

City of San Diego

CONTRACTOR'S NAME: West Coast General Corporation
ADDRESS: 13700 Stowe Drive, Suite 100, Poway CA 92064
TELEPHONE NO.: 619-561-4200 **FAX NO.:** _____
CITY CONTACT: Antoinette Sanfilippo, Contract Specialist, Email: ASanfilippo@sandiego.gov
Phone No. (619) 533-3439
MGQuilico/MJNakasha/MLWenceslao

BIDDING DOCUMENTS



FOR

POLICE RANGE REFURBISHMENT PROJECT – PHASE II

BID NO.: _____ **K-19-1847-DBB-3**
SAP NO. (WBS/IO/CC): _____ **S-18005**
CLIENT DEPARTMENT: _____ **1914**
COUNCIL DISTRICT: _____ **9**
PROJECT TYPE: _____ **BT**

THIS CONTRACT WILL BE SUBJECT TO THE FOLLOWING:

- PHASED-FUNDING
- THE CITY'S SUBCONTRACTING PARTICIPATION REQUIREMENTS FOR SLBE PROGRAM
- PREVAILING WAGE RATES: STATE FEDERAL
- APPRENTICESHIP

BID DUE DATE:

2:00 PM
JUNE 26, 2019

CITY OF SAN DIEGO'S ELECTRONIC BIDDING SITE, PLANETBIDS

<http://www.sandiego.gov/cip/bidopps/index.shtml>

ENGINEER OF WORK

The engineering Specifications and Special Provisions contained herein have been prepared by or under the direction of the following Registered Architect:

Juan Manuel Oncina, C13,996 5/20/2019
1) Registered Architect Date

Seal:



Julie DeLeon Balista 5/23/19
2) For City Engineer Date

Seal:



TABLE OF CONTENTS

SECTION	PAGE
1. NOTICE INVITING BIDS	4
2. INSTRUCTIONS TO BIDDERS	7
3. PERFORMANCE AND PAYMENT BONDS	18
4. ATTACHMENTS:	
A. SCOPE OF WORK.....	21
B. PHASED FUNDING PROVISIONS	24
C. RESERVED.....	27
D. PREVAILING WAGES.....	28
E. SUPPLEMENTARY SPECIAL PROVISIONS.....	33
TECHNICALS	67
1. Appendix A - Mitigated Negative Declaration/Notice of Exemption	638
2. Appendix B - Fire Hydrant Meter Program.....	691
3. Appendix C - Materials Typically Accepted by Certificate of Compliance.....	705
4. Appendix D - Sample City Invoice with Cash Flow Forecast.....	707
5. Appendix E - Location Map	710
6. Appendix F - Hazardous Label/Forms	712
7. Appendix G - Sample Archaeology Invoice	718
8. Appendix H - Advanced Metering Infrastructure (AMI) Device Protection.....	721
9. Appendix I - Lead Containing Materials and Universal Waste Abatement Specification.....	728
10. Appendix J - LED Sports Lighting (Drawings; Calculation; Illumination Summary).....	903
11. Appendix K - Bullet Traps Drawing	936
12. Appendix L - Light Fixture Catalog Cut	953
F. RESERVED.....	1008
G. CONTRACT AGREEMENT	1009
5. CERTIFICATIONS AND FORMS.....	1012

NOTICE INVITING BIDS

1. **SUMMARY OF WORK:** This is the City of San Diego's (City) solicitation process to acquire Construction services for **Police Range Refurbishment Project – Phase II**. For additional information refer to Attachment A.
2. **FULL AND OPEN COMPETITION:** This solicitation is subject to full and open competition and may be bid by Contractors on the City's approved Prequalified Contractors List. For information regarding the Contractors Prequalified list visit the City's web site: <http://www.sandiego.gov>.
3. **ESTIMATED CONSTRUCTION COST:** The City's estimated construction cost for this project is **\$9,100,000**.
4. **BID DUE DATE AND TIME ARE: JUNE 26, 2019 AT 2:00 P.M.**
5. **PREVAILING WAGE RATES APPLY TO THIS CONTRACT:** Refer to Attachment D.
6. **LICENSE REQUIREMENT:** To be eligible for award of this contract, Prime contractor must possess the following licensing classification(s): **A; For Specialty Contractor, refer to Appendix I for Lead Containing Materials and Universal Waste Abatement Specification**
7. **SUBCONTRACTING PARTICIPATION PERCENTAGES:** Subcontracting participation percentages apply to this contract.
 - 7.1. 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	6.4%
2. ELBE participation	8.0%
3. Total mandatory participation	14.4%
 - 7.2. The Bid may be declared non-responsive if the Bidder fails to meet the following requirements:
 - 7.2.1. Include SLBE-ELBE certified subcontractors at the overall mandatory participation percentage identified in this document; **OR**
 - 7.2.2. Submit Good Faith Effort documentation, saved in searchable Portable Document Format (PDF) and stored on Compact Disc (CD) or Digital Video Disc (DVD), 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.

8. PRE-BID MEETING:

8.1 Prospective Bidders are **required** to attend the Pre-Bid Meeting. The purpose of the meeting is to discuss the scope of the Project, submittal requirements, the pre-qualification process and any Equal Opportunity Contracting Program requirements and reporting procedures. To request a sign language or oral interpreter for this visit, call the Public Works Contracts Division at (619) 533-3450 at least 5 Working Days prior to the meeting to ensure availability. Failure to attend the Mandatory Pre-Bid Meeting may result in the Bid being deemed non-responsive. The Pre-Bid meeting is scheduled as follows:

Time: 10:00 A.M.
Date: June 13, 2019
Location: SDPD Revolver Club, Rock House Clubhouse
4008 Federal Boulevard, San Diego, CA

Attendance at the Pre Bid Meeting will be evidenced by the Bidder's representative's signature on the attendance roster. It is the responsibility of the Bidder's representative to complete and sign the attendance roster.

Bidders may not be admitted after the specified start time of the mandatory Pre-Bid Meeting.

9. PRE-BID SITE VISIT: All those wishing to submit a bid **MUST** visit the Work Site with the Engineer. The purpose of the Site visit is to acquaint Bidders with the Site conditions. To request a sign language or oral interpreter for this visit, call the Public Works Contracts at (619) 533-3450 at least 5 Working Days prior to the meeting to ensure availability. The Pre-Bid Site Visit is scheduled as follows:

Time: 11:00 A.M.
Date: June 13, 2019
Location: SDPD Revolver Club, Rock House Clubhouse
4008 Federal Boulevard, San Diego, CA

ATTENTION: Bidder's **shall** wear safety gear (closed toe shoes; ear protection) during the Pre-bid site visit.

10. AWARD PROCESS:

10.1. The Award of this contract is contingent upon the Contractor's compliance with all conditions of Award as stated within these documents and within the Notice of Intent to Award.

10.2. Upon acceptance of bids and determination of the apparent low bidder, the City will prepare the contract documents for execution within approximately 21 days of the date of the bid opening. The City will then award the contract upon receipt of properly signed Contract, bonds, and insurance documents.

10.3. This contract will be deemed executed and effective only upon the signing of the Contract by the Mayor or his designee and approval as to form by the City Attorney's Office.

10.4. The low Bid will be determined by the Base Bid alone.

11. POST – AWARD BACKGROUND CHECK:

- 11.1.** Upon award, all employees of the Prime and any Subcontractors who may be working on the project site must complete and pass a minor background check administered by SDPD.
- 11.2.** Any such employee who does not successfully pass the background check will not be permitted on Police Department property. Not passing the background check affects that individual employee only – not the entire Prime or Subcontractor.
- 11.3.** A clear, color copy of each person’s valid Driver’s License will be required to complete this process.
- 11.4.** All Contractors, Subcontractors and their employees will be required to wear matching color Safety Vests at all times while on Police Department property.
- 11.5.** All Contractors, Subcontractors and their employees will be required to ensure that while entering and exiting doors and gates, that they completely close before leaving the premises.

12. SUBMISSION OF QUESTIONS:

- 12.1.** The Director (or Designee) of Public Works Department is the officer responsible for opening, examining, and evaluating the competitive Bids submitted to the City for the acquisition, construction and completion of any public improvement except when otherwise set forth in these documents. Any questions related to this solicitation shall be submitted to:

Public Works Contracts
525 B Street, Suite 750 (7th Floor)
San Diego, California, 92101
Attention: Antoinette Sanfilippo
OR:

ASanfilippo@sandiego.gov

- 12.2.** Questions received less than 14 days prior to the date for opening of Bids may not be considered.
- 12.3.** Questions or clarifications deemed by the City to be material shall be answered via issuance of an addendum and posted to the City’s online bidding service.
- 12.4.** Only questions answered by formal written addenda shall be binding. Oral and other interpretations or clarifications shall be without legal effect. It is the Bidder’s responsibility to be informed of any addenda that have been issued and to include all such information in its Bid.

13. PHASED FUNDING: For Phased Funding Conditions, see Attachment B.

INSTRUCTIONS TO BIDDERS

1. PREQUALIFICATION OF CONTRACTORS:

- 1.1. Contractors submitting a Bid must be pre-qualified for the total amount proposed, including all alternate items, prior to the date of 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 may be deemed **non-responsive** and ineligible for award.
- 1.2. The completed application must be submitted online no later than 2 weeks prior to the bid opening.
- 1.3. **Joint Venture Bidders Cumulative Maximum Bidding Capacity:** For projects with an engineer's estimate of \$30,000,000 or greater, Joint Ventures submitting bids may be deemed responsive and eligible for award if the cumulative maximum bidding capacity of the individual Joint Venture entities is equal to or greater than the total amount proposed.
 - 1.3.1. Each of the entities of the Joint Venture must have been previously prequalified at a minimum of \$15,000,000.
 - 1.3.2. Bids submitted with a total amount proposed of less than \$30,000,000 are not eligible for Cumulative Maximum Bidding Capacity prequalification. To be eligible for award in this scenario, the Joint Venture itself or at least one of the Joint Venture entities must have been prequalified for the total amount proposed.
 - 1.3.3. Bids submitted by Joint Ventures with a total amount proposed of \$30,000,000 or greater on a project with an engineer's estimate of less than \$30,000,000 are not eligible for Cumulative Maximum Bidding Capacity prequalification.
 - 1.3.4. The Joint Venture designated as the Apparent Low Bidder shall provide evidence of its corporate existence and furnish good and approved bonds in the name of the Joint Venture within 14 Calendar Days of receipt by the Bidder of a form of contract for execution.
- 1.4. Complete information and links to the on-line prequalification application are available at:

<http://www.sandiego.gov/cip/bidopps/prequalification>
- 1.5. Due to the City's responsibility to protect the confidentiality of the contractors' information, City staff will not be able to provide information regarding contractors'

prequalification status over the telephone. Contractors may access real-time information about their prequalification status via their vendor profile on [PlanetBids™](#).

2. ELECTRONIC FORMAT RECEIPT AND OPENING OF BIDS: Bids will be received in electronic format (eBids) EXCLUSIVELY at the City of San Diego's electronic bidding (eBidding) site, at: <http://www.sandiego.gov/cip/bidopps/index.shtml> and are due by the date, and time shown on the cover of this solicitation.

2.1. BIDDERS MUST BE PRE-REGISTERED with the City's bidding system and possess a system-assigned Digital ID in order to submit an electronic bid.

2.2. The City's bidding system will automatically track information submitted to the site including IP addresses, browsers being used and the URLs from which information was submitted. In addition, the City's bidding system will keep a history of every login instance including the time of login, and other information about the user's computer configuration such as the operating system, browser type, version, and more. Because of these security features, Contractors who disable their browsers' cookies will not be able to log in and use the City's bidding system.

2.3. The City's electronic bidding system is responsible for bid tabulations. Upon the bidder's or proposer's entry of their bid, the system will ensure that all required fields are entered. **The system will not accept a bid for which any required information is missing.** This includes all necessary pricing, subcontractor listing(s) and any other essential documentation and supporting materials and forms requested or contained in these solicitation documents.

2.4. BIDS REMAIN SEALED UNTIL BID DEADLINE. eBids are transmitted into the City's bidding system via hypertext transfer protocol secure (https) mechanism using SSL 128-256 bit security certificates issued from Verisign/Thawte which encrypts data being transferred from client to server. Bids submitted prior to the "Bid Due Date and Time" are not available for review by anyone other than the submitter who has until the "Bid Due Date and Time" to change, rescind or retrieve its proposal should it desire to do so.

2.5. BIDS MUST BE SUBMITTED BY BID DUE DATE AND TIME. Once the bid deadline is reached, no further submissions are accepted into the system. Once the Bid Due Date and Time has lapsed, bidders, proposers, the general public, and City staff are able to immediately see the results on line. City staff may then begin reviewing the submissions for responsiveness, EOCB compliance and other issues. The City may require any Bidder to furnish statement of experience, financial responsibility, technical ability, equipment, and references.

2.6. RECAPITULATION OF THE WORK. Bids shall not contain any recapitulation of the Work. Conditional Bids may be rejected as being non-responsive. Alternative proposals will not be considered unless called for.

2.7. BIDS MAY BE WITHDRAWN by the Bidder only up to the bid due date and time.

2.7.1. Important Note: Submission of the electronic bid into the system may not be instantaneous. Due to the speed and capabilities of the user's internet service provider (ISP), bandwidth, computer hardware and other variables, it may take time for the bidder's submission to upload and be received by the City's eBidding system. It is the bidder's sole responsibility to ensure their bids are received on time by the City's eBidding system. The City of San Diego is not responsible for bids that do not arrive by the required date and time.

2.8. ACCESSIBILITY AND AMERICANS WITH DISABILITIES ACT (ADA) COMPLIANCE: To request a copy of this solicitation in an alternative format, contact the Public Works Contract Specialist listed on the cover of this solicitation at least five (5) working days prior to the Bid/Proposal due date to ensure availability.

3. ELECTRONIC BID SUBMISSIONS CARRY FULL FORCE AND EFFECT

3.1. The bidder, by submitting its electronic bid, acknowledges that doing so carries the same force and full legal effect as a paper submission with a longhand (wet) signature.

3.2. By submitting an electronic bid, the bidder certifies that the bidder has thoroughly examined and understands the entire Contract Documents (which consist of the plans and specifications, drawings, forms, affidavits and the solicitation documents), and that by submitting the eBid as its bid proposal, the bidder acknowledges, agrees to and is bound by the entire Contract Documents, including any addenda issued thereto, and incorporated by reference in the Contract Documents.

3.3. The Bidder, by submitting its electronic bid, agrees to and certifies under penalty of perjury under the laws of the State of California, that the certification, forms and affidavits submitted as part of this bid are true and correct.

3.4. The Bidder agrees to the construction of the project as described in Attachment "A-Scope of Work" for the City of San Diego, in accordance with the requirements set forth herein for the electronically submitted prices. The Bidder guarantees the Contract Price for a period of 120 days from the date of Bid opening. 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.

4. BIDS ARE PUBLIC RECORDS: Upon receipt by the City, Bids shall become public records subject to public disclosure. It is the responsibility of the respondent to clearly identify any confidential, proprietary, trade secret or otherwise legally privileged information contained within the Bid. General references to sections of the California Public Records Act (PRA) will not suffice. If the Contractor does not provide applicable case law that clearly establishes that the requested information is exempt from the disclosure requirements of the PRA, the City shall be free to release the information when required in accordance with the PRA, pursuant

to any other applicable law, or by order of any court or government agency, and the Contractor will hold the City harmless for release of this information.

5. CONTRACTOR REGISTRATION AND ELECTRONIC REPORTING SYSTEM:

5.1. **Prior** to the Award of the Contract or Task Order, you and your Subcontractors and Suppliers must register with the City's web-based vendor registration and bid management system. For additional information go to:

<http://www.sandiego.gov/purchasing/bids-contracts/vendorreg>

5.2. The City may not award the contract until registration of all subcontractors and suppliers is complete. In the event this requirement is not met within the time frame specified in the Notice of Intent to Award letter, the City reserves the right to rescind the Notice of Award / Intent to Award and to make the award to the next responsive and responsible bidder / proposer.

6. JOINT VENTURE CONTRACTORS: Provide a copy of the Joint Venture agreement and the Joint Venture license to the City within 14 Calendar Days after receiving the Contract forms.

7. INSURANCE REQUIREMENTS:

7.1. All certificates of insurance and endorsements required by the contract are to be provided upon issuance of the City's Notice of Intent to Award letter.

7.2. Refer to sections 5-4, "INSURANCE" of the Supplementary Special Provisions (SSP) for the insurance requirements which must be met.

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

Title	Edition	Document Number
Standard Specifications for Public Works Construction ("The GREENBOOK") http://www.greenbookspecs.org/	2018	PWPI010119-01
City of San Diego Standard Specifications for Public Works Construction ("The WHITEBOOK")* https://www.sandiego.gov/publicworks/edocref/greenbook	2018	PWPI010119 -02
City of San Diego Standard Drawings* https://www.sandiego.gov/publicworks/edocref/standarddraw	2018	PWPI010119 -03
Citywide Computer Aided Design and Drafting (CADD) Standards https://www.sandiego.gov/publicworks/edocref/drawings	2018	PWPI010119 -04
California Department of Transportation (CALTRANS) Standard Specifications – http://www.dot.ca.gov/des/oe/construction-contract-standards.html	2018	PWPI030119-05

Title	Edition	Document Number
CALTRANS Standard Plans http://www.dot.ca.gov/des/oe/construction-contract-standards.html	2018	PWPI030119-06
California Manual on Uniform Traffic Control Devices Revision 3 (CA MUTCD Rev 3) http://www.dot.ca.gov/trafficops/camutcd/	2014	PWPI030119-07
<p>NOTE: *Available online under Engineering Documents and References at: http://www.sandiego.gov/publicworks/edocref/index.shtml</p> <p>*Electronic updates to the Standard Drawings may also be found in the link above</p>		

9. **CITY'S RESPONSES AND ADDENDA:** The City, at its discretion, may respond to any or all questions submitted in writing via the City's eBidding web site in the **form of an addendum**. No other responses to questions, oral or written shall be of any force or effect with respect to this solicitation. The changes to the Contract Documents through addenda are made effective as though originally issued with the Bid. The Bidders shall acknowledge the receipt of Addenda at the time of bid submission.
10. **CITY'S RIGHTS RESERVED:** The City reserves the right to cancel the Notice Inviting 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 Notice Inviting Bids shall be the sole responsibility of each bidder. The Notice Inviting Bids creates or imposes no obligation upon the City to enter a contract.
11. **CONTRACT PRICING:** This solicitation is for a Lump Sum contract with Unit Price provisions as set forth herein. The Bidder agrees to perform construction services for the City of San Diego in accordance with these contract documents for the prices listed below. The Bidder further agrees to guarantee the Contract Price for a period of 120 days from the date of Bid opening. The duration of the Contract Price guarantee may be extended, by mutual consent of the parties, by the number of days required for the City to obtain all items necessary to fulfill all contractual conditions.
12. **SUBCONTRACTOR INFORMATION:**
- 12.1. **LISTING OF SUBCONTRACTORS.** In accordance with the requirements provided in the "Subletting and Subcontracting Fair Practices Act" of the California Public Contract Code, the Bidder shall provide the **NAME** and **ADDRESS** of each Subcontractor who will perform work, labor, render services or who 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 state within the description, whether the subcontractor is a **CONSTRUCTOR, CONSULTANT** or **SUPPLIER**. The Bidder shall state the **DIR REGISTRATION NUMBER** for all subcontractors and shall further state within the description, the **PORITION** of the work which will be performed 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 may result in the Bid being rejected as **non-responsive** and ineligible for award. The Bidder's attention is directed to the Special Provisions – Section 3-2, “SELF-PERFORMANCE”, 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 for which Bidders are seeking recognition towards achieving any mandatory, voluntary (or both) subcontracting participation goals.

Additionally, pursuant to California Senate Bill 96 and in accordance with the requirements of Labor Code sections 1771.1 and 1725.5, by submitting a bid or proposal to the City, Contractor is certifying that he or she has verified that all subcontractors used on this public work project are registered with the California Department of Industrial Relations (DIR). **The Bidder shall provide the name, address, license number, DIR registration number of any Subcontractor – regardless of tier** - who will perform work, labor, render services or specially fabricate and install a portion [type] of the work or improvement pursuant to the contract.

12.2. LISTING OF SUPPLIERS. Any Bidder seeking the recognition of Suppliers of equipment, materials, or supplies obtained from third party Suppliers towards achieving any mandatory or voluntary (or both) subcontracting participation goals shall provide, at a minimum, the **NAME, LOCATION (CITY), DIR REGISTRATION NUMBER** and the **DOLLAR VALUE** of each supplier. The Bidder will be credited up to 60% of the amount to be paid to the Suppliers for materials and supplies unless vendor manufactures or substantially alters materials and supplies, in which case, 100% will be credited. The Bidder is to indicate within the description whether the listed firm is a supplier or manufacturer. If no indication is provided, the listed firm will be credited at 60% of the listed dollar value for purposes of calculating the Subcontractor Participation Percentage.

12.3. LISTING OF SUBCONTRACTORS OR SUPPLIERS FOR ALTERNATES. For subcontractors or suppliers to be used on additive or deductive alternate items, in addition to the above requirements, bidder shall further note “ALTERNATE” and alternate item number within the description.

13. SUBMITTAL OF “OR EQUAL” ITEMS: See Section 4-6, “Trade Names” in The WHITEBOOK and as amended in the SSP.

14. AWARD:

14.1. The Award of this contract is contingent upon the Contractor's compliance with all conditions precedent to Award.

14.2. Upon acceptance of a Bid, the City will prepare contract documents for execution within approximately 21 days of the date of the Bid opening and award the Contract approximately within 7 days of receipt of properly executed Contract, bonds, and insurance documents.

- 14.3.** This contract will be deemed executed and effective only upon the signing of the Contract by the Mayor or his designee and approval as to form the City Attorney's Office.
- 15. SUBCONTRACT LIMITATIONS:** The Bidder's attention is directed to Standard Specifications for Public Works Construction, Section 3-2, "SELF-PERFORMANCE" in The GREENBOOK and as amended in the SSP which requires the Contractor to self-perform not less than the specified amount. Failure to comply with this requirement shall render the bid **non-responsive** and ineligible for award.
- 16. AVAILABILITY OF PLANS AND SPECIFICATIONS:** Contract Documents may be obtained by visiting the City's website: <http://www.sandiego.gov/cip/>. Plans and Specifications for this contract are also available for review in the office of the City Clerk or Public Works Contracts.
- 17. ONLY ONE BID PER CONTRACTOR SHALL BE ACCEPTED:** No person, firm, or corporation shall be allowed to make, file, or be interested in more than one (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. Any Bidder who submits more than one bid will result in the rejection of all bids submitted.
- 18. SAN DIEGO BUSINESS TAX CERTIFICATE:** The Contractor and 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 and submit to the Contract Specialist upon request or as specified in the Contract Documents. Tax Identification numbers for both the Bidder and the listed Subcontractors must be submitted on the City provided forms within these documents.
- 19. BIDDER'S GUARANTEE OF GOOD FAITH (BID SECURITY) FOR DESIGN-BID-BUILD CONTRACTS:**
- 19.1.** For bids \$250,000 and above, bidders shall submit Bid Security at bid time. Bid Security shall be in one of the following forms: a cashier's check, or a properly certified check upon some responsible bank; or an approved corporate surety bond payable to the City of San Diego for an amount of not less than 10% of the total bid amount.
- 19.2.** This check or bond, and the monies represented thereby, will be held by the City as a guarantee that the Bidder, if awarded the contract, will in good faith enter into the contract and furnish the required final performance and payment bonds.
- 19.3.** The Bidder agrees that in the event of the Bidder's failure to execute this contract and provide the required final bonds, the money represented by the cashier's or certified check will remain the property of the City; and the Surety agrees that it will pay to the

City the damages, not exceeding the sum of 10% of the amount of the Bid, that the City may suffer as a result of such failure.

- 19.4. At the time of bid submission, bidders must upload and submit an electronic PDF copy of the aforementioned bid security. Whether in the form of a cashier's check, a properly certified check or an approved corporate surety bond payable to the City of San Diego, the bid security must be uploaded to the City's eBidding system. Within twenty-four (24) hours after the bid due date and time, the first five (5) apparent low bidders must provide the City with the original bid security.
- 19.5. Failure to submit the electronic version of the bid security at the time of bid submission AND failure to provide the original within twenty-four (24) hours may cause the bid to be rejected and deemed **non-responsive**.

20. AWARD OF CONTRACT OR REJECTION OF BIDS:

- 20.1. This contract may be awarded to the lowest responsible and reliable Bidder.
- 20.2. Bidders shall complete ALL eBid forms as required by this solicitation. Incomplete eBids will not be accepted.
- 20.3. The City reserves the right to reject any or all Bids, to waive any informality or technicality in Bids received, and to waive any requirements of these specifications as to bidding procedure.
- 20.4. Bidders will not be released on account of their errors of judgment. Bidders may be released only upon receipt by the City within 3 Working Days of the bid opening, written notice from the Bidder which shows proof of honest, credible, clerical error of a material nature, free from fraud or fraudulent intent; and of evidence that reasonable care was observed in the preparation of the Bid.
- 20.5. A bidder who is not selected for contract award may protest the award of a contract to another bidder by submitting a written protest in accordance with the San Diego Municipal Code.
- 20.6. The City of San Diego will not discriminate in the award of contracts with regard to race, religion creed, color, national origin, ancestry, physical handicap, marital status, sex or age.
- 20.7. Each Bid package properly signed as required by these specifications shall constitute a firm offer which may be accepted by the City within the time specified herein.
- 20.8. The City reserves the right to evaluate all Bids and determine the lowest Bidder on the basis of the base bid and any proposed alternates or options as detailed herein.

21. BID RESULTS:

- 21.1.** The availability of the bids on the City's eBidding system shall constitute the public announcement of the apparent low bidder. In the event that the apparent low bidder is subsequently deemed non-responsive or non-responsible, a notation of such will be made on the eBidding system. The new ranking and apparent low bidder will be adjusted accordingly.
- 21.2.** To obtain the bid results, view the results on the City's web site, or request the results by U.S. mail and provide a self-addressed, stamped envelope. If requesting by mail, be sure to reference the bid name and number. The bid tabulations will be mailed to you upon their completion. The results will not be given over the telephone.

22. THE CONTRACT:

- 22.1.** 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 14 days after receipt by Bidder of a form of contract for execution unless an extension of time is granted to the Bidder in writing.
- 22.2.** If the Bidder takes longer than 14 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.
- 22.3.** 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.
- 22.4.** 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 14 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.
- 22.5.** 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 and approval as to form by the City Attorney's Office. 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.

- 23. EXAMINATION OF PLANS, SPECIFICATIONS, AND SITE OF WORK:** The Bidder shall examine carefully the Project Site, the Plans and Specifications, other materials as described in the Special Provisions, Section 3-9, "TECHNICAL STUDIES AND SUBSURFACE DATA", and the proposal forms (e.g., Bidding Documents). The submission of a Bid 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.
- 24. CITY STANDARD PROVISIONS:** This contract is subject to the following standard provisions. See The WHITEBOOK for details.
- 24.1.** The City of San Diego Resolution No. R-277952 adopted on May 20, 1991 for a Drug-Free Workplace.
- 24.2.** The City of San Diego Resolution No. R-282153 adopted on June 14, 1993 related to the Americans with Disabilities Act.
- 24.3.** The City of San Diego Municipal Code §22.3004 for Contractor Standards.
- 24.4.** The City of San Diego's Labor Compliance Program and the State of California Labor Code §§1771.5(b) and 1776.
- 24.5.** Sections 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.
- 24.6.** The City's Equal Benefits Ordinance (EBO), Chapter 2, Article 2, Division 43 of The San Diego Municipal Code (SDMC).
- 24.7.** The City's Information Security Policy (ISP) as defined in the City's Administrative Regulation 90.63.

25. PRE-AWARD ACTIVITIES:

- 25.1.** The contractor selected by the City to execute a contract for this Work shall submit the required documentation as specified in the herein and in the Notice of Award. Failure to provide the information as specified may result in the Bid being rejected as **non-responsive**.
- 25.2.** The decision that bid is non-responsive for failure to provide the information required within the time specified shall be at the sole discretion of the City.

PERFORMANCE BOND, LABOR AND MATERIALMEN'S BOND

FAITHFUL PERFORMANCE BOND AND LABOR AND MATERIALMEN'S BOND:

West Coast General Corporation, a corporation, as principal, and Fidelity and Deposit Company of Maryland, 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 Ten Million Nine Hundred Ninety-Eight Thousand Three Hundred Thirteen Dollars and Zero Cents (\$10,998,313.00) for the faithful performance of the annexed contract, and in the sum of Ten Million Nine Hundred Ninety-Eight Thousand Three Hundred Thirteen Dollars and Zero Cents (\$10,998,313.00) for the benefit of laborers and materialmen designated below.

Conditions:

If the Principal shall faithfully perform the annexed contract with the City of 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 Article 2. Claimants, (iii) public works of improvement commencing with Civil Code Section 9100 of the Civil Code of the State of California.

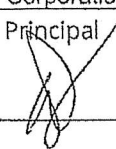
Changes in the terms of the annexed contract or specifications accompanying same or referred to therein shall not affect the Surety's obligation on this bond, and the Surety hereby waives notice of same.

PERFORMANCE BOND, LABOR AND MATERIALMEN'S BOND (continued)


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

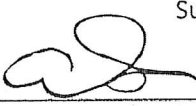
Dated 11/14/2019

Approved as to Form

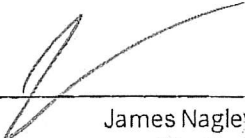
West Coast General Corporation
Principal
By 
David E. Davey, President
Printed Name of Person Signing for Principal

Mara W. Elliott, City Attorney

By 
Deputy City Attorney 11/21/19

Fidelity and Deposit Company of Maryland
Surety
By  Aidan Smock
Attorney-in-fact

Approved:

By 
James Naglevoort
Director
Public Works Department

777 S. Figueroa Street, Suite 3900
Local Address of Surety
Los Angeles, CA 90017
Local Address (City, State) of Surety
213.270.0714
Local Telephone No. of Surety

Premium \$67,611.00 for the contract term and is subject to adjustment based on final contract price.

Bond No. 7661275

**ZURICH AMERICAN INSURANCE COMPANY
COLONIAL AMERICAN CASUALTY AND SURETY COMPANY
FIDELITY AND DEPOSIT COMPANY OF MARYLAND
POWER OF ATTORNEY**

KNOW ALL MEN BY THESE PRESENTS: That the ZURICH AMERICAN INSURANCE COMPANY, a corporation of the State of New York, the COLONIAL AMERICAN CASUALTY AND SURETY COMPANY, a corporation of the State of Illinois, and the FIDELITY AND DEPOSIT COMPANY OF MARYLAND a corporation of the State of Illinois (herein collectively called the "Companies"), by **Robert D. Murray, Vice President**, in pursuance of authority granted by Article V, Section 8, of the By-Laws of said Companies, which are set forth on the reverse side hereof and are hereby certified to be in full force and effect on the date hereof, do hereby nominate, constitute, and appoint **Richard HALLETT, Aidan SMOCK, Tim MCCLELLAN, Marta COLLETT, all of San Diego, California**, its true and lawful agent and Attorney-in-Fact, to make, execute, seal and deliver, for, and on its behalf as surety, and as its act and deed: **any and all bonds and undertakings**, and the execution of such bonds or undertakings in pursuance of these presents, shall be as binding upon said Companies, as fully and amply, to all intents and purposes, as if they had been duly executed and acknowledged by the regularly elected officers of the ZURICH AMERICAN INSURANCE COMPANY at its office in New York, New York., the regularly elected officers of the COLONIAL AMERICAN CASUALTY AND SURETY COMPANY at its office in Owings Mills, Maryland., and the regularly elected officers of the FIDELITY AND DEPOSIT COMPANY OF MARYLAND at its office in Owings Mills, Maryland., in their own proper persons.

The said Vice President does hereby certify that the extract set forth on the reverse side hereof is a true copy of Article V, Section 8, of the By-Laws of said Companies, and is now in force.

IN WITNESS WHEREOF, the said Vice-President has hereunto subscribed his/her names and affixed the Corporate Seals of the said **ZURICH AMERICAN INSURANCE COMPANY, COLONIAL AMERICAN CASUALTY AND SURETY COMPANY, and FIDELITY AND DEPOSIT COMPANY OF MARYLAND**, this 14th day of May, A.D. 2019.



ATTEST:
**ZURICH AMERICAN INSURANCE COMPANY
COLONIAL AMERICAN CASUALTY AND SURETY COMPANY
FIDELITY AND DEPOSIT COMPANY OF MARYLAND**

By: *Robert D. Murray*
Vice President

By: *Dawn E. Brown*
Secretary

**State of Maryland
County of Baltimore**

On this 14th day of May, A.D. 2019, before the subscriber, a Notary Public of the State of Maryland, duly commissioned and qualified, **Robert D. Murray, Vice President and Dawn E. Brown, Secretary** of the Companies, to me personally known to be the individuals and officers described in and who executed the preceding instrument, and acknowledged the execution of same, and being by me duly sworn, deposed and saith, that he/she is the said officer of the Company aforesaid, and that the seals affixed to the preceding instrument are the Corporate Seals of said Companies, and that the said Corporate Seals and the signature as such officer were duly affixed and subscribed to the said instrument by the authority and direction of the said Corporations.

