicing is defined as insertion of a narrow blade pulled behind a tractor, similar to a
 plow blade, at least 10 inches into the soil while at the same time pulling silt geotextile fabric
 into the ground through the opening created by the blade to the depth of the blade. Once the
 gerotextile is installed, the soil is compacted using tractor tires.
- This method will not work with pre-fabricated, wire backed silt fence.
- Benefits:
 - Ease of installation (most often done with a 2 person crew). In addition, installation using static slicing has been found to be more efficient on slopes, in rocky soils, and in saturated soils.
 - Minimal soil disturbance.
 - Greater level of compaction along fence, leading to higher performance (i.e. greater sediment retention).
 - Uniform installation.
 - Less susceptible to undercutting/undermining.

Costs

- It should be noted that costs vary greatly across regions due to available supplies and labor costs.
- Average annual cost for installation using the traditional silt fence installation method (assumes 6 month useful life) is \$7 per linear foot based on vendor research. Range of cost is \$3.50 - \$9.10 per linear foot.
- In tests, the slicing method required 0.33 man hours per 100 linear feet, while the trenched based systems required as much as 1.01 man hours per linear foot.

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Repair undercut silt fences.

- Repair or replace split, torn, slumping, or weathered fabric. The lifespan of silt fence fabric is generally 5 to 8 months.
- Silt fences that are damaged and become unsuitable for the intended purpose should be removed from the site of work, disposed, and replaced with new silt fence barriers.
- Sediment that accumulates in the BMP should be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when the sediment accumulation reaches one-third of the barrier height.
- Silt fences should be left in place until the upstream area is permanently stabilized. Until then, the silt fence should be inspected and maintained regularly.
- Remove silt fence when upgradient areas are stabilized. Fill and compact post holes and anchor trench, remove sediment accumulation, grade fence alignment to blend with adjacent ground, and stabilize disturbed area.

References

Manual of Standards of Erosion and Sediment Control Measures, Association of Bay Area Governments, May 1995.

National Management Measures to Control Nonpoint Source Pollution from Urban Areas, United States Environmental Protection Agency, 2002.

Proposed Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters, Work Group-Working Paper, USEPA, April 1992.

Sedimentation and Erosion Control Practices, and Inventory of Current Practices (Draft), UESPA, 1990.

Southeastern Wisconsin Regional Planning Commission (SWRPC). Costs of Urban Nonpoint Source Water Pollution Control Measures. Technical Report No. 31. Southeastern Wisconsin Regional Planning Commission, Waukesha, WI. 1991

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Stormwater Management Manual for The Puget Sound Basin, Washington State Department of Ecology, Public Review Draft, 1991.

U.S. Environmental Protection Agency (USEPA). Stormwater Management for Industrial Activities: Developing Pollution Prevention Plans and Best Management Practices. U.S. Environmental Protection Agency, Office of Water, Washington, DC, 1992.

Water Quality Management Plan for the Lake Tahoe Region, Volume II, Handbook of Management Practices, Tahoe Regional Planning Agency, November 1988.Soil Stabilization BMP Research for Erosion and Sediment Controls: Cost Survey Technical Memorandum, State of California Department of Transportation (Caltrans), July 2007.

Erosion and Sediment Control Manual, Oregon Department of Environmental Quality, February 2005.

Silt Fence







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Fiber Rolls



Description and Purpose

A fiber roll consists of straw, coir, or other biodegradable materials bound into a tight tubular roll wrapped by netting, which can be photodegradable or natural. Additionally, gravel core fiber rolls are available, which contain an imbedded ballast material such as gravel or sand for additional weight when staking the rolls are not feasible (such as use as inlet protection). When fiber rolls are placed at the toe and on the face of slopes along the contours, they intercept runoff, reduce its flow velocity, release the runoff as sheet flow, and provide removal of sediment from the runoff (through sedimentation). By interrupting the length of a slope, fiber rolls can also reduce sheet and rill erosion until vegetation is established.

Suitable Applications

Fiber rolls may be suitable:

- Along the toe, top, face, and at grade breaks of exposed and erodible slopes to shorten slope length and spread runoff as sheet flow.
- At the end of a downward slope where it transitions to a steeper slope.
- Along the perimeter of a project.
- As check dams in unlined ditches with minimal grade.
- Down-slope of exposed soil areas.
- At operational storm drains as a form of inlet protection.

Categories

EC	Erosion Control	×
SE	Sediment Control	\checkmark
тс	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	
Leg	end:	
\checkmark	Primary Category	
×	Secondary Category	

Targeted Constituents

Sediment	\checkmark
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

SE-1 Silt Fence SE-6 Gravel Bag Berm SE-8 Sandbag Barrier SE-14 Biofilter Bags



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Around temporary stockpiles.

Limitations

- Fiber rolls are not effective unless trenched in and staked.
- Not intended for use in high flow situations.
- Difficult to move once saturated.
- If not properly staked and trenched in, fiber rolls could be transported by high flows.
- Fiber rolls have a very limited sediment capture zone.
- Fiber rolls should not be used on slopes subject to creep, slumping, or landslide.
- Rolls typically function for 12-24 months depending upon local conditions.

Implementation

Fiber Roll Materials

- Fiber rolls should be prefabricated.
- Fiber rolls may come manufactured containing polyacrylamide (PAM), a flocculating agent within the roll. Fiber rolls impregnated with PAM provide additional sediment removal capabilities and should be used in areas with fine, clayey or silty soils to provide additional sediment removal capabilities. Monitoring may be required for these installations.
- Fiber rolls are made from weed free rice straw, flax, or a similar agricultural material bound into a tight tubular roll by netting.
- Typical fiber rolls vary in diameter from 9 in. to 20 in. Larger diameter rolls are available as well.

Installation

- Locate fiber rolls on level contours spaced as follows:
 - Slope inclination of 4:1 (H:V) or flatter: Fiber rolls should be placed at a maximum interval of 20 ft.
 - Slope inclination between 4:1 and 2:1 (H:V): Fiber Rolls should be placed at a maximum interval of 15 ft. (a closer spacing is more effective).
 - Slope inclination 2:1 (H:V) or greater: Fiber Rolls should be placed at a maximum interval of 10 ft. (a closer spacing is more effective).
- Prepare the slope before beginning installation.
- Dig small trenches across the slope on the contour. The trench depth should be $\frac{1}{4}$ to $\frac{1}{3}$ of the thickness of the roll, and the width should equal the roll diameter, in order to provide area to backfill the trench.

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- It is critical that rolls are installed perpendicular to water movement, and parallel to the slope contour.
- Start building trenches and installing rolls from the bottom of the slope and work up.
- It is recommended that pilot holes be driven through the fiber roll. Use a straight bar to drive holes through the roll and into the soil for the wooden stakes.
- Turn the ends of the fiber roll up slope to prevent runoff from going around the roll.
- Stake fiber rolls into the trench.
 - Drive stakes at the end of each fiber roll and spaced 4 ft maximum on center.
 - Use wood stakes with a nominal classification of 0.75 by 0.75 in. and minimum length of 24 in.
- If more than one fiber roll is placed in a row, the rolls should be overlapped, not abutted.
- See typical fiber roll installation details at the end of this fact sheet.

Removal

- Fiber rolls can be left in place or removed depending on the type of fiber roll and application (temporary vs. permanent installation). Typically, fiber rolls encased with plastic netting are used for a temporary application because the netting does not biodegrade. Fiber rolls used in a permanent application are typically encased with a biodegradeable material and are left in place. Removal of a fiber roll used in a permanent application can result in greater disturbance.
- Temporary installations should only be removed when up gradient areas are stabilized per General Permit requirements, and/or pollutant sources no longer present a hazard. But, they should also be removed before vegetation becomes too mature so that the removal process does not disturb more soil and vegetation than is necessary.

Costs

Material costs for regular fiber rolls range from \$20 - \$30 per 25 ft roll.

Material costs for PAM impregnated fiber rolls range between 7.00-\$9.00 per linear foot, based upon vendor research.

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Repair or replace split, torn, unraveling, or slumping fiber rolls.
- If the fiber roll is used as a sediment capture device, or as an erosion control device to maintain sheet flows, sediment that accumulates in the BMP should be periodically removed

in order to maintain BMP effectiveness. Sediment should be removed when sediment accumulation reaches one-third the designated sediment storage depth.

- If fiber rolls are used for erosion control, such as in a check dam, sediment removal should not be required as long as the system continues to control the grade. Sediment control BMPs will likely be required in conjunction with this type of application.
- Repair any rills or gullies promptly.

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Erosion and Sediment Control Manual, Oregon Department of Environmental Quality, February 2005.





Gravel Bag Berm



Description and Purpose

A gravel bag berm is a series of gravel-filled bags placed on a level contour to intercept sheet flows. Gravel bags pond sheet flow runoff, allowing sediment to settle out, and release runoff slowly as sheet flow, preventing erosion.

Suitable Applications

Gravel bag berms may be suitable:

- As a linear sediment control measure:
 - Below the toe of slopes and erodible slopes
 - As sediment traps at culvert/pipe outlets
 - Below other small cleared areas
 - Along the perimeter of a site
 - Down slope of exposed soil areas
 - Around temporary stockpiles and spoil areas
 - Parallel to a roadway to keep sediment off paved areas
 - Along streams and channels
- As a linear erosion control measure:
 - Along the face and at grade breaks of exposed and erodible slopes to shorten slope length and spread runoff as sheet flow.

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Categories

EC	Erosion Control	×
SE	Sediment Control	\checkmark
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater	
	Management Control	
<u>м</u> м	Waste Management and	
• • • • •	Materials Pollution Control	
Leg	end:	
\checkmark	Primary Category	

Secondary Category

Targeted Constituents

Sediment	\checkmark
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

SE-1 Silt Fence SE-5 Fiber Roll SE-8 Sandbag Barrier SE-14 Biofilter Bags



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- At the top of slopes to divert runoff away from disturbed slopes.
- As chevrons (small check dams) across mildly sloped construction roads. For use check dam use in channels, see SE-4, Check Dams.

Limitations

- Gravel berms may be difficult to remove.
- Removal problems limit their usefulness in landscaped areas.
- Gravel bag berm may not be appropriate for drainage areas greater than 5 acres.
- Runoff will pond upstream of the berm, possibly causing flooding if sufficient space does not exist.
- Degraded gravel bags may rupture when removed, spilling contents.
- Installation can be labor intensive.
- Durability of gravel bags is somewhat limited and bags may need to be replaced when installation is required for longer than 6 months.
- Easily damaged by construction equipment.
- When used to detain concentrated flows, maintenance requirements increase.

Implementation

General

A gravel bag berm consists of a row of open graded gravel-filled bags placed on a level contour. When appropriately placed, a gravel bag berm intercepts and slows sheet flow runoff, causing temporary ponding. The temporary ponding allows sediment to settle. The open graded gravel in the bags is porous, which allows the ponded runoff to flow slowly through the bags, releasing the runoff as sheet flows. Gravel bag berms also interrupt the slope length and thereby reduce erosion by reducing the tendency of sheet flows to concentrate into rivulets, which erode rills, and ultimately gullies, into disturbed, sloped soils. Gravel bag berms are similar to sand bag barriers, but are more porous. Generally, gravel bag berms should be used in conjunction with temporary soil stabilization controls up slope to provide effective erosion and sediment control.

Design and Layout

- Locate gravel bag berms on level contours.
- When used for slope interruption, the following slope/sheet flow length combinations apply:
 - Slope inclination of 4:1 (H:V) or flatter: Gravel bags should be placed at a maximum interval of 20 ft, with the first row near the slope toe.
 - Slope inclination between 4:1 and 2:1 (H:V): Gravel bags should be placed at a maximum interval of 15 ft. (a closer spacing is more effective), with the first row near the slope toe.

Slope inclination 2:1 (H:V) or greater: Gravel bags should be placed at a maximum interval of 10 ft. (a closer spacing is more effective), with the first row near the slope toe.

- Turn the ends of the gravel bag barriers up slope to prevent runoff from going around the berm.
- Allow sufficient space up slope from the gravel bag berm to allow ponding, and to provide room for sediment storage.
- For installation near the toe of the slope, gravel bag barriers should be set back from the slope toe to facilitate cleaning. Where specific site conditions do not allow for a set-back, the gravel bag barrier may be constructed on the toe of the slope. To prevent flows behind the barrier, bags can be placed perpendicular to a berm to serve as cross barriers.
- Drainage area should not exceed 5 acres.
- In Non-Traffic Areas:
 - Height = 18 in. maximum
 - Top width = 24 in. minimum for three or more layer construction
 - Top width = 12 in. minimum for one or two layer construction _
 - Side slopes = 2:1 (H:V) or flatter -
- In Construction Traffic Areas:
 - Height = 12 in. maximum _
 - Top width = 24 in. minimum for three or more layer construction.
 - Top width = 12 in. minimum for one or two layer construction. _
 - Side slopes = 2:1 (H:V) or flatter. _
- Butt ends of bags tightly.
- On multiple row, or multiple layer construction, overlap butt joints of adjacent row and row beneath.
- Use a pyramid approach when stacking bags.

Materials

Bag Material: Bags should be woven polypropylene, polyethylene or polyamide fabric or burlap, minimum unit weight of 4 ounces/yd², Mullen burst strength exceeding 300 lb/in² in conformance with the requirements in ASTM designation D3786, and ultraviolet stability exceeding 70% in conformance with the requirements in ASTM designation D4355.

- **Bag Size:** Each gravel-filled bag should have a length of 18 in., width of 12 in., thickness of 3 in., and mass of approximately 33 lbs. Bag dimensions are nominal, and may vary based on locally available materials.
- *Fill Material:* Fill material should be 0.5 to 1 in. crushed rock, clean and free from clay, organic matter, and other deleterious material, or other suitable open graded, non-cohesive, porous gravel.

Costs

Material costs for gravel bags are average and are dependent upon material availability. \$2.50-3.00 per filled gravel bag is standard based upon vendor research.

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Gravel bags exposed to sunlight will need to be replaced every two to three months due to degrading of the bags.
- Reshape or replace gravel bags as needed.
- Repair washouts or other damage as needed.
- Sediment that accumulates in the BMP should be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when the sediment accumulation reaches one-third of the barrier height.
- Remove gravel bag berms when no longer needed and recycle gravel fill whenever possible and properly dispose of bag material. Remove sediment accumulation and clean, re-grade, and stabilize the area.

References

Handbook of Steel Drainage and Highway Construction, American Iron and Steel Institute, 1983.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Stormwater Pollution Plan Handbook, First Edition, State of California, Department of Transportation Division of New Technology, Materials and Research, October 1992.

Erosion and Sediment Control Manual, Oregon Department of Environmental Quality, February 2005.

Street Sweeping and Vacuuming



Description and Purpose

Street sweeping and vacuuming includes use of self-propelled and walk-behind equipment to remove sediment from streets and roadways, and to clean paved surfaces in preparation for final paving. Sweeping and vacuuming prevents sediment from the project site from entering storm drains or receiving waters.

Suitable Applications

Sweeping and vacuuming are suitable anywhere sediment is tracked from the project site onto public or private paved streets and roads, typically at points of egress. Sweeping and vacuuming are also applicable during preparation of paved surfaces for final paving.

Limitations

Sweeping and vacuuming may not be effective when sediment is wet or when tracked soil is caked (caked soil may need to be scraped loose).

Implementation

- Controlling the number of points where vehicles can leave the site will allow sweeping and vacuuming efforts to be focused, and perhaps save money.
- Inspect potential sediment tracking locations daily.
- Visible sediment tracking should be swept or vacuumed on a daily basis.
- Do not use kick brooms or sweeper attachments. These tend to spread the dirt rather than remove it.

Categories

EC	Erosion Control	
SE	Sediment Control	×
тс	Tracking Control	\checkmark
WE	Wind Erosion Control	
NS	Non-Stormwater	
110	Management Control	
wм	Waste Management and	
	Materials Pollution Control	
Leg	end:	
\checkmark	Primary Objective	

Secondary Objective

Targeted Constituents

Sediment	\checkmark
Nutrients	
Trash	\checkmark
Metals	
Bacteria	
Oil and Grease	\checkmark
Organics	

Potential Alternatives

None



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If not mixed with debris or trash, consider incorporating the removed sediment back into the project

Costs

Rental rates for self-propelled sweepers vary depending on hopper size and duration of rental. Expect rental rates from \$58/hour (3 vd³ hopper) to \$88/hour (9 vd³ hopper), plus operator costs. Hourly production rates vary with the amount of area to be swept and amount of sediment. Match the hopper size to the area and expect sediment load to minimize time spent dumping.

Inspection and Maintenance

- Inspect BMPs prior to forecast rain, daily during extended rain events, after rain events, weekly during the rainy season, and at two-week intervals during the non-rainy season.
- When actively in use, points of ingress and egress must be inspected daily.
- When tracked or spilled sediment is observed outside the construction limits, it must be removed at least daily. More frequent removal, even continuous removal, may be required in some jurisdictions.
- Be careful not to sweep up any unknown substance or any object that may be potentially hazardous.
- Adjust brooms frequently: maximize efficiency of sweeping operations.
- After sweeping is finished, properly dispose of sweeper wastes at an approved dumpsite.

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Labor Surcharge and Equipment Rental Rates, State of California Department of Transportation (Caltrans), April 1, 2002 – March 31, 2003.

Straw Bale Barrier



Description and Purpose

A straw bale barrier is a series of straw bales placed on a level contour to intercept sheet flows. Straw bale barriers pond sheet- flow runoff, allowing sediment to settle out.

Suitable Applications

Straw bale barriers may be suitable:

- As a linear sediment control measure:
 - Below the toe of slopes and erodible slopes
 - As sediment traps at culvert/pipe outlets
 - Below other small cleared areas
 - Along the perimeter of a site
 - Down slope of exposed soil areas
 - Around temporary stockpiles and spoil areas
 - Parallel to a roadway to keep sediment off paved areas
 - Along streams and channels
- As linear erosion control measure:
 - Along the face and at grade breaks of exposed and erodible slopes to shorten slope length and spread runoff as sheet flow



Categories

EC	Erosion Control	×
SE	Sediment Control	\checkmark
тс	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	
Leg	end:	
\checkmark	Primary Objective	
×	Secondary Objective	

Targeted Constituents

Sediment	\checkmark
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

SE-1 Silt Fence SE-5 Fiber Rolls SE-6 Gravel Bag Berm SE-8 Sandbag Barrier

- At the top of slopes to divert runoff away from disturbed slopes
- As check dams across mildly sloped construction roads

Limitations

Straw bale barriers:

- Are not to be used for extended periods of time because they tend to rot and fall apart
- Are suitable only for sheet flow on slopes of 10 % or flatter
- Are not appropriate for large drainage areas, limit to one acre or less
- May require constant maintenance due to rotting
- Are not recommended for concentrated flow, inlet protection, channel flow, and live streams
- Cannot be made of bale bindings of jute or cotton
- Require labor-intensive installation and maintenance
- Cannot be used on paved surfaces
- Should not to be used for drain inlet protection
- Should not be used on lined ditches
- May introduce undesirable non-native plants to the area

Implementation

General

A straw bale barrier consists of a row of straw bales placed on a level contour. When appropriately placed, a straw bale barrier intercepts and slows sheet flow runoff, causing temporary ponding. The temporary ponding provides quiescent conditions allowing sediment to settle. Straw bale barriers also interrupt the slope length and thereby reduce erosion by reducing the tendency of sheet flows to concentrate into rivulets, which erode rills, and ultimately gullies, into disturbed, sloped soils.

Straw bale barriers have not been as effective as expected due to improper use. These barriers have been placed in streams and drainage ways where runoff volumes and velocities have caused the barriers to wash out. In addition, failure to stake and entrench the straw bale has allowed undercutting and end flow. Use of straw bale barriers in accordance with this BMP should produce acceptable results.

Design and Layout

- Locate straw bale barriers on a level contour.
 - Slopes up to 10:1 (H:V): Straw bales should be placed at a maximum interval of 50 ft (a closer spacing is more effective), with the first row near the toe of slope.
 - Slopes greater than 10:1 (H:V): Not recommended.

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- Allow sufficient space up slope from the barrier to allow ponding, and to provide room for sediment storage.
- For installation near the toe of the slope, consider moving the barrier away from the slope toe to facilitate cleaning. To prevent flow behind the barrier, sand bags can be placed perpendicular to the barrier to serve as cross barriers.
- Drainage area should not exceed 1 acre, or 0.25 acre per 100 ft of barrier.
- Maximum flow path to the barrier should be limited to 100 ft.
- Straw bale barriers should consist of two parallel rows.
 - Butt ends of bales tightly
 - Stagger butt joints between front and back row
 - Each row of bales must be trenched in and firmly staked
- Straw bale barriers are limited in height to one bale laid on its side.
- Anchor bales with either two wood stakes or four bars driven through the bale and into the soil. Drive the first stake towards the butt joint with the adjacent bale to force the bales together.
- See attached figure for installation details.

Materials

- *Straw Bale Size:* Each straw bale should be a minimum of 14 in. wide, 18 in. in height, 36 in. in length and should have a minimum mass of 50 lbs. The straw bale should be composed entirely of vegetative matter, except for the binding material.
- *Bale Bindings*: Bales should be bound by steel wire, nylon or polypropylene string placed horizontally. Jute and cotton binding should not be used. Baling wire should be a minimum diameter of 14 gauge. Nylon or polypropylene string should be approximately 12 gauge in diameter with a breaking strength of 80 lbs force.
- *Stakes*: Wood stakes should be commercial quality lumber of the size and shape shown on the plans. Each stake should be free from decay, splits or cracks longer than the thickness of the stake, or other defects that would weaken the stakes and cause the stakes to be structurally unsuitable. Steel bar reinforcement should be equal to a #4 designation or greater. End protection should be provided for any exposed bar reinforcement.

Costs

Straw bales cost \$5 - \$7 each. Adequate labor should be budgeted for installation and maintenance.

Inspection and Maintenance

Maintenance

- Inspect BMPs prior to forecast rain, daily during extended rain events, after rain events, weekly during the rainy season, and at two-week intervals during the non-rainy season.
- Straw bales degrade, especially when exposed to moisture. Rotting bales will need to be replaced on a regular basis.
- Replace or repair damaged bales as needed.
- Repair washouts or other damages as needed.
- Sediment that accumulates in the BMP must be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when the sediment accumulation reaches one-third of the barrier height. Sediment removed during maintenance may be incorporated into earthwork on the site or disposed at an appropriate location.
- Remove straw bales when no longer needed. Remove sediment accumulation, and clean, regrade, and stabilize the area. Removed sediment should be incorporated in the project or disposed of.

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.



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Storm Drain Inlet Protection



Description and Purpose

Storm drain inlet protection consists of a sediment filter or an impounding area in, around or upstream of a storm drain, drop inlet, or curb inlet. Storm drain inlet protection measures temporarily pond runoff before it enters the storm drain, allowing sediment to settle. Some filter configurations also remove sediment by filtering, but usually the ponding action results in the greatest sediment reduction. Temporary geotextile storm drain inserts attach underneath storm drain grates to capture and filter storm water.

Suitable Applications

Every storm drain inlet receiving runoff from unstabilized or otherwise active work areas should be protected. Inlet protection should be used in conjunction with other erosion and sediment controls to prevent sediment-laden stormwater and non-stormwater discharges from entering the storm drain system.

Limitations

- Drainage area should not exceed 1 acre.
- In general straw bales should not be used as inlet protection.
- Requires an adequate area for water to pond without encroaching into portions of the roadway subject to traffic.

Categories

×

WM	Materials Pollution Control	
	Management Control	
NS	Non-Stormwater	
WE	Wind Erosion Control	
TC	Tracking Control	
SE	Sediment Control	\checkmark
EC	Erosion Control	

Secondary Category

Targeted Constituents N Sediment

oodinion	
Nutrients	
Trash	×
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

SE-1 Silt Fence SE-5 Fiber Rolls SE-6 Gravel Bag Berm SE-8 Sandbag Barrier SE-14 Biofilter Bags



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- Sediment removal may be inadequate to prevent sediment discharges in high flow conditions or if runoff is heavily sediment laden. If high flow conditions are expected, use other onsite sediment trapping techniques in conjunction with inlet protection.
- Frequent maintenance is required.
- Limit drainage area to 1 acre maximum. For drainage areas larger than 1 acre, runoff should be routed to a sediment-trapping device designed for larger flows. See BMPs SE-2, Sediment Basin, and SE-3, Sediment Traps.
- Excavated drop inlet sediment traps are appropriate where relatively heavy flows are expected, and overflow capability is needed.

Implementation

General

Inlet control measures presented in this handbook should not be used for inlets draining more than one acre. Runoff from larger disturbed areas should be first routed through SE-2, Sediment Basin or SE-3, Sediment Trap and/or used in conjunction with other drainage control, erosion control, and sediment control BMPs to protect the site. Different types of inlet protection are appropriate for different applications depending on site conditions and the type of inlet. Alternative methods are available in addition to the methods described/shown herein such as prefabricated inlet insert devices, or gutter protection devices.

Design and Layout

Identify existing and planned storm drain inlets that have the potential to receive sedimentladen surface runoff. Determine if storm drain inlet protection is needed and which method to use.

- The key to successful and safe use of storm drain inlet protection devices is to know where runoff that is directed toward the inlet to be protected will pond or be diverted as a result of installing the protection device.
 - Determine the acceptable location and extent of ponding in the vicinity of the drain inlet. The acceptable location and extent of ponding will influence the type and design of the storm drain inlet protection device.
 - Determine the extent of potential runoff diversion caused by the storm drain inlet protection device. Runoff ponded by inlet protection devices may flow around the device and towards the next downstream inlet. In some cases, this is acceptable; in other cases, serious erosion or downstream property damage can be caused by these diversions. The possibility of runoff diversions will influence whether or not storm drain inlet protection is suitable; and, if suitable, the type and design of the device.
- The location and extent of ponding, and the extent of diversion, can usually be controlled through appropriate placement of the inlet protection device. In some cases, moving the inlet protection device a short distance upstream of the actual inlet can provide more efficient sediment control, limit ponding to desired areas, and prevent or control diversions.

- Six types of inlet protection are presented below. However, it is recognized that other effective methods and proprietary devices exist and may be selected.
 - Silt Fence: Appropriate for drainage basins with less than a 5% slope, sheet flows, and flows under 0.5 cfs.
 - Excavated Drop Inlet Sediment Trap: An excavated area around the inlet to trap sediment (SE-3).
 - Gravel bag barrier: Used to create a small sediment trap upstream of inlets on sloped, paved streets. Appropriate for sheet flow or when concentrated flow may exceed 0.5 cfs, and where overtopping is required to prevent flooding.
 - Block and Gravel Filter: Appropriate for flows greater than 0.5 cfs.
 - Temporary Geotextile Storm drain Inserts: Different products provide different features. Refer to manufacturer details for targeted pollutants and additional features.
 - Biofilter Bag Barrier: Used to create a small retention area upstream of inlets and can be located on pavement or soil. Biofilter bags slowly filter runoff allowing sediment to settle out. Appropriate for flows under 0.5 cfs.
- Select the appropriate type of inlet protection and design as referred to or as described in this fact sheet.
- Provide area around the inlet for water to pond without flooding structures and property.
- Grates and spaces around all inlets should be sealed to prevent seepage of sediment-laden water.
- Excavate sediment sumps (where needed) 1 to 2 ft with 2:1 side slopes around the inlet.

Installation

- **DI Protection Type 1 Silt Fence -** Similar to constructing a silt fence; see BMP SE-1, Silt Fence. Do not place fabric underneath the inlet grate since the collected sediment may fall into the drain inlet when the fabric is removed or replaced and water flow through the grate will be blocked resulting in flooding. See typical Type 1 installation details at the end of this fact sheet.
 - 1. Excavate a trench approximately 6 in. wide and 6 in. deep along the line of the silt fence inlet protection device.
 - 2. Place 2 in. by 2 in. wooden stakes around the perimeter of the inlet a maximum of 3 ft apart and drive them at least 18 in. into the ground or 12 in. below the bottom of the trench. The stakes should be at least 48 in.
 - 3. Lay fabric along bottom of trench, up side of trench, and then up stakes. See SE-1, Silt Fence, for details. The maximum silt fence height around the inlet is 24 in.
 - 4. Staple the filter fabric (for materials and specifications, see SE-1, Silt Fence) to wooden stakes. Use heavy-duty wire staples at least 1 in. in length.

- 5. Backfill the trench with gravel or compacted earth all the way around.
- **DI Protection Type 2 Excavated Drop Inlet Sediment Trap -** Install filter fabric fence in accordance with DI Protection Type 1. Size excavated trap to provide a minimum storage capacity calculated at the rate 67 yd³/acre of drainage area. See typical Type 2 installation details at the end of this fact sheet.
- DI Protection Type 3 Gravel bag Flow from a severe storm should not overtop the curb. In areas of high clay and silts, use filter fabric and gravel as additional filter media. Construct gravel bags in accordance with SE-6, Gravel Bag Berm. Gravel bags should be used due to their high permeability. See typical Type 3 installation details at the end of this fact sheet.
 - 1. Construct on gently sloping street.
 - 2. Leave room upstream of barrier for water to pond and sediment to settle.
 - 3. Place several layers of gravel bags overlapping the bags and packing them tightly together.
 - 4. Leave gap of one bag on the top row to serve as a spillway. Flow from a severe storm (e.g., 10 year storm) should not overtop the curb.
- DI Protection Type 4 Block and Gravel Filter Block and gravel filters are suitable for curb inlets commonly used in residential, commercial, and industrial construction. See typical Type 4 installation details at the end of this fact sheet.
 - 1. Place hardware cloth or comparable wire mesh with 0.5 in. openings over the drop inlet so that the wire extends a minimum of 1 ft beyond each side of the inlet structure. If more than one strip is necessary, overlap the strips. Place woven geotextile over the wire mesh.
 - 2. Place concrete blocks lengthwise on their sides in a single row around the perimeter of the inlet, so that the open ends face outward, not upward. The ends of adjacent blocks should abut. The height of the barrier can be varied, depending on design needs, by stacking combinations of blocks that are 4 in., 8 in., and 12 in. wide. The row of blocks should be at least 12 in. but no greater than 24 in. high.
 - 3. Place wire mesh over the outside vertical face (open end) of the concrete blocks to prevent stone from being washed through the blocks. Use hardware cloth or comparable wire mesh with 0.5 in. opening.
 - 4. Pile washed stone against the wire mesh to the top of the blocks. Use 0.75 to 3 in.
- DI Protection Type 5 Temporary Geotextile Insert (proprietary) Many types of temporary inserts are available. Most inserts fit underneath the grate of a drop inlet or inside of a curb inlet and are fastened to the outside of the grate or curb. These inserts are removable and many can be cleaned and reused. Installation of these inserts differs between manufacturers. Please refer to manufacturer instruction for installation of proprietary devices.

- DI Protection Type 6 Biofilter bags Biofilter bags may be used as a substitute for gravel bags in low-flow situations. Biofilter bags should conform to specifications detailed in SE-14, Biofilter bags.
 - 1. Construct in a gently sloping area.
 - 2. Biofilter bags should be placed around inlets to intercept runoff flows.
 - 3. All bag joints should overlap by 6 in.
 - 4. Leave room upstream for water to pond and for sediment to settle out.
 - 5. Stake bags to the ground as described in the following detail. Stakes may be omitted if bags are placed on a paved surface.

Costs

- Average annual cost for installation and maintenance of DI Type 1-4 and 6 (one year useful life) is \$200 per inlet.
- Temporary geotextile inserts are proprietary and cost varies by region. These inserts can
 often be reused and may have greater than 1 year of use if maintained and kept undamaged.
 Average cost per insert ranges from \$50-75 plus installation, but costs can exceed \$100.
 This cost does not include maintenance.

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Silt Fences. If the fabric becomes clogged, torn, or degrades, it should be replaced. Make sure the stakes are securely driven in the ground and are in good shape (i.e., not bent, cracked, or splintered, and are reasonably perpendicular to the ground). Replace damaged stakes. At a minimum, remove the sediment behind the fabric fence when accumulation reaches one-third the height of the fence or barrier height.
- Gravel Filters. If the gravel becomes clogged with sediment, it should be carefully removed from the inlet and either cleaned or replaced. Since cleaning gravel at a construction site may be difficult, consider using the sediment-laden stone as fill material and put fresh stone around the inlet. Inspect bags for holes, gashes, and snags, and replace bags as needed. Check gravel bags for proper arrangement and displacement.
- Sediment that accumulates in the BMP should be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when the sediment accumulation reaches one-third of the barrier height.
- Inspect and maintain temporary geotextile insert devices according to manufacturer's specifications.
- Remove storm drain inlet protection once the drainage area is stabilized.

Clean and regrade area around the inlet and clean the inside of the storm drain inlet, as _ it should be free of sediment and debris at the time of final inspection.

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Stormwater Management Manual for The Puget Sound Basin, Washington State Department of Ecology, Public Review Draft, 1991.

Erosion and Sediment Control Manual, Oregon Department of Environmental Quality, February 2005.

Storm Drain Inlet Protection



NOTES:

- 1. For use in areas where grading has been completed and final soil stabilization and seeding are pending.
- 2. Not applicable in paved areas.
- 3. Not applicable with concentrated flows.

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Notes

- 1. For use in cleared and grubbed and in graded areas.
- 2. Shape basin so that longest inflow area faces longest length of trap.
- 3. For concentrated flows, shape basin in 2:1 ratio with length oriented towards direction of flow.





TYPICAL PROTECTION FOR INLET ON GRADE

NOTES:

- 1. Intended for short-term use.
- 2. Use to inhibit non-storm water flow.
- 3. Allow for proper maintenance and cleanup.
- 4. Bags must be removed after adjacent operation is completed
- 5. Not applicable in areas with high silts and clays without filter fabric.

Storm Drain Inlet Protection



Temporary Silt Dike



Description and Purpose

Temporary silt dikes are pre-manufactured devices that are typically specified and installed for semi-permanent drainage and sediment control on the perimeter of disturbed sites or stockpiles and as check dams within channels.

Suitable Applications

Temporary silt dikes are generally used in areas as a substitute for fiber rolls and silt fences to slow down runoff water, divert drainage or contain fines and sediment. A temporary silt dike typically consists of a triangular foam or recycled rubber core covered in geotextile fabric. Temporary silt dikes are a linear control and have a variety of profiles (triangular, round, and square). Temporary silt dikes may be suitable for:

- On paved surfaces for perimeter protection.
- As check structures in channels.
- Along the perimeter of disturbed sites in lieu of silt fence.
- At operational storm drains as a form of inlet protection.
- Around temporary stockpiles or material/equipment storage areas.
- At the interface between graveled driveways and pavement.
- Along the toe of exposed and erodible slopes.

Categories

EC	Erosion Control	×	
SE	Sediment Control	\checkmark	
тс	Tracking Control		
WE	Wind Erosion Control		
NS	Non-Stormwater Management Control		
WM	Waste Management and Materials Pollution Control		
Legend:			
\checkmark	Primary Category		
×	Secondary Category		

Targeted Constituents

Sediment	\checkmark
Nutrients	
Trash	×
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

SE-1 Silt Fence SE-5 Fiber Roll SE-6 Gravel Bag Berm SE-8 Sandbag Barrier



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Limitations

- Temporary silt dikes require additional measures to adhere to asphalt in cold and windy climates, as glue may not adhere adequately to the pavement.
- Temporary silt dikes may not be appropriate for drainage areas greater than 5 acres.
- Runoff will pond upstream of the barrier, possibly causing flooding or bypass if sufficient space does not exist to accommodate ponding.
- Temporary silt dikes may require frequent maintenance especially when used near vehicle traffic or to detain concentrated flows (e.g. check dams or inlet protection).
- When used to detain concentrated flows, maintenance requirements increase.

Implementation

General

When appropriately placed, temporary silt dikes intercept and slow sheet flow runoff, causing temporary ponding. The temporary ponding provides quiescent conditions allowing sediment to settle. The core is porous, which allows the ponded runoff to flow slowly through the silt dike, releasing the runoff as sheet flows. Generally, temporary silt dikes should be used in conjunction with temporary soil stabilization controls up slope to provide effective erosion and sediment control or as a non-stormwater perimeter control.

Design and Layout

- Temporary silt dikes used on soil should be attached to the ground per manufacturer specifications.
- Temporary silt dikes used on asphalt or concrete may be attached using a variety of methods, including nailing the dikes to the pavement, or using a high strength adhesive.
- Follow manufacturer specifications when installing temporary silt dikes.
- Allow sufficient space up slope from the silt dikes to allow ponding, and to provide room for sediment storage.
- For installation near the toe of the slope, temporary silt dike should be set back three feet from the slope toe to facilitate cleaning. Where site conditions do not allow set back, the silt dike may be constructed on the toe of the slope. To prevent flows behind the barrier, bags can be placed perpendicular to a berm to serve as cross barriers.
- Drainage area should not exceed 5 acres.
- Butt ends of temporary silt dike tightly. Overlaps should be sealed in accordance with the manufacturer's detail.

Materials

• Several manufactured products are available.

Costs

Silt dike averages \$35-45 per 7 ft. section.

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Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Temporary silt dike exposed to sunlight will need to be replaced more frequently due to photo-degradation.
- Reshape or replace sections of damaged temporary silt dike as needed.
- Repair washouts or other damage as needed.
- Sediment that accumulates behind the BMP should be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when the sediment accumulation reaches one-third of the barrier height.
- Remove temporary silt dikes when no longer needed. Remove sediment accumulation and clean, re-grade, and stabilize the area. Removed sediment should be incorporated in the project or disposed of properly.

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Erosion and Sediment Control Manual, Oregon Department of Environmental Quality, February 2005.
Compost Socks and Berms



Description and Purpose

Compost socks and berms act as three-dimensional biodegradable filtering structures to intercept runoff where sheet flow occurs and are generally placed at the site perimeter or at intervals on sloped areas. Compost socks are generally a mesh sock containing compost and a compost berm is a dike of compost, trapezoidal in cross section. When employed to intercept sheet flow, both BMPs are placed perpendicular to the flow of runoff, allowing filtered runoff to pass through the compost and retaining sediment (and potentially other pollutants). A compost sock can be assembled on site by filling a mesh sock (e.g. with a pneumatic blower). The compost berm should be constructed using a backhoe or equivalent and/or a pneumatic delivery (blower) system and should be properly compacted. Compost socks and berms act as filters, reduce runoff velocities, and in some cases, aid in establishing vegetation.

Compost is organic, biodegradable, and renewable. Compost provides soil structure that allows water to infiltrate the compost medium which helps prevent rill erosion and the retained moisture promotes seed germination and vegetation growth, in addition to providing organic matter and nutrients important for fostering vegetation. Compost improves soil quality and productivity, as well as erosion and sediment control. The compost of the compost sock or berm can be selected that targets site specific objectives in capturing sediment and other pollutants, supporting vegetation, or additional erosion control.

Categories

Leg	end:	
WM	Waste Management and Materials Pollution Control	
NS	Non-Stormwater Management Control	
WE	Wind Erosion Control	
тс	Tracking Control	
SE	Sediment Control	\checkmark
EC	Erosion Control	×

Secondary Category

Targeted Constituents

Sediment	\checkmark
Nutrients	
Trash	
Metals	×
Bacteria	×
Oil and Grease	×
Organics	

Potential Alternatives

SE-1 Silt Fence SE-5 Fiber Roll SE-6 Gravel Bag Berm SE-8 Sandbag Barrier SE-14 Biofilter Bags





Compost is typically derived from combinations of feedstocks, biosolids, leaf and yard trimmings, manure, wood, or mixed solid waste. Many types of compost are products of municipal recycle or "Greenwaste" programs. Compost is organic and biodegradable and can be left onsite. There are many types of compost with a variety of properties with specific functions, and accordingly compost selection is an important design consideration in the application of this type of erosion and sediment control.

Suitable Applications

- Along the toe, top, face, and at grade breaks of exposed and erodible slopes to shorten slope length and spread runoff as sheet flow (compost berms should only be used at the top of slopes or on slopes 4:1 (H:V) or flatter, all other slope applications should use compost socks)
- Along the perimeter of a project
- As check dams in unlined ditches (compost socks only)
- Down-slope of exposed soil areas
- At operational storm drains as a form of inlet protection (compost socks only)
- Around temporary stockpiles

Compost socks and berms do not require special trenching or BMP removal compared to other sediment control methods (e.g. silt fence or fiber rolls). Compost socks and berms can remain in place after earth disturbing activities are completed or the compost components can be spread over the site providing nutrients for plant growth and augmenting soil structure. BMPs that remain in place are particularly advantageous below embankments, especially adjacent streams, by limiting re-entry and the disturbance to sensitive areas.

Compost can be pre-seeded prior to application (recommended by the EPA for construction site stormwater runoff control and required for compost socks) or seeded after installation (for compost berms only). The compost medium can also remove pollutants in stormwater including heavy metals; oil and grease; and hydrocarbons.

Limitations

- Compost can potentially leach nutrients (dissolved phosphorus and nitrogen) into runoff and potentially impact water quality. Compost should not be used directly upstream from nutrient impaired waterbodies (Adams et. al, 2008).
- Compost may also contain other undesirable constituents that are detrimental to water quality. Compost should be obtained from a supplier certified by the California Integrated Waste Management Board or compost should otherwise meet the environmental health standards of Title 14, California Code of Regulations, Division 7, Chapter 3.1, Article 7. Carefully consider the qualifications and experience of any compost producer/supplier.
- Application by hand is more time intensive and potentially costly. Using a pneumatic blower truck is the recommended cost effective method of assembly.
- Compost socks and berms should not be employed at the base of slopes greater than 2:1 (H:V). They can be employed with other erosion control methods for steeper slopes.

- Difficult to move once saturated.
- Compost berms should not be applied in areas of concentrated flows.
- Compost socks and berms are easy to fix; however, they are susceptible to damage by frequent traffic. Compost socks can be used around heavy machinery, but regular disturbance decreases sock performance.

Implementation

Compost Materials

- California Compost Regulations (Title 14, California Code of Regulations, Division 7, Chapter 3.1, Article 7, Section 17868.3) define and require a quality of compost for application. Compost should comply with all physical and chemical requirements. Specific requirements are provided in Table 1, taken from Caltrans Standard Special Provision 10-1 (SSP 10-1), Erosion Control (Compost Blanket).
- The compost producer should be fully permitted as specified under the California Integrated Waste Management Board, Local Enforcement Agencies and any other State and Local Agencies that regulate Solid Waste Facilities. If exempt from State permitting requirements, the composting facility should certify that it follows guidelines and procedures for production of compost meeting the environmental health standards of Title 14, California Code of Regulations, Division 7, Chapter 3.1, Article 7.
- The compost producer should be a participant in United States Composting Council's Seal of Testing Assurance program.
- Compost medium parameter specifications for compost socks and berms have been developed to assist in compost selection, such as those provided by the American Association of State Highway Transportation Officials (AASHTO).
- Particle size is important parameter for selecting compost. Well consolidated coarser grades
 of compost (e.g. small and large pieces) perform better for filtration objectives, while finer
 grades better support vegetation. Particle size of the compost should be selected based on
 site conditions, such as expected precipitation, and filtration goals and / or long term plant
 nutrients.
- Compost moisture should be considered for composition quality and application purposes. A range of 30-50% is typical. Compost that is too dry is hard to apply and compost that is too wet is more difficult (and more expensive) to transport. For arid or semi-arid areas, or for application during the dry season, use compost with greater moisture content than areas with wetter climates. For wetter or more humid climates or for application during the wet season, drier composts can be used as the compost will absorb moisture from the ambient air.
- If vegetation establishment is a desired function of the compost, a compost sample should be inspected by a qualified individual. Vegetation has different nutrient and moisture needs.
- Organic content of the compost is also important and should range from 30 to 65% depending on site conditions.

- Compost should not be derived from mixed municipal solid waste and should be reasonably free of visible contaminates.
- Compost should not contain paint, petroleum products, pesticides or any other chemical residues harmful to animal life or plant growth. Metal concentrations in compost should not exceed the maximum metal concentrations listed under Title 14, California Code of Regulations, Division 7, Chapter 3.1, Section 17868.2.
- Compost should not possess objectionable odors.
- Compost should be weed free.

Compost Socks and Berms

Property	Test Method	Requirement
	*TMECC 04.11-A	
pH	Elastometric pH 1:5 Slurry Method	6.0-8.0
	pH Units	
Soluble Salts	TMECC 04.10-A	
Soluble Saits	Electrical Conductivity 1:5 Slurry Method	0-10.0
	dS/m (mmhos/cm)	
	TMECC 03.09-A	
Moisture Content	Total Solids & Moisture at 70+/- 5 deg C	30-60
	% Wet Weight Basis	
Organic Matter	TMECC 05.07-A	
Content	Loss-On-Ignition Organic Matter Method (LOI)	30-65
Content	% Dry Weight Basis	
	TMECC 05.05-A	
Maturity	Germination and Vigor	80 or Above
	Seed Emergence	80 or Above
	Seedling Vigor	SO OF ADOVE
	% Relative to Positive Control	
	TMECC 05.08-B	
Stability	Carbon Dioxide Evolution Rate	8 or below
	mg CO ₂ -C/g OM per day	
		100% Passing, 3 inch
	TMECC 02.02-B	90-100% Passing, 1 inch
Particle Size	Sample Sieving for Aggregate Size Classification	65-100% Passing, 3/4 inch
	% Dry Weight Basis	0 - 75% Passing, 1/4 inch
		Maximum length 6 inches
Pathogen	TMECC 07.01-B	
ratilogen	Fecal Coliform Bacteria	Pass
	< 1000 MPN/gram dry wt.	
Pathogen	TMECC 07.01-B	
i utilogen	Salmonella	Pass
	< 3 MPN/4 grams dry wt.	
	TMECC 02.02-C	
Physical Contaminants	Man Made Inert Removal and Classification:	Combined Total:
i nysicar containinants	Plastic, Glass and Metal	< 1.0
	% > 4mm fraction	
	TMECC 02.02-C	
	Man Made Inert Removal and Classification:	
Physical Contaminants	Sharps (Sewing needles, straight pins and hypodermic	None Detected
	needles)	
	% > 4mm fraction	

 Table 1. Physical/Chemical Requirements of Compost

 Reference - Caltrans SSP-10 Erosion Control Blanket (Compost)

*TMECC refers to "Test Methods for the Examination of Composting and Compost," published by the United States Department of Agriculture and the United States Compost Council (USCC).