IN TESTIMONY WHEREOF, I have hereunto set my hand and affixed my Official Seal the day and year first above written.



Constance A. Dunn, Notary Public
My Commission Expires: July 9, 2019

EXTRACT FROM BY-LAWS OF THE COMPANIES

"Article V, Section 8, Attorneys-in-Fact. The Chief Executive Officer, the President, or any Executive Vice President or Vice President may, by written instrument under the attested corporate seal, appoint attorneys-in-fact with authority to execute bonds, policies, recognizances, stipulations, undertakings, or other like instruments on behalf of the Company, and may authorize any officer or any such attorney-in-fact to affix the corporate seal thereto; and may with or without cause modify or revoke any such appointment or authority at any time."

CERTIFICATE

I, the undersigned, Vice President of the ZURICH AMERICAN INSURANCE COMPANY, the COLONIAL AMERICAN CASUALTY AND SURETY COMPANY, and the FIDELITY AND DEPOSIT COMPANY OF MARYLAND, do hereby certify that the foregoing Power of Attorney is still in full force and effect on the date of this certificate; and I do further certify that Article V, Section 8, of the By-Laws of the Companies is still in force.

This Power of Attorney and Certificate may be signed by facsimile under and by authority of the following resolution of the Board of Directors of the ZURICH AMERICAN INSURANCE COMPANY at a meeting duly called and held on the 15th day of December 1998.

RESOLVED: "That the signature of the President or a Vice President and the attesting signature of a Secretary or an Assistant Secretary and the Seal of the Company may be affixed by facsimile on any Power of Attorney...Any such Power or any certificate thereof bearing such facsimile signature and seal shall be valid and binding on the Company."

This Power of Attorney and Certificate may be signed by facsimile under and by authority of the following resolution of the Board of Directors of the COLONIAL AMERICAN CASUALTY AND SURETY COMPANY at a meeting duly called and held on the 5th day of May, 1994, and the following resolution of the Board of Directors of the FIDELITY AND DEPOSIT COMPANY OF MARYLAND at a meeting duly called and held on the 10th day of May, 1990.

RESOLVED: "That the facsimile or mechanically reproduced seal of the company and facsimile or mechanically reproduced signature of any Vice-President, Secretary, or Assistant Secretary of the Company, whether made heretofore or hereafter, wherever appearing upon a certified copy of any power of attorney issued by the Company, shall be valid and binding upon the Company with the same force and effect as though manually affixed.

IN TESTIMONY WHEREOF, I have hereunto subscribed my name and affixed the corporate seals of the said Companies, this 14th day of November, 2019.



Brian M. Hodges, Vice President

TO REPORT A CLAIM WITH REGARD TO A SURETY BOND, PLEASE SUBMIT A COMPLETE DESCRIPTION OF THE CLAIM INCLUDING THE PRINCIPAL ON THE BOND, THE BOND NUMBER, AND YOUR CONTACT INFORMATION TO:

Zurich Surety Claims
1299 Zurich Way
Schaumburg, IL 60196-1056
www.reportsfclaims@zurichna.com
800-626-4577

CALIFORNIA ALL-PURPOSE ACKNOWLEDGMENT

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

STATE OF CALIFORNIA

County of San Diego }

On NOV 14 2019

before me, Sandra Corona, Notary Public,
Date Insert Name of Notary exactly as it appears on the official seal

personally appeared Aidan Smock

Name(s) of Signer(s)



Place Notary Seal Above

who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

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

Witness my hand and official seal.

Signature Sandra Corona
Signature of Notary Public

OPTIONAL

Though the information below is not required by law, it may prove valuable to persons relying on the document and could prevent fraudulent removal and reattachment of the form to another document.

Description of Attached Document

Title or Type of Document: _____

Document Date: _____ Number of Pages: _____

Signer(s) Other Than Named Above: _____

Capacity(ies) Claimed by Signer(s)

Signer's Name: _____

- Individual
- Corporate Officer — Title(s): _____
- Partner Limited General
- Attorney in Fact
- Trustee
- Guardian or Conservator
- Other: _____

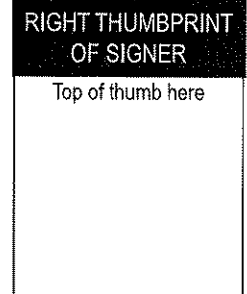
Signer is Representing: _____



Signer's Name: _____

- Individual
- Corporate Officer — Title(s): _____
- Partner Limited General
- Attorney in Fact
- Trustee
- Guardian or Conservator
- Other: _____

Signer is Representing: _____



CALIFORNIA ALL-PURPOSE ACKNOWLEDGMENT

CIVIL CODE § 1189

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

State of California)
County of San Diego)
On Nov 15, 2019 before me, Kim A Jensen
Date Here Insert Name and Title of the Officer
personally appeared David E Davey
Name(s) of Signer(s)

who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

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

WITNESS my hand and official seal.



Signature Kim A Jensen
Signature of Notary Public

Place Notary Seal Above

OPTIONAL

Though this section is optional, completing this information can deter alteration of the document or fraudulent reattachment of this form to an unintended document.

Description of Attached Document

Title or Type of Document: _____ Document Date: _____
Number of Pages: _____ Signer(s) Other Than Named Above: _____

Capacity(ies) Claimed by Signer(s)

Signer's Name: _____
 Corporate Officer — Title(s): _____
 Partner — Limited General
 Individual Attorney in Fact
 Trustee Guardian or Conservator
 Other: _____
Signer Is Representing: _____

Signer's Name: _____
 Corporate Officer — Title(s): _____
 Partner — Limited General
 Individual Attorney in Fact
 Trustee Guardian or Conservator
 Other: _____
Signer Is Representing: _____

ATTACHMENTS

ATTACHMENT A
SCOPE OF WORK

SCOPE OF WORK

1. SCOPE OF WORK:

Police Range Refurbishment Project - Phase II is the remainder of the Refurbishment project which includes but not limited to the following:

1. Environmental Lead remediation per the Asbestos and Lead Inspection Report where impacts areas of work.
 2. Accessibility: Remove and replace concrete paving at public range and tie in with existing accessible route.
 3. New Permanent storm water facilities to comply with regional permit, with landscape plants and irrigation.
 4. Grading of hillside, soil nail and shotcrete retaining wall.
 5. Site cast tilt-up concrete range divider walls.
 6. New bullet traps at each range
 7. Repair, resurface, reseal and restripe A/C Paving at West and East Ranges
 8. New site sports lighting at West and East Ranges
 9. New Shade Structures at West, Public and Rapid Fire Ranges
 10. New Storage Rooms associated with West and Rapid Fire Ranges
 11. New entrance doors and sidelights to clubhouse assembly room
 12. Interior improvements to clubhouse
 13. Interior finish improvements to staff building
 14. Install/Reinstall a temporary SDPD staff trailer equipped with electric utility during construction in the Staff building to avoid work impact on SDPD staff. See SSP Section 8-2
- 1.1.** The Work shall be performed in accordance with:
- 1.1.1.** The Notice Inviting Bids and Plans numbered 41205-1-D through 41205-131-D, inclusive as provided in the link below:

<https://filecloud.sandiego.gov/url/2i3uuhua53ntuwta>
 - 1.1.2.** Environmental Lead Remediation per Asbestos and Lead Inspection Report. Refer to **Appendix I**.

2. **LOCATION OF WORK:** The location of the Work is as follows:

4002-4008 Federal Boulevard, San Diego, CA 92105

3. **CONTRACT TIME:** The Contract Time for completion of the Work, including the Plant Establishment Period, shall be **264 Working Days**.

ATTACHMENT B
PHASED FUNDING PROVISIONS

PHASED FUNDING PROVISIONS

1. PRE-AWARD

1.1. Within 10 Working Days of the Notice of Intent to Award, the Contractor must contact the Project Manager to discuss fund availability for each phase and shall also submit the following:

1.1.1. Construction Cost Loaded Schedule in accordance with 6-1, "CONSTRUCTION SCHEDULE AND COMMENCEMENT OF THE WORK" and 7-3, "PAYMENT."

1.2. Contractor's failure to perform any of the following may result cancelling the award of the Contract:

1.2.1. Meeting with the City's Project Manager to discuss the Phased Funding Schedule.

1.2.2. Agreeing to a Phased Funding Schedule within **thirty** days of meeting with the City's Project Manager.

2. POST-AWARD

2.1. Do not start any construction activities for the next phase until the Notice to Proceed (NTP) has been issued by the City. The City will issue a separate NTP for each phase.

2.2. The City may issue the NTP for a subsequent phase before the completion of the preceding phase.

PHASED FUNDING SCHEDULE AGREEMENT

The particulars left blank below, such as the total number of phases and the amounts assigned to each phase, will be completed with funding specific information from the Pre-Award Schedule and Construction Cost Loaded Schedule submitted to and approved by the City.

BID NUMBER: K-19-1847-DBB-3

CONTRACT OR TASK TITLE: Police Range Refurbishment Project Phase II

CONTRACTOR: West Coast General Corporation

Funding Phase	Phase Description	Phase Start	Phase Finish	Not-to-Exceed Amount
1	All shooting equipment would be procured and delivered on site; Shooting equipment on the West, East, and Public Range would be installed. Shooting equipment on the Rapid	Dec 2019	Oct 2020	\$ 8,000,000.00
2	Range will be delivered to the site. All sports lighting equipment would be delivered and installed on site; Soil Nail Wall #1 (West, Public & East); West & East Range built and complete (No precast benches or shot blasted range markers); Public Range bullet trap complete, existing structure to remain as is; Rapid Fire range to remain as is (no work in this area) All remaining work to be completed including: Rapid range complete; Public range shelters; Architectural building work; precast benches/shot blasted range markers	July 2020	Dec 2020	\$ 2,998,313.00
Contract Total				\$ 10,998,313.00

Notes:

- 1) WHITEBOOK section 7-3.10, "Phased Funding Compensation" applies.
- 2) The total of all funding phases shall be equal to the TOTAL BID PRICE as shown on BID SCHEDULE 1 - PRICES.
- 3) This PHASED FUNDING SCHEDULE AGREEMENT will be incorporated into the CONTRACT and shall only be revised by written modifications to the CONTRACT.

CITY OF SAN DIEGO

CONTRACTOR

PRINT NAME: Zina Rommell
Construction Manager

PRINT NAME: David Davey

Signature: Zina Rommell

Title: President

Date: 10/3/2019

Signature: [Signature]

PRINT NAME: MICHELLE CARCA-SOLLO
Project Manager

Date: October 2nd, 2019

Signature: [Signature]

Date: 10/3/2019

ATTACHMENT C

RESERVED

ATTACHMENT D
PREVAILING WAGES

PREVAILING WAGES

1. **PREVAILING WAGE RATES:** Pursuant to San Diego Municipal Code section 22.3019, construction, alteration, demolition, repair and maintenance work performed under this Contract is subject to State prevailing wage laws. For construction work performed under this Contract cumulatively exceeding \$25,000 and for alteration, demolition, repair and maintenance work performed under this Contract cumulatively exceeding \$15,000, the Contractor and its subcontractors shall comply with State prevailing wage laws including, but not limited to, the requirements listed below.
 - 1.1. **Compliance with Prevailing Wage Requirements.** Pursuant to sections 1720 through 1861 of the California Labor Code, the Contractor and its subcontractors shall ensure that all workers who perform work under this Contract are paid not less than the prevailing rate of per diem wages as determined by the Director of the California Department of Industrial Relations (DIR). This includes work performed during the design and preconstruction phases of construction including, but not limited to, inspection and land surveying work.
 - 1.1.1. Copies of such prevailing rate of per diem wages are on file at the City and are available for inspection to any interested party on request. Copies of the prevailing rate of per diem wages also may be found at <http://www.dir.ca.gov/OPRL/DPreWageDetermination.htm>. Contractor and its subcontractors shall post a copy of the prevailing rate of per diem wages determination at each job site and shall make them available to any interested party upon request.
 - 1.1.2. The wage rates determined by the DIR refer to expiration dates. If the published wage rate does not refer to a predetermined wage rate to be paid after the expiration date, then the published rate of wage shall be in effect for the life of this Contract. If the published wage rate refers to a predetermined wage rate to become effective upon expiration of the published wage rate and the predetermined wage rate is on file with the DIR, such predetermined wage rate shall become effective on the date following the expiration date and shall apply to this Contract in the same manner as if it had been published in said publication. If the predetermined wage rate refers to one or more additional expiration dates with additional predetermined wage rates, which expiration dates occur during the life of this Contract, each successive predetermined wage rate shall apply to this Contract on the date following the expiration date of the previous wage rate. If the last of such predetermined wage rates expires during the life of this Contract, such wage rate shall apply to the balance of the Contract.
 - 1.2. **Penalties for Violations.** Contractor and its subcontractors shall comply with California Labor Code section 1775 in the event a worker is paid less than the prevailing wage rate for the work or craft in which the worker is employed. This shall be in addition to any other applicable penalties allowed under Labor Code sections 1720 – 1861.

- 1.3. Payroll Records.** Contractor and its subcontractors shall comply with California Labor Code section 1776, which generally requires keeping accurate payroll records, verifying and certifying payroll records, and making them available for inspection. Contractor shall require its subcontractors to also comply with section 1776. Contractor and its subcontractors shall submit weekly certified payroll records online via the City's web-based Labor Compliance Program. Contractor is responsible for ensuring its subcontractors submit certified payroll records to the City.
- 1.3.1.** Contractor and their subcontractors shall also furnish records specified in Labor Code section 1776 directly to the Labor Commissioner in the manner required by Labor Code section 1771.4.
- 1.4. Apprentices.** Contractor and its subcontractors shall comply with California Labor Code sections 1777.5, 1777.6 and 1777.7 concerning the employment and wages of apprentices. Contractor is held responsible for the compliance of their subcontractors with sections 1777.5, 1777.6 and 1777.7.
- 1.5. Working Hours.** Contractor and their subcontractors shall comply with California Labor Code sections 1810 through 1815, including but not limited to: (i) restrict working hours on public works contracts to eight hours a day and forty hours a week, unless all hours worked in excess of 8 hours per day are compensated at not less than 1½ times the basic rate of pay; and (ii) specify penalties to be imposed on contractors and subcontractors of \$25 per worker per day for each day the worker works more than 8 hours per day and 40 hours per week in violation of California Labor Code sections 1810 through 1815.
- 1.6. Required Provisions for Subcontracts.** Contractor shall include at a minimum a copy of the following provisions in any contract they enter into with a subcontractor: California Labor Code sections 1771, 1771.1, 1775, 1776, 1777.5, 1810, 1813, 1815, 1860 and 1861.
- 1.7. Labor Code Section 1861 Certification.** Contractor in accordance with California Labor Code section 3700 is required to secure the payment of compensation of its employees and by signing this Contract, Contractor certifies that "I am aware of the provisions of Section 3700 of the California Labor Code which require every employer to be insured against liability for workers' compensation or to undertake self-insurance in accordance with the provisions of that code, and I will comply with such provisions before commencing the performance of the work of this Contract."
- 1.8. Labor Compliance Program.** The City has its own Labor Compliance Program authorized in August 2011 by the DIR. The City will withhold contract payments when payroll records are delinquent or deemed inadequate by the City or other governmental entity, or it has been established after an investigation by the City or other governmental entity that underpayment(s) have occurred. For questions or assistance, please contact the City of San Diego's Prevailing Wage Unit at 858-627-3200.

- 1.9. Contractor and Subcontractor Registration Requirements.** This project is subject to compliance monitoring and enforcement by the DIR. A contractor or subcontractor shall not be qualified to bid on, be listed in a bid or proposal, subject to the requirements of section 4104 of the Public Contract Code, or engage in the performance of any contract for public work, unless currently registered and qualified to perform public work pursuant to Labor Code section 1725.5. It is not a violation of this section for an unregistered contractor to submit a bid that is authorized by Section 7029.1 of the Business and Professions code or by Section 10164 or 20103.5 of the Public Contract Code, provided the contractor is registered to perform public work pursuant to Section 1725.5 at the time the contract is awarded.
- 1.9.1.** A Contractor's inadvertent error in listing a subcontractor who is not registered pursuant to Labor Code section 1725.5 in response to a solicitation shall not be grounds for filing a bid protest or grounds for considering the bid non-responsive provided that any of the following apply: (1) the subcontractor is registered prior to bid opening; (2) within twenty-four hours after the bid opening, the subcontractor is registered and has paid the penalty registration fee specified in Labor Code section 1725.5; or (3) the subcontractor is replaced by another registered subcontractor pursuant to Public Contract Code section 4107.
- 1.9.2.** By submitting a bid or proposal to the City, Contractor is certifying that he or she has verified that all subcontractors used on this public work project are registered with the DIR in compliance with Labor Code sections 1771.1 and 1725.5, and Contractor shall provide proof of registration for themselves and all listed subcontractors to the City at the time of bid or proposal due date or upon request.
- 1.10. Stop Order.** For Contractor or its subcontractors engaging in the performance of any public work contract without having been registered in violation of Labor Code sections 1725.5 or 1771.1, the Labor Commissioner shall issue and serve a stop order prohibiting the use of the unregistered contractors or unregistered subcontractor(s) on ALL public works until the unregistered contractor or unregistered subcontractor(s) is registered. Failure to observe a stop order is a misdemeanor.
- 1.11. List of all Subcontractors.** The Contractor shall provide the list of subcontractors (regardless of tier), along with their DIR registration numbers, utilized on this Contract prior to any work being performed; and the Contractor shall provide a complete list of all subcontractors with each invoice. Additionally, Contractor shall provide the City with a complete list of all subcontractors (regardless of tier) utilized on this contract within ten working days of the completion of the contract, along with their DIR registration numbers. The City shall withhold final payment to Construction Management Professional until at least thirty (30) days after this information is provided to the City.

1.12. Exemptions for Small Projects. There are limited exemptions for installation, alteration, demolition, or repair work done on projects of \$25,000 or less. The Contractor shall still comply with Labor Code sections 1720 et. seq. The only recognized exemptions are listed below:

1.12.1. Registration. The Contractor will not be required to register with the DIR for small projects. (Labor Code section 1771.1).

1.12.2. Certified Payroll Records. The records required in Labor Code section 1776 shall be required to be kept and submitted to the City of San Diego, but will not be required to be submitted online with the DIR directly. The Contractor will need to keep those records for at least three years following the completion of the Contract. (Labor Code section 1771.4).

1.12.3. List of all Subcontractors. The Contractor shall not be required to hire only registered subcontractors and is exempt from submitting the list of all subcontractors that is required in section 1.11 above. (Labor code section 1773.3).

ATTACHMENT E
SUPPLEMENTARY SPECIAL PROVISIONS

SUPPLEMENTARY SPECIAL PROVISIONS

The following Supplementary Special Provisions (SSP) modifies the following documents:

1. The **2018 Edition** of the Standard Specifications for Public Works Construction (The "GREENBOOK").
2. The **2018 Edition** of the City of San Diego Standard Specifications for Public Works Construction (The "WHITEBOOK"), including the following:
 - a) General Provisions (A) for all Construction Contracts.

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

1-2 TERMS AND DEFINITIONS. To the "WHITEBOOK", item 54, "Normal Working Hours", ADD the following:

The **Normal Working Hours** are **7:00 AM to 3:30 PM**.

To the "WHITEBOOK", item 43, DELETE in its entirety and SUBSTITUTE with the following:

43. **Field Order** - A Field Order is a written agreement by the Engineer to compensate you for Work items in accordance with 2-8, "EXTRA WORK" or 2-9, "CHANGED CONDITIONS". A Field Order does not change the Contract Price, Contract Time, or the scope intent of the Contract.

To the "WHITEBOOK", ADD the following:

108. **Substantial Completion:** stage of construction or building project in which the Work is sufficiently complete, in accordance with the construction contract documents, installed in compliance with the California Code of Regulations Title 24, and as determined by the Engineer in accordance with Whitebook Section 3-13.1.2, so that the City may use or occupy the building project or designated portion thereof for the intended purpose. Also, the following, as applies to entire project or portion of project under consideration for Substantial Completion:

- i. All structural work and considerations provided, performed, special inspections passed, and inspected to approval of Engineer and DSD.
- ii. All earthwork, drainage, paving complete.
- iii. All site improvements, including shade structures, fences and gates, paint striping complete.
- iv. Sports lighting installed, powered, controls configured and operational.

- v. Buildings enclosed and cleaned, all products installed, mechanical-plumbing-electrical work installed and operational, finishes installed; with only adjustment, touch-up work, or final cleaning remaining. Where applies, all historic work complete in accordance with Secretary of Interiors Standards.
- vi. Landscape and Irrigation installed and Plant Establishment Period has begun as issued via field notification by the Engineer.
- vii. All building and site features required to be accessible have been inspected by the City's Office of ADA Compliance and Accessibility and approved.

SECTION 3 – CONTROL OF THE WORK

3-2 SELF-PERFORMANCE. To the "GREENBOOK", DELETE in its entirety and SUBSTITUTE with the following:

- 1. You shall perform, with your own organization, Contract Work amounting to at least 30% of the base Bid **AND** 30% of any alternates.

3-9 TECHNICAL STUDIES AND SUBSURFACE DATA. To the "WHITEBOOK", ADD the following:

- 5. In preparation of the Contract Documents, the designer has relied upon the following reports of explorations and tests at the Work Site:
 - a) Supplemental Geotechnical Investigation & Infiltration Assessment dated November 13, 2018 by SCST, LLC.
 - b) Structural Calculations by Orion Structural Engineering, Inc.
 - c) Priority Development Project, Storm Water Quality Management Plan dated May 10, 2019 by Nasland Engineering
- 6. The reports listed above are available for review at the following link:

[Technical Studies](#)

3-10 SURVEYING. To the "GREENBOOK", DELETE in its entirety and SUBSTITUTE with the following:

3-10 SURVEYING.

- 1. You shall locate and mark all features related to the building and site, including landscaping and hardscape, using industry standard contractor's construction tools.
- 2. You shall preserve construction survey stakes, control points, and other survey related marks described in 3-10.1, "Survey Services Provided by the City" for the duration of the Project. If any construction survey stakes are lost or

disturbed and need to be replaced, such replacement shall be performed by the City at your expense.

3-10.1 Survey Services Provided by the City.

1. The City will provide surveying services and on-site survey staking for the following:
 - a) Locations of any property lines, boundaries, or easement surveys within the project boundaries as required by the project.
 - b) Locations of up to four corners per building.
 - c) Verification of building pad finish surface elevation.
 - d) A maximum of 4 site control points.
 - e) Location and perpetuation of survey monuments within the project boundary in accordance with 400-2, "Permanent Survey Markers".
2. Notify the Resident Engineer in writing at least 2 Working Days prior to requesting survey services provided by the City.

3-10.2 Line and Grade.

1. The Work shall conform to the lines, elevations, and grades shown on the Plans. Three consecutive points set on the same slope shall be used together so that any variation from a straight grade can be detected. Any such variation shall be reported to the Engineer. In the absence of such report, you shall be responsible for any error in the grade of the Work.
2. Grades for underground conduits will be set at the surface of the ground. You shall transfer them to the bottom of the trench.

3-10.3 Payment.

1. The payment for survey services Work shall be included in the Contract Price.

3-12.4.3 Storage and Staging Areas. To the "WHITEBOOK", ADD the following:

4. The contractor shall use the parking lot area west of accessible parking space near the pedestrian gate as a staging area and trailer area.

3-13.3 Warranty. To the "WHITEBOOK", item 1, DELETE in its entirety and SUBSTITUTE with the following:

1. You shall warranty and repair all defective materials and workmanship for a period of 1 year. This call back warranty period shall start on the date the Work was accepted by the City unless the City had beneficial use of the project (excluding water, sewer, and storm drain projects). In addition, you shall warranty the Work against all latent defects for a period of 10 years and patent defects for a period of 4 years.

3-13.3.1 Defective Work. To the "WHITEBOOK", item 6, DELETE in its entirety and SUBSTITUTE with the following:

6. For Building Projects which require a certificate of occupancy, not including sewer and water facilities, if you fail to correct the defective Work listed on the City's Punchlist within 45 Working Days after the Contract Time, you shall reimburse the City for all costs to provide inspection services required to monitor Work beyond the 45 Working Days. The City shall bill you for the additional inspection at the City's established rates.

SECTION 4 - CONTROL OF MATERIALS

4-3.4 Specialty Inspection Paid for by the Contractor. To the "WHITEBOOK", ADD the following:

2. The specialty inspections required shall include ALL but not limited to the following:
 - a) Refer to plan sheets 41205-67-D to 41205-69-D, Structural General Notes.

4-3.6 Preapproved Materials. To the "WHITEBOOK", ADD the following:

3. You shall submit in writing a list of all products to be incorporated in the Work that are on the AML.
4. The following materials were reviewed and accepted by the asset owner:
 - i. Resilient Tile: Mannington Commercial - Manor Oak LVT plank for Clubhouse and Staff Building
 - a. 9x36 at Clubhouse
 - b. 6x36 at Staff Building
 - ii. Resilient Tile Base: Mannington Commercial – Optimum Edge (Type TS) – 'Coffee – 930'
 - iii. Daltile Saddlebrook plank tile – 6x36 plank and wall base, 'Farmhouse – SD14'
 - iv. Daltile Keystones porcelain tile – 2x2 at shower area, 'Marble – D325'
 - v. Daltile Modern Dimensions tile – 4-1/4x8-1/2 at walls outside shower, 'Crisp Linen 0139'
 - vi. Carpet: Mannington Commercial Carpet Tile – 24x24 at platform and ramp, 'Align, Secant (13579)'
 - vii. Ceiling Tile: USG Ceiling Panel – 12x12, 'Orion 85'
 - viii. Cabinetry: Formica, 'Cascara Teakwood, Natural Grain 8909-NG'
 - ix. Countertop: Stainless Steel (no solid surfacing)
 - x. Concrete Color: Solomon 'Thyme'
 - xi. West Storage Building – acceptable to use fiber cement panel, rather than Trespa (plastic panel)

4-6 TRADE NAMES. To the “WHITEBOOK”, ADD the following:

11. You shall submit your list of proposed substitutions for an “equal” item **no less than 15 working days prior to the bid due date** and on the City’s Product Submittal Form available at:

<http://www.sandiego.gov/publicworks/edocref/index.shtml>

SECTION 5 – LEGAL RELATIONS AND RESPONSIBILITIES

5-4 INSURANCE. To the “GREENBOOK”, DELETE in its entirety and SUBSTITUTE with the following:

5-4 INSURANCE.

1. The insurance provisions herein shall not be construed to limit your indemnity obligations contained in the Contract.

5-4.1 Policies and Procedures.

1. You shall procure the insurance described below, at its 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.
2. Insurance coverage for property damage resulting from your operations is on a replacement cost valuation. The market value will not be accepted.
3. You shall 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 the Contract, e.g., your indemnity obligations, is not deemed limited to the insurance coverage required by this Contract.
4. The payment for insurance shall be included in the Contract Price as bid by you. 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.
5. Policies of insurance shall 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 the Contract. Your failure to maintain or renew coverage or to provide evidence of renewal during the term of the Contract may be treated by the City as a material breach of the Contract.

5-4.2 Types of Insurance.

5-4.2.1 Commercial General Liability Insurance.

1. Commercial General Liability Insurance shall 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.
2. The policy shall 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).
3. There shall be no endorsement or modification limiting the scope of coverage for either "insured vs. insured" claims or contractual liability. You shall maintain the same or equivalent insurance for at least 10 years following completion of the Work.
4. All costs of defense shall be outside the policy limits. Policy coverage shall be in liability limits of not less than the following:

<u>General Annual Aggregate Limit</u>	<u>Limits of Liability</u>
Other than Products/Completed Operations	\$2,000,000
Products/Completed Operations Aggregate Limit	\$2,000,000
Personal Injury Limit	\$1,000,000
Each Occurrence	\$1,000,000

5-4.2.2 Commercial Automobile Liability Insurance.

1. You shall 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").
2. All costs of defense shall be outside the limits of the policy.

5-4.2.3 Contractors Pollution Liability Insurance.

1. You shall procure and maintain at your expense or require your Subcontractor, as described below, to procure and maintain the Contractors Pollution Liability Insurance including contractual liability coverage to cover liability arising out of cleanup, removal, storage, or handling of hazardous or toxic chemicals, materials, substances, or any other pollutants by you or any Subcontractor in an amount not less than \$2,000,000 limit for bodily injury and property damage.

2. All costs of defense shall be outside the limits of the policy. Any such insurance provided by your Subcontractor instead of you shall be approved separately in writing by the City.
3. For approval of a substitution of your Subcontractor's insurance, you shall certify that all activities for which the Contractors Pollution Liability Insurance will provide coverage will be performed exclusively by the Subcontractor providing the insurance. The deductible shall not exceed \$25,000 per claim.
4. Contractual liability shall include coverage of tort liability of another party to pay for bodily injury or property damage to a third person or organization. There shall be no endorsement or modification of the coverage limiting the scope of coverage for either "insured vs. insured" claims or contractual liability.
5. Occurrence based policies shall be procured before the Work commences and shall be maintained for the Contract Time. Claims Made policies shall be procured before the Work commences, shall be maintained for the Contract Time, and shall include a 12 month extended Claims Discovery Period applicable to this contract or the existing policy or policies that shall continue to be maintained for 12 months after the completion of the Work without advancing the retroactive date.
6. Except as provided for under California law, the policy or policies shall provide that the City is entitled to 30 Days prior written notice (10 Days for cancellation due to non-payment of premium) of cancellation or non-renewal of the policy or policies.

5-4.2.4 Contractors Hazardous Transporters Pollution Liability Insurance.

1. You shall provide at your expense or require your Subcontractor to provide, as described below, Contractors Hazardous Transporters Pollution Liability Insurance including contractual liability coverage to cover liability arising out of transportation of hazardous or toxic, materials, substances, or any other pollutants by you or any Subcontractor in an amount not less than \$2,000,000 limit per occurrence/aggregate for bodily injury and property damage.
2. All costs of defense shall be outside the limits of the policy. The deductible shall not exceed \$25,000 per claim. Any such insurance provided by a subcontractor instead of you shall be approved separately in writing by the City.
3. For approval of the substitution of Subcontractor's insurance the Contractor shall certify that all activities for which Contractors Hazardous Transporters Pollution Liability Insurance will provide coverage will be performed exclusively by the Subcontractor providing the insurance.

4. Contractual liability shall include coverage of tort liability of another party to pay for bodily injury or property damage to a third person or organization. There shall be no endorsement or modification of the coverage limiting the scope of coverage for either “insured vs. insured” claims or contractual liability. Occurrence based policies shall be procured before the Work commences and shall be maintained for the duration of this Contract. Claims Made policies shall be procured before the Work commences, shall be maintained for the duration of this contract, and shall include a 12 month extended Claims Discovery Period applicable to this contract or the existing policy or policies that shall continue to be maintained for 12 months after the completion of the Work under this Contract without advancing the retroactive date.
5. Except as provided for under California law, the policy or policies shall provide that the City is entitled to 30 Days prior written notice (10 Days for cancellation due to non-payment of premium) of cancellation or non-renewal of the policy or policies.

5-4.2.5 Contractors Builders Risk Property Insurance.

1. You shall provide at your expense, and maintain until Final Acceptance of the Work, a Special Form Builders Risk Policy or Policies. This insurance shall be in an amount equal to the replacement cost of the completed Work (without deduction for depreciation) including the cost of excavations, grading, and filling. The policy or policies limits shall be 100% of this Contract value of the Work plus 15% to cover administrative costs, design costs, and the costs of inspections and construction management.
2. Insured property shall include material or portions of the Work located away from the Site but intended for use at the Site and shall cover material or portions of the Work in transit. The policy or policies shall include as insured property scaffolding, falsework, and temporary buildings located at the Site. The policy or policies shall cover the cost of removing debris, including demolition.
3. The policy or policies shall provide that all proceeds thereunder shall be payable to the City as Trustee for the insured, and shall name the City, the Contractor, Subcontractors, and Suppliers of all tiers as named insured. The City, as Trustee, will collect, adjust, and receive all monies which may become due and payable under the policy or policies, may compromise any and all claims thereunder, and will apply the proceeds of such insurance to the repair, reconstruction, or replacement of the Work.
4. Any deductible applicable to the insurance shall be identified in the policy or policies documents and responsibility for paying the part of any loss not covered because of the application of such deductibles shall be apportioned among the parties except for the City as follows: if there is more than one claimant for a single occurrence, then each claimant shall pay a pro-rata share of the per

occurrence deductible based upon the percentage of their paid claim to the total paid for insured. The City shall be entitled to 100% of its loss. You shall pay the City any portion of that loss not covered because of a deductible at the same time the proceeds of the insurance are paid to the City as trustee.

5. Any insured, other than the City, making claim to which a deductible applies shall be responsible for 100% of the loss not insured because of the deductible. Except as provided for under California law, the policy or policies shall provide that the City is entitled to 30 Days prior written notice (10 Days for cancellation due to non-payment of premium) of cancellation or non-renewal of the policy or policies.

5-4.3 Rating Requirements. Except for the State Compensation Insurance Fund, all insurance required by this Contract as described herein shall 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.

5-4.3.1 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 Approved Surplus Lines Insurers (LASLI list).

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

5-4.4 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 shall 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.

5-4.5 Policy Endorsements.

5-4.5.1 Commercial General Liability Insurance.

5-4.5.1.1 Additional Insured.

1. You shall 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.
2. To the fullest extent allowed by law e.g., California Insurance Code §11580.04, the policy shall be endorsed to include the City and its respective elected officials, officers, employees, agents, and representatives as additional insured.
3. The additional insured coverage for projects for which the Engineer's Estimate is \$1,000,000 or more shall 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.
4. The additional insured coverage for projects for which the Engineer's Estimate is less than \$1,000,000 shall 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.

5-4.5.1.2 Primary and Non-Contributory Coverage. The policy shall 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 shall provide that any insurance maintained by the City and its elected officials, officers, employees, agents and representatives shall be in excess of your insurance and shall not contribute to it.

5-4.5.1.3 Project General Aggregate Limit. The policy or policies shall 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 shall reduce the Designated Construction Project General Aggregate Limit. The Designated Construction Project General Aggregate Limit shall be in addition to the aggregate limit provided for the products-completed operations hazard.

5-4.5.2 Commercial Automobile Liability Insurance.

5-4.5.2.1 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 shall 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.

5-4.5.3 Contractors Pollution Liability Insurance Endorsements.

5-4.5.3.1 Additional Insured.

1. The policy or policies shall be endorsed to include as an Insured the City and its respective elected officials, officers, employees, agents, and representatives, with respect to 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.

Except that in connection with, collateral to, or affecting any construction contract to which the provisions of subdivision (b) of § 2782 of the California Civil Code apply, this endorsement shall not provide any duty of indemnity coverage for the active negligence of the City and its respective elected officials, officers, employees, agents, and representatives in any case where an agreement to indemnify the City and its respective elected officials, officers, employees, agents, and representatives would be invalid under subdivision (b) of §2782 of the California Civil Code.

- 2. In any case where a claim or loss encompasses the negligence of the Insured and the active negligence of the City and its respective elected officials, officers, employees, agents, and representatives that are not covered because of California Insurance Code §11580.04, the insurer's obligation to the City and its respective elected officials, officers, employees, agents, and representatives shall be limited to obligations permitted by California Insurance Code §11580.04.

5-4.5.3.2 Primary and Non-Contributory Coverage. The policy or policies shall be endorsed to provide that the insurance afforded by the Contractors Pollution Liability Insurance policy or policies is primary to any insurance or self-insurance of the City and its elected officials, officers, employees, agents and representatives with respect to operations including the completed operations of the Named Insured. Any insurance maintained by the City and its elected officials, officers, employees, agents and representatives shall be in excess of your insurance and shall not contribute to it.

5-4.5.3.3 Severability of Interest. For Contractors Pollution Liability Insurance, the policy or policies shall provide that your insurance shall apply separately to each insured against whom claim is made or suit is brought, except with respect to the limits of the insurer's liability and shall provide cross-liability coverage.

5-4.5.4 Contractors Hazardous Transporters Pollution Liability Insurance Endorsements.

5-4.5.4.1 Additional Insured.

- 1. The policy or policies shall be endorsed to include as an Insured the City and its respective elected officials, officers, employees, agents, and representatives, with respect to 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.

Except that in connection with, collateral to, or affecting any construction contract to which the provisions of subdivision (b) of §2782 of the California Civil Code apply, this endorsement shall not provide any duty of indemnity coverage for the active negligence of the City and its respective elected officials, officers, employees, agents, and representatives in any case where an agreement to indemnify the City and its respective elected officials, officers, employees, agents, and representatives would be invalid under subdivision (b) of §2782 of the California Civil Code.

2. In any case where a claim or loss encompasses the negligence of the Insured and the active negligence of the City and its respective elected officials, officers, employees, agents, and representatives that are not covered because of California Insurance Code §11580.04, the insurer's obligation to the City and its respective elected officials, officers, employees, agents, and representatives shall be limited to obligations permitted by California Insurance Code §11580.04.

5-4.5.4.2 Primary and Non-Contributory Coverage. The policy or policies shall be endorsed to provide that the insurance afforded by the Contractors Pollution Liability Insurance policy or policies is primary to any insurance or self-insurance of the City and its elected officials, officers, employees, agents and representatives with respect to operations including the completed operations of the Named Insured. Any insurance maintained by the City and its elected officials, officers, employees, agents and representatives shall be in excess of your insurance and shall not contribute to it.

5-4.5.4.3 Severability of Interest. For Contractors Hazardous Transporters Pollution Liability Insurance, the policy or policies shall provide that your insurance shall apply separately to each insured against whom claim is made or suit is brought, except with respect to the limits of the insurer's liability and shall provide cross-liability coverage.

5-4.5.5 Builders Risk Endorsements.

5-4.5.5.1 Waiver of Subrogation. The policy or policies shall 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.

5-4.5.5.2 Builders Risk – Partial Utilization. If the City desires to occupy or use a portion or portions of the Work prior to Acceptance in accordance with this Contract, the City will notify you and you shall immediately notify your Builder's Risk insurer and obtain an endorsement that the policy or policies shall not be cancelled or lapse on account of

any such partial use or occupancy. You shall obtain the endorsement prior to the City's occupation and use.

5-4.6 Deductibles and Self-Insured Retentions. You shall pay for all deductibles and self-insured retentions. You shall disclose deductibles and self-insured retentions to the City at the time the evidence of insurance is provided.

5-4.7 Reservation of Rights. The City reserves 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. The City 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.

5-4.8 Notice of Changes to Insurance. You shall notify the City 30 Days prior to any material change to the policies of insurance provided under this Contract.

5-4.9 Excess Insurance. Policies providing excess coverage shall follow the form of the primary policy or policies e.g., all endorsements.

5-4.10 Architects and Engineers Professional Insurance (Errors and Omissions Insurance).

1. For Contracts with required engineering services (e.g., Design-Build, preparation of engineered Traffic Control Plans (TCP), and etc.) by you, you shall keep or require all of your employees or Subcontractors, who provide professional engineering services under this contract, Professional Liability coverage with a limit of **\$1,000,000** per claim and **\$2,000,000** annual aggregate in full force and effect.
2. You shall ensure the following:
 - a) The policy retroactive date is on or before the date of commencement of the Project.
 - b) The policy will be maintained in force for a period of 3 years after completion of the Project or termination of this Contract, whichever occurs last. You agree that for the time period specified above, there will be no changes or endorsements to the policy that affect the specified coverage.
3. If professional engineering services are to be provided solely by the Subcontractor, you shall:
 - a) Certify this to the City in writing and
 - b) Agree in writing to require the Subcontractor to procure Professional Liability coverage in accordance with the requirements set forth above.

5-4.11 Workers' Compensation Insurance and Employers Liability Insurance.

1. In accordance with the provisions of §3700 of the California Labor Code, you shall provide at your 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.

2. Limits for this insurance shall be not less than the following:

<u>Workers' Compensation</u>	<u>Statutory Employers Liability</u>
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

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

5-4.11.1. Waiver of Subrogation. The policy or policies shall 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.

5-13 ELECTRONIC COMMUNICATION. To the "WHITEBOOK", ADD the following:

2. Virtual Project Manager shall be used on this Contract. For more information, refer to the VPM training videos at the location below:

<https://www.sandiego.gov/publicworks/edocref>

SECTION 6 - PROSECUTION AND PROGRESS OF THE WORK

6-1.1 Construction Schedule. To the "WHITEBOOK", item 1, subsection "s", DELETE in its entirety and SUBSTITUTE with the following:

s) Submit an updated cash flow forecast with every pay request (for each Project ID or WBS number provided in the Contract) showing periodic and cumulative construction billing amounts for the duration of the Contract Time. If there has been any Extra Work since the last update, include only the approved amounts.

i. Refer to the Sample City Invoice materials in **Appendix D – Sample City Invoice with Cash Flow Forecast** and use the format shown.

- ii. See also the “Cash Flow Forecast Example” at the location below:

<https://www.sandiego.gov/publicworks/edocref>

To the “WHITEBOOK”, ADD the following:

- 3. The **90 Calendar Days** Plant Establishment Period is included in the stipulated Contract Time and shall begin with the acceptance of installation of the vegetation plan in accordance with Section 801-6, “MAINTENANCE AND PLANT ESTABLISHMENT”.

6-1.2.1 Construction Phasing. To the “WHITEBOOK”, ADD the following:

- 3. The contractor shall coordinate closely with the SDPD Rangemaster with the phasing schedule. In order to maintain the use part of the Police facility, the following phases of work shall be utilized:
 - a) Phase I:
 - i. West Range, Public Range and East Range will be closed until further notice. Rapid Fire Range will be operational.
 - ii. Soil Nail/Shotcrete Retaining wall: Work will start on the west end proceeding to east. Proceed approximately to low point in brow swale between Public and East Ranges.
 - iii. Complete trap pad and trap installation at West and Public Ranges.
 - iv. Complete tilt-up wall between West and Public Ranges.
 - v. Complete fencing, gates and paving at West and Public Ranges.
 - vi. Complete concrete pads for conex storage containers.
 - b) Phase II:
 - i. All Ranges are non operational.
 - ii. Complete Soil Nail/Shotcrete retaining wall through East Range.
 - c) Phase III:
 - i. Public Range, East Range and Rapid Fire will be closed until further notice. West Range will be operational.
 - ii. Commence work in the Clubhouse (Rock House) and Staff Building.
 - iii. Relocating the contents of the Armory, equipment and furniture out of Staff Building.

6-1.3 Work Outside Normal Working Hours. To the “WHITEBOOK”, ADD the following:

- 4. The contractor shall act as a good neighbor, adjust work hours when requested by the SDPD Rangemaster due to trainings, certification or special events within the Police Range facility.

6-1.5.2 Excusable Non-Compensable Delays. To the "WHITEBOOK", DELETE in its entirety and SUBSTITUTE with the following:

6-1.5.2 Excusable Non-Compensable and Concurrent Delays.

1. The City shall only issue an extension of time for Excusable Delays that meet the requirements of 6-4.2, "Extensions of Time" for the following circumstances:
 - a) Delays resulting from Force Majeure.
 - b) Delays caused by weather.
 - c) Delays caused by changes to County, State, or Federal law.
2. When a non-excusable delay is concurrent with an Excusable Delay, you shall not be entitled to an extension of Contract Time for the period the non-excusable delay is concurrent with the Excusable Delay.
3. When an Excusable Non-Compensable Delay is concurrent with an Excusable Compensable Delay, you shall be entitled to an extension of Contract Time, but shall not be entitled to compensation for the period the Excusable Non-Compensable Delay is concurrent with the Excusable Compensable Delay.

6-4.2 Extensions of Time. To the "WHITEBOOK", DELETE in its entirety and SUBSTITUTE with the following:

1. The Contract Time shall not be modified except by Change Order.
2. You shall notify the City in writing within **1 Working Day** after the occurrence and discovery of an event that impacts the Project Schedule.
 - a) If you believe this event requires a Change Order, you shall submit a **written Change Order request with a report to** the City that explains the request for Change Order within **5 Working Days**. The Change Order request must include supporting data, a general description of the discovery, the basis for extension, and the estimated length of extension. The City may grant an extension of time, in writing, for the Change Order request if you require more time to gather and analyze data.
3. The Engineer shall not grant an extension of Contract Time in accordance with 6-1.5, "Excusable Delays" unless you demonstrate, through an analysis of the critical path, the following:
 - a) The event causing the delay impacted the activities along the Project's critical path.

- b) The increases in the time to perform all or part of the Project beyond the Contract Time arose from unforeseeable causes beyond your control and without your fault or negligence and that all project float has been used.
4. Any modifications to the Contract Time will be incorporated into the weekly document that the Engineer issues that stipulates the Contract Time. If you do not agree with this document, submit to the Engineer for review a written protest supporting your objections to the document within **30 Calendar Days** after receipt of the statement. Your failure to file a timely protest shall constitute your acceptance of the Engineer’s weekly document.
- a) Your protest will be considered a claim for time extension and shall be subject to 2-10.1, “Claims”.

ADD:

6-6.1.1 Environmental Document.

- 1. The City of San Diego has prepared a **Mitigated Negative Declaration/Notice of Declaration/Notice of Exemption** for **Police Range Refurbishment Project – Phase II**, Project No. **S-18005**, as referenced in the Contract Appendix. You shall comply with all requirements of the **Mitigated Negative Declaration/Notice of Declaration/Notice of Exemption** as set forth in **Appendix A**.
- 2. Compliance with the City’s environmental document shall be included in the Contract Price, unless separate bid items have been provided.

6-6.2.1 Archaeological and Native American Monitoring Program. To the “WHITEBOOK”, ADD the following:

- 4. The contractor shall retain a qualified archaeologist and Native American Monitor for this Contract. You shall coordinate your activities and Schedule with the activities and schedules of the archaeologist and Native American monitor. Notify the Engineer before noon of the Working Day before monitoring is required. See 3-5, “INSPECTION” for details.
- 5. Refer to Mitigating, Monitoring, and Reporting Program (MMRP) Requirements of Sheet G-2 of the plans.

ADD:

6-6.2.1.1 Payment.

- 4. The payment for the Archeological and Native American Monitoring Program shall be included in the applicable Bid Items.

6-6.4 Written Notice and Report. To the “WHITEBOOK”, DELETE in its entirety and SUBSTITUTE with the following:

- 1. Your failure to notify the Resident Engineer within **1 Working Day** OR provide a Change Order request within **5 Working Days** after the event, in accordance with 6-4.2, “Extensions of Time”, will be considered grounds for refusal by the

City to consider such request if your failure to notify prejudices the City in responding to the event.

SECTION 7 – MEASUREMENT AND PAYMENT

7-3.1 General. To the “WHITEBOOK” ADD the following:

3. The Lump Sum Bid item for **“Construction of Police Range Refurbishment Project – Phase II”** shall include payments for all work required as specified per plan sheets 41205-1-D through 41205-131-D, Contract Documents, and this Notice of Inviting Bids inclusive.
4. The payment for all work required per **Appendix I Lead Containing Materials and Universal Waste Abatement Specification shall be included in the applicable Bid items, which includes but not limited to the following:**
 - i. Preparation of Hazardous Waste Management Plan and Reporting
 - ii. Monitoring of Contaminated Soil
 - iii. Testing, Sampling, Site Storage, and Handling of Soils Containing RCRA Hazardous Waste
 - iv. Loading, Transportation, and Disposal of soils containing RCRA Hazardous Waste

7-3.9 Field Orders. To the “WHITEBOOK”, DELETE in its entirety and SUBSTITUTE with the following:

1. If the cumulative total of Field Order items of Work does not exceed the “Field Orders” Bid Item, the City shall pay those Field Orders as shown below:

TABLE 7-3.9

FIELD ORDER LIMITS

Contract Price	Maximum Field Order Work Amount
Less than \$100,001	\$2,500
\$100,001 to \$1,000,000	\$5,000
\$1,000,001 to \$5,000,000	\$10,000
\$5,000,001 to \$15,000,000	\$20,000
\$15,000,001 to \$30,000,000	\$40,000
Greater than \$30,000,000	\$50,000

2. Field Order items of Work for contracts greater than \$15,000,000 will require additional approvals from the City prior to its approval by the Resident Engineer.
3. The City will issue a Field Order only after the City's acceptance of the cost of the field order amount.
4. Field Orders shall not be used to add scope or to include extensions of time related to changes in work.
5. If in the event there is a change related to the critical path on the project which necessitates an extension of time and the change amount is within the Field Order limits shown on Table 7-3.9, then a Field Order can be issued to compensate you for the approved costs. Any extensions of time associated with the change shall be included in a subsequent Change Order and no additional compensation shall be granted as part of the change order for the extension of time.
6. The unused portions of Field Orders Bid item shall revert to the City upon Acceptance.

SECTION 8 - FACILITIES FOR AGENCY PERSONNEL

8-2 FIELD OFFICE FACILITIES. To the "WHITEBOOK",ADD the following:

2. Contractor shall provide a temporary San Diego Police Department (SDPD) staff trailer equipped with electric utility during construction in the Staff Office building to avoid work impact on SDPD staff. The temporary staff trailer will host 10-12 SDPD staff.
3. Prior to commencing of the tenant improvements at the staff office, the contractor shall coordinate with SDPD staff for the time period consistent with construction operations on the date of the trailer delivery, installation and furnishing.

8-2.1 Class "A" Field Office. To the "WHITEBOOK",ADD the following:

4. The temporary field office trailer shall have a minimum floor space of 1200 square feet in area, at least 2 doors and window area of not less than 22 square feet. All doors and windows shall be provided with screens and blinds.
5. The contractor shall supply a temporary electrical service from the existing electrical panel. Electric power shall be provided to include a minimum of 4 duplex convenience outlets. Heating and air conditioning of sufficient capacity shall be provided by the contractor.
6. SDPD shall supply the data lines to the temporary field office trailer.

8-2.1.2 Furnishings. To the "WHITEBOOK",ADD the following:

17. The contractor shall remove the existing furnitures from the existing staff office to the temporary field office trailer. The contractor shall coordinate with the SDPD staff for the specific items to move.

8-5 REMOVAL OF FACILITIES. To the "GREENBOOK", ADD the following:

The temporary field office trailer shall be removed from the work site upon the completion of the work at the Staff Office Building. Furnitures from the temporary field office trailer shall be removed and relocate to the Staff Office Building.

ADD:

8-6 BASIS OF PAYMENT To the "GREENBOOK",ADD the following:

Payment for the temporary SDPD staff trailer, labor for removing and relocating staff furnitures shall be included in the lump sum bid item for "Construction of Police Range Refurbishment Project – Phase II".

SECTION 200 – ROCK MATERIALS

200-2 UNTREATED BASE MATERIALS.

200-2.1 General. To the "WHITEBOOK",ADD the following:

3. Base material for concrete paving, sidewalks, walkways, and ramps shall be Class 2 Aggregate base and shall conform to 3/4" Class 2 aggregate base, per Whitebook section 200-2.9 "Class 2 Aggregate Base." Installation per section 301-2.

SECTION 201 - CONCRETE, MORTAR AND RELATED MATERIALS

201-1 PORTLAND CEMENT CONCRETE:

201-1.1.2 Concrete Specified by Class and Alternate Class. To the "GREENBOOK",ADD the following:

The Type of Construction, Concrete Class, and Maximum Slump for the various sub-items of concrete work shall be as specified in Table 201-1.1.2 of the Standard Specifications with the following additions or modifications:

Type of Construction	Concrete Class	Max. Slump (With Certified Truck Ticket)
Concrete Paving (not integral with	560-C-3250	4-inch
Concrete Sidewalk and Curb	560-C-3250	4-inch
Concrete Street Section	560-C-3250	3-inch
Concrete Mow Curb	560-C-3250	4-inch
CIP Concrete Block Seating	560-C-3250	4-inch
Concrete Footings	560-C-3250	4-inch
Concrete Base	520-C-2500	4-inch

SECTION 300 - EARTHWORK

300-1 CLEARING AND GRUBBING

300-1.1 **General.** To the "GREENBOOK",ADD the following:

Prior to submittal of a Bid for this Work, the Contractor shall inspect the project site to verify the magnitude and cost of all clearing and grubbing required to accomplish this Work. Clearing and grubbing shall also include the removal and disposal of all miscellaneous materials: Buried pavements and other materials, old subsurface pavements and other materials encountered under existing pavements, which are within designated excavation areas on the plans.

The work includes demolition and removal (unclassified demolition) of all materials and facilities indicated or specified. Do not begin demolition until authorization is received from the Engineer. Remove rubbish and debris daily, unless otherwise directed. Store materials that cannot be removed daily in areas approved by the Engineer.

In addition to the above items, clearing and grubbing shall include, but not be limited to the following items as shown on the plans or specified in these Special Provisions:

1. Providing continuous pedestrian and vehicular within the project area, and as directed by the Engineer.Sawcutting of concrete and asphalt concrete at joints and construction limits.
2. Protection of existing improvements designated to remain in place. Contractor shall be responsible for replacement of any improvements damaged during clearing and grubbing or construction activities at no additional cost

Clearing and grubbing shall also include sawcutting, demolition, removal, and disposal of all existing improvements or otherwise required to perform the work, or as directed by the Resident Engineer.

300-2 **Unclassified Excavation:**

300-2.1 **General:** To the "GREENBOOK", ADD the following: In general, the on-site soils are suitable for reuse as fill if free from vegetation, debris, and other deleterious matter.

300-2.9 **Payment.**To the "GREENBOOK",DELETE in its entirety and ADD the following:

Unclassified Excavation shall include full compensation for furnishing all labor, materials, tools, equipment, and incidents, and for doing all the work involved in the excavation and embankments to achieve the subgrades and final grades as shown on the plans and as specified and as directed by the Resident Engineer.

The contractor shall be required to prepare their own earthwork for bidding and construction purposes. Any reference to earthwork quantities on the plans is strictly for bonding purposes and shall not be used by the contractor for a price basis. No

additional compensation for excavation, embankment, import, or export of material shall be allowed.

Payment for Unclassified Excavation shall be included in the lump sum bid item for **“Construction of Police Range Refurbishment Project – Phase II”** and shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in the excavation and embankments to achieve the subgrades and final grades as shown on the plans and as specified and as directed by the Resident Engineer.

SECTION 301 – SUBGRADE PREPARATION, TREATED MATERIALS, AND PLACEMENT OF BASE MATERIALS

301-2 UNTREATED BASE.

301-2.1 General. To the “GREENBOOK”,ADD the following:

Class II Aggregate Base shall be installed per Section 301-2.

301-2.4 To the “GREENBOOK”,ADD the following:

Payment for Class II Aggregate Base shall be at the contract unit price per cubic yard and shall be included in the overall project cost, and shall include full compensation for furnishing all labor, materials, equipment and incidentals necessary to perform the work as specified in the Standard Specifications, these Special Provisions and as directed by the City Engineer.

SECTION 303 - CONCRETE AND MASONRY CONSTRUCTION

303-1 CONCRETE STRUCTURES

303-1.1 General. To the “GREENBOOK”,ADD the following:

This work shall consist of preparing the area on which the concrete work is to be placed, which may include preparation of sub-grade, removal of tree roots, and placement of base materials in accordance with these Specifications and as shown on the plans. The following types of miscellaneous concrete items are included:

- a) Concrete Cleanouts
- b) Concrete Catch Basin

303-1.11 Payment. To the “GREENBOOK”,DELETE and REPLACE with the following:

Payment for concrete structures shall be included in the total lump sum project price and shall include the complete structural section, reinforcing, subgrade preparation, compaction, form work , and all specified finishes, admixtures, sealants, etc. and no other payment allowed therefore.

303-2.1.1 General. To the "GREENBOOK",DELETE last paragraph and SUBSTITUTE with the following:

303-2.1.1 Air-placed concrete shall be applied by Method B (Shotcrete).

ADD:

303-2.1.4 Submittals. Submit the following to Engineer for review and acceptance at least 30 day before placing shotcrete:

- A. Comply with Standard Specifications for Public Works Construction 'The GREENBOOK' and City Supplement 'The WHITEBOOK', current editions, Section 3-8.2 for Shop Drawings and Submittals.
- B. Shop Drawings:
 - 1. Indicate locations of cast-in-place concrete Work and accessory items such as vapor barriers.
 - 2. Steel Reinforcement: Placing drawings that detail fabrication, bending and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing and supports for concrete reinforcement.
 - 3. Embedded items.
 - 4. How Work will interface with adjacent Work.
 - 5. Construction Joint Layout: Indicate proposed construction joints required. Location of construction joints is subject to approval of the Engineer.
- C. Mix Design Data:
 - 1. Submit name, address and telephone number of the concrete production facility which the contractor intends to engage to design the concrete mixes. Submit name and qualifications of the proposed concrete technologist.
 - 2. Mix Design: Submit a concrete mix design for each strength and type of concrete indicated in the drawings or specified. Include:
 - a. minimum compressive strength
 - b. water/cement ratio
 - c. maximum slump
 - d. air content percentage

- e. source
 - f. size and amount of coarse aggregate
 - g. proposed admixtures including color additives
 - h. mix proportions of all aggregates
 - i. Clearly indicate locations where each mix design will be used.
3. Test Reports: Submit copies of test reports showing that the proposed mixes produce concrete with the strengths and properties specified. Include tests for cement, aggregates and admixtures. Provide gradation analysis.
- D. Material Certificates: Submit certification that each of the following conforms to the standards indicated:
- 1. Portland cement: ASTM C150.
 - 2. Normal weight concrete aggregates: ASTM C33.
 - 3. Lightweight concrete aggregates: ASTM C330.
 - 4. Aggregates: Submit evidence that the aggregate is not reactive in the presence of cement alkalis. In the absence of evidence, aggregate shall be tested per ASTM C289. If results of test are other than innocuous, aggregates shall be tested per ASTM C1567 as reported per ACI 318 as modified by CBC, Section 1903A.3.
 - 5. Curing materials.
 - 6. Steel reinforcement and accessories.
- E. Product Data and Manufacturer Installation Instructions: Submit manufacturers' data on each type of manufactured products indicated showing compliance with specified requirements.
- F. Material Samples: Submit the following:
- 1. Samples for Pigment Color Selection: Submit manufacturer's complete sample chip set, including pigment number and required dosage rate for each color.
- G. Test Panels and Mockup Panels:
- 1. Test Panels – to determine compressive strength, demonstrate encapsulation of the reinforcement, and absorption testing. Comply

with 2012 Standard Specifications for Public Works Construction 'The GREENBOOK' and 2012 City Supplement 'The WHITEBOOK', Section 303-2.4 for Tests.

- a. Size: 16 Sq. Ft. or larger, as directed by the Engineer.
 - b. Thickness: matching the minimum design thickness.
2. Mockup Panels - Demonstrating Final Finishes: Build on site 30 days prior to commencing work, using same materials, methods and work force that will be used for the project. Engineer will determine specific requirements and location. Mockup will not be incorporated as part of the final project.
- a. Size: 16 Sq. Ft., or larger if needed to adequately illustrate the pattern and texture selected.
 - b. One mockup panel for custom carved finish.
 - c. One mockup panel for smooth rubbed finish.
- H. Description of proposed equipment for mixing and applying shotcrete conforming to GREENBOOK Section 303-2.2. Include the manufacturer's instructions, recommendations, literature, performance, and test data.
- I. Proposed method for placement and curing shotcrete conforming to GREENBOOK Sections 303-2.6 through 303-2.10.
- J. Manufacturer's Installation Instructions: Indicate installation procedures, surface preparation, recommendations, storage and handling requirements, and interface required with adjacent construction for concrete accessories.
- K. Project References: Include project name, owner's name, and phone numbers
- L. Nozzle Operator's Experience and Training: For each nozzle operator, include shotcrete application experience
- M. Shotcrete Supervisor Experience: Include direct shotcrete application experience on comparable projects.
- N. Testing Laboratory Certification: Include documentation that the strength-testing laboratory complies with ASTM C 1077 and has the experience to perform the tests specified in this Section. The testing laboratory shall be AASHTO-accredited for ASTM C 1077 or demonstrate the ability to perform the requisite tests.

- O. Other information necessary to verify compliance with ACI 506.2.
- P. Results of all shotcrete preconstruction testing.
- Q. Minutes of Pre-installation Conference.
- R. Qualification Letter: Stating compliance with Installer Qualifications.
- S. Project Record Documents/Contractor AS-BUILTS: Accurately record actual locations of embedded utilities and components that will be concealed from view upon completion of shotcrete work.

ADD:

303-2.1.5 Quality Assurance.

- A. Installer's Qualifications: The contractor shall be qualified to perform the work specified by reason of experience. Nozzlemen shall be certified in accordance with requirements of ACI CP-60 Craftsman Work Book and the ACI 660 Shotcrete Nozzlemen Certification Committee.
- B. Preconstruction Testing: Shotcrete test panels.
- C. Mockup Panels: Finished shotcrete panels for review and acceptance of finish coat only.
- D. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant. Obtain aggregate from a single source. Obtain admixtures from single source from single manufacturer.
- E. Perform work of this section in accordance with ACI 506.2, unless specifically modified by requirements in the Contract Documents.
- F. Follow recommendations of ACI 306R when concreting during cold weather.
- G. Pre-installation Conference: Before starting shotcrete construction, conduct conference at Project site.
 - 1. Meet with City, Engineer, testing and inspection agency representative, Contractor's superintendent, nozzlemen, shotcrete supervisor, independent testing agency representative responsible for concrete design mixtures, ready mix concrete manufacturer, concrete subcontractor, special concrete finish subcontractor, and installers whose work interfaces with or affects concrete construction, including installer of structural steel connections, rough plumbing and rough electrical.
 - 2. Review methods and procedures related to shotcrete construction.
 - 3. Before submitting design mixtures, review shotcrete design mixture

and examine procedures for ensuring quality of shotcrete materials.

4. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment and facilities needed to make progress and avoid delays.
5. Review surface finish requirements for conditions and finishes.
6. Review special inspection and testing requirements and inspecting agency procedures for field quality control, concrete finishes and finishing, curing procedures, construction contraction and isolation joints, joint filler strips, semi-rigid joint fillers, vapor-retarder installation, floor and slab flatness and levelness measurement, concrete repair procedures and concrete protection.

303-2.1.6 Project Conditions.

Protection of Shotcrete: During construction, cover tops of walls, projections and sills with waterproof sheeting at end of each day's work. Cover partially completed wall when construction is not in progress.

1. Extend cover a minimum of 24 inches down side of wall and hold cover securely in place.

Stain Prevention: Prevent soil from staining the face of concrete to be left exposed or painted. Immediately remove soils that come in contact with such concrete.

1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
2. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing dirt onto completed concrete.

Follow ACI recommendations when applying concrete in cold or hot weather.

303-2.3.2 Method B. To the "GREENBOOK",DELETE in its entirety and SUBSTITUTE with the following:

303-2.3.2 Method B. The concrete class shall comply with 650-E-4000P. Portland Cement shall be Type V.

Concrete coloring agents shall conform to ASTM C 979. Use only coloring agents composed of synthetic or natural inorganic iron oxides.

303-2.4 Tests. To the "GREENBOOK", ADD the following after the 2nd paragraph:

303-2.4 Final Acceptance of Test Panels will be based on the 28-day strength.

Shotcrete production work may commence upon approval of the design mix, nozzlemen and mockup panels, and continue if the specified strengths are obtained. The shotcrete work by a crew will be suspended if the test results for their work do not satisfy the strength requirements. The Contractor shall change all or some of the following: the mix, the crew, the equipment, or the procedures. Before resuming work, the crew must shoot additional test panels and demonstrate that the shotcrete in the panels satisfies the specified strength requirements. The cost of all work required to obtain satisfactory strength tests will be borne by the Contractor.

Test Panels: One test panel shall include the maximum anticipated reinforcing congestion shown on the Plans. Cores extracted from this test panel shall demonstrate encapsulation of the reinforcement in accordance with ACI 506.2 equal to core grade 2 or better.

Another construction test panel shall be constructed without reinforcement and have cores extracted for absorption and compressive strength testing.

Submit field quality control test reports within two working days of performing the tests. Include the following information on the reports:

1. Sample identification including mix design and test panel number and orientation.
2. Date and time of sample preparation including curing conditions and sample dimensions.
3. Date, time and type of test.
4. Complete test results including load and deformation data during testing, sketch of sample before and after testing, and any unusual occurrences observed.
5. Name and signature of person performing the test.
6. Location of steel reinforcement, covered by shotcrete.
7. Name of nozzleman.

ADD:

303-2.4.1 Mockup Panels. Demonstrating Final Finishes. Conduct preconstruction mock up panels before starting shotcrete production.

Build on site 30 days prior to commencing work, using same materials, methods and work force that will be used for the project. Engineer will determine specific requirements and location. Mockup will not be incorporated as part of the final project.

- a. Size: 16 Sq. Ft., or larger if needed to adequately illustrate the pattern and texture selected.

- b. One mockup panel demonstrating custom carved finish.
- c. One mockup panel demonstrating smooth rubbed finish.

Finishing: Apply finish coat according to method proposed, reviewed and approved during preconstruction submittal process. Use integral color material matching color samples submitted, reviewed and approved by Engineer. Custom carved texture according to sample photographs found in Technical Specification Section 31 3236 Soil Nail Retaining Wall.

Mock Up Acceptance: The Engineer with accept or reject the mockup panels based on visual inspection of finish coat, including color and texture.

303-2.7 Forms and Ground Wires. To the "GREENBOOK", ADD the following:

303-2.7 The maximum distance between the wires on any surface shall be equal to the vertical nail spacing.

ADD:

303-2.9.1 Final Face Finish: Shotcrete finish shall be either a custom-carved finish or a smooth-rubbed finish in locations as indicated on the Drawings.

1. Finish custom-carved wall surface areas to match approved mockup panel and photographic examples provided at end of Technical Specification Section 31 3236 Soil Nail Retaining Wall.
2. All finish areas to be integral colored concrete, matching approved sample and mockup panels.

Coatings: Coat all exposed surfaces with anti-graffiti system as specified in 2012 City Supplement 'The WHITEBOOK', Section 210-6 for Anti-Graffiti Coating.

Shotcrete Facing Tolerances. Construction tolerances for the shotcrete facing from plan location and plan dimensions are as follows:

Horizontal location of welded wire mesh; reinforcing bars, and headed studs:

10 mm (0.4 in.)