Installation

- Prior to application, prepare locations for socks and berms by removing brush and thick vegetation. The compost of the sock and/or berm should be allowed to come in full contact with the ground surface.
- Select method to apply the compost sock or berm. A pneumatic blower is most cost effective and most adaptive in applying compost to steep, rough terrain, and hard to reach locations.
- The compost of the berm should be distributed evenly to the surface, compacted, and shaped trapezoidal in cross section. Berm design is generally consists of a base two times the height. AASHTO specification MP 9-03 provides compost berm dimensions based on anticipated site precipitation (AASHTO, 2003 and USEPA, 2009). State agencies, such as Oregon

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Department of Environmental Quality (ODEQ) have developed berm dimension based on slope steepness and length (ODEQ, 2004).

- Compost socks can be assembled on site by filling mesh socks with the selected compost. Mesh socks can be tied at one end, filled, and then tied at the other end. The ends of socks can be interlocked until the desired length is achieved. The sock diameter is a function of slope steepness and length. Again, ASSHTO provides specifications for various parameters. Compost socks range from 8" to 18", but are typically 12" to 18" in diameter.
- Compost socks are typically placed in contours perpendicular to sheet flow. They can also be placed in V formation on a slope. Compost socks need to be anchored, typically stakes, through the center of the sock. To prevent water flowing around them, the ends of compost socks should be placed upslope.
- Locate compost socks and berms on level contours spaced as follows:
 - Slope inclination of 4:1 (H:V) or flatter: Socks and/or berms should be placed at a maximum interval of 20 ft.
 - Slope inclination between 4:1 and 2:1 (H:V): Socks should be placed at a maximum interval of 15 ft. (a closer spacing is more effective).
 - Slope inclination 2:1 (H:V) or greater: Socks should be placed at a maximum interval of 10 ft. (a closer spacing is more effective).
- Place perimeter socks and berms using a j-hook installation. Use of vegetation will also provide additional anchoring.
- Compost socks and berms can be placed around the perimeter of an affected area, like a silt fence, if the area is flat or on a contour. Do not place these socks and berms where ponded water could become an issue.
- If used at the toe of slopes, the compost sock or berm should at a minimum of 5 to 10 feet away.
- Use additional anchoring and erosion control BMPS in conjunction of the compost socks and berms as needed.
- Consider using compost berms or socks as necessary at the top and/or bottom of the slope for additional erosion control performance.
- Compost socks and berms can also be effective over rocky and frozen ground if installed properly.
- It is recommended that the drainage areas of these compost BMPs do not exceed 0.25 acre per 100 feet placement interval and runoff does not exceed 1 cubic foot per second.

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Costs

Recently obtained vendor costs indicated \$3.50 per linear foot for compost berm application and \$2.00 per linear foot for 8" socks and \$2.50 per linear foot for 12"socks. Costs do not include final compost sock or berm functions at the end of construction activities, including spreading or removal, if required. ODEQ estimates that compost berms cost 30 percent less than silt fences to install.

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Once damage is identified, mend or reapply the sock or berm as needed. Washed out areas should be replaced. If the sock or berm height is breached during a storm, an additional sock can be stacked to increase the sock height and similarly the berm dimensions can be increased, as applicable. An additional sock or berm may be installed upslope, as needed. It may be necessary to apply an additional type of stormwater BMP, such as a compost blanket.
- Sediment contained by the sock or berm should be removed prior reaching 1/3 of the exposed height of the BMP. The sediment can be stabilized with the compost sock or berm with vegetation at the end of construction activities.
- Care should be exercised to minimize the damage to protected areas while making repairs, as any area damaged will require reapplication of BMPs.
- Limit traffic to minimize damage to BMPs or impede vegetation establishment.

References

An analysis of Composting as an Environmental Remediation Technology, U.S. Environmental Protection Agency (USEPA), Solid Waste and Emergency Response (5305W), EPA530-R-8-008, 1998.

Characteristics of Compost: Moisture Holding and Water Quality Improvement, Center for Research in Water Resources, Kirchoff, C., Malina, J., and Barrett, M., 2003.

Compost Utilization for Erosion Control, The University of Georgia College of Agricultural and Environmental Sciences, pubs.caes.uga.edu/caespubs/pubcd/B1200.htm, Faucette, B. and Risse, M., 2001.

Erosion and Sediment Control Manual, Oregon Department of Environmental Quality, February 2005.

Standard Special Provision 10-1, Erosion Control (Compost Blanket), State of California Department of Transportation (Caltrans). 2007 Update.

Evaluation of Environmental Benefits and Impacts of Compost and Industry Standard Erosion and Sediment Controls Measures Used in Construction Activities, Dissertation, Institute of Ecology, University of Georgia, Faucette, B., 2004. National Pollutant Discharge Elimination System (NPDES), Compost Blankets, U.S. Environmental Protection Agency (USEPA). http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=factsheet results&vie w=specific&bmp=118, 2009.

Standard Specifications for Transportation Materials and Methods of Sampling and Testing, Designation MP-9, Compost for Erosion/Sediment Control (Filter Berms), Provisional, American Association of State Highway Transportation Officials (AASHTO), 2003.

Stormwater Best Management Practices (BMPs) Field Trials of Erosion Control Compost in Reclamation of Rock Quarry Operations, Nonpoint Source Protection Program CWA §319(h), Texas Commission on Environmental Quality, Adams, T., McFarland, A., Hauck, L., Barrett, M., and Eck, B., 2008.

Biofilter Bags



Description and Purpose

Biofilter bags, or bio-bags, are a multi-purpose sediment control BMP consisting of a plastic mesh bag filled with 100% recycled wood product waste. Biofilter bags come in a variety of sizes (30" X 18" and 30" X 9" being common) and generally have between 1-2 cubic yards of recycled wood waste (or wood chips). Biofilter bags work by detaining flow and allowing a slow rate of discharge through the wood media. This action removes suspended sediment through gravity settling of the detained water and filtration within the bag.

Suitable Applications

Biofilter bags are a short-term BMP that can be rapidly deployed, maintained, and replaced. Biofilter bags can be an effective short-term solution to place in developed rills to prevent further erosion until permanent measures can be established. Suitable short-term applications include:

- As a linear sediment control measure:
 - Below the toe of slopes and erodible slopes
 - Below other small cleared areas
 - Along the perimeter of a site (with low-expected flow)
 - Down slope of exposed soil areas
 - Around temporary stockpiles and spoil areas
 - Parallel to a roadway to keep sediment off paved areas

Categories

⊡	Primary Category	
l ea	end	
WM	Waste Management and Materials Pollution Control	
NS	Non-Stormwater Management Control	
WE	Wind Erosion Control	
TR	Tracking Control	
SE	Sediment Control	\checkmark
EC	Erosion Control	

Secondary Category

Targeted Constituents

Sediment	\checkmark
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

SE-1 Silt Fence SE-4 Check Dams SE-5 Fiber Roll SE-6 Gravel Bag Berm SE-8 Sandbag Barrier SE-10 Storm Drain Inlet Protection



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- Along streams and channels
- As linear erosion control measure:
 - Along the face and at grade breaks of exposed and erodible slopes to shorten slope length and spread runoff as sheet flow
 - At the top of slopes to divert runoff away from disturbed slopes
 - As check dams across mildly sloped construction roads
- Inlet Protection (See SE-10)
- Supplement to silt fences or other sediment control devices

Limitations

- Short life-span (2-3 months); regular maintenance and replacement required to ensure effectiveness. Bags will rapidly fill with sediment and reduce permeability.
- Easily damaged by construction vehicles.
- If not properly staked, will fail on slope applications.
- If improperly installed can allow undercutting or side-cutting flow.
- Not effective where water velocities or volumes are high.
- Potentially buoyant and easily displaced if not properly installed.

Implementation

General

Biofilter bags are a relatively low cost temporary BMP that are easily deployed and have a simple installation that can be performed by hand. Without proper installation, however, biofilter bags can fail due to their light weight, potential displacement, and multiple joint locations. One of the benefits of utilizing biofilter bags is that the media (wood-product) can be recycled or used onsite when no longer needed (where acceptable).

Design and Layout – Linear control

- Locate biofilter bags on level contours.
 - Slopes between 20:1 and 4:1 (H:V): Biofilter bags should be placed at a maximum interval of 20 ft, with the first row near the slope toe.
 - Slopes between 4:1 and 2:1 (H:V): Biofilter bags should be placed at a maximum interval of 15 ft, with the first row near the slope toe.
 - Slopes 2:1 (H:V) or steeper: Biofilter bags should be placed at a maximum interval of 10 ft., with the first row placed the slope toe.

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- Turn the ends of the biofilter bag barriers up slope to prevent runoff from going around the berm.
- Allow sufficient space up slope from the biofilter bag berm to allow ponding, and to provide room for sediment storage.
- Stake biofilter bags into a 1 to 2 in. deep trench with a width equal to the bag.
 - Drive one stake at each end of the bag.
 - Use wood stakes with a nominal classification of 0.75 by 0.75 in. and minimum length of 24 in.
- Biofilter bags should be overlapped (6 in.), not abutted.

Costs

Pre-filled biofilter bags cost approximately \$2.50-\$3.50 per bag, dependent upon size.

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Biofilter bags exposed to sunlight will need to be replaced every two to three months due to degrading of the bags.
- Reshape or replace biofilter bags as needed.
- Repair washouts or other damage as needed.
- Sediment that is retained by the BMP should be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when the sediment accumulation reaches one-third of the barrier height.
- Remove biofilter bag berms when no longer needed. Remove sediment accumulation and clean, re-grade, and stabilize the area. Biofilter media may be used on-site, if allowed.

References

Catalog of Stormwater Best Management Practices for Idaho Cities and Counties. Volume 2, Section 7, BMP 34 – Biofilter Bags, Idaho Department of Environmental Quality, 2005.

Erosion and Sediment Control Manual, Oregon Department of Environmental Quality, February 2005.

Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Wind Erosion Control



Description and Purpose

Wind erosion or dust control consists of applying water or other chemical dust suppressants as necessary to prevent or alleviate dust nuisance generated by construction activities. Covering small stockpiles or areas is an alternative to applying water or other dust palliatives.

California's Mediterranean climate, with a short "wet" season and a typically long, hot "dry" season, allows the soils to thoroughly dry out. During the dry season, construction activities are at their peak, and disturbed and exposed areas are increasingly subject to wind erosion, sediment tracking and dust generated by construction equipment. Site conditions and climate can make dust control more of an erosion problem than water based erosion. Additionally, many local agencies, including Air Quality Management Districts, require dust control and/or dust control permits in order to comply with local nuisance laws, opacity laws (visibility impairment) and the requirements of the Clean Air Act. Wind erosion control is required to be implemented at all construction sites greater than 1 acre by the General Permit.

Suitable Applications

Most BMPs that provide protection against water-based erosion will also protect against wind-based erosion and dust control requirements required by other agencies will generally meet wind erosion control requirements for water quality protection. Wind erosion control BMPs are suitable during the following construction activities:

Categories

EC	Erosion Control			
SE	Sediment Control	×		
тс	Tracking Control			
WE	Wind Erosion Control	\checkmark		
NS	Non-Stormwater Management Control			
WM	Waste Management and Materials Pollution Control			
Legend:				
∑ ı	Primary Category			
X	Secondary Category			

Targeted Constituents

Sediment	V
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

EC-5 Soil Binders



- Construction vehicle traffic on unpaved roads
- Drilling and blasting activities
- Soils and debris storage piles
- Batch drop from front-end loaders
- Areas with unstabilized soil
- Final grading/site stabilization

Limitations

- Watering prevents dust only for a short period (generally less than a few hours) and should be applied daily (or more often) to be effective.
- Over watering may cause erosion and track-out.
- Oil or oil-treated subgrade should not be used for dust control because the oil may migrate into drainageways and/or seep into the soil.
- Chemical dust suppression agents may have potential environmental impacts. Selected chemical dust control agents should be environmentally benign.
- Effectiveness of controls depends on soil, temperature, humidity, wind velocity and traffic.
- Chemical dust suppression agents should not be used within 100 feet of wetlands or water bodies.
- Chemically treated subgrades may make the soil water repellant, interfering with long-term infiltration and the vegetation/re-vegetation of the site. Some chemical dust suppressants may be subject to freezing and may contain solvents and should be handled properly.
- In compacted areas, watering and other liquid dust control measures may wash sediment or other constituents into the drainage system.
- If the soil surface has minimal natural moisture, the affected area may need to be pre-wetted so that chemical dust control agents can uniformly penetrate the soil surface.

Implementation

Dust Control Practices

Dust control BMPs generally stabilize exposed surfaces and minimize activities that suspend or track dust particles. The following table presents dust control practices that can be applied to varying site conditions that could potentially cause dust. For heavily traveled and disturbed areas, wet suppression (watering), chemical dust suppression, gravel asphalt surfacing, temporary gravel construction entrances, equipment wash-out areas, and haul truck covers can be employed as dust control applications. Permanent or temporary vegetation and mulching can be employed for areas of occasional or no construction traffic. Preventive measures include minimizing surface areas to be disturbed, limiting onsite vehicle traffic to 15 mph or less, and controlling the number and activity of vehicles on a site at any given time.

Chemical dust suppressants include: mulch and fiber based dust palliatives (e.g. paper mulch with gypsum binder), salts and brines (e.g. calcium chloride, magnesium chloride), non-petroleum based organics (e.g. vegetable oil, lignosulfonate), petroleum based organics (e.g. asphalt emulsion, dust oils, petroleum resins), synthetic polymers (e.g. polyvinyl acetate, vinyls, acrylic), clay additives (e.g. bentonite, montimorillonite) and electrochemical products (e.g. enzymes, ionic products).

	Dust Control Practices							
Site Condition	Permanent Vegetation	Mulching	Wet Suppression (Watering)	Chemical Dust Suppression	Gravel or Asphalt	Temporary Gravel Construction Entrances/Equipment Wash Down	Synthetic Covers	Minimize Extent of Disturbed Area
Disturbed Areas not Subject to Traffic	Х	Х	Х	Х	Х			Х
Disturbed Areas Subject to Traffic			Х	Х	Х	Х		Х
Material Stockpiles		Х	Х	Х			Х	Х
Demolition			Х			Х	х	
Clearing/ Excavation			Х	Х				Х
Truck Traffic on Unpaved Roads			Х	Х	X	х	X	
Tracking					Х	X		

Additional preventive measures include:

- Schedule construction activities to minimize exposed area (see EC-1, Scheduling).
- Quickly treat exposed soils using water, mulching, chemical dust suppressants, or stone/gravel layering.
- Identify and stabilize key access points prior to commencement of construction.
- Minimize the impact of dust by anticipating the direction of prevailing winds.
- Restrict construction traffic to stabilized roadways within the project site, as practicable.
- Water should be applied by means of pressure-type distributors or pipelines equipped with a spray system or hoses and nozzles that will ensure even distribution.
- All distribution equipment should be equipped with a positive means of shutoff.
- Unless water is applied by means of pipelines, at least one mobile unit should be available at all times to apply water or dust palliative to the project.
- If reclaimed waste water is used, the sources and discharge must meet California Department of Health Services water reclamation criteria and the Regional Water Quality

Control Board (RWOCB) requirements. Non-potable water should not be conveyed in tanks or drain pipes that will be used to convey potable water and there should be no connection between potable and non-potable supplies. Non-potable tanks, pipes, and other conveyances should be marked, "NON-POTABLE WATER - DO NOT DRINK."

- Pave or chemically stabilize access points where unpaved traffic surfaces adjoin paved roads.
- Provide covers for haul trucks transporting materials that contribute to dust.
- Provide for rapid clean up of sediments deposited on paved roads. Furnish stabilized construction road entrances and wheel wash areas.
- Stabilize inactive areas of construction sites using temporary vegetation or chemical stabilization methods.

For chemical stabilization, there are many products available for chemically stabilizing gravel roadways and stockpiles. If chemical stabilization is used, the chemicals should not create any adverse effects on stormwater, plant life, or groundwater and should meet all applicable regulatory requirements.

Costs

Installation costs for water and chemical dust suppression vary based on the method used and the length of effectiveness. Annual costs may be high since some of these measures are effective for only a few hours to a few days.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities.
- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Check areas protected to ensure coverage.
- Most water-based dust control measures require frequent application, often daily or even multiple times per day. Obtain vendor or independent information on longevity of chemical dust suppressants.

References

Best Management Practices and Erosion Control Manual for Construction Sites, Flood Control District of Maricopa County, Arizona, September 1992.

California Air Pollution Control Laws, California Air Resources Board, updated annually.

Construction Manual, Chapter 4, Section 10, "Dust Control"; Section 17, "Watering"; and Section 18, "Dust Palliative", California Department of Transportation (Caltrans), July 2001.

North Crown Point Comfort Station

Prospects for Attaining the State Ambient Air Quality Standards for Suspended Particulate Matter (PM10), Visibility Reducing Particles, Sulfates, Lead, and Hydrogen Sulfide, California Air Resources Board, April 1991.

Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Entrance/ Outlet Tire Wash

× \mathbf{N}

 \mathbf{N}

Categories

EC SE

TC WE

NS

WM

Legend:

Sediment

Nutrients

Trash

Metals

Bacteria

Organics

Erosion Control

Sediment Control

Tracking Control

Primary Objective Secondary Objective

Wind Erosion Control Non-Stormwater

Management Control Waste Management and

Materials Pollution Control



Description and Purpose

A tire wash is an area located at stabilized construction access points to remove sediment from tires and under carriages and to prevent sediment from being transported onto public roadways.

Suitable Applications

Tire washes may be used on construction sites where dirt and mud tracking onto public roads by construction vehicles may occur.

Limitations

- The tire wash requires a supply of wash water.
- A turnout or doublewide exit is required to avoid having entering vehicles drive through the wash area.
- Do not use where wet tire trucks leaving the site leave the road dangerously slick.

Implementation

- Incorporate with a stabilized construction entrance/exit. See TC-1, Stabilized Construction Entrance/Exit.
- Construct on level ground when possible, on a pad of coarse aggregate greater than 3 in. but smaller than 6 in. A geotextile fabric should be placed below the aggregate.
- Wash rack should be designed and constructed/manufactured for anticipated traffic loads.

Oil and Grease

Targeted Constituents

Potential Alternatives

TC-1 Stabilized Construction Entrance/Exit



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1 of 3

- Provide a drainage ditch that will convey the runoff from the wash area to a sediment trapping device. The drainage ditch should be of sufficient grade, width, and depth to carry the wash runoff.
- Use hoses with automatic shutoff nozzles to prevent hoses from being left on.
- Require that all employees, subcontractors, and others that leave the site with mud caked tires and undercarriages to use the wash facility.
- Implement SC-7, Street Sweeping and Vacuuming, as needed.

Costs

Costs are low for installation of wash rack.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and of two-week intervals in the non-rainy season to verify continued BMP implementation.
- Inspect BMPs subject to non-stormwater discharge daily while non-stormwater discharges occur.
- Remove accumulated sediment in wash rack and/or sediment trap to maintain system performance.
- Inspect routinely for damage and repair as needed.

References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Coastal Nonpoint Pollution Control Program; Program Development and Approval Guidance, Working Group, Working Paper; USEPA, April 1992.

Manual of Standards of Erosion and Sediment Control Measures, Association of Bay Area Governments, May 1995.

Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.



North Crown Point Comfort Station

TC-3

Water Conservation Practices



Description and Purpose

Water conservation practices are activities that use water during the construction of a project in a manner that avoids causing erosion and the transport of pollutants offsite. These practices can reduce or eliminate non-stormwater discharges.

Suitable Applications

Water conservation practices are suitable for all construction sites where water is used, including piped water, metered water, trucked water, and water from a reservoir.

Limitations

None identified.

Implementation

- Keep water equipment in good working condition.
- Stabilize water truck filling area.
- Repair water leaks promptly.
- Washing of vehicles and equipment on the construction site is discouraged.
- Avoid using water to clean construction areas. If water must be used for cleaning or surface preparation, surface should be swept and vacuumed first to remove dirt. This will minimize amount of water required.
- Direct construction water runoff to areas where it can soak

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Appendix E North Crown Point - New Comfort Station Station State Pollution Control Plan North Crown Point Comfort Station

Categories

EC	Erosion Control	×		
SE	Sediment Control	×		
тс	Tracking Control			
WE	Wind Erosion Control			
NS	Non-Stormwater	N		
NO	Management Control	Ľ		
wм	Waste Management and			
VVIVI	Materials Pollution Control			
Legend:				
⊠ F	Primary Objective			

Targeted Constituents

Secondary Objective

Sediment	\checkmark
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None



into the ground or be collected and reused.

- Authorized non-stormwater discharges to the storm drain system, channels, or receiving waters are acceptable with the implementation of appropriate BMPs.
- Lock water tank valves to prevent unauthorized use.

Costs

The cost is small to none compared to the benefits of conserving water.

Inspection and Maintenance

- Inspect and verify that activity based BMPs are in place prior to the commencement of authorized non-stormwater discharges.
- Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges are occuring.
- Repair water equipment as needed to prevent unintended discharges.
 - Water trucks _
 - Water reservoirs (water buffalos)
 - Irrigation systems -
 - Hydrant connections _

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Paving and Grinding Operations



Description and Purpose

Prevent or reduce the discharge of pollutants from paving operations, using measures to prevent runon and runoff pollution, properly disposing of wastes, and training employees and subcontractors.

The General Permit incorporates Numeric Effluent Limits (NEL) and Numeric Action Levels (NAL) for pH and turbidity (see Section 2 of this handbook to determine your project's risk level and if you are subject to these requirements).

Many types of construction materials associated with paving and grinding operations, including mortar, concrete, and cement and their associated wastes have basic chemical properties that can raise pH levels outside of the permitted range. Additional care should be taken when managing these materials to prevent them from coming into contact with stormwater flows, which could lead to exceedances of the General Permit requirements.

Suitable Applications

These procedures are implemented where paving, surfacing, resurfacing, or sawcutting, may pollute stormwater runoff or discharge to the storm drain system or watercourses.

Limitations

- Paving opportunities may be limited during wet weather.
- Discharges of freshly paved surfaces may raise pH to environmentally harmful levels and trigger permit violations.

November 2009

Categories

\checkmark	Primary Category	
Leg	end:	
WM	Waste Management and Materials Pollution Control	×
NS	Non-Stormwater Management Control	\checkmark
WE	Wind Erosion Control	
тс	Tracking Control	
SE	Sediment Control	
EC	Erosion Control	

Secondary Category

Targeted Constituents

Sediment	\checkmark
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	\checkmark
Organics	

Potential Alternatives

None



Implementation

General

- Avoid paving during the wet season when feasible.
- Reschedule paving and grinding activities if rain is forecasted.
- Train employees and sub-contractors in pollution prevention and reduction.
- Store materials away from drainage courses to prevent stormwater runon (see WM-1, Material Delivery and Storage).
- Protect drainage courses, particularly in areas with a grade, by employing BMPs to divert runoff or to trap and filter sediment.
- Stockpile material removed from roadways away from drain inlets, drainage ditches, and watercourses. These materials should be stored consistent with WM-3, Stockpile Management.
- Disposal of PCC (Portland cement concrete) and AC (asphalt concrete) waste should be in conformance with WM-8, Concrete Waste Management.

Saw Cutting, Grinding, and Pavement Removal

- Shovel or vacuum saw-cut slurry and remove from site. Cover or barricade storm drains during saw cutting to contain slurry.
- When paving involves AC, the following steps should be implemented to prevent the discharge of grinding residue, uncompacted or loose AC, tack coats, equipment cleaners, or unrelated paving materials:
 - AC grindings, pieces, or chunks used in embankments or shoulder backing should not be allowed to enter any storm drains or watercourses. Install inlet protection and perimeter controls until area is stabilized (i.e. cutting, grinding or other removal activities are complete and loose material has been properly removed and disposed of)or permanent controls are in place. Examples of temporary perimeter controls can be found in EC-9, Earth Dikes and Drainage Swales; SE-1, Silt Fence; SE-5, Fiber Rolls, or SE-13 Compost Socks and Berms
 - Collect and remove all broken asphalt and recycle when practical. Old or spilled asphalt should be recycled or disposed of properly.
- Do not allow saw-cut slurry to enter storm drains or watercourses. Residue from grinding operations should be picked up by a vacuum attachment to the grinding machine, or by sweeping, should not be allowed to flow across the pavement, and should not be left on the surface of the pavement. See also WM-8, Concrete Waste Management, and WM-10, Liquid Waste Management.
- Pavement removal activities should not be conducted in the rain.
- Collect removed pavement material by mechanical or manual methods. This material may be recycled for use as shoulder backing or base material.

If removed pavement material cannot be recycled, transport the material back to an approved storage site.

Asphaltic Concrete Paving

- If paving involves asphaltic cement concrete, follow these steps:
 - Do not allow sand or gravel placed over new asphalt to wash into storm drains, streets, or creeks. Vacuum or sweep loose sand and gravel and properly dispose of this waste by referring to WM-5, Solid Waste Management.
 - Old asphalt should be disposed of properly. Collect and remove all broken asphalt from the site and recycle whenever possible.

Portland Cement Concrete Paving

Do not wash sweepings from exposed aggregate concrete into a storm drain system. Collect waste materials by dry methods, such as sweeping or shoveling, and return to aggregate base stockpile or dispose of properly. Allow aggregate rinse to settle. Then, either allow rinse water to dry in a temporary pit as described in WM-8, Concrete Waste Management, or pump the water to the sanitary sewer if authorized by the local wastewater authority.

Sealing Operations

- During chip seal application and sweeping operations, petroleum or petroleum covered aggregate should not be allowed to enter any storm drain or water courses. Apply temporary perimeter controls until structure is stabilized (i.e. all sealing operations are complete and cured and loose materials have been properly removed and disposed).
- Inlet protection (SE-10, Storm Drain Inlet Protection) should be used during application of seal coat, tack coat, slurry seal, and fog seal.
- Seal coat, tack coat, slurry seal, or fog seal should not be applied if rainfall is predicted to occur during the application or curing period.

Paving Equipment

- Leaks and spills from paving equipment can contain toxic levels of heavy metals and oil and grease. Place drip pans or absorbent materials under paving equipment when not in use. Clean up spills with absorbent materials and dispose of in accordance with the applicable regulations. See NS-10, Vehicle and Equipment Maintenance, WM-4, Spill Prevention and Control, and WM-10, Liquid Waste Management.
- Substances used to coat asphalt transport trucks and asphalt spreading equipment should not contain soap and should be non-foaming and non-toxic.
- Paving equipment parked onsite should be parked over plastic to prevent soil contamination.
- Clean asphalt coated equipment offsite whenever possible. When cleaning dry, hardened asphalt from equipment, manage hardened asphalt debris as described in WM-5, Solid Waste Management. Any cleaning onsite should follow NS-8, Vehicle and Equipment Cleaning.

Thermoplastic Striping

- Thermoplastic striper and pre-heater equipment shutoff valves should be inspected to ensure that they are working properly to prevent leaking thermoplastic from entering drain inlets, the stormwater drainage system, or watercourses.
- Pre-heaters should be filled carefully to prevent splashing or spilling of hot thermoplastic. Leave six inches of space at the top of the pre-heater container when filling thermoplastic to allow room for material to move.
- Do not pre-heat, transfer, or load thermoplastic near drain inlets or watercourses.
- Clean truck beds daily of loose debris and melted thermoplastic. When possible, recycle thermoplastic material.

Raised/Recessed Pavement Marker Application and Removal

- Do not transfer or load bituminous material near drain inlets, the stormwater drainage system, or watercourses.
- Melting tanks should be loaded with care and not filled to beyond six inches from the top to leave room for splashing.
- When servicing or filling melting tanks, ensure all pressure is released before removing lids to avoid spills.
- On large-scale projects, use mechanical or manual methods to collect excess bituminous material from the roadway after removal of markers.

Costs

• All of the above are low cost measures.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of paving and grinding operations.
- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Sample stormwater runoff required by the General Permit.
- Keep ample supplies of drip pans or absorbent materials onsite.
- Inspect and maintain machinery regularly to minimize leaks and drips.

References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995. Hot Mix Asphalt-Paving Handbook AC 150/5370-14, Appendix I, U.S. Army Corps of Engineers, July 1991.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Erosion and Sediment Control Manual, Oregon Department of Environmental Quality, February 2005.

Illicit Connection/ Discharge



Description and Purpose

Procedures and practices designed for construction contractors to recognize illicit connections or illegally dumped or discharged materials on a construction site and report incidents.

Suitable Applications

This best management practice (BMP) applies to all construction projects. Illicit connection/discharge and reporting is applicable anytime an illicit connection or discharge is discovered or illegally dumped material is found on the construction site.

Limitations

Illicit connections and illegal discharges or dumping, for the purposes of this BMP, refer to discharges and dumping caused by parties other than the contractor. If pre-existing hazardous materials or wastes are known to exist onsite, they should be identified in the SWPPP and handled as set forth in the SWPPP.

Implementation

Planning

- Review the SWPPP. Pre-existing areas of contamination should be identified and documented in the SWPPP.
- Inspect site before beginning the job for evidence of illicit connections, illegal dumping or discharges. Document any pre-existing conditions and notify the owner.
- Inspect site regularly during project execution for evidence

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Appendix E North Crown Point - New Comfort Station Sasqa Water Pollution Control Plan North Crown Point Comfort Station

Categories

EC	Erosion Control	
SE	Sediment Control	
тс	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	V
WM	Waste Management and Materials Pollution Control	
Legend:		
\checkmark	Primary Objective	
×	Secondary Objective	

Targeted Constituents

Sediment	
Nutrients	\checkmark
Trash	\checkmark
Metals	\checkmark
Bacteria	\checkmark
Oil and Grease	\checkmark
Organics	\checkmark

Potential Alternatives

None



of illicit connections, illegal dumping or discharges.

• Observe site perimeter for evidence for potential of illicitly discharged or illegally dumped material, which may enter the job site.

Identification of Illicit Connections and Illegal Dumping or Discharges

- **General** unlabeled and unidentifiable material should be treated as hazardous.
- **Solids** Look for debris, or rubbish piles. Solid waste dumping often occurs on roadways with light traffic loads or in areas not easily visible from the traveled way.
- Liquids signs of illegal liquid dumping or discharge can include:
 - Visible signs of staining or unusual colors to the pavement or surrounding adjacent soils
 - Pungent odors coming from the drainage systems
 - Discoloration or oily substances in the water or stains and residues detained within ditches, channels or drain boxes
 - Abnormal water flow during the dry weather season
- Urban Areas Evidence of illicit connections or illegal discharges is typically detected at storm drain outfall locations or at manholes. Signs of an illicit connection or illegal discharge can include:
 - Abnormal water flow during the dry weather season
 - Unusual flows in sub drain systems used for dewatering
 - Pungent odors coming from the drainage systems
 - Discoloration or oily substances in the water or stains and residues detained within ditches, channels or drain boxes
 - Excessive sediment deposits, particularly adjacent to or near active offsite construction projects
- Rural Areas Illicit connections or illegal discharges involving irrigation drainage ditches are detected by visual inspections. Signs of an illicit discharge can include:
 - Abnormal water flow during the non-irrigation season
 - Non-standard junction structures
 - Broken concrete or other disturbances at or near junction structures

Reporting

Notify the owner of any illicit connections and illegal dumping or discharge incidents at the time of discovery. For illicit connections or discharges to the storm drain system, notify the local stormwater management agency. For illegal dumping, notify the local law enforcement agency.

Cleanup and Removal

The responsibility for cleanup and removal of illicit or illegal dumping or discharges will vary by location. Contact the local stormwater management agency for further information.

Costs

Costs to look for and report illicit connections and illegal discharges and dumping are low. The best way to avoid costs associated with illicit connections and illegal discharges and dumping is to keep the project perimeters secure to prevent access to the site, to observe the site for vehicles that should not be there, and to document any waste or hazardous materials that exist onsite before taking possession of the site.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and at two-week intervals in the non-rainy season to verify continued BMP implementation.
- Inspect the site regularly to check for any illegal dumping or discharge.
- Prohibit employees and subcontractors from disposing of non-job related debris or materials at the construction site.
- Notify the owner of any illicit connections and illegal dumping or discharge incidents at the time of discovery.

References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.

Potable Water/ Irrigation



Description and Purpose

Potable Water/Irrigation consists of practices and procedures to manage the discharge of potential pollutants generated during discharges from irrigation water lines, landscape irrigation, lawn or garden watering, planned and unplanned discharges from potable water sources, water line flushing, and hydrant flushing.

Suitable Applications

Implement this BMP whenever potable water or irrigation water discharges occur at or enter a construction site.

Limitations

None identified.

Implementation

- Direct water from offsite sources around or through a construction site, where feasible, in a way that minimizes contact with the construction site.
- Discharges from water line flushing should be reused for landscaping purposes where feasible.
- Shut off the water source to broken lines, sprinklers, or valves as soon as possible to prevent excess water flow.
- Protect downstream stormwater drainage systems and watercourses from water pumped or bailed from trenches excavated to repair water lines.
- Inspect irrigated areas within the construction limits for

EC	Erosion Control	
SE	Sediment Control	
ГС	Tracking Control	
ΝE	Wind Erosion Control	
١S	Non-Stormwater Management Control	V
ΝM	Waste Management and Materials Pollution Control	
_egend:		
\checkmark	Primary Obiective	

Secondary Objective

Targeted Constituents

Sediment	\checkmark
Nutrients	\checkmark
Trash	
Metals	\checkmark
Bacteria	
Oil and Grease	
Organics	\checkmark

Potential Alternatives

None



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excess watering. Adjust watering times and schedules to ensure that the appropriate amount of water is being used and to minimize runoff. Consider factors such as soil structure, grade, time of year, and type of plant material in determining the proper amounts of water for a specific area.

Costs

Cost to manage potable water and irrigation are low and generally considered to be a normal part of related activities.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and at two-week intervals in the non-rainy season to verify continued BMP implementation.
- Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges occur.
- Repair broken water lines as soon as possible.
- Inspect irrigated areas regularly for signs of erosion and/or discharge.

References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.

Vehicle and Equipment Cleaning

 $\mathbf{\Lambda}$





Categories

Secondary Objective

Targeted Constituents

Sediment	\checkmark
Nutrients	\checkmark
Trash	
Metals	
Bacteria	
Oil and Grease	\checkmark
Organics	\checkmark

Potential Alternatives

None



Description and Purpose

Vehicle and equipment cleaning procedures and practices eliminate or reduce the discharge of pollutants to stormwater from vehicle and equipment cleaning operations. Procedures and practices include but are not limited to: using offsite facilities; washing in designated, contained areas only; eliminating discharges to the storm drain by infiltrating the wash water; and training employees and subcontractors in proper cleaning procedures.

Suitable Applications

These procedures are suitable on all construction sites where vehicle and equipment cleaning is performed.

Limitations

Even phosphate-free, biodegradable soaps have been shown to be toxic to fish before the soap degrades. Sending vehicles/equipment offsite should be done in conjunction with TC-1, Stabilized Construction Entrance/Exit.

Implementation

Other options to washing equipment onsite include contracting with either an offsite or mobile commercial washing business. These businesses may be better equipped to handle and dispose of the wash waters properly. Performing this work offsite can also be economical by eliminating the need for a separate washing operation onsite.

If washing operations are to take place onsite, then:

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- Use phosphate-free, biodegradable soaps.
- Educate employees and subcontractors on pollution prevention measures.
- Do not permit steam cleaning onsite. Steam cleaning can generate significant pollutant concentrates.
- Cleaning of vehicles and equipment with soap, solvents or steam should not occur on the project site unless resulting wastes are fully contained and disposed of. Resulting wastes should not be discharged or buried, and must be captured and recycled or disposed according to the requirements of WM-10, Liquid Waste Management or WM-6, Hazardous Waste Management, depending on the waste characteristics. Minimize use of solvents. Use of diesel for vehicle and equipment cleaning is prohibited.
- All vehicles and equipment that regularly enter and leave the construction site must be cleaned offsite.
- When vehicle and equipment washing and cleaning must occur onsite, and the operation cannot be located within a structure or building equipped with appropriate disposal facilities, the outside cleaning area should have the following characteristics:
 - Located away from storm drain inlets, drainage facilities, or watercourses
 - Paved with concrete or asphalt and bermed to contain wash waters and to prevent runon and runoff
 - Configured with a sump to allow collection and disposal of wash water
 - No discharge of wash waters to storm drains or watercourses _
 - Used only when necessary _
- When cleaning vehicles and equipment with water:
 - Use as little water as possible. High-pressure sprayers may use less water than a hose and should be considered
 - Use positive shutoff valve to minimize water usage
 - Facility wash racks should discharge to a sanitary sewer, recycle system or other approved discharge system and must not discharge to the storm drainage system, watercourses, or to groundwater

Costs

Cleaning vehicles and equipment at an offsite facility may reduce overall costs for vehicle and equipment cleaning by eliminating the need to provide similar services onsite. When onsite cleaning is needed, the cost to establish appropriate facilities is relatively low on larger, longduration projects, and moderate to high on small, short-duration projects.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and at two-week intervals in the non-rainy season to verify continued BMP implementation.
- Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges occur.
- Inspection and maintenance is minimal, although some berm repair may be necessary.
- Monitor employees and subcontractors throughout the duration of the construction project to ensure appropriate practices are being implemented.
- Inspect sump regularly and remove liquids and sediment as needed.
- Prohibit employees and subcontractors from washing personal vehicles and equipment on the construction site.

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual. State of California Department of Transportation (Caltrans), November 2000.

Swisher, R.D. Surfactant Biodegradation, Marcel Decker Corporation, 1987.

Vehicle and Equipment Fueling



Description and Purpose

Vehicle equipment fueling procedures and practices are designed to prevent fuel spills and leaks, and reduce or eliminate contamination of stormwater. This can be accomplished by using offsite facilities, fueling in designated areas only, enclosing or covering stored fuel, implementing spill controls, and training employees and subcontractors in proper fueling procedures.

Suitable Applications

These procedures are suitable on all construction sites where vehicle and equipment fueling takes place.

Limitations

Onsite vehicle and equipment fueling should only be used where it is impractical to send vehicles and equipment offsite for fueling. Sending vehicles and equipment offsite should be done in conjunction with TC-1, Stabilized Construction Entrance/ Exit.

Implementation

- Use offsite fueling stations as much as possible. These businesses are better equipped to handle fuel and spills properly. Performing this work offsite can also be economical by eliminating the need for a separate fueling area at a site.
- Discourage "topping-off" of fuel tanks.
- Absorbent spill cleanup materials and spill kits should be available in fueling areas and on fueling trucks, and should

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Categories

EC	Erosion Control	
SE	Sediment Control	
тс	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	V
WM	Waste Management and Materials Pollution Control	
Legend:		
\checkmark	Primary Objective	
×	Secondary Objective	

Targeted Constituents

Sediment	
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	\checkmark
Organics	

Potential Alternatives

None



be disposed of properly after use.

- Drip pans or absorbent pads should be used during vehicle and equipment fueling, unless the fueling is performed over an impermeable surface in a dedicated fueling area.
- Use absorbent materials on small spills. Do not hose down or bury the spill. Remove the adsorbent materials promptly and dispose of properly.
- Avoid mobile fueling of mobile construction equipment around the site; rather, transport the equipment to designated fueling areas. With the exception of tracked equipment such as bulldozers and large excavators, most vehicles should be able to travel to a designated area with little lost time.
- Train employees and subcontractors in proper fueling and cleanup procedures.
- When fueling must take place onsite, designate an area away from drainage courses to be used. Fueling areas should be identified in the SWPPP.
- Dedicated fueling areas should be protected from stormwater runon and runoff, and should be located at least 50 ft away from downstream drainage facilities and watercourses. Fueling must be performed on level-grade areas.
- Protect fueling areas with berms and dikes to prevent runon, runoff, and to contain spills.
- Nozzles used in vehicle and equipment fueling should be equipped with an automatic shutoff to control drips. Fueling operations should not be left unattended.
- Use vapor recovery nozzles to help control drips as well as air pollution where required by Air Quality Management Districts (AQMD).
- Federal, state, and local requirements should be observed for any stationary above ground storage tanks.

Costs

All of the above measures are low cost except for the capital costs of above ground tanks that meet all local environmental, zoning, and fire codes.

Inspection and Maintenance

- Vehicles and equipment should be inspected each day of use for leaks. Leaks should be repaired immediately or problem vehicles or equipment should be removed from the project site.
- Keep ample supplies of spill cleanup materials onsite.
- Immediately clean up spills and properly dispose of contaminated soil and cleanup materials.
References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance, Working Group Working Paper; USEPA, April 1992.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.

Vehicle & Equipment Maintenance NS-10



Description and Purpose

Prevent or reduce the contamination of stormwater resulting from vehicle and equipment maintenance by running a "dry and clean site". The best option would be to perform maintenance activities at an offsite facility. If this option is not available then work should be performed in designated areas only, while providing cover for materials stored outside, checking for leaks and spills, and containing and cleaning up spills immediately. Employees and subcontractors must be trained in proper procedures.

Suitable Applications

These procedures are suitable on all construction projects where an onsite yard area is necessary for storage and maintenance of heavy equipment and vehicles.

Limitations

Onsite vehicle and equipment maintenance should only be used where it is impractical to send vehicles and equipment offsite for maintenance and repair. Sending vehicles/equipment offsite should be done in conjunction with TC-1, Stabilized Construction Entrance/Exit.

Outdoor vehicle or equipment maintenance is a potentially significant source of stormwater pollution. Activities that can contaminate stormwater include engine repair and service, changing or replacement of fluids, and outdoor equipment storage and parking (engine fluid leaks). For further information on vehicle or equipment servicing, see NS-8, Vehicle and Equipment Cleaning, and NS-9, Vehicle and

Categories

EC	Erosion Control	
SE	Sediment Control	
тс	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater	V
NO	Management Control	
wм	Waste Management and	
	Materials Pollution Control	
Legend:		
\checkmark	Primary Objective	

Secondary Objective

Targeted Constituents

Sediment	
Nutrients	\checkmark
Trash	\checkmark
Metals	
Bacteria	
Oil and Grease	\checkmark
Organics	\checkmark

Potential Alternatives

None



Equipment Fueling.

Implementation

- Use offsite repair shops as much as possible. These businesses are better equipped to handle vehicle fluids and spills properly. Performing this work offsite can also be economical by eliminating the need for a separate maintenance area.
- If maintenance must occur onsite, use designated areas, located away from drainage courses. Dedicated maintenance areas should be protected from stormwater runon and runoff, and should be located at least 50 ft from downstream drainage facilities and watercourses.
- Drip pans or absorbent pads should be used during vehicle and equipment maintenance work that involves fluids, unless the maintenance work is performed over an impermeable surface in a dedicated maintenance area.
- Place a stockpile of spill cleanup materials where it will be readily accessible.
- All fueling trucks and fueling areas are required to have spill kits and/or use other spill protection devices.
- Use adsorbent materials on small spills. Remove the absorbent materials promptly and dispose of properly.
- Inspect onsite vehicles and equipment daily at startup for leaks, and repair immediately.
- Keep vehicles and equipment clean; do not allow excessive build-up of oil and grease.
- Segregate and recycle wastes, such as greases, used oil or oil filters, antifreeze, cleaning solutions, automotive batteries, hydraulic and transmission fluids. Provide secondary containment and covers for these materials if stored onsite.
- Train employees and subcontractors in proper maintenance and spill cleanup procedures.
- Drip pans or plastic sheeting should be placed under all vehicles and equipment placed on docks, barges, or other structures over water bodies when the vehicle or equipment is planned to be idle for more than 1 hour.
- For long-term projects, consider using portable tents or covers over maintenance areas if maintenance cannot be performed offsite.
- Consider use of new, alternative greases and lubricants, such as adhesive greases, for chassis lubrication and fifth-wheel lubrication.
- Properly dispose of used oils, fluids, lubricants, and spill cleanup materials.
- Do not place used oil in a dumpster or pour into a storm drain or watercourse.
- Properly dispose of or recycle used batteries.
- Do not bury used tires.

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• Repair leaks of fluids and oil immediately.

Listed below is further information if you must perform vehicle or equipment maintenance onsite.

Safer Alternative Products

- Consider products that are less toxic or hazardous than regular products. These products are often sold under an "environmentally friendly" label.
- Consider use of grease substitutes for lubrication of truck fifth-wheels. Follow manufacturers label for details on specific uses.
- Consider use of plastic friction plates on truck fifth-wheels in lieu of grease. Follow manufacturers label for details on specific uses.

Waste Reduction

Parts are often cleaned using solvents such as trichloroethylene, trichloroethane, or methylene chloride. Many of these cleaners are listed in California Toxic Rule as priority pollutants. These materials are harmful and must not contaminate stormwater. They must be disposed of as a hazardous waste. Reducing the number of solvents makes recycling easier and reduces hazardous waste management costs. Often, one solvent can perform a job as well as two different solvents. Also, if possible, eliminate or reduce the amount of hazardous materials and waste by substituting non-hazardous or less hazardous materials. For example, replace chlorinated organic solvents with non-chlorinated solvents. Non-chlorinated solvents like kerosene or mineral spirits are less toxic and less expensive to dispose of properly. Check the list of active ingredients to see whether it contains chlorinated solvents. The "chlor" term indicates that the solvent is chlorinated. Also, try substituting a wire brush for solvents to clean parts.

Recycling and Disposal

Separating wastes allows for easier recycling and may reduce disposal costs. Keep hazardous wastes separate, do not mix used oil solvents, and keep chlorinated solvents (like,trichloroethane) separate from non-chlorinated solvents (like kerosene and mineral spirits). Promptly transfer used fluids to the proper waste or recycling drums. Don't leave full drip pans or other open containers lying around. Provide cover and secondary containment until these materials can be removed from the site.

Oil filters can be recycled. Ask your oil supplier or recycler about recycling oil filters.

Do not dispose of extra paints and coatings by dumping liquid onto the ground or throwing it into dumpsters. Allow coatings to dry or harden before disposal into covered dumpsters.

Store cracked batteries in a non-leaking secondary container. Do this with all cracked batteries, even if you think all the acid has drained out. If you drop a battery, treat it as if it is cracked. Put it into the containment area until you are sure it is not leaking.

Costs

All of the above are low cost measures. Higher costs are incurred to setup and maintain onsite maintenance areas.

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Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and at two-week intervals in the non-rainy season to verify continued BMP implementation.
- Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges occur.
- Keep ample supplies of spill cleanup materials onsite.
- Maintain waste fluid containers in leak proof condition.
- Vehicles and equipment should be inspected on each day of use. Leaks should be repaired immediately or the problem vehicle(s) or equipment should be removed from the project site.
- Inspect equipment for damaged hoses and leaky gaskets routinely. Repair or replace as needed.

References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Coastal Nonpoint Pollution Control Program; Program Development and Approval Guidance, Working Group, Working Paper; USEPA, April 1992.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Concrete Curing



Description and Purpose

Concrete curing is used in the construction of structures such as bridges, retaining walls, pump houses, large slabs, and structured foundations. Concrete curing includes the use of both chemical and water methods.

Concrete and its associated curing materials have basic chemical properties that can raise the pH of water to levels outside of the permitted range. Discharges of stormwater and non-stormwater exposed to concrete during curing may have a high pH and may contain chemicals, metals, and fines. The General Permit incorporates Numeric Effluent Limits (NEL) and Numeric Action Levels (NAL) for pH (see Section 2 of this handbook to determine your project's risk level and if you are subject to these requirements).

Proper procedures and care should be taken when managing concrete curing materials to prevent them from coming into contact with stormwater flows, which could result in a high pH discharge.

Suitable Applications

Suitable applications include all projects where Portland Cement Concrete (PCC) and concrete curing chemicals are placed where they can be exposed to rainfall, runoff from other areas, or where runoff from the PCC will leave the site.

Categories

₫	Primary Category	
Legend:		
WM	Waste Management and Materials Pollution Control	V
NS	Non-Stormwater Management Control	V
WE	Wind Erosion Control	
TC	Tracking Control	
SE	Sediment Control	
EC	Erosion Control	

Secondary Category

Targeted Constituents

Sediment	\checkmark
Nutrients	
Trash	
Metals	\checkmark
Bacteria	
Oil and Grease	\checkmark
Organics	

Potential Alternatives

None



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Limitations

• Runoff contact with concrete waste can raise pH levels in the water to environmentally harmful levels and trigger permit violations.

Implementation

Chemical Curing

- Avoid over spray of curing compounds.
- Minimize the drift by applying the curing compound close to the concrete surface. Apply an
 amount of compound that covers the surface, but does not allow any runoff of the
 compound.
- Use proper storage and handling techniques for concrete curing compounds. Refer to WM-1, Material Delivery and Storage.
- Protect drain inlets prior to the application of curing compounds.
- Refer to WM-4, Spill Prevention and Control.

Water Curing for Bridge Decks, Retaining Walls, and other Structures

- Direct cure water away from inlets and watercourses to collection areas for evaporation or other means of removal in accordance with all applicable permits. See WM-8 Concrete Waste Management.
- Collect cure water at the top of slopes and transport to a concrete waste management area in a non-erosive manner. See EC-9 Earth Dikes and Drainage Swales, EC-10, Velocity Dissipation Devices, and EC-11, Slope Drains.
- Utilize wet blankets or a similar method that maintains moisture while minimizing the use and possible discharge of water.

Education

- Educate employees, subcontractors, and suppliers on proper concrete curing techniques to prevent contact with discharge as described herein.
- Arrange for the QSP or the appropriately trained contractor's superintendent or representative to oversee and enforce concrete curing procedures.

Costs

All of the above measures are generally low cost.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities.
- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.

- Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges occur.
- Sample non-stormwater discharges and stormwater runoff that contacts uncured and partially cured concrete as required by the General Permit.
- Ensure that employees and subcontractors implement appropriate measures for storage, handling, and use of curing compounds.
- Inspect cure containers and spraying equipment for leaks.

References

Blue Print for a Clean Bay-Construction-Related Industries: Best Management Practices for Stormwater Pollution Prevention; Santa Clara Valley Non Point Source Pollution Control Program, 1992.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.

Erosion and Sediment Control Manual, Oregon Department of Environmental Quality, February 2005.

Concrete Finishing



Description and Purpose

Concrete finishing methods are used for bridge deck rehabilitation, paint removal, curing compound removal, and final surface finish appearances. Methods include sand blasting, shot blasting, grinding, or high pressure water blasting. Stormwater and non-stormwater exposed to concrete finishing by-products may have a high pH and may contain chemicals, metals, and fines. Proper procedures and implementation of appropriate BMPs can minimize the impact that concrete-finishing methods may have on stormwater and non-stormwater discharges.

The General Permit incorporates Numeric Effluent Limits (NEL) and Numeric Action Levels (NAL) for pH (see Section 2 of this handbook to determine your project's risk level and if you are subject to these requirements).

Concrete and its associated curing materials have basic chemical properties that can raise pH levels outside of the permitted range. Additional care should be taken when managing these materials to prevent them from coming into contact with stormwater flows, which could lead to exceedances of the General Permit requirements.

Suitable Applications

These procedures apply to all construction locations where concrete finishing operations are performed.

Categories

\checkmark	Primary Category	
Legend:		
WM	Waste Management and Materials Pollution Control	V
NS	Non-Stormwater Management Control	V
WE	Wind Erosion Control	
тс	Tracking Control	
SE	Sediment Control	
EC	Erosion Control	
FC	Erosion Control	

Secondary Category

Targeted Constituents

Sediment	\checkmark
Nutrients	
Trash	
Metals	\checkmark
Bacteria	
Oil and Grease	
Organics	\checkmark

Potential Alternatives

None



California Stormwater BMP Handbook Construction Appendix E North Crown Point - New Comfort Station Sesan Water Pollution Control Plan North Crown Point Comfort Station

Limitations

• Runoff contact with concrete waste can raise pH levels in the water to environmentally harmful levels and trigger permit violations.

Implementation

- Collect and properly dispose of water from high-pressure water blasting operations.
- Collect contaminated water from blasting operations at the top of slopes. Transport or dispose of contaminated water while using BMPs such as those for erosion control. Refer to EC-9, Earth Dikes and Drainage Swales, EC-10, Velocity Dissipation Devices, and EC-11, Slope Drains.
- Direct water from blasting operations away from inlets and watercourses to collection areas for infiltration or other means of removal (dewatering). Refer to NS-2 Dewatering Operations.
- Protect inlets during sandblasting operations. Refer to SE-10, Storm Drain Inlet Protection.
- Refer to WM-8, Concrete Waste Management for disposal of concrete debris.
- Minimize the drift of dust and blast material as much as possible by keeping the blasting nozzle close to the surface.
- When blast residue contains a potentially hazardous waste, refer to WM-6, Hazardous Waste Management.

Education

- Educate employees, subcontractors, and suppliers on proper concrete finishing techniques to prevent contact with discharge as described herein.
- Arrange for the QSP or the appropriately trained contractor's superintendent or representative to oversee and enforce concrete finishing procedures.

Costs

These measures are generally of low cost.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities.
- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges occur.
- Sample non-stormwater discharges and stormwater runoff that contacts concrete dust and debris as required by the General Permit.

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- Sweep or vacuum up debris from sandblasting at the end of each shift.
- At the end of each work shift, remove and contain liquid and solid waste from containment structures, if any, and from the general work area.
- Inspect containment structures for damage prior to use and prior to onset of forecasted rain.

References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.

Material Delivery and Storage



Description and Purpose

Prevent, reduce, or eliminate the discharge of pollutants from material delivery and storage to the stormwater system or watercourses by minimizing the storage of hazardous materials onsite, storing materials in watertight containers and/or a completely enclosed designated area, installing secondary containment, conducting regular inspections, and training employees and subcontractors.

This best management practice covers only material delivery and storage. For other information on materials, see WM-2, Material Use, or WM-4, Spill Prevention and Control. For information on wastes, see the waste management BMPs in this section.

Suitable Applications

These procedures are suitable for use at all construction sites with delivery and storage of the following materials:

- Soil stabilizers and binders
- Pesticides and herbicides
- **Fertilizers**
- Detergents
- Plaster
- Petroleum products such as fuel, oil, and grease

Categories

×	Secondary Category	
$\mathbf{\Lambda}$	Primary Category	
Legend:		
WM	Waste Management and Materials Pollution Control	V
NS	Non-Stormwater Management Control	
WE	Wind Erosion Control	
тс	Tracking Control	
SE	Sediment Control	
EC	Erosion Control	

Targeted Constituents

Sediment	\checkmark
Nutrients	\checkmark
Trash	\checkmark
Metals	\checkmark
Bacteria	
Oil and Grease	\checkmark
Organics	\checkmark

Potential Alternatives

None



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California Stormwater BMP Handbook Construction Appendix E North Crown Point - New Comfort Station State Pollution Control Plan North Crown Point Comfort Station

- Asphalt and concrete components
- Hazardous chemicals such as acids, lime, glues, adhesives, paints, solvents, and curing compounds
- Concrete compounds
- Other materials that may be detrimental if released to the environment

Limitations

- Space limitation may preclude indoor storage.
- Storage sheds often must meet building and fire code requirements.

Implementation

The following steps should be taken to minimize risk:

- Chemicals must be stored in water tight containers with appropriate secondary containment or in a storage shed.
- When a material storage area is located on bare soil, the area should be lined and bermed.
- Use containment pallets or other practical and available solutions, such as storing materials within newly constructed buildings or garages, to meet material storage requirements.
- Stack erodible landscape material on pallets and cover when not in use.
- Contain all fertilizers and other landscape materials when not in use.
- Temporary storage areas should be located away from vehicular traffic.
- Material Safety Data Sheets (MSDS) should be available on-site for all materials stored that have the potential to effect water quality.
- Construction site areas should be designated for material delivery and storage.
- Material delivery and storage areas should be located away from waterways, if possible.
 - Avoid transport near drainage paths or waterways.
 - Surround with earth berms or other appropriate containment BMP. See EC-9, Earth Dikes and Drainage Swales.
 - Place in an area that will be paved.
- Storage of reactive, ignitable, or flammable liquids must comply with the fire codes of your area. Contact the local Fire Marshal to review site materials, quantities, and proposed storage area to determine specific requirements. See the Flammable and Combustible Liquid Code, NFPA30.
- An up to date inventory of materials delivered and stored onsite should be kept.

- Hazardous materials storage onsite should be minimized.
- Hazardous materials should be handled as infrequently as possible.
- Keep ample spill cleanup supplies appropriate for the materials being stored. Ensure that cleanup supplies are in a conspicuous, labeled area.
- Employees and subcontractors should be trained on the proper material delivery and storage practices.
- Employees trained in emergency spill cleanup procedures must be present when dangerous materials or liquid chemicals are unloaded.
- If significant residual materials remain on the ground after construction is complete, properly remove and dispose of materials and any contaminated soil. See WM-7, Contaminated Soil Management. If the area is to be paved, pave as soon as materials are removed to stabilize the soil.

Material Storage Areas and Practices

- Liquids, petroleum products, and substances listed in 40 CFR Parts 110, 117, or 302 should be stored in approved containers and drums and should not be overfilled. Containers and drums should be placed in temporary containment facilities for storage.
- A temporary containment facility should provide for a spill containment volume able to contain precipitation from a 25 year storm event, plus the greater of 10% of the aggregate volume of all containers or 100% of the capacity of the largest container within its boundary, whichever is greater.
- A temporary containment facility should be impervious to the materials stored therein for a minimum contact time of 72 hours.
- A temporary containment facility should be maintained free of accumulated rainwater and spills. In the event of spills or leaks, accumulated rainwater and spills should be collected and placed into drums. These liquids should be handled as a hazardous waste unless testing determines them to be non-hazardous. All collected liquids or non-hazardous liquids should be sent to an approved disposal site.
- Sufficient separation should be provided between stored containers to allow for spill cleanup and emergency response access.
- Incompatible materials, such as chlorine and ammonia, should not be stored in the same temporary containment facility.
- Materials should be covered prior to, and during rain events.
- Materials should be stored in their original containers and the original product labels should be maintained in place in a legible condition. Damaged or otherwise illegible labels should be replaced immediately.

- Bagged and boxed materials should be stored on pallets and should not be allowed to accumulate on the ground. To provide protection from wind and rain throughout the rainy season, bagged and boxed materials should be covered during non-working days and prior to and during rain events.
- Stockpiles should be protected in accordance with WM-3, Stockpile Management.
- Materials should be stored indoors within existing structures or completely enclosed storage sheds when available.
- Proper storage instructions should be posted at all times in an open and conspicuous location.
- An ample supply of appropriate spill clean up material should be kept near storage areas.
- Also see WM-6, Hazardous Waste Management, for storing of hazardous wastes.

Material Delivery Practices

- Keep an accurate, up-to-date inventory of material delivered and stored onsite.
- Arrange for employees trained in emergency spill cleanup procedures to be present when dangerous materials or liquid chemicals are unloaded.

Spill Cleanup

- Contain and clean up any spill immediately.
- Properly remove and dispose of any hazardous materials or contaminated soil if significant residual materials remain on the ground after construction is complete. See WM-7, Contaminated Soil Management.
- See WM-4, Spill Prevention and Control, for spills of chemicals and/or hazardous materials.
- If spills or leaks of materials occur that are not contained and could discharge to surface waters, non-visible sampling of site discharge may be required. Refer to the General Permit or to your project specific Construction Site Monitoring Plan to determine if and where sampling is required.

Cost

• The largest cost of implementation may be in the construction of a materials storage area that is covered and provides secondary containment.

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Keep storage areas clean and well organized, including a current list of all materials onsite.
- Inspect labels on containers for legibility and accuracy.

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Repair or replace perimeter controls, containment structures, covers, and liners as needed to maintain proper function.

References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance, Working Group Working Paper; USEPA, April 1992.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.



Description and Purpose

Prevent or reduce the discharge of pollutants to the storm drain system or watercourses from material use by using alternative products, minimizing hazardous material use onsite, and training employees and subcontractors.

Suitable Applications

This BMP is suitable for use at all construction projects. These procedures apply when the following materials are used or prepared onsite:

- Pesticides and herbicides
- Fertilizers
- Detergents
- Petroleum products such as fuel, oil, and grease
- Asphalt and other concrete components
- Other hazardous chemicals such as acids, lime, glues, adhesives, paints, solvents, and curing compounds
- Other materials that may be detrimental if released to the environment

Categories

Ø	Primary Category	
Legend:		
WM	Waste Management and Materials Pollution Control	V
NS	Non-Stormwater Management Control	
WE	Wind Erosion Control	
тс	Tracking Control	
SE	Sediment Control	
EC	Erosion Control	

Secondary Category

Targeted Constituents

Sediment	$\mathbf{\nabla}$
Nutrients	\checkmark
Trash	\checkmark
Metals	\checkmark
Bacteria	
Oil and Grease	\checkmark
Organics	\checkmark

Potential Alternatives

None



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Limitations

Safer alternative building and construction products may not be available or suitable in every instance.

Implementation

The following steps should be taken to minimize risk:

- Minimize use of hazardous materials onsite.
- Follow manufacturer instructions regarding uses, protective equipment, ventilation, flammability, and mixing of chemicals.
- Train personnel who use pesticides. The California Department of Pesticide Regulation and county agricultural commissioners license pesticide dealers, certify pesticide applicators, and conduct onsite inspections.
- The preferred method of termiticide application is soil injection near the existing or proposed structure foundation/slab; however, if not feasible, soil drench application of termiticides should follow EPA label guidelines and the following recommendations (most of which are applicable to most pesticide applications):
 - Do not treat soil that is water-saturated or frozen.
 - Application shall not commence within 24-hours of a predicted precipitation event with a 40% or greater probability. Weather tracking must be performed on a daily basis prior to termiticide application and during the period of termiticide application.
 - Do not allow treatment chemicals to runoff from the target area. Apply proper quantity to prevent excess runoff. Provide containment for and divert stormwater from application areas using berms or diversion ditches during application.
 - Dry season: Do not apply within 10 feet of storm drains. Do not apply within 25 feet of aquatic habitats (such as, but not limited to, lakes; reservoirs; rivers; permanent streams; marshes or ponds; estuaries; and commercial fish farm ponds).
 - Wet season: Do not apply within 50 feet of storm drains or aquatic habitats (such as, but not limited to, lakes; reservoirs; rivers; permanent streams; marshes or ponds; estuaries; and commercial fish farm ponds) unless a vegetative buffer is present (if so, refer to dry season requirements).
 - Do not make on-grade applications when sustained wind speeds are above 10 mph (at application site) at nozzle end height.
 - Cover treatment site prior to a rain event in order to prevent run-off of the pesticide into non-target areas. The treated area should be limited to a size that can be backfilled and/or covered by the end of the work shift. Backfilling or covering of the treated area shall be done by the end of the same work shift in which the application is made.
 - The applicator must either cover the soil him/herself or provide written notification of the above requirement to the contractor on site and to the person commissioning the

application (if different than the contractor). If notice is provided to the contractor or the person commissioning the application, then they are responsible under the Federal Insecticide Fungicide, and Rodenticide Act (FIFRA) to ensure that: 1) if the concrete slab cannot be poured over the treated soil within 24 hours of application, the treated soil is covered with a waterproof covering (such as polyethylene sheeting), and 2) the treated soil is covered if precipitation is predicted to occur before the concrete slab is scheduled to be poured.

- Do not over-apply fertilizers, herbicides, and pesticides. Prepare only the amount needed. Follow the recommended usage instructions. Over-application is expensive and environmentally harmful. Unless on steep slopes, till fertilizers into the soil rather than hydraulic application. Apply surface dressings in several smaller applications, as opposed to one large application, to allow time for infiltration and to avoid excess material being carried offsite by runoff. Do not apply these chemicals before predicted rainfall.
- Train employees and subcontractors in proper material use.
- Supply Material Safety Data Sheets (MSDS) for all materials.
- Dispose of latex paint and paint cans, used brushes, rags, absorbent materials, and drop cloths, when thoroughly dry and are no longer hazardous, with other construction debris.
- Do not remove the original product label; it contains important safety and disposal information. Use the entire product before disposing of the container.
- Mix paint indoors or in a containment area. Never clean paintbrushes or rinse paint containers into a street, gutter, storm drain, or watercourse. Dispose of any paint thinners, residue, and sludge(s) that cannot be recycled, as hazardous waste.
- For water-based paint, clean brushes to the extent practicable, and rinse to a drain leading to a sanitary sewer where permitted, or contain for proper disposal off site. For oil-based paints, clean brushes to the extent practicable, and filter and reuse thinners and solvents.
- Use recycled and less hazardous products when practical. Recycle residual paints, solvents, non-treated lumber, and other materials.
- Use materials only where and when needed to complete the construction activity. Use safer alternative materials as much as possible. Reduce or eliminate use of hazardous materials onsite when practical.
- Document the location, time, chemicals applied, and applicator's name and qualifications.
- Keep an ample supply of spill clean up material near use areas. Train employees in spill clean up procedures.
- Avoid exposing applied materials to rainfall and runoff unless sufficient time has been allowed for them to dry.
- Discontinue use of erodible landscape material within 2 days prior to a forecasted rain event and materials should be covered and/or bermed.

Provide containment for material use areas such as masons' areas or paint mixing/preparation areas to prevent materials/pollutants from entering stormwater.

Costs

All of the above are low cost measures.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities.
- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Ensure employees and subcontractors throughout the job are using appropriate practices.

References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance, Working Group Working Paper; USEPA, April 1992.

Comments on Risk Assessments Risk Reduction Options for Cypermethrin: Docket No. OPP-2005–0293; California Stormwater Quality Association (CASQA) letter to USEPA, 2006.Environmental Hazard and General Labeling for Pyrethroid Non-Agricultural Outdoor Products, EPA-HQ-OPP-2008-0331-0021; USEPA, 2008.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.

Stockpile Management



Description and Purpose

Stockpile management procedures and practices are designed to reduce or eliminate air and stormwater pollution from stockpiles of soil, soil amendments, sand, paving materials such as portland cement concrete (PCC) rubble, asphalt concrete (AC), asphalt concrete rubble, aggregate base, aggregate sub base or pre-mixed aggregate, asphalt minder (so called "cold mix" asphalt), and pressure treated wood.

Suitable Applications

Implement in all projects that stockpile soil and other loose materials.

Limitations

- Plastic sheeting as a stockpile protection is temporary and hard to manage in windy conditions. Where plastic is used, consider use of plastic tarps with nylon reinforcement which may be more durable than standard sheeting.
- Plastic sheeting can increase runoff volume due to lack of infiltration and potentially cause perimeter control failure.
- Plastic sheeting breaks down faster in sunlight.
- The use of Plastic materials and photodegradable plastics should be avoided.

Implementation

Protection of stockpiles is a year-round requirement. To properly manage stockpiles:

Categories

Legend: Primary Category		
WM	Waste Management and Materials Pollution Control	V
NS	Non-Stormwater Management Control	×
WE	Wind Erosion Control	
TC	Tracking Control	
SE	Sediment Control	×
EC	Erosion Control	

Secondary Category

Targeted Constituents

Sediment	\checkmark
Nutrients	\checkmark
Trash	\checkmark
Metals	\checkmark
Bacteria	
Oil and Grease	\checkmark
Organics	\checkmark

Potential Alternatives

None



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- On larger sites, a minimum of 50 ft separation from concentrated flows of stormwater, drainage courses, and inlets is recommended.
- All stockpiles are required to be protected immediately if they are not scheduled to be used within 14 days.
- Protect all stockpiles from stormwater runon using temporary perimeter sediment barriers such as compost berms (SE-13), temporary silt dikes (SE-12), fiber rolls (SE-5), silt fences (SE-1), sandbags (SE-8), gravel bags (SE-6), or biofilter bags (SE-14). Refer to the individual fact sheet for each of these controls for installation information.
- Implement wind erosion control practices as appropriate on all stockpiled material. For specific information, see WE-1, Wind Erosion Control.
- Manage stockpiles of contaminated soil in accordance with WM-7, Contaminated Soil Management.
- Place bagged materials on pallets and under cover.
- Ensure that stockpile coverings are installed securely to protect from wind and rain.
- Some plastic covers withstand weather and sunlight better than others. Select cover materials or methods based on anticipated duration of use.

Protection of Non-Active Stockpiles

Non-active stockpiles of the identified materials should be protected further as follows:

Soil stockpiles

- Soil stockpiles should be covered or protected with soil stabilization measures and a temporary perimeter sediment barrier at all times.
- Temporary vegetation should be considered for topsoil piles that will be stockpiled for extended periods.

Stockpiles of Portland cement concrete rubble, asphalt concrete, asphalt concrete rubble, aggregate base, or aggregate sub base

Stockpiles should be covered and protected with a temporary perimeter sediment barrier at all times.

Stockpiles of "cold mix"

Cold mix stockpiles should be placed on and covered with plastic sheeting or comparable material at all times and surrounded by a berm.

Stockpiles of fly ash, stucco, hydrated lime

Stockpiles of materials that may raise the pH of runoff (i.e., basic materials) should be covered with plastic and surrounded by a berm.

Stockpiles/Storage of wood (Pressure treated with chromated copper arsenate or ammoniacal copper zinc arsenate

Treated wood should be covered with plastic sheeting or comparable material at all times and surrounded by a berm.

Protection of Active Stockpiles

Active stockpiles of the identified materials should be protected as follows:

- All stockpiles should be covered and protected with a temporary linear sediment barrier prior to the onset of precipitation.
- Stockpiles of "cold mix" and treated wood, and basic materials should be placed on and covered with plastic sheeting or comparable material and surrounded by a berm prior to the onset of precipitation.
- The downstream perimeter of an active stockpile should be protected with a linear sediment barrier or berm and runoff should be diverted around or away from the stockpile on the upstream perimeter.

Costs

For cost information associated with stockpile protection refer to the individual erosion or sediment control BMP fact sheet considered for implementation (For example, refer to SE-1 Silt Fence for installation of silt fence around the perimeter of a stockpile.)

Inspection and Maintenance

- Stockpiles must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- It may be necessary to inspect stockpiles covered with plastic sheeting more frequently during certain conditions (for example, high winds or extreme heat).
- Repair and/or replace perimeter controls and covers as needed to keep them functioning properly.
- Sediment shall be removed when it reaches one-third of the barrier height.

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Spill Prevention and Control



Description and Purpose

Prevent or reduce the discharge of pollutants to drainage systems or watercourses from leaks and spills by reducing the chance for spills, stopping the source of spills, containing and cleaning up spills, properly disposing of spill materials, and training employees.

This best management practice covers only spill prevention and control. However, WM-1, Materials Delivery and Storage, and WM-2, Material Use, also contain useful information, particularly on spill prevention. For information on wastes, see the waste management BMPs in this section.

Suitable Applications

This BMP is suitable for all construction projects. Spill control procedures are implemented anytime chemicals or hazardous substances are stored on the construction site, including the following materials:

- Soil stabilizers/binders
- **Dust** palliatives
- Herbicides
- Growth inhibitors
- Fertilizers
- Deicing/anti-icing chemicals

Categories

- **Erosion Control** EC SE Sediment Control TC **Tracking Control** WE Wind Erosion Control Non-Stormwater NS Management Control Waste Management and WM $\mathbf{\Lambda}$ Materials Pollution Control Legend: Primary Objective
- Secondary Objective

Targeted Constituents

Sediment	\checkmark
Nutrients	\checkmark
Trash	\checkmark
Metals	\checkmark
Bacteria	
Oil and Grease	\checkmark
Organics	\checkmark

Potential Alternatives

None



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- Fuels
- Lubricants
- Other petroleum distillates

Limitations

- In some cases it may be necessary to use a private spill cleanup company.
- This BMP applies to spills caused by the contractor and subcontractors.
- Procedures and practices presented in this BMP are general. Contractor should identify appropriate practices for the specific materials used or stored onsite

Implementation

The following steps will help reduce the stormwater impacts of leaks and spills:

Education

- Be aware that different materials pollute in different amounts. Make sure that each employee knows what a "significant spill" is for each material they use, and what is the appropriate response for "significant" and "insignificant" spills.
- Educate employees and subcontractors on potential dangers to humans and the environment from spills and leaks.
- Hold regular meetings to discuss and reinforce appropriate disposal procedures (incorporate into regular safety meetings).
- Establish a continuing education program to indoctrinate new employees.
- Have contractor's superintendent or representative oversee and enforce proper spill prevention and control measures.

General Measures

- To the extent that the work can be accomplished safely, spills of oil, petroleum products, substances listed under 40 CFR parts 110,117, and 302, and sanitary and septic wastes should be contained and cleaned up immediately.
- Store hazardous materials and wastes in covered containers and protect from vandalism.
- Place a stockpile of spill cleanup materials where it will be readily accessible.
- Train employees in spill prevention and cleanup.
- Designate responsible individuals to oversee and enforce control measures.
- Spills should be covered and protected from stormwater runon during rainfall to the extent that it doesn't compromise clean up activities.
- Do not bury or wash spills with water.

- Store and dispose of used clean up materials, contaminated materials, and recovered spill material that is no longer suitable for the intended purpose in conformance with the provisions in applicable BMPs.
- Do not allow water used for cleaning and decontamination to enter storm drains or watercourses. Collect and dispose of contaminated water in accordance with WM-10, Liquid Waste Management.
- Contain water overflow or minor water spillage and do not allow it to discharge into drainage facilities or watercourses.
- Place proper storage, cleanup, and spill reporting instructions for hazardous materials stored or used on the project site in an open, conspicuous, and accessible location.
- Keep waste storage areas clean, well organized, and equipped with ample cleanup supplies as appropriate for the materials being stored. Perimeter controls, containment structures, covers, and liners should be repaired or replaced as needed to maintain proper function.

Cleanup

- Clean up leaks and spills immediately.
- Use a rag for small spills on paved surfaces, a damp mop for general cleanup, and absorbent
 material for larger spills. If the spilled material is hazardous, then the used cleanup
 materials are also hazardous and must be sent to either a certified laundry (rags) or disposed
 of as hazardous waste.
- Never hose down or bury dry material spills. Clean up as much of the material as possible and dispose of properly. See the waste management BMPs in this section for specific information.

Minor Spills

- Minor spills typically involve small quantities of oil, gasoline, paint, etc. which can be controlled by the first responder at the discovery of the spill.
- Use absorbent materials on small spills rather than hosing down or burying the spill.
- Absorbent materials should be promptly removed and disposed of properly.
- Follow the practice below for a minor spill:
 - Contain the spread of the spill.
 - Recover spilled materials.
 - Clean the contaminated area and properly dispose of contaminated materials.

Semi-Significant Spills

• Semi-significant spills still can be controlled by the first responder along with the aid of other personnel such as laborers and the foreman, etc. This response may require the cessation of all other activities.

- Spills should be cleaned up immediately:
 - Contain spread of the spill.
 - Notify the project foreman immediately.
 - If the spill occurs on paved or impermeable surfaces, clean up using "dry" methods (absorbent materials, cat litter and/or rags). Contain the spill by encircling with absorbent materials and do not let the spill spread widely.
 - If the spill occurs in dirt areas, immediately contain the spill by constructing an earthen dike. Dig up and properly dispose of contaminated soil.
 - If the spill occurs during rain, cover spill with tarps or other material to prevent contaminating runoff.

Significant/Hazardous Spills

- For significant or hazardous spills that cannot be controlled by personnel in the immediate vicinity, the following steps should be taken:
 - Notify the local emergency response by dialing 911. In addition to 911, the contractor will notify the proper county officials. It is the contractor's responsibility to have all emergency phone numbers at the construction site.
 - Notify the Governor's Office of Emergency Services Warning Center, (916) 845-8911.
 - For spills of federal reportable quantities, in conformance with the requirements in 40 CFR parts 110,119, and 302, the contractor should notify the National Response Center at (800) 424-8802.
 - Notification should first be made by telephone and followed up with a written report.
 - The services of a spills contractor or a Haz-Mat team should be obtained immediately. Construction personnel should not attempt to clean up until the appropriate and qualified staffs have arrived at the job site.
 - Other agencies which may need to be consulted include, but are not limited to, the Fire Department, the Public Works Department, the Coast Guard, the Highway Patrol, the City/County Police Department, Department of Toxic Substances, California Division of Oil and Gas, Cal/OSHA, etc.

Reporting

- Report significant spills to local agencies, such as the Fire Department; they can assist in cleanup.
- Federal regulations require that any significant oil spill into a water body or onto an adjoining shoreline be reported to the National Response Center (NRC) at 800-424-8802 (24 hours).

Use the following measures related to specific activities:

Vehicle and Equipment Maintenance

- If maintenance must occur onsite, use a designated area and a secondary containment, located away from drainage courses, to prevent the runon of stormwater and the runoff of spills.
- Regularly inspect onsite vehicles and equipment for leaks and repair immediately
- Check incoming vehicles and equipment (including delivery trucks, and employee and subcontractor vehicles) for leaking oil and fluids. Do not allow leaking vehicles or equipment onsite.
- Always use secondary containment, such as a drain pan or drop cloth, to catch spills or leaks when removing or changing fluids.
- Place drip pans or absorbent materials under paving equipment when not in use.
- Use absorbent materials on small spills rather than hosing down or burying the spill. Remove the absorbent materials promptly and dispose of properly.
- Promptly transfer used fluids to the proper waste or recycling drums. Don't leave full drip pans or other open containers lying around
- Oil filters disposed of in trashcans or dumpsters can leak oil and pollute stormwater. Place the oil filter in a funnel over a waste oil-recycling drum to drain excess oil before disposal. Oil filters can also be recycled. Ask the oil supplier or recycler about recycling oil filters.
- Store cracked batteries in a non-leaking secondary container. Do this with all cracked batteries even if you think all the acid has drained out. If you drop a battery, treat it as if it is cracked. Put it into the containment area until you are sure it is not leaking.

Vehicle and Equipment Fueling

- If fueling must occur onsite, use designate areas, located away from drainage courses, to prevent the runon of stormwater and the runoff of spills.
- Discourage "topping off" of fuel tanks.
- Always use secondary containment, such as a drain pan, when fueling to catch spills/ leaks.

Costs

Prevention of leaks and spills is inexpensive. Treatment and/ or disposal of contaminated soil or water can be quite expensive.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and of two-week intervals in the non-rainy season to verify continued BMP implementation.
- Inspect BMPs subject to non-stormwater discharge daily while non-stormwater discharges occur.

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- Keep ample supplies of spill control and cleanup materials onsite, near storage, unloading, and maintenance areas.
- Update your spill prevention and control plan and stock cleanup materials as changes occur in the types of chemicals onsite.

References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.

Solid Waste Management

WM-5

 $\mathbf{\Lambda}$



Description and Purpose

Solid waste management procedures and practices are designed to prevent or reduce the discharge of pollutants to stormwater from solid or construction waste by providing designated waste collection areas and containers, arranging for regular disposal, and training employees and subcontractors.

Suitable Applications

This BMP is suitable for construction sites where the following wastes are generated or stored:

- Solid waste generated from trees and shrubs removed during land clearing, demolition of existing structures (rubble), and building construction
- Packaging materials including wood, paper, and plastic
- Scrap or surplus building materials including scrap metals, rubber, plastic, glass pieces and masonry products
- Domestic wastes including food containers such as beverage cans, coffee cups, paper bags, plastic wrappers, and cigarettes
- Construction wastes including brick, mortar, timber, steel and metal scraps, pipe and electrical cuttings, nonhazardous equipment parts, styrofoam and other materials used to transport and package construction materials
- Highway planting wastes, including vegetative material,

Categories

EC	Erosion Control	
SE	Sediment Control	
тс	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater	
NO	Management Control	
\ A/ M	Waste Management and	
VVIVI	Materials Pollution Control	
Legend:		
Primary Objective		

× Secondary Objective

Targeted Constituents

Sediment	\checkmark
Nutrients	\checkmark
Trash	\checkmark
Metals	\checkmark
Bacteria	
Oil and Grease	\checkmark
Organics	\checkmark

Potential Alternatives

None



plant containers, and packaging materials

Limitations

Temporary stockpiling of certain construction wastes may not necessitate stringent drainage related controls during the non-rainy season or in desert areas with low rainfall.

Implementation

The following steps will help keep a clean site and reduce stormwater pollution:

- Select designated waste collection areas onsite.
- Inform trash-hauling contractors that you will accept only watertight dumpsters for onsite use. Inspect dumpsters for leaks and repair any dumpster that is not watertight.
- Locate containers in a covered area or in a secondary containment.
- Provide an adequate number of containers with lids or covers that can be placed over the container to keep rain out or to prevent loss of wastes when it is windy.
- Plan for additional containers and more frequent pickup during the demolition phase of construction.
- Collect site trash daily, especially during rainy and windy conditions.
- Remove this solid waste promptly since erosion and sediment control devices tend to collect litter.
- Make sure that toxic liquid wastes (used oils, solvents, and paints) and chemicals (acids, pesticides, additives, curing compounds) are not disposed of in dumpsters designated for construction debris.
- Do not hose out dumpsters on the construction site. Leave dumpster cleaning to the trash hauling contractor.
- Arrange for regular waste collection before containers overflow.
- Clean up immediately if a container does spill.
- Make sure that construction waste is collected, removed, and disposed of only at authorized disposal areas.

Education

- Have the contractor's superintendent or representative oversee and enforce proper solid waste management procedures and practices.
- Instruct employees and subcontractors on identification of solid waste and hazardous waste.
- Educate employees and subcontractors on solid waste storage and disposal procedures.
- Hold regular meetings to discuss and reinforce disposal procedures (incorporate into regular safety meetings).

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- Require that employees and subcontractors follow solid waste handling and storage procedures.
- Prohibit littering by employees, subcontractors, and visitors.
- Minimize production of solid waste materials wherever possible.

Collection, Storage, and Disposal

- Littering on the project site should be prohibited.
- To prevent clogging of the storm drainage system, litter and debris removal from drainage grates, trash racks, and ditch lines should be a priority.
- Trash receptacles should be provided in the contractor's yard, field trailer areas, and at locations where workers congregate for lunch and break periods.
- Litter from work areas within the construction limits of the project site should be collected and placed in watertight dumpsters at least weekly, regardless of whether the litter was generated by the contractor, the public, or others. Collected litter and debris should not be placed in or next to drain inlets, stormwater drainage systems, or watercourses.
- Dumpsters of sufficient size and number should be provided to contain the solid waste generated by the project.
- Full dumpsters should be removed from the project site and the contents should be disposed of by the trash hauling contractor.
- Construction debris and waste should be removed from the site biweekly or more frequently as needed.
- Construction material visible to the public should be stored or stacked in an orderly manner.
- Stormwater runon should be prevented from contacting stored solid waste through the use of berms, dikes, or other temporary diversion structures or through the use of measures to elevate waste from site surfaces.
- Solid waste storage areas should be located at least 50 ft from drainage facilities and watercourses and should not be located in areas prone to flooding or ponding.
- Except during fair weather, construction and highway planting waste not stored in watertight dumpsters should be securely covered from wind and rain by covering the waste with tarps or plastic.
- Segregate potentially hazardous waste from non-hazardous construction site waste.
- Make sure that toxic liquid wastes (used oils, solvents, and paints) and chemicals (acids, pesticides, additives, curing compounds) are not disposed of in dumpsters designated for construction debris.
- For disposal of hazardous waste, see WM-6, Hazardous Waste Management. Have hazardous waste hauled to an appropriate disposal and/or recycling facility.

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North Crown Point Comfort Station		

Salvage or recycle useful vegetation debris, packaging and surplus building materials when practical. For example, trees and shrubs from land clearing can be used as a brush barrier, or converted into wood chips, then used as mulch on graded areas. Wood pallets, cardboard boxes, and construction scraps can also be recycled.

Costs

All of the above are low cost measures.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and of two-week intervals in the non-rainy season to verify continued BMP implementation.
- Inspect BMPs subject to non-stormwater discharge daily while non-stormwater discharges occur
- Inspect construction waste area regularly.
- Arrange for regular waste collection.

References

Processes, Procedures and Methods to Control Pollution Resulting from All Construction Activity, 430/9-73-007, USEPA, 1973.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.

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Description and Purpose

Prevent or reduce the discharge of pollutants to stormwater from hazardous waste through proper material use, waste disposal, and training of employees and subcontractors.

Suitable Applications

This best management practice (BMP) applies to all construction projects. Hazardous waste management practices are implemented on construction projects that generate waste from the use of:

- **Petroleum Products** Asphalt Products
- Pesticides **Concrete Curing Compounds** -
- **Palliatives** Acids
- Septic Wastes Paints -
- Stains **Solvents** _
- Wood Preservatives **Roofing Tar** -
- Any materials deemed a hazardous waste in California, Title 22 Division 4.5, or listed in 40 CFR Parts 110, 117, 261, or 302

Categories

EC	Erosion Control	
SE	Sediment Control	
тс	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	
Legend:		
Primary Objective		

Secondary Objective

Targeted Constituents

Sediment	
Nutrients	\checkmark
Trash	\checkmark
Metals	\checkmark
Bacteria	\checkmark
Oil and Grease	\checkmark
Organics	\checkmark

Potential Alternatives

None



In addition, sites with existing structures may contain wastes, which must be disposed of in accordance with federal, state, and local regulations. These wastes include:

- Sandblasting grit mixed with lead-, cadmium-, or chromium-based paints
- Asbestos
- PCBs (particularly in older transformers)

Limitations

- Hazardous waste that cannot be reused or recycled must be disposed of by a licensed hazardous waste hauler.
- Nothing in this BMP relieves the contractor from responsibility for compliance with federal, state, and local laws regarding storage, handling, transportation, and disposal of hazardous wastes.
- This BMP does not cover aerially deposited lead (ADL) soils. For ADL soils refer to WM-7, Contaminated Soil Management.

Implementation

The following steps will help reduce stormwater pollution from hazardous wastes:

Material Use

- Wastes should be stored in sealed containers constructed of a suitable material and should be labeled as required by Title 22 CCR, Division 4.5 and 49 CFR Parts 172, 173, 178, and 179.
- All hazardous waste should be stored, transported, and disposed as required in Title 22 CCR, Division 4.5 and 49 CFR 261-263.
- Waste containers should be stored in temporary containment facilities that should comply with the following requirements:
 - Temporary containment facility should provide for a spill containment volume equal to 1.5 times the volume of all containers able to contain precipitation from a 25 year storm event, plus the greater of 10% of the aggregate volume of all containers or 100% of the capacity of the largest tank within its boundary, whichever is greater.
 - Temporary containment facility should be impervious to the materials stored there for a minimum contact time of 72 hours.
 - Temporary containment facilities should be maintained free of accumulated rainwater and spills. In the event of spills or leaks, accumulated rainwater and spills should be placed into drums after each rainfall. These liquids should be handled as a hazardous waste unless testing determines them to be non-hazardous. Non-hazardous liquids should be sent to an approved disposal site.
 - Sufficient separation should be provided between stored containers to allow for spill cleanup and emergency response access.

- Incompatible materials, such as chlorine and ammonia, should not be stored in the same temporary containment facility.
- Throughout the rainy season, temporary containment facilities should be covered during non-working days, and prior to rain events. Covered facilities may include use of plastic tarps for small facilities or constructed roofs with overhangs.
- Drums should not be overfilled and wastes should not be mixed.
- Unless watertight, containers of dry waste should be stored on pallets.
- Do not over-apply herbicides and pesticides. Prepare only the amount needed. Follow the recommended usage instructions. Over application is expensive and environmentally harmful. Apply surface dressings in several smaller applications, as opposed to one large application. Allow time for infiltration and avoid excess material being carried offsite by runoff. Do not apply these chemicals just before it rains. People applying pesticides must be certified in accordance with federal and state regulations.
- Paint brushes and equipment for water and oil based paints should be cleaned within a contained area and should not be allowed to contaminate site soils, watercourses, or drainage systems. Waste paints, thinners, solvents, residues, and sludges that cannot be recycled or reused should be disposed of as hazardous waste. When thoroughly dry, latex paint and paint cans, used brushes, rags, absorbent materials, and drop cloths should be disposed of as solid waste.
- Do not clean out brushes or rinse paint containers into the dirt, street, gutter, storm drain, or stream. "Paint out" brushes as much as possible. Rinse water-based paints to the sanitary sewer. Filter and reuse thinners and solvents. Dispose of excess oil-based paints and sludge as hazardous waste.
- The following actions should be taken with respect to temporary contaminant:
 - Ensure that adequate hazardous waste storage volume is available. -
 - Ensure that hazardous waste collection containers are conveniently located.
 - Designate hazardous waste storage areas onsite away from storm drains or watercourses and away from moving vehicles and equipment to prevent accidental spills.
 - Minimize production or generation of hazardous materials and hazardous waste on the job site.
 - Use containment berms in fueling and maintenance areas and where the potential for spills is high.
 - Segregate potentially hazardous waste from non-hazardous construction site debris.
 - Keep liquid or semi-liquid hazardous waste in appropriate containers (closed drums or similar) and under cover.

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- Clearly label all hazardous waste containers with the waste being stored and the date of _ accumulation.
- Place hazardous waste containers in secondary containment. _
- Do not allow potentially hazardous waste materials to accumulate on the ground. _
- Do not mix wastes.
- Use all of the product before disposing of the container.
- Do not remove the original product label; it contains important safety and disposal information.

Waste Recycling Disposal

- Select designated hazardous waste collection areas onsite.
- Hazardous materials and wastes should be stored in covered containers and protected from vandalism.
- Place hazardous waste containers in secondary containment.
- Do not mix wastes, this can cause chemical reactions, making recycling impossible and complicating disposal.
- Recycle any useful materials such as used oil or water-based paint.
- Make sure that toxic liquid wastes (used oils, solvents, and paints) and chemicals (acids, pesticides, additives, curing compounds) are not disposed of in dumpsters designated for construction debris.
- Arrange for regular waste collection before containers overflow.
- Make sure that hazardous waste (e.g., excess oil-based paint and sludge) is collected, removed, and disposed of only at authorized disposal areas.

Disposal Procedures

- Waste should be disposed of by a licensed hazardous waste transporter at an authorized and licensed disposal facility or recycling facility utilizing properly completed Uniform Hazardous Waste Manifest forms.
- A Department of Health Services certified laboratory should sample waste to determine the appropriate disposal facility.
- Properly dispose of rainwater in secondary containment that may have mixed with hazardous waste.
- Attention is directed to "Hazardous Material", "Contaminated Material", and "Aerially Deposited Lead" of the contract documents regarding the handling and disposal of hazardous materials.

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Education

- Educate employees and subcontractors on hazardous waste storage and disposal procedures.
- Educate employees and subcontractors on potential dangers to humans and the environment from hazardous wastes.
- Instruct employees and subcontractors on safety procedures for common construction site hazardous wastes.
- Instruct employees and subcontractors in identification of hazardous and solid waste.
- Hold regular meetings to discuss and reinforce hazardous waste management procedures (incorporate into regular safety meetings).
- The contractor's superintendent or representative should oversee and enforce proper hazardous waste management procedures and practices.
- Make sure that hazardous waste is collected, removed, and disposed of only at authorized disposal areas.
- Warning signs should be placed in areas recently treated with chemicals.
- Place a stockpile of spill cleanup materials where it will be readily accessible.
- If a container does spill, clean up immediately.