Location of headed studs on bearing plate: 6 mm (¼ in.)

Spacing between reinforcing bars: 25 mm (1 in.)

Reinforcing lap, from specified dimension: 25mm (1 in.)

Complete thickness of shotcrete:

If troweled or screeded:	15 mm (0.6 in.)
If left as shot:	30 mm (1.2 in.)
Planeness of finish face surface-gap under 3-m (10-ft) straightedge:	
If troweled or screeded:	15 mm (0.6 in.)
If left as shot:	30 mm (1.2 in.)
Nail head bearing plate deviation from parallel to wall face:	10degrees

303-5 Concrete Curbs, Walks, Gutters, Cross Gutters, Alley Intersections, Access Ramps, and Driveways.

303-5.5 Finishing.

303-5.5.3 Walk. To the "GREENBOOK",ADD the following:

The forms shall be set to place the finish surface in a plane sloping from one edge of paving to the other edge a maximum of 1.5 percent right angle to the edge of paving.

SECTION 304 - METAL FABRICATION AND CONSTRUCTION

304-6 PAYMENT. To the "WHITEBOOK" ADD the following:

- The steel structures will be paid under the Lump Sum price for "Construction of Police Range Refurbishment Project – Phase II" for quantities as shown on the plans. No payment shall be made for structural works unless previously approved by the Engineer. No payment for structural work replacement will be made when the damage is due to the Contractor's failure to protect existing improvements. The contractor shall bear all costs for repairing or retesting.

SECTION 400 – PROTECTION AND RESTORATION

400-1 General. To the "WHITEBOOK", ADD the following:

- Section 4216/4217 of the Government Code requires a Dig-Alert identification number be issued at least two (2) working days prior to a "Permit To Excavate" will be valid. For your Dig-Alert identification number, Contractor shall call the following Underground Service Alert, services, and utilities:

Underground Service Alert	1-800-422-4133
Police	531-2000
Streets	527-7500
Drainage	527-7500
Water and Sewer	1-800-422-4133

San Diego Gas & Electric q 239-7511
Cable T.V. 236-9251 ext. 5212

SECTION 401 - REMOVAL

401-2 Asphalt Concrete Pavement. To the "WHITEBOOK", DELETE (a) in its entirety and SUBSTITUTE with the following:

- a) Bituminous pavement shall be cut and removed in such a manner so as not to tear, bulge or displace adjacent paving by use of construction machinery. Wheel type pressure cutters and drop hammer cutters will not be permitted for final edge cut. Sawcutting of edges to be joined is required. Where only the surface of existing bituminous pavement is to be removed, the method of removal shall be approved by the Engineer, and a minimum laying depth of 25 mm (1 inch) of new pavement material shall be provided at the join line. Where bituminous pavement adjoins a trench, the edges adjacent to the trench shall be trimmed to neat straight lines before resurfacing to ensure that all areas to be resurfaced are accessible to the rollers used to compact the subgrade or paving materials.

ADD the following:

- d) Miscellaneous materials: Buried pavements, old subsurface pavements and other materials encountered under existing pavements, which are within designated excavation areas on the demolition plans shall be removed.

SECTION 402 - UTILITIES

402-2 PROTECTION. To the "WHITEBOOK", item 2, ADD the following:

- g) Refer to **Appendix H - Advanced Metering Infrastructure (AMI) Device Protection** for more information on the protection of AMI devices.
3. Protection of the existing concrete target loading tunnel and pit in the middle of the Public Range and shoring during construction to avoid tunnel collapse due to movement and impacts during construction.

SECTION 600 – TEMPORARY TRAFFIC CONTROL

600-2 VEHICULAR ACCESS. To the "WHITEBOOK", ADD the following:

5. The contractor shall access West Range through Vehicle Maintenance Facility (VMF) site and large gate on the west side of West Range. The contractor shall coordinate with Police staff and VMF during construction of West Range.

SECTION 801 – INSTALLATION

801-2.3 **Finish Grading.** To the “WHITEBOOK”, item 2, ADD the following:

4. Finish grades shall be measured at the top surface of materials. The Contractor shall calculate required subgrade elevations based on surface material thickness.

The Contractor shall take every precaution to protect and avoid damage to underground utilities during his grading and conditioning operations.

The Contractor shall coordinate all drainage work with all other trades. Established site drainage shall be maintained by the Contractor during all phases of construction.

Final finish grades shall ensure positive drainage of the site with all surface drainage away from trails, buildings, play areas, walls, and toward, drainage facilities, and catch basins or water courses.

Final grades shall be acceptable to the Resident Engineer. Grading operations shall conform with the Geotechnical Report.

SECTION 1001 – CONSTRUCTION BEST MANAGEMENT PRACTICES (BMPs)

1001-1 **GENERAL.** To the “WHITEBOOK”, ADD the following:

7. Based on a preliminary assessment by the City, this Contract is subject to WPCP.

SECTION 1002 – PERMANENT BEST MANAGEMENT PRACTICES (BMPS)

1002-4.4 **Measurement and Payment.** To the “WHITEBOOK” DELETE in its entirety and SUBSTITUTE with the following:

Payment for Perforated PVC pipes shall be included in the total lump sum project price and shall include all materials, labor, tools, equipment and incidentals (including pipe risers, caps, fittings, pipe penetrations, and joint sealants) and no other payment allowed therefore.

1002-5.4 **Payment.** To the “WHITEBOOK” DELETE in its entirety and SUBSTITUTE with the following:

Payment for underdrain cleanouts shall be included in the total lump sum project price and shall include shoring, backfill, compaction, installation of cleanout including wyes and jointing, pipe risers, gaskets, frames and covers or screw caps and concrete

encasements. This shall also include the Work required for testing and acceptance and no other payment allowed therefore.

1002-7.11 Measurement and Payment. To the "WHITEBOOK" DELETE in its entirety and SUBSTITUTE with the following:

Payment for Bioretention Soil Media shall be included in the total lump sum project price and shall include all labor, placement, soil mixture, testing and all other incidentals necessary to install the BSM and no other payment allowed therefore.

1002-8.7 Measurement and Payment. To the "WHITEBOOK" DELETE in its entirety and SUBSTITUTE with the following:

Payment for graded aggregate choker material, open graded aggregate storage material shall be included in the total lump sum project price and shall include all labor, placement, soil mixture, testing and all other incidentals necessary to install the material and no other payment allowed therefore.

END OF SUPPLEMENTARY SPECIAL PROVISIONS (SSP)

TECHNICALS

CITY OF SAN DIEGO POLICE RANGE REFURBISHMENT PROJECT – PHASE II

TECHNICAL SPECIFICATION

FINAL DESIGN
MAY 22, 2019

TABLE OF CONTENTS

02 41 16 – Structure Demolition

02 41 19 – Selective Demolition

03 30 00 - Cast-in-Place Concrete

03 47 13 – Tilt-Up Concrete

03 54 16 – Hydraulic Cement Underlayment

05 12 00 – Structural Steel Framing

05 12 13 – Architecturally Exposed Structural Steel Framing

05 31 00 – Steel Decking

05 40 00 – Cold-Formed Metal Framing

05 50 00 – Metal Fabrications

06 10 00 – Rough Carpentry

06 16 00 – Sheathing

06 41 13 – Wood-Veneer-Faced Architectural Cabinets

06 41 16 – Plastic-Laminate-Clad Architectural Cabinets

07 13 26 – Self-Adhering Sheet Waterproofing

07 19 00 – Water Repellents

07 25 00 – Weather Barriers

07 41 13.13 – Formed Metal Roof Panels

07 46 46 – Fiber-Cement Siding

07 62 00 - Sheet Metal Flashing and Trim

07 92 00 - Joint Sealants

08 01 52.93 – Historic Treatment of Wood Windows

08 11 13 – Hollow Metal Doors and Frames

08 14 33 – Stile and Rail Wood Doors

08 71 00 – Door Hardware

FINAL DESIGN
MAY 10, 2019

08 88 00 - Glazing
08 88 56 – Ballistics Resistant Glazing
09 01 90.91 – Painting Restoration
09 22 16 – Non-Structural Metal Framing
09 29 00 – Gypsum Board
09 30 13 – Ceramic Tiling
09 51 23 – Acoustical Tile Ceilings
09 65 13 – Resilient Base and Accessories
09 65 19 – Resilient Tile Flooring
09 68 13 – Tile Carpeting
09 91 23 – Interior Painting
09 96 00 – High-Performance Coatings
10 14 23.13 – Room-Identification Signage
10 28 00 - Toilet and Bath Accessories
10 44 16 - Fire Extinguishers
11 67 23 – Shooting Range Equipment
22 05 18 – Escutcheons for Plumbing Piping
22 05 23.12 – Ball Valves for Plumbing Piping
22 07 19 – Plumbing Piping Insulation
22 11 16 – Domestic Water Piping
22 13 16 – Sanitary Waste and Vent Piping
22 13 19 – Sanitary Waste Piping Specialties
22 42 13.13 – Commercial Water Closets
22 42 16.13 – Commercial Lavatories
23 05 53 – Identification for HVAC Piping and Equipment
23 31 13 – Metal Ducts

FINAL DESIGN
MAY 10, 2019

23 34 23 – HVAC Power Ventilators
23 34 39 – High-Volume, Low-Speed Fans
26 05 00 – General Electrical Requirements
26 05 10 – Basic Electrical Materials and Methods
26 05 19 – Wires and Cables
26 05 26 – Grounding and Bonding
26 05 43 – Raceways and Boxes
26 05 53 – Identification for Electrical Systems
26 05 73 – Overcurrent Protective Devices
26 09 23 – Lighting Control Devices
26 09 43.23 – Relay-Based Lighting Controls
26 24 16 – Panelboards
26 27 26 – Wiring Devices
26 51 00 – Interior Lighting
26 56 00 – Exterior Lighting
26 56 68 – Sports Lighting - LED
27 51 16 – Public Address and Mass Notifications System
31 32 36 – Soil Nail Retaining Wall
32 31 32 – Composite Fences and Gates
33 46 00 - Subdrainage

END OF TABLE OF CONTENTS

FINAL DESIGN
MAY 10, 2019

SECTION 02 41 16
STRUCTURE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract - Standard Specifications for Public Works Construction 'The GREENBOOK' and City Supplement 'The WHITEBOOK', latest editions, including Supplemental Supplementary Provisions (SSPs), apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Demolition and removal of buildings and site improvements.
2. Removing below-grade construction.
3. Disconnecting, capping or sealing, and abandoning in-place site utilities.
4. Salvaging items for reuse by City.

B. Related Requirements:

1. Section 024119 "Selective Demolition" for partial demolition of buildings, structures, and site improvements – generally, applies to Historic Clubhouse Building and Staff Office Building work.

1.3 DEFINITIONS

- A. Remove: Detach items from existing construction and dispose of them off-site unless indicated to be salvaged.

- B. Remove and Salvage: Detach items from existing construction, in a manner to prevent damage, and store. Include fasteners or brackets needed for reattachment elsewhere.

1.4 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.

1.5 PREINSTALLATION MEETINGS

- A. Predemolition Conference: Conduct conference at Project site.
1. Inspect and discuss condition of construction to be demolished.
 2. Review structural load limitations of existing structures.
 3. Review and finalize building demolition schedule and verify availability of demolition personnel, equipment, and facilities needed to make progress and avoid delays.
 4. Review and finalize protection requirements.
 5. Review procedures for noise control and dust control.
 6. Review procedures for protection of adjacent buildings.
 7. Review items to be salvaged and returned to Owner.

1.6 INFORMATIONAL SUBMITTALS

- A. Engineering Survey: Submit engineering survey of condition of existing pavements in areas of historic shade structures – West Range and Public Range.
1. Provide copies to Engineer including printed hard copy and digital survey file.
 - a. Hard Copy: 1"=20' scale on minimum Arch D (24x36) size bond paper. 3 copies.
 - b. Digital PDF: Of printed Arch D sheet allowing archive and ready reproduction.
 - c. Digital survey file: Comply with City Microstation standard. Provide file to Engineer on flash drive or compact disc.
- B. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property, for environmental protection, for dust control and, for noise control. Indicate proposed locations and construction of barriers.
1. For Engineer review and information only. Design team will not review this item.
 2. Adjacent Buildings: Detail special measures proposed to protect adjacent buildings to remain including means of egress from those buildings.
- C. 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.
- D. Predemolition Photographs and Video: Show existing conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by salvage and demolition operations. Comply with Section 400-1.1 "Video Recording of Existing Conditions." Submit before the Work begins.

1.7 CLOSEOUT SUBMITTALS

- A. Inventory: Submit a list of items that have been removed and salvaged.

1.8 FIELD CONDITIONS

- A. Buildings to be demolished will be vacated and their use discontinued before start of the Work.
- B. Buildings immediately adjacent to demolition area will be occupied. Conduct building demolition so operations of occupied buildings will not be disrupted.
 - 1. Provide not less than 7 days' notice of activities that will affect operations of adjacent occupied buildings.
 - 2. Maintain access to existing walkways, exits, and other facilities used by occupants of adjacent buildings.
 - a. Do not close or obstruct walkways, exits, or other facilities used by occupants of adjacent buildings without written permission from authorities having jurisdiction.
- C. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
 - 1. Before building demolition, Owner will remove the following items:
 - a. Contents of existing storage rooms.
- D. Hazardous Materials: Present and prevalent throughout the site, and in buildings and structures to be demolished. A report on the presence of hazardous materials is on file for review and use. Examine report to become aware of locations where hazardous materials are present. Review special instructions in Supplemental Special Provisions for handling and remediation requirements.
 - 1. Hazardous material remediation is specified elsewhere in the Contract Documents.
 - 2. Do not disturb hazardous materials or items suspected of containing hazardous materials except under procedures specified elsewhere in the Contract Documents.
- E. On-site storage or sale of removed items or materials is not permitted.

1.9 COORDINATION

- A. Arrange demolition schedule so as not to interfere with Owner's on-site operations or operations of adjacent occupied buildings. Work activities on any area, or range, of the site must be closely coordinated with the Engineer and Police Representative.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- 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.

2.2 SOIL MATERIALS

- A. Satisfactory Soils: Comply with requirements in Section 300 "Earthwork."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Review Project Record Documents of existing construction or other existing condition and hazardous material information provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in Project Record Documents.
- B. Perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during building demolition operations.
- C. Inventory and record the condition of items to be removed and salvaged.

3.2 PREPARATION

- A. Salvaged Items: Comply with the following:
 - 1. Clean salvaged items of dirt and demolition debris.
 - 2. Pack or crate items after cleaning. Identify contents of containers.
 - 3. Store items in a secure area until delivery to Owner.
 - 4. Transport items to storage area designated by Engineer.
 - 5. Protect items from damage during transport and storage.

3.3 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

- A. Existing Utilities to be Disconnected: Locate, identify, disconnect, and seal or cap off utilities serving buildings and structures to be demolished.
 - 1. Arrange to shut off utilities with utility companies.
 - 2. If removal, relocation, or abandonment of utility services will affect adjacent occupied buildings, then provide temporary utilities that bypass buildings and

structures to be demolished and that maintain continuity of service to other buildings and structures.

3. Cut off pipe or conduit a minimum of 24 inches (610 mm) below grade. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing according to requirements of authorities having jurisdiction.
4. Do not start demolition work until utility disconnecting and sealing have been completed and verified in writing.

3.4 PROTECTION

- A. Existing Facilities: Protect adjacent walkways, loading docks, building entries, and other building facilities during demolition operations. Maintain exits from existing buildings.
- B. 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.
- C. Existing Utilities to Remain: Maintain utility services to remain and protect from damage during demolition operations.
 1. Do not interrupt existing utilities serving adjacent occupied or operating facilities unless authorized in writing by Owner and authorities having jurisdiction.
 2. Provide temporary services during interruptions to existing utilities, as acceptable to Owner and authorities having jurisdiction.
 - a. Provide at least 7 days' notice to occupants of affected buildings if shutdown of service is required during changeover.
- D. 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.
 5. Provide protection to ensure safe passage of people around building demolition area and to and from occupied portions of adjacent buildings and structures.
 6. Protect walls, windows, roofs, and other adjacent exterior construction that are to remain and that are exposed to building demolition operations.
 7. Erect and maintain dustproof partitions and temporary enclosures to limit dust, noise, and dirt migration to occupied portions of adjacent buildings.

- E. 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.

3.5 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 fire watch during and for at least 2 hours after flame-cutting operations.
 - 3. Maintain adequate ventilation when using cutting torches.
 - 4. 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 trafficways 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.

3.6 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 walls and other below-grade construction.
 - 1. Remove below-grade construction, including basements, foundation walls, and footings, completely.

POLICE RANGE REFURBISHMENT PROJECT – PHASE II

- D. Existing Utilities: Demolish and remove existing utilities and below-grade utility structures.

3.7 SITE RESTORATION

- A. Below-Grade Areas: Rough grade below-grade areas ready for further excavation or new construction.
- B. Below-Grade Areas: Completely fill below-grade areas and voids resulting from building demolition operations with satisfactory soil materials according to backfill requirements in Section 300 "Earthwork."
- C. 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.

3.8 REPAIRS

- A. Promptly repair damage to adjacent buildings caused by demolition operations.

3.9 DISPOSAL OF DEMOLISHED MATERIALS

- A. Remove demolition waste materials from Project site and and recycle or dispose of them according to City's "Construction Waste Management and Disposal Program."
 - 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.

3.10 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 024119
SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract - Standard Specifications for Public Works Construction 'The GREENBOOK' and City Supplement 'The WHITEBOOK', latest editions, including Supplemental Supplementary Provisions (SSPs), apply to this Section.

1.2 SUMMARY

A. Section Includes:

- 1. Generally, this Section applies to Historic Clubhouse Building and Staff Office Building.
- 2. Demolition and removal of selected portions of building or structure.
- 3. Demolition and removal of selected site elements.
- 4. Salvage of existing items to be reused or recycled.

B. Related Requirements:

- 1. Section 024116 "Structure Demolition" for site features and structures to be completely removed.

1.3 DEFINITIONS

- A. Remove: Detach items from existing construction and dispose of them off-site unless indicated to be salvaged or reinstalled.
- B. Remove and Salvage: Detach items from existing construction, in a manner to prevent damage, and deliver to City ready for reuse.
- C. Remove and Reinstall: Detach items from existing construction, in a manner to prevent damage, prepare for reuse, and reinstall where indicated.
- D. Existing to Remain: Leave existing items that are not to be removed and that are not otherwise indicated to be salvaged or reinstalled.
- E. Dismantle: To remove by disassembling or detaching an item from a surface, using gentle methods and equipment to prevent damage to the item and surfaces; disposing of items unless indicated to be salvaged or reinstalled.

1.4 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 City.
 - 1. Carefully salvage in a manner to prevent damage and promptly return to City.

1.5 PREINSTALLATION MEETINGS

- A. Predemolition Conference: Conduct conference at Project site.
 - 1. Inspect and discuss condition of construction to be selectively demolished.
 - 2. Review structural load limitations of existing structure.
 - 3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
 - 4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
 - 5. Review areas where existing construction is to remain and requires protection.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For refrigerant recovery technician.
- B. Engineering Survey: Submit engineering survey of condition of building.
- C. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property, for environmental protection, for dust control. Indicate proposed locations and construction of barriers.
- D. Schedule of Selective Demolition Activities: Indicate the following:
 - 1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure City Rangemaster's on-site operations are uninterrupted.
 - 2. Interruption of utility services. Indicate how long utility services will be interrupted.
 - 3. Coordination for shutoff, capping, and continuation of utility services.
 - 4. Use of elevator and stairs.
 - 5. Coordination of City's continuing occupancy of portions of existing building and of City's partial occupancy of completed Work.
- E. Predemolition Photographs and Video: Show existing conditions of adjoining construction, including finish surfaces, that might be misconstrued as damage caused by demolition operations. Submit to Engineer before Work begins.

POLICE RANGE REFURBISHMENT PROJECT – PHASE II

- F. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.
- G. Warranties: Documentation indicating that existing warranties are still in effect after completion of selective demolition.

1.7 CLOSEOUT SUBMITTALS

- A. Inventory: Submit a list of items that have been removed and salvaged.

1.8 QUALITY ASSURANCE

- A. Refrigerant Recovery Technician Qualifications: Certified by an EPA-approved certification program.

1.9 FIELD CONDITIONS

- A. Owner will occupy portions of site and adjacent buildings immediately adjacent to selective demolition area. Conduct selective demolition so City's operations will not be disrupted.
- B. Conditions existing at time of inspection for bidding purpose will be maintained by City as far as practical.
 - 1. Before selective demolition, City will remove the following items:
 - a. Personal effects, but not furniture.
 - b. Computer and Telephone equipment.
- C. Notify Engineer of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
 - 1. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by City under a separate contract.
- E. Hazardous Materials: Present and prevalent throughout the site, and in buildings and structures to be demolished. A report on the presence of hazardous materials is on file for review and use. Examine report to become aware of locations where hazardous materials are present. Review special instructions in Supplemental Special Provisions for handling and remediation requirements.
 - 1. Hazardous material remediation is specified elsewhere in the Contract Documents.

POLICE RANGE REFURBISHMENT PROJECT – PHASE II

- 2. Do not disturb hazardous materials or items suspected of containing hazardous materials except under procedures specified elsewhere in the Contract Documents.
- F. Historic Areas: Demolition and hauling equipment and other materials shall be of sizes that clear surfaces within historic spaces, areas, rooms, and openings, including temporary protection, by 12 inches (300 mm) or more.
- G. Storage or sale of removed items or materials on-site is not permitted.
- H. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
 - 1. Maintain fire-protection facilities in service during selective demolition operations.

1.10 COORDINATION

- A. Arrange selective demolition schedule so as not to interfere with City Rangemaster's operations.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- B. Standards: Comply with ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Review Project Record Documents of existing construction or other existing condition and hazardous material information provided by City. City does not guarantee that existing conditions are same as those indicated in Project Record Documents.
- B. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs or video.
 - 1. 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.
 - 2. Before selective demolition or removal of existing building elements that will be reproduced or duplicated in final Work, make permanent record of measurements, materials, and construction details required to make exact reproduction.

3.2 PREPARATION

- A. Refrigerant: Before starting demolition, remove refrigerant from mechanical equipment according to 40 CFR 82 and regulations of authorities having jurisdiction.

3.3 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

- A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.
- B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off utility services and mechanical/electrical systems serving areas to be selectively demolished.
 - 1. Arrange to shut off utilities with utility companies.
 - 2. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
 - 3. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated on Drawings to be removed.
 - a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
 - b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material and leave in place.
 - c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
 - d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
 - e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
 - f. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
 - g. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material and leave in place.

3.4 PROTECTION

- A. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
 - 1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
 - 2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
 - 3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.

4. Cover and protect furniture, furnishings, and equipment that have not been removed.
 5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Section 015000 "Temporary Facilities and Controls."
- B. Temporary Shoring: Design, provide, and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
1. Strengthen or add new supports when required during progress of selective demolition.
- C. Remove temporary barricades and protections where hazards no longer exist.

3.5 SELECTIVE DEMOLITION, GENERAL

- A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
 2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.
 3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
 4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
 5. Maintain fire watch during and for at least 2 hours after flame-cutting operations.
 6. Maintain adequate ventilation when using cutting torches.
 7. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
 8. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
 9. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
 10. Dispose of demolished items and materials promptly. Comply with requirements of City's Construction Waste Management Plan.
- B. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
- C. Removed and Salvaged Items:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until delivery to City.
4. Transport items to City's storage area designated by City.
5. Protect items from damage during transport and storage.

D. Removed and Reinstalled Items:

1. Clean and repair items to functional condition adequate for intended reuse.
2. Pack or crate items after cleaning and repairing. Identify contents of containers.
3. Protect items from damage during transport and storage.
4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

E. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Engineer, items may be removed to a suitable, protected storage location during selective demolition and reinstalled in their original locations after selective demolition operations are complete.

3.6 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

- A. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals using power-driven saw, and then remove concrete between saw cuts.
- B. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, and then break up and remove.
- C. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI's "Recommended Work Practices for the Removal of Resilient Floor Coverings." Do not use methods requiring solvent-based adhesive strippers.

3.7 DISPOSAL OF DEMOLISHED MATERIALS

- A. Remove demolition waste materials from Project site and dispose of them in an EPA-approved construction and demolition waste landfill acceptable to authorities having jurisdiction and recycle or dispose of them according to City's Construction Waste Management and Disposal Plan.
 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. Burning: Do not burn demolished materials.

3.8 CLEANING

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

3.9 SELECTIVE DEMOLITION SCHEDULE

- A. Remove: Items as indicated on Drawings, and those items and materials which must be removed to complete new Work.
- B. Remove and Reinstall: Furniture, Fixtures and Equipment not indicated to be Removed on Drawings. These include, but are not limited to:
 - 1. Clubhouse Assembly Room: Tables and Chairs, Bar and Floor Rail, Bar return, ice machine, window blinds.
 - 2. Clubhouse Kitchen: Stainless steel counters and sinks, refrigerators, stove, water heater.
 - 3. Staff Office Building: Desks, chairs, other FF&E required to complete Work, safes, filing cabinets, storage cabinets, metal lockers, refrigerator, contents of cabinetry to receive work, ceiling-mounted security grille, window-mount air conditioning unit.
- C. Existing to Remain: Items indicated as such on Drawings.
- D. Dismantle: All items, materials, finishes noted to be removed in Clubhouse shall be Dismantled per the definition of this Section with care taken to interface of any historical work to remain.

END OF SECTION 024119

SECTION 033000

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract - Standard Specifications for Public Works Construction 'The GREENBOOK' and City Supplement 'The WHITEBOOK', latest editions, including Supplemental Supplementary Provisions (SSPs), apply to this Section.

1.2 SUMMARY

- A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes.
- B. Related Requirements:
 - 1. Section 312000 "Earth Moving" for drainage fill under slabs-on-grade.

1.3 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash, slag cement, other pozzolans, and silica fume; materials subject to compliance with requirements.
- B. W/C Ratio: The ratio by weight of water to cementitious materials.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:
 - a. Contractor's superintendent.
 - b. Independent testing agency responsible for concrete design mixtures.
 - c. Ready-mix concrete manufacturer.
 - d. Concrete Subcontractor.
 - 2. Review special inspection and testing and inspecting agency procedures for field quality control, concrete finishes and finishing, cold- and hot-weather concreting

POLICE RANGE REFURBISHMENT PROJECT – PHASE II

procedures, curing procedures, construction contraction and isolation joints, and joint-filler strips, semirigid joint fillers, forms and form removal limitations, shoring and reshoring procedures, vapor-retarder installation, anchor rod and anchorage device installation tolerances, steel reinforcement installation, methods for achieving specified floor and slab flatness and levelness, floor and slab flatness and levelness measurement, concrete repair procedures, and concrete protection.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
 - 1. Indicate amounts of mixing water to be withheld for later addition at Project site.
- C. Steel Reinforcement Shop Drawings: Placing Drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.
- D. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.
 - 1. Location of construction joints is subject to approval of the Architect.
- E. Samples: For vapor retarder.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer, manufacturer, testing agency.
- B. Welding certificates.
- C. Material Certificates: For each of the following, signed by manufacturers:
 - 1. Cementitious materials.
 - 2. Admixtures.
 - 3. Form materials and form-release agents.
 - 4. Steel reinforcement and accessories.
 - 5. Curing compounds.
 - 6. Floor and slab treatments.
 - 7. Bonding agents.
 - 8. Adhesives.
 - 9. Vapor retarders.
 - 10. Semirigid joint filler.
 - 11. Joint-filler strips.

12. Repair materials.

D. Material Test Reports: For the following, from a qualified testing agency:

1. Aggregates: Include service record data indicating absence of deleterious expansion of concrete due to alkali aggregate reactivity.

E. Formwork Shop Drawings: Prepared by or under the supervision of a qualified professional engineer, detailing fabrication, assembly, and support of formwork.

1. Shoring and Reshoring: Indicate proposed schedule and sequence of stripping formwork, shoring removal, and reshoring installation and removal.

F. Floor surface flatness and levelness measurements indicating compliance with specified tolerances.

G. Field quality-control reports.

H. Minutes of preinstallation conference.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.

B. 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.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

C. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.

1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.

2. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician, Grade I. Testing agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician, Grade II.

D. Welding Qualifications: Qualify procedures and personnel according to AWS D1.4/D 1.4M.

1.8 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing on concrete mixtures.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.

1.10 FIELD CONDITIONS

- A. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
 - 1. When average high and low temperature is expected to fall below 40 deg F (4.4 deg C) for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301 (ACI 301M).
 - 2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
 - 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.
- B. Hot-Weather Placement: Comply with ACI 301 (ACI 301M) and ACI 305.1 (ACI 305.1M), and as follows:
 - 1. Maintain concrete temperature below 90 deg F (32 deg C) at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
 - 2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

- A. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
 - 1. ACI 301 (ACI 301M).
 - 2. ACI 117 (ACI 117M).

2.2 FORM-FACING MATERIALS

- A. Smooth-Formed Finished Concrete: Form-facing panels that provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
 - 1. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:
 - a. B-B (Concrete Form), Class 1 or better; mill oiled and edge sealed.
- 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.
- C. Void Forms: Biodegradable paper surface, treated for moisture resistance, structurally sufficient to support weight of plastic concrete and other superimposed loads.
- D. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch (19 by 19 mm), minimum.
- E. Rustication Strips: Wood, metal, PVC, or rubber strips, kerfed for ease of form removal.
- F. Form-Release Agent: Commercially formulated form-release agent that does not bond with, stain, or adversely affect concrete surfaces and does not impair subsequent treatments of concrete surfaces.
 - 1. Formulate form-release agent with rust inhibitor for steel form-facing materials.
- G. Form Ties: Factory-fabricated, removable or snap-off glass-fiber-reinforced plastic or metal form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
 - 1. Furnish units that leave no corrodible metal closer than 1 inch (25 mm) to the plane of exposed concrete surface.
 - 2. Furnish ties that, when removed, leave holes no larger than 1 inch (25 mm) in diameter in concrete surface.

2.3 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.
- B. Low-Alloy-Steel Reinforcing Bars: ASTM A 706/A 706M, deformed.
- C. Plain-Steel Wire: ASTM A 1064/A 1064M, galvanized.
- D. Deformed-Steel Wire: ASTM A 1064/A 1064M.

2.4 REINFORCEMENT ACCESSORIES

- A. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), plain-steel bars, cut true to length with ends square and free of burrs.
- B. Zinc Repair Material: ASTM A 780/A 780M.
- C. 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," of greater compressive strength than concrete and as follows:
 - 1. For concrete surfaces exposed to view, where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.

2.5 CONCRETE MATERIALS

- A. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.
- B. Cementitious Materials:
 - 1. Portland Cement: ASTM C 150/C 150M, Type V, gray.
- C. Normal-Weight Aggregates: ASTM C 33/C 33M, Class 1N coarse aggregate or better, graded. Provide aggregates from a single source with documented service record data of satisfactory service in similar applications and service conditions using similar aggregates and cementitious materials.
 - 1. Maximum Coarse-Aggregate Size:
 - a. 1 inch (25 mm) at FOUNDATION and MASS CONCRETE WORK.
 - b. 3/4 inch (19 mm) at SLAB, WALLS, and other CONCRETE WORK.
 - 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- D. Air-Entraining Admixture: ASTM C 260/C 260M.
- E. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

ADMIXTURES shall NOT be used unless substantiating data is submitted to, and accepted by the Engineer (EOR) and Architect of Record (AOR.)

- 1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
- 2. Retarding Admixture: ASTM C 494/C 494M, Type B.
- 3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.

4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

F. Water: ASTM C 94/C 94M and potable.

2.6 VAPOR RETARDERS

A. Sheet Vapor Retarder: ASTM E 1745, Class A. Include manufacturer's recommended adhesive or pressure-sensitive tape.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Reef Industries, Inc.
 - b. Stego Industries, LLC.
 - c. W. R. Meadows, Inc.
2. Minimum Thickness: 15 mils.

2.7 LIQUID FLOOR TREATMENTS

A. Penetrating Liquid Floor Treatment: Clear, chemically reactive, waterborne solution of inorganic silicate or silicate materials and proprietary components; odorless; that penetrates, hardens, and densifies concrete surfaces.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. BASF Corp. - Construction Chemicals.
 - b. Dayton Superior.
 - c. Euclid Chemical Company (The); an RPM company.
 - d. PROSOCO, Inc.
 - e. W.R. Meadows, Inc.

2.8 CURING MATERIALS

A. 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.

B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

C. Water: Potable.

2.9 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber or ASTM D 1752, cork or self-expanding cork.
- B. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids, epoxy resin with a Type A shore durometer hardness of 80 according to ASTM D 2240.
- C. Bonding Agent: ASTM C 1059/C 1059M, Type II, nonredispersible, acrylic emulsion or styrene butadiene.
- D. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements, and as follows:
 - 1. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.
- E. Reglets: Fabricate reglets of not less than 0.022-inch- (0.55-mm-) thick, galvanized-steel sheet. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.
- F. Dovetail Anchor Slots: Hot-dip galvanized-steel sheet, not less than 0.034 inch (0.85 mm) thick, with bent tab anchors. Temporarily fill or cover face opening of slots to prevent intrusion of concrete or debris.