Costs

All of the above are low cost measures.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and of two week intervals in the non-rainy season to verify continued BMP implementation.
- Inspect BMPs subject to non-stormwater discharge daily while non-stormwater discharges occur
- Hazardous waste should be regularly collected.
- A foreman or construction supervisor should monitor onsite hazardous waste storage and disposal procedures.
- Waste storage areas should be kept clean, well organized, and equipped with ample cleanup supplies as appropriate for the materials being stored.
- Perimeter controls, containment structures, covers, and liners should be repaired or replaced as needed to maintain proper function.
- Hazardous spills should be cleaned up and reported in conformance with the applicable Material Safety Data Sheet (MSDS) and the instructions posted at the project site.

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- The National Response Center, at (800) 424-8802, should be notified of spills of federal reportable quantities in conformance with the requirements in 40 CFR parts 110, 117, and 302. Also notify the Governors Office of Emergency Services Warning Center at (916) 845-8911.
- A copy of the hazardous waste manifests should be provided.

References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Processes, Procedures and Methods to Control Pollution Resulting from All Construction Activity, 430/9-73-007, USEPA, 1973.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.

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Categories

EC SE

TC

WE

NS

WM

Legend:

Erosion Control

Sediment Control

Tracking Control Wind Erosion Control

Non-Stormwater

Primary Objective Secondary Objective

Management Control Waste Management and

Materials Pollution Control



Description and Purpose

Prevent or reduce the discharge of pollutants to stormwater from contaminated soil and highly acidic or alkaline soils by conducting pre-construction surveys, inspecting excavations regularly, and remediating contaminated soil promptly.

Suitable Applications

Contaminated soil management is implemented on construction projects in highly urbanized or industrial areas where soil contamination may have occurred due to spills, illicit discharges, aerial deposition, past use and leaks from underground storage tanks.

Limitations

Contaminated soils that cannot be treated onsite must be disposed of offsite by a licensed hazardous waste hauler. The presence of contaminated soil may indicate contaminated water as well. See NS-2, Dewatering Operations, for more information.

The procedures and practices presented in this BMP are general. The contractor should identify appropriate practices and procedures for the specific contaminants known to exist or discovered onsite.

Implementation

Most owners and developers conduct pre-construction environmental assessments as a matter of routine. Contaminated soils are often identified during project planning and development with known locations identified in the plans, specifications and in the SWPPP. The contractor should review applicable reports and investigate appropriate call-outs in the

Targeted Constituents

Sediment	
Nutrients	\checkmark
Trash	\checkmark
Metals	\checkmark
Bacteria	\checkmark
Oil and Grease	\checkmark
Organics	\checkmark

Potential Alternatives

None



plans, specifications, and SWPPP. Recent court rulings holding contractors liable for cleanup costs when they unknowingly move contaminated soil highlight the need for contractors to confirm a site assessment is completed before earth moving begins.

The following steps will help reduce stormwater pollution from contaminated soil:

- Conduct thorough, pre-construction inspections of the site and review documents related to the site. If inspection or reviews indicated presence of contaminated soils, develop a plan before starting work.
- Look for contaminated soil as evidenced by discoloration, odors, differences in soil properties, abandoned underground tanks or pipes, or buried debris.
- Prevent leaks and spills. Contaminated soil can be expensive to treat and dispose of properly. However, addressing the problem before construction is much less expensive than after the structures are in place.
- The contractor may further identify contaminated soils by investigating:
 - Past site uses and activities
 - Detected or undetected spills and leaks
 - Acid or alkaline solutions from exposed soil or rock formations high in acid or alkaline forming elements
 - Contaminated soil as evidenced by discoloration, odors, differences in soil properties, abandoned underground tanks or pipes, or buried debris.
 - Suspected soils should be tested at a certified laboratory.

Education

- Have employees and subcontractors complete a safety training program which meets 29 CFR 1910.120 and 8 CCR 5192 covering the potential hazards as identified, prior to performing any excavation work at the locations containing material classified as hazardous.
- Educate employees and subcontractors in identification of contaminated soil and on contaminated soil handling and disposal procedures.
- Hold regular meetings to discuss and reinforce disposal procedures (incorporate into regular safety meetings).

Handling Procedures for Material with Aerially Deposited Lead (ADL)

- Materials from areas designated as containing (ADL) may, if allowed by the contract special provisions, be excavated, transported, and used in the construction of embankments and/or backfill.
- Excavation, transportation, and placement operations should result in no visible dust.
- Caution should be exercised to prevent spillage of lead containing material during transport.

• Quality should be monitored during excavation of soils contaminated with lead.

Handling Procedures for Contaminated Soils

- Minimize onsite storage. Contaminated soil should be disposed of properly in accordance with all applicable regulations. All hazardous waste storage will comply with the requirements in Title 22, CCR, Sections 66265.250 to 66265.260.
- Test suspected soils at an approved certified laboratory.
- Work with the local regulatory agencies to develop options for treatment or disposal if the soil is contaminated.
- Avoid temporary stockpiling of contaminated soils or hazardous material.
- Take the following precautions if temporary stockpiling is necessary:
 - Cover the stockpile with plastic sheeting or tarps.
 - Install a berm around the stockpile to prevent runoff from leaving the area.
 - Do not stockpile in or near storm drains or watercourses.
- Remove contaminated material and hazardous material on exteriors of transport vehicles and place either into the current transport vehicle or into the excavation prior to the vehicle leaving the exclusion zone.
- Monitor the air quality continuously during excavation operations at all locations containing hazardous material.
- Procure all permits and licenses, pay all charges and fees, and give all notices necessary and incident to the due and lawful prosecution of the work, including registration for transporting vehicles carrying the contaminated material and the hazardous material.
- Collect water from decontamination procedures and treat or dispose of it at an appropriate disposal site.
- Collect non-reusable protective equipment, once used by any personnel, and dispose of at an appropriate disposal site.
- Install temporary security fence to surround and secure the exclusion zone. Remove fencing when no longer needed.
- Excavate, transport, and dispose of contaminated material and hazardous material in accordance with the rules and regulations of the following agencies (the specifications of these agencies supersede the procedures outlined in this BMP):
 - United States Department of Transportation (USDOT)
 - United States Environmental Protection Agency (USEPA)
 - California Environmental Protection Agency (CAL-EPA)

- California Division of Occupation Safety and Health Administration (CAL-OSHA) _
- Local regulatory agencies

Procedures for Underground Storage Tank Removals

- Prior to commencing tank removal operations, obtain the required underground storage tank removal permits and approval from the federal, state, and local agencies that have jurisdiction over such work.
- To determine if it contains hazardous substances, arrange to have tested, any liquid or sludge found in the underground tank prior to its removal.
- Following the tank removal, take soil samples beneath the excavated tank and perform analysis as required by the local agency representative(s).
- The underground storage tank, any liquid or sludge found within the tank, and all contaminated substances and hazardous substances removed during the tank removal and transported to disposal facilities permitted to accept such waste.

Water Control

- All necessary precautions and preventive measures should be taken to prevent the flow of water, including ground water, from mixing with hazardous substances or underground storage tank excavations. Such preventative measures may consist of, but are not limited to, berms, cofferdams, grout curtains, freeze walls, and seal course concrete or any combination thereof.
- If water does enter an excavation and becomes contaminated, such water, when necessary to proceed with the work, should be discharged to clean, closed top, watertight transportable holding tanks, treated, and disposed of in accordance with federal, state, and local laws.

Costs

Prevention of leaks and spills is inexpensive. Treatment or disposal of contaminated soil can be quite expensive.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and of two-week intervals in the non-rainy season to verify continued BMP implementation.
- Arrange for contractor's Water Pollution Control Manager, foreman, and/or construction supervisor to monitor onsite contaminated soil storage and disposal procedures.
- Monitor air quality continuously during excavation operations at all locations containing hazardous material.
- Coordinate contaminated soils and hazardous substances/waste management with the appropriate federal, state, and local agencies.

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Implement WM-4, Spill Prevention and Control, to prevent leaks and spills as much as possible.

References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Processes, Procedures and Methods to Control Pollution Resulting from All Construction Activity, 430/9-73-007, USEPA, 1973.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.

Concrete Waste Management



Description and Purpose

Prevent the discharge of pollutants to stormwater from concrete waste by conducting washout onsite or offsite in a designated area, and by employee and subcontractor training.

The General Permit incorporates Numeric Effluent Limits (NEL) and Numeric Action Levels (NAL) for pH (see Section 2 of this handbook to determine your project's risk level and if you are subject to these requirements).

Many types of construction materials, including mortar, concrete, stucco, cement and block and their associated wastes have basic chemical properties that can raise pH levels outside of the permitted range. Additional care should be taken when managing these materials to prevent them from coming into contact with stormwater flows and raising pH to levels outside the accepted range.

Suitable Applications

Concrete waste management procedures and practices are implemented on construction projects where:

- Concrete is used as a construction material or where concrete dust and debris result from demolition activities.
- Slurries containing portland cement concrete (PCC) are generated, such as from saw cutting, coring, grinding, grooving, and hydro-concrete demolition.

Categories

Lege V	end: Primary Category	
WM	Waste Management and Materials Pollution Control	V
NS	Non-Stormwater Management Control	×
WE	Wind Erosion Control	
TC	Tracking Control	
SE	Sediment Control	
EC	Erosion Control	

× Secondary Category

Targeted Constituents

Sediment	\checkmark
Nutrients	
Trash	
Metals	\checkmark
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None



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- Concrete trucks and other concrete-coated equipment are washed onsite.
- Mortar-mixing stations exist.
- Stucco mixing and spraying .
- See also NS-8, Vehicle and Equipment Cleaning.

Limitations

- Offsite washout of concrete wastes may not always be possible.
- Multiple washouts may be needed to assure adequate capacity and to allow for evaporation.

Implementation

The following steps will help reduce stormwater pollution from concrete wastes:

- Incorporate requirements for concrete waste management into material supplier and subcontractor agreements.
- Store dry and wet materials under cover, away from drainage areas. Refer to WM-1, Material Delivery and Storage for more information.
- Avoid mixing excess amounts of concrete.
- Perform washout of concrete trucks in designated areas only, where washout will not reach stormwater.
- Do not wash out concrete trucks into storm drains, open ditches, streets, streams or onto the ground. Trucks should always be washed out into designated facilities.
- Do not allow excess concrete to be dumped onsite, except in designated areas.
- For onsite washout:
 - On larger sites, it is recommended to locate washout areas at least 50 feet from storm drains, open ditches, or water bodies. Do not allow runoff from this area by constructing a temporary pit or bermed area large enough for liquid and solid waste.
 - Washout wastes into the temporary washout where the concrete can set, be broken up, and then disposed properly.
 - Washout should be lined so there is no discharge into the underlying soil.
- Do not wash sweepings from exposed aggregate concrete into the street or storm drain.
 Collect and return sweepings to aggregate base stockpile or dispose in the trash.
- See typical concrete washout installation details at the end of this fact sheet.

Education

• Educate employees, subcontractors, and suppliers on the concrete waste management techniques described herein.

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- Arrange for contractor's superintendent or representative to oversee and enforce concrete waste management procedures.
- Discuss the concrete management techniques described in this BMP (such as handling of concrete waste and washout) with the ready-mix concrete supplier before any deliveries are made.

Concrete Demolition Wastes

- Stockpile concrete demolition waste in accordance with BMP WM-3, Stockpile Management.
- Dispose of or recycle hardened concrete waste in accordance with applicable federal, state or local regulations.

Concrete Slurry Wastes

- PCC and AC waste should not be allowed to enter storm drains or watercourses.
- PCC and AC waste should be collected and disposed of or placed in a temporary concrete washout facility (as described in Onsite Temporary Concrete Washout Facility, Concrete Transit Truck Washout Procedures, below).
- A foreman or construction supervisor should monitor onsite concrete working tasks, such as saw cutting, coring, grinding and grooving to ensure proper methods are implemented.
- Saw-cut concrete slurry should not be allowed to enter storm drains or watercourses. Residue from grinding operations should be picked up by means of a vacuum attachment to the grinding machine or by sweeping. Saw cutting residue should not be allowed to flow across the pavement and should not be left on the surface of the pavement. See also NS-3, Paving and Grinding Operations; and WM-10, Liquid Waste Management.
- Concrete slurry residue should be disposed in a temporary washout facility (as described in Onsite Temporary Concrete Washout Facility, Concrete Transit Truck Washout Procedures, below) and allowed to dry. Dispose of dry slurry residue in accordance with WM-5, Solid Waste Management.

Onsite Temporary Concrete Washout Facility, Transit Truck Washout Procedures

- Temporary concrete washout facilities should be located a minimum of 50 ft from storm drain inlets, open drainage facilities, and watercourses. Each facility should be located away from construction traffic or access areas to prevent disturbance or tracking.
- A sign should be installed adjacent to each washout facility to inform concrete equipment operators to utilize the proper facilities.
- Temporary concrete washout facilities should be constructed above grade or below grade at the option of the contractor. Temporary concrete washout facilities should be constructed and maintained in sufficient quantity and size to contain all liquid and concrete waste generated by washout operations.

- Temporary washout facilities should have a temporary pit or bermed areas of sufficient volume to completely contain all liquid and waste concrete materials generated during washout procedures.
- Temporary washout facilities should be lined to prevent discharge to the underlying ground or surrounding area.
- Washout of concrete trucks should be performed in designated areas only.
- Only concrete from mixer truck chutes should be washed into concrete wash out.
- Concrete washout from concrete pumper bins can be washed into concrete pumper trucks and discharged into designated washout area or properly disposed of or recycled offsite.
- Once concrete wastes are washed into the designated area and allowed to harden, the concrete should be broken up, removed, and disposed of per WM-5, Solid Waste Management. Dispose of or recycle hardened concrete on a regular basis.
- Temporary Concrete Washout Facility (Type Above Grade)
 - Temporary concrete washout facility (type above grade) should be constructed as shown on the details at the end of this BMP, with a recommended minimum length and minimum width of 10 ft; however, smaller sites or jobs may only need a smaller washout facility. With any washout, always maintain a sufficient quantity and volume to contain all liquid and concrete waste generated by washout operations.
 - Materials used to construct the washout area should conform to the provisions detailed in their respective BMPs (e.g., SE-8 Sandbag Barrier).
 - Plastic lining material should be a minimum of 10 mil in polyethylene sheeting and should be free of holes, tears, or other defects that compromise the impermeability of the material.
 - Alternatively, portable removable containers can be used as above grade concrete washouts. Also called a "roll-off"; this concrete washout facility should be properly sealed to prevent leakage, and should be removed from the site and replaced when the container reaches 75% capacity.
- Temporary Concrete Washout Facility (Type Below Grade)
 - Temporary concrete washout facilities (type below grade) should be constructed as shown on the details at the end of this BMP, with a recommended minimum length and minimum width of 10 ft. The quantity and volume should be sufficient to contain all liquid and concrete waste generated by washout operations.
 - Lath and flagging should be commercial type.
 - Plastic lining material should be a minimum of 10 mil polyethylene sheeting and should be free of holes, tears, or other defects that compromise the impermeability of the material.

- The base of a washout facility should be free of rock or debris that may damage a plastic liner.

Removal of Temporary Concrete Washout Facilities

- When temporary concrete washout facilities are no longer required for the work, the hardened concrete should be removed and properly disposed or recycled in accordance with federal, state or local regulations. Materials used to construct temporary concrete washout facilities should be removed from the site of the work and properly disposed or recycled in accordance with federal, state or local regulations.
- Holes, depressions or other ground disturbance caused by the removal of the temporary concrete washout facilities should be backfilled and repaired.

Costs

All of the above are low cost measures. Roll-off concrete washout facilities can be more costly than other measures due to removal and replacement; however, provide a cleaner alternative to traditional washouts. The type of washout facility, size, and availability of materials will determine the cost of the washout.

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Temporary concrete washout facilities should be maintained to provide adequate holding capacity with a minimum freeboard of 4 in. for above grade facilities and 12 in. for below grade facilities. Maintaining temporary concrete washout facilities should include removing and disposing of hardened concrete and returning the facilities to a functional condition. Hardened concrete materials should be removed and properly disposed or recycled in accordance with federal, state or local regulations.
- Washout facilities must be cleaned, or new facilities must be constructed and ready for use once the washout is 75% full.
- Inspect washout facilities for damage (e.g. torn liner, evidence of leaks, signage, etc.). Repair all identified damage.

References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000, Updated March 2003.

Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.



Concrete Waste Management



Sanitary/Septic Waste Management **WM-9**



Description and Purpose

Proper sanitary and septic waste management prevent the discharge of pollutants to stormwater from sanitary and septic waste by providing convenient, well-maintained facilities, and arranging for regular service and disposal.

Suitable Applications

Sanitary septic waste management practices are suitable for use at all construction sites that use temporary or portable sanitary and septic waste systems.

Limitations

None identified.

Implementation

Sanitary or septic wastes should be treated or disposed of in accordance with state and local requirements. In many cases, one contract with a local facility supplier will be all that it takes to make sure sanitary wastes are properly disposed.

Storage and Disposal Procedures

Temporary sanitary facilities should be located away from drainage facilities, watercourses, and from traffic circulation. If site conditions allow, place portable facilities a minimum of 50 feet from drainage convevances and traffic areas. When subjected to high winds or risk of high winds, temporary sanitary facilities should be secured to prevent overturning.

Categories

\checkmark	Primary Category			
Legend:				
WM	Waste Management and Materials Pollution Control	V		
NS	Non-Stormwater Management Control			
WE	Wind Erosion Control			
тс	Tracking Control			
SE	Sediment Control			
EC	Erosion Control			

× Secondary Category

Targeted Constituents

Sediment	
Nutrients	\checkmark
Trash	\checkmark
Metals	
Bacteria	\checkmark
Oil and Grease	
Organics	\checkmark

Potential Alternatives

None



- Temporary sanitary facilities must be equipped with containment to prevent discharge of pollutants to the stormwater drainage system of the receiving water.
- Consider safety as well as environmental implications before placing temporary sanitary facilities.
- Wastewater should not be discharged or buried within the project site.
- Sanitary and septic systems that discharge directly into sanitary sewer systems, where permissible, should comply with the local health agency, city, county, and sewer district requirements.
- Only reputable, licensed sanitary and septic waste haulers should be used.
- Sanitary facilities should be located in a convenient location.
- Temporary septic systems should treat wastes to appropriate levels before discharging.
- If using an onsite disposal system (OSDS), such as a septic system, local health agency requirements must be followed.
- Temporary sanitary facilities that discharge to the sanitary sewer system should be properly connected to avoid illicit discharges.
- Sanitary and septic facilities should be maintained in good working order by a licensed service.
- Regular waste collection by a licensed hauler should be arranged before facilities overflow.
- If a spill does occur from a temporary sanitary facility, follow federal, state and local regulations for containment and clean-up.

Education

- Educate employees, subcontractors, and suppliers on sanitary and septic waste storage and disposal procedures.
- Educate employees, subcontractors, and suppliers of potential dangers to humans and the environment from sanitary and septic wastes.
- Instruct employees, subcontractors, and suppliers in identification of sanitary and septic waste.
- Hold regular meetings to discuss and reinforce the use of sanitary facilities (incorporate into regular safety meetings).
- Establish a continuing education program to indoctrinate new employees.

Costs

All of the above are low cost measures.

November 2009

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Arrange for regular waste collection.
- If high winds are expected, portable sanitary facilities must be secured with spikes or weighed down to prevent over turning.
- If spills or leaks from sanitary or septic facilities occur that are not contained and discharge from the site, non-visible sampling of site discharge may be required. Refer to the General Permit or to your project specific Construction Site Monitoring Plan to determine if and where sampling is required.

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.

TAB D

Signatory Authorization Delegation Form

Intent: The intent of this form is to give authorization to an individual not considered an executive officer of the discharger/owner's company. By delegating authority, the executive officer will not be required to inspect the forms or the site.

Who: This form shall be filled out by the discharge/owner's executive officer.

Where: The completed, signed form shall be kept under Tab D of this SWPCP.

When: This form only needs to be completed once and shall be completed prior to the start of any construction activities on the site.

Storm Water Pollution Control Plan Signatory Authorization Delegation Form

North Crown Point - New Comfort Station Mission Bay Park, San Diego, CA 92109

Storm Water Pollution Control Plan dated February 2011

"In accordance with the NPDES General Permit for Storm Water Discharges from Construction Activities, Section 8.11B (Signatory Requirements), and the (owner's Representative is hereby duly authorized to sign all reports and certifications that are required under the Permit and as part of this Storm Water Pollution Control Plan on my behalf.

Signed:
Printed Name:
Title:
Company Name:
Address:
Telephone Number:
Date:

TAB E

Inspection Report

Intent: This form will be used to perform site inspections. It is the intent of this document to find and address any unsatisfactory or damaged Best Management Practices. Corrective actions will be recommended by the inspector and the jobsite superintendent shall make sure the repairs are made as quickly as possible.

Who: This will be the qualified inspector's responsibility.

Where: This form shall be kept under Tab E.

When: The form shall be filled out ONCE every seven (7) days, pre-storm, post-storm, and once every 24 hours for extended rainfall events.

Storm Water Pollution Control Plan Inspection Form

North Crown Point - New Comfort Station

Mission Bay Park, San Diego, CA 92109

Storm Water Pollution Control Plan dated February 2011

Inspections/reports must be completed every seven (7) days, pre-storm, post-storm, and every 24 hours during extended rainfall events.

Inspection Type:	🗌 Routine (every 7 calendar days)	🗌 Pre-Storm	□ Storm	Post-Storm
Date:	W	eek Ending:	<u></u>	
Weather/Storm Event	Information:			
Storm Start Time:	Sto	orm Duration: _		
Time Elapsed Since Las	st Storm: Ap	proximate Amou	nt of Rainfall	(inches):

Based on the results of the inspection, necessary control modifications shall be implemented within seven (7) calendar days. These reports shall be kept on file as part of the Storm Water Pollution Prevention Plan for at least five (5) years from the date of completion and submission of the Final Stabilization Certification/Termination Checklist and Notice of Termination. A copy of the SWPCP shall be kept at the site at all times during construction.

Certification Statement:

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Name of Inspector:	Title of Inspector:
Qualifications of Inspector:	
Inspector's Signature:	
<u>Compliance C</u> I certify that, based on no incidents of non-complia compliance wit	<u>Certification*</u> ance identified during the inspection, the site is in h the SWPCP.
Name of Owner's Duly Authorized Representative (Print	ted):
Signature of Owner's Duly Authorized Representative: _	
Date:	
*Note: Only to be signed when the site is in full compli	ance with the SWPCP.

Inspection Form Continued

Inspection Areas (Structural)	Satisfactory	Unsatisfactory (provide location or numeric identification per plan sheet)	N/A	Corrective Action Required	Implementation Date of Corrective Action
Construction Entrance/Exit or Entrance/ Outlet tire wash					
Perimeter Silt Fence/Fiber Rolls/ Gravel Bags					
Material Laydown/Storage Area					
Waste Storage Areas					
Portable Restrooms					
Vehicle Maintenance Area					

Page 2 of 2

TAB F

SWPCP Modification Form

Intent: This form is intended to allow the contractor to make modifications to the Erosion Control Plans for installation of underground utilities, curb & gutter, etc. Each removal and reinstallation of a BMP shall be documented with one of these forms. The owner and owner's engineer may also request modifications to the SWPCP, which would require one of these forms as well.

Who: This will be the jobsite superintendent's responsibility (and on occasion the owner or the owner's engineer).

Where: This form shall be kept under Tab F.

When: The form shall be filled out as needed.

Storm Water Pollution Control Plan SWPCP Modification Form

North Crown Point - New Comfort Station

Mission Bay Park, San Diego, CA 92109

Storm Water Pollution Control Plan dated February 2011

CHANGES REQUIRED FOR STORMWATER POLLUTION PREVENTION PLAN

The SWPCP must be amended whenever there is a change in design, construction, operation, or maintenance at the construction site that has a significant effect on the discharge of pollutants to the waters of the United States that has not been previously addressed in the SWPCP, if inspections or investigations by site staff, local, state or federal officials determine that discharges are causing water quality exceedances or the SWPCP is ineffective in eliminating or significantly minimizing pollutants in storm water discharges from the construction site, or based on the results of an inspection, the SWPCP must be modified to include additional or modified BMPs designed to correct identified problems. Revisions must be completed within seven (7) calendar days following the inspection.

To: Addrocci	Project Manager	Date:	
Address:		Project:	North Crown Point - New Comfort Station
Telephone: Facsimile: Sent Via:	Facsimile	Courier	🗍 US Mail
INSPECTOR:	(Print)		DATE:
	(Signature)		
QUALIFICATIC	ONS OF INSPECTOR:		
CHANGES REQ	QUIRED TO THE STORMWATER	r pollution c	CONTROL PLAN:
REASONS FOR	CHANGES:		

TAB G

Monthly Training Log

Intent: This form will be used to document the regular training required by the SWPCP. Training should be made a part of the weekly (or equivalent) jobsite meeting.

Who: This will be the jobsite superintendent's responsibility.

Where: This form shall be kept under Tab G.

When: The form shall be filled out at minimum ONCE a month, or as new subcontractors begin to mobilize on-site.

Storm Water Pollution Control Plan Monthly Training Log

North Crown Point - New Comfort Station

Mission Bay Park, San Diego, CA 92109

Storm Water Pollution Control Plan dated February 2011

Storm Water Pollution Prevention Plan Topic: (Check as appropriate)

Temporary Soil Stabilization	Temporary Sediment Control
Wind Erosion Control	Tracking Control
Non-Storm Water Management	Waste Management and Mate

Fracian & Sadimant Control Plan

Waste Management and Materials	
Pollution Control	

Erosion & Sediment Control Plan

Specific Training Objective:	
Date:	
Instructor:	
Location:	
Telephone:	

Attendance Roster

Name	Company	Telephone Number	Signature

TAB H

AFFIDAVIT OF DISPOSAL

WHEREAS, on the _____ DAY OF _____, 2____, the undersigned entered into and executed a contract with the City of San Diego, a municipal corporation, for:

NORTH CROWN POINT COMFORT STATION

(Project)

as particularly described in said contract and identified as Bid No. K-12-5498-DBB-3-C; SAP No. (WBS/IO/CC) B-10088 and WHEREAS, the specifications of said contract requires the Contractor to affirm that "all brush, trash, debris, and surplus materials resulting from this project have been disposed of in a legal manner"; and WHEREAS, said contract has been completed and all surplus materials disposed of:

NOW, THEREFORE, in consideration of the final payment by the City of San Diego to said Contractor under the terms of said contract, the undersigned Contractor, does hereby affirm that all surplus materials as described in said contract have been disposed of at the following location(s)

and that they have been disposed of according to all applicable laws and regulations.

Dated this _____ DAY OF _____, 2____.

____Contractor

by

ATTEST:

State of ______.
County of ______

On this _____ DAY OF _____, 2___, before the undersigned, a Notary Public in and for said County and State, duly commissioned and sworn, personally appeared known to me to be the _____

Contractor named in the foregoing Release, and whose name is subscribed thereto, and acknowledged to me that said Contractor executed the said Release.

Notary Public in and for said County and State

SUPPLEMENTARY SPECIAL PROVISIONS (SSP)

THESE SUPPLEMENTARY SPECIAL PROVISIONS CONFORM TO THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION (THE GREENBOOK) CURRENTLY ADOPTED BY THE CITY, INCLUDING ITS CURRENT SUPPLEMENT AMENDMENTS (CITY SUPPLEMENTS INCLUDED IN THE WHITEBOOK), EXCEPT FOR THE FOLLOWING:

STYLE OF SPECIFICATIONS

The City is gradually standardizing the style and language of the standard specifications for the public works construction. The new style and language follows the Federal guidelines for "Plain Language" to the extent possible.

The use of this new style does not change the meaning of a specification not yet using this style. Where used in the Contract Documents, statement or command type phrases (i.e., active voice and imperative mood) refer to and are directed at the Bidder or Contractor as applicable. The specifications are written to the Bidder before award and the Contractor after. Before award, interpret sentences written in the imperative mood as starting with "The Bidder must" and interpret "you" as "the Bidder" and "your" as "the Bidder's." After award, interpret sentences written in the imperative mood as starting with "The Contractor" and "your" as "the Contractor must" and interpret "you" as "the Contractor"." Similarly, interpret "we" and "us" as "the City" and "our" as "the City's."

PART 1 – GENERAL PROVISIONS

SECTION 1 – TERMS, DEFINITIONS, ABBREVIATIONS, UNITS OF MEASURE, AND SYMBOLS

1-2 TERMS AND DEFINITIONS.

Agency – ADD the following:

Regulatory activities handled by the City of San Diego Developmental Services, Fire and Planning Departments, or any other City Department are not subject to the responsibilities of the City under this contract.

Certificate of Compliance – To the City Supplement, DELETE in its entirety and SUBSTITUTE with the following:

Certificate of Compliance – A written document signed and submitted by a supplier or manufacturer that certifies that the material or assembled material supplied to the Work site complies with the requirements of the Contract Documents.

Contract Documents – To the City Supplement, DELETE in its entirety and SUBSTITUTE with the following:

The Agreement, Addendum, Invitation to Bids, Instructions to Bidders, Special Notice page, funding agency provisions, Bid and documentation accompanying the Bid and any post-bid documentation submitted prior to the Notice of Award when attached as an exhibit to the Contract, Bonds, permits from jurisdictional regulatory agencies, Supplementary Special Provisions (SSP), City's EOCP Requirements, City Supplement, Plans, Standard Plans, Construction Documents, Reference Specifications listed in the Invitation to Bids or the RFP for Design-Build contracts, Request for Qualifications (RFQ), Statement of Qualifications (SOQ), Request for Proposals (RFP), modifications issued after the execution of the Contract e.g., Change Orders, Construction Manager At Risk's Guaranteed Maximum Price including written qualifications, assumptions and conditions thereto and Pre-construction Services Agreement.

2-3.4 Subcontract Requirements. To the City Supplement, ADD the following paragraph:

The Contractor shall ensure that all of its Subcontractors are licensed at the time of the execution of their subcontract agreements. In the event a Subcontractor is not properly licensed, the Contractor shall cease payment to Subcontractor for all work performed when the Subcontractor was improperly licensed. Any payment made by the Contractor to a Subcontractor for work performed when the Subcontractor was unlicensed shall be returned to the City.

Where the Contract Documents require that a particular product be installed or applied by an applicator approved by the manufacturer, it is the Contractor's responsibility to ensure the Subcontractor or Supplier employed for such work is approved by the manufacturer.

2-5.2 Precedence of Contract Documents. To the City Supplement, DELETE in its entirety and SUBSTITUTE with the following:

2-5.2 Precedence of Contract Documents. DELETE in its entirety and SUBSTITUTE with the following:

If there is a conflict between any of the Contract Documents, the document highest in the order of precedence shall control. The order of precedence, from highest to lowest, shall be as follows:

- 1) Permits (i.e., issued by jurisdictional regulatory agencies)
- 2) Change Orders and Supplemental Agreements; whichever occurs last
- 3) Contract and Agreement
- 4) Addenda
- 5) Bid (e.g., price Proposal for <u>Design-Build</u> contracts)
- 6) Request for Proposal (RFP)
- 7) Invitation to Bid
- 8) Instruction to Bidders
- 9) Request for Qualifications (RFQ)
- 10) Special Provisions (i.e., City's EOCP Requirements, City Supplement, and Supplementary Special Provisions (SSP))
- 11) Plans
- 12) Construction Documents (for <u>Design-Build</u> contracts)
- 13) Standard Drawings
- 14) Reference Specifications (e.g., GREENBOOK)
- 15) Technical Proposal (for <u>Design-Build</u> contracts)
- 16) Statement of Qualifications (SOQ)

When additional requirements by the funding sources are physically or by reference incorporated in the Contract Documents, the funding source's requirements shall govern **unless specified otherwise**.

2-6 WORK TO BE DONE. ADD the following:

In accordance with the provisions of California Law, the Contractor shall possess or require the Subcontractor(s) to possess valid appropriate license(s) for the Work being performed.

2-7 SUBSURFACE DATA. ADD the following:

In preparation of the Contract Documents, the designer has relied upon the following reports of explorations and tests of subsurface conditions at the Work Site:

1. Report of Geotechnical Design Services North Crown Point Comfort Station Replacement, dated October 8, 2010 by Ninyo & Moore G&E Sciences Consultants.

The report(s) listed above is(are) available for review by contacting the City Project Manager or visiting:

ftp://ftp.sannet.gov/OUT/ECP/2-7%20SUBSURFACE%20DATA/

2-9.1 Permanent Survey Markers. DELETE in its entirety and SUBSTITUTE with the following:

The Contractor shall notify the Engineer or the owner on a Private Contract, at least 7 days before starting the Work to allow for the preservation of survey markers, survey monuments, lot stakes (tagged), and benchmarks. The Engineer or the owner on a Private Contract, will, at its cost, file a Corner Record Form referencing survey monuments subject to disturbance in the Office of the County Surveyor prior to the start of construction and also prior to the completion of construction for the replacement of survey monuments. The Contractor shall not disturb or permanently cover survey markers, survey monuments, lot stakes (tagged), or benchmarks without the consent of the Engineer or the owner on a Private Contract. The Contractor shall bear the expense of uncovering and replacing any that may be disturbed without permission. Replacement shall be done only under the direction of the Engineer by a Registered Land Surveyor or a Registered Civil Engineer authorized to practice land surveying within the State of California. When a change is made in the finished elevation of the pavement of any roadway in which a permanent survey monument is located, the Contractor shall adjust the monument cover to the new grade within 7 days of finished paving unless otherwise specified in the Special Provisions.

2-9.2 Survey Services. DELETE in its entirety and SUBSTITUTE with the following:

The Contractor shall be responsible for all surveying services or as may be specified in these Special Provisions.

The payment for survey services shall be included in the various Bid items unless a Bid item for Survey Services has been provided.

2-10 AUTHORITY OF BOARD AND ENGINEER. ADD the following:

Regulating agencies of the City, such as Developmental Services, Fire and Planning Departments, enforce Legal Requirements and standards. These enforcement activities are not subject to the responsibilities of the Engineer under this Agreement.
5/24/12 CN

City of San Diego

CONTRACTOR'S NAME: DELTA BUILDERS

ADDRESS:

TELEPHONE NO.:

_____ FAX NO.:_

CITY CONTACT: JASON GRANI, 600 B Street Suite 800 MS 908A, San Diego, CA 92101-4520 Email: jgrani@sandiego.gov; Phone: 619-533-7525; Fax: 858-627-3297

CG/NB/egz



CONTRACT DOCUMENTS FOR

NORTH CROWN POINT COMFORT STATION

VOLUME 2 OF 2

BID NO.:	K-12-5498-DBB-3-C	
SAP NO. (WBS/IO/CC):	B-10088	
CLIENT DEPARTMENT:	1102	
COUNCIL DISTRICT:	2	
PROJECT TYPE:	BE/BT	

THIS CONTRACT IS SUBJECT TO THE FOLLOWING:

> THE CITY'S SUBCONTRACTING PARTICIPATION REQUIREMENTS FOR SLBE PROGRAM.

THIS BIDDING DOCUMENT TO BE SUBMITTED IN ITS ENTIRETY REFER TO INVITATION TO BIDS FOR TIME, DATE, AND LOCATION

SLBE CERTIEICATE # 11ME 320



TABLE OF CONTENTS

Volume 2 - Bidding Documents

The following forms must be completed in their entirety and submitted with the Bid. Include the form(s) even if the information does not apply. Where the information does not apply write in N/A. Failure to include any of the forms may cause the Bid to be deemed **non-responsive**. If you are uncertain or have any questions about any required information, contact the City no later than 14 days prior to Bid due date.

DESCRIPTION

PAGE NUMBER

id/Proposal
id Bond
on-Collusion Affidavit To Be Executed By Bidder And Submitted With Bid and Submitted With Bid
nder 23 USC 112 and PCC 7106
ontractors Certification of Pending Actions
qual Benefits Ordinance Certification of Compliance
roposal (Bid)
orm AA35 List of Subcontractors
orm AA40 Named Equipment/Material Supplier List

PROPOSAL

Bidder's General Information

To the City of San Diego:

Pursuant to "Invitation to Bids", specifications, and requirements on file with the City Clerk, and subject to all provisions of the Charter and Ordinances of the City of San Diego and applicable laws and regulations of the United States and the State of California, the undersigned hereby proposes to furnish to the City of San Diego, complete at the prices stated herein, the items or services hereinafter mentioned. The undersigned further warrants that this bid is not made in the interest of, or on behalf of, any undisclosed person, partnership, company, association, organization, or corporation; that the bid is genuine and not collusive or sham; that the bidder has not directly or indirectly induced or solicited any other bidder to put in a false or sham bid, and has not directly or indirectly colluded. conspired, connived, or agreed with any bidder or anyone else to put in a sham bid, or that anyone shall refrain from bidding; that the bidder has not in any manner, directly or indirectly, sought by agreement, communication, or conference with anyone to fix the bid price of the bidder or any other bidder, or to fix any overhead, profit, or cost element of the bid price, or of that of any other bidder, or to secure any advantage against the public body awarding the contract of anyone interested in the proposed contract; that all statements contained in the bid are true; and, further, that the bidder has not, directly or indirectly, submitted his or her bid price or any breakdown thereof, or the contents thereof, or divulged information or data relative thereto, or paid, and will not pay, any fee to any corporation, partnership, company, association, organization, bid depository, or to any member or agent thereof to effectuate a collusive or sham bid.

The undersigned bidder(s) further warrants that bidder(s) has thoroughly examined and understands the entire Contract Documents (plans and specifications) and the Bidding Documents therefore, and that by submitting said Bidding Documents as its bid proposal, bidder(s) acknowledges and is bound by the entire Contract Documents, including any addenda issued thereto, as such Contract Documents incorporated by reference in the Bidding Documents.

IF A SOLE OWNER OR SOLE CONTRACTOR SIGN HERE:

2) Signature (Given and	sumana) of prop	rietor		
) Signature (Orven and	sumancy or prop		<u></u>	
3) Place of Business (Str	eet & Number) _	•	• 	
4) City and State			·····	Zip Code
5) Telephone No		; ;	Facsimile No.	

- (1) Name under which business is conducted $\frac{1}{1}$
- (2) Name of each member of partnership [indicate character of each partner, general or special (limited):

(3) Signature (Note: Signature must be made by a general partner)

2

(4) Place of Business (Street & Number)	
(5) City and State Zip Code (6) Telephone No Facsimile No IF A CORPORATION, SIGN HERE: (1) Name under which business is conducted DELTA BUILDERS. (2) Signature, with official title of officer authorized to sign for the corporation: (Signature) MIR MOSHIRI (Printed Name) PRESIDENT (Title of Officer) (Impress Corporate (3) Incorporated under the laws of the State of CALIFOR-NIA.	
(6) Telephone No Facsimile No IF A CORPORATION, SIGN HERE: (1) Name under which business is conducted DELTA BUILDERS. (2) Signature, with official title of officer authorized to sign for the corporation: (Signature) MIR MOSHIRI (Printed Name) PRESIDENT (Title of Officer) (Impress Corporate (3) Incorporated under the laws of the State of CALIFOR-NIA.	
IF A CORPORATION, SIGN HERE: (1) Name under which business is conducted DELTA BUILDERS. MIR BUILDERS. (2) Signature, with official title of officer authorized to sign for the corporation: (Signature) MIR MOSHIRI (Printed Name) PRESIDEAT (Impress Corporate (3) Incorporated under the laws of the State of LIFOR-NIA.	
 (1) Name under which business is conducted <u>DELTA BUILDERS</u>. (2) Signature, with official title of officer authorized to sign for the corporation: (Signature) <u>MIR MOSHIRI</u> (Printed Name) <u>PRESIDENT</u> (Title of Officer) (Impress Corporate (3) Incorporated under the laws of the State of <u>CALIFOR-NIA</u>. 	
 (2) Signature, with official title of officer authorized to sign for the corporation: (Signature) MIR MOSHIRI (Printed Name) FRESIDENT (Title of Officer) (Impress Corporate (3) Incorporated under the laws of the State of	
(Signature) MIR MOSHIRI (Printed Name) PRESIDENT (Title of Officer) (Impress Corporate (3) Incorporated under the laws of the State of <u>CALIFOP-NIA</u> .	
(Signature) <u>MIR MOSHIRI</u> (Printed Name) <u>PRESIDENT</u> (Title of Officer) (Impress Corporate (3) Incorporated under the laws of the State of <u>CALIFOP-NIA</u> .	
MIR MOSHIRI (Printed Name) PRESIDENT (Title of Officer) (Impress Corporate (3) Incorporated under the laws of the State of <u>CALIFOR-NIA</u> .	
(Printed Name) FRESIDENT (Title of Officer) (Impress Corporate (3) Incorporated under the laws of the State of <u>CALIFOP-NIA</u> .	
(Title of Officer) (3) Incorporated under the laws of the State of(ALIFOP-NIA.	
(Title of Officer) (Impress Corporate (3) Incorporated under the laws of the State of <u>CALIFOR-NIA</u> .	
(1) Inte of Officer) (Impress Corporate (3) Incorporated under the laws of the State of	
(3) Incorporated under the laws of the State of CALIFOR-NIA.	Seal Here)
(3) Incorporated under the laws of the State ofCACILOPINIA	
(4) Place of Business (Street & Number) 22 35 Faraday AVe. Suite	- 5/
(5) City and State <u>Carlsbgd</u> , <u>Ca</u> . Zip Code <u>9</u>	2008
(6) Telephone No. <u>760 - 602 - 84 84</u> Facsimile No. <u>760 - 602 - 8</u>	3444
THE FOLLOWING SECTIONS MUST BE FILLED IN BY ALL PROPOSERS:	
In accordance with the "INVITATION TO BIDS", the bidder holds a California State C license for the following classification(s) to perform the work described in these specificati LICENSE CLASSIFICATION $A \neq B$	Contractor's ons:
LICENSE NO. 564882 EXPIRES DEC. 2013,	2012
This license classification must also be shown on the front of the bid envelope. Failul license classification on the bid envelope may cause return of the bid unopened.	re to show
TAX IDENTIFICATION NUMBER (TIN):	
E-Mail Address: De Habuilders@, col. Com.	

THIS PROPOSAL MUST BE NOTARIZED BELOW:

I certify, under penalty of perjury, that the representations made herein regarding my State Contractor's license number, classification and expiration date are true and correct.

۰. presi Title Signature SUBSCRIBED AND SWORN TO BEFORE ME, THIS 21^{5t} DAY OF <u>May</u>, <u>2012</u>. Notary Public in and for the County of <u>San Dugu</u>, State of <u>California</u> (NOTARIAL SEAL)



THIS PROPOSAL MUST BE NOTARIZED BELOW:

I certify, under penalty of perjury, that the representations made herein regarding my State Contractor's license number, classification and expiration date are true and correct.

۰. presi Signature Title SUBSCRIBED AND SWORN TO BEFORE ME, THIS 2/012 DAY OF Notary Public in and for the County of San Dugo, State of (NOTARIAL SEAL)



BID BOND

KNOW ALL MEN BY THESE PRESENTS,

. Ali statici

 That
 Delta Builders
 as Principal, and

 The Ohio Casualty Insurance Company
 as Surety, are

 held and finnly bound unto The City of San Diego hereinafter called "OWNER," in the sum of
 10% OF THE TOTAL BID AMOUNT for the payment of which sum, well and truly to be made,

 we bind ourselves, our heirs, executors, administrators, successors, and assigns, jointly and severally, finnly by these presents.

WHEREAS, said Principal has submitted a Bid to said OWNER to perform the WORK required under the bidding schedule(s) of the OWNER's Contract Documents entitled

North Crown Point Comfort Station

NOW THEREPORE, if said Principal is awarded a contract by said OWNER and, within the time and in the manner required in the "Invitation to Bids" enters into a written Agreement on the form of agreement bound with said Contract Documents, furnishes the required certificates of insurance, and furnishes the required Performance Bond and Payment Bond, then this obligation shall be null and void, otherwise it shall remain in full force and effect. In the event suit is brought upon this bond by said OWNER and OWNER prevails, said Surety shall pay all costs incurred by said OWNER in such suit, including a reasonable attorney's fee to be fixed by the court.

SIGNED AND SEALED, this	21st	day of	Мау	, 20 12
		The Ohi	o Casualty	
Delta Builders	(SEAL)	Insuran	ce Company	(SEA(.)
(Principel)	, , , ,		(Surety)	~
By:		By:	$c \in$	2000
(Signature)			(Signature) Cyndi Beilman Attorney-in-Fact
CODAT AND NOT LOTAL LOTA	(A)) (())) A (A)			

(SEAL AND NOTARIAL ACKNOWLEDGEMENT OF SURETY)

6 | Page

CALIFORNIA ALL-PURPOSE ACKNOWLEDGMENT

	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx					
STATE OF CALIFORNIA	}					
	/					
On <u>May 21, 2012</u> before me,	Pam Davis, Notary Public Here Insert Name and Title of the Officer					
personally appeared Cyndi Beilman	Name(s) of Signer(s)					
PAM DAVIS Commission # 1818711 Notary Public - California San Diego County My Comm. Expires Oct 20, 2012	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 ***/she/t*** executed the same in ****/her/t*** authorized capacity(***), and that by ***/her/t*****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.					
	Signatura (Panad Jamas					
Place Notary Seal Above	Signature of Notary Public Pam Davis					
Though the information below is not required by la and could prevent fraudulent removal an	w, it may prove valuable to persons relying on the document ad reattachment of this form to another document.					
Description of Attached Document						
Title or Type of Document:						
Document Date:	Number of Pages:					
Signer(s) Other Than Named Above:						
Canacity(ies) Claimed by Signer(s)						
Capacity(les) Channed by Orgher(s)	· .					
Signer's Name:	Signer's Name: Individual Corporate Officer — Title(s): Partner — Limited General Attorney in Fact Trustee Guardian or Conservator Other: Signer Is Representing:					



POA - AFCC, LMIC, OCIC, PIC & WAIC LMS 12873 041012

NON-COLLUSION AFFIDAVIT TO BE EXECUTED BY BIDDER AND SUBMITTED WITH BID UNDER 23 USC 112 AND PCC 7106

State of California)
County of <u>San Diego</u>) ss.
MIR MOSHIRI, being first duly sworn, deposes and
says that he or she is PRESIDENT of the party making the foregoing
bid that the bid is not made in the interest of, or on behalf of, any undisclosed person, partnership,
company, association, organization, or corporation; that the bid is genuine and not collusive or sham;
that the bidder has not directly or indirectly induced or solicited any other bidder to put in a false or
sham bid, and has not directly or indirectly colluded, conspired, connived, or agreed with any bidder
or anyone else to put in a sham bid, or that anyone shall refrain from bidding; that the bidder has not
in any manner, directly or indirectly, sought by agreement, communication, or conference with
anyone to fix the bid price of the bidder or any other bidder, or to fix any overhead, profit, or cost
element of the bid price, or of that of any other bidder, or to secure any advantage against the public
body awarding the contract of anyone interested in the proposed contract; that all statements
contained in the bid are true; and further, that the bidder has not, directly or indirectly, submitted his
or her bid price or any breakdown thereof, or the contents thereof, or divulged information or data
relative thereto, or paid, and will not pay, any fee to any corporation, partnership, company
association, organization, bid depository, or to any member or agent thereof to effectuate a collusive
or sham bid.
7,110
Signed:
Title: Presi Witt -
Subscribed and sworn to before me this day of,20_12_
(Xelet
O Notary Public
(SEAL) COMMISSION Expires Aug 10, 2013

CONTRACTORS CERTIFICATION OF PENDING ACTIONS

As part of its bid or proposal (Non-Price Proposal in the case of Design-Build contracts), the Bidder shall provide to the City a list of all instances within the past ten years where a complaint was filed or pending against the Bidder in a legal or administrative proceeding alleging that Bidder discriminated against its employees, subcontractors, vendors or suppliers, and a description of the status or resolution of that complaint, including any remedial action taken.

CHECK ONE BOX ONLY.

The undersigned certifies that within the past 10 years the Bidder has NOT been the subject of a complaint or pending action in a legal administrative proceeding alleging that Bidder discriminated against its employees, subcontractors, vendors or suppliers.

The undersigned certifies that within the past ten years the Bidder has been the subject of a complaint or pending action in a legal administrative proceeding alleging that Bidder discriminated against its employees, subcontractors, vendors or suppliers. A description of the status or resolution of that complaint, including any remedial action taken and the applicable dates is as follows:

DELTA BUILDERS	
MIR MOSHLIRI	Title president.
Name	
m	Date 5/22/12
Signature	
USE ADDITIONAL FORM	
	DELTA BUILDERS MIR MOSHIRI Name Signature

EQUAL BENEFITS ORDINANCE CERTIFICATION OF COMPLIANCE



For additional information, contact: CITY OF SAN DIEGO

EQUAL BENEFITS PROGRAM

202 C Street, MS 9A, San Diego, CA 92101 Phone (619) 533-3948 Fax (619) 533-3220

		CO	MPANY	Y INFORM	ATIO	N		
Company Name:	DELTA B	DILDERS				Contact Name	e: MIR	MOSHIRI
Company Addres	is: 2235	Faraday	AVE.	SUITE	5	Contact Phon	1e:760-6	02-8484
						Contact Emai	il: de lta	abuildersu
		C	ONTRA	CT INFORM	ATION			
Contract Title: N	losth Crou	wn Point	Comf	bot 5t	ratio	n Star	t Date: -	
Contract Number	(if no number	, state location):	San	Diego,	, (q.	End	Date: -	<u>ـ</u>
The Equal Benefits maintain equal ben Contractor sh Benefits in child care; Any benefit Contractor sh during open Contractor sh Contractor sh Contractor sh NOTE: This sumr www.sandiego.go	SUM s Ordinance [EE efits as defined all offer equal be clude health, d travel/relocation t not offer an e hall post notice enrollment per hall allow City a all submit <i>EBO C</i> mary is provide <i>v/administratio</i>	MARY OF EQU 30] requires the C in SDMC §22.430 ental, vision insu on expenses; emp mployee with a s e of firm's equal iods. access to records <i>Certification of Con</i> ed for convenience <i>n</i> .	AL BEN City to entro 2 for the es with sp rance; pe bloyee as pouse, is benefits , when re <i>ppliance</i> , s ce. Full to	er into contra duration of the bouses and er ension/401(k) sistance prog not required policy in the quested, to c igned under p ext of the EE	IVANCE cts only v e contract mployees plans; b grams; cr to be off to be off workpla confirm co penalty of p 30 and F	REQUIREMENTS with contractors who To comply: with domestic partne ereavement, family, redit union members ered to an employee ce and notify employee ce and notify employee compliance with EBO perjury, prior to award Rules Implementing	certify they parental le parental le ship; or any e with a do oyees at t orequirement of contract the EBO	y will provide and eave; discounts, y other benefit. omestic partner. ime of hire and ents. t. are available at
	CON	TRACTOR EQU	AL BEN	EFITS ORD	INANCE	CERTIFICATION		
Please indicate y	our firm's com	pliance status w	ith the E	BO. The City	y may re	quest supporting de	ocumenta	tion.
I affirr	n compliance	with the EBO b	ecause n	ny firm <i>(con</i> i	tractor m	ust <u>select one</u> reas	son):	
	ovides equal l ovides no ben as no employe as collective ba	penefits to spouses refits to spouses res. rgaining agreeme	ses and c or dome nt(s) in pla	domestic par estic partners ace prior to Ja	rtners. s. anuary 1,	2011, that has not b	een renew	ved or expired.
I requimade of the make	est the City's a a reasonable e availability of a every reasona	pproval to pay aff affort but is not al cash equivalent ble effort to exter	ected em ble to prov for benef id all avai	iployees a ca vide equal be its available f lable benefits	ash equiv enefits up to spouse s to dome	alent in lieu of equal on contract award. I es but not domestic estic partners.	benefits a l agree to partners a	and verify my firm notify employees and to continue to
It is unlawful for an associated with th	ny contractor to e execution, av	knowingly subm vard, amendmen	it any fals t, or admi	se information inistration of a	n to the C any contr	City regarding equal act. [San Diego Mur	benefits o nicipal Coo	r cash equivalent de §22.4307(a)]
Under penalty of certify that my fir benefits for the definition of the definition o	perjury under m understand uration of the o	laws of the Stat s the requireme contract or pay a	e of Calil nts of the cash eq	fornia, I certi e Equal Ben uivalent if at	ify the at nefits Oro uthorized	bove information is linance and will pro l by the City.	true and ovide and	correct. I further I maintain equal
M	R MOS	HIRI			ر	mo	1-	
N	lame/Title of S	Signatory				Signature		
		FOR			TISTE CO			
Receipt Date	EBO And	lyst			ved u	Not Approved -	- Reason	•
Receipt Date.		uyou.				- 1101 Approved	rev	02/15/2011

PROPOSAL (BID)

The Bidder agrees to the construction of **NORTH CROWN POINT COMFORT STATION**, for the City of San Diego, in accordance with these contract documents for the prices listed below. The Bidder guarantees the Contract Price for a period of 120 days (90 days for federally funded contracts and contracts valued at \$500,000 or less) from the date of Bid opening to Award of the Contract. The duration of the Contract Price guarantee shall be extended by the number of days required for the City to obtain all items necessary to fulfill all conditions precedent e.g., bond and insurance.

Item	Quantity	Unit	Payment Reference	NAICS	Description	Unit Price	Extension		
	BASE BID								
1.	1	LS	2-4.1	237990	Bonds (Payment and Performance)	\geq	\$ 10,677.00		
2.	1	AL	9-3.5	237990	Field Orders	\geq	\$40,000.00		
3.	1	AL	7-5.1	236220	Building Permits	> <	\$4,000.00		
4.	1	LS	801-9.4	237990	Water Pollution Control Program Implementation	\geq	\$ 1000000		
5.	1	LS	801-9.4	541330	Development and Amendment of WPCP	\searrow	\$ 2000.00		
6.	1	LS	9-3.1	237990	Demolition of existing Comfort Station	> <	\$ 10,000.00		
7.	1	LS	9-3.1	237990	Construction of New North Crown Point Comfort Station	\geq	\$ 281,323.00		
			-	· · · · · ·					
					ESTIMATED TOTAL	BASE BID:	\$ 399,000.9		

TOTAL BID PRICE FOR BID (Base Bid, Items 1 through 7, inclusive) amount written in words:

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

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

Bidder: DELTA	BUILD	EPS,	MIR	MOSHIR	[
Title: PRESIDENT								·	
Business Address:	2235	Faraday	AVE.	suite	\$1	Carlsbad,	(q.	92008	
Place of Business:	2235	Faraday	AVE.	suite	\$,	Carlsbad,	(a.	92008	
Place of Residence:	Callsba	d, G.							
Signature:	an	· · · ·							
NOTES:	//	PRESI	DENT						

- A. The City shall determine the low Bid based on the Base Bid alone.
- B. Prices and notations shall be in ink or typewritten. All corrections (which have been initiated by the Bidder using erasures, strike out, line out, or "white-out") shall be typed or written in with ink adjacent thereto, and shall be initialed in ink by the person signing the bid proposal.
- C. Failure to initial all corrections made in the bidding documents shall cause the Bid to be rejected as **non-responsive** and ineligible for further consideration.
- D. Blank spaces must be filled in, using figures. Bidder's failure to submit a price for any Bid item that requires the Bidder to submit a price shall render the Bid **non-responsive** and shall be cause for its rejection.
- E. Unit prices shall be entered for all unit price items. Unit prices shall not exceed two (2) decimal places. If the Unit prices entered exceed two (2) decimal places, the City will only use the first two digits after the decimal points without rounding up or down.
- F. All extensions of the unit prices bid will be subject to verification by the City. In the case of inconsistency or conflict between the product of the Quantity x Unit Price and the Extension, the product shall govern.
- G. In the case of inconsistency or conflict, between the sums of the Extensions with the estimated total Bid, the sum of the Extensions shall govern.
- H. Bids shall not contain any recapitulation of the Work. Conditional Bids will be rejected as being **non-responsive**. Alternative proposals will not be considered unless called for.
- I. The Bid shall contain an acknowledgment of receipt of all addenda, the numbers of which shall be filled in on the Bid form. The following addenda have been received and are acknowledged in this bid: [......]. If an addendum or addenda has been issued by the City and not noted above as being received by the Bidder, this proposal shall be rejected as being **non-responsive**.

LIST OF SUBCONTRACTORS

In accordance with the requirements provided in the "Subletting and Subcontracting Fair Practices Act", Division 2. Part 1, Chapter 4 of the Public Contract Code, the Bidder shall list below the name and address of each Subcontractor who will perform work, labor, render services or specially fabricates and installs a portion [type] of the work or improvement, in an amount in excess of 0.5% of the Contractor's total Bid. The Bidder shall also list below the portion of the work which will be done by each subcontractor under this Contract. The Contractor shall list only one Subcontractor for each portion of the Work. The DOLLAR VALUE of the total Bid to be performed shall be stated for all subcontractors listed. Failure to comply with this requirement shall result in the Bid being rejected as non-responsive and ineligible for award. The Bidder's attention is directed to the Special Provisions - General; Paragraph 2-3 Subcontracts, which stipulates the percent of the Work to be performed with the Bidders' own forces. The Bidder shall list all SLBE, ELBE, DBE, DVBE, MBE, WBE, OBE, SDB, WoSB, HUBZone, and SDVOSB Subcontractors that Bidders are seeking recognition towards achieving any mandatory, voluntary, or both subcontracting participation percentages.

NAME, ADDRESS AND TELEPHONE NUMBER OF SUBCONTRACTOR	CONSTRUCTOR OR DESIGNER	TYPE OF WORK	DOLLAR VALUE OF SUBCONTRACT	MBE, WBE, DBE, DVBE, OBE, ELBE, SLBE, SDB, WoSB, HUBZone, OR SDVOSB ©	WHERE CERTIFIED Ø	CHECK IF JOINT VENTURE PARTNERSHIP
Name: PWC Address: P.O. BOX 230026 City:ENCINITAS State: <u>CG</u> - Zip: <u>92023</u> Phone: 760 - 310 - 9095	PRATT EQUIPMENT CORP	GRADING DEMO	15,000 -			
Name: FIT2 PATRIC ETECTRIC Address: 4926 MOND GAHELA 57 City: 500 Die 90 State: Cg. Zip: 92117 Phone: 858 - 301-4454		ELECTRK	2 <i>5,0</i> 00 ·			
Name: \$COTT MICHAEL INC. Address: p.o. Box 127 City: San Marcos State: Ca. Zip: 92079 Phone: 760-744-2807		Plumbing	39,000.08.			

① As appropriate, Bidder shall identify Subcontractor as one of the following and shall include a valid proof of certification (except for OBE, SLBE and ELBE):

Certified Minority Business Enterprise	MBE	Certified Woman Business Enterprise	WBE
Certified Disadvantaged Business Enterprise	DBE	Certified Disabled Veteran Business Enterprise	DVBE
Other Business Enterprise	OBE	Certified Emerging Local Business Enterprise	ELBE
Certified Small Local Business Enterprise	SLBE	Small Disadvantaged Business	SDB
Woman-Owned Small Business	WoSB	HUBZone Business	HUBZone
Service-Disabled Veteran Owned Small Business	SDVOSB		

② As appropriate, Bidder shall indicate if Subcontractor is certified by:

City of San Diego	CITY	State of California Department of Transportation	CALTRANS
California Public Utilities Commission	CPUC	San Diego Regional Minority Supplier Diversity Council	SRMSDC
State of California's Department of General Services	CADoGS	City of Los Angeles	LA
State of California	CA	U.S. Small Business Administration	SBA

The Bidder will not receive any subcontracting participation percentages if the Bidder fails to submit the required proof of certification (except for OBE, SLBE and ELBE).

Form Title: LIST OF SUBCONTRACTORS Form Number: AA35 North Crown Point Comfort Station (Rev. June 2011)

LIST OF SUBCONTRACTORS

In accordance with the requirements provided in the "Subletting and Subcontracting Fair Practices Act", Division 2. Part 1, Chapter 4 of the Public Contract Code, the Bidder shall list below the name and address of each Subcontractor who will perform work, labor, render services or specially fabricates and installs a portion [type] of the work or improvement, in an amount in excess of 0.5% of the Contractor's total Bid. The Bidder shall also list below the portion of the work which will be done by each subcontractor under this Contract. The Contractor shall list only one Subcontractor for each portion of the Work. The DOLLAR VALUE of the total Bid to be performed shall be stated for all subcontractors listed. Failure to comply with this requirement shall result in the Bid being rejected as non-responsive and ineligible for award. The Bidder's attention is directed to the Special Provisions - General; Paragraph 2-3 Subcontracts, which stipulates the percent of the Work to be performed with the Bidders' own forces. The Bidder shall list all SLBE, ELBE, DBE, DVBE, MBE, WBE, OBE, SDB, WoSB, HUBZone, and SDVOSB Subcontractors that Bidders are seeking recognition towards achieving any mandatory, voluntary, or both subcontracting participation percentages.

NAME, ADDRESS AND TELEPHONE NUMBER OF SUBCONTRACTOR	CONSTRUCTOR OR DESIGNER	TYPE OF WORK	DOLLAR VALUE OF SUBCONTRACT	MBE, WBE, DBE, DVBE, OBE, ELBE, A SLBE, SDB, WoSB, HUBZone, OR SDVOSB ©	WHERE CERTIFIED @	CHECK IF JOINT VENTURE PARTNERSHIP
Name: Whit fon CM Address: 11021 Via Frontera # E City: G. D. State: Ca. Zip: 92127 Phone \$58-673-0946		WPCP Dovelor Implement	2,300.00	·		
Name: STUMBAUGH Address: 3303 N. San bernalo Birl. City: Burbagk State: Cq. Zip: q1504 Phone: S18240. 1627		ACCESSORIE	s 3,404.0 <u>9</u>			
Name: NV5 Testinh Inspection. Address: 7895 Convey Ct- #18- City: 5. State: Ca Ca Zip: 9211 Phone: \$58-715-5800 Ca		special Inspection	4,195.			

① As appropriate, Bidder shall identify Subcontractor as one of the following and shall include a valid proof of certification (except for OBE, SLBE and ELBE):

Certified Minority Business Enterprise	MBE	Certified Woman Business Enterprise	WBE
Certified Disadvantaged Business Enterprise	DBE	Certified Disabled Veteran Business Enterprise	DVBE
Other Business Enterprise	OBE	Certified Emerging Local Business Enterprise	ELBE
Certified Small Local Business Enterprise	SLBE	Small Disadvantaged Business	SDB
Woman-Owned Small Business	WoSB	HUBZone Business	HUBZone
Service-Disabled Veteran Owned Small Business	SDVOSB		

② As appropriate, Bidder shall indicate if Subcontractor is certified by:

City of San Diego	CITY	State of California Department of Transportation	CALTRANS
California Public Utilities Commission	CPUC	San Diego Regional Minority Supplier Diversity Council	SRMSDC
State of California's Department of General Services	CADoGS	City of Los Angeles	LA
State of California	CA	U.S. Small Business Administration	SBA

The Bidder will not receive any subcontracting participation percentages if the Bidder fails to submit the required proof of certification (except for OBE, SLBE and ELBE).

Form Title: LIST OF SUBCONTRACTORS Form Number: AA35 North Crown Point Comfort Station (Rev. June 2011)

LIST OF SUBCONTRACTORS

In accordance with the requirements provided in the "Subletting and Subcontracting Fair Practices Act", Division 2, Part 1, Chapter 4 of the Public Contract Code, the Bidder shall list below the name and address of each Subcontractor who will perform work, labor, render services or specially fabricates and installs a portion [type] of the work or improvement, in an amount in excess of 0.5% of the Contractor's total Bid. The Bidder shall also list below the portion of the work which will be done by each subcontractor under this Contract. The Contractor shall list only one Subcontractor for each portion of the Work. The **DOLLAR VALUE** of the total Bid to be performed shall be stated for all subcontractors listed. Failure to comply with this requirement shall result in the Bid being rejected as non-responsive and ineligible for award. The Bidder's attention is directed to the Special Provisions - General; Paragraph 2-3 Subcontracts, which stipulates the percent of the Work to be performed with the Bidders' own forces. The Bidder shall list all SLBE, ELBE, DBE, DVBE, MBE, WBE, OBE, SDB, WoSB, HUBZone, and SDVOSB Subcontractors that Bidders are seeking recognition towards achieving any mandatory, voluntary, or both subcontracting participation percentages.

NAME, ADDRESS AND TELEPHONE NUMBER OF SUBCONTRACTOR	CONSTRUCTOR OR DESIGNER	TYPE OF WORK.	DOLLAR VALUE OF SUBCONTRACT	MBE, WBE, DBE, DVBE, OBE, ELBE, SLBE, SDB, WoSB, HUBZone, OR SDVOSB ©	WHERE CERTIFIED 2	CHECK IF JOINT VENTURE PARTNERSHIP
Name: <u>Division</u> TEN. Address: <u>\$\$\$3 5007 Bov lane.</u> City: <u>Lemon Grove</u> State: <u>ca</u> . Zip: <u>91945</u> Phone: <u>619-741-</u> \$267		signaqe	4,675.02			
Name: UDI Address: 11850 Atbodgka Way City: D. State: Ca Zip: 92131 Phone: 858-335-0688		Dcor Install.	3,500.			
Name:						

① As appropriate, Bidder shall identify Subcontractor as one of the following and shall include a valid proof of certification (except for OBE, SLBE and ELBE):

Certified Minority Business Enterprise	MBE	Certified Woman Business Enterprise	WBE
Certified Disadvantaged Business Enterprise	DBE	Certified Disabled Veteran Business Enterprise	DVBE
Other Business Enterprise	OBE	Certified Emerging Local Business Enterprise	ELBE
Certified Small Local Business Enterprise	SLBE	Small Disadvantaged Business	SDB
Woman-Owned Small Business	WoSB	HUBZone Business	HUBZone
Service-Disabled Veteran Owned Small Business	SDVOSB		
② As appropriate, Bidder shall indicate if Subcontractor is certified	l by:		
City of San Diego	CITY	State of California Department of Transportation	CALTRANS
California Public Utilities Commission	CPUC	San Diego Regional Minority Supplier Diversity Council	SRMSDC
State of California's Department of General Services	CADoGS	City of Los Angeles	LA
State of California	CA	U.S. Small Business Administration	SBA
The Bidder will not receive any subcontracting participation p	ercentages if the	Bidder fails to submit the required proof of certificat	ion (except for

OBE, SLBE and ELBE).

Form Title: LIST OF SUBCONTRACTORS Form Number: AA35 North Crown Point Comfort Station

(Rev. June 2011)

CONTRACTOR'S RESPONSIBILITIES			
I. IT IS THE CONTRACTORS SOLE RESPONSIBILITY TO ENFORCE SAFETY MEASURES AND REGULATIONS. THE CONTRACTOR SHALL DESIGN AND CONSTRUCT THESE MEASURES AND BE SOLELY RESPONSIBLE FOR CONFORMING TO ALL LOCAL, STATE AND FEDERAL SAFETY AND HEALTH STANDARDS LAWS AND REGULATIONS.		CROWN PO	
2. CONTRACTOR SHALL ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THIS PROJECT INCLUDING: SAFETY OF ALL PERSONS AND PROPERTY, AND THIS REQUIREMENT SHALL APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS.	NEW COM	AFORT STATION	部 <u>522</u>
3. THE CONTRACTOR SHALL BE RESPONSIBLE TO INSURE THAT ALL DETAILS ARE BUILT IN ACCORDANCE WITH THESE PLANS. IF THERE IS ANY QUESTION REGARDING THESE PLANS. THE CONTRACTOR SHALL REQUEST AN INTERPRETATION BEFORE DOING ANY WORK BY CONTACT WITH THE RESIDENT ENGINEER.	3725 CORONA ORI	ENTE ROAD. SAN DIEG	$O_{CA} 92109$
4. LOCATION AND ELEVATION OF IMPROVEMENTS TO BE MET BY WORK TO BE DONE SHALL BE CONFIRMED BY FIELD MEASUREMENTS PRIOR TO CONSTRUCTION OF NEW WORK.			
5. BEFORE EXCAVATING FOR THIS PROJECT. CONTRACTOR WILL MAKE EXPLORATION EXCAVATIONS AND LOCATE EXISTING UNDERGROUND UTILITIES SUFFICIENTLY AHEAD OF CONSTRUCTION TO PERMIT REVISIONS TO PLANS IF REVISIONS ARE NECESSARY. THE CONTRACTOR SHALL VERIFY THE LOCATION(S) OF ALL UNDERGROUND UTILITIES. THE	CALGREEN MANDATORY MEASURES/ Contractor responsibilities	PROJECT DIRECTORY	DRAWING INDEX
EXISTENCE AND LOCATION OF ANY UNDERGROUND UTILITY PIPES OR STRUCTURES SHOWN ON THESE PLANS WERE BY A SEARCH OF THE AVAILABLE RECORDS.	I. FOLLOW THE STORM WATER POLLUTION PREVENTION PLAN (SWPPP) PREPARED BY FLORES/LUND CONSULTANTS (DTD. FEBRUARY, 2011).	CLIENT/LEGAL OWNER STRUCTURAL ENGINEER CITY OF SAN DIEGO BERGER/ABAM ENGINEERING & CARITAL FROMESTS	1. T-1.0 TITLE SHEET, INDEX, DIRECTORY & VIC. MAP 2. T-2.0 GENERAL NOTES & LEGENDS, ABBREVIATIONS
6. CONTRACTOR IS REQUIRED TO TAKE PRECAUTIONARY MEASURES TO PROTECT THE UTILITY LINES SHOWN HEREON AND ANY OTHER EXISTING LINES NOT OF RECORD OR NOT SHOWN.	A. RECYCLE AND/OR SALVAGE FOR RE-USE A MINIMUM OF 50% OF THE CONSTRUCTION AND DEMOLITION DEBRIS.	ENGINEERING & CAPITAL PROJECTS(FORMERLT) FLORES LUND CONSULTANT600 B STREET &TH FLOOR,7220 TRADE STREET, SUITE 120SAN DIEGO, CA 92101SAN DIEGO, CA 92121	3. C-1.0 DEMOLITION PLAN 4. C-2.0 GRADING & UTILITY PLAN 5. C-3.0 EPOSION CONTROL PLAN
7. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY MONUMENTATION AND/OR BENCH MARK WHICH WILL BE DISTURBED OR DESTROYED BY CONSTRUCTION. SUCH POINTS SHALL BE REFERENCED AND REPLACED WITH APPROPRIATE MONUMENTATION BY A LAND CORNER RECORD, OR RECORD OF SURVEY. THE RECORD SHALL BE FILED BY A LICENSED LAND	B. REUSE OR RECYCLE 100% OF SOIL AND LAND CLEARING DEBRIS. 3. COMPLY WITH V.O.C. LIMITS FOR ALL SEALANTS & COATINGS.	JASON GRANI PH: (858) 566-0626 PH: (619) 533-7525 FAX: (858) 566-0627 CRAIG VOSS CRAIG VOSS	6. AS-10 SITE PLAN 7. A-10 FLOOR PLAN & SCHEDULES 8. A-1.1 ROOF PLAN & REFLECTED CEILING PLAN
SURVEYOR OR REGISTERED CIVIL ENGINEER AS REQUIRED BY THE LAND SURVEYOR'S ACT. 8. CONTRACTOR SHALL NOTIFY THE CITY TRAFFIC ENGINEER AT LEAST FIVE (5) WORKING DAYS	1. LIGHT POLLUTION REDUCTION TO CEC LIMITS 2. 20% REDUCTION IN WATER USE.	PLATT/WHITELAW ARCHITECTS INC. MECHANICAL/PLUMBING 4034 30TH STREET	9. A-2.0 ELEVATIONS 10. A-3.0 SECTIONS & DETAILS 11. A-5.0 DETAILS
9. IF CONSTRUCTION IS TO BE PERFORMED IN STAGES, ALL WORK SHALL BE COMPLETED IN	CITY OF SAN DIEGO POLICY COMPLIANCE	SAN DIEGO, CA 92104BENDER DEAN ENGINEERINGPH: (619) 546-4326438 CAM. DEL RIO S. SUITE 217SAN DIEGO, CA 92108SAN DIEGO, CA 92108	12. A-5.1 DETAILS 13. SI.O GENERAL NOTES 14. SI.I. TYPICAL DETAILS
EACH STAGE PRIOR TO BEGINNING WORK ON THE NEXT STAGE. 10. THE CONTRACTOR SHALL ALSO TAKE THE NECESSARY STEPS TO PROTECT ADJACENT PROPERTY FROM ANY EROSION AND SILTATION THAT RESULTS FROM HIS OPERATIONS BY APPROPRIATE MEANS (GRAVEL BAG, DIKES, ETC) UNTIL SUCH TIME THAT THE PROJECT IS	 BACKFLOW DEVICE IS EXISTING AND SHALL BE PROTECTED AS PART OF THIS PROJECT COMPLY WITH HAZARDOUS MATERIALS PER CITY OF SAN DIEGO BULLETIN 116 COMPLY WITH CONSTRUCTION AND DEMOLITION DEBRIS PER CITY BULLETIN 119 COMPLY WITH STORM WATER REQUIREMENTS PER CITY OF GAN DIEGO CTORY WATER 	FAX: (619) 546-4350 PH: (619) 704-1900 SANDY GRAMLEY FAX: (858) 427-1608 HEATHER SCHOPPLEIN HEATHER SCHOPPLEIN	15. S1.2 TYPICAL DETAILS 16. S2.0 FOUNDATION DETAILS 17. S3.0 FOUNDATION AND ROOF PLANS 18. S4.0 WALL ELEVATIONS
COMPLETE AND ACCEPTED FOR BY THE CITY OF SAN DIEGO.	MANAGEMENT PLAN AS DETERMINED BY FORM DS-560. PROJECT DOES NOT DISTURB MORE THAN I ACRE AND CREATES LESS THAN 5000 S.F. OF IMPERVIOUS SURFACE. PROJECT DOES NOT REQUIRE A N.P.D.E.S. PERMIT. PROJECT WILL REQUIRE CONSTRUCTION B.M.P. PER SECTION IV OF THE CITY OF SAN DIEGO'S STORM WATER STANDARDS MANUAL	BERGER/ABAM (FORMERLY) FLORES LUND CONSULTANTS 7220 TRADE STREET, SUITE 120 SAN DIEGO (A 4212) ELECTRICAL ENGINEER TURPIN & RATTAN ENGINEERING 4719 PALM AVE	19.54.1WALL SECTIONS20.S-5.0ROOF FRAMING DETAILS21.P-0.1PLUMBING LEGEND, SCHEDULES & NOTES22.P-1.1PLUMBING FLOOR PLANS
UNDERGROUND UTILITIES	PARK CONSTRUCTION INSPECTION STAGES	SAN DIEGO, CA 92121 LA MESA, CA 91941-5221 PH: $(858) 566-0626$ PH: $(619) 466-6224$ FAX: $(858) 566-0627$ FAX: $(619) 466-6233$	23. E-Ø.I SYMBOL LIST, ABBREVIATIONS & GENERAL NOTES 24. E-Ø.2 INDOOR TITLE 24 25. E-Ø.3 OUTDOOR TITLE 24
BEFORE EXCAVATING, VERIFY THE LOCATION OF UNDERGROUND UTILITIES. AT LEAST THREE (3) WORKING DAYS PRIOR TO EXCAVATION, THE CONTRACTOR SHALL REQUEST A MARKOUT OF UNDERGROUND UTILITIES AND AND THE CONTRACTOR SHALL	AND INSPECTION TEAM	AHMAD KHAN KARL PORTS	26. E-0.4 OUTDOOR TITLE 24 27. E-1.0 PARTIAL SITE PLAN
REQUEST A MARKOUT OF UNDERGROUND UTILITIES BY CALLING THE BELOW LISTED REGIONAL NOTIFICATION CENTER FOR AN INQUIRY IDENTIFICATION NUMBER:	PARK INSPECTION TEAM	RESPONSIBLE CHARGE	28. E-2.0 FLOOR PLAN - DEMOLITION & LIGHTING 29. E-3.0 FLOOR PLAN - POWER
(GAS, ELECTRIC, TELEPHONE, WATER, SEWER, LIGHTING & T.V.)	 A. SITE SUPERINTENDENT (CONTRACTOR/DEVELOPER'S REPRESENTATIVE) B. CONTRACTOR(S) C. RESIDENT ENGINEER FROM FIELD ENGINEERING DEPARTMENT 	I HEREBY DECLARE THAT I AM THE ARCHITECT OR CONSULTANT OF WORK FOR THIS PROJECT, THAT I HAVE EXERCISED REASONABLE CHARGE OVER THE DESIGN OF THE PROJECT AS DEFINED IN SECTION 6703 OF THE BUSINESS AND PROFESSIONS CODE,	
CITY FACILITIES MAINTENANCE DIVISION 619-236.5500	E. DESIGN CONSULTANT F. PARK AND RECREATION DISTRICT MANAGER	AND THAT THE DESIGN IS CONSISTENT WITH CURRENT STANDARDS.	
SURVEY DATA	G. PARK AND RECREATION ASSET MANAGER PARK CONSTRUCTION INSPECTION STAGES	CITY OF SAN DIEGO IN CONFINED TO A REVIEW ONLY AND DOES NOT RELIEVE ME, AS ARCHITECT OR ENGINEER OF WORK, OF MY RESPONSIBILITIES FOR PROJECT DESIGN.	
BASIS OF BEARINGS/COORDINATES: THE BASIS OF BEARINGS FOR THIS PROJECT WAS DERIVED FROM A PREVIOUS STATIC GPS SURVEY USING GPS 154 AND GPS 2011 AS SUBVED FROM A PREVIOUS	1. PRE-CONSTRUCTION MEETING 2. ROUGH GRADING AND DRAINAGE.	ANUME 11/30/11 ALISON M. WHITELAW, FAIA - LIC. #C-10375 DATE PLATT/WHITELAW ARCHITECTS INC	
14492 I.E. S 42 ²⁷ 26" W, NAD 83 FEET, ZONE 6 (EPOCH 91.35), UTILIZING RTK/GPS FIELD PROCEDURES WITH A CALVRS BASE STATION LOCATED AT	 IRRIGATION MAINLINE PRESSURE TEST. IRRIGATION LATERAL LINE PRESSURE TEST. WIRING PRIOR TO BACKETLY ING TRENCHES 	4034 30TH STREET SAN DIEGO, CA 92104	DESCRIPTION OF WORK
OBRC AND CONSTRAINING TO GPS 154 AND GPS 2911. BENCH:	 HARDSCAPE AT TIME OF FINISHED STAKING AND LAYOUT. FINISH GRADING AND SOIL PREPARATION. IRRIGATION COVERAGE TEST 	P) 619.546.4326 F) 619.546.4350	DEMOLISH EXISTING COMFORT STATION & BUILD NEW 579 S.F. COMFORT STATION IN THE SAME LOCATION.
NMBP CROWN PT. DR. AND LAMONT ST. ELEVATION 24.296' MSL, BASED ON NGVD 29 FEET AS SHOWN IN CITY OF SAN DIEGO BENCH BOOK.	9. PLANT MATERIAL (WHEN DELIVERED) AND PLACEMENT APPROVAL. 10. PLAY GROUND INSPECTION, IF APPLICABLE.	THE CONSULTANT LICENCE STAMP, LICENSE NUMBER AND SIGNATURE SHALL BE SHOWN ON THE PROFESSIONAL CONSULTANTS APPLICABLE SHEETS	
VICINITY MAP	AS-BUILTS). 12. 90-DAY PLANT MAINTENANCE PERIOD (THIS INSPECTION IS TO BE HELD WHEN THE PUNCH LIST	Building Codes Analysis	PLAN CHECK SET
Man Point Dr. 19	ITEMS ARE COMPLETE. IF TURF AREA IS PLANTED FROM SEED OR STOLONS THE PLANT MAINTENANCE PERIOD SHALL BE 120-DAYS). 13. FINAL WALK-THROUGH, ACCEPTANCE BY THE CITY. CONTRACTOR TO SUBMIT FINAL APPROVED AS-BUILT DRAWINGS TO THE CITY.	CODE CLASSIFICATIONS: • OCCUPANCY TYPE B • TYPE OF CONSTRUCTION Y-B • ALLOWABLE AREA / STORIES 9000 / 2	Platt/Whitelaw Architects, Inc. 4034 30th Street, SAN DIEGO CA 92104
	Construction & Building Codes	• NO SPRINKLERS REQUIRED OR PROVIDED	(619) 546-4326 FAX (619) 546-4350
IN AL PROJECT	 APPLICABLE BUILDING CODES: 2010 CA BLDG. STDS. ADMIN. CODE TITLE 24 OF CALIFORNIA CCR PART 1 2010 CALIFORNIA BUILDING CODE TITLE 24 OF CALIFORNIA CCR PART 2 		NODTU ODOLAINI DOINIT
Lawyer- tarkeeting BP PR ST Woorland Dr BP PR ST Woorland Dr	 2010 CALIFORNIA ELECTRICAL CODE TITLE 24 OF CALIFORNIA CCR PART 3 2010 CALIFORNIA MECHANICAL CODE TITLE 24 OF CALIFORNIA CCR PART 4 2010 CALIFORNIA PLUMBING CODE TITLE 24 OF CALIFORNIA CCR PART 5 	DISABLED ACCESS COMPLIANCE REVIEW	NEW COMFORT STATION #522
Mooriand Dr	 2010 CALIFORNIA ENERGY CODE TITLE 24 OF CALIFORNIA CCR PART 6 2010 CALIFORNIA FIRE CODE TITLE 24 OF CALIFORNIA CCR PART 9 ADDITIONAL APPLICABLE STANDARDS AND SPECIFICATIONS: 	DISABLED ACCESS COMPLIANCE REVIEW JURISDICTIONAL AUTHORITY: I) CITY OF SAN DIEGO: STATE OF CALIFORNIA, TITLE 24, PART 2, CHAPTER IIA, IIB, AND IIC (AS APPLICABLE), 2) FEDERAL GOVERNMENT, DEPARTMENT OF JUSTICE, CIVIL RIGHTS	SHEET TITLE: TITLE SHEET, DRAWING INDEX, CODE PROJECT DIRECTORY & VICINITY MAP SHEET NUMBER: T-1.0
NOT TO SCALE	 2009 GREENBOOK - STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION INCLUDING THE CITY OF SAN DIEGO WHITEBOOK, DOCUMENT NUMBER PITSO90110-1, 2010 EDITION. CONSULTANT'S GUIDE TO PARK PLANNING AND DEVELOPMENT 2011 EDITION. 	SECTION: AMERICAN WITH DISABILITIES ACT OF 1990 (ADA), TITLE II AND TITLE III (AS APPLICABLE).	CITY OF SAN DIEGO, CALIFORNIA ENGINEERING AND CAPITAL PROJECTS DEPARTMENT SHEET OF 29 SHEETS WBS <u>B-10088</u>
CONTEXT PLAN CONSTRUCTION CHANGE / ADDENDUM WARNING	DEGO-STAN	IFGAI DESCRIDTION	Image: Section between the section head 3/8/12 ALI DARVISHI FOR CITY ENGINEER DATE DATE DESCRIPTION BY APPROVED DATE
IF THIS BAR DOES NOT MEASURE I"	CITY OF SAN DIEGO PUBLIC WORKS PROJECT	NO ASSESSOR'S PARCEL NUMBER AVAILABLE - SITE IS NON-PARCELLED GOVERNMENT LAND.	ORIGINAL SG/SR 12.09.10 JASON CRARI PLANCHECK SG/TE 11.30.11 226-1698
THEN DRAWING IS NOT TO SCALE.			CCS27 COORDINATE 1867-6259 CCS83 COORDINATE CONTRACTOR DATE STARTED ZC101
			INSPECTOR DATE COMPLETED 36161-1-D

GENERAL NOTES

GENERAL

- ALL WORK SHALL CONFORM TO THE CALIFORNIA BUILDING CODE. SEE TITLE SHEET FOR CURRENT ADOPTED CODES AND STANDARDS. THE CURRENT ADOPTED VERSIONS OF THE CALIFORNIA PLUMBING CODE, CALIFORNIA MECHANICAL CODE, CALIFORNIA FIRE CODE, CALIFORNIA ELECTRICAL CODE, NFPA LIFE SAFETY CODE, AMERICANS WITH DISABILITIES ACT REGULATIONS, AND ALL ICC, NFPA, U.L., ANSI, ASTM AND OTHER STANDARDS.
- THE INTENT OF THESE DRAWINGS AND SPECIFICATIONS IS THAT ALL THE WORK OF THE ALTERATION IS TO 2. BE IN ACCORDANCE WITH TITLE 24, CALIFORNIA CODE OF REGULATIONS. NOTIFY THE ARCHITECT OF ANY EXISTING CONDITIONS DISCOVERED, WHICH WILL RESULT IN NON-COMPLIANT CONSTRUCTION, AND WHICH ARE NOT COVERED BY THE CONTRACT DOCUMENTS WHEREIN THE FINISHED WORK WILL NOT COMPLY WITH TITLE 24, CALIFORNIA CODE OF REGULATIONS. A CHANGE ORDER DETAILING AND SPECIFYING THE REQUIRED WORK, SHALL BE SUBMITTED TO AND APPROVED BY RESIDENT ENGINEER BEFORE PROCEEDING WITH THE WORK.
- THE CONTRACTOR SHALL INCLUDE ALL LABOR, MATERIALS AND SERVICES NECESSARY FOR THE 3. COMPLETION OF ALL WORK SHOWN, PRESCRIBED OR REASONABLY INFERRED, BUT NOT LIMITED TO THAT EXPLICITLY INDICATED IN THE CONTRACT DOCUMENTS. ALL CONTRACTORS ARE RESPONSIBLE FOR FOLLOWING THE CONTRACT SPECIFICATIONS AND DRAWINGS, IF ANY QUESTIONS ARISE FROM CONFLICTS OR NEED FOR ADDITIONAL INFORMATION, THE CONTRACTOR SHALL NOTIFY THE RESIDENT ENGINEER IMMEDIATELY.
- UNDER NO CIRCUMSTANCES SHALL DIMENSIONS BE SCALED DIRECTLY FROM DRAWINGS. THE CONTRACTOR 4 SHALL NOTIFY THE ARCHITECT OF ANY DISCREPANCIES OR CONFLICTS.
- ORIGINAL CONSTRUCTION DRAWINGS ARE AVAILABLE FOR CONTRACTOR INFORMATION. THE ARCHITECT 5. HAS NOT VERIFIED AND DOES NOT WARRANTY ACCURACY OF DRAWINGS OBTAINED FROM CLIENT.
- THE CONTRACTOR AND ALL SUBCONTRACTORS SHALL VERIFY ALL DIMENSIONS AND CONDITIONS ON THE 6. JOB SITE PRIOR TO START OF WORK. ANY DEVIATIONS FROM THE CONTRACT DOCUMENTS WHICH ARE NECESSITATED BY FIELD CONDITIONS SHALL BE REPORTED TO THE RESIDENT ENGINEER. IT IS CONSIDERED ESSENTIAL THAT THE CONTRACTOR EXAMINE THE SITE & PORTIONS THEREOF WHICH AFFECT THE CONTRACTOR'S WORK. NO ADDITIONAL EXPENSE SHALL BE AWARDED RESULTING FROM THE FAILURE TO PERFORM THIS EXAMINATION. THE RESIDENT ENGINEER SHALL BE NOTIFIED OF ANY CONFLICTS, ERRORS OR OMISSIONS. VERIFY ALL DIMENSIONS & EXISTING CONDITIONS INCLUDING, BUT NOT LIMITED TO: WALLS, FLOORS, MECHANICAL CONSTRUCTION, EXISTING CONSTRUCTION TO REMAIN & EXISTING CONSTRUCTION TO BE DEMOLISHED.
- INFORMATION SHOWN BY CONSULTANTS OR DISCIPLINE DOCUMENTS IS NOT MEANT TO DEFINE SCOPE OF 7. WORK OF SUBCONTRACTOR RESPONSIBILITY. IT SHALL BE THE GENERAL CONTRACTOR'S RESPONSIBILITY TO DETERMINE SCOPE OF WORK BETWEEN THE SUBCONTRACTORS DURING THE BIDDING PROCESS.
- ALL SYMBOLS AND ABBREVIATIONS USED ON THE DRAWINGS ARE CONSIDERED TO BE CONSTRUCTION 8. STANDARDS. IF THE CONTRACTOR HAS QUESTIONS REGARDING ABBREVIATIONS OR THEIR EXACT MEANING, THE ARCHITECT SHALL BE NOTIFIED FOR CLARIFICATION.
- ALL PENETRATIONS THROUGH STRUCTURAL MEMBERS, FIRE-RATED ASSEMBLIES, CEILING & FLOOR SLABS 9. SHALL REQUIRE THE ARCHITECT'S APPROVAL PRIOR TO START OF ANY WORK.
- 10. REROUTE ALL SERVICES OR PORTIONS OF SERVICES IN THE PATH OF DEMOLITION OR NEW WORK AND PROVIDE FOR COMPATIBILITY WITH NEW WORK AS REQUIRED, EXAMPLE: RELOCATE EXISTING LIGHT SWITCHES AND RECEPTACLES IF REQUIRED AT APPROPRIATE ACCESSIBLE HEIGHT.

CONTRACTOR

- AT KEY NOTES WHICH STATE THE PHRASE "PATCH OR PAINT", THE WORD "PATCH" OR "PAINT" REQUIRES THE CONTRACTOR TO PREPARE MATERIALS PER THE SPECIFICATIONS OR MANUFACTURES INSTRUCTIONS. IF ADDITIONAL WORK BEYOND THE SCOPE DESCRIBED IN CONTRACT DOCUMENTS IS REQUIRED, QUANTITIES OF DAMAGED MATERIALS TO REPAIR ITEMS NOT NOTED ON PLANS SHALL BE IDENTIFIED BY THE CONTRACTOR.
- THE CONTRACTOR SHALL VERIFY ACCESS TO ALL AREAS WHERE NEW UTILITIES WILL BE INSTALLED. THE 12. CONTRACTOR SHALL INCLUDE IN HIS BID, ANY COST ASSOCIATED WITH OBTAINING ACCESS, INSTALLATION OF ACCESS PANELS AND/OR REROUTING OF PIPES/CONDUIT OR REPLACING FINISHES AND FIXTURES TO MATCH ADJACENT.
- THE CONTRACTOR SHALL ARRANGE FOR THE PREMISES TO BE MAINTAINED IN AN ORDERLY MANNER 13. THROUGHOUT THE COURSE OF WORK. PROVIDE AND MAINTAIN TEMPORARY BARRICADES AND FACILITIES AS REQUIRED TO PROTECT THE PUBLIC DURING THE PERIOD OF CONSTRUCTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGE TO EXISTING STRUCTURES, SITE WORK OR EQUIPMENT. SUCH DAMAGE SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE AND TO THE SATISFACTION OF THE ARCHITECT.
- CONTRACTOR SHALL COORDINATE WITH THE OWNERS REPRESENTATIVE AND SITE ADMINISTRATION REGARDING CONTRACTORS SITE USE AND ACCESS, AND MAINTAIN STAFF AND PUBLIC ACCESS AT ALL TIMES SITE IS OPEN FOR USE, AND ENSURE ALL CONSTRUCTION WORK IS INSIDE FENCED AREA.
- THE CONTRACTOR/SUBCONTRACTORS SHALL FURNISH AND SHALL BE FULLY RESPONSIBLE FOR ADEQUATE 15. SHORING, BRACING, BARRICADES AND PROTECTIVE MEASURES, ETC., REQUIRED FOR SAFETY AND TO PROTECT THE CONSTRUCTION SITE AND PERIPHERY. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGE TO EXISTING STRUCTURE, FINISHES OR EQUIPMENT. SUCH DAMAGE SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE, TO THE SATISFACTION OF THE ARCHITECT OR DISTRICT REPRESENTATIVE.