2.10 REPAIR MATERIALS

- A. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch (6.4 mm) and that can be filled in over a scarified surface to match adjacent floor elevations.
 - 1. Cement Binder: ASTM C 150/C 150M, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
 - 2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
 - 3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch (3.2 to 6 mm) or coarse sand as recommended by topping manufacturer.
 - 4. Compressive Strength: Not less than 5000 psi (34.5 MPa) at 28 days when tested according to ASTM C 109/C 109M.

2.11 CONCRETE MIXTURES, GENERAL

- 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 (ACI 301M).

POLICE RANGE REFURBISHMENT PROJECT – PHASE II

1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.
- B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
 1. Fly Ash: 25 percent.
 2. Combined Fly Ash and Pozzolan: 25 percent.
 3. Slag Cement: 50 percent.
 4. Combined Fly Ash or Pozzolan and Slag Cement: 50 percent portland cement minimum, with fly ash or pozzolan not exceeding 25 percent.
 5. Silica Fume: 10 percent.
 6. Combined Fly Ash, Pozzolans, and Silica Fume: 35 percent with fly ash or pozzolans not exceeding 25 percent and silica fume not exceeding 10 percent.
 7. Combined Fly Ash or Pozzolans, Slag Cement, and Silica Fume: 50 percent with fly ash or pozzolans not exceeding 25 percent and silica fume not exceeding 10 percent.
- C. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.
- D. Admixtures: Use admixtures according to manufacturer's written instructions.
 1. Use plasticizing admixture in concrete, as required, for placement and workability.
 2. Use water-reducing and -retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
 3. Use water-reducing admixture in pumped concrete, with a w/c ratio below 0.50.
 4. Use corrosion-inhibiting admixture in concrete mixtures where indicated.

2.12 CONCRETE MIXTURES FOR BUILDING ELEMENTS

- A. Footings and Foundations: Normal-weight concrete.
 1. Minimum Compressive Strength at 28 days: As indicated on Drawings.
 2. Maximum W/C Ratio: 0.50.
 3. Slump Limit: 4 inches (100 mm), plus or minus 1 inch (25 mm).
- B. Slabs-on-Grade: Normal-weight concrete.
 1. Minimum Compressive Strength at 28 days: As indicated on Drawings.
 2. Maximum W/C Ratio: 0.50.
 3. Minimum Cementitious Materials Content: 520 lb/cu. yd. (309 kg/cu. m).
 4. Slump Limit: 4 inches (100 mm), plus or minus 1 inch (25 mm).
 5. Air Content: Do not allow air content of trowel-finished floors to exceed 3 percent.
- C. Other concrete elements, as indicated On Drawings.

2.13 FABRICATING REINFORCEMENT

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

2.14 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 (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 FORMWORK INSTALLATION

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301 (ACI 301M), 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 (ACI 117M).
- C. Limit concrete surface irregularities, designated by ACI 347 as abrupt or gradual, as follows:
 - 1. Class A, 1/8 inch (3.2 mm) for smooth-formed finished surfaces.
- D. Construct forms tight enough to prevent loss of concrete mortar.
- E. Construct forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast-concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
 - 1. Install keyways, reglets, recesses, and the like, for easy removal.
 - 2. Do not use rust-stained steel form-facing material.
- F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.
- G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.
- H. Chamfer exterior corners and edges of permanently exposed concrete.

POLICE RANGE REFURBISHMENT PROJECT – PHASE II

- I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.
- J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2 EMBEDDED ITEM INSTALLATION

- 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.
 - 1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC 303.

3.3 REMOVING AND REUSING FORMS

- A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F (10 deg C) for 24 hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations, and curing and protection operations need to be maintained.
 - 1. Leave formwork for beam soffits, joists, slabs, and other structural elements that support weight of concrete in place until concrete has achieved at least 70 percent of its 28-day design compressive strength.
 - 2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.
- B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material are not acceptable for exposed surfaces. Apply new form-release agent.
- C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

3.4 VAPOR-RETARDER INSTALLATION

- A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder according to ASTM E 1643 and manufacturer's written instructions.
 - 1. Lap joints 6 inches (150 mm) and seal with manufacturer's recommended tape.
- B. Bituminous Vapor Retarders: Place, protect, and repair bituminous vapor retarder according to manufacturer's written instructions.

3.5 STEEL REINFORCEMENT INSTALLATION

- A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting 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 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/D 1.4M, where indicated.
- D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

3.6 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 Architect.
 - 1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
 - 2. Locate joints for beams, slabs, joists, and girders in the middle third of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
 - 3. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.

- 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 does not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.

3.7 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections are completed.
- B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Engineer of Record.
- C. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is 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. Deposit concrete in horizontal layers of depth not to exceed formwork design pressures and in a manner to avoid inclined construction joints.
 2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301 (ACI 301M).
 3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches (150 mm) into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.
- D. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
1. Consolidate concrete during placement operations, so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
 2. Maintain reinforcement in position on chairs during concrete placement.
 3. Screed slab surfaces with a straightedge and strike off to correct elevations.
 4. Slope surfaces uniformly to drains where required.
 5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

3.8 FINISHING FORMED SURFACES

- A. 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.
- B. 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.

3.9 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. 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 to receive trowel finish.
- C. 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 exposed to view.
 - 2. Finish and measure surface, so gap at any point between concrete surface and an unleveled, freestanding, 10-ft.- (3.05-m-) long straightedge resting on two high spots and placed anywhere on the surface does not exceed 1/8 inch (3.2 mm).
- D. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces indicated. While concrete is still plastic, slightly scarify surface with a fine broom.
 - 1. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.

3.10 MISCELLANEOUS CONCRETE ITEM INSTALLATION

- A. Filling In: Fill in holes and openings left in concrete structures after work of other trades is in place unless otherwise indicated. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.

- B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.
- C. Equipment Bases and Foundations:
 - 1. Coordinate sizes and locations of concrete bases with actual equipment provided.
 - 2. Construct concrete bases 4 inches (100 mm) high unless otherwise indicated, and extend base not less than 6 inches (150 mm) in each direction beyond the maximum dimensions of supported equipment unless otherwise indicated or unless required for seismic anchor support.
 - 3. Minimum Compressive Strength: 3500 psi (24.1 MPa) at 28 days.
 - 4. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch (450-mm) centers around the full perimeter of concrete base.
 - 5. For supported equipment, install post-installed anchor bolts that extend through concrete base and anchor into structural concrete substrate. Anchor bolt type as indicated on Drawings.
 - 6. Prior to pouring concrete, place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 7. Cast anchor-bolt insert into bases. Install anchor bolts to elevations required for proper attachment to supported equipment.

3.11 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 305.1 (ACI 305.1M) for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h (1 kg/sq. m 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.
- C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for remainder of curing period.
- D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.
- E. 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 with the following materials:

- a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch (300-mm) lap over adjacent absorptive covers.
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.
- a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
 - b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
 - c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies does not interfere with bonding of floor covering used on Project.

3.12 LIQUID FLOOR TREATMENT APPLICATION

- A. Penetrating Liquid Floor Treatment: Prepare, apply, and finish penetrating liquid floor treatment according to manufacturer's written instructions.
1. Remove curing compounds, sealers, oil, dirt, laitance, and other contaminants and complete surface repairs.
 2. Do not apply to concrete that is less than 14 days' old, unless otherwise stated in manufacturer's written instructions.
 3. Apply liquid until surface is saturated, scrubbing into surface until a gel forms; rewet; and repeat brooming or scrubbing. Rinse with water; remove excess material until surface is dry. Apply a second coat in a similar manner if surface is rough or porous.

3.13 JOINT FILLING

- A. Prepare, clean, and install joint filler according to manufacturer's written instructions.
1. Defer joint filling until concrete has aged at least one month. Do not fill joints until construction traffic has permanently ceased.
- B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joints clean and dry.
- C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches (50 mm) deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

3.14 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Engineer. Remove and replace concrete that cannot be repaired and patched to Engineer's approval.
- B. Patching Mortar: Mix dry-pack patching mortar, consisting of 1 part portland cement to 2-1/2 parts fine aggregate passing a No. 16 (1.18-mm) sieve, using only enough water for handling and placing.
- C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch (13 mm) in any dimension to solid concrete. Limit cut depth to 3/4 inch (19 mm). Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
 2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar matches surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
 3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.
- D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch (0.25 mm) wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
 2. After concrete has cured at least 14 days, correct high areas by grinding.
 3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
 4. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch (6 mm) to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
 5. Repair defective areas, except random cracks and single holes 1 inch (25 mm) or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch (19-mm) clearance all around. Dampen concrete surfaces in

contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete, except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.

6. Repair random cracks and single holes 1 inch (25 mm) or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.

- E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.
- F. Repair materials and installation not specified above may be used, subject to Engineer's approval.

3.15 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.

- B. Inspections:

1. Steel reinforcement placement.
2. Steel reinforcement welding.
3. Headed bolts and studs.
4. Verification of use of required design mixture.
5. Concrete placement, including conveying and depositing.
6. Curing procedures and maintenance of curing temperature.
7. Verification of concrete strength before removal of shores and forms from beams and slabs.
8. As indicated in Drawings – Summary of Special Inspection – Sheets S1.3 and S1.4.

- C. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172/C 172M shall be performed according to the following requirements:

1. Testing Frequency: Obtain at least one composite sample for each 100 cu. yd. (76 cu. m) or fraction thereof of each concrete mixture placed each day.
 - a. When frequency of testing provides fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.

POLICE RANGE REFURBISHMENT PROJECT – PHASE II

3. Air Content: ASTM C 231/C 231M, pressure method, for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
4. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F (4.4 deg C) and below or 80 deg F (27 deg C) and above, and one test for each composite sample.
5. Compression Test Specimens: ASTM C 31/C 31M.
 - a. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.
6. Compressive-Strength Tests: ASTM C 39/C 39M; test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.
 - a. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.
7. Strength of each concrete mixture will be satisfactory if every average of any three-consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi (3.4 MPa).
8. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
9. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
10. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Architect.
11. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
12. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

3.16 PROTECTION OF LIQUID FLOOR TREATMENTS

- A. Protect liquid floor treatment from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by liquid floor treatments installer.

END OF SECTION 033000

SECTION 034713

TILT-UP CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract - Standard Specifications for Public Works Construction 'The GREENBOOK' and City Supplement 'The WHITEBOOK', latest editions, including Supplemental Supplementary Provisions (SSPs), apply to this Section.

1.2 SUMMARY

- A. Section includes load-bearing, tilt-up concrete, including the following:
 - 1. Monolithic panels.

1.3 DEFINITIONS

- A. Face-down Surface: Concealed surface of as-cast, tilt-up panel formed against the casting slab.
- B. Face-up Surface: Exposed upper surface of as-cast, tilt-up panel.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Before submitting design mixes, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with tilt-up concrete to attend, including the following:
 - a. Contractor's superintendent.
 - b. Independent testing agency responsible for concrete design mixtures.
 - c. Ready-mix concrete manufacturer.
 - d. Tilt-up concrete Subcontractor.
 - 2. Review special inspection procedures; testing and inspecting agency procedures for field quality control; tilt-up concrete finishes and finishing; curing procedures; casting-slab construction, flatness and levelness, finish, and joint requirements; steel reinforcement installation; hoisting and erection plans; measurement of

fabrication and erection tolerances; tilt-up concrete repair procedures; and tilt-up concrete protection.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
- C. Shop Drawings: Detail fabrication and installation of tilt-up concrete units. Indicate panel locations, plans, elevations, dimensions, shapes, cross sections, and details of steel embedments. Match panel identification designations on Shop Drawings with those on Contract Drawings.
 - 1. Include steel reinforcement, detailing fabrication, bending, and placing. Include material, grade, bar schedules, stirrup spacing, bent-bar diagrams, arrangement, and supports of concrete reinforcement.
 - 2. Include additional steel reinforcement to resist hoisting and erection stresses.
 - 3. Include locations and details of hoisting points and lifting devices for handling and erection.
 - 4. Include engineering analysis data of additional steel reinforcement and hoisting and erection details, signed and sealed by the qualified professional engineer responsible for their preparation.
 - 5. Indicate welded connections by AWS standard symbols. Detail cast-in inserts, connections, and joints, including accessories.
 - 6. Include layout of wythe connectors for sandwich panels.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer, manufacturer, and testing agency.
- B. Welding certificates.
- C. Material Certificates: For each of the following, signed by manufacturers:
 - 1. Cementitious materials.
 - 2. Admixtures.
 - 3. Steel reinforcement and accessories.
 - 4. Bond breakers.
 - 5. Curing compounds.
 - 6. Inserts and embedments.
- D. Material Test Reports: For the following, from a qualified testing agency:
 - 1. Aggregates. Include service record data indicating absence of deleterious expansion of concrete due to alkali aggregate reactivity.

- E. Field quality-control reports.

1.7 QUALITY ASSURANCE

- A. **Manufacturer Qualifications:** A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C94/C94M requirements for production facilities and equipment.
 - 1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- B. **Installer Qualifications:** A qualified installer who employs a supervisor on Project who is an ACI-certified Tilt-up Supervisor.
- C. **Testing Agency Qualifications:** An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C1077 and ASTM E329 for testing indicated.
 - 1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade I, according to ACI CP-1 or an equivalent certification program.
 - 2. Personnel performing laboratory tests shall be an ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician, Grade I. Testing agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician, Grade II.
- D. **Welding Qualifications:** Qualify procedures and personnel according to the following:
 - 1. AWS D1.1/D1.1M.
 - 2. AWS D1.4/D1.4M.
- E. **Mockups:** Cast and erect tilt-up concrete panel mockups to demonstrate typical reveals, surface finishes, texture, color, and standard of workmanship.
 - 1. Build mockup panels in the location and of the size indicated or, if not indicated, as directed by Architect.
 - 2. In presence of Engineer, damage part of an exposed surface for each finish, color, and texture required, and demonstrate materials and techniques proposed for repairs to match adjacent undamaged surfaces.

1.8 PRECONSTRUCTION TESTING

- A. **Preconstruction Testing Service:** Engage a qualified independent testing agency to perform preconstruction testing on concrete mixtures.

PART 2 - PRODUCTS

2.1 TILT-UP CONCRETE

- A. Comply with ACI 301 (ACI 301M), unless modified by requirements in the Contract Documents.

2.2 FORMS AND ACCESSORIES

- A. Forms: Metal, dressed lumber, or other approved materials that are nonreactive with concrete and that will provide continuous, true, and smooth concrete surfaces.
- B. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch (19 by 19 mm).
- C. Sealer: Penetrating, clear, polyurethane wood form sealer formulated to reduce absorption of bleedwater and prevent migration of set-retarding chemicals from wood or plywood.

2.3 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A615/A615M, Grade 60 (Grade 420), deformed.
- B. Low-Alloy-Steel Reinforcing Bars: ASTM A706/A706M, deformed.
- C. Plain-Steel Wire: ASTM A82/A82M, as drawn.
- D. Plain-Steel Welded-Wire Reinforcement: ASTM A185/A185M, fabricated from as-drawn steel wire into flat sheets.
- E. Deformed-Steel Welded-Wire Reinforcement: ASTM A497/A497M, flat sheet.
- F. Bar Supports: Manufactured according to CRSI's "Manual of Standard Practice" of plastic or CRSI Class 1 plastic-protected steel wire or Class 2 stainless-steel wire.

2.4 CONCRETE MATERIALS

- A. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.
- B. Cementitious Material:
 - 1. Portland Cement: ASTM C150/C150M, Type V, white.
- C. Coarse Aggregate: ASTM C33/C33M, Class 4S coarse aggregate or better, graded. Provide aggregates from single source with documented service record data of

satisfactory service in similar applications and service conditions using similar aggregates and cementitious materials.

1. Maximum Coarse-Aggregate Size: 3/4 inch (19 mm) nominal.
- D. Fine Aggregate: ASTM C33/C33M, manufactured or natural sand, from same source for Project, free of materials with deleterious reactivity to alkali in cement.
- E. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and that do 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 C494/C494M, Type A.
 2. Retarding Admixture: ASTM C494/C494M, Type B.
 3. Water-Reducing and Retarding Admixture: ASTM C494/C494M, Type D.
 4. High-Range, Water-Reducing Admixture: ASTM C494/C494M, Type F.
 5. High-Range, Water-Reducing and Retarding Admixture: ASTM C494/C494M, Type G.
 6. Plasticizing and Retarding Admixture: ASTM C1017/C1017M, Type II.
- F. Color Pigment: ASTM C979/C979M, synthetic mineral-oxide pigments or colored water-reducing admixtures; color stable, free of carbon black, nonfading, and resistant to lime and other alkalis.
1. Color: Match Engineers sample.
- G. Water: ASTM C94/C94M and potable.

2.5 BOND BREAKERS

- A. Waterborne, Chemically Reactive Bond Breaker: Penetrating polymerized emulsion containing no oils, waxes, paraffins, or silicones, and compatible with casting-slab curing compound.

2.6 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 C171, polyethylene film or white burlap-polyethylene sheet.

2.7 CONNECTION MATERIALS

- A. Embedded Metal Items and Loose Hardware: Comply with Section 055000 "Metal Fabrications" for materials for securing tilt-up concrete panels together and to supporting and adjacent construction.

2.8 LIFTING INSERTS AND ACCESSORIES

- A. Furnish inserts, dowels, bolts, nuts, washers, and other items to be cast in panels for tilting and lifting.
 - 1. Manufacture inserts with feet of plastic or stainless-steel-tipped steel wire.
- B. Furnish brace anchors and other accessories to be cast in panels and in casting slab for attaching bracing.
 - 1. Manufacture wall brace anchors and accessories with feet of stainless-steel-tipped steel wire.
 - 2. Manufacture floor brace anchors that do not penetrate vapor retarder under slab-on-grade.

2.9 BEARING PADS

- A. Elastomeric Pads: AASHTO M 251, plain, vulcanized, 100 percent polychloroprene (neoprene) elastomer, molded to size or cut from a molded sheet; Type A Shore durometer hardness of 50 to 70, ASTM D2240; and minimum tensile strength of 2250 psi (15.5 MPa), ASTM D412.
- B. Random, Fiber-Reinforced Elastomeric Pads: Preformed, randomly oriented synthetic fibers set in elastomer with a Type A Shore durometer hardness of 70 to 90, ASTM D2240.
- C. Cotton-Duck-Fabric-Reinforced Elastomeric Pads: Preformed, horizontally layered cotton-duck fabric bonded in elastomer with a Type A Shore durometer hardness of 80 to 100, ASTM D2240.
- D. High-Density Plastic Strips: Multimonomer, nonleaching plastic.

2.10 GROUT

- A. Nonmetallic, Nonshrink Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage-compensating agents, and plasticizing and water-reducing agents; complying with ASTM C1107, of consistency suitable for application.

2.11 MISCELLANEOUS MATERIALS

- A. Flashing Reglets: Open type having continuous groove not less than 1-1/8 inches (28 mm) deep by 3/16 inch (5 mm) wide at opening and sloped upward to 45 degrees. Temporarily fill or cover face openings of reglets to prevent intrusion of concrete or debris.
 - 1. Stainless Steel: ASTM A240/A240M, Type 304, soft annealed, not less than 0.0187 inch (0.5 mm) thick.

2.12 REPAIR MATERIALS

- A. Bonding Agent: ASTM C1059, Type II, nonredispersible, acrylic emulsion or styrene butadiene.
- B. Patching Mortar: Dry-pack mix consisting of 1 part portland cement to 2-1/2 parts fine aggregate passing No. 16 (1.18-mm) sieve, using only enough water for handling and placing.

2.13 CONCRETE MIXTURES

- A. Obtain each color, size, type, and variety of concrete mixture from single manufacturer with resources to provide concrete of consistent quality in appearance and physical properties.
- B. Prepare design mixtures for each type and strength of concrete, proportioned on basis of laboratory trial mixture or field test data, or both, according to ACI 301 (ACI 301M).
 - 1. Use a qualified independent testing agency for preparing and reporting proposed concrete design mixtures based on laboratory trial mixtures.
- C. Proportion concrete mixture as follows:
 - 1. Minimum Compressive Strength: 4000 psi (27.6 MPa) at 28 days.
 - 2. Maximum W/C Ratio: 0.40, unless indicated otherwise on Drawings.
 - 3. Slump Limit: 4 inches (100 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. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete according to ACI 301 (ACI 301M) requirements.
- D. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.
- E. Admixtures: Use admixtures according to manufacturer's written instructions.
 - 1. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.

2. Any use of admixture must be reviewed and approved by Engineer prior to including in the Work.
- F. Color Pigment: Add color pigment to concrete mixture according to manufacturer's written instructions and to result in hardened concrete color consistent with approved mockup.

2.14 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C94/C94M, and furnish batch ticket information.
1. When air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 FORMWORK INSTALLATION

- A. Construct and brace formwork so tilt-up concrete panels are of size, shape, alignment, elevation, and position indicated.
1. Construct forms on slab-on-grade or on temporary casting slab, at Contractor's option.
 2. Provide for openings, offsets, recesses, reveals, rustications, reglets, and blockouts.
- B. Construct forms for easy removal without hammering or prying against concrete surfaces. Use kerfed inserts, such as those forming reglets, rustications, and recesses, for easy removal.
- C. Set edge forms for panels to achieve required panel thickness.
- D. Chamfer exposed corners and edges, unless otherwise indicated, using chamfer strips fabricated to produce uniform, smooth lines and tight edge joints.
- E. Coat contact surfaces of wood forms and chamfers with sealer before placing reinforcement.

3.2 BOND BREAKER INSTALLATION

- A. Uniformly and continuously apply two coats of bond breaker to casting-slab surfaces by power spray or roller according to manufacturer's written instructions, before placing steel reinforcement. Recoat areas subjected to moisture before drying. Maintain continuity of coating until concrete placement.

- B. After placing steel reinforcement, touch up or recoat worn or damaged areas with bond breaker. Do not splash or coat steel reinforcement and inserts.

3.3 REINFORCEMENT AND INSERT INSTALLATION

- A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating and placing reinforcement.
- B. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover.
 - 1. Field weld reinforcement according to AWS D1.4/D1.4M, where indicated.
 - 2. Do not tack-weld crossing reinforcing bars.
 - 3. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.
- C. Install welded-wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.
- D. Accurately place and securely support embedded items, anchorages, inserts, cramps, retainers, bar chords and sleeves, and other items to be built into panels. Coordinate with other trades for installing cast-in items.

3.4 PANEL CASTING, GENERAL

- A. Comply with ACI 301 (ACI 301M) for handling, placing, and consolidating concrete.
- B. Maintain position of steel reinforcement, inserts, and anchors during concrete placement, consolidation, and finishing.
- C. Screed panel surfaces to correct level with a straightedge and strike off.
 - 1. Begin initial floating before excess moisture or bleedwater appears on the surface. Use bull floats or darbies to form a uniform and open-textured surface plane free of humps or hollows. Do not disturb panel surfaces before beginning finishing operations.
- D. Form chamfers at top edges of panel perimeters, openings, and similar locations not formed by chamfer strips unless otherwise indicated.
- E. Surface Defects: Limit visible surface defects to those permitted by TCA's "Tilt-up Concrete Association's Guideline Specifications" for Grade A, Architectural panel surfaces.

3.5 CASTING TOLERANCES

- A. Cast tilt-up concrete panels without exceeding the following tolerances:
1. Height and Width of Panels:
 - a. For Panels up to 20 Feet (6.1 m) Tall: 1/4 inch (6 mm) wide.
 - b. For Panels 20 to 30 Feet (6.1 to 9.1 m) Tall: 3/8 inch (10 mm) wide.
 - c. Each Additional 10 Feet (3.05 m) in Excess of 30 Feet (9.1 m) Tall: 1/8 inch (3 mm) wide.
 2. Thickness: 3/16 inch (5 mm).
 3. Skew of Panel or Opening: Difference in length of diagonals of 1/8 inch per 72 inches (3 mm per 1830 mm) with a maximum difference of 1/2 inch (13 mm).
 4. Openings Cast into Panel:
 - a. Size of Opening: 1/4 inch (6 mm).
 - b. Location of Centerline of Opening: 1/4 inch (6 mm).
 5. Location and Placement of Embedded Items:
 - a. Inserts, Bolts, and Pipe Sleeves: 3/8 inch (10 mm).
 - b. Lifting and Bracing Inserts: As required by manufacturer.
 - c. Lateral Placement of Weld Plate Embedments: 1 inch (25 mm).
 - d. Tipping and Flushness of Weld Plate Embedments: 1/4 inch (6 mm).
 6. Deviation of Steel Reinforcement Cover: Maintain minimum cover required by ACI 301 (ACI 301M).

3.6 FACE-UP FINISHES

- A. Float Finish: Consolidate surface of plastic concrete with power-driven floats or by hand floating. Restraighten and cut down high spots and fill low spots. Repeat float passes and restraighten until surface is left with a uniform, smooth, granular texture.
- B. Trowel Finish: After applying float finish, apply first trowel finish and consolidate plastic concrete by hand trowel or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and is uniform in texture and appearance.

3.7 FACE-DOWN FINISHES

- A. Smooth, As-Cast Finish: Cast panel to produce a surface free of pockets, sand streaks, and honeycombs. Produce a surface appearance of uniform color and texture.

3.8 CONCRETE PROTECTING AND CURING

- A. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures according to ACI 301 (ACI 301M).
 - 1. Apply evaporation retarder in hot, dry, or windy weather to protect concrete from rapid moisture loss before and during finishing operations. Apply according to manufacturer's written instructions after screeding and bull floating concrete, but before float finishing.
- B. Begin curing immediately after finishing concrete. Cure by one or a combination of the following methods according to ACI 308.1:
 - 1. Moisture Curing: Keep surfaces continuously moist for no fewer than seven days with the following materials:
 - a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated and kept continuously wet. Cover concrete surfaces and edges with 12-inch (300-mm) lap over adjacent absorptive covers.
 - 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 no fewer than seven days. Immediately repair any holes or tears during curing period, using cover material and waterproof tape.

3.9 ERECTION

- A. Use erection equipment with care to prevent damage to floor slabs and panels.
- B. Lift, support, and erect panels only at designated lifting or supporting points indicated on Shop Drawings.
- C. Do not erect panels until 75 percent of 28-day compressive strength of concrete has been verified.
- D. Install tilt-up concrete panels level, plumb, square, and true. Place panels on leveled grout-setting pads or shims in correct position. Maintain joint width of 1/2 inch (13 mm) between panels.
 - 1. Install tilt-up concrete panels with face-down surfaces exposed to:
 - a. West Range, where occurs at panel between West and Public Ranges.
 - b. Rapid Fire Range, where occurs at panels surrounding Rapid Fire Ranges.
 - c. Rapid Fire Range 1, where occurs at center divider between Rapid Fire Ranges.

- E. Temporarily brace and support panels securely in position against loads comparable in intensity to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to panels are secured.
- F. Anchor panels in place and, if indicated, to one another.
 - 1. Weld steel connectors to steel supports and embedments indicated, complying with AWS D1.1/D1.1M.
- G. Solidly grout-fill gaps between foundation system and bottom of panels.

3.10 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections and to submit reports.
- B. Inspections:
 - 1. Steel reinforcement placement.
 - 2. Steel reinforcement welding.
 - 3. Headed bolts and studs.
 - 4. Verification of use of required design mixture.
 - 5. Concrete placement, including conveying and depositing.
 - 6. Curing procedures and maintenance of curing temperature.
 - 7. Verification of concrete strength before erection of tilt-up panels.
- C. Testing Services: Tests shall be performed according to ACI 301 (ACI 301M).
- D. Tilt-up concrete panels will be considered defective if they do not pass tests and inspections.
- E. Prepare test and inspection reports.

3.11 ERECTION TOLERANCES

- A. Install tilt-up concrete panels without exceeding the following erection tolerances:
 - 1. Joint Width Variation (Exterior Face): Without decreasing or increasing more than 50 percent from specified joint width, maintain joint width as follows:
 - a. For Panels up to 20 Feet (6.1 m) Tall: 1/4 inch (6 mm).
 - b. Each Additional 10 Feet (3.05 m) in Excess of 20 Feet (6.1 m) Tall: 1/8 inch (3 mm).
 - 2. Joint Taper: Maximum 3/8 inch (10 mm) over length, but not greater than the following:

POLICE RANGE REFURBISHMENT PROJECT – PHASE II

- a. For Panels up to 20 Feet (6.1 m) Tall: 1/4 inch (6 mm).
 - b. Each Additional 10 Feet (3.05 m) in Excess of 20 Feet (6.1 m) Tall: 1/8 inch (3 mm).
3. Panel Alignment:
- a. Alignment of Horizontal and Vertical Joints: 1/4 inch (6 mm).
 - b. Offset in Exterior Face of Adjacent Panels: 1/4 inch (6 mm).

3.12 FILLING AND REPAIR

- A. Patch holes and voids left by erecting and bracing inserts on tilt-up panels and slabs-on-grade. Cut or chip edges of voids perpendicular to concrete surface. Fill blockouts where indicated.
 1. Clean, dampen with water, and brush-coat holes, voids, and blockouts with bonding agent. Fill and compact with patching mortar of a stiff consistency before bonding agent has dried.
 2. Finish surfaces of fills and repairs to Engineer's approval, with materials of same colors and textures as finishes on surrounding surfaces.
- B. Repair damaged galvanized-steel surfaces of connectors by cleaning and applying a coat of zinc repair paint.
- C. Repair damage to tilt-up panels and slabs-on-grade resulting from tilt-up work, as directed by Engineer.
- D. Remove and replace tilt-up panels that do not comply with requirements in this Section.
- E. Demolish and remove temporary concrete casting slabs.

END OF SECTION 03 47 13

SECTION 035416

HYDRAULIC CEMENT UNDERLAYMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Polymer-modified, self-leveling, hydraulic cement underlayment for application below interior floor coverings.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Include plans indicating substrates, locations, and average depths of underlayment based on survey of substrate conditions.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Installer who is approved by manufacturer for application of underlayment products required for this Project.

1.7 FIELD CONDITIONS

- A. Environmental Limitations: Comply with manufacturer's written instructions for substrate temperature, ventilation, ambient temperature and humidity, and other conditions affecting underlayment performance.

1. Place hydraulic cement underlayments only when ambient temperature and temperature of substrates are between 50 and 80 deg F (10 and 27 deg C).

PART 2 - PRODUCTS

2.1 HYDRAULIC CEMENT UNDERLAYMENTS

- A. Hydraulic Cement Underlayment: Polymer-modified, self-leveling, hydraulic cement product that can be applied in minimum uniform thickness of 1/4 inch (6 mm) and that can be feathered at edges to match adjacent floor elevations.
 1. Manufacturers: Subject to compliance with requirements, provide products by the following, or approved equal:
 - a. Euclid Chemical Company (The); an RPM company.
 - 1) Product EUCOFLOOR SL160.
 - 2) Approved equal.
 2. Cement Binder: ASTM C150/C150M, portland cement, or hydraulic or blended hydraulic cement as defined by ASTM C219.
 3. Compressive Strength: Not less than 3500psi at 28 days when tested according to ASTM C109/C109M.
- B. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch (3 to 6 mm); or coarse sand as recommended by underlayment manufacturer.
 1. Provide aggregate when recommended in writing by underlayment manufacturer for underlayment thickness required.
- C. Water: Potable and at a temperature of not more than 70 deg F (21 deg C).
- D. Reinforcement: Where required by manufacturer for desired thickness, provide galvanized metal lath or other corrosion-resistant reinforcement recommended in writing by underlayment manufacturer.
- E. Primer: Product of underlayment manufacturer recommended in writing for substrate, conditions, and application indicated.
- F. Surface Sealer: Designed to reduce porosity as recommended by manufacturer for type of floor covering to be applied to underlayment. Confirm compatibility with flooring finish in Section 09 65 19 Resilient Tile Flooring. Provide manufacturer's certification of compatibility in writing to Engineer when submitted for review.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for conditions affecting performance of the Work.
- B. Proceed with application only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. General: Prepare and clean substrate according to manufacturer's written instructions.
 - 1. Treat nonmoving substrate cracks according to manufacturer's written instructions to prevent cracks from telegraphing (reflecting) through underlayment.
 - 2. Fill substrate voids to prevent underlayment from leaking.
- B. Concrete Substrates: Mechanically remove, according to manufacturer's written instructions, laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants that might impair underlayment bond.
 - 1. Mechanically abrade the surface to achieve a surface profile equal to CSP 3-5 in accordance with ICRI Guideline 310.2. Clean profiled area.
 - 2. Moisture Testing: Perform tests so that each test area does not exceed 1000 sq. ft. (304.8 sq. m), and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
 - a. Anhydrous Calcium Chloride Test, ASTM F1869: Proceed with installation only after substrates do not exceed a maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. (1.36 kg of water/100 sq. m) in 24 hours.
 - b. Relative Humidity Test: Using in situ probes, ASTM F2170. Proceed with installation only after substrates have a maximum 85 percent relative humidity level measurement, or as recommended by hydraulic cement underlayment manufacturer.
- C. Adhesion Tests: After substrate preparation, test substrate for adhesion with underlayment according to manufacturer's written instructions.

3.3 APPLICATION

- A. General: Mix and apply underlayment components according to manufacturer's written instructions.
 - 1. Close areas to traffic during underlayment application and for time period after application recommended in writing by manufacturer.
 - 2. Coordinate application of components to provide optimum adhesion to substrate and between coats.