FIRE

16. INTERIOR FINISH SHALL COMPLY WITH CBC, CFC & TITLE 19 CCR.

- THE CONSTRUCTION, REMODEL OR DEMOLITION OF A BUILDING SHALL COMPLY WITH 2010 CFC ARTICLE 87. 17. CONTRACTOR SHALL PREPARE FOR OR: PATCH, INFILL, SAND, TRIM, PRIME OR OTHERWISE PROVIDE THE PREPARATION NEEDED TO INSTALL OR REMOVE NOTED ITEMS.
- 18. BUILDINGS UNDERGOING CONSTRUCTION, ALTERATION OR DEMOLITION SHALL BE IN ACCORDANCE WITH CFC CHAPTER 14 [CFC 1401.1]

DECORATIVE MATERIALS SHALL BE MAINTAINED IN A FLAME-RETARDANT CONDITION. [TITLE 19, SECT 3.08, 3.21; CFC 19. 804]

🧔 - AT ŧ - AND A.B. - ANCHOR BOLT ABS - ABSOLUTE A.CON. - ASPHALT CONCRETE A.C. - ASPHALT COMPOSITION ACTILE - ACOUSTICAL TILE ADD'L, ADDT'L - ADDITIONAL ADJ. - ADJACENT A.F.F. - ABOVE FINISH FLOOR ALT. - ALTERNATE ALUM. - ALUMINUM APPL - APPLICATION ARCH'L - ARCHITECTURAL ASPH. - ASPHALT BD. - BOARD BLDG. - BUILDING B.O.B - BOTTOM OF BEAM BOT. - BOTTOM BM - BEAM

B.M. - BENCH MARK CAULK'G - CAULKING C.B. - CATCH BASIN CDC - CHILD DEVELOPMENT CENTER CEM. - CEMENT CHN'L - CHANNEL C.I. - CAST IRON C.I.P. - CAST IN PLACE C.J. - CONTROL JOINT

Q - CENTER LINE CLG. - CEILING CLR. - CLEAR C.M.U. - CONCRETE MASONRY UNIT COL. - COLUMN CONC. - CONCRETE CONT. - CONTINUOUS CPT - CARPET

CTR. - CENTER CUB - CUBICLE DBL. - DOUBLE DET. - DETAIL D.F. - DOUGLAS FIR D.H. - DOUBLE HUNG D.G. - DECOMPOSED GRANITE

~, DIA. - DIAMETER DMG - DAMAGE DR. - DOOR D.S. - DOWNSPOUT D.W. - DRINKING WATER COOLER DWG. - DRAWING

E - TACTILE "EXIT" SIGN (E) - EXISTING EA. - EACH E.J. - EXPANSION JOINT ELEC. - ELECTRICAL ELEV.- ELEVATOR OR ELEVATION E.J. - EXPANSION JOINT EQ. - EQUAL

ER - TACTILE "EXIT ROUTE" SIGN E.S. - EACH SIDE E.S. - EACH SIDE EXHS'T - EXHAUST EXP. - EXPOSED EX, EXIST. - EXISTING EX. JT. - EXPANSION JOINT EXP. - EXPANSION

ABBREVIATIONS

F/ - FROM

C.JT. - CONTROL JOINT

F.B. - FIBERGLASS F.D. - FLOOR DRAIN F.H. - FIRE HYDRANT F.E.C. - FIRE EXTINGUISHER CABINET FIN. - FINISH FLASH'G - FLASHING FLUOR. - FLUORESCENT FLR. - FLOOR FLR. COAT. - SEAMLESS FLR. COATING FLT - FLOOR TILE F.O.B. - FACE OF BUILDING F.O.C. - FACE OF CONCRETE F.O.F. - FACE OF FINISH F.O.M. - FACE OF MASONRY F.O.P. - FACE OF POST F.O.S. - FACE OF STUD FT. - FOOT FTG. - FOOTING FURR'G - FURRING F.V. - FIELD VERIFY G.A.F. - GALV. AFTER FABRICATION GA. - GAUGE GALV. - GALVANIZED GD. - GRADE GEN. - GENERAL GYP. - GYPSUM HARD'R - HARDENER HARD/SEAL - HARDENER WITH SEALER H.B. - HOSE BIB HD. - HEAD HOWR. - HARDWARE HI. - HIGH H.M. - HOLLOW METAL H., HORIZ. - HORIZONTAL HT. - HEIGHT HW - HARDWOOD I.D. - INSIDE DIAMETER INSUL., INSUL'N - INSULATION INT. - INTERIOR JAN. - JANITOR LAM. - LAMINATE LAV. - LAVATORY LCS. - LUNCH COURT SHELTER L.F. - LINEAR FEET L.L.V. - LONG LEG VERTICAL LO - LOW MACH. - MACHINE MAS. - MASONRY MAT. - MATERIAL MAX. - MAXIMUM M.B. - MACHINE BOLT MECH. - MECHANICAL MET. - METAL M.H. - MANHOLE MIN. - MINIMUM MNFR. - MANUFACTURER MANUF. - MANUFACTURER MO - MASONRY OPENING MOWD - MAINTENANCE OPERATIONS WAREHOUSE DEPT. MRB. - MARKER BOARD M.R. - MOISTURE RESISTANT MTD - MOUNTED N.H.S.F. - NATIONAL HIGH SCHOOL FED. N.I.C. - NOT IN CONTRACT NO., # - NUMBER NOM. - NOMINAL. N.T.S. - NOT TO SCALE

(N) - NEW

O/ - OVERO.C. - ON CENTER OCC - OCCUPANT/OCCUPANCY O.H. - OVERALL HEIGHT OR O.H. - OPPOSITE HAND OPN'G - OPENING OPP. - OPPOSITE PC. - PIECE PCC - PORTLAND CEMENT CONCRETE PERF. - PERFORATED PLAS. - PLASTIC P - PLATE PH - PANIC HARDWARE PL. - PLATE PLYWD. - PLYWOOD P.O.T. - PATH OF TRAVEL P.S.F. - POUNDS PER SQUARE FOOT P.T. - PRESSURE TREATED P.L. - PROPERTY LINE P.T.D. - PAPER TOWEL DISPENSER QT - QUARRY TILE QTY. - QUANTITY R., RAD. - RADIUS REC. - RECESSED REINF. - REINFORCING RCP - REFLECTED CEILING PLAN R.O. - ROUGH OPENING R.R. - RETURN REGISTER REQ'D - REQUIRED S.D. - SOAP DISH S.F. - SQUARE FEET SEAL'R - SEALER SHW. - SHOWER SHT. - SHEET SHT'G - SHEATHING SIM. - SIMILAR SO. - SOUTH SP. - SPECIAL SPC. - SPACE SQ. - SQUARE S.S. - SERVICE SINK S.S. - STAINLESS STEEL ST.STL. - STAINLESS STEEL STC - SOUND TRANSMISSION CLASS STD. - STANDARD STL. - STEEL STRUCT. - STRUCTURAL STSMS - STEEL SHEET METAL SCREW SUSP. - SUSPENDED TEL. TELE. - TELEPHONE THK. - THICK THRESH. - THRESHOLD T.O. - TOP OF T.P.H. - TOILET PAPER HOLDER TRANS. - TRANSVERSE TT - TOILET TW - TEACHING WALL TYP. - TYPICAL U.O.N. - UNLESS OTHERWISE NOTED U.N.O. - UNLESS NOTED OTHERWISE VAT - VINAL ASBESTOS TILE V.C.T. -VINYL COMPOSITION TILE V.I.F. - VERIFY IN FIELD V., VERT. - VERTICAL W - WITH W.C. - WATER CLOSET ND. - WOOD WO - WITHOUT WNDW. WDW. - WINDOW W.P. - WATERPROOF W.W.F. - WELDED WIRE FABRIC W.M.S. - WIRE MESH SCREEN



PROVIDE WALL MOUNTED FIRE

EXTINGUISHER 48" MAX. A.F.F.

AND CLEAR OF DOOR SWING.

(E) EXIT LIGHT

TO REMAIN

EXIT LIGHT

(SEE SCHEDULE)

----- ## ---- WALL TYPE

(##) ----- ROOM SYMBOL

∩ FE

3)

 $\langle 2 \rangle$

 $\langle XX \rangle$ -----

DOOR SYMBOL DOOR NUMBER SEE SCHEDULE) PANIC HARDWARE SEE SCHEDULE)			
BIGNAGE SYMBOL SIGN NUMBER - PER PLAN			i .
SCREEN SYMBOL			
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		,	
		• •	
			·

4034	30th Stre 546-4326	et, SAN DI FAX (EGO CA 619) 546	92104 -4350	G G G G G G G G G G G G G G
					of MALLON F
NO NEW	RTH COM	CR FOR1	OW r st		OINT N #522
SHEET TITLE:			,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		SHEET NUMBER:
GENERAL NOT STANDARDS	res, sy and ai	MBOLS BBREV	LEGE	END NS	T-2.0
CITY OF SA engineering and SHEE	N DIEG capital t 2 of	O, CA PROJECTS 29 SHEE	LIFOR 5 depar TS	NIA	wbs <u>B-10088</u>
FOR CITY ENG	INEER		3/8/1 DATE	2	ALI DARVISHI
DESCRIPTION	BY	APPROVED	DATE	FILMED	2
ORIGINAL	SG/SR TT/JPB		12.09.10		SLASON GRAN
1	ł	1	1		FRUIEUI MANAGER

DATE STARTED

DATE COMPLETED

CONTRACTOR

INSPECTOR .

Platt/Whitelaw Architects. Inc.

ATIO S H \cap \cap

DED AD

226-1698 CCS27 COORDINATE 1867-6259

CCS83 COORDINATE

36161-2-D



	DEMOLITION NOTES
1.	DEMOLISH AND REMOVE ALL EXISTING IMPROVEMENTS WITHIN LIMITS OF WORK UNLESS INDICATED OTHERWISE. KEYNOTES REFER TO TYPICAL ITEMS OF DEMOLITION AND ARE NOT ALL-INCLUSIVE.
2.	THE CONTRACTOR SHALL NOTIFY DIGALERT (1-800-227-2600) AT LEAST THREE DAYS PRIOR TO STARTING WORK AND SHALL ARRANGE FOR AND COORDINATE SHUT DOWN, DISCONNECTION AND CAPPING OF EXISTING UTILITIES WITH THE APPROPRIATE UTILITY OWNERS PRIOR TO COMMENCING THE WORK.
3.	PROTECT IN PLACE ALL EXISTING IMPROVEMENTS, STRUCTURES AND UNDERGROUND UTILITIES TO REMAIN.
4. [•]	THE LOCATION AND EXISTENCE OF EXISTING UNDERGROUND FACILITIES SHOWN ON THE DRAWINGS WERE OBTAINED FROM A SEARCH OF AVAILABLE RECORD DRAWINGS. THE CONTRACTOR SHALL POTHOLE EXISTING UTILITIES AT POINTS OF CONNECTIONS AND ALL UTILITY CROSSINGS TO DETERMINE EXACT LOCATION PRIOR TO STARTING ANY WORK.
5.	COORDINATE LOCATION OF ALL UNDERGROUND UTILITIES AND STORM DRAINS WITH TREE LOCATIONS, MECHANICAL/ELECTRICAL FACILITIES, AND OTHER INSTALLATIONS. REFER TO LANDSCAPE, PLUMBING, ARCHITECTURAL AND ELECTRICAL DRAWINGS FOR ADDITIONAL INFORMATION.
6.	ALL EXISTING "DRY" UTILITIES SHOWN HEREON ARE FOR INFORMATION PURPOSES ONLY. REFER TO ELECTRICAL PLANS AND APPROPRIATE UTILITY COMPANY PLANS FOR ANY WORK ON OR WITH THESE UTILITIES.
7.	REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.
	DEMOLITION KEY NOTES

1	DEMOLISH AND REMOVE EXISITNG BUILDING AND ASSOCIATED FOOTINGS.
2	DEMOLISH AND REMOVE EXISTING WALL.
3	DEMOLISH AND REMOVE EXISTING PCC HARDSCAPE.
4	SAWCUT LINE.
5	PROTECT INPLACE EXISTING SEWER CLEANOUT AND BOX.

CALGREEN MANDATORY MEASURES

1. CONTRACTOR IS REQUIRED TO PROVIDE CONSTRUCTION WASTE MANAGEMENT PLAN AND DOCUMENTS.

CONTRACTOR IS REQUIRED TO REDUCE WASTE BY AT LEAST 50%.
 CONTRACTOR IS REQUIRED TO REUSE OR RECYCLE 100% OF SOIL AND LAND CLEARING DEBRIS.



DATE COMPLETED

PRELIMINARY-NOT FOR CONSTRUCTION Nov 07 2011 OTTED: FLC PROJECT NO. (DESIGN BY: RAWN BY:

REVIEWED BY:

UPDATED BY:

INSPECTOR _

www.floreelund.com



ACCESSIBILIT	Y NOTES
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COMPLY WITH THE REQUIREMENTS OF THE CALIFORNIA BUILDING CODE (2007 CBC) FOR ALL SITE IMPROVEMENTS.

3. NO CHANGES IN LEVEL GREATER THAN 1/2" SHALL BE ALLOWED WITHOUT A CURB RAMP. CHANGES IN LEVEL BETWEEN 1/4" AND

1/2" SHALL BE BEVELED WITH A SLOPE NO GREATER THAN 1:2. CATCH BASIN AND DRAIN INLET GRATES SHALL HAVE SPACES NO GREATER THAN 1/2" WIDE IN ONE DIRECTION. IF GRATINGS HAVE ELONGATED OPENINGS, THEY SHALL BE PLACED SO THE LONG

DIMENSION IS PERPENDICULAR TO THE DOMINANT DIRECTION OF

CURB RAMPS SHALL BE REQUIRED WHEREVER ACCESSIBLE ACCESS ROUTES CROSS A CURB.

ACCESSIBLE RAMPS AND HANDRAILS SHALL BE REQUIRED WHEREVER SLOPE EXCEEDS 5%. MAXIMUM SLOPE SHALL BE 7.70%. LEVEL LANDINGS SHALL BE INSTALLED AT TOP AND BOTTOM OF EACH RUN EQUAL TO THE WIDTH OF THE RAMP, 60" OR 72" MINIMUM, AND INTERMEDIATE LANDINGS AT INTERVALS NOT EXCEEDING 30" OF ERTICAL RISE. BOTTOM LANDINGS AND INTERMEDIATE LANDINGS WITH DIRECTION CHANGES IN EXCESS OF 30 DEGREES SHALL BE MINIMUM 72" IN THE DIRECTION OF TRAVEL. RAMPS AND LANDINGS WITH VERTICAL SIDE DROP-OFFS SHALL HAVE WALLS, RAILINGS, PROTECTIVE SURFACES OR MINIMUM 6" HIGH CURBS.

ALL STAIRS SHALL HAVE A 2" WIDE SLIP RESISTANT, CONTRASTING COLOR STRIPE AND DETECTABLE WARNING, 1" MAXIMUM FROM NOSING ON ALL TREADS.

ALL PAVEMENT CROSS SLOPES (SLOPES PERPENDICULAR TO THE DIRECTION OF TRAVEL) SHALL BE A MAXIMUM OF 1.5%. ALL RAMPS SHALL HAVE A MAXIMUM SLOPE OF 1 IN 13. ALL LANDINGS AT STAIRS AND RAMPS SHALL HAVE A MAXIMUM SLOPE OF 1.5% (BOTH DIRECTIONS). ALL WALKWAYS SHALL HAVE A MAXIMUM SLOPE LESS THAN 5% IN THE DIRECTION OF TRAVEL. ALL MAXIMUM SLOPES ARE ABSOLUTE AND SUPERSEDE CONSTRUCTION TOLERANCES STATED IN THE PROJECT SPECIFICATION OR ELSEWHERE. THE CONTRACTOR HAS THE OPTION OF ADJUSTING GRADES TO ALLOW FOR CONSTRUCTION TOLERANCE BUT SHALL NOT ADJUST GRADES TO LESS THAN 1% SLOPE OR GREATER THAN 2%. THE CONTRACTOR SHALL CONTACT THE ARCHITECT REGARDING ANY GRADE REVISIONS PRIOR TO CONSTRUCTION OF PAVEMENT AREAS. THE PAVEMENT SLOPES WILL BE REVIEWED AFTER CONSTRUCTION AND PAVEMENT OVER THE MAXIMUM SLOPES SPECIFIED ABOVE SHALL BE REPLACED AT THE CONTRACTOR'S EXPENSE.

GRADING KEY NOTES

FURNISH AND INSTALL 4" THICK P.C.C. CONCRETE HARDSCAPE WITH 6"X6" WWM IN FLATWORK. PLACE 4" THICK CLEAN SAND OVER COMPACTED SUBGRADE SCARIFIED TO A DEPTH OF 12". REGRADE ADJACENT SURFACE TO MEET RAISED ELEVATIONS. ADJUST

ALL SURFACE MANIFESTATIONS TO MEET NEW GRADES.

PROTECT IN PLACE EXISTING CLEANOUT AND ADJUST BOX AND GRATE TO MEET NEW GRADES. REPLACE IN KIND IF DAMAGED DUE TO CONSTRUCTION ACTIVITY.

FURNISH AND INSTALL RP BACKFLOW ASSEMBLY PER CITY OF SAN DIEGO STANDARD DRAWING SDW-100. FURNISH AND INSTALL STAINLES STEEL BACKFLOW PERVENTER ENCLOSURE TO MEET REQUIREMENTS OF "CONSULTANT GUIDE TO PARK DESIGN" APPENDIX E.

FLC

SCALE: 1"=10'

REFER TO PROJECT GEOTECHNICAL REPORT FOR BUILDING PAD OVEREXCAVATION AND RECOMPACTION REQUIREMENTS AND SITE

LEGEND						
ITEM SYMBOL						
APPROX. LIMIT OF WORK · · · · · · · · · · · · · · · · · · ·						
PROPOSED CONTOUR						
PROPOSED PCC PAVEMENT						
PROPOSED CURB AND GUTTER						
PROPOSED STORM DRAIN (PVT) · · · · · · · · · SD						
PROPOSED CLEANOUT · · · · · · · · · · · · · · · · · CO						
PROPOSED POINT OF CONNECTION · · · ·						
PROPOSED TOP OF CURB ELEV.						
PROPOSED FINISHED SURFACE/ FLOW LINE //6.50 FS/FL						
PROPOSED RIM ELEV.						
EXISTING CONTOUR · · · · · · · · · · · · · · · · · · ·						
EXISTING TELEPHONE LINE · · · · · · · · · · · · · · · · · · ·						
EXISTING ELECTRICAL LINE · · · · · · · · · · · · · · · · · · ·						
EXISTING SEWER MANHOLE · · · · · · · · · · · · · · · · · · ·						
EXISTING WATER METER · · · · · · · · · · · · · · · · · · ·						

ABBREVIATIONS

	ASPHALTIC CONCRETE FINISH GRADE FINISH SURFACE FLOW LINE TOP OF CURB TOP OF WALL BACK FLOW PREVENTOR POST INDICATOR VALVE FIRE DEPARTMENT CONNECTION RIM FLEVATION	POC V MH PVC DWG REC ELEC SDRSD P.C.C.	POINT OF CONNECTION UTILITY VAULT MANHOLE (SEWER, STORM DRAIN, UTILITY) POLYVINYL CHLORIDE (PIPE MATERIAL) DRAWING RECORD/RECORDED ELECTRIC/ELECTRICAL SAN DIEGO REGIONAL STANDARD DRAWINGS PORTLAND CEMENT CONCRETE
ĺ	RIM ELEVATION	P.C.C. SWR	SEWER

GENERAL NOTES								
	1.	THE CONTRACTOR SHALL NOTIFY DIGALERT (1-800-227-2600) AT LEAST 3 DAYS PRIOR TO STARTING WORK AND SHALL ARRANGE FOR AND COORDINATE SHUT DOWN, DISCONNECTION AND CAPPING OF EXISTING UTILITIES WITH THE APPROPRIATE UTILITY OWNERS PRIOR TO COMMENCING THE WORK.						
	2.	PROTECT IN PLACE ALL EXISTING IMPROVEMENTS, STRUCTURES AND UNDERGROUND UTILITIES WHICH ARE TO REMAIN. MAINTAIN UTILITY SERVICES TO ALL EXISTING FACILITIES AT ALL TIMES, UNLESS OTHERWISE SPECIFIED.						
	3.	THE LOCATION AND EXISTENCE OF EXISTING UNDERGROUND FACILITIES SHOWN ON THE DRAWINGS WERE OBTAINED FROM A SEARCH OF AVAILABLE RECORD DRAWINGS. THE CONTRACTOR SHALL POTHOLE EXISTING UTILITIES AT POINTS OF CONNECTIONS AND ALL UTILITY CROSSINGS TO DETERMINE EXACT LOCATION PRIOR TO STARTING ANY WORK.						
	4.	COORDINATE LOCATION OF ALL UNDERGROUND UTILITIES AND STORM DRAINS WITH TREE LOCATIONS, MECHANICAL/ELECTRICAL FACILITIES, AND OTHER INSTALLATIONS. REFER TO LANDSCAPE, PLUMBING, ARCHITECTURAL AND ELECTRICAL DRAWINGS FOR ADDITIONAL INFORMATION.						
	5.	ALL EXISTING "DRY" UTILITIES SHOWN HEREON ARE FOR INFORMATION PURPOSES ONLY. REFER TO ELECTRICAL PLANS AND APPROPRIATE UTILITY COMPANY PLANS FOR ANY WORK ON OR WITH THESE UTILITIES.						
	6.	REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.						
	7.	WORK MAY OCCUR BEYOND THE LIMIT OF WORK LINE INDICATED ON THESE DRAWINGS. THIS ADDITIONAL WORK MAY INCLUDE, BUT IS NOT LIMITED TO, UTILITY INSTALLATION; FOOTING AND FOUNDATION CONSTRUCTION; TRENCH REPAIR; TRENCHING AND TRENCH RESURFACING; PCC/AC REPAIR; HARDSCAPE; LANDSCAPING AND/OR SHORING. IN ADDITION, REFER TO THE ARCHITECTURAL, STRUCTURAL, LANDSCAPING, MECHANICAL, PLUMBING AND ELECTRICAL SHEETS FOR ITEMS THAT MAY NOT BE SHOWN ON THIS SHEFT						

Platt/Whitelaw Architects, Inc. 4034 30th Street, SAN DIEGO CA 92104 (619) 546-4326 FAX (619) 546-4350	
NORTH CROWN P NEW COMFORT STATIC	OINT DN #522
SHEET TITLE:	SHEET NUMBER:
GRADING AND UTILITY PLAN	C-2.0
CITY OF SAN DIEGO, CALIFORNIA	D 10088

DATE COMPLETED

(IN FEET) 1 INCH = 10 FTWBS <u>B-10088</u> ENGINEERING AND CAPITAL PROJECTS DEPARTMENT SHEET 4 OF 29 SHEETS 3/8/12 thida ALI DARVISHI SECTION HEAD FOR CITY ENGINEER ER DATE BY APPROVED DATE FILMED DESCRIPTION **PRELIMINARY-NOT FOR CONSTRUCTION** ORIGINAL SG/SR PROJECT MANAGER 12.09.10 Nov 07 20 226-1698 PROFESSIONAL ENGINEERS FLC PROJECT NO. C1(CCS27 COORDINATE 506 W. GRAHAM AVENUE, SLITE 104, LAKE ELSINORE, CALIFORNIA 92530 DESIGN BY: (858) 568-0626 FAX (951) 471-1835 1867-6259 CCS83 COORDINATE DRAWN BY: HEAD OFFICE: 7220 TRADE STREET, SUITE 120. SAN DIEGO, CALIFORNIA 92121 (858) 566-0626 FAX (858) 566-0627 WRI CONTRACTOR ____ DATE STARTED _ 36161-4-D www.floreslund.com UPDATED BY: INSPECTOR _

#522 STATION COMFORT NEW OINT Z

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	LEGEND									
	<u>SYMBOL</u>	DESCRIPTION	BMP*	LOCATION						
$\langle 1 \rangle$	888	SILT FENCE	SE-1	AS INDICATED, AND AT TOES OF ALL SLOPES GREATER THAN 15 FT. HIGH						
2		GRAVEL BAGS	SE-6	AS INDICATED, AND AT TOPS AND TOES OF ALL SLOPES, INCLUDING TEMPORARY SLOPES						
3	FR	FIBER ROLLS	SE-5	AS INDICATED, AND AT TOPS AND TOES OF ALL SLOPES, INCLUDING TEMPORARY SLOPES						
4	$\rightarrow \rightarrow \rightarrow$	TOP AND TOE OF SLOPE DIVERSION DITCH	EC-9	AS INDICATED, AND AS REQUIRED TO DIRECT RUNOFF TOWARDS STORM DRAIN						
(5)		ENTRANCE/ EXIT TIRE WASH	TC-3	AS INDICATED, AND AT ANY OTHER ACCESS POINTS FOR CONSTRUCTION VEHICLES						
TYP.	Ē	STORM DRAIN INLET PROTECTION	SE10	ALL STORM DRAIN INLETS						

= L.C DALE: 1"=10'	·	9. CONCRETE Pla 40 00 00 00 00 00 00 00 00 00 00 00 00	TRUCK WASH. Att/Whitelaw An 034 30th Street, SAN 019) 546-4326 FA)	r chitects, DIEGO CA 921 ((619) 546-435	Inc. 04 50	γ
		NO NEW	ORTH CF	ROWN	PC TIOI	DINT N #522
PHIC SCALE	20	SHEET TITLE:	ION CONTRO	L PLAN		C-3.0
IN FEET) ICH = 10 FT		CITY OF S engineering a SH	AN DIEGO, C nd capital projec ieet 5 of 29 shi	ALIFORNIA ts departme Eets	Д :NT	wbs <u>B-10088</u>
		FOR CITY I	ENGINEER	3/8/12 DATE		ALI DARVISHI
FOR CONS	TRUCTION	DESCRIPTION ORIGINAL	BY APPROVE SG/SR	D DATE FII 12.09.10	LMED -	JASON CRANL'
CONSULTANTS	DATE: Nov 07 2011 PLOTTED: FLC PROJECT NO. C1030					PROJECT MANAGER 226-1698 CCS27 COORDINATE
Sivure, Calpurina 92030	DRAWN BY: CL					1867-6259



- RELOCATION OF EXISTING FACILITIES PRIOR TO CONSTRUCTION.
- RECREATION STAFF TO PRESERVE AND PROTECT EXISTING LANDSCAPE AND IRRIGATION SYSTEMS ADJACENT TO PROJECT SITE.

× KEY NOTES EXEMPT **DEVELOPMENT SERVICES** DURING CONSTRUCTION THE CONTRACTOR SHALL PROVIDE AND MAINTAIN DEPARTMENT Land Development Review AN ADA-COMPLIANT HAND-WASHING STATION, A MINIMUM OF (2) UNISEX PUBLIC-USE TOILET FACILITIES, AND ONE ADA-COMPLIANT PUBLIC USE 234657 TOILET FACILITY. PORTABLE TOILETS AND THE HAND-WSHING STATION From Jandscape 142.0402 ARE TO BE COMPLIANT WITH ALL APPLICABLE CODES, REGULATIONS, AND Brilly , Municipal Code Section Type Munic INDUSTRY STANDARDS, INCLUDING DISPOSAL. SERVICING WILL OCCUR A MINIMUM OF TWICE A WEEK ON MONDAYS AND FRIDAYS. _Initials & Date 12-19-11 Phone 446-5343 Any revision to these plans will revoke this exemption GENERAL NOTES THE CONTRACTOR IS RESPONSIBLE FOR DISCONNECTION AND PROPERLY TERMINATING ALL UTILITIES AND ALL ELECTRICAL SYSTEMS - REPLACE EXISTING GRADED, DISTURBED, OR ERODED AREAS THAT WILL NOT BE PERMANENTLY CONCRETE SIDEWALK TO PAVED, COVERED BY STRUCTURE, OR PLANTED FOR A PERIOD OF 90 -MATCH-ADJACENT CALENDAR DAYS SHALL BE TEMPORARILY REVEGETATED WITH A MAX. 1.5% SLOPE IN ANY NON-IRRIGATED HYDROSEED MIX, GROUND COVER, OR EQUIVALENT MATERIAL DIRECTION (SDMC 142.0411[b]) LEGEND SITE ACCESSIBLE PATH OF TRAVEL (P.O.T.) NEW CONCRETE PAVING A .. * A 'A APPROXIMATE AREA OF IRRIGATION REPAIR \mathbf{v} AND LANDSCAPE RESTORATION * * 10'-0"-PROTECT TREES DURING CONSTRUCTION. Prs# 234657 (Cycle # IF) BUILDING DEVELOPMENT REVIEW DIVISION-STRUCTURAL M-Shadyable/19/11 FAMMY BUL DE Platt/Whitelaw Architects, Inc. WWW WHIT S PLAN 4034 30th Street, SAN DIEGO CA 92104 NORTH C-10375 (619) 546-4326 FAX (619) 546-4350 32 NORTH CROWN POINT COM **NEW COMFORT STATION #522** SHEET TITLE: SHEET NUMBER: VERIFY EXACT LOCATIONS AND STAKE ALL DISCONNECTED, CAPPED, OR RELOCATED ШZ AS-1.0 SITE PLAN OTHER SECTIONS, INCLUDING PIPING AND WIRING. IF ANY PART OF THIS PLAN CITY OF SAN DIEGO, CALIFORNIA CANNOT BE FOLLOWED DUE TO SITE CONDITIONS, CONTACT RESIDENT ENGINEER WBS <u>B-10088</u> NO ENGINEERING AND CAPITAL PROJECTS DEPARTMENT SHEET 6 OF 29 SHEETS _ 3/8/12 ALI DARVISHI SECTION HEAD FOR CITY ENGINEER DATE BY APPROVED DATE FILMED DESCRIPTION LASON CRANI CITY OF SAN DIEGO'S CONSULTANTS GUIDE TO PARK DESIGN AND DEVELOPMENT. SG/SR TT/JPB ORIGINAL 12.09.10 ()226-1698 CCS27 COORDINATE 1867-6259 CCS83 COORDINATE 0 Z CONTRACTOR DATE STARTED 36161- 6-D DATE COMPLETED INSPECTOR .

DOOR SYMBOL DOOR DOOR FRAME GENERAL NOTES: SIZE DETAILS ALL DOORS FIBERGLASS REINFORCED POLYESTER (FRP) Flush doors **T**HO ALL DOORS ARE NOT FIRE RATED Ī 100 6'-0" 7'-0" | 3/4" FRP 11/A-5.1 В 101 3'-0" 7'-0" | 3/4" 5/A-5.I FRP A 102 11/A-5.1 3'-0" 7'-0" 1 3/4" FRP A 103 2'-4" 7'-0" | 3/4" FRP 11/A-5.1 104 2'-4" | 3/4" 11/A-5.1 7'-0" FRP A 105 2'-4" 7'-0" 1 3/4" FRP 11/A-5.1 A 106 2'-4" 11/A-5.1 1 3/4" FRP 7'-0" 101 2'-4" 7'-0" | 3/4" FRP 11/A-5.1 A 108 2'-4" 1 3/4" FRP 11/A-5.1 7'-0" A 109 11/A-5.1 2'-4" | 3/4" FRP 7'-0" A 110 A 11/A-5.1 3'-0" 7'-0" | 3/4" FRP 101 × m MAINTENAN STORAGE XXXXXXXXX 14) FLOOR & GROUND PLAN SCALE: 1/4"= 1'-0"



KEY NOTES

1. BABY CHANGING STATION

- 2. HAND DRYER SURFACE MOUNT CONTROL WITH REMOTE FAN ASSEMBLY.
- 3. PROVIDE 3/4" ACX PLYWOOD BACKBOARD, 8' TALL
- 4. 30" X 48" CLEAR SPACE MAX. 1.9% SLOPE IN ANY DIRECTION

5. FLOOR DRAIN PER P-1.1

- 6. DRINKING FOUNTAIN PER DETAIL 4/A-5.1
- 7. ELECTRICAL PANELS AND METER SEE SHEET E-3.0
- 8. DRAIN INTERCEPTOR PER P-1.1
- 9. TOILET PAPER DISP. SURFACE MOUNTED PER CITY SPEC'S, TYP.
- 10. PROVIDE SOAP DISPENSER, MOUNTING HEIGHT PER DET. 1/A-5.0
- 11. 1½" DIA. GRAB BAR MIN. 36" @ REAR, MIN. 42" @ SIDE, MOUNT
- PER 1/A-5.1 12. ACCESSIBLE LAVATORY
- 13. 5-1/2" X 1-1/2" DRAIN OPENING THRU CMU AT BOTTOM OF WALL -TYPICAL AT EACH TOILET ROOM - SEE 13/S2.0
- 14. HIGH PERFORMANCE COATING O/ CONCRETE MAT SLAB, TYPICAL @ ALL TOILET ROOMS AND MAINTENANCE/STORAGE ROOM
- 15. BLOCK-OUT FOR FLUSH SENSOR IN CMU WALL COORDINATE W/ 1/P-0.1, TYPICAL AT EACH TOILET
- 16. SLOPE FLOOR TO THRU-WALL DRAINS, TYPICAL AT ALL TOILET ROOMS
- 17. ACCESS FOOR LOCATE AS NEEDED TO SERVICE PLUMBING
- 18. ROOF LINE ABOVE

INTERIOR FINISH NOTES

INTERIOR WALLS: ACRYLIC LATEX WITH ALIPHATIC POLYURETHANE COATING. 2. INTERIOR FLOORS: POLYURETHANE WITH BROADCAST SAND.

LEGEND

XXX SIGNAGE SEE 5/A-5.0

(###) DOORS SEE SHEET A-1.0

CMU WALL W/ HIGH-PERFORMANCE COATINGS EACH FACE - COORDINATE THICKNESSES W/ S3.0 2X4 WOOD STUD @ 16" O.C. W/ FIBER CEMENT SIDING WHERE EXPOSED TO INTERIOR - SEE 10/A-5.1



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	SG/SR TT/JPB		12.09.10		PROJECT MANAGER 226-1698 CCS27 COORDINAT
					1867-6259 CCS83 COORDINAT
	36161-7-				





SYM	SYMBOL		LOU	VER		DETAILS				
				SIZE	•					
		QUANTITY	TYPE	HLCIM	HEIGHT	HICK ACHI	HEAD	AMB	SILL	
1	1	C	2'-8"	1'-6"	7-3/4"	XXX	7/A-5.I	II/A-5.I		
2	2	A2	2'-8"	2'-7"	7-3/4"		7/A-5.I	11/A-5.1		
З	2	AI	2'-8"	2'-7"	7-3/4"		7/A-5.1	II/A-5.I		
4	2	AL	2'-8"	2'-7"	7-3/4"		7/A-5.1	11/A-5.1		
5	2	в	3'-4"	'-6"	7-3/4"		7/A-5.I	II/A-5.I		
6	2	D	3'-2"	1'-6"	7-3/4"		7/A-5.I	II/A-5.I		
. 7	4	E	5'-1"	'- q "	4"		7/A-5.1	II/A-5.I	LOUVI	
8	2	F	5'-6"	2'-0"	5-3/4"		7/A-5.1	II/A-5.I		
٩	4	G	3'-8"	2'-0"	5-3/4"		7/A-5.1	II/A-5.I		
10	2	н	3'-8"	2'-0"	5-3/4"		7/A-5.1	II/A-5.I		
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NOTES:

\A-3.0





TYPE

× KEY NOTES

- 1. FIBER CEMENT SOFFIT
- 2. LINE OF CMU WALL BELOW
- 3. STAINLESS STEEL SCREEN IN HM FRAME
- 4. LINE OF STRUCTURE BELOW
- 5. METAL ROOF O/ VAPOR BARRIER O/ PLYWOOD.
- 6. LIGHT FIXTURE
- 7. EXPOSED STRUCTURE PAINT
- 8. LOUVER

DEFE

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NORTH CROWN POINT NEW COMFORT STATION #522								
SHEET TITLE:	RO	OF PLA	N &		SHEET NUMBER:			
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	,				1867-6259 ccs83 coordinate			
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	DA	IE COMPLET	<u>LU</u>					



SYMBOL	MATERIAL	FINISH	REFERENCE COLOR TO MATCH	REMARKS
A	METAL ROOF	FF	ROMAN BLUE	CLASS 'A'
В	PRE-FINISHED SHEET METAL	FF	ROMAN BLUE	FASCIA
C	NOT USED			
D	D CMU PRECISION		RCP "CALIFORNIA GOLD"	WALLS
E	GLAZED CMU	INTEGRAL	ASTRAGLAZE "BUTTERMILK"	WALLS, BOTTOM 2 AND TOP 3
F	CONCRETE SITE FLATWORK,	INTEGRAL	M.A.S.	CONCRETE SITE FLATWORK,
G	STAINLESS STEEL MESH	FF		
Н	STEEL DOOR FRAMES	PAINT	UMBER BROWN	
. 1	FIBERGLASS DOORS	FF 、	NOUGAT	

16'



 \mathbf{O}

32'

J. W. W. 4/

C C-10375 7 C EXP 7-31-13 ₹

SHEET NUMBER:

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ALI DARVISHI SECTION HEAD

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226-1698 CCS27 COORDINATE

1867-6259 ccs83 coordinate

36161-1**0**-D

2. METAL ROOF O/ VAPOR BARRIER O/ ROOF SHEATHING

10. 2X4 STUD WALL W/ FIBER CEMENT SIDING 0/ 1/2" PLYWOOD EACH SIDE



 \bigcirc OMF ШZ ()



i~ \mathbf{O} COMF

REINFORCED MASONRY (SPECIAL INSPECTION REQUIRED PER U.B.C.)

CONCRETE BLOCK UNITS SHALL BE MEDIUM WEIGHT AND COMPLY WITH ASTM C90, GRADE 'N', AND SHALL ALSO COMPLY WITH U.B.C. STANDARD NO.24-4 FOR fm=1500 PSI OPEN END UNITS SHALL BE GROUTED SOLID AND NEED NOT COMPLY WITH THE WEB THICKNESS REQUIREMENTS OF TABLE 24-4-C OF U.B.C. STANDARD NO.24-4. PROVIDE DEEP CUT BOND BEAM UNITS WHERE HORIZONTAL REINFORCEMENT OCCURS, TYP. (U.N.O.)

MORTAR SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 12.5 MPa (1800 PSI) AFTER 2 28 DAYS. RECOMMENDED MIXING PROPORTIONS BY VOLUME TYP. (U.N.O.): PORTLAND CEMENT: 1 PART SAND (BASED ON DAMP LOOSE CONDITION): NOT LESS THAN 2 1/4 AND NOT MORE THAN 3 TIMES THE SUM OF THE SEPARATE VOLUMES OF CEMENTITIOUS MATERIALS. LIME: OVER 1/4 TO 1/2 PARTS BY VOLUME.

- COARSE GROUT SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 13.8 MPa (2000 PSI) - 3. AFTER 28 DAYS. RECOMMENDED MIXING PROPORTIONS BY VOLUME TYP. (U.N.O.): PORTLAND CEMENT: 1 PART SAND (BASED ON DAMP LOOSE CONDITION): 2 1/4 TO 3 TIMES THE SUM OF THE VOLUMES OF THE CEMENTITIOUS MATERIALS. PEA GRAVEL (BASED ON DAMP LOOSE CONDITION): 1 TO 2 TIMES THE SUM OF THE VOLUMES OF THE CEMENTITIOUS MATERIALS.
- 4. REINFORCING STEEL SHALL COMPLY WITH ASTM A615M, GRADE 420 WELDED REINFORCEMENT SHALL COMPLY WITH ASTM A706M OR VERIFIED EQUIVALENT.
- MATERIAL QUALITY CONTROL: PRIOR TO DELIVERY OF MASONRY MATERIALS TO THE JOB SITE, DELIVER TO THE ARCHITECT A LETTER CERTIFYING THAT ALL SUCH MATERIALS TO BE DELIVERED TO THE JOB SITE ARE IN STRICT CONFORMANCE WITH THE PROVISIONS OF THIS SECTION.
- 6. PROVIDE SPECIAL INSPECTION AS PER 1701.5 (7) OF THE U.B.C. FOR ALL MASONRY WORK.
- UNLESS OTHERWISE DETAILED: LAP #4 AND #5 REINFORCEMENT BARS A MINIMUM OF 48 DIAMETERS, LAP #6 AND LARGER REINFORCEMENT BARS A MINIMUM OF 60 DIAMETERS.
- UNLESS OTHERWISE DETAILED: FOR ALL HORIZONTAL REINFORCING, PROVIDE A STANDARD 90 DEGREE HOOK AT THE END OF ALL WALLS. HOOK THE REINFORCING INTO THE INTERSECTING WALL OR HOOK INTO THE LAST VERTICAL CELL WHERE NO INTERSECTING WALL OCCURS.
- 9. PROVIDE³/["] MINIMUM OR ONE BAR DIAMETER, WHICHEVER IS GREATER, GROUT BETWEEN THE FACE OF A REBAR AND ANY INTERIOR SURFACE OF THE MASONRY.
- 10. UNLESS SPECIFICALY DETAILED. ALL VERTICAL REINFORCING SHALL BE IN ONE PIECE FROM FOOTING TO ROOF, OR FROM FOOTING TO FLOOR AND FROM FLOOR TO ROOF AND SHALL BE SECURED AGAINST DISPLACEMENT PRIOR TO GROUTING BY WIRE POSITIONERS OR OTHER SUITABLE DEVICES NOT EXCEEDING 200 BAR DIAMETER INTERVALS NOR 3000 mm MAXIMUM ON CENTER. SPLICING OF REINFORCEMENT WILL NOT BE ACCEPTED UNLESS APPROVED PRIOR TO THE START OF ANY MASONRY WORK.
- 11. ALL CELLS SHALL BE GROUTED SOLID. GROUT LIFTS SHALL NOT EXCEED 6'-0"IN HEIGHT. CLEANOUT HOLES SHALL BE PROVIDED AT THE BASE OF ALL GROUTED CELLS FOR GROUT LIFTS OVER 5'-0" HIGH. "GROUT-AID" SHALL BE ADDED TO THE MIX FOR GROUT LIFTS OVER 5'-0" HIGH.
- 12. GROUT CONSTRUCTION JOINTS SHALL BE FORMED BY STOPPING THE POUR 1 $\frac{1}{2}$ " BELOW THE UPPERMOST UNIT.
- 13. GROUT SHALL BE CONSOLIDATED BEFORE LOSS OF PLASTICITY USING MECHANICAL VIBRATING EQUIPMENT TO MINIMIZE VOIDS DUE TO WATER LOSS. RODDING WILL NOT BE ACCEPTED.
- 14. ALL CMU WALLS SHALL BE DOWLED FROM SUPPORTS WITH BARS OF SAME SIZE AND SPACING, TYP., U.N.O.

TIMBER

- 1. ALL FRAMING LUMBER SHALL BE DOUGLAS FIR/LARCH (NORTH) AND SHALL BE GRADE MARKED AS FOLLOWS UNLESS OTHERWISE NOTED:
- A. LIGHT FRAMING, BLOCKING AND NON BEARING STUDS LESS THAN HIGH 12'-0" STANDARD OR BETTER
- No. 1 OR BETTER RAFTERS AND CEILING JOISTS.. C. 4x BEAMS / POSTS x 12'-0" OR LESS... No. 1 OR BETTER
- D. POSTS OVER 12'-0"... No. BEAMS AND STRINGERS (6x AND OVER).. No. 1
- POSTS AND TIMBERS (6x AND OVER) x 12'-0" OR LESS.. No. 1
- G. POSTS AND TIMBERS (6x AND OVER) OVER 12'-0"... No. 1
- 2. ALL TIMBER AND DECKING TO BE PRESSURED TREATED.

H. ALL EXPOSED BEAM FRAMING TO BE W.H.O.C.

- 3. PLYWOOD DOUGLAS FIR U.S, DEPT. OF COMMERCE PS 1-83 (EXTERIOR GLUE)
- A. 1/2" PLYWOOD ROOF SHT'G...... ... GROUP 1, CD-EXPOSURE 1, INDEX 32/16
- 4. PROVIDE MINIMUM NAILING IN ACCORDANCE WITH THE NAILING SCHEDULE.
- 5. PROVIDE A 3x MEMBER FOR ALL PLYWOOD EDGE NAILING SPACING CLOSER THAN 3" ON CENTER.
- 6. SILL PLATES ON CONCRETE SHALL BE DOUGLAS FIR, PRESSURE TREATED, WITH 5/8"DIA x 10" ANCHOR BOLTS AT 48"o/c MAXIMUM. CLOSER SPACING IS REQUIRED AT SHEAR WALLS: TWO ANCHOR BOLTS PER WALL WITH A MINIMUM OF 7 DIAMETERS AND 12" MAXIMUM END DISTANCE. PROVIDE 2x2x3/16 WASHER > AT ALL ANCHOR BOLTS.
- 7. TOP PLATES OF ALL STUD WALLS SHALL BE DOUBLED, SAME SIZE AS STUDS, LAP PLATES 4'-0" MINIMUM WITH AT LEAST 20- 16d NAILS @ 4" MAXIMUM ON CENTER. REFER TO SPLICE DETAIL.
- 8. SOLID BLOCK STUDS AT MIDHEIGHT OF WALL AT CORNER & WINDOWS
- 9. PLACE 2X SOLID BLOCKING BETWEEN ALL JOISTS AND RAFTERS AT SUPPORTS AND UNDER ALL PARTITIONS
- 10. BOLTS SHALL HAVE 7 DIAMETER MINIMUM END DISTANCE AND 4 DIAMETER MINIMUM EDGE DISTANCE, UNLESS OTHERWISE NOTED.
- 11. ALL BOLTS SHALL BE FITTED WITH WASHERS. HOLES IN WOOD SHALL BE BORED WITH A BIT 1/32" TO 1/16" LARGER THAN THE BOLT.
- 12. STEEL FRAMING CONNECTORS SHALL BE MANUFACTURED BY THE SIMPSON STRONG-TIE COMPANY UNLESS ALTERNATE CONNECTORS HAVE BEEN APPROVED BY THE ENGINEER PRIOR TO CONSTRUCTION. ALL CONNECTORS SHALL BE STAINLESS STEEL EXCEPT U.N.O.
- 13. ALL FASTENERS TO BE HOT DIPPED GALV. OR STAINLESS STEEL.

CONCRETE

- THESE DRAWINGS AND SPECIFICATIONS. CONCRETE PLACEMENT.
- PROVIDE DESIGN MIX PER SPECIFICATION

ITEM OF CONSTRUCTION

- 1) HARD ROCK CONCRETE (23 TYPE I CEMENT w/ XY PE A. MAT SLAB
- 5. MINIMUM CONCRETE PROTEC 1) CAST-IN-PLACE CONCRETE: A. CONCRETE CAST AGAINST
- EXPOSED TO EAR B. CONCRETE EXPOSED TO E
- NO. 19 THRU N NO., 16 BAR, AND SMALLE
- C. CONCRETE NOT EXPOSED SLABS, WALLS, JOISTS:
- NO.. 36 BAR AND SMALLEI BEAMS. COLUMNS:

- DETAIL 2/S1.1 AND 7/S2.2.
- SPACING. STAGGER SPLICE ALL REINFORCING.
- SHEET S1.1
- DUCTS, VENTS AND SIMILAR OPENINGS.
- 12. CHAMFER: 3/4" ON ALL EXPOSED CORNERS.
- 13. ALL ANCHOR BOLTS SHALL BE TIED IN PLACE PRIOR TO PLACING CONCRETE.

REINFORCING STEEL

- PRIOR TO FABRICATION.
- VERIFIED EQUIVALENT.
- FOOTINGS.
- S1.1 TYP. (U.N.O.)

SPECIAL INSPECTION

FOLLOWING TYPES OF WORK IN CONFORMANCE WITH THE "IBC SEC. 1704

- A. CONCRETE: DURING THE TAKING OF TEST SPECIMENS AND PLACING OF ALL REINFORCED CONCRETE.
- C. REINFORCED MASONARY.
- D. SOLIS.
- SHEET S1.2

Add note on plan: "NOTICE TO THE APPLICANT/OWNER/ OWNER'S AGENT/ARCHITECT or ENGINEER OF RECORD: By using this permitted construction drawings for construction/installation of the work specified herein, you agree to comply with the requirements of City of San Diego for special inspections, structural observations, construction material testing and off-site fabrication of building components, contained in the statement of special inspections and, as required by the California construction codes."

Add note on plan: "NOTICE TO THE CONTRACTOR/BUILDER/INSTALLER/SUB-CONTRACTOR/OWNER-BUILDER: By using this permitted construction drawings for construction/installation of the work specified herein, you acknowledge and are aware of, the requirements contained in the statement of special inspections. You agree to comply with the requirements of City of San Diego for special inspections, structural observations, construction material testing and off-site fabrication of building components, contained in the statement of special inspections and, as required by the California construction codes."

1. ALL CONCRETE WORK SHALL CONFORM TO THE "REQUIREMENTS FOR REINFORCED CONCRETE" (ACI 318, 2005 EDITION) AND THE SPECIFICATIONS FOR STRUCTURAL CONCRETE FOR BUILDINGS" (ACI 301), LATEST APPROVED EDITIONS, WITH MODIFICATIONS AS NOTED IN

2. CONTINUOUS INSPECTION BY A CONCRETE INSPECTOR IS REQUIRED FOR ALL STRUCTURAL

4. CONCRETE STRENGTHS: THE CONCRETE STRENGTH SHOWN IN THE FOLLOWING TABLE IS MINIMUM COMPRESSIVE STRENGTH AT 28 DAYS, THE AGGREGATE SHOWN IS THE MAXIMUM SIZE(MM), AND THE SLUMP SHOWN IS THE MAXIMUM (MM).

	STRENGTH	AGGREGATE	SLUMP
23 Kg/m3 145 PCF AVERAGE) X ADMIXTURE	3000 PSI	1"	4"
TIVE COVER OF REINFORCING:			
AND PERMANENTLY	·	3"	
Earth or Weather: No. 36 Bar			
ER TO WEATHER OR IN CONTACT V	VITH GROUND:	1 1/2"	
ς		3/4"	

PRIMARY REINFORCEMENT, TIES, STIRRUPS, SPIRALS,.....1 1/2"

NO PIPES OR DUCTS SHALL BE PLACED IN CONCRETE COLUMNS, WALLS OR SLABS UNLESS SPECIFICALLY DETAILED OR UNLESS SLEEVES ARE PROVIDED IN ACCORDANCE WITH THE TYPICAL

7. WALLS AND COLUMNS SHALL BE DOWELED FROM SUPPORTS WITH BARS OF THE SAME SIZE AND

8. SPLICE CONTINUOUS REINFORCING IN ACCORDANCE WITH THE TYPICAL DETAIL 9 ON SHEET S1.1,

9. PROVIDE MINIMUM EMBEDMENT OF REINFORCING IN CONFORMANCE WITH THE TYPICAL DETAIL 5 ON

10. REFER TO THE ARCHITECTURAL, MECHANICAL AND ELECTRICAL DRAWINGS FOR LOCATIONS OF PIPES,

11. REINFORCING, ANCHOR BOLTS AND ALL OTHER EMBEDDED ITEMS SHALL BE SECURELY HELD IN POSITION AND SHALL BE INSPECTED PRIOR TO PLACING CONCRETE.

1. DETAILS OF REINFORCEMENT SHALL BE IN ACCORDANCE WITH CHAPTER 7 OF "AMERICAN CONCRETE INSTITUTE 318" UNLESS OTHERWISE NOTED. REINFORCING STEEL DETAILING.

BENDING AND PLACING SHALL BE IN ACCORDANCE WITH THE CONCRETE REINFORCING STEEL INSTITUTE "MANUAL OF STANDARD PRACTICE", LATEST EDITION. 2. WELDING OF REINFORCING STEEL, IF PERMITTED BY THE ARCHITECT AND STRUCTURAL

ENGINEER, SHALL BE IN ACCORDANCE WITH THE "STRUCTURAL WELDING CODE- REINFORCING STEEL" OF THE AMERICAN WELDING SOCIETY, AWS D1.4, AND SHALL BE PERFORMED BY WELDERS QUALIFIED UNDER THE PROCEDURES CONTAINED THEREIN. 3. ALL REINFORCING STEEL SHOP DRAWINGS SHALL BE REVIEWED BY THE STRUCTURAL ENGINEER

4. ALL REINFORCING STEEL SHALL CONFORM TO ASTM A-615M, GRADE 420 FOR NO.13 AND LARGER, OTHERWISE GRADE 300. WELDED REINFORCING SHALL CONFORM TO ASTM 706 OR

5. SPACER TIES: PROVIDE A MINIMUM OF #10 [#3] TIES AT 610 mm [24"] IN ALL BEAMS AND

6. PROVIDE MINIMUM SPLICE LENGTH IN ACCORDANCE WITH THE TYPICAL SCHEDULE ON SHEET

7. BAR SUPPORTS SHALL BE PROVIDED IN ACCORDANCE WITH THE PROVISIONS OF "BAR SUPPORT SPECIFICATION" BY THE CONCRETE REINFORCING STEEL INSTITUTE (CRSI).

SPECIAL INSPECTION BY SPECIAL INSPECTORS SATISFACTORY TO THE ROIC IS REQUIRED FOR THE

B. REINFORCING STEEL: DURING THE PLACING OF REINFORCING STEEL FOR ALL CONCRETE.

2. FOR MORE REQ'D SPECIAL INSPECTION SEE STATEMENT OF SPECIAL INSPECTION TABLES ON

STRUCTURAL OBSERVATIONS AND SPECIAL INSPECTION

- 1. THE DESIGN PROFESSIONAL RESPONSIBLE FOR THE STRUCTURAL DESIGN SUBMIT A STATEMENT IN WRITING TO THE BUILDING OFFICIAL, STATING THA DURING THE CONSTRUCTION OF THIS STRUCTURE, SITE VISITS HAVE BEEN PERFORMED TO OBSERVE GENERAL COMPLIANCE WITH THE APPROVED STRUCTURAL PLANS, SPECIFICATIONS AND CHANGE ORDERS. FURTHER, TH STATEMENT SHALL, IN DETAIL, NOTE HOW ANY DEFICIENCIES HAVE BEEN CORRECTED.
- THE GENERAL CONTRACTOR SHALL SUBMIT A WRITTEN STATEMENT OF RESPONSIBILITY FOR CONSTRUCTION OF ITEMS LISTED FOR SPECIAL INSPEC PRIOR TO COMMENCEMENT OF WORK.
- STRUCTURAL VISUAL OBSERVATION MUST BE PROVIDED AT THE SIGNIFICAN OF CONSTRUCTION. STRUCTURAL OBSERVATION DOES NOT INCLUDE OR W THE INSPECTIONS REQUIRED BY SECTION 1701 OR OTHER SECTIONS OF THE CODE. AS A MINIMUM, THIS STRUCTURE REQUIRES SITE OBSERVATIONS BEI THE FOLLOWING HAS BEEN STARTED: A. POURING THE INITIAL FOOTINGS. B. GROUTING OF CMU WALLS.
- 4. THE CONSTRUCTION MATERIALS TESTING LABORATORY MUST BE APPROVE THE CITY OF SAN DIEGO DEVELOPMENT SERVICES, FOR TESTING OF MATERI SYSTEMS, COMPONENTS AND EQUIPMENTS.
- 5. FABRICATOR SHALL BE REGISTERED AND APPROVED BY THE CITY OF SAN DIE DEVELOPMENT SERVICES FOR FABRICATION OF MEMBERS AND ASSEMBLIES THE PREMISES OF THE FABRICATOR'S SHOP.
- 6. FABRICATOR SHALL SUBMIT AN "APPLICATION TO PERFORM OFF-SITE FABRIC/ TO THE INSPECTION SERVICES DIVISION FOR APPROVAL PRIOR TO COMMENCEMENT OF FABRICATION.
- 7. FABRICATOR SHALL SUBMIT A "CERTIFICATE OF COMPLIANCE FOR OFF-SITE FABRICATION" TO THE INSPECTION SERVICES DIVISION PRIOR TO ERECTION FABRICATED ITEMS AND ASSEMBLIES.
- 8. A "PROPERTY OWNER'S FINAL REPORT FORM" FOR WORK REQUIRED TO HAV SPECIAL INSPECTIONS, TESTING AND STRUCTURAL OBSERVATIONS MUST BE COMPLETED BY THE PROPERTY OWNER, PROPERTY OWNER'S AGENT OF REC ARCHITECT OF RECORD OR ENGINEER OF RECORD AND SUBMITTED TO THE INSPECTION SERVICES DIVISION.
- 9. SPECIAL INSPECTION IS REQUIRED DURING TAKING TEST SPECIMENS AND P CONCRETE.
- 10. SPECIAL INSPECTION IS REQUIRED PRIOR TO AND DURING PLACEMENT OF CONCRETE AROUND THE BOLTS USING THE ALLOWABLE VALUES FOR BOLT INSTALLED WITH SPECIAL INSPECTION.
- 11. SPECIAL INSPECTION IS REQUIRED VERIFYING THE REINFORCING PRIOR TO CLOSING THE FORMS OR DELIVERY OF CONCRETE TO THE JOB SITE.
- 12. THE SPECIAL INSPECTOR MUST BE CERTIFIED BY THE CITY OF SAN DIEGO DEVELOPMENT SERVICES IN THE CATEGORY OF WORK REQUIRED TO HAVE SPECIAL INSPECTION.
- 13. THE SPECIAL INSPECTIONS IDENTIFIED ON PLANS ARE IN ADDITION TO AND SUBSTITUTE FOR. THOSE INSPECTIONS REQUIRED TO BE PERFORMED BY A BUILDING INSPECTOR.
- 14. CONTINUOUS SPECIAL INSPECTION IS DEFINED BY THE CBC AS, THE FULL T OBSERVATION OF WORK REQUIRING SPECIAL INSPECTION BY AN APPRO SPECIAL INSPECTOR WHO IS PRESENT IN THE AREA WHERE THE WORK IS B PERFORMED.
- 15. PERIODIC SPECIAL INSPECTION IS DEFINED BY THE CBC AS, THE PART-TIME INTERMITTENT OBSERVATION OF WORK REQUIRING SPECIAL INSPECTION B APPROVED SPECIAL INSPECTOR WHO IS PRESENT IN THE AREA WHERE THE HAS BEEN OR IS BEING PERFORMED AND AT THE COMPLETION OF THE WOI

STRUCTURAL TESTING FOR SEISMIC RESISTANCE

- FOR SEISMIC DESIGN CATEGORY AND OCCUPANCY CATEGORY AS LISTED O GENERAL NOTES SHEET S1.0 THE FOLLOWING TESTING, CERTIFICATIONS AN INSPECTIONS SHALL BE PROVIDED FOR THIS PROJECT:
- 2. MECHANICAL & ELECTRICAL EQUIPMENT THE APPLICABLE SEISMIC DESIGN CRITERIA ARE PROVIDED ON SHEET S1.0 OF THESE CONSTRUCTION DOCUM THE MANUFACTURER AND REGISTERED DESIGN PROFESSIONAL IN RESPON CHARGE OF THE DESIGNATED SEISMIC SYSTEM COMPONENTS AND MOUNT SYSTEMS OR ANCHORAGE SHALL TEST & ANALYZE THESE COMPONENTS AN SUBMIT CERTIFICATE OF COMPLIANCE FOR REVIEW AND ACCEPTANCE TO T PROJECT ENGINEER OF RECORD AND THE BUILDING OFFICIAL. QUALIFICAT SHALL BE BY AN ACTUAL TEST ON A SHAKE TABLE, BY 3-D SHOCK TESTS, BY ANALYTICAL METHOD USING DYNAMIC CHARACTERISTICS AND FORCES, BY USE OF EXPERIENCE DATE OR BY A MORE RIGOROUS ANALYSIS PROVIDING EQUIVALENT SAFETY.

SOILS REPORT BY NINYO+ MOORE OCTOBER 8, 2010 Proj. # 106896001

WITH AMENDMENT DATED DEC 20, 2010

	GENERAL NOTES
SHALL	THE FOLLOWING GENERAL NOTES ARE A SUMMARY OF THE SPECIFICATIONS FOR THE CONVENIENCE OF THE CONTRACTOR. REFER TO THE SPECIFICATIONS.
	GENERAL
IE	1. CONTRACTOR SHALL VERIFY ALL DIMENSIONS BEFORE STARTING WORK AND NOTIFY THE ARCHITECT IMMEDIATELY OF ANY DISCREPANCIES FOUND.
	 SPECIFIC CODES AND DETAILS SHALL TAKE PRECEDENCE OVER THESE GENERAL NOTES AND THE TYPICAL DETAILS ON S1.1 THROUGH S1.2, IN CASE OF CONFLICT NOTIFY ENGINEER FOR CLARIFICATION
CTION	 WHERE NO CONSTRUCTION DETAILS ARE SHOWN OR NOTED FOR ANY PART OF THE WORK, THE DETAILS USED SHALL BE THE SAME AS FOR OTHER SIMILAR WORK, PROVIDED THAT PRIOR APPROVAL IS OBTAINED FROM THE ARCHITECT OR ENGINEER.
IT ITEMS VAIVE	4. THE DESIGN IS BASED ON INTERNATIONAL BUILDING CODE (IBC) 2006 EDITION, AND REFERENCES THEREIN.
E FORE	 NEITHER THE OWNER NOR THE ARCHITECT WILL ENFORCE SAFETY MEASURES OR REGULATIONS. THE CONTRACTOR SHALL DESIGN, CONSTRUCT AND MAINTAIN ALL SAFETY DEVICES, INCLUDING SHORING AND BRACING, AND SHALL BE SOLELY RESPONSIBLE FOR CONFORMING TO ALL LOCAL, STATE AND FEDERAL SAFETY AND HEALTH STANDARDS, LAWS AND REGULATIONS.
	FOUNDATION:
IALS,	 THE ALLOWABLE SOIL BEARING PRESSURE FOR MAT FOUNDATIONS IS 1500 PSF. AN EXPLORATION OF THE SOIL UNDERLYING THIS SITE WAS MADE BY NINYO & MORE (DOCUMENT NO. 106896001 DATED 10 /8/2010) ADDENDUM LETTER ISSUED BY NINYO & MORE DATED 12 /20 /10. THE CONTRACTOR SHALL BECOME FAMILIAR WITH THE INFORMATION CONTAINED THEREIN
S ON	BEFORE COMMENCING ANY WORK. 3. FOOTING ELEVATIONS SHOWN ARE FOR INFORMATION PURPOSES ONLY AND ARE ASSUMED TO
ATION"	BE IN SUITABLE BEARING MATERIALS. THE ACTUAL ADEQUACY OF THE BEARING MATERIAL SHALL BE DETERMINED BY A REPRESENTATIVE OF "GEOTECHNICS INCORPORATED" PRIOR TO PLACING OF REINFORCING OR POURING OF CONCRETE, AND FOOTING ELEVATIONS SHALL BE ADJUSTED, OR OTHER REMEDIAL ACTION TAKEN. AS DIRECTED BY THIS REPRESENTATIVE AND APPROVED BY
·. ·	THE ENGINEER. 4. ALL ANCHORS AND DOWELS SHALL BE TIED IN PLACE PRIOR TO CALLING FOR FOUNDATION
OF	INSPECTION.
Έ	
E CORD,	DESIGN CRITERIA
Ē	 CALIFORNIA BUILDING CODE (CBC) 2010 EDITION, AND REFERENCES THEREIN. "RECOMENDED LATERAL FORCE REQUIREMENTS AND COMMENTARY" BY THE STRUCTURAL
LACING	 ENGINEERS ASSOCIATION OF CALIFORNIA, 1999 EDITION. 3. ASCE STANDARD ASCE 7-05, AMERICAN SOCIETY OF CIVIL ENGINEERS. 4. DESIGN LOADS:
S	A. LIVE LOADS ROOF
	B. WIND (PER IBC) VELOCITY
	C. SEISMIC - SHORT PERIOD
	SPECTRAL RESPONSE :
	SPECTRAL RESPONSE:
NOT A	ADJUSTED SPECTRAL RESPONSE: Sm1 = 0.9405
CITY'S	DESIGN SPECTRAL RESPONSE: $S_{DS} = 1.068$ DESIGN SPECTRAL RESPONSE:
	OCCUPANCY CATEGORY: II SEISMIC DESIGN CATEGORY: D
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RK.	
	CONSULTANTS
N	7220 Trade Street, Suite 120 San Diego, CA 92121 (858) 566-0626
	Platt/Whitelaw Architects, Inc.
FNTS	4034 30th Street, SAN DIEGO CA 92104
SIBLE	(619) 546-4326 FAX (619) 546-4350
ID HE	
THE FOR	NORTH CROWN POINT NEW COMFORT STATION #522
	SHEET TITLE: SHEET NUMBER: SI SHEET NUMBER:
	CITY OF SAN DIEGO, CALIFORNIA ENGINEERING AND CAPITAL PROJECTS DEPARTMENT SHEET 13 OF 29 SHEETS WBS <u>B-10088</u>
	FOR CITY ENGINEER 3/8/12 ALI DARVISHI
	DESCRIPTION BY APPROVED DATE FILMED ORIGINAL SG/SR 12.09.10 CLASON OPANI
	11.07.11 PROJECT MANAGER
	CCS27 COORDINATE
	CONTRACTOR DATE STARTED
	INSPECTOR DATE COMPLETED 36161-13-D



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SOILS - VERIFICATION AND INSPECTION REQUIREMENTS (CBC T-1704.7)

	INSPECTION FREQUENCY		TESTING & INSPECITON CRITERIA
	CONTINUOUS	PERIODIC	PROJECT SPECIFIC REFERENCE
1. VERIFY MATERIALS BELOW FOOTINGS ARE ADEQUATE TO ACHIEVE THE DESIGN BEARING CAPACITY.	- - -	Х	
2. VERIFY EXCAVATIONS ARE EXTENDED TO PROPER DEPTH AND HAVE REACHED PROPER MATERIAL.	-	X	REFER TO GEOTECHNICAL REPORT TERRA COSTA CONSULTING GROUP
3. PERFORM CLASSIFICATION AND TESTING OF CONTROLLED FILL MATERIALS.	-	X	4455 MURPHY CANYON ROAD, SUITE 100 SAN DIEGO, CA 92123 (858) 573-6900
4. VERIFY USE OF PROPER MATERIALS, DENSITIES AND LIFT THICKNESSES DURING PLACEMENT AND COMPACTION OF CONTROLLED FILL.	X	· _	PROJECT NO. 2531 DATED: FEBRUARY 26, 2010
5. PRIOR TO PLACEMENT OF CONTROLLED FILL, OBSERVE SUBGRADE AND VERIFY THAT SITE HAS BEEN PREPARED PROPERLY.	-	x	

STATEMENT OF SPECIAL INSPECTIONS:

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CONCRETE CONSTRUCTION - VERIFICATION AND INSPECTION REQUIREMENTS (CBC T-1704.4)

VERIFICATION AND INSPECTION	CONTINUOUS	PERIODIC	REFERENCED STANDARD	CBC REFERENCE	PRC
1. INSPECTION OF REINFORCING STEEL.	-	X	ACI 318: 3.5, 7.1-7.7	1913.4	
2. INSPECT BOLTS TO BE INSTALLED IN CONCRETE PRIOR TO AND DURING PLACEMENT OF CONCRETE.	-	Х	· -	1911.5	
3. VERIFYING USE OF REQUIRED DESIGN MIX.		х	ACI 318: CH. 4, 5.2-5.4	1904.2.2, 1913.2,1913.3	
4. AT THE TIME FRESH CONCRETE IS SAMPLED TO FABRICATE SPECIMENS FOR STRENGTH TESTS, PERFORM SLUMP AND AIR CONTENT TESTS, AND DETERMINE THE TEMPERATURE OF THE CONCRETE.	X	•	ASTM C 172 ASTM C 31 ACI 318: 5.6, 5.8	1913.10	***
5. INSPECTION OF CONCRETE FOR PROPER APPLICATION TECHNIQUES.	x	un de la constante de la const Un de la constante de	ACI 318: 5.9, 5.10	1913.6, 1913.7, 1913.8	

MASONRY CONSTRUCTION - VERIFICATION AND INSPECTION REQUIREMENTS (CBC T-1704.5.1)

VERIFICATION AND INSPECTION	CONTINUOUS	PERIODIC
1. INSPECTION OF REINFORCING STEEL		
A. PROPORTIONS OF SITE-PREPARED MORTAR.	-	X
B. CONSTRUCTION OF MORTAR JOINTS.	-	X
C. LOCATION OF REINFORCEMENT, CONNECTORS.	-	X
2. THE INSPECTION PROGRAM SHALL VERIFY:	-	X
A. SIZE AND LOCATION OF STRUCTURAL ELEMENTS.	-	X
B. TYPE, SIZE AND LOCATION OF ANCHORS, INCLUDING OTHER DETAILS OF ANCHORAGE OF MASONRY TO STRUCTURAL MEMBERS, FRAMES OR OTHER CONSTRUCTION.	-	X
C. SPECIFIED SIZE, GRADE AND TYPE OF REINFORCEMENT.	-	x
D. WELDING OF REINFORCING BARS.	x	-
E. PROTECTION OF MASONRY DURING COLD WEATHER (TEMPERATURE BELOW 40° F) OR HOT WEATHER (TEMPERATURE ABOVE 80° F).	-	x
3. PRIOR TO GROUTING, THE FOLLOWING SHALL BE VERIFIED TO ENSURE COMPLIANCE:	-	
A. GROUT SPACE IS CLEAN.	-	X
B. PLACEMENT OF REINFORCEMENT AND CONNECTORS.	· _	X
C. PROPORTIONS OF SITE-PREPARED GROUT.	-	X
D. CONSTRUCTION OF MORTAR JOINTS.	-	X
4. GROUT PLACEMENT SHALL BE VERIFIED TO ENSURE COMPLIANCE WITH CODE AND CONSTRUCTION DOCUMENT PROVISIONS.	x	-
5. PREPARATION OF ANY REQUIREDE GROUT SPECIMENS, MORTAR AND SPECIMENS AND/OR PRISMS SHALL BE OBSERVED.	x	-
6. COMPLIANCE WITH REQUIRED INSPECTION PROVISIONS OF THE CONSTRUCTION DOCUMENTS AND THE APPROVED SUBMITTALS SHALL BE VERIFIED.	-	x





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NOTES:

\$4.0

9 S5.0

- 1. REFER TO SHEET S1.0 TO S1.2 FOR GENERAL NOTES & STANDARD DETAILS. THESE NOTES & DETAILS SHALL BE USED WHERE APPLICABLE WHETHER SPECIFICALLY REFERENCED OR NOT.
- 2. REFER TO ARCHITECTURAL DRAWINGS FOR THE FOLLOWING: A. ALL DIMENSIONS NOT SHOWN. B. ALL OPENINGS NOT SHOWN.
 - C. ALL NON-BEARING WALL NOT SHOWN.
- 3. REFER TO ARCH'L DWGS. FOR FINISHED ELEVATIONS. ALL ELEVATIONS, STEPS, & SLOPES SHOWN ARE TO BE USED FOR BIDDING ONLY, THEY ARE NOT TO BE USED FOR CONSTRUCTION.
- 4. IT IS SOLEY THE CONTRACTORS RESPONSIBILITY TO DESIGN & PROVIDE ALL NECESSARY SHORING BEFORE ANY OTHER WORK BEGINS. NEITHER THE OWNER, ARCHITECT, OR ENGINEER ARE RESPONSIBLE FOR ANY PART OF THE BUILDING SHORING PROCESS.
- 5. FIELD VERIFY EXISTING FRAMING AND NOTIFY ARCHITECT AND ENGINEER OF ANY DEVIATIONS.
- 6. ALL FRAMING HARDWARE TO BE STAINLESS STEEL.



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	BergerABA FLORES LL C O N S U L T A 7220 Trade Street, Suite 120 San Diego, CA 92121 (858)	AM JND NTS 566-0626	PROPERTY OF CH	
· ·	BergerABA FLORES LL C O N S U L T A 7220 Trade Street, Suite 120 San Diego, CA 92121 (858) Platt/Whitelaw Archited 4034 30th Street, SAN DIEGO (619) 546-4326 FAX (619) 546	AM JND NTS 566-0626 2ts, Inc. A 92104 -4350	TROFES	
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PLUMBING GENERAL NOTES:

I. CONTRACTOR SHALL CAREFULLY REVIEW THESE PLANS AND SPECIFICATIONS PRIOR TO BID. CONTRACTOR SHALL ALSO REVIEW PLANS AND SPECIFICATIONS OF OTHER RELATED TRADES (INCLUDING CIVIL, STRUCTURAL, AND ELECTRICAL) PRIOR TO BID TO INSURE AN ACCURATE UNDERSTANDING OF EXACT SCOPE OF WORK.

2. CONTRACTOR SHALL VERIFY ALL EQUIPMENT MODEL NUMBERS, CAPACITIES, SIZES, VOLTAGES, AND ALL OTHER SCHEDULED INFORMATION WITH OTHER APPLICABLE TRADES AND WITH THE MANUFACTURER PRIOR TO INSTALLATION.

- 3. CONTRACTOR SHALL VERIFY ALL LOCATIONS, SIZES, P.O.C.'S, INVERT ELEVATIONS, AND AVAILABILITY OF ALL EXISTING UTILITIES PRIOR TO INSTALLATION OF ANY MATERIAL OR EQUIPMENT.
- 4. THESE DRAWINGS ARE ESSENTIALLY DIAGRAMMATIC, AND ARE NOT INTENDED TO INDICATE ALL DETAILS AND NECESSARY OFFSETS OF PIPING. THE CONTRACTOR SHALL INSTALL MATERIAL AND EQUIPMENT IN A MANNER AS TO CONFORM TO STRUCTURE, AVOID OBSTRUCTIONS, PRESERVE HEADROOM, AND KEEP OPENINGS AND ACCESS CLEAR. CONTRACTOR SHALL NOTIFY THE ARCHITECT IN WRITING OF ANY DISCREPANCIES OR CONFLICTS THAT WOULD AFFECT THE SYSTEM PERFORMANCE OR INCUR ADDITIONAL COSTS. THIS NOTIFICATION SHALL BE SUBMITTED PRIOR TO INSTALLATION OF THE ITEMS CONCERNED.
- 5. NEW EQUIPMENT INDICATED ON THESE DRAWINGS IS SHOWN IN APPROXIMATE LOCATIONS. CONTRACTOR SHALL FIELD VERIFY ALL EXISTING CONDITIONS, INCLUDING EQUIPMENT LOCATIONS, P.O.C.'S AND STRUCTURAL MEMBERS PRIOR TO INSTALLATION. IN ALL CASES, ADEQUATE ACCESS (PER MANUFACTURER'S RECOMMENDATIONS AND CODE COMPLIANCE) FOR MAINTENANCE AND REPLACEMENT OF EQUIPMENT SHALL BE PROVIDED.
- 6. ALL WORK SHALL BE DONE IN ACCORDANCE WITH ALL APPLICABLE CODES. NOTHING SHOWN ON THE PLANS OR STATED IN THE SPECIFICATIONS IS INTENDED TO INDICATE THAT THE INSTALLATIONS OR CONNECTIONS OF ANY ITEM OR DEVICE SHOULD BE DONE CONTRARY TO MANUFACTURER'S INSTRUCTIONS AND ALL APPLICABLE CODES AND REGULATIONS.
- 7. ALL PLUMBING EQUIPMENT, MATERIAL, AND ALL CONNECTIONS THERETO SHALL BE INSTALLED COMPLETE PER MANUFACTURER'S INSTRUCTIONS TO PROVIDE A COMPLETE AND FULLY OPERATIONAL SYSTEM.
- 8. SOIL, SEWER AND WASTE PIPING SHALL SLOPE AT 1/4" PER FOOT MINIMUM, UNLESS OTHERWISE NOTED.
- 9. ALL PLUMBING SOLDER SHALL BE LEAD FREE AND SHALL CONFORM TO IAPMO IS 3-2003 AND THE INSTALLATION STANDARD FOR COPPER PLUMBING TUBE, PIPE AND FITTINGS. NON-METALLIC PIPING IS NOT APPROVED.
- 10. IF THE CONTRACTORS' USE OF SUBSTITUTE MATERIALS, EQUIPMENT OR METHODS OF INSTALLATION REQUIRES ANY CHANGES IN OTHER TRADES' WORK FROM THAT SHOWN ON THE DRAWINGS, THE EXTRA COST OF THE OTHER TRADES' WORK SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR INITIATING THE SUBSTITUTION.
- . SUBMITTALS: APPROVAL OF THE SUBMITTALS DOES NOT RELEASE THE CONTRACTOR FROM OBLIGATIONS TO FULLY COMPLY WITH ALL REQUIREMENTS OF THE CONSTRUCTION DOCUMENTS OR APPLICABLE CODE REGULATIONS.
- 12. NON-METALLIC PIPING NOT ALLOWED.
- 13. CROSS CONNECTION PROTECTION SHALL BE PROVIDED AT ALL POTABLE WATER SUPPLIED APPLIANCES AND EQUIPMENT. BACKFLOW PREVENTERS SHOWN ON THESE PLANS, WHICH ARE USED FOR EQUIPMENT (I.E. MEDICAL, PROCESS, AIR CONDITIONING, KITCHEN EQUIPMENT, LANDSCAPE, ETC.) SHALL BE APPROVED BY THE FOUNDATION FOR CROSS-CONNECTION CONTROL AND HYDRAULIC RESEARCH (FCCCHR) AT THE UNIVERSITY OF SOUTHERN CALIFORNIA
- 4. PLUMBING EQUIPMENT SHALL BE CERTIFIED BY, AND COMPLY WITH THE STATE OF CALIFORNIA ENERGY CONSERVATION STANDARDS (E.E.S.) SECTION 113. COMPLIANCE CERTIFICATES SHALL BE PROVIDED WITH EQUIPMENT SUBMITTALS.
- 15. ALL VENT-THROUGH-ROOF PIPES SHALL TERMINATE NO LESS THAN 10'-0" MINIMUM FROM ALL OUTSIDE AIR AND BUILDING OPENINGS. SHALL CONFORM TO SECTION 906.2 OF THE 2007 CPC.
- 16. A WATER HAMMER ARRESTOR SHALL BE INSTALLED AT LOCATIONS OF SELF-CLOSING VALVES PER UPC 609.10. PROVIDE 8X8 ACCESS PANEL.
- 7. INSTALL FLUSH VALVE HANDLES ON WIDE SIDE OF HANDICAP ACCESSIBLE TOILETS PER ADA STANDARDS.
- 18. USE ONLY CAST IRON FOR SOIL AND WASTE PIPING, AND COPPER PIPING FOR WATER SUPPLY. DO NOT USE PLASTIC PIPING ON THIS PROJECT.
- 19. BUILDING DRAIN AND VENT PIPING MATERAILS SHALL COMPLY WITH SECTION 710.0 AND 903.0 OF THE CALIFORNIA PLUMBING CODE.
- 20. ALL SANITARY SYSTEM MATERIALS SHALL BE LISTED BY AN APPROVED LISTING AGENCY.
- 21. ALL DOMESTIC WATER PIPING: ABOVE GRADE SHALL BE TYPE "L" COPPER TUBING HARD DRAWN WITH WROUGHT COPPER SOLDER SWEAT FITTINGS. WHERE BELOW GRADE AND WITHIN 5' OF BUILDING LINE, SHALL BE TYPE "L" COPPER TUBING IN SINGLE CONTINOUS LENGTH WITH POLYETHYLENE OUTER TUBING. ALL UNDERGROUND COPPER TUBING SHALL BE BRAZED EXCEPT RISERS, WHICH SHALL BE SOFT SOLDERED.
- 22. FLOOR DRAINS OR SIMILAR TRAPS DIRECTLY CONNECTED TO THE DRAINAGE SYSTEM AND SUBJECT TO INFREQUENT USE SHALL BE PROVIDED WITH AN APPROVED AUTOMATIC MEANS OF MAINTAINING THEIR WATER SEALS.

ENERGY CONSERVATION NOTES:

- . PIPING IS TO BE INSULATED CONSISTENT WITH THE REQUIREMENTS OF SECTION 118, 123 AND 124 OF THE ENERGY EFFICIENCY STANDARDS.
- 2. LAVATORY FAUCETS RESTROOMS ARE TO HAVE A MAXIMUM 0.4 GPM FLOW RATE, PER TABLE 5.303.2.3 2010 CALGREEN.
- 3. PROVIDE VACUUM BREAKERS AT DOMESTIC WATER HOSE BIBBS.
- 4. PROVIDE ULTRA LOW (1.28 G.P.M. MAX.) FLUSH TOILETS, PER TABLE 5.303.2.3 2010 CALGREEN. 5. SHOULD CONTRACTOR PROPOSE AND/OR INSTALL ALTERNATIVE EQUIPMENT OR SYSTEMS, THE CONTRACTOR WILL SECURE APPROVALS OF ALL REVIEWING AGENCIES AS REGARDS TO PLAN CHECK, CODE COMPLIANCE AND TITLE 24 COMPLIANCE.
- 6. ALL PLUMBING FIXTURE CONTROLS MUST NOT REQUIRE TIGHT GRASPING, PINCHING OR TWISTING OF THE WRIST. THE FORCE TO ACTIVATE THE CONTROLS TO BE LESS THAN OR EQUAL TO 5 LBS.
- 7. PIPING BELOW ACCESSIBLE SINKS AND LAVATORIES ARE TO BE INSULATED. SEE SPECIFICATIONS.
- 8. WHERE SELF-CLOSING VALVES ARE USED, THEY WILL REMAIN OPEN FOR 10 SECONDS.

DECLARATION OF RESPONSIBLE CHARGE

I HEREBY DECLARE THAT I AM THE ENGINEER OF WORK FOR THE PROJECT, THAT I EXERCISED RESPONSIBLE CHARGE OVER THE DESIGN OF THE PROJECT AS DEFINED IN SECTION 6703 OF THE BUSINESS AND PROFESSIONS CODE, AND THAT THE DESIGN IS CONSISTENT WITH CURRENT STANDARDS.

I UNDERSTAND THAT THE CHECK OF PROJECT DRAWINGS AND SPECIFICATIONS BY THE CITY OF SAN DIEGO IS CONFINED TO A REVIEW ONLY AND DOES NOT RELIEVE ME, AS ENGINEER OF WORK, OF MY RESPONSIBILITIES FOR PROJECT DESIGN.

MARK BENDER, P.E.

#24209

9/30/12 EXPIRES

	MIN. BRANCH SIZE			NCH SIZE		
MARK	C.W.	H.W.	VENT	WASTE	OR ARM	FIXTURE
<u>WC-1</u>	1-1/4"		2"	4"	INTEGRAL	WATER CLOSET: ACORN DURA-WARE 2100-W-1-HET-ADA BLOWOUT JET TOILET, OFF FLOOR, WALL HUNG, WALL SUPPLY, HIGH EFFICIENCY TOILET 1.28 GPF, 304 SS CONSTRUCTION, ELONGATED BOWL, SELF-DRAINING FLUSHING RIM, SATIN FINISH, 1-1/2" WALL (CONCEALED) SPUD, 2-1/8" TRAPWAY. PROVIDE WITH SLOAN 143-1.28-TP ROYAL MODEL FLUSHOMETER CONCEALED CLOSET FLUSH VALVE, WITH ADA COMPLIANT HANDLE, 1.28 GPF, AND TRAP PRIMER ELBOW. ADA COMPLIANT
<u>WC-2</u>	1-1/4"	_	2"	4"	INTEGRAL	WATER CLOSET: ACORN DURA-WARE 2100-W-1-HET-ADA BLOWOUT JET TOILET, OFF FLOOR, WALL HUNG, WALL SUPPLY, HIGH EFFICIENCY TOILET 1.28 GPF, 304 SS CONSTRUCTION, ELONGATED BOWL, SELF-DRAINING FLUSHING RIM, SATIN FINISH, 1-1/2" WALL (CONCEALED) SPUD, 2-1/8" TRAPWAY. PROVIDE WITH SLOAN 152-1.28-L3 ROYAL MODEL FLUSHOMETER CONCEALED CLOSET FLUSH VALVE, WITH 3" METAL OSCILLATING PUSH BUTTON, 1.28 GPF.
<u>L-1</u>	1/2"	-	2"	2"	1-1/2"	LAVATORY: ACORN MERIDIAN 3703-1-H-EB STAINLESS STEEL CURVED FRONT TRI-BASIN LAVATORY, 304 SS, SATIN FINISH; BASINS, COUNTERTOP, BACKSPLASH AND HOUSING FEATURE FULLY WELDED, SEAMLESS CORNERS, ROUND BASINS INCLUDE GRID STRAINERS, OFF FLOOR MOUNTING, 1-1/4" O.D., 5" DEEP, 1-1/2" P-TRAP WASTE OUTLET, ENCLOSED BOTTOM. PROVIDE WITH HAND OPERATION, BACKSPLASH MOUNTED SPOUT AND PUSHBUTTONS STANDARD, WITH 0.4 GPM FLOW CONTROL (0.4 GPM MUST BE SPECIFIED WHEN ORDERING). MOUNT AT ADA COMPLIANT HEIGHT.
<u>DF-1</u>	1/2"		2"	2"	1-1/4"	DRINKING FOUNTAIN: HAYS 1011 "HI-LO" WALL MOUNTED BARRIER FREE DRINKING FOUNTAIN, DUAL 304 SS SATIN FINISH BASINS WITH INTEGRAL SWIRL DESING, SS WALL BRACKET, PUSH BUTTON OPERATED SS VALVES WITH FRONT-ACCESSIBLE CARTIDGE AND FLOW ADJUSTMENT, POLISHED CHROME-PLATED BRASS VANDAL RESISTANT BUBBLER HEADS WITH INTEGRAL LAMINAR ANTI-SQUIRT FLOW, VANDAL RESISTANT BOTTOM PLATES, 1-1/4" O.D. WASTE PIPES, 3/8" WATER TUBING TO EACH BASIN. PROVIDE WITH HAYS 6603 ACCESS PANELS. MOUNT AT ADA COMPLIANT HEIGHT.
<u>HB—1</u>	3/4"	_	-	2"		HOSE BIBB: ACORN 8121 ROUGH BRASS CONSTRUCTION HOSE FAUCET/VALVE WITH LOOSE KEY WHEEL HANDLE, REPLACEABLE DISC, HOSE THREAD SPOUT, WITH ASSE 1011 BACKFLOW PREVENTER OUTLET IN 3/4" SIZE
<u>SI-1</u>	-		2"	3"	3"	SEDIMENT DRAIN INTERCEPTOR: MIFAB MI-SD-3 SEDIMENT/DRAIN INTERCEPTOR, VISIBLE DEEP SEAL TRAP, 20-1/2"X27" GRATE, 32 GALLON/4.5 CUBIC FEET HOLDING CAPACITY, 77 LBS SEDIMENT CAPACITY, SEWER GAS STOPPER, INTEGRAL AIR RELIEF BY-PASS, 14 GAUGE SLOTTED POWDER EPOXY COATED INLET GRATE WITH SLOT SIZE OF 3/8"X3", REMOVABLE SEDIMENT AND MUD PAN
<u>FD-1</u>	-		2"	2"	2"	FLOOR DRAIN: ZURN Z415-VP SQUARE 6"x6" CAST IRON ENAMELED WITH DOUBLE DRAINAGE FLANGE, WEEP HOLES, REVERSIBLE, ADJUSTABLE CLAMPING COLLAR, NICKEL BRONZE STRAINER THREADED COLLAR, BOTTOM OUTLET WITH TRAP PRIMER CONNECTION. PROVIDE TRAP PRIMER TO MAINTAIN WATER SEAL.
PROSEE	VIDE ALL FIXT ARCHITECTUR	fures with a Ral for acce	ll vandal pi Ssibility mou	roof option: Jnting heigh	s. TS	



BUILDING WATER CALCULATIONS TOTAL DEVELOPED LENGTH PRV LENGTH (TO LAST FIXTURE) FITTINGS, VALVES (PRV LENGTH X 1.5) PSI LOSS RISE 5 FT x 0.43 PSI/FT FIXTURE (WATER CLOSET) FIXTURE (PRV) METER BACKFLOW PREVENTER REQUIRED WATER PRESSURE 42.00 PSI <u>-39.15</u> PSI LOSS DIFFERENCE 2.85 PSI 2.85 PSI DIFFERENCE X 100 = 5.07 P.S.I MAXIMUM PRESS. DROP

56 FEET TOTAL LENGTH

LINION







ALLOWABLE /100 FT. OF PIPE

PLUMBI	NG LEGEN	D
SYMBOL	ABBREVIATIONS	DESCRIPTION
	S OR W	SOIL, WASTE OR DRAIN ABOVE SLAB
	S OR W	SOIL, WASTE OR DRAIN BELOW SLAB
	V	SANITARY VENT
	CW	COLD WATER
ŀŌ	BV	BALL VALVE
C	CL	CAPPED LINE
ф	GCO	CLEAN-OUT TO GRADE
ф	FC0	FLOOR CLEAN-OUT
· }	WCO	WALL CLEAN-OUT
61101-	DN	DOWN OR DROP
0+ +0+-	UP	RISE OR RISER
	НВ	HOSE BIB
<u> </u>	WHA	WATER HAMMER ARRESTOR
	TP	TRAP PRIMER
	AP	ACCESS PANEL
	AVG.	AVERAGE
	BF	BELOW FLOOR
	CLG	CEILING
	CONT	CONTINUATION
	(E)	EXISTING
	FLR .	FLOOR
	FIX.	FIXTURE
с. С. С. С	GPM	GALLONS PER MINUTE
	HDR	HEADER
	LAV	LAVATORY
	NIC	NOT IN CONTRACT
	NTS	NOT TO SCALE
	PSI	POUNDS PER SQUARE INCH
	TYP	TYPICAL
	VTR	VENT THRU ROOF

WATE	R PI	PE SIZ	E TABLE					
	COLD WATER (8 FPS MAX. VELOCITY)							
FIFE SIZE	GPM	VELOCITY (FPS)	FLUSH TANK FU	FLUSH VALVE FU				
1/2"	2	3.0	. 1	0				
3/4"	6	4.0	6	0				
1"	12	4.7	16	0				
1-1/4"	20	5.1	21	0				
1-1/2"	35	6.3	66	20				
2"	70	7.3	225	108				
2-1/2"	110	7.4	479	365				

B

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1. ORIENT PRESSURE REDUCING VALVE TO ALLOW FOR ACCESS TO MAIN CAP

PRESSURE REDUCING STATION DETAL

	Platt/Whitelaw Architects, Inc. 4034 30th Street, SAN DEGO CA 92104	
Ø	BENDER DEAN ENGINEERING 438 Camino Del Rio South Suite 217 San Diego, CA 92108-3547 Phone: (619) 704-1900 Fax: (858) 427-1608	Contraction of the second seco