3. At substrate expansion, isolation, and other moving joints, allow joint of same width to continue through underlayment.
 - B. Apply primer over prepared substrate at manufacturer's recommended spreading rate.
 - C. Apply underlayment to produce uniform, level surface.
 1. Apply a bond coat to the surface of the initial layer and place additional underlayment to achieve the final smooth surface.
 2. Apply a final layer without aggregate to product surface.
 3. Feather edges to match adjacent floor elevations.
 - D. Cure underlayment according to manufacturer's written instructions. Prevent contamination during application and curing processes.
 - E. Do not install floor coverings over underlayment until after time period recommended in writing by underlayment manufacturer.
 - F. Apply surface sealer at rate recommended by manufacturer.
 - G. Remove and replace underlayment areas that evidence lack of bond with substrate, including areas that emit a "hollow" sound when tapped.
- 3.4 PROTECTION
- A. Protect underlayment from concentrated and rolling loads for remainder of construction period.

END OF SECTION 035416

SECTION 051200

STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract - Standard Specifications for Public Works Construction 'The GREENBOOK' and City Supplement 'The WHITEBOOK', latest editions, including Supplemental Supplementary Provisions (SSPs), apply to this Section.

1.2 SUMMARY

A. Section Includes:

- 1. Structural steel.
- 2. Prefabricated building columns.
- 3. Field-installed shear connectors.
- 4. Grout.

B. Related Requirements:

- 1. Section 051213 "Architecturally Exposed Structural Steel Framing" for additional requirements for architecturally exposed structural steel.
- 2. Section 055000 "Metal Fabrications" for steel lintels and shelf angles not attached to structural-steel frame, miscellaneous steel fabrications, and, other steel items not defined as structural steel.
- 3. Section 099113 "Exterior Painting" and Section 099123 "Interior Painting" and Section 099600 "High-Performance Coatings" for surface-preparation and priming requirements.

1.3 DEFINITIONS

A. Structural Steel: Elements of the structural frame indicated on Drawings and as described in AISC 303, "Code of Standard Practice for Steel Buildings and Bridges." Seismic-Load-Resisting System: Elements of structural-steel frame designated as "SLRS" or along grid lines designated as "SLRS" on Drawings, including columns, beams, and braces and their connections.

B. Heavy Sections: Rolled and built-up sections as follows:

- 1. Shapes included in ASTM A 6/A 6M with flanges thicker than 1-1/2 inches (38 mm).
- 2. Welded built-up members with plates thicker than 2 inches (50 mm).

3. Column base plates thicker than 2 inches (50 mm).

C. Protected Zone: Structural members or portions of structural members indicated as "Protected Zone" on Drawings. Connections of structural and nonstructural elements to protected zones are limited.

D. Demand Critical Welds: Those welds, the failure of which would result in significant degradation of the strength and stiffness of the Seismic-Load-Resisting System and which are indicated as "Demand Critical" or "Seismic Critical" on Drawings.

1.4 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

1.5 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.6 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Show fabrication of structural-steel components.

1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.

2. Include embedment Drawings.

3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.

4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical, high-strength bolted connections.

5. Identify members and connections of the Seismic-Load-Resisting System.

6. Indicate locations and dimensions of protected zones.

7. Identify demand critical welds.

C. Welding Procedure Specifications (WPSs) and Procedure Qualification Records (PQRs): Provide according to AWS D1.1/D1.1M, "Structural Welding Code - Steel," for each welded joint whether prequalified or qualified by testing, including the following:

1. Power source (constant current or constant voltage).

2. Electrode manufacturer and trade name, for demand critical welds.

1.7 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer, fabricator, shop-painting applicators, testing agency.
- B. Welding certificates.
- C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.
- D. Mill test reports for structural steel, including chemical and physical properties.
- E. Product Test Reports: For the following:
 - 1. Bolts, nuts, and washers including mechanical properties and chemical analysis.
 - 2. Direct-tension indicators.
 - 3. Tension-control, high-strength, bolt-nut-washer assemblies.
 - 4. Shear stud connectors.
 - 5. Shop primers.
 - 6. Nonshrink grout.
- F. Survey of existing conditions.
- G. Source quality-control reports.
- H. Field quality-control and special inspection reports.

1.8 QUALITY ASSURANCE

- A. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category STD.
- B. Installer Qualifications: A qualified installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector, Category CSE.
- C. Shop-Painting Applicators: Qualified according to AISC's Sophisticated Paint Endorsement P2 or to SSPC-QP 3, "Standard Procedure for Evaluating Qualifications of Shop Painting Applicators."
- D. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - 1. Welders and welding operators performing work on bottom-flange, demand-critical welds shall pass the supplemental welder qualification testing, as required by AWS D1.8/D1.8M. FCAW-S and FCAW-G shall be considered separate processes for welding personnel qualification.
- E. Comply with applicable provisions of the following specifications and documents:
 - 1. AISC 303.
 - 2. AISC 341 and AISC 341s1.

3. AISC 360.
4. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.
 1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.
- B. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.
 1. Fasteners may be repackaged provided Owner's testing and inspecting agency observes repackaging and seals containers.
 2. Clean and relubricate bolts and nuts that become dry or rusty before use.
 3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F 1852 fasteners and for retesting fasteners after lubrication.

PART 2 - PRODUCTS

2.1 STRUCTURAL-STEEL MATERIALS

- A. W-Shapes: ASTM A 992/A 992M.
- B. Channels, Angles, M , S-Shapes: ASTM A 36/A 36M.
- C. Plate and Bar: ASTM A 36/A 36M.
- D. Cold-Formed Hollow Structural Sections: ASTM A 500/A 500M, Grade B, structural tubing.
- E. Steel Pipe: ASTM A 53/A 53M, Type E or Type S, Grade B.
 1. Weight Class: As indicated.
 2. Finish: Galvanized.
- F. Steel Castings: ASTM A 216/A 216M, Grade WCB with supplementary requirement S11.
- G. Steel Forgings: ASTM A 668/A 668M.
- H. Welding Electrodes: Comply with AWS requirements.

2.2 BOLTS, CONNECTORS, AND ANCHORS

- A. Unheaded Anchor Rods: ASTM F 1554, Grade 36.
 - 1. Configuration: As indicated.
 - 2. Nuts: ASTM A 563 (ASTM A 563M) hex carbon steel.
 - 3. Plate Washers: ASTM A 36/A 36M carbon steel.
 - 4. Washers: ASTM F 436 (ASTM F 436M), Type 1, hardened carbon steel.
 - 5. Finish: Hot-dip zinc coating, ASTM A 153/A 153M, Class C.
- B. Headed Anchor Rods: ASTM F 1554, Grade 36, straight.
 - 1. Nuts: ASTM A 563 (ASTM A 563M) hex carbon steel.
 - 2. Plate Washers: ASTM A 36/A 36M carbon steel.
 - 3. Washers: ASTM F 436 (ASTM F 436M), Type 1, hardened carbon steel.
 - 4. Finish: Hot-dip zinc coating, ASTM A 153/A 153M, Class C.
- C. Threaded Rods: ASTM A 36/A 36M.
 - 1. Nuts: ASTM A 563 (ASTM A 563M) hex carbon steel.
 - 2. Washers: ASTM A 36/A 36M carbon steel.
 - 3. Finish: Hot-dip zinc coating, ASTM A 153/A 153M, Class C.
- D. Eye Bolts and Nuts: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1030.
- E. Sleeve Nuts: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1018.

2.3 PRIMER

- A. Primer: SSPC-Paint 25 BCS, Type II, zinc oxide, alkyd, linseed oil primer.
- B. Galvanizing Repair Paint: ASTM A 780/A 780M.

2.4 GROUT

- A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107/C 1107M, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

2.5 FABRICATION

- A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC 303, "Code of Standard Practice for Steel Buildings and Bridges," and to AISC 360.
 - 1. Camber structural-steel members where indicated.
 - 2. Fabricate beams with rolling camber up.

3. Identify high-strength structural steel according to ASTM A 6/A 6M and maintain markings until structural steel has been erected.
 4. Mark and match-mark materials for field assembly.
 5. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.
- B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.
1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1/D1.1M.
- C. Bolt Holes: Cut, drill, or punch standard bolt holes perpendicular to metal surfaces.
- D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.
- E. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel members.
1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.
 2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
 3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

2.6 SHOP CONNECTIONS

- A. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

2.7 SHOP PRIMING

- A. Shop prime steel surfaces except the following:
1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches (50 mm).
 2. Surfaces to be field welded.
 3. Surfaces of high-strength bolted, slip-critical connections.
 4. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).
- B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:
1. SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
- C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film

thickness of 1.5 mils (0.038 mm). Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
2. Apply two coats of shop paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.

2.8 GALVANIZING

A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel according to ASTM A 123/A 123M.

1. Fill vent and drain holes that are exposed in the finished Work unless they function as weep holes, by plugging with zinc solder and filing off smooth.

2.9 SOURCE QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform shop tests and inspections.

1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.

B. Welded Connections: Visually inspect shop-welded connections according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:

1. Liquid Penetrant Inspection: ASTM E 165.
2. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
3. Ultrasonic Inspection: ASTM E 164.
4. Radiographic Inspection: ASTM E 94.

C. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify, with certified steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.

1. Prepare a certified survey of existing conditions. Include bearing surfaces, anchor rods, bearing plates, and other embedments showing dimensions, locations, angles, and elevations.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated.

3.3 ERECTION

- A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.
- B. Baseplates Bearing Plates and Leveling Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.
 - 1. Set plates for structural members on wedges, shims, or setting nuts as required.
 - 2. Weld plate washers to top of baseplate.
 - 3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
 - 4. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.
- C. Maintain erection tolerances of structural steel within AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."
- D. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that are in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
 - 1. Level and plumb individual members of structure.
- E. Splice members only where indicated.
- F. Do not use thermal cutting during erection.
- G. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.
- H. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.

3.4 FIELD CONNECTIONS

- A. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
 - 1. Comply with AISC 303 and AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.
 - 2. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in AISC 303, "Code of Standard Practice for Steel Buildings and Bridges," for mill material.

3.5 PREFABRICATED BUILDING COLUMNS

- A. Install prefabricated building columns to comply with AISC 360, manufacturer's written recommendations, and requirements of testing and inspecting agency that apply to the fire-resistance rating indicated.

3.6 FIELD QUALITY CONTROL

- A. Special Inspections: Engage a qualified special inspector to perform the following special inspections:
 - 1. Verify structural-steel materials and inspect steel frame joint details.
 - 2. Verify weld materials and inspect welds.
 - 3. Verify connection materials and inspect high-strength bolted connections.
- B. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

3.7 REPAIRS AND PROTECTION

- A. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing and repair galvanizing to comply with ASTM A 780/A 780M.
- B. Touchup Painting: Immediately after erection, clean exposed areas where primer is damaged or missing and paint with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 - 1. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.

END OF SECTION 051200

SECTION 051213

ARCHITECTURALLY EXPOSED STRUCTURAL STEEL FRAMING

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract - Standard Specifications for Public Works Construction 'The GREENBOOK' and City Supplement 'The WHITEBOOK', latest editions, including Supplemental Supplementary Provisions (SSPs), apply to this Section.

1.2 SUMMARY

- A. Section includes architecturally exposed structural-steel (AESS).
 - 1. Requirements in Section 051200 "Structural Steel Framing" also apply to AESS.
 - 2. This section applies to structural steel at West Range and Public Range Shade Structures.
- B. Related Requirements:
 - 1. Section 051200 "Structural Steel Framing" for additional requirements applicable to AESS.
 - 2. Section 055000 "Metal Fabrications" for steel lintels and shelf angles not attached to structural-steel frame, miscellaneous steel fabrications, and, other metal items not defined as structural steel.

1.3 DEFINITIONS

- A. AESS: Structural steel designated as "architecturally exposed structural steel" or "AESS" in the Contract Documents.

1.4 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

1.5 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.6 ACTION SUBMITTALS

- A. Shop Drawings: Show fabrication of AESS components. Shop Drawings for structural steel may be used for AESS provided items of AESS are specifically identified and requirements below are met for AESS.
1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
 2. Include embedment Drawings.
 3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain. Indicate grinding, finish, and profile of welds.
 4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical, high-strength bolted connections. Indicate orientation of bolt heads.
 5. Indicate exposed surfaces and edges and surface preparation being used.
 6. Indicate special tolerances and erection requirements.
- B. Samples: Submit Samples of AESS to set quality standards for exposed welds.
1. Two steel plates, 3/8 by 8 by 4 inches (9.5 by 200 by 100 mm), with long edges joined by a groove weld and with weld ground smooth.
 2. Steel plate, 3/8 by 8 by 8 inches (9.5 by 200 by 200 mm), with one end of a short length of rectangular steel tube, 4 by 6 by 3/8 inches (100 by 150 by 9.5 mm), welded to plate with a continuous fillet weld and with weld ground smooth and blended.
 3. Round steel tube or pipe, minimum 8 inches (200 mm) in diameter, with end of another round steel tube or pipe, approximately 4 inches (100 mm) in diameter, welded to its side at a 45-degree angle with a continuous fillet weld and with weld ground smooth and blended.

1.7 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For fabricator.
- B. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

1.8 QUALITY ASSURANCE

- A. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category STD, or is accredited by the IAS Fabricator Inspection Program for Structural Steel (AC 172).
- B. Shop-Painting Applicators: Qualified according to AISC's Sophisticated Paint Endorsement P1 or SSPC-QP 3, "Standard Procedure for Evaluating Qualifications of Shop Painting Applicators."

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Use special care in handling to prevent twisting, warping, nicking, and other damage. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.
 - 1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

1.10 FIELD CONDITIONS

- A. Field Measurements: Where AESS is indicated to fit against other construction, verify actual dimensions by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 BOLTS, CONNECTORS, AND ANCHORS

- A. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F 1852, Type 1, round-head assemblies, consisting of steel structural bolts with splined ends, heavy-hex carbon-steel nuts, and hardened carbon-steel washers.
 - 1. Finish: Mechanically deposited zinc coating.
- B. Corrosion-Resisting (Weathering Steel), Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F 1852, Type 3, round-head assemblies, consisting of steel structural bolts with splined ends, heavy-hex carbon-steel nuts, and hardened carbon-steel washers.

2.2 FILLER

- A. Filler: Polyester filler intended for use in repairing dents in automobile bodies.

2.3 PRIMER

- A. Primer: SSPC-Paint 25 BCS, Type II, zinc oxide, alkyd, linseed oil primer.
- B. Etching Cleaner for Galvanized Metal: MPI#25.
- C. Galvanizing Repair Paint: ASTM A 780/A 780M.
- D. Shop Primer for Galvanized Steel: MPI#134, water-based galvanized metal primer.

2.4 FABRICATION

- A. Shop fabricate and assemble AESS to the maximum extent possible. Locate field joints at concealed locations if possible. Detail assemblies to minimize handling and to expedite erection.
- B. In addition to special care used to handle and fabricate AESS, comply with the following:
 - 1. Fabricate with exposed surfaces smooth, square, and free of surface blemishes including pitting, rust, scale, and roughness.
 - 2. Grind sheared, punched, and flame-cut edges of AESS to remove burrs and provide smooth surfaces and edges.
 - 3. Fabricate AESS with exposed surfaces free of mill marks, including rolled trade names and stamped or raised identification.
 - 4. Fabricate AESS with exposed surfaces free of seams to maximum extent possible.
 - 5. Remove blemishes by filling or grinding or by welding and grinding, before cleaning, treating, and shop priming.
 - 6. Fabricate with piece marks fully hidden in the completed structure or made with media that permits full removal after erection.
 - 7. Fabricate AESS to the tolerances specified in AISC 303 for steel that is designated AESS.
 - 8. Fabricate AESS to the tolerances specified in AISC 303 for steel that is not designated AESS.
 - 9. Seal-weld open ends of hollow structural sections with 3/8-inch (9.5-mm) closure plates for AESS.
- C. Curved Members: Fabricate indicated members to curved shape by rolling to final shape in fabrication shop.
 - 1. Distortion of webs, stems, outstanding flanges, and legs of angles shall not be visible from a distance of 20 feet (6 m) under any lighting conditions.
 - 2. Tolerances for walls of hollow steel sections after rolling shall be approximately 1/2 inch (13 mm).
- D. Coping, Blocking, and Joint Gaps: Maintain uniform gaps of 1/8 inch (3.2 mm) with a tolerance of 1/32 inch (0.8 mm) for AESS.
- E. Bolt Holes: Cut, drill, or punch standard bolt holes perpendicular to metal surfaces.
- F. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel members.
 - 1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.
 - 2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
 - 3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

2.5 SHOP CONNECTIONS

- A. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work, and comply with the following:
1. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding specified tolerances.
 2. Use weld sizes, fabrication sequence, and equipment for AESS that limit distortions to allowable tolerances.
 3. Provide continuous, sealed welds at angle to gusset-plate connections and similar locations where AESS is exposed to weather.
 4. Provide continuous welds of uniform size and profile where AESS is welded.
 5. Grind butt and groove welds flush to adjacent surfaces within tolerance of plus 1/16 inch, minus zero inch (plus 1.5 mm, minus zero mm) for AESS.
 6. Remove backing bars or runoff tabs; back-gouge and grind steel smooth AESS.
 7. At locations where welding on the far side of an exposed connection of AESS occurs, grind distortions and marking of the steel to a smooth profile aligned with adjacent material.
 8. Make fillet welds for AESS oversize and grind to uniform profile with smooth face and transition.

2.6 GALVANIZING

- A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel according to ASTM A 123/A 123M.
1. Do not quench or apply post-galvanizing treatments that might interfere with paint adhesion.
 2. Fill vent and drain holes that are exposed in the finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.

2.7 SHOP PRIMING

- A. Shop prime steel surfaces except the following:
1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches (50 mm).
 2. Surfaces to be field welded.
 3. Surfaces to be high-strength bolted with slip-critical connections.
 4. Surfaces to receive sprayed fire-resistive materials.
- B. Surface Preparation for Nongalvanized Steel: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:
1. SSPC-SP 11, "Power Tool Cleaning to Bare Metal."
- C. Preparing Galvanized Steel for Shop Priming: After galvanizing, thoroughly clean steel of grease, dirt, oil, flux, and other foreign matter, and treat with etching cleaner.

- D. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils (0.038 mm). Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.
 - 1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
 - 2. Apply two coats of shop paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify, with steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.
 - 1. Prepare a certified survey of bearing surfaces, anchor rods, bearing plates, and other embedments showing dimensions, locations, angles, and elevations.
- B. Examine AESS for twists, kinks, warping, gouges, and other imperfections before erecting.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Provide temporary shores, guys, braces, and other supports during erection to keep AESS secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated.
 - 1. If possible, locate welded tabs for attaching temporary bracing and safety cabling where they will be concealed from view in the completed Work.

3.3 ERECTION

- A. Set AESS accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.
 - 1. Erect AESS to the tolerances specified in AISC 303 for steel that is designated AESS.
 - 2. Erect AESS to the tolerances specified in AISC 303 for steel that is not designated AESS.
- B. Do not use thermal cutting during erection.

3.4 FIELD CONNECTIONS

- A. Weld Connections: Comply with requirements in "Weld Connections" Paragraph in "Shop Connections" Article.
 - 1. Remove backing bars or runoff tabs; back-gouge and grind steel smooth for AESS.
 - 2. Remove erection bolts in AESS, fill holes, and grind smooth.
 - 3. Fill weld access holes in AESS and grind smooth.

3.5 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified independent testing and inspecting agency to inspect AESS as specified in Section 051200 "Structural Steel Framing." The testing agency is not responsible for enforcing requirements relating to aesthetic effect.
- B. Engineer will observe AESS in place to determine acceptability relating to aesthetic effect.

3.6 REPAIRS AND PROTECTION

- A. Remove welded tabs that were used for attaching temporary bracing and safety cabling and that are exposed to view in the completed Work. Grind steel smooth.
- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780/A 780M.
- C. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 - 1. Clean and prepare surfaces by SSPC-SP 3 power-tool cleaning.

END OF SECTION 051213

SECTION 053100

STEEL DECKING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract - Standard Specifications for Public Works Construction 'The GREENBOOK' and City Supplement 'The WHITEBOOK', latest editions, including Supplemental Supplementary Provisions (SSPs), apply to this Section.

1.2 SUMMARY

- A. Section Includes:

- 1. Roof deck.

- B. Related Requirements:

- 1. Section 051200 "Structural Steel Framing" for shop- and field-welded shear connectors.
- 2. Section 055000 "Metal Fabrications" for framing deck openings with miscellaneous steel shapes.
- 3. Section 099600 "High-Performance Coatings" for repair painting of primed deck and finish painting of deck.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of deck, accessory, and product indicated.

- B. Shop Drawings:

- 1. Include layout and types of deck panels, anchorage details, reinforcing channels, pans, cut deck openings, special jointing, accessories, and attachments to other construction.

1.4 INFORMATIONAL SUBMITTALS

- A. Welding certificates.

- B. Product Certificates: For each type of steel deck.

- C. Product Test Reports: For tests performed by a qualified testing agency, indicating that each of the following complies with requirements:

1. Power-actuated mechanical fasteners.
2. Acoustical roof deck.

D. Evaluation Reports: For steel deck, from ICC-ES.

E. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM E329 for testing indicated.

B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.

B. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. AISI Specifications: Comply with calculated structural characteristics of steel deck according to AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members."

2.2 ROOF DECK

A. Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 31, and with the following:

1. Prime-Painted Steel Sheet: ASTM A1008/A1008M, Structural Steel (SS), Grade 40 (275) minimum, shop primed with manufacturer's standard baked-on, rust-inhibitive primer.
 - a. Color: Manufacturer's standard.
2. Deck Profile: As indicated.
3. Profile Depth: As indicated.
4. Design Uncoated-Steel Thickness: As indicated.
5. Span Condition: As indicated.
6. Side Laps: Overlapped or interlocking seam at Contractor's option.

2.3 ACCESSORIES

- A. General: Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.
- B. Mechanical Fasteners: Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws.
- C. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 10 (4.8-mm) minimum diameter.
- D. Flexible Closure Strips: Vulcanized, closed-cell, synthetic rubber.
- E. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi (230 MPa), not less than 0.0359-inch (0.91-mm) design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.
- F. Column Closures, End Closures, Z-Closures, and Cover Plates: Steel sheet, of same material, finish, and thickness as deck unless otherwise indicated.
- G. Weld Washers: Uncoated steel sheet, shaped to fit deck rib, [0.0598 inch (1.52 mm)] [0.0747 inch (1.90 mm)] thick, with factory-punched hole of 3/8-inch (9.5-mm) minimum diameter.
- H. Repair Paint: Manufacturer's standard rust-inhibitive primer of same color as primer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine supporting frame and field conditions 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, GENERAL

- A. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 31, manufacturer's written instructions, and requirements in this Section.
- B. Install temporary shoring before placing deck panels if required to meet deflection limitations.
- C. Locate deck bundles to prevent overloading of supporting members.

- D. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.
- E. Place deck panels flat and square and fasten to supporting frame without warp or deflection.
- F. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.
- G. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.
- H. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.

3.3 ROOF-DECK INSTALLATION

- A. Fasten roof-deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated or arc seam welds with an equal perimeter that is not less than 1-1/2 inches (38 mm) long, and as follows:
 - 1. Weld Diameter: [5/8 inch (16 mm)] [3/4 inch (19 mm)], nominal.
 - 2. Weld Spacing: Weld edge and interior ribs of deck units with a minimum of two welds per deck unit at each support. Space welds 12 inches (305 mm) apart in the field of roof and 6 inches (150 mm) apart in roof corners and perimeter.
- B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals not exceeding the lesser of one-half of the span or 18 inches (457 mm), and as follows:
 - 1. Mechanically fasten with self-drilling, No. 10 (4.8-mm-) diameter or larger, carbon-steel screws.
 - 2. Mechanically clinch or button punch.
 - 3. If deck is minimum 0.0474 inch (1.20mm) thick, Contractor may fasten with a minimum of 1-1/2-inch- (38-mm-) long welds.
- C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches (38 mm), with end joints as follows:
 - 1. End Joints: Lapped 2 inches (51 mm) minimum.
- D. Miscellaneous Roof-Deck Accessories: Install ridge and valley plates, finish strips, end closures, and reinforcing channels according to deck manufacturer's written instructions. Weld to substrate to provide a complete deck installation.
 - 1. Weld cover plates at changes in direction of roof-deck panels unless otherwise indicated.

3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Field welds will be subject to inspection.
- C. Prepare test and inspection reports.

3.5 PROTECTION

- A. Repair Painting: Wire brush and clean rust spots, welds, and abraded areas on both surfaces of prime-painted deck immediately after installation and apply repair paint.
 - 1. Wire brushing, cleaning, and repair painting of bottom deck surfaces are included in Section 09 60 00 "High-Performance Coatings."

END OF SECTION 053100

SECTION 054000

COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract - Standard Specifications for Public Works Construction 'The GREENBOOK' and City Supplement 'The WHITEBOOK', latest editions, including Supplemental Supplementary Provisions (SSPs), apply to this Section.

1.2 SUMMARY

A. Section Includes:

- 1. Load-bearing wall framing.
- 2. Roof rafter framing.

B. Related Requirements:

- 1. Section 055000 "Metal Fabrications" for miscellaneous steel shapes, masonry shelf angles, and connections used with cold-formed metal framing.
- 2. Section 092216 "Non-Structural Metal Framing" for standard, interior non-load-bearing, metal-stud framing, with height limitations and ceiling-suspension assemblies.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.

B. Shop Drawings:

- 1. Include layout, spacings, sizes, thicknesses, and types of cold-formed steel framing; fabrication; and fastening and anchorage details, including mechanical fasteners.
- 2. Indicate reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing agency.
- B. Welding certificates.
- C. Product Certificates: For each type of code-compliance certification for studs and tracks.
- D. Product Test Reports: For each listed product, for tests performed by manufacturer and witnessed by a qualified testing agency or a qualified testing agency.
 - 1. Steel sheet.
 - 2. Expansion anchors.
 - 3. Power-actuated anchors.
 - 4. Mechanical fasteners.
 - 5. Vertical deflection clips.
 - 6. Horizontal drift deflection clips
 - 7. Miscellaneous structural clips and accessories.
- E. Evaluation Reports: For nonstandard cold-formed steel framing post-installed anchors and power-actuated fasteners, from ICC-ES or other qualified testing agency acceptable to authorities having jurisdiction.

1.6 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM E329 for testing indicated.
- B. Product Tests: Mill certificates or data from a qualified independent testing agency, or in-house testing with calibrated test equipment, indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, and metallic-coating thickness.
- C. Code-Compliance Certification of Studs and Tracks: Provide documentation that framing members are certified according to the product-certification program of the Steel Stud Manufacturers Association.
- D. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - 2. AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."

PART 2 - PRODUCTS

- A. Cold-Formed Steel Framing Standards: Unless more stringent requirements are indicated, framing shall comply with AISI S100, AISI S200, and the following:
 - 1. Floor and Roof Systems: AISI S210.
 - 2. Wall Studs: AISI S211.
 - 3. Headers: AISI S212.
 - 4. Lateral Design: AISI S213.

2.2 COLD-FORMED STEEL FRAMING MATERIALS

- A. Steel Sheet: ASTM A1003/A1003M, Structural Grade, Type H, metallic coated, of grade and coating designation as follows:
 - 1. Grade: ST33H (ST230H).
 - 2. Coating: G90 (Z275) or equivalent.
- B. Steel Sheet for Vertical Deflection, Drift Clips: ASTM A653/A653M, structural steel, zinc coated, of grade and coating as follows:
 - 1. Grade: 33 (230).
 - 2. Coating: G90 (Z275).

2.3 LOAD-BEARING WALL FRAMING

- A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:
 - 1. Minimum Base-Metal Thickness: 0.0329 inch (0.84 mm), unless otherwise indicated on Drawings.
 - 2. Flange Width: 1-5/8 inches (41 mm), unless otherwise indicated on Drawings.
- B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with straight flanges, and as follows:
 - 1. Minimum Base-Metal Thickness: 0.0329 inch (0.84 mm), unless otherwise indicated on Drawings.
 - 2. Flange Width: 1-1/4 inches (32 mm), unless otherwise indicated on Drawings.
- C. Steel Box or Back-to-Back Headers: Manufacturer's standard C-shapes used to form header beams, of web depths indicated, unpunched, with stiffened flanges, and as follows:
 - 1. Minimum Base-Metal Thickness: 0.0538 inch (1.37 mm), unless otherwise indicated on Drawings.
 - 2. Flange Width: 1-5/8 inches (41 mm), unless otherwise indicated on Drawings.
- D. Steel Single- or Double-L Headers: Manufacturer's standard L-shapes used to form header beams, of web depths indicated, and as follows:
 - 1. Minimum Base-Metal Thickness: 0.0538 inch (1.37 mm), unless otherwise indicated on Drawings.
 - 2. Top Flange Width: 1-5/8 inches (41 mm), unless otherwise indicated on Drawings.

2.4 ROOF-RAFTER FRAMING

- A. Steel Rafters: Manufacturer's standard C-shaped steel sections, of web depths indicated, with stiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: 0.0538 inch (1.37 mm), unless otherwise indicated on Drawings.
2. Flange Width: 1-5/8 inches (41 mm), minimum.

2.5 FRAMING ACCESSORIES

- A. Fabricate steel-framing accessories from ASTM A1003/A1003M, Structural Grade, Type H, metallic coated steel sheet, of same grade and coating designation used for framing members.
- B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:
 1. Supplementary framing.
 2. Bracing, bridging, and solid blocking.
 3. Web stiffeners.
 4. Anchor clips.
 5. End clips.
 6. Foundation clips.
 7. Gusset plates.
 8. Stud kickers and knee braces.
 9. Joist hangers and end closures.
 10. Hole-reinforcing plates.
 11. Backer plates.

2.6 ANCHORS, CLIPS, AND FASTENERS

- A. Steel Shapes and Clips: ASTM A36/A36M, zinc coated by hot-dip process according to ASTM A123/A123M.
- B. Anchor Bolts: ASTM F1554, Grade 36, threaded carbon-steel hex-headed bolts, carbon-steel nuts, and flat, hardened-steel washers; zinc coated by hot-dip process according to ASTM A153/A153M, Class C.
- C. Post-Installed Anchors: Fastener systems with bolts of same basic metal as fastened metal, if visible, unless otherwise indicated; with working capacity greater than or equal to the design load, according to an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC58 or ICC-ES AC308 as appropriate for the substrate.
 1. Uses: Securing cold-formed steel framing to structure.
 2. Material for Exterior or Interior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 (A1) stainless-steel bolts, ASTM F593 (ASTM F738M), and nuts, ASTM F594 (ASTM F836M).
- D. Power-Actuated Anchors: Fastener systems with working capacity greater than or equal to the design load, according to an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

- E. Mechanical Fasteners: ASTM C1513, corrosion-resistant-coated, self-drilling, self-tapping, steel drill screws.
 - 1. Head Type: Low-profile head beneath sheathing; manufacturer's standard elsewhere.
- F. Welding Electrodes: Comply with AWS standards.

2.7 MISCELLANEOUS MATERIALS

- A. Galvanizing Repair Paint: ASTM A780/A780M, MIL-P-21035B, or SSPC-Paint 20.
- B. Nonmetallic, Nonshrink Grout: Factory-packaged, nonmetallic, noncorrosive, nonstaining grout, complying with ASTM C1107/C1107M, and with a fluid consistency and 30-minute working time.
- C. Shims: Load-bearing, high-density, multimonomer, nonleaching plastic; or cold-formed steel of same grade and metallic coating as framing members supported by shims.
- D. Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch (6 mm) thick, selected from manufacturer's standard widths to match width of bottom track or rim track members as required.

2.8 FABRICATION

- A. Fabricate cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI's specifications and standards, manufacturer's written instructions, and requirements in this Section.
 - 1. Fabricate framing assemblies using jigs or templates.
 - 2. Cut framing members by sawing or shearing; do not torch cut.
 - 3. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, pneumatic pin fastening, or riveting as standard with fabricator. Wire tying of framing members is not permitted.
 - a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
 - b. Locate mechanical fasteners and install according to Shop Drawings, with screws penetrating joined members by no fewer than three exposed screw threads.
 - 4. Fasten other materials to cold-formed steel framing by welding, bolting, pneumatic pin fastening, or screw fastening, according to Shop Drawings.
- B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies by means that prevent damage or permanent distortion.

- C. Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable variation of 1/8 inch in 10 feet (1:960) and as follows:
 - 1. Spacing: Space individual framing members no more than plus or minus 1/8 inch (3 mm) from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
 - 2. Squareness: Fabricate each cold-formed steel framing assembly to a maximum out-of-square tolerance of 1/8 inch (3 mm).

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, conditions, and abutting structural framing 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. Install load-bearing shims or grout between the underside of load-bearing wall bottom track and the top of foundation wall or slab at locations with a gap larger than 1/4 inch (6 mm) to ensure a uniform bearing surface on supporting concrete or masonry construction.
- B. Install sealer gaskets at the underside of wall bottom track or rim track and at the top of foundation wall or slab at stud or joist locations.

3.3 INSTALLATION, GENERAL

- A. Cold-formed steel framing may be shop or field fabricated for installation, or it may be field assembled.
- B. Install cold-formed steel framing according to AISI S200, AISI S202, and manufacturer's written instructions unless more stringent requirements are indicated.
- C. Install shop- or field-fabricated, cold-formed framing and securely anchor to supporting structure.
 - 1. Screw, bolt, or weld wall panels at horizontal and vertical junctures to produce flush, even, true-to-line joints with maximum variation in plane and true position between fabricated panels not exceeding 1/16 inch (1.6 mm).
- D. Install cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened.
 - 1. Cut framing members by sawing or shearing; do not torch cut.

POLICE RANGE REFURBISHMENT PROJECT – PHASE II

2. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, or riveting. Wire tying of framing members is not permitted.
 - a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
 - b. Locate mechanical fasteners, install according to Shop Drawings, and comply with requirements for spacing, edge distances, and screw penetration.
- E. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.
- F. Install temporary bracing and supports to secure framing and support loads equal to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.
- G. Do not bridge building expansion joints with cold-formed steel framing. Independently frame both sides of joints.
- H. Install insulation, specified in Section 072100 "Thermal Insulation," in framing-assembly members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.
- I. Fasten hole-reinforcing plate over web penetrations that exceed size of manufacturer's approved or standard punched openings.

3.4 LOAD-BEARING WALL INSTALLATION

- A. Install continuous top and bottom tracks sized to match studs. Align tracks accurately and securely anchor at corners and ends, and at spacings as follows:
 1. Anchor Spacing: 24 inches (610 mm), unless otherwise indicated on Drawings.
- B. Squarely seat studs against top and bottom tracks, with gap not exceeding 1/8 inch (3 mm) between the end of wall-framing member and the web of track. Fasten both flanges of studs to top and bottom tracks. Space studs as follows:
 1. Stud Spacing: 16 inches (406 mm), unless otherwise indicated on Drawings.
- C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar configurations.
- D. Align studs vertically where floor framing interrupts wall-framing continuity. Where studs cannot be aligned, continuously reinforce track to transfer loads.
- E. Align floor and roof framing over studs according to AISI S200, Section C1. Where framing cannot be aligned, continuously reinforce track to transfer loads.

- F. Anchor studs abutting structural columns or walls, including masonry walls, to supporting structure.
- G. Install headers over wall openings wider than stud spacing. Locate headers above openings. Fabricate headers of compound shapes indicated or required to transfer load to supporting studs, complete with clip-angle connectors, web stiffeners, or gusset plates.
 - 1. Frame wall openings with not less than a double stud at each jamb of frame. Fasten jamb members together to uniformly distribute loads.
 - 2. Install tracks and jack studs above and below wall openings. Anchor tracks to jamb studs with clip angles or by welding, and space jack studs same as full-height wall studs.
- H. Install supplementary framing, blocking, and bracing in stud framing indicated to support fixtures, equipment, services, casework, heavy trim, furnishings, and similar work requiring attachment to framing.
 - 1. If type of supplementary support is not indicated, comply with stud manufacturer's written recommendations and industry standards in each case, considering weight or load resulting from item supported.
- I. Install horizontal bridging in stud system, spaced vertically 48 inches (1220 mm), unless otherwise indicated on Drawings. Fasten at each stud intersection.
 - 1. Channel Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs with a minimum of two screws into each flange of the clip angle for framing members up to 6 inches (150 mm) deep.
 - 2. Strap Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges, and secure solid blocking to stud webs or flanges.
 - 3. Bar Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.
- J. Install miscellaneous framing and connections, including supplementary framing, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.5 JOIST INSTALLATION

- A. Install perimeter joist track sized to match joists. Align and securely anchor or fasten track to supporting structure at corners, ends, and spacings indicated.
- B. Install joists bearing on supporting frame, level, straight, and plumb; adjust to final position, brace, and reinforce. Fasten joists to both flanges of joist track.
 - 1. Install joists over supporting frame with a minimum end bearing of 1-1/2 inches (38 mm), unless indicated otherwise in Drawings.

POLICE RANGE REFURBISHMENT PROJECT – PHASE II

2. Reinforce ends and bearing points of joists with web stiffeners, end clips, joist hangers, steel clip angles, or steel-stud sections.
- C. Space joists not more than 2 inches (51 mm) from abutting walls, and as follows:
 1. Joist Spacing: 16 inches (406 mm), unless indicated otherwise on Drawings.
- D. Frame openings with built-up joist headers, consisting of joist and joist track or another combination of connected joists if indicated.
- E. Install bridging at intervals indicated. Fasten bridging at each joist intersection as follows:
 1. Joist-Track Solid Bridging: Joist-track solid blocking of width and thickness indicated, secured to joist webs.
 2. Combination Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and joist-track solid blocking of width and thickness indicated. Fasten flat straps to bottom flange of joists and secure solid blocking to joist webs.
- F. Secure joists to load-bearing interior walls to prevent lateral movement of bottom flange.
- G. Install miscellaneous joist framing and connections, including web stiffeners, closure pieces, clip angles, continuous angles, hold-down angles, anchors, and fasteners, to provide a complete and stable joist-framing assembly.

3.6 ERECTION TOLERANCES

- A. Install cold-formed steel framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet (1:960) and as follows:
 1. Space individual framing members no more than plus or minus 1/8 inch (3 mm) from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

3.7 FIELD QUALITY CONTROL

- A. Testing: Engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Field and shop welds will be subject to testing and inspecting.
- C. Testing agency will report test results promptly and in writing to Contractor and Engineer.
- D. Cold-formed steel framing will be considered defective if it does not pass tests and inspections.
- E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.8 REPAIRS AND PROTECTION

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed steel framing with galvanized repair paint according to ASTM A780/A780M and manufacturer's written instructions.
- B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that cold-formed steel framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION 054000

SECTION 055000

METAL FABRICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract - Standard Specifications for Public Works Construction 'The GREENBOOK' and City Supplement 'The WHITEBOOK', latest editions, including Supplemental Supplementary Provisions (SSPs), apply to this Section.

1.2 SUMMARY

A. Section Includes:

- 1. Stainless steel countertop.
- 2. Stainless steel range counters, fixed and removeable.
- 3. Exterior light mounting plates.
- 4. Steel framing and supports for countertops.
- 5. Steel framing and supports for mechanical and electrical equipment.
- 6. Steel framing and supports for applications where framing and supports are not specified in other Sections.
- 7. Loose bearing and leveling plates for applications where they are not specified in other Sections.

B. Products furnished, but not installed, under this Section include the following:

- 1. Loose steel lintels.
- 2. Anchor bolts, steel pipe sleeves, slotted-channel inserts, and wedge-type inserts indicated to be cast into concrete or built into unit masonry.
- 3. Steel weld plates and angles for casting into concrete for applications where they are not specified in other Sections.

C. Related Requirements:

- 1. Section 033000 "Cast-in-Place Concrete" for installing anchor bolts, steel pipe sleeves, slotted-channel inserts, wedge-type inserts, and other items cast into concrete.
- 2. Section 051200 "Structural Steel Framing."

1.3 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of metal fabrications that are anchored to or that receive other work. 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.

1.4 ACTION SUBMITTALS

- A. Product Data: For the following:
 - 1. Nonslip aggregates and nonslip-aggregate surface finishes.
 - 2. Paint products.
 - 3. Grout.
- B. Shop Drawings: Show fabrication and installation details. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items. Provide Shop Drawings for the following:
 - 1. Steel framing and supports for countertops.
 - 2. Steel framing and supports for mechanical and electrical equipment.
 - 3. Steel framing and supports for applications where framing and supports are not specified in other Sections.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For professional engineer.
- B. Welding certificates.
- C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.
- D. Research/Evaluation Reports: For post-installed anchors, from ICC-ES.

1.6 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1.7 FIELD CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.
 - 1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

2.2 METALS

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.
- B. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- C. Stainless-Steel Sheet, Strip, and Plate: ASTM A 240/A 240M or ASTM A 666, Type 304.
- D. Stainless-Steel Bars and Shapes: ASTM A 276, Type 316L.
- E. Steel Tubing: ASTM A 500/A 500M, cold-formed steel tubing.
- F. Steel Pipe: ASTM A 53/A 53M, Standard Weight (Schedule 40) unless otherwise indicated.
- G. Slotted Channel Framing: Cold-formed metal box channels (struts) complying with MFMA-4.
 - 1. Size of Channels: As indicated.
 - 2. Material: Galvanized steel, ASTM A 653/A 653M, structural steel, Grade 33 (Grade 230), with G90 (Z275) coating; 0.079-inch (2-mm) nominal thickness.
- H. Cast Iron: Either gray iron, ASTM A 48/A 48M, or malleable iron, ASTM A 47/A 47M, unless otherwise indicated.
- I. Aluminum Plate and Sheet: ASTM B 209 (ASTM B 209M), Alloy 6061-T6.
- J. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), Alloy 6063-T6.

POLICE RANGE REFURBISHMENT PROJECT – PHASE II

- K. Aluminum-Alloy Rolled Tread Plate: ASTM B 632/B 632M, Alloy 6061-T6.
- L. Aluminum Castings: ASTM B 26/B 26M, Alloy 443.0-F.
- M. Bronze Extrusions: ASTM B 455, Alloy UNS No. C38500 (extruded architectural bronze).
- N. Bronze Castings: ASTM B 584, Alloy UNS No. C83600 (leaded red brass) or No. C84400 (leaded semired brass).
- O. Nickel Silver Extrusions: ASTM B 151/B 151M, Alloy UNS No. C74500.
- P. Nickel Silver Castings: ASTM B 584, Alloy UNS No. C97600 (20 percent leaded nickel bronze).

2.3 FASTENERS

- A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.
 - 1. Provide stainless-steel fasteners for fastening aluminum.
 - 2. Provide stainless-steel fasteners for fastening stainless steel.
 - 3. Provide stainless-steel fasteners for fastening nickel silver.
 - 4. Provide bronze fasteners for fastening bronze.
- B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with hex nuts, ASTM A 563 (ASTM A 563M); and, where indicated, flat washers.
- C. Stainless-Steel Bolts and Nuts: Regular hexagon-head annealed stainless-steel bolts, ASTM F 593 (ASTM F 738M); with hex nuts, ASTM F 594 (ASTM F 836M); and, where indicated, flat washers; Alloy Group 1 (A1).
- D. Anchor Bolts: ASTM F 1554, Grade 36, of dimensions indicated; with nuts, ASTM A 563 (ASTM A 563M); and, where indicated, flat washers.
 - 1. Hot-dip galvanize or provide mechanically deposited, zinc coating where item being fastened is indicated to be galvanized.
- E. 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/E 488M, conducted by a qualified independent testing agency.
- F. Cast-in-Place Anchors in Concrete: Either threaded type or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A 47/A 47M malleable iron or

POLICE RANGE REFURBISHMENT PROJECT – PHASE II

ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F 2329.

- G. Post-Installed Anchors: chemical anchors.
 - 1. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 (A1) stainless-steel bolts, ASTM F 593 (ASTM F 738M), and nuts, ASTM F 594 (ASTM F 836M).

2.4 MISCELLANEOUS MATERIALS

- A. Epoxy Zinc-Rich Primer: Complying with MPI#20 and compatible with topcoat.
- B. Shop Primer for Galvanized Steel: Primer formulated for exterior use over zinc-coated metal and compatible with finish paint systems indicated.
- 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. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.
- E. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107/C 1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.

2.5 FABRICATION, GENERAL

- A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm) unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- D. Form exposed work with accurate angles and surfaces and straight edges.
- E. Weld corners and seams continuously to comply with the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.

POLICE RANGE REFURBISHMENT PROJECT – PHASE II

4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.
- G. Fabricate seams and other connections that are exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
- I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.
- J. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 by 1-1/2 inches (3.2 by 38 mm), with a minimum 6-inch (150-mm) embedment and 2-inch (50-mm) hook, not less than 8 inches (200 mm) from ends and corners of units and 24 inches (600 mm) o.c., unless otherwise indicated.

2.6 STAINLESS STEEL COUNTERTOPS

- A. General: Provide custom fabricated countertop where indicated on Drawings. Entire counter, including splash and edge turndowns to be seamless, flush, integral welded and ground smooth.
- B. Fabricate with Premium NSF Approved 14 GA Type 304 18-8 Stainless Steel.
- C. Fully back with Marine Grade MDF.
- D. Splash and Edge conditions as indicated per plan.
- E. Coordinate with Section 064116 "Plastic-laminate-clad Architectural Cabinets" for fit and overall counter height (including no-drip edge condition) to be 33-1/2 inches maximum over finish floor. Knee clearance at accessible portions of cabinetry shall maintain 27-1/2 inches clearance above finished floor.

2.7 STAINLESS STEEL RANGE COUNTERS

- A. General: Provide custom fabricated counter where indicated on Drawings. Entire counter to be seamless, flush, integral welded and ground smooth.
- B. Fabricate with Premium NSF Approved 14 GA Type 316 18-8 Stainless Steel.

POLICE RANGE REFURBISHMENT PROJECT – PHASE II

- C. Fully back with Marine Grade BB Plywood between stiffeners, 3/4-inch minimum thickness, laminate with exterior rated glue.
- D. Front, back, end and stiffener conditions as indicated on Drawings.
- E. Coordinate with Shade Structure fabrication – field measure distance between steel studs at each bay and fabricate accordingly for bind-proof fit. Allow 1/4-inch gap between end of counter and steel shade structure column. Individually mark each counter with permanent stenciled paint indicating range, structural bay it is fabricated to fit, and arrow indicating north orientation.
- F. Fabricate clips per Drawings for positive attachment to substrate HSS tube.

2.8 EXTERIOR LIGHT MOUNTING PLATE

- A. General: Provide custom fabricated light mounting plate as indicated on Drawings.
- B. Fabricate with 11 GA 316 18-8 Stainless Steel as indicated on Drawings. Acid-wash finish to receive High-Performance Coating per Section 099600.

2.9 MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.
- B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.
 - 1. Fabricate units from slotted channel framing where indicated.
 - 2. Furnish inserts for units installed after concrete is placed.
- C. Galvanize miscellaneous framing and supports where indicated.
- D. Prime miscellaneous framing and supports with zinc-rich primer where indicated.

2.10 MISCELLANEOUS STEEL TRIM

- A. Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.
- B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.
 - 1. Provide with integrally welded steel strap anchors for embedding in concrete or masonry construction.

- C. Galvanize and prime exterior miscellaneous steel trim.
- D. Prime exterior miscellaneous steel trim with zinc-rich primer.

2.11 LOOSE BEARING AND LEVELING PLATES

- A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction. Drill plates to receive anchor bolts and for grouting.
- B. Galvanize plates.
- C. Prime plates with zinc-rich primer.
- D. Prime per Section 051213 “Architecturally Exposed Structural Steel” and finish per Section 099600 “High-Performance Coatings” where structures indicated “AESS” on Drawings.

2.12 STEEL WELD PLATES AND ANGLES

- A. Provide steel weld plates and angles not specified in other Sections, for items supported from concrete construction as needed to complete the Work. Provide each unit with no fewer than two integrally welded steel strap anchors for embedding in concrete.

2.13 FINISHES, GENERAL

- A. Finish metal fabrications after assembly.
- B. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

2.14 STEEL AND IRON FINISHES

- A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153/A 153M for steel and iron hardware and with ASTM A 123/A 123M for other steel and iron products.
 - 1. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.
- B. Preparation for Shop Priming Galvanized Items: After galvanizing, thoroughly clean railings of grease, dirt, oil, flux, and other foreign matter, and treat with metallic phosphate process.
- C. Shop prime iron and steel items not indicated to be galvanized unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.

POLICE RANGE REFURBISHMENT PROJECT – PHASE II

1. Shop prime with zinc-rich primer.
- D. Preparation for Shop Priming: Prepare surfaces to comply with requirements indicated below:
1. Exterior Items: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 2. Items Indicated to Receive Zinc-Rich Primer: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 3. Items Indicated to Receive Primers Specified in Section 099600 "High-Performance Coatings": SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 4. Other Items: SSPC-SP 3, "Power Tool Cleaning."
- E. Shop Priming: Apply shop primer to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.
1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
- F. Prime per Section 051213 "Architecturally Exposed Structural Steel" and finish per Section 099600 "High-Performance Coatings" where structures indicated "AESS" on Drawings.

2.15 ALUMINUM FINISHES

- A. As-Fabricated Finish: AA-M12.
- B. Clear Anodic Finish: AAMA 611, Class I, AA-M12C22A41.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- C. Field Welding: Comply with the following requirements:
 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 2. Obtain fusion without undercut or overlap.
 3. Remove welding flux immediately.

4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, wood screws, and other connectors.
- E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.
- F. Corrosion Protection: Coat concealed surfaces of aluminum that come into contact with grout, concrete, masonry, wood, or dissimilar metals with the following:
 1. Cast Aluminum: Heavy coat of bituminous paint.
 2. Extruded Aluminum: Two coats of clear lacquer.

3.2 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.
- B. Support steel girders on solid grouted masonry, concrete, or steel pipe columns. Secure girders with anchor bolts embedded in grouted masonry or concrete or with bolts through top plates of pipe columns.
 1. Where grout space under bearing plates is indicated for girders supported on concrete or masonry, install as specified in "Installing Bearing and Leveling Plates" Article.
- C. Install pipe columns on concrete footings with grouted baseplates. Position and grout column baseplates as specified in "Installing Bearing and Leveling Plates" Article.
 1. Grout baseplates of columns supporting steel girders after girders are installed and leveled.

3.3 INSTALLING BEARING AND LEVELING PLATES

- A. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of plates.
- B. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with nonshrink grout. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.4 ADJUSTING AND CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 - 1. Apply by brush or spray to provide a minimum 2.0-mil (0.05-mm) dry film thickness.
- B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Section 099113 "Exterior Painting."
- C. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780/A 780M.

END OF SECTION 055000

SECTION 061000
ROUGH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract - Standard Specifications for Public Works Construction 'The GREENBOOK' and City Supplement 'The WHITEBOOK', latest editions, including Supplemental Supplementary Provisions (SSPs), apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Framing with dimension lumber.
2. Wood blocking and nailers.
3. Wood furring and grounds.
4. Wood sleepers.
5. Plywood backing panels.

B. Related Requirements:

1. Section 061600 "Sheathing" for sheathing and subflooring.

1.3 DEFINITIONS

- A. Boards or Strips: Lumber of less than 2 inches nominal (38 mm actual) size in least dimension.
- B. Dimension Lumber: Lumber of 2 inches nominal (38 mm actual) size or greater but less than 5 inches nominal (114 mm actual) size in least dimension.
- C. Exposed Framing: Framing not concealed by other construction.
- D. OSB: Oriented strand board.
- E. Timber: Lumber of 5 inches nominal (114 mm actual) size or greater in least dimension.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

POLICE RANGE REFURBISHMENT PROJECT – PHASE II

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. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
3. For fire-retardant treatments, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D 5664.
4. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

1.5 INFORMATIONAL SUBMITTALS

- A. Material Certificates: 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.
- B. Evaluation Reports: For the following, from ICC-ES:
 1. Power-driven fasteners.
 2. Post-installed anchors.
 3. Metal framing anchors.

1.6 QUALITY ASSURANCE

- A. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Stack wood products flat with spacers beneath and between each bundle to provide air circulation. Protect wood products from weather by covering with waterproof sheeting, securely anchored. 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, comply with the applicable rules of any rules-writing agency certified

by the ALSC Board of Review. Grade lumber 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. For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on end or back of each piece.
3. Dress lumber, S4S, unless otherwise indicated.

B. Maximum Moisture Content of Lumber: 19 percent unless otherwise indicated.

2.2 DIMENSION LUMBER FRAMING

A. Joists, Rafters, and Other Framing Not Listed Above: Minimum grade as indicated on Drawings.

1. Species:
 - a. Hem-fir (north); NLGA.
 - b. Southern pine; SPIB.
 - c. Douglas fir-larch; WCLIB or WWPA.

B. Exposed Framing Indicated to Receive a Stained or Natural Finish: Hand-select material for uniformity of appearance and freedom from characteristics, on exposed surfaces and edges, that would impair finish appearance, including decay, honeycomb, knot-holes, shake, splits, torn grain, and wane.

1. Species and Grade: As indicated above for load-bearing construction of same type.

2.3 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. Rooftop equipment bases and support curbs.
4. Cants.
5. Furring.
6. Grounds.
7. Utility shelving.

B. Dimension Lumber Items: Minimum grade as indicated on Drawings. grade lumber of any of the following species:

1. Hem-fir (north); NLGA.
2. Mixed southern pine or southern pine; SPIB.
3. Spruce-pine-fir; NLGA.

4. Hem-fir; WCLIB or WWPA.
 5. Spruce-pine-fir (south); NeLMA, WCLIB, or WWPA.
- C. Concealed Boards: 19 percent maximum moisture content and any of the following species and grades:
1. Mixed southern pine or southern pine; No. 2 grade; SPIB.
 2. Hem-fir or hem-fir (north); Construction or No. 2 Common grade; NLGA, WCLIB, or WWPA.
 3. Spruce-pine-fir (south) or spruce-pine-fir; Construction or No. 2 Common grade; NeLMA, NLGA, WCLIB, or WWPA.
- D. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.
- E. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.
- F. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

2.4 PLYWOOD BACKING PANELS

- A. Equipment Backing Panels: Plywood, DOC PS 1, Exterior, A-C, fire-retardant treated, in thickness indicated or, if not indicated, not less than 3/4-inch (19-mm) nominal thickness.

2.5 FASTENERS

- A. General: Fasteners shall be of size and type indicated and shall comply with requirements specified in this article for material and manufacture.
1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners of Type 304 stainless steel.
- B. Nails, Brads, and Staples: ASTM F 1667.
- C. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.
- D. Post-Installed Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC01, ICC-ES AC58, ICC-ES AC193, or ICC-ES AC308 as appropriate for the substrate.
1. Material: Stainless steel with bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2 (ASTM F 738M and ASTM F 836M, Grade A1 or A4).

2.6 METAL FRAMING ANCHORS

- A. Allowable design loads, as published by manufacturer, shall meet or exceed those indicated on Drawings. 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. Framing anchors shall be punched for fasteners adequate to withstand same loads as framing anchors.
- B. Stainless-Steel Sheet: ASTM A 666, Type 316.
 - 1. Use for exterior locations and where indicated.

2.7 MISCELLANEOUS MATERIALS

- A. Adhesives for Gluing to Concrete or Masonry: Formulation complying with ASTM D 3498 that is approved for use indicated by adhesive manufacturer.
- B. Water-Repellent Preservative: NWWDA-tested and -accepted formulation containing 3-iodo-2-propynyl butyl carbamate, combined with an insecticide containing chlorpyrifos as its active ingredient.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- B. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.
- C. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry accurately to other construction. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.
- D. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels. Install fire-retardant-treated plywood backing panels with classification marking of testing agency exposed to view.
- E. Install shear wall panels to comply with manufacturer's written instructions.
- F. Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.
- G. Install sill sealer gasket to form continuous seal between sill plates and foundation walls.
- H. Do not splice structural members between supports unless otherwise indicated.

POLICE RANGE REFURBISHMENT PROJECT – PHASE II

- I. 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 (406 mm) o.c.
- J. Provide fire blocking in furred spaces, stud spaces, and other concealed cavities as indicated and as follows:
 - 1. Fire block furred spaces of walls, at each floor level, at ceiling, and at not more than 96 inches (2438 mm) o.c. with solid wood blocking or noncombustible materials accurately fitted to close furred spaces.
 - 2. Fire block concealed spaces of wood-framed walls and partitions at each floor level, at ceiling line of top story, and at not more than 96 inches (2438 mm) o.c. Where fire blocking is not inherent in framing system used, provide closely fitted solid wood blocks of same width as framing members and 2-inch nominal (38-mm actual) thickness.
 - 3. Fire block concealed spaces between floor sleepers with same material as sleepers to limit concealed spaces to not more than 100 sq. ft. (9.3 sq. m) and to solidly fill space below partitions.
- K. Sort and select lumber so that natural characteristics do 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.
- L. 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.
- M. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.
- N. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
 - 1. Table 2304.9.1, "Fastening Schedule," in California Building Code (CBC).
 - 2. ICC-ES evaluation report for fastener.
- O. Use steel common 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. Drive nails snug but do not countersink nail heads unless otherwise indicated.
- P. For exposed work, arrange fasteners in straight rows parallel with edges of members, with fasteners evenly spaced, and with adjacent rows staggered.

POLICE RANGE REFURBISHMENT PROJECT – PHASE II

1. Comply with indicated fastener patterns where applicable. Before fastening, mark fastener locations, using a template made of sheet metal, plastic, or cardboard.
2. Use common nails unless otherwise indicated. Drive nails snug but do not countersink nail heads.

3.2 WOOD BLOCKING, AND NAILER INSTALLATION

- A. Install where indicated and where required for 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.

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.

3.4 CEILING JOIST AND RAFTER FRAMING INSTALLATION

- A. Ceiling Joists: Install with crown edge up and complying with requirements specified above for floor joists. Face nail to ends of parallel rafters.
- B. 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 (50 mm) 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 (50 mm) deeper. Bevel ends of jack rafters for full bearing against hip rafter.
- C. Provide collar beams (ties) as indicated or, if not indicated, provide 1-by-6-inch nominal- (19-by-140-mm actual-) size boards between every third pair of rafters, but not more than 48 inches (1219 mm) o.c. Locate below ridge member, at third point of rafter span. Cut ends to fit roof slope and nail to rafters.
- D. Provide special framing as indicated for eaves, overhangs, dormers, and similar conditions if any.

3.5 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 enough that moisture content exceeds that specified, 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 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract - Standard Specifications for Public Works Construction 'The GREENBOOK' and City Supplement 'The WHITEBOOK', latest editions, including Supplemental Supplementary Provisions (SSPs), apply to this Section.

1.2 SUMMARY

A. Section Includes:

- 1. Wall sheathing.
- 2. Roof sheathing.
- 3. Parapet sheathing.
- 4. Composite nail base insulated roof sheathing.
- 5. Subflooring.
- 6. Underlayment.
- 7. Sheathing joint and penetration treatment.

B. Related Requirements:

- 1. Section 055000 "Metal Fabrications".
- 2. Section 061000 "Rough Carpentry" for plywood backing panels.
- 3. Section 072500 "Weather Barriers" for water-resistive barrier applied over wall sheathing.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Evaluation Reports: For the following, from ICC-ES:
- C. Field quality-control reports.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Stack panels flat with spacers beneath and between each bundle to provide air circulation. Protect sheathing from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PANEL PRODUCTS

- A. Thickness: As needed to comply with requirements specified, but not less than thickness indicated.
- B. Factory mark panels to indicate compliance with applicable standard.

2.2 WALL SHEATHING

- A. Plywood Sheathing: DOC PS 1, Exterior, Structural I sheathing.
 - 1. Span Rating: Not less than 32/16.
 - 2. Nominal Thickness: Not less than 1/2 inch (13 mm).

2.3 ROOF SHEATHING

- A. Plywood Sheathing: DOC PS 1, Exposure 1 sheathing.
 - 1. Span Rating: Not less than 40/20.
 - 2. Nominal Thickness: Not less than 5/8 inch (16 mm).

2.4 SUBFLOORING AND UNDERLAYMENT

- A. Plywood Combination Subfloor-Underlayment: DOC PS 1, Exterior, Structural I, C-C Plugged single-floor panels.
 - 1. Span Rating: Not less than 24.
 - 2. Nominal Thickness: Not less than 7/8 inch (22.2 mm).
 - 3. Edge Detail: Square.

2.5 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
 - 1. For roof and wall sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A153/A153M or of Type 304 stainless steel.

- B. Nails, Brads, and Staples: ASTM F1667.
- C. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.
- D. Screws for Fastening Sheathing to Wood Framing: ASTM C1002.
- E. Screws for Fastening Wood Structural Panels to Cold-Formed Metal Framing: ASTM C954, except with wafer heads and reamer wings, length as recommended by screw manufacturer for material being fastened.

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. Arrange joints so that pieces do not span between fewer than three support members.
- 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. Table 2304.9.1, "Fastening Schedule," in the ICC's International Building Code.
 - 2. ICC-ES evaluation report for fastener.
- 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 wall and 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 WOOD STRUCTURAL PANEL INSTALLATION

- A. General: Comply with applicable recommendations in APA Form No. E30, "Engineered Wood Construction Guide," for types of structural-use panels and applications indicated.
- B. Fastening Methods: Fasten panels as indicated below:

POLICE RANGE REFURBISHMENT PROJECT – PHASE II

1. Combination Subfloor-Underlayment:
 - a. Glue and nail to wood framing.
 - b. Screw to cold-formed metal framing.
 - c. Space panels 1/8 inch (3 mm) apart at edges and ends.

2. Wall and Roof Sheathing:
 - a. Screw to cold-formed metal framing.
 - b. Space panels 1/8 inch (3 mm) apart at edges and ends.

END OF SECTION 061600

SECTION 064113

WOOD-VENEER-FACED ARCHITECTURAL CABINETS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract - Standard Specifications for Public Works Construction 'The GREENBOOK' and City Supplement 'The WHITEBOOK', latest editions, including Supplemental Supplementary Provisions (SSPs), apply to this Section.

1.2 SUMMARY

A. Section Includes:

- 1. Wood-veneer-faced architectural cabinets.
- 2. Wood furring, blocking, shims, and hanging strips for installing architectural cabinets that are not concealed within other construction.
- 3. Shop finishing of architectural cabinets.

B. Related Requirements:

- 1. Section 061000 "Rough Carpentry" for wood furring, blocking, shims, and hanging strips required for installing cabinets that are concealed within other construction before cabinet installation.
- 2. Section 064116 "Plastic-Laminate-Clad Architectural Cabinetry" for cabinetry at the Clubhouse.

1.3 COORDINATION

- A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to support loads imposed by installed and fully loaded cabinets.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.

B. Sustainable Design Submittals:

1. Product Data: For recycled content, indicating postconsumer and preconsumer recycled content and cost.
2. Product Certificates: For regional materials, indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include distance to Project and cost for each regional material.
3. Chain-of-Custody Certificates: For certified wood products. Include statement of costs.
4. Product Data: For adhesives, indicating that product contains no urea formaldehyde.
5. Product Data: For composite wood products, indicating that product contains no urea formaldehyde.

C. Shop Drawings: For architectural cabinets.

1. Include plans, elevations, sections, and attachment details.
2. Show large-scale details.
3. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
4. Show locations and sizes of cutouts and holes for items installed in architectural cabinets.
5. Show veneer leaves with dimensions, grain direction, exposed face, and identification numbers indicating the flitch and sequence within the flitch for each leaf.
6. Apply WI Certified Compliance Program label to Shop Drawings.

D. Samples: For each exposed product and for each color and finish specified, in manufacturer's standard size.

E. Samples for Initial Selection: For each type of exposed finish.

F. Samples for Verification: For the following:

1. Lumber and Panel Products with Shop-Applied Opaque Finish: 5 inches (125 mm) wide by 12 inches (300 mm) long for lumber and 8 by 10 inches (200 by 250 mm) for panels, for each finish system and color.
 - a. Finish one-half of exposed surface.
2. Thermoset Decorative Panels: 8 by 10 inches (200 by 250 mm), for each color, pattern, and surface finish.
 - a. Provide edge banding on one edge.
3. Corner Pieces:
 - a. Cabinet-front frame joints between stiles and rails and at exposed end pieces, 18 inches (450 mm) high by 18 inches (450 mm) wide by 6 inches (150 mm) deep.
 - b. Miter joints for standing trim.

4. Exposed Cabinet Hardware and Accessories: One full-size unit for each type and finish.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For manufacturer and Installer.
- B. Product Certificates: For the following:
 1. Composite wood products.
 2. Thermoset decorative panels.
 3. Adhesives.

1.7 CLOSEOUT SUBMITTALS

- A. Quality Standard Compliance Certificates: WI Certified Compliance Program certificates.

1.8 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.
 1. Manufacturer's Certification: Licensed participant in WI's Certified Compliance Program.
- B. Installer Qualifications: Licensed participant in WI's Certified Compliance Program.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver cabinets until painting and similar finish operations that might damage architectural cabinets have been completed in installation areas. Store cabinets in installation areas or in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.

1.10 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install cabinets until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature and relative humidity at levels planned for building occupants during the remainder of the construction period.
- B. Field Measurements: Where cabinets are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

POLICE RANGE REFURBISHMENT PROJECT – PHASE II

1. Locate concealed framing, blocking, and reinforcements that support cabinets by field measurements before being enclosed/concealed by construction, and indicate measurements on Shop Drawings.
- C. Established Dimensions: Where cabinets are indicated to fit to other construction, establish dimensions for areas where cabinets are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

PART 2 - PRODUCTS

2.1 CABINETS, GENERAL

- A. Quality Standard: Unless otherwise indicated, comply with the Architectural Woodwork Standards for grades of architectural cabinets indicated for construction, finishes, installation, and other requirements.
1. Provide labels and certificates from WI certification program indicating that woodwork and installation complies with requirements of grades specified.
 2. The Contract Documents contain requirements that are more stringent than the referenced woodwork quality standard. Comply with requirements of Contract Documents in addition to those of the referenced quality standard.