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SYMBOL LIST

<u>ីញិ</u> រាស្រ្ត	DASHED SYMBOL INDICATES EXISTING FIXTURE,	A, AMP	AMPERE
	SUBEACE MOUNTED ELUOPESSENT LIGUTING ENTURE	AC	ALTERNATING
	SURFACE MOUNTED FLUORESCENT LIGHTING FIXTURE.	AF	AMPS FRAME,
	FIXTURE TYPE.	AFF	ABOVE FINISHE
Φ	SINGLE RECEPTACLE, MOUNTED AT +18" U.O.N.	AFG	ABOVE FINISHE
	DUPLEX RECEPTACLE, MOUNTED AT +18" U.O.N.	AIC	AMPERE INTER
Ð	DUPLEX RECEPTACLE, WITH GFI PROTECTION, MOUNTED AT +18" U.O.N.	AT	AMPS TRIP RA
@	DOUBLE DUPLEX RECEPTACLE, MOUNTED AT +15" U.O.N. TO BOTTOM OF BOX.	AS	AMPS SWITCH
Ð	DOUBLE DUPLEX RECEPTACLE WITH GFI PROTECTION MOUNTED WITHIN A WP "IN-USE" TYPE ENCLOSURE.	BC	BARE COPPER
凸	METER.		
	POWER DISTRIBUTION SWITCHBOARD. (SWBD)		
	FLUSH MOUNTED PANELBOARD.	CIR	
	SURFACE MOUNTED PANELBOARD.	0.0.	
	SURFACE MOUNTED CABINET, AS NOTED.	CW	CULU WATER
	FLUSH MOUNTED CABINET, AS NOTED.	DB	DIRECT BURIAL
0	CODE SIZE JUNCTION BOX.	Dwg	DRAWING
	PULL BOX WITH SCREW COVER, SIZE AS NOTED.	EA.	EACH
<u></u>	CONDUIT CONCEALED IN WALL OR CEILING SPACE.	EG	EQUIPMENT GR
Т	TRANSFORMER, SIZE AND MOUNTING AS NOTED. (XFMR)	ELEC	ELECTRICAL
TC	TIME CONTROLLED SWITCH.	ELEV.	ELEVATION
	CONDUIT CONCEALED UNDERFLOOR SLAB OR UNDERGROUND.	ES	ENERGY SAVIN
0	CONDUIT TURNED UP.	EX	EXISTING
O	CONDUIT TURNED DOWN.	GFI	GROUND-FAUL
E	CONDUIT STUB-OUT TERMINATION.	GND	GROUND
	HOMERUN TO INDICATED PANELBOARD ("A"). NUMBERS (1,3)	HID	HIGH INTENSIT
/4"-3 #8-i 1, # 10 [/] EG	INDICATE BRANCH CIRCUIT NUMBERS.	HPF	HIGH POWER F
. · · ·	INDICATES 3/4" CONDUIT WITH 3 NUMBER 8 CONDUCTORS + 1 NUMBER 10 EQUIPMENT GROUND.	HP5	HIGH PRESSUR
	3/4" CONDUIT WITH 2#12 CONDUCTORS PLUS 1#12	KAIC	1000 AMPS IN
	3/4" CONDUCT WITH 3/412 CONDUCTORS DUIS 1/42	KVA	
	EQUIPMENT GROUNDING CONDUCTOR.	KW	KILOWATT (kw)
#10	A NUMBER ADJACENT TO THE HASH MARK IN ANY CONDUIT RUN INDICATES THE CONDUCTOR SIZE TO BE USED IN LIFU	KWH	KILOWATT-HOL
	OF #12 AWG. CONDUIT AND EQUIPMENT GROUNDING CONDUCTOR SHALL BE SIZED PER CEC. ILON	LCL	LONG CONTINU
•/	DISCONNECT SWITCH	LTG	LIGHTING
6		NEC	NATIONAL ELE
)	LOW VOLTAGE CIRCUIT BREAKER.	NEMA	NATIONAL ELE
R	FUSE SIZE AND TYPE AS NOTED	NIC	NOT IN CONTR
		NTS	NOT TO SCALE
	POWER TRANSFORMER.	OC	ON CENTER
<u>⊥</u>	GROUND CONNECTION	0/D	OUTDOOR
•••• •••	- SWITCH SIZE	POC	POINT OF CON
	- NO OF POLES	RFF	REFERENCE
60AS 3P		SW	SWITCH
30AF		TYP	TYPICAI
. I		U/G	UNDERGROUND
	- TRIP SETTING	U.O.N.	UNLESS OTHER
100AT	- FRAME SIZE	WP	WFATHERPROOF
225AF			
	- NO. OF POLES		
4	ELECTRICAL NOTE REFERENCE. (TYPICAL)	· · · · ·	
$\begin{pmatrix} 1 \\ E-6 \end{pmatrix}$	INDICATES DETAIL '1' ON SHEET E-6 (TYPICAL)		
T	TELEPHONE CONDUIT		

------R ------- CONDUIT TO BE REMOVED

ABBREVIATIONS LIST

- TERNATING CURRENT
- IPS FRAME, OR AMPS FUSE RATING
- OVE FINISHED FLOOR
- OVE FINISHED GRADE
- IPERE INTERRUPTING CAPACITY
- IPS TRIP RATING
- IPS SWITCH RATING

- NDUIT
- LIFORNIA ELECTRICAL CODE
- CUIT
- NDUIT ONLY
- ID WATER
- RECT BURIAL

- JIPMENT GROUND
- CTRICAL
- VATION
- ERGY SAVING
- STING
- OUND-FAULT INTERRUPTER
- DUND
- H INTENSITY DISCHARGE
- H POWER FACTOR
- H PRESSURE SODIUM
- RTZ
- DO AMPS INTERRUPTING CAPACITY (kaic)
- OVOLT AMPS (kva)
- OWATT (kw)
- OWATT-HOUR (kwh)
- NG CONTINUOUS LOAD
- ITING
- TIONAL ELECTRICAL CODE
- TIONAL ELECTRICAL MANUFACTURERS ASSOCIATION
- IN CONTRACT
- TO SCALE
- CENTER
- TDOOR
- INT OF CONNECTION
- FERENCE
- ITCH
- PICAL
- DERGROUND
- LESS OTHERWISE NOTED
- ATHERPROOF

UNTING HEIGHT ABOVE FINISHED FLOOR (TYPICAL)

GENERAL NOTES

- 1. ALL WORK SHALL BE IN COMPLIANCE WITH THE 2010 CALIFORNIA ELECTRICAL CODE (CEC), CALIFORNIA BUILDING (CBC), CALIFORNIA FIRE CODE (CFC) AND WHERE APPLICABLE AS AMENDED BY LOCAL ORDINANCES AND CODES (GOVERNING MUNICIPALITIES, AND ALL CALIFORNIA AMENDMENTS.
- 2. ALL ELECTRICAL DRAWINGS ARE TO BE READ IN CONJUNCTION WITH ALL OTHER RELATED CONTRACT DRAWINGS.
- 3. THE CONTRACTOR SHALL VERIFY EXACT LOCATION, SIZE AND EXTENT OF ALL EXISTING UTILITIES, OBSTRUCTIONS AND/OR OTHER CONDITIONS WHICH MAY AFFECT THE PROPOSED WORK UNDER THE PROJECT. THE CONTRACTOR S TAKE EVERY PRECAUTION TO PREVENT DAMAGE TO EXISTING WORK. ANY DAMAGE TO EXISTING UTILITIES OR STRUCTURES DURING CONSTRUCTION SHALL BE IMMEDIATELY REPAIRED OR REPLACED IN ACCORDANCE WITH THE OWNERS DIRECTION AT THE CONTRACTOR'S EXPENSE.
- 4. THE CONTRACTOR SHALL CAREFULLY EXAMINE ALL CONTRACT DRAWINGS AND BE RESPONSIBLE FOR THE PROPER FITTING OF MATERIALS AND EQUIPMENT AT EACH LOCATION AS INDICATED WITHOUT SUBSTANTIAL ALTERATION. IN MUCH AS THE DRAWINGS ARE GENERALLY DIAGRAMMATIC AND BECAUSE OF THE SMALL SCALE OF THE DRAWINGS IS NOT POSSIBLE TO INDICATE ALL OFFSETS, FITTINGS AND ACCESSORIES WHICH MAY BE REQUIRED. FURNISHING FITTINGS REQUIRED TO MEET SUCH CONDITIONS SHALL BE AT NO COST TO THE OWNER.
- 5. SYSTEM AND EQUIPMENT GROUNDING SHALL BE AS REQUIRED BY THE C.E.C.
- 6. CONDUIT RUNS ARE SHOWN DIAGRAMMATICALLY ONLY AND SHALL BE INSTALLED IN A MANNER TO PREVENT CONFLICTS WITH EQUIPMENT AND STRUCTURAL CONDITIONS. EXPOSED CONDUITS SHALL BE INSTALLED PARALLEL BEAMS AND WALLS.
- 7. ALL FEEDERS AND BRANCH CIRCUITS SHALL HAVE A GROUND CONDUCTOR INSTALLED.
- 8. THE WIRING DIAGRAMS, QUANTITY AND SIZE OF WIRES AND CONDUITS ARE BASED UPON SELECTED STANDARD COMPONENTS OF ELECTRICAL EQUIPMENT. MODIFICATIONS APPROVED BY THE ENGINEER MAY BE MADE BY THE CONTRACTOR AT HIS EXPENSE TO ACCOMMODATE EQUIPMENT ACTUALLY PURCHASED. THE BASIC SEQUENCE AND METHOD OF CONTROL MUST BE MAINTAINED AS INDICATED ON THE DRAWINGS AND SPECIFICATIONS.
- 9. ALL CIRCUIT PROTECTIVE DEVICES SHALL HAVE THE REQUIRED RATINGS AND INTERRUPTING CAPACITY EQUAL TO GREATER THAN THE AVAILABLE SHORT CIRCUIT CURRENT AT ITS SUPPLY TERMINAL. MINIMUM INTERRUPTING CAPA SHALL BE 10,000 AMPS.
- 10. OUTLET BOXES, UTILIZATION EQUIPMENT CABINETS, CONDUIT SYSTEMS, AND CONVENIENCE OUTLETS SHALL BE GROUNDED IN ALL ELECTRICAL SYSTEMS OPERATING AT 48 VOLTS AND ABOVE. EACH GROUND WIRE SHALL BE TERMINATED AT THE EQUIPMENT GROUND BAR. GROUND WIRES SHALL BE SIZED PER C.E.C. 250.122.
- 11. ALL CONDUITS SHALL BE A MINIMUM OF 3/4", UNLESS SPECIFICALLY STATED OTHERWISE.
- 12. ALL WIRING SHALL BE THHN/THWN COPPER, REGARDLESS OF APPLICATION. NO ALUMINUM WIRING SHALL BE USED.
- 13. FIELD VERIFY EXISTING CONDITIONS AND ADVISE ARCHITECT OF ANY DISCREPANCIES OR DEVIATIONS BETWEEN PLA AND ACTUAL CONDITIONS PRIOR TO SUBMITTING BID.
- 14. ALL WIRING SHALL BE IN CONDUIT. NO TYPE 'MC' OR SIMILAR PRE-ASSEMBLED CABLE SHALL BE USED.
- 15. ALL CONDUIT SHALL BE PVC COATED RIGID. FITTINGS SHALL BE COMPRESSION TYPE.
- 16. RECEPTACLES SHALL BE 20A WHITE SPECIFICATION GRADE HEAVY DUTY FLUSH NYLON FACE, BACK AND SIDE WIRE HUBBELL HBL53521 OR APPROVED EQUAL BY PASS & SEYMOUR OR LEVITON TO MATCH EXISTING. PROVIDE SUBMI FOR REVIEW.
- 17. ALL DEVICE BOXES SHALL BE PLASTIC, EXCEPT FOR EXTERIOR GFCI BOXES SHALL BE SUTABLE FOR MARINE LOCATION.
- 18. WALL PLATES SHALL BE WHITE HIGH IMPACT SMOOTH NYLON. PROVIDE SUBMITTAL FOR REVIEW.
- 19. ALL OVERCURRENT DEVICE TERMINATIONS SHALL BE LISTED FOR USE WITH 75' CONDUCTORS.
- 20. THE CONTRACTOR IS RESPONSIBLE FOR SEALING ALL FIRE RATED PENETRATIONS WHETHER INDICATED OR NOT.
- 21. IF THE CONTRACTOR BELIEVES THAT THERE ARE CONFLICTS WITHIN THESE ELECTRICAL DRAWINGS OR BETWEEN THE ELECTRICAL DRAWINGS AND THE SPECIFICATIONS, OR BETWEEN THE ELECTRICAL DRAWINGS AND ANY MECHANICAL ARCHITECTURAL, PLUMBING OR STRUCTURAL DRAWING, BID THE MORE EXPENSIVE OR ELABORATE PROCESS OR PROCEDURE SHOWN AND CALL THE DISCREPANCY TO THE ARCHITECT'S ATTENTION. SHOULD THE CLIENT, IN ITS DISCRETION, CHOOSE TO IMPLEMENT THE CHEAPER OR SIMPLER PROCEDURE AFTER BID OPENING, A CREDIT CHANG ORDER WILL BE ISSUED BY THE CONTRACTOR.
- 22. DEVICE MOUNTING HEIGHTS ARE MEASURED FROM FINISHED FLOOR TO CENTER OF BOX.

DECLARATION OF RESPONSIBLE CHARCE

I HEREBY DECLARE THAT I AM THE ENGINEER OF WORK FOR THE PROJECT, THAT I EXERCISED RESPONSIBLE (DESIGN OF THE PROJECT AS DEFINED IN SECTION 6703 OF THE BUSINESS AND PROFESSIONS CODE, AND THAT CONSISTENT WITH CURRENT STANDARDS.

I UNDERSTAND THAT THE CHECK OF PROJECT DRAWINGS AND SPECIFICATIONS BY THE CITY OF SAN DIEGO IS REVIEW ONLY AND DOES NOT RELIEVE ME, AS ENGINEER OF WORK, OF MY RESPONSIBILITIES FOR PROJECT DES

Higter J. Kuntyman STEPHEN J. KURTZMAN 13554

<u>09-30-2012</u> Expires

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		24"			
	DEVICE		- H		OF ROL E
				PROACH	
	48" MAX.				
	3	54" MAX.		MAX-F	
	15" MIN. FINISHED	D		46 [°]	
	REGULAR MOUNTIN	NG HEIGHT	OVER OBSTRU	CTIONS	
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CERTIFICATE OF COMPLIANCE	(Page 1 of 4) LTG-10
Project Name: CITY OF SAN DIEGO, N. CROWN POINT COMFO	RT STATION Date: 11-2-11
Project Address: CROWN POINT DR AND	Climate Zone: Building CFA: 618
INGRAHAM DRIVE SAN DIEGO, CA 92109	7 Unconditioned Floor Area:
General Information	F ² x x x x
Building Type: Nonresidential L High-Ris	se Residential
Schools	med Spaces 🔲 Unconditioned Spaces
Phase of Construction: 🗌 New Construction 🗌 Addition	Alteration
Methond of Compliance: 🗌 Complete Building 🕅 Area Cat	tegory 🔲 Tailored
Documentation Author's Declaration Statement I certify that this Certificate of Compliance documentation is accurate an	nd complete.
Name: KARL PORTS	The Karl best
Company: TURPIN AND RATTAN ENGINEERING, INC.	Date: 11-2-11
Address:	If applicable:
4719 PALM AVE	CEA # CEPE #
AT (GL 1 17)	CELET
City/State/Zip: I A MESA CA Q1QA1	Phone: (619)466-6224
 City/State/Zip: LA MESA, CA 91941 Principal Lighting Designer's Declaration Statement I am eligible under Division 3 of the California Business and Profession This Certificate of Compliance identifies the lighting features and performed and perfo	Phone: (619)466-6224 as Code to accept responsibility for the lighting design. rmance specifications required for compliance with
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2008 Nonresidential Compliance Forms

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August 2009

August 2009

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	Watts			Watts	
Installed Ligh	ting 364	(from Unconditi	ioned LTG-1C Page 2	1g	
Lighting Control Cr	edit	<u>(nom ondoxuu</u> L	ighting Control Cred	it	· · · · · ·
Conditioned Spaces (from LTG-2	2C)	Unconditioned S	Spaces (from LTG-2C) ⁻	
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2008 Nonresidential Compliance Forms

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Fa	il then describe on Page 2 of the Inspection Checklist Form and t	ake a	opropriate	e action to c	orrect.Ver	fy building	z plans if	necessary.	
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WANDATORY LIGHTING CONTRO CHECKLIST	LS - FIELI
Type / Description	Number of Units
TIME CLOCK	1
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SPECIAL FEATURES INSPECTION The local enforcement agency should pay special attent justification and documentation, and special verification may reject a building or design that otherwise complies	CHECKLI ion to the items n. The local enfo based on the ag
Field Inspector's Notes or Discrepancie	25:

LIGHTING	MANDATORY	MEASURES

2008 Nonresidential Compliance Forms

BUILDING LIGHTING SHUT-OFF: NOT SHOWN OVERRIDE FOR BUILDING LIGHTING SHUT-OFF: YES AUTOMATIC CONTROL DEVICES CERTIFIED: YES FLUORESCENT BALLASTS AND LUMINAIRES CERTIFIED: YES TANDEM WIRING FOR TWO-LAMP BALLASTS: N/A INDIVIDUAL ROOM/AREA CONTROLS: YES UNIFORM REDUCTION FOR INDIVIDUAL ROOMS: N/A DAYLIT AREA CONTROLS: N/A CONTROL OF EXTERIOR LIGHTS: N/A

TERTIFICATE OF COMPL	JANCE	(Pag	e 3 of 4)	LTG	-1C
roject Name: CITY OF SAN DIEGO, N	. CROWN POINT CO	DMFORT STATION	^{te:} 11-2-1	1	
NDOOR LIGHTING SCHEDULE and	FIELD INSPECTION	ENERGY CHECKLIST			
ill in controls for all spaces: a) area contr utomatic daylighting controls for daylit ar ontrols - general lighting controlled separ utomatic controls for retail stores >50,000	rols, b)multi-level contr eas >2500SF, d) shut- ately from display, ornu ISF, in accordance with	ols, c) manual daylighting cont off controls, e) display lighting c amental and display case lightin h Section 131.	rois for aayuu (controls, f) tail g and g)dema	ored ligh nd respo	'JUSE, uting Instve
MANDATORY LIGHTING COM	NTROLS - FIELD	INSPECTION ENERG	Y .	Fi Insp	eld ector
Type / Description	Number of Units	Location in Building	Special Features	Pass	Fail
TIME CLOCK	1	PARK STORAGE/MAINT.			
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SPECIAL FEATURES INSPEC	TION CHECKLI	ST (See Page 2 of 4 of LTG-10)		
The local enforcement agency should pay speci justification and documentation, and special ve	al attention to the items s rification. The local enfor complies based on the add	pecified in this checklist. These item reement agency determines the adeq emacy of the special justification at	s require specia puacy of the just ad documentation	l written fication, c n submitte	und ed.
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August 2009

TURP ENGINEERING CONSULTING 4719 PALM LA MESA, U 619 / 466 E-MAIL: EN TREI K.PORTE 11/02/11 - E G:09/09263.00/AG	IN & RATTAN s, INC. ENGINEERS A AVENUE A 91941-5221 / 6224 FAX 466 / 6233 GINEER@TREISD.COM # 09263.00 :59AM ADPROJ/09263.00 E-0.2.0WG	PR THE STREET	FESSION J. KUP 13554 9-30-12 FCALIE
403 (619	t/Whitelaw Architec 4 30th Street, SAN DIEGO CA 1) 546-4326 FAX (619) 54	ts, Inc. A 92104 6-4350	
NC NEW	RTH CROW COMFORT S	/N P	OINT N #522
NC NEW SHEET TITLE:	RTH CROW COMFORT S	/N P	OINT N #522 SHEET NUMBER: E-0.2
NC NEW SHEET TITLE:	NDOOR TITLE 24	/N P TATIC	OINT N #522 SHEET NUMBER: E-0.2 WBS <u>B-10088</u>
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NC NEW SHEET TITLE:	NDOOR TITLE 24 NDOOR 129 SHEETS	IN P TATIC RNIA RTMENT /12 FILMED	OINT N #522 SHEET NUMBER: E-0.2 WBS B-10088 ALI DARVISHI SECTION HEAD JASON GRANI PROJECT MANAGER 226-1698 CCS27 COORDINATE 1867 COED

DATE STARTED _____ DATE COMPLETED _

CONTRACTOR

INSPECTOR

36161-**24**-D

Certificate of Compliance	(Page 1 of 4) OLTG-1C
Project Name: CITY OF SAN DIEGO, N. CROWN POINT COMFORT STATION	Date: 11-2-11
Project Address: CROWN POINT DR AND INGRAHAM DRIVE, SAN DIEGO, CA 92109	Total Hardscape Illuminated Area:
General Information	
Phase of Construction: 🛛 New Construction 🗌 Addition 🔲 Alterat	ion
Occumentation Author's Declaration Statement I certify that this Certificate of Compliance documentation is accurate and complete.	
Name: KARL PORTS Signature:	5-
Company: TURPIN AND RATTAN ENGINEERING, INC.	Date: 11-2-11
Address: 4719 PALM AVE	IF Applicable: CEA # CEPE #
City/State/Zip: LA MESA, CA 91941	Phone: (619)466-6224
Principal Lighting Designer's Declaration Statement	
•1 am eligible under Division 5 of the California Busiless and Professions Code to accept	pt responsionity for the fighting design.
• This Certificate of Compliance identifies the lighting features and performance specific	cations required for compliance with
The 24, Pages 1 and 0 of the Camornia Code of Regulations.	
 The design features represented on the Certificate of Compliance are consistent with th design on the other applicable compliance forms, worksheets, calculations, plans, and s enforcement agency for approval with this building permit applications. 	e information provided to document this pecifications submitted to the
The design features represented on the Certificate of Compliance are consistent with the design on the other applicable compliance forms, worksheets, calculations, plans, and s enforcement agency for approval with this building permit applications. Name: STEVE KURTZMAN Signature: Mathematical Mathemati	e information provided to document this pecifications submitted to the
The design features represented on the Certificate of Compliance are consistent with the design on the other applicable compliance forms, worksheets, calculations, plans, and s enforcement agency for approval with this building permit applications. Name: STEVE KURTZMAN Signature: Hypers J Huttown Company: TURPIN AND RATTAN ENGINEERING, INC.	e information provided to document this specifications submitted to the Phone: (619)466-6224
The design features represented on the Certificate of Compliance are consistent with the design on the other applicable compliance forms, worksheets, calculations, plans, and s enforcement agency for approval with this building permit applications. STEVE KURTZMAN Signature: Mathematical Signature: Signature: Mathematical Signature: Si	Phone: (619)466-6224 License # 13554
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• The design features represented on the Certificate of Compliance are consistent with the design on the other applicable compliance forms, worksheets, calculations, plans, and senforcement agency for approval with this building permit applications. Name: STEVE STEVE KURTZMAN Signature: Mathematications Name: Signature: Ompany: TURPIN AND RATTAN ENGINEERING, INC. Address: 4719 PALM AVE City/State/Zip: LA LA MESA, CA Principal Lighting Designer's Declaration KI I certify that this Certificate of Compliance documentation is accurate and complete, are power, including building mounted, pole-mounted, as well as all other outdoor lighting designing Power Allowances for Specific Applications or Additional Lighting Power Allowances for Specific	e information provided to document this specifications submitted to the $\frac{Phone:}{(619)466-6224}$ License # 13554 Date: 11-2-11 and accounts for all outdoor lighting signed for the site, and that Additional rances for Ordinance Requirements 47 of the Standards.
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2008 Nonresidential Compliance Forms

2008 Nonresidential Compliance Forms

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CERTIFICATE OF CO	MPLIANCE	(Page 4 of 4)	OLTG-10
Project Name: CITY OF SAN DIE	GO, N. CROWN POINT COMFORT STATION	Date: 11-2-1	1
ALLOWED AND INSTALI	LED OUTDOOR LIGHTING POWER		
			Lighting Wattag Power Allowanc
Α	Lighting power allowance for general hardscape (from OLTG-2C Page 1 of 3)		•
B	Specific application lighting wattage allowance per un (from OLTG-2C Page 1 of 3)	it length	•
С	Specific application wattage allowance for ornamental (from OLTG-2C Page 1 of 3)	lighting	•
D	Specific application wattage allowance per application (from OLTG-2C Page 2 of 3)	• •	•
Е	Specific application lighting wattage allowance per are (from OLTG-2C Page 2 of 3)	a	224
F	Additional lighting power allowance for ordinance req (from OLTG-2C Page 3 of 3)	uirements	•
G	Total Allowed Wattage = Sum of rows A through F:		•
Н	Total Installed Watts (from Luminaire Schedule, (from OLTG-1C (Page 2 of 4)	· · · · · · · · · · · · · · · · · · ·	117

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]	Luminaire S	Schedule		T			Inst	alled W	atts	T T		
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August 2009

2008 Nonresidential Compliance Forms

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Project Name: CITY OF SAN DIE	GO, N. CROWN POINT	COMFORT	STATION	Date:	11-2-11		
A. OUTDOOR LIGHTING ZONE	C						
OUTDOOR LIGHTING ZONE:	$OLZ1 \square OLZ2 \square OI$	$LZ3 \Box O$	L Z 4	-			
Is the Outdoor Lighting Zone: X Del	fault in accordance with §	10-114, or	🗆 Amen	ded by J	HA		
 (JHA): The site is a government designate or LZ3, in accordance with Table The local jurisdiction having auth Energy Commission by providing The adopted change is posted on 1 B. ADDITIONAL LIGHTING PO 	ed park, recreation area, wi 10-114-A, because the site ority has officially adopted g the materials required in § the Energy Commission we WER ALLOWANCE FO	ildlife preserve is contained 1 a change to 10-114(d) to bosite.	e, or portion within such a the State Def the Executiv	thereof, zone. ault Ligh re Directo	and has bee ting Zone a or. NTS	m desig	nated as l
Are additional lighting power allowa	ince for ordinance in Table	147-C used?		es 🖾	No		
C. ACCEPTANCE FORMS Required Acceptance Tests Designer:							
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2008 Nonresidential Compliance Forms

August 2009

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	SG/SR	12.09.10		ASON GRANE PROJECT MANAGER 226-1698
				<u>1867–6259</u> CCSB3 COORDINATE
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NC 7 CROWN NORTH

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System Name or Identificat	ion/Tag:		Syster	m Location or Area S	Served:				~
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Enforcement Agency:	<u>⊨ ****** , </u>	<u>, ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,</u>	Permi	it Number:	ar eans tha dha da chuire ta bhla a thaire than an thair a bhair a bhair a bhair	,,.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,			
Note: Submit one Certif	icate of Accep	stance for each system	n Enforc	cement Agency Use: C	hecked by/Date				
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FIELD TECHNICIAN'S D	DECLARATIO	NSTATEMENT							
 I certify under penalty of I am the person who per 	of perjury, unde	r the laws of the State of the	of California, the second s	he information provi	ded on this form is true and c	orrect.			
 I certify that the constru- specifications approved 	iction/installati	on identified on this for	m complies wi	ith the acceptance re-	quirements indicated in the pl	ans and			
Reference Nonresidenti	al Appendix N	A7.	etruction/insta	llation identified on	this form has been completed	and is			
posted or made availabl	le with the build	ling permit(s) issued fo	r the building.						
Field Technician's Name:			Field	Technician's Signatu	ire:				
		Date Signed:	Positi	on With Company (7	Fitle):				
RESPONSIBLE PERSO	N'S DECLAR	ATION STATEMENT	Г						
• I certify under penalty of on my behalf as my emp	of perjury, under ployee or my a	r the laws of the State of gent and I have reviewe	of California, the difference of the second se	hat I am the Field Te ion provided on this	chnician, or the Field Techni form.	cian is acting			
• I am a licensed contract classification, to take re	or, architect, or sponsibility for	engineer, who is eligib the scope of work spec	ole under Divis cified on this d	tion 3 of the Business ocument and attest to	s and Professions Code, in the the declarations in this state	e applicable ment			
(responsible person).I certify that the information	ation provided (on this form substantiate	es that the cons	truction/installation	identified on this form compli	es with the			
acceptance requirement acceptance requirement	s indicated in th s and procedure	e plans and specificatio s specified in Reference	ons approved by e Nonresidentia	y the enforcement ag al Appendix NA7.	ency, and conforms to the app	licable			
• I have confirmed that th posted or made available	e Installation C e with the build	ertificate(s) for the cons ing permit(s) issued for	struction/install the building.	lation identified on th	nis form has been completed a	nd is			
• I will ensure that a com issued for the building,	pleted, signed and made avai	copy of this Certificate able to the enforcement	of Acceptance t agency for all	shall be posted, or n l applicable inspectio	nade available with the buildi ons. I understand that a signed	ng permit(s) copy of this			
Certificate of Acceptant	ce is required to	be included with the d	locumentation	the builder provides	to the building owner at occu	pancy.			
Pasaonsible Person's Name			Deene	ngihla Dargan'a Sign	-		_	•	
Kesponsiole reison s Maine	· · · · · · · · · · · · · · · · · · ·		Kespt	JISIDIC I CISON S SIgn	ature.				
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CE	RTI	TIFICATE OF ACCEPTANCE OI	LTG-2A
A	7.7 (V Outdoor Lighting Acceptance Tests (Pag	e 2 of 3
:0J	ect in	CITY OF SAN DIEGO, N. CROWN POINT COMFORT STATION	
/SI	em N	Name or Identification/Tag: System Location or Area Served:	
		• · · •	
A	7.7.	7.1 Outdoor Motion Sensor Acceptance	
	Int	atent: Lights are turned off when not needed per Section 119(d) & 132.	
0	nstr	truction Inspection	
	Mo	lotion Sensor Construction Inspection	
		Motion sensor has been located to minimize false signals	
		Sensor is not triggered by motion outside of adjacent area	
		Desired motion sensor coverage is not blocked by obstruction that could adversely affect performance	
Ľ	nctio	nonal testing	
_	Sim	mulate motion in area under lights controlled by the motion sensor. Verify and document the following:	······
		Status indicator operates correctly.	the
		motion sensor	uic
		Signal sensitivity is adequate to achieve desired control	
	Sim	mulate no motion in area with lighting controlled by the sensor but with motion adjacent to this area. Verify and do	cument
	the	e following:	ndirion
		per Standard Section 119(d).	
		The occupant sensor does not trigger a false "on" from movement outside of the controlled area	
		Signal sensitivity is adequate to achieve desired control	
-			
4	7.7.	7.2 Outdoor Lighting Shut-off Controls	
	nstr	ruction Inspection	
	Out	Astronomical time switch controls and automatic time switch controls have been certified to the Energy Commis	sion in
		accordance with the applicable provision in Standards Section 119. Verify that model numbers of all such control	ols are
_		listed on the Energy Commission database as "Certified Appliances & Control Devices."	
-		Controls to turn off lights during daytime hours are installed	
		Astronomical and standard time switch control is programmed with acceptable weekday, weekend, and holiday (applicable) schedules	<u>i</u> t
		Demonstrate and document for the owner time switch programming including weekday, weekend, holiday sched	ules as
_		well as all set-up and preference program settings	<u>b)</u>
	inst	stalled which is able to schedule separately:	n)
		A reduction in outdoor lighting power by 50 to 80%	`
-		Turning off all outdoor lighting covered by Section 132(c)2 of the Standards	
-		Verify that the correct time and date is properly set in the standard and astronomical time switch.	
-		Verify that the correct latitude, longitude and time zone are set in the astronomical time switch.	
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2008 Nonresidential	Compliance Forms

August 2009

CE	RTIFICATE OF ACCEPTANCE
NA	7.7 Outdoor Lighting Acceptance Tests
Proj	ect Name/Address: CITY OF SAN DIEGO, N. CR
Syst	tem Name or Identification/Tag:
NA	A7.7.2.2 Outdoor Photocontrol Functional
Not	e photocontrol must be used in conjunction with time
1	Standards. Nighttime test Simulate or provide conditions with
1.	Controlled lights turn on
2	Suprise test: Provide between 10 and 30 horizontal
<u> </u>	Controlled lights turn off
NA	7723 Astronomical Time Switch Functi
110	Power off test. Program control with location infor
1.	power source for at least 1 hour. Verify and docume
	Control retains all programmed settings and lo
2.	Night schedule ON test. Simulate or provide times
	document:
	Controlled lights turn on
3.	document:
	Controlled lights turn off
4.	Sunrise test: Simulate or provide the programmed of
	Controlled lights turn off
NI A	7774 Standard (non astronomical) Tim
Nat	(1.7.2.4 Standard (non-astronomical) 1 in
NOL	Power off test Program control with local date and
1.	hour. Verify and document:
	Control retains all programmed schedules and
2.	On schedule test. Simulate or provide times when li
	□ Controlled lights turn on
3.	Schedule test. Simulate or provide times when the s
	□ Controlled lights turn off

2008 Nonresidential Compliance Forms

	OLTG-2
······	(Page 3 of
WN POINT COMFORT STATIC	N
System Location or Area Se	erved:
	
esting	
witch or motion sensor to meet th	ne requirements of Section 132(c)2 of
ut daylight. Verify and document:	
otcandles (fc) to photosensor. Ve	rify and document the following
nal testing	
ation, local date and time, and sch	nedules. Disconnect control from
t: al date and time	
hen the sun has set and lights are s	scheduled to be ON. Verify and
when the sun has set and lights are	scheduled to be OFF. Verify and
set time after the time of local sur	nise
Switch Functional Testing	5
ocontrol to meet requirements of S	Section 132(c) of the Standards.
me and schedules. Disconnect co	ontrol from power source for at least
cal date and time	
nts are scheduled to be ON. Verify	y and document:
has set and lights are scheduled	to be OFF. Verify and document:
•	
	ι.

August 2009



____ DATE STARTED ____ DATE COMPLETED _

CONTRACTOR

INSPECTOR

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36161-**26**-D



GENERAL NOTE

CONTRACTOR TO PROVIDE ALL APPROVALS AND PERMITS FOR STREET WORK AND ALL WORK IN PUBLIC RIGHT OF WAY, INCLUDED BUT NOT LIMITED TO CITY AND ALL SERVING UTILITES.

RECESSED HOLD DOWN TAMPER PROOF NUTS. BOTTOM OF COVER SHALL BE FURNISHED WITH INTEGRAL CAST

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500,

TURPIN & RATTAN NGINEERING. INC. CONSULTING ENGINEERS 4719 PALM AVENUE LA MESA, CA 91941-5221 619/466/6224 FAX 466/6233 E-MAIL: ENGINEER@TREISD.COM TREI # 09263.00 #522 K.Ports 11/02/11 - 8:52am G:\D9\D9263.00\ACADPR0J\09263.00_E-1.0.owg 11/02/11 Platt/Whitelaw Architects, Inc. 059-228 STATION 4034 30th Street, SAN DIEGO CA 92104 (619) 546-4326 FAX (619) 546-4350 ĽB. ORT COMF(NORTH CROWN POINT NEW COMFORT STATION #522 SHEET TITLE: PARTIAL SITE PLAN NEW SHEET NUMBER: E-1.0 CITY OF SAN DIEGO, CALIFORNIA WBS <u>B-10088</u> ENGINEERING AND CAPITAL PROJECTS DEPARTMENT SHEET 27 OF 29 SHEETS 3/8/12 ALI DARVISHI ph FOR CITY ENGINEER DATE BY APPROVED DATE FILMED DESCRIPTION JASON GRANIL PROJECT MANAGER SG/SR 12.09.10 ORIGINAL 226-1698 CCS27 COORDINATE 1867-6259 CCS83 COORDINATE CONTRACTOR ____ DATE STARTED ___ 36161-**27**-D DATE COMPLETED INSPECTOR

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NOTE

ALL LAMPS INCLUDING SPARES SHALL BE MANUFACTURED BY OSRAM/SYLVANIA, VENTURE, PHILIPS OR G.E. UNLESS SPECIFICALLY NOTED OTHERWISE. WHERE AVAILABLE, ALL FLUORESCENT LAMPS SHALL BE OF THE TYPE THAT PERMITS NON-HAZARDOUS DISPOSAL. ALL LAMPS (INCLUDING SPARES) OF EACH TYPE, STYLE AND WATTAGE SHALL BE FROM ONE (1) SINGLE MANUFACTURING BATCH TO ENSURE UNIFORM VISUAL APPEARANCE WHEN ENERGIZED. LAMPS DIFFERING IN VISUAL APPEARANCE WITH REGARD TO COLOR TEMPERATURE SHALL BE REPLACED BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE OWNER.

NOTE

ALL 4'-0" T8 LAMPS SHALL BE SPECIFICALI #F032/835XPS/ECO WITH A CRI OF 86, 320 3040 MEAN LUMENS.

ALL NON-DIMMED 4'-O" FIXTURES SHALL BE FOLLOWING LAMP/BALLAST COMBINATIONS:

LAMPS: SYLVANIA #F032/835XPS/ECO AND FOLLOWS: 1 LAMP: # QTP1X32T8/UNV PSX F (25 WAT 2 LAMP: # QTP2X32T8/UNV PSX F (49 WAT

THESE COMBINATIONS SHALL PROVIDE 30000 TOGETHER WITH A LIMITED 36 MONTH LAMP ASSOCIATED 5 YEAR BALLAST WARRANTY. (F 60+ WARRANTY)

TRUE EQUALS FROM G.E. OFFERING THE SAME OR BETTER WARRANTY, INITIAL LUMENS, AND TOTAL FIXTURE WATTAGE(S) ARE ALSO ACCEPTABLE.

	LIGHTING FIXTURE SCHEDULE														
	MANUFACTURER		ALTERNATE MANUFACTURER		L/	AMPS		FIX1	TURE						
LY SYLVANIA XPS TYPE	FIXTURE TYPE	AND CATALOG NUMBER	AND ALTERNATE CATALOG NUMBER	QTY.	TYPE	WATTS	COLOR TEMP.	INPUT VOLTS	TOTAL INPUT WATTS	BALLAST TYPE	MOUNTING	DESCRIPTION			
BE PROVIDED WITH THE	KENALL C A H1212FL-PP-13-1-DV	OR EQUAL BY COOPER LIGHTING OR COLUMBIA	1	CFL	. 13	3000K	120	24	ELECTRONIC	WALL	12"x 12" WALL VANDAL RESISTANT FIXTURE WITH 0.125" POLYCARBONATE LENS AND WHITE HOUSING. UL LISTED FOR WET LOCATION				
D SYLVANIA BALLASTS AS	B	KENALL N548C-1-32-IS-1-DV	OR EQUAL BY COOPER LIGHTING OR COLUMBIA	1	T8	32	3000K	120	28	ELECTRONIC	SURFACE HARD LID CEILING OR WALL	5"x4' ONE PIECE WRAP AROUND LENS/HOUSING, HIGH IMPACT MOLDED POLYCARBONATE CLEAR PRISMATIC REFRACTOR, .125" THICKNESS.			
OO HOUR RATED LAMP LIFE WARRANTY AND AN (REFER SYLVANIA QUICK	Ċ	KENALL N524-C-2-17-IS-1-DV-IR	OR EQUAL BY COOPER LIGHTING OR COLUMBIA	2	T8 .	17	3000K	120	28	ELECTRONIC	WALL MOUNT	SAME AS FIXTURE 'B' EXCEPT 2 FOOT LENGTH			







TURP ENGINEERING, CONSULTING E 4719 PALM LA MESA, CA 619 / 466 / 0 E-MAIL: ENG TREI # K.PORTS 11/02/11 - 8:4 G:\09\09263.00\ACA	IN & RATTAN INC. ENGINEERS AVENUE A 91941-5221 6224 FAX 466 / 6233 INEER@TREISD.COM CO9263.00 47AM DPROJ\09263.00_E-2.0.DWG	PRO PRO INFINITION Exp. 1 1/0	ESS/04 J. AUD 3554 AUD CALIFORM CALIFORM 22/11
Platt/ 4034 (619)	Whitelaw Architects 30th Street, SAN DIEGO CA 546-4326 FAX (619) 546-	s, Inc. 92104 -4350	
NO	RTH CROW COMFORT ST		DINT N #522
SHEET TITLE: FLOOR PLAN -	DEMOLITION AND LIGH	ITING	SHEET NUMBER: E-2.0
CITY OF SAN engineering and shee	N DIEGO, CALIFORI capital projects depar 1 28 of 29 sheets	NIA tment	wbs <u>B-10088</u>
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FOR CITY ENGI	NEER DATE BY APPROVED DATE	Z FILMED	ALI DARVISHI SECTION HEAD
FOR CITY ENGI DESCRIPTION ORIGINAL	NEER DATE BY APPROVED DATE SG/SR 12.09.10	FILMED	ALI DARVISHI SECTION HEAD JASON GRANI PROJECT MANAGER 226–1698 CCS27 COORDINATE

NORTH CROWN POINT – NEW COMFORT STATION #522



- 3" C.O PER SDG&E REQUIREMENTS

- 3" C.O. PER SDG&E REQUIREMENTS

	MOUNTING: SURFA ENTER CABINET A VOLTAGE: 120/240	PANEL 'A'												MAIN: <u>100 AMP</u> TYPE: <u>BOLT-ON</u> BUSSING: <u>100 AMP</u> AIC: <u>10K</u>					
	LOCATION	VOLT-AMPERES		L	R	M	BKR.				B	BKR.		R	L	VOLT-AMPERES			
	LOOAHON	ØA	øВ	Ġ	ĠĊ		MP	L E		AB		MP	Ś	Ī	Ġ	ØA	øB	LUUN	
\$	EXTERIOR LIGHTING	252		9	•	•	20	1	1 4	2	1	20	•	•	•	720		PARK STORAG	E OUTLET
**	INTERIOR LIGHTING		364	13			20	1	3		1	20				1	720	PARK STORAG	E OUTLET
	EXTERIOR OUTLET	180		1		1	20	1	5	6	1	20	1			720		PARK STORAG	E OUTLET
	EXTERIOR OUTLET		540	3	1		20	1	7		1	20					720	PARK STORAG	E OUTLET
	HAND DRYER	180				1	20	1	9	10) 1	20	1			180		IRRIGATION CO	NTROLLERS
	ELECTRIC ROOM OUTLET		180		1	1	20	1	11		2 1	20						SPARE	
	SPARE				1	1	20	1	134	- 14	1	20			1			SPARE	
	SPARE				1	1	20	1	15		5 1	20						SPARE	
	SPARE .						20	1	179	18	3 1	20			Γ			SPARE	
	SUBTOTAL	612	1084													1620	1440	SUB	TOTAL
	TOTAL VOLT-AMP	ERES/PH	HASE		ØA	= 2	223	2		VA								øB= 2524	VA
	TOTAL PANEL VOL	T-AMPE	ERES: 4	756	3	VA	+	LC	Ľ	200)		V	A=	4	956	VA	AMPS=	21
1	* CONTROLS VIA TIME CL	OCK																	

** CONTROLS VIA TIME CLOCK/PHOTOCELL. CIRCUIT TO BE SWITCHED PHOTOCELL-ON, TIMECLOCK-OFF.

- RECONNECT RETAINED PANEL B



ELECTRICAL CONTRACTOR TO MEET S.D.G.&E.

1 MINIMUM 36" RADIUS SWEEP FOR CONDUIT. FLUSH TO TOP OF PAD. DO NOT CUT CONDUIT IN THE CURVED PORTION OF THE

2 SET PAD ON 6" INCHES OF 90% COMPACTED SOIL. PAD SHALL BE SET ON FINAL GRADE.

(4) TERMINATE GROUND CONDUCTOR ON GROUND ROD WITH SET SCREW GROUND CLAMP.

5 LEAVE 24" PIGTAIL ABOVE FINAL GRADE.

6 ALL WORK SHALL CONFORM TO SDG&E STANDARDS AND PER SDG&E CONSTRUCTION DOCUMENTS.

7 CLEAR WORKING SPACE OF 8'-0" SHALL BE MAINTAINED IN FRONT AND 2'-0" IN REAR OF TRANSFORMER PAD.

D E-504/

KEYNOTES

- (1) SDG&E METER AND DISCONNECT, COORDINATE WITH SDG&E FOR EXACT WORK
- 2 RE-INSTALL RETAINED METER AND PANEL, MAKE ALL CONNECTIONS FOR A FULLY FUNCTIONAL SYSTEM
- 3 3/4"-1#4 GROUND TO 3/4"X10' LONG COPPERCLAD GROUND ROD

MOUNTING: SURF ENTER CABINET A VOLTAGE: 120/24				F	۶A	١N	El		۴B	2				MAIN TYPE BUSS	: <u>100</u> A : <u>BOLT-</u> SING: <u>10</u>	MP -ON 0 AMP AIC: 10K			
VOLT-AMPERES		L	L R M		BKR.				BKR.		MF	R	Ļ	VOLT-A	MPERES				
LOCATION	ØA	ØB	I G	E C	S	A M P	POLL		A I	B	PO-LW	A M P	S	EC	G	ØA	øB	LOCATION	
SPACE	•		•	•	•	•	•	1	•	2	•	•	•	•	•	•		SPACE	
SPACE		•	٠			•	•	3		4	•	•					•	SPACE	
SPACE	•		•			•	•	5	-	6	•	•				•		SPACE	
SPACE		•	•			•	•	7		8	·	٠					•	SPACE	
SPACE	•					•	•	9	.	10	•	•						SPACE	
SPACE		•				•	•	11	\vdash	•12	·	٠						SPACE	
SPACE						•	•	13	 	14	•	٠						SPACE	
SPACE						•	•	15	┝─	•16	·	٠						SPACE	
SPACE						•	•	17	•	18	•	•						SPACE	
SUBTOTAL	• '	•														•	•	SUBTOTAL	
TOTAL VOLT-AMF	HASE		ØA	.= .				VA									ØB=. VA		
TOTAL PANEL VO	ERES: .			VA	+	LC	Ľ	•				V	A=	٠		VA	AMPS= .		
PANEL IS USED BY 'CRE	W CLASSIC	ONCE OR	TW	CE /	YE	AR.				,									

FAULT CURRENT CALCULATONS

SINGLE PHASE SYSTEM FAULT AT THE END OF A RUN OF CABLE

THREE SINGLE CONDUCTORS ALUMINUM CONDUCTOR NON-MAGNETIC CONDUIT WIRE SIZE 250

CONTRACTOR .

INSPECTOR _

360 FT LENGTH OF RUN 1 CONDUCTORS PER PHASE 42000 AMP LINE-TO-NEUTRAL SHORT CIRCUIT CURRENT AT BEGINNING OF RUN 120.0000 V LINE-TO-NEUTRAL VOLTAGE

SINGLE PHASE LINE-TO-LINE CIRCUIT CURRENT = 3890.222 AMPS

SINGLE PHASE LINE-TO NEUTRAL SHORT CIRCUIT CURRENT = 2073.126 AMPS



DATE STARTED

DATE COMPLETED .

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36161-**29**-D