2.2 WOOD CABINETS FOR OPAQUE FINISH

- A. Architectural Woodwork Standards Grade: Custom.
- B. Regional Materials: Wood products shall be manufactured within 500 miles (800 km) of Project site from materials that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles (800 km) of Project site.
- C. Regional Materials: Wood products shall be manufactured within 500 miles (800 km) of Project site.
- D. Certified Wood: Wood products shall be certified as "FSC Pure"[or "FSC Mixed Credit"] according to FSC STD-01-001 and FSC STD-40-004.
- E. Type of Construction: Face frame. Match cabinets style in existing room.
- F. Door and Drawer-Front Style: Flush inset. Match cabinets style in existing room.
- G. Species for Exposed Lumber Surfaces: Any closed-grain hardwood.
- H. Panel Product for Exposed Surfaces: MDF.
- I. Semiexposed Surfaces:

POLICE RANGE REFURBISHMENT PROJECT – PHASE II

1. Surfaces Other Than Drawer Bodies: Match materials indicated for exposed surfaces.
 - a. Edges of Thermoset Decorative Panel Shelves: PVC or polyester edge banding.
 2. Drawer Sides and Backs: Solid-hardwood lumber.
 3. Drawer Bottoms: Hardwood plywood.
- J. Drawer Construction: Fabricate with exposed fronts fastened to subfront with mounting screws from interior of body.
1. Join subfronts, backs, and sides with glued rabbeted joints supplemented by mechanical fasteners.

2.3 WOOD MATERIALS

- A. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of architectural cabinet and quality grade specified unless otherwise indicated.
1. Do not use plain-sawn softwood lumber with exposed, flat surfaces more than 3 inches (75 mm) wide.
 2. Wood Moisture Content: 5 to 10 percent.
- B. Composite Wood Products: Products shall be made without urea formaldehyde.
- C. Composite Wood Products: Products shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
1. MDF: ANSI A208.2, Grade 130.
 2. Particleboard: ANSI A208.1, Grade M-2-Exterior Glue.
 3. Softwood Plywood: DOC PS 1, medium-density overlay.
 4. Veneer-Faced Panel Products (Hardwood Plywood): HPVA HP-1.

2.4 CABINET HARDWARE AND ACCESSORIES

- A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Accuride International.
 - b. Blum, Julius & Co., Inc.
 - c. Knappe & Vogt Manufacturing Company.
 - d. Rockford Process Control, LLC.

POLICE RANGE REFURBISHMENT PROJECT – PHASE II

- B. Butt Hinges: 2-3/4-inch (70-mm), five-knuckle steel hinges made from 0.095-inch- (2.4-mm-) thick metal, and as follows:
 - 1. Semiconcealed Hinges for Flush Doors: ANSI/BHMA A156.9, B01361.
 - 2. Semiconcealed Hinges for Overlay Doors: ANSI/BHMA A156.9, B01521.
 - a. Rockford Process Control, LLC Model 851, brushed stainless steel, or approved equal.
- C. Back-Mounted Pulls: ANSI/BHMA A156.9, B02011.
- D. Wire Pulls: Back mounted, solid metal, 5 inches (127 mm) long, 2-1/2 inches (63.5 mm) deep, and 5/16 inch (8 mm) in diameter.
- E. Catches: Magnetic catches, ANSI/BHMA A156.9, B03141.
- F. Adjustable Shelf Standards and Supports: ANSI/BHMA A156.9, B04102; with shelf brackets, B04112.
- G. Shelf Rests: ANSI/BHMA A156.9, B04013; metal.
- H. Drawer Slides: ANSI/BHMA A156.9.
 - 1. Grade 1 and Grade 2: Side mounted and extending under bottom edge of drawer.
 - a. Type: Full extension.
 - b. Material: Epoxy-coated steel with polymer rollers.
 - 2. Grade 1HD-100 and Grade 1HD-200: Side mounted; full-extension type; zinc-plated-steel, ball-bearing slides.
 - 3. For drawers not more than 3 inches (75 mm) high and not more than 24 inches (600 mm) wide, provide Grade 1.
 - 4. For drawers more than 3 inches (75 mm) high, but not more than 6 inches (150 mm) high and not more than 24 inches (600 mm) wide, provide Grade 1HD-100.
 - 5. For drawers more than 6 inches (150 mm) high or more than 24 inches (600 mm) wide, provide Grade 1HD-200.
- I. Door Locks: ANSI/BHMA A156.11, E07121.
- J. Door and Drawer Silencers: ANSI/BHMA A156.16, L03011.
- K. Grommets for Cable Passage: 2-inch (51-mm) OD, molded-plastic grommets and matching plastic caps with slot for wire passage.
 - 1. Color: Black.
- L. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with ANSI/BHMA A156.18 for BHMA finish number indicated.
 - 1. Satin Stainless Steel: ANSI/BHMA 630.
- M. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in ANSI/BHMA A156.9.

2.5 MISCELLANEOUS MATERIALS

- A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln-dried to less than 15 percent moisture content.
- B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.
- C. Adhesives: Do not use adhesives that contain urea formaldehyde.

2.6 FABRICATION

- A. Fabricate architectural cabinets to dimensions, profiles, and details indicated. Ease edges and corners to 1/16-inch (1.5-mm) radius unless otherwise indicated.
- B. Complete fabrication, including assembly and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
 - 1. Notify Engineer seven days in advance of the dates and times architectural cabinet fabrication will be complete.
 - 2. Trial fit assemblies at manufacturer's shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements before disassembling for shipment.
- C. Shop-cut openings to maximum extent possible to receive hardware, appliances, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

2.7 SHOP FINISHING

- A. General: Finish architectural cabinets at manufacturer's shop as specified in this Section. Defer only final touchup, cleaning, and polishing until after installation.
- B. Shop Priming: Shop apply the prime coat including backpriming, if any, for items specified to be field finished. See Section 099123 "Interior Painting" for material and application requirements.
- C. Preparation for Finishing: Comply with referenced quality standard for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing architectural cabinets, as applicable to each unit of work.

POLICE RANGE REFURBISHMENT PROJECT – PHASE II

1. Backpriming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of cabinets.
- D. Opaque Finish:
1. Architectural Woodwork Standards Grade: Same as item to be finished.
 2. Finish: System - 4, water-based latex acrylic.
 3. Color: As selected by Engineer from manufacturer's full range.
 4. Sheen: Satin, 31-45 gloss units measured on 60-degree gloss meter per ASTM D523.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Before installation, condition cabinets to humidity conditions in installation areas for not less than 72 hours.

3.2 INSTALLATION

- A. Architectural Woodwork Standards Grade: Install cabinets to comply with quality standard grade of item to be installed.
- B. Assemble cabinets and complete fabrication at Project site to extent that it was not completed in the shop.
- C. Anchor cabinets to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing. Use fine finishing nails[or finishing screws] for exposed fastening, countersunk and filled flush with cabinet surface.
1. For shop-finished items, use filler matching finish of items being installed.
- D. Install cabinets level, plumb, and true in line to a tolerance of 1/8 inch in 96 inches (3 mm in 2400 mm)using concealed shims.
1. Scribe and cut cabinets to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
 2. Install cabinets without distortion so doors and drawers fit openings and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.
 3. Maintain veneer sequence matching of cabinets with transparent finish.
 4. Fasten wall cabinets through back, near top and bottom, and at ends not more than 16 inches (400 mm) o.c. with No. 10 wafer-head screws sized for not less than 1-1/2-inch (38-mm) penetration into wood framing, blocking, or hanging strips, No. 10 wafer-head sheet metal screws through metal backing or metal framing behind wall finish or toggle bolts through metal backing or metal framing behind wall finish.

- E. Shop Finishes: Touch up finishing after installation of architectural cabinets. Fill nail holes with matching filler.
 - 1. Apply specified finish coats, including stains and paste fillers if any, to exposed surfaces where only sealer/prime coats are shop applied.

3.3 FIELD QUALITY CONTROL

- A. Inspections: Provide inspection of installed Work through WI's Certified Compliance Program certifying that woodwork, including installation, complies with requirements of the Architectural Woodwork Standards for the specified grade.
 - 1. Inspection entity shall prepare and submit report of inspection.

3.4 ADJUSTING AND CLEANING

- A. Repair damaged and defective cabinets, where possible, to eliminate functional and visual defects. Where not possible to repair, replace architectural cabinets. Adjust joinery for uniform appearance.
- B. Clean, lubricate, and adjust hardware.
- C. Clean cabinets on exposed and semiexposed surfaces. Touch up finishes to restore damaged or soiled areas.

END OF SECTION 064113

SECTION 064116

PLASTIC-LAMINATE-CLAD ARCHITECTURAL CABINETS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract - Standard Specifications for Public Works Construction 'The GREENBOOK' and City Supplement 'The WHITEBOOK', latest editions, including Supplemental Supplementary Provisions (SSPs), apply to this Section.

1.2 SUMMARY

A. Section Includes:

- 1. Plastic-laminate-clad architectural cabinets.
- 2. Wood furring, blocking, shims, and hanging strips for installing plastic-laminate-clad architectural cabinets that are not concealed within other construction.

B. Related Requirements:

- 1. Section 055000 "Metal Fabrications" for stainless steel countertop.
- 2. Section 061000 "Rough Carpentry" for wood furring, blocking, shims, and hanging strips required for installing cabinets that are concealed within other construction before cabinet installation.

1.3 COORDINATION

- A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to support loads imposed by installed and fully loaded cabinets.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Sustainable Design Submittals:
 - 1. Environmental Product Declaration: For each product.

2. Health Product Declaration: For each product.
3. Sourcing of Raw Materials: Corporate sustainability report for each manufacturer.
4. Chain-of-Custody Certificates: For certified wood products. Include statement of costs.
5. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.
6. Laboratory Test Reports: For composite wood products, indicating compliance with requirements for low-emitting materials.

C. Shop Drawings:

1. Include plans, elevations, sections, and attachment details.
2. Show large-scale details.
3. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
4. Show locations and sizes of cutouts and holes for items installed in plastic-laminate architectural cabinets.
5. Apply WI Certified Compliance Program label to Shop Drawings.

D. Samples for Verification: For the following:

1. Plastic Laminates: 12 by 12 inches (300 by 300 mm), for each type, color, pattern, and surface finish required.
 - a. Provide one sample applied to core material with specified edge material applied to one edge.
2. Thermoset Decorative Panels: 12 by 12 inches (300 by 300 mm), for each color, pattern, and surface finish.
 - a. Provide edge banding on one edge.
3. Corner Pieces:
 - a. Cabinet-front frame joints between stiles and rails and at exposed end pieces, 18 inches (450 mm) high by 18 inches (450 mm) wide by 6 inches (150 mm) deep.
 - b. Miter joints for standing trim.
4. Exposed Cabinet Hardware and Accessories: One full-size unit for each type and finish.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For manufacturer and Installer.
- B. Product Certificates: For the following:
 1. Wood composite material.
 2. High-pressure decorative laminate.
 3. Adhesives.

- C. Evaluation Reports: For fire-retardant-treated materials, from ICC-ES.
- D. Field quality-control reports.

1.7 CLOSEOUT SUBMITTALS

- A. Quality Standard Compliance Certificates: WI Certified Compliance Program certificates.

1.8 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.

- 1. Manufacturer's Certification: Licensed participant in WI's Certified Compliance Program.

- B. Installer Qualifications: Licensed participant in WI's Certified Compliance Program.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver cabinets until painting and similar finish operations that might damage architectural cabinets have been completed in installation areas. Store cabinets in installation areas or in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.

1.10 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install cabinets until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature and relative humidity at levels planned for building occupants during the remainder of the construction period.

- B. Field Measurements: Where cabinets are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

- 1. Locate concealed framing, blocking, and reinforcements that support cabinets by field measurements before being enclosed/concealed by construction, and indicate measurements on Shop Drawings.

- C. Established Dimensions: Where cabinets are indicated to fit to other construction, establish dimensions for areas where cabinets are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

PART 2 - PRODUCTS

2.1 PLASTIC-LAMINATE-CLAD ARCHITECTURAL CABINETS

- A. Quality Standard: Unless otherwise indicated, comply with the Architectural Woodwork Standards for grades of cabinets indicated for construction, finishes, installation, and other requirements.
 - 1. Provide labels and certificates from WI certification program indicating that woodwork and installation complies with requirements of grades specified.
 - 2. The Contract Documents may contain requirements that are more stringent than the referenced quality standard. Comply with requirements of Contract Documents in addition to those of the referenced quality standard.
- B. Architectural Woodwork Standards Grade: Premium.
- C. Regional Materials: Wood products shall be manufactured within 100 miles (160 km) of Project site from materials that have been extracted, harvested, or recovered, as well as manufactured, within 100 miles (160 km) of Project site.
- D. Certified Wood: Wood products shall be certified as "FSC Pure" or "FSC Mixed Credit" according to FSC STD-01-001 and FSC STD-40-004.
- E. Type of Construction: Frameless.
- F. Door and Drawer-Front Style: Flush overlay.
- G. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or if not indicated, as required by quality standard.
 - 1. As indicated per Interior Finish Schedule on Drawings.
- H. Laminate Cladding for Exposed Surfaces:
 - 1. Horizontal Surfaces: Grade HGS.
 - 2. Postformed Surfaces: Grade HGP.
 - 3. Vertical Surfaces: Grade HGS.
 - 4. Edges: PVC edge banding, 3.0 mm thick, matching laminate in color, pattern, and finish.
 - 5. Pattern Direction: Vertically for drawer fronts, doors, and fixed panels.
- I. Materials for Semiexposed Surfaces:
 - 1. Surfaces Other Than Drawer Bodies: High-pressure decorative laminate, NEMA LD 3, Grade VGS.
 - a. Edges of Plastic-Laminate Shelves: PVC edge banding, 3.0 mm thick, matching laminate in color, pattern, and finish.

POLICE RANGE REFURBISHMENT PROJECT – PHASE II

- b. For semiexposed backs of panels with exposed plastic-laminate surfaces, provide surface of high-pressure decorative laminate, NEMA LD 3, Grade VGS.
- 2. Drawer Sides and Backs: Solid-hardwood lumber.
- 3. Drawer Bottoms: Hardwood plywood.
- J. Dust Panels: 1/4-inch (6.4-mm) plywood or tempered hardboard above compartments and drawers unless located directly under tops.
- K. Concealed Backs of Panels with Exposed Plastic-Laminate Surfaces: High-pressure decorative laminate, NEMA LD 3, Grade BKL.
- L. Drawer Construction: Fabricate with exposed fronts fastened to subfront with mounting screws from interior of body.
 - 1. Join subfronts, backs, and sides with glued dovetail joints.
- M. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:
 - 1. Match Engineer's sample.

2.2 WOOD MATERIALS

- A. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of architectural cabinet and quality grade specified unless otherwise indicated.
 - 1. Wood Moisture Content: 5 to 10 percent.
- B. Composite Wood and Agrifiber Products: Provide materials that comply with requirements of referenced quality standard for each type of architectural cabinet and quality grade specified unless otherwise indicated.
- C. Composite Wood Products: Products shall be made using ultra-low-emitting formaldehyde resins as defined in the California Air Resources Board's "Airborne Toxic Control Measure to Reduce Formaldehyde Emissions from Composite Wood Products" or shall be made with no added formaldehyde.
 - 1. Medium-Density Fiberboard (MDF): ANSI A208.2, Grade 130.
 - 2. Particleboard: ANSI A208.1, Grade M-2-Exterior Glue.
 - 3. Softwood Plywood: DOC PS 1, medium-density overlay.

2.3 CABINET HARDWARE AND ACCESSORIES

- A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets.

POLICE RANGE REFURBISHMENT PROJECT – PHASE II

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Accuride International.
 - b. Blum, Julius & Co., Inc.
 - c. Knape & Vogt Manufacturing Company.
 - d. Rockford Process Control, LLC.
- B. Butt Hinges: 2-3/4-inch (70-mm), five-knuckle steel hinges made from 0.095-inch- (2.4-mm-) thick metal, and as follows:
 1. Semiconcealed Hinges for Flush Doors: ANSI/BHMA A156.9, B01361.
 2. Semiconcealed Hinges for Overlay Doors: ANSI/BHMA A156.9, B01521.
- C. Back-Mounted Pulls: ANSI/BHMA A156.9, B02011.
- D. Wire Pulls: Back mounted, solid metal, 5 inches (127 mm) long, 2-1/2 inches (63.5 mm) deep, and 5/16 inch (8 mm) in diameter.
- E. Catches: Magnetic catches, ANSI/BHMA A156.9, B03141.
- F. Adjustable Shelf Standards and Supports: ANSI/BHMA A156.9, B04071; with shelf rests, B04081.
- G. Shelf Rests: ANSI/BHMA A156.9, B04013; two-pin plastic with shelf hold-down clip.
- H. Drawer Slides: ANSI/BHMA A156.9.
 1. Grade 1 and Grade 2: Side mounted and extending under bottom edge of drawer.
 - a. Type: Full extension.
 - b. Material: Epoxy-coated steel with polymer rollers.
 2. Grade 1HD-100 and Grade 1HD-200: Side mounted; full-extension type; zinc-plated-steel ball-bearing slides.
 3. For drawers not more than 3 inches (75 mm) high and not more than 24 inches (600 mm) wide, provide Grade 1.
 4. For drawers more than 3 inches (75 mm) high, but not more than 6 inches (150 mm) high and not more than 24 inches (600 mm) wide, provide Grade 1HD-100.
 5. For drawers more than 6 inches (150 mm) high or more than 24 inches (600 mm) wide, provide Grade 1HD-200.
 6. For computer keyboard shelves, provide Grade 1HD-100.
 7. For trash bins not more than 20 inches (500 mm) high and 16 inches (400 mm) wide, provide Grade 1HD-100.
- I. Door and Drawer Silencers: ANSI/BHMA A156.16, L03011.
- J. Grommets for Cable Passage: 2-inch (51-mm) OD, molded-plastic grommets and matching plastic caps with slot for wire passage.
 1. Color: Brown.

POLICE RANGE REFURBISHMENT PROJECT – PHASE II

- K. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with ANSI/BHMA A156.18 for ANSI/BHMA finish number indicated.
 - 1. Dark, Oxidized, Satin Bronze, Oil Rubbed: ANSI/BHMA 613 for bronze base.
 - 2. Satin Stainless Steel: ANSI/BHMA 630.
- L. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in ANSI/BHMA A156.9.

2.4 MISCELLANEOUS MATERIALS

- A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln-dried to less than 15 percent moisture content.
- B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.
- C. Adhesives: Use adhesives that meet the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- D. Adhesive for Bonding Plastic Laminate: Urea formaldehyde.
 - 1. Adhesive for Bonding Edges: Hot-melt adhesive or adhesive specified above for faces.

2.5 FABRICATION

- A. Fabricate architectural cabinets to dimensions, profiles, and details indicated.
- B. Complete fabrication, including assembly and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
- C. Shop-cut openings to maximum extent possible to receive hardware, appliances, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Before installation, condition cabinets to humidity conditions in installation areas for not less than 72 hours.

3.2 INSTALLATION

- A. Architectural Woodwork Standards Grade: Install cabinets to comply with Custom Grade.
- B. Assemble cabinets and complete fabrication at Project site to extent that it was not completed in the shop.
- C. Anchor cabinets to anchors or blocking built in or directly attached to substrates. Secure with wafer-head cabinet installation screws.
- D. Install cabinets level, plumb, and true in line to a tolerance of 1/8 inch in 96 inches (3 mm in 2400 mm) using concealed shims.
 - 1. Scribe and cut cabinets to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
 - 2. Install cabinets without distortion so doors and drawers fit openings and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.
 - 3. Fasten wall cabinets through back, near top and bottom, and at ends not more than 16 inches (400 mm) o.c. with No. 10 wafer-head screws sized for not less than 1-1/2-inch (38-mm) penetration into wood framing, blocking, or hanging strips.

3.3 FIELD QUALITY CONTROL

- A. Inspections: Provide inspection of installed Work through WI's Certified Compliance Program certifying that woodwork, including installation, complies with requirements of the Architectural Woodwork Standards for the specified grade.
 - 1. Inspection entity shall prepare and submit report of inspection.

3.4 ADJUSTING AND CLEANING

- A. Repair damaged and defective cabinets, where possible, to eliminate functional and visual defects. Where not possible to repair, replace architectural cabinets. Adjust joinery for uniform appearance.
- B. Clean, lubricate, and adjust hardware.
- C. Clean cabinets on exposed and semiexposed surfaces.

END OF SECTION 064116

SECTION 071326

SELF-ADHERING SHEET WATERPROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract - Standard Specifications for Public Works Construction 'The GREENBOOK' and City Supplement 'The WHITEBOOK', latest editions, including Supplemental Supplementary Provisions (SSPs), apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Modified bituminous sheet waterproofing, fabric reinforced.
 - 2. Molded-sheet drainage panel.
 - 3. Molded-sheet collector panel system.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review waterproofing requirements including surface preparation, substrate condition and pretreatment, minimum curing period, forecasted weather conditions, special details and sheet flashings, installation procedures, testing and inspection procedures, and protection and repairs.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, and tested physical and performance properties of waterproofing.
 - 2. Include manufacturer's written instructions for evaluating, preparing, and treating substrate.
- B. Samples: For each exposed product and for each color and texture specified, including the following products:
 - 1. 8-by-8-inch (200-by-200-mm) square of waterproofing and flashing sheet.
 - 2. 4-by-4-inch (100-by-100-mm) square of drainage panel.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Field quality-control reports.
- C. Sample Warranties: For special warranties.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by waterproofing manufacturer.

1.7 FIELD CONDITIONS

- A. Environmental Limitations: Apply waterproofing within the range of ambient and substrate temperatures recommended in writing by waterproofing manufacturer. Do not apply waterproofing to a damp or wet substrate.
 - 1. Do not apply waterproofing in snow, rain, fog, or mist.
- B. Maintain adequate ventilation during preparation and application of waterproofing materials.

1.8 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to furnish replacement waterproofing material for waterproofing that does not comply with requirements or that fails to remain watertight within specified warranty period.
 - 1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations for Waterproofing System: Obtain waterproofing materials, protection course, and molded-sheet drainage panels from single source from single manufacturer.

2.2 MODIFIED BITUMINOUS SHEET WATERPROOFING

- A. Modified Bituminous Sheet: Minimum 60-mil (1.5-mm) nominal thickness, self-adhering sheet consisting of 56 mils (1.4 mm) of rubberized asphalt laminated on one side to a 4-mil- (0.10-mm-) thick, polyethylene-film reinforcement, and with release liner on adhesive side; formulated for application with primer or surface conditioner that complies with VOC limits of authorities having jurisdiction.

1. Physical Properties:
 - a. Tensile Strength, Membrane: 250 psi (1.7 MPa) minimum; ASTM D412, Die C, modified.
 - b. Ultimate Elongation: 300 percent minimum; ASTM D412, Die C, modified.
 - c. Low-Temperature Flexibility: Pass at minus 20 deg F (minus 29 deg C); ASTM D1970/D1970M.
 - d. Crack Cycling: Unaffected after 100 cycles of 1/8-inch (3-mm) movement; ASTM C836/C836M.
 - e. Puncture Resistance: 40 lbf (180 N) minimum; ASTM E154/E154M.
 - f. Water Absorption: 0.2 percent weight-gain maximum after 48-hour immersion at 70 deg F (21 deg C); ASTM D570.
 - g. Water Vapor Permeance: 0.05 perm (2.9 ng/Pa x s x sq. m) maximum; ASTM E96/E96M, Water Method.
 - h. Hydrostatic-Head Resistance: 200 feet (60 m) minimum; ASTM D5385.
2. Sheet Strips: Self-adhering, rubberized-asphalt strips of same material and thickness as sheet waterproofing.

2.3 AUXILIARY MATERIALS

- A. Furnish auxiliary materials recommended by waterproofing manufacturer for intended use and compatible with sheet waterproofing.
 1. Furnish liquid-type auxiliary materials that comply with VOC limits of authorities having jurisdiction.
- B. Primer: Liquid waterborne primer recommended for substrate by sheet-waterproofing material manufacturer.
- C. Surface Conditioner: Liquid, waterborne surface conditioner recommended for substrate by sheet-waterproofing material manufacturer.
- D. Liquid Membrane: Elastomeric, two-component liquid, cold fluid applied, of trowel grade or low viscosity.
- E. Substrate Patching Membrane: Low-viscosity, two-component, modified asphalt coating.
- F. Metal Termination Bars: Aluminum bars, approximately 1 by 1/8 inch (25 by 3 mm), predrilled at 9-inch (229-mm) centers.
- G.

2.4 MOLDED-SHEET DRAINAGE PANELS

- A. Nonwoven-Geotextile-Faced, Molded-Sheet Drainage Panel without Polymeric Film: Composite subsurface drainage panel acceptable to waterproofing manufacturer and consisting of a studded, nonbiodegradable, molded-plastic-sheet drainage core; with a nonwoven, needle-punched geotextile facing with an apparent opening size not

exceeding No. 70 (0.21-mm) sieve laminated to one side of the core, without a polymeric film bonded to the other side; and with a vertical flow rate through the core of 9 to 21 gpm per ft. (112 to 261 L/min. per m).

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. BASF Corporation.
 - b. Carlisle Coatings & Waterproofing Inc.
 - c. Polyguard Products, Inc.
 - d. Soprema, Inc.
 - e. W.R. Meadows, Inc.
 - f. Protecto Wrap Jiffy Seal

- B. Molded-Sheet Collector-Panel System Wrapped with Geotextile: Composite subsurface collector-panel system by same manufacturer as primary molded-sheet drainage panels; consisting of a high-profile, studded, nonbiodegradable, molded-plastic-sheet drainage core; wrapped with a nonwoven-geotextile facing with an apparent opening size not exceeding No. 40 (0.425-mm) sieve; and with a vertical flow rate through the core of 21 to 97 gpm per ft. (261 to 1197 L/min. per m) and a minimum horizontal, in-plane flow rate of 21 gpm per ft. (261 L/min. per m). Provide system with manufacturer's outlets, connectors, tapes, and other accessories to connect primary molded-sheet drainage panels with piped subdrainage system.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of waterproofing.
 1. Verify that concrete has cured and aged for minimum time period recommended in writing by waterproofing manufacturer.
 2. Verify that substrate is visibly dry and within the moisture limits recommended in writing by manufacturer. Test for capillary moisture by plastic sheet method according to ASTM D4263.
 3. Verify that compacted subgrade is dry, smooth, sound, and ready to receive waterproofing sheet.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean, prepare, and treat substrates according to manufacturer's written instructions. Provide clean, dust-free, and dry substrates for waterproofing application.

POLICE RANGE REFURBISHMENT PROJECT – PHASE II

- B. Mask off adjoining surfaces not receiving waterproofing to prevent spillage and overspray affecting other construction.
- C. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.
- D. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids.
- E. Prepare, fill, prime, and treat joints and cracks in substrates. Remove dust and dirt from joints and cracks according to ASTM D4258.
 - 1. Install sheet strips of width according to manufacturer's written instructions and center over treated construction and contraction joints and cracks exceeding a width of 1/16 inch (1.6 mm).
- F. Bridge and cover isolation joints, expansion joints, and discontinuous deck-to-wall and deck-to-deck joints with overlapping sheet strips of widths according to manufacturer's written instructions.
- G. Corners: Prepare, prime, and treat inside and outside corners according to ASTM D6135.
 - 1. Install membrane strips centered over vertical inside corners. Install 3/4-inch (19-mm) fillets of liquid membrane on horizontal inside corners and as follows:
 - a. At footing-to-wall intersections, extend liquid membrane in each direction from corner or install membrane strip centered over corner.
- H. Prepare, treat, and seal vertical and horizontal surfaces at terminations and penetrations through waterproofing and at drains and protrusions according to ASTM D6135.

3.3 INSTALLATION OF MODIFIED BITUMINOUS SHEET WATERPROOFING

- A. Install modified bituminous sheets according to waterproofing manufacturer's written instructions and per recommendations in ASTM D6135.
- B. Apply primer to substrates at required rate and allow it to dry. Limit priming to areas that will be covered by sheet waterproofing in same day. Reprime areas exposed for more than 24 hours.
- C. Apply and firmly adhere sheets over area to receive waterproofing. Accurately align sheets and maintain uniform 2-1/2-inch- (64-mm-) minimum lap widths and end laps. Overlap and seal seams, and stagger end laps to ensure watertight installation.
- D. Apply continuous sheets over already-installed sheet strips, bridging substrate cracks, construction, and contraction joints.
- E. Seal edges of sheet-waterproofing terminations with mastic.

- F. Repair tears, voids, and lapped seams in waterproofing not complying with requirements. Slit and flatten fishmouths and blisters. Patch with sheet waterproofing extending 6 inches (150 mm) beyond repaired areas in all directions.
- G. Immediately install protection course with butted joints over waterproofing membrane.
 - 1. Molded-sheet drainage panels] [Insulation drainage panels] [Board insulation] may be used in place of a separate protection course to vertical applications when approved by waterproofing manufacturer and installed immediately.

3.4 INSTALLATION OF MOLDED-SHEET DRAINAGE PANEL

- A. Place and secure molded-sheet drainage panels, with geotextile facing away from wall or deck substrate, according to manufacturer's written instructions. Use adhesive or another method that does not penetrate waterproofing. Lap edges and ends of geotextile to maintain continuity. Protect installed molded-sheet drainage panels during subsequent construction.

3.5 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests.
- B. Manufacturer's Field Service: Engage a site representative qualified by waterproofing membrane manufacturer to inspect substrate conditions, surface preparation, membrane application, flashings, protection, and drainage components; and to furnish daily reports to Engineer.
- C. Waterproofing will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.

3.6 PROTECTION, REPAIR, AND CLEANING

- A. Protect waterproofing from damage and wear during remainder of construction period.
- B. Correct deficiencies in or remove waterproofing that does not comply with requirements; repair substrates, reapply waterproofing, and repair sheet flashings.
- C. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended in writing by manufacturer of affected construction.

END OF SECTION 071326

SECTION 071900

WATER REPELLENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract - Standard Specifications for Public Works Construction 'The GREENBOOK' and City Supplement 'The WHITEBOOK', latest editions, including Supplemental Supplementary Provisions (SSPs), apply to this Section.

1.2 SUMMARY

- A. Section includes penetrating water-repellent treatments for the following vertical and horizontal surfaces:
 - 1. Cast-in-place concrete.
 - 2. Precast concrete.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include manufacturer's printed statement of VOC content.
 - 2. Include manufacturer's recommended number of coats for each type of substrate and spreading rate for each separate coat.
- B. Samples: For each type of water repellent and substrate indicated, 12 by 12 inches (300 by 300 mm) in size, with specified water-repellent treatment applied to half of each Sample.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Applicator, testing agency.
- B. Product Certificates: For each type of water repellent.
- C. Field quality-control reports.

- D. Sample Warranty: For special warranty.

1.6 QUALITY ASSURANCE

- A. Applicator Qualifications: An employer of workers trained and approved by manufacturer.
- B. Mockups: Prepare mockups of each required water repellent on each type of substrate required to demonstrate aesthetic effects, for preconstruction testing, and to set quality standards for materials and execution.
 - 1. Locate mockups on existing surfaces where directed by Engineer in locations that enable viewing under same conditions as the completed Work.
 - a. Size: 25 sq. ft. (2.3 sq. m) each.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

1.7 FIELD CONDITIONS

- A. Limitations: Proceed with application only when the following existing and forecasted weather and substrate conditions permit water repellents to be applied according to manufacturers' written instructions and warranty requirements:
 - 1. Concrete surfaces and mortar have cured for not less than 28 days.
 - 2. Building has been closed in for not less than 30 days before treating wall assemblies.
 - 3. Ambient temperature is above 40 deg F (4.4 deg C) and below 100 deg F (37.8 deg C) and will remain so for 24 hours.
 - 4. Substrate is not frozen and substrate-surface temperature is above 40 deg F (4.4 deg C) and below 100 deg F (37.8 deg C).
 - 5. Rain or snow is not predicted within 24 hours.
 - 6. Not less than seven days have passed since surfaces were last wet.
 - 7. Windy conditions do not exist that might cause water repellent to be blown onto vegetation or surfaces not intended to be treated.

1.8 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer and Applicator agree(s) to repair or replace materials that fail to maintain water repellency specified in "Performance Requirements" Article within specified warranty period.
 - 1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PENETRATING WATER REPELLENTS

- A. Silane, Penetrating Water Repellent: Clear, containing 20 percent or more solids of alkyltrialkoxysilanes; with alcohol, mineral spirits, water, or other proprietary solvent carrier; and with 400 g/L or less of VOCs.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. BASF Corporation.
 - b. Euclid Chemical Company (The); an RPM company.
 - c. PROSOCO, Inc.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements and conditions affecting performance of the Work.
 - 1. Verify that surfaces are clean and dry according to water-repellent manufacturer's requirements. Check moisture content in three representative locations by method recommended by manufacturer.
 - 2. Verify that there is no efflorescence or other removable residues that would be trapped beneath the application of water repellent.
 - 3. Verify that required repairs are complete, cured, and dry before applying water repellent.
- B. Test pH level according to water-repellent manufacturer's written instructions to ensure chemical bond to silica-containing or siliceous minerals.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. New Construction and Repairs: Allow concrete and other cementitious materials to age before application of water repellent, according to repellent manufacturer's written instructions.
- B. Cleaning: Before application of water repellent, clean substrate of substances that could impair penetration or performance of product according to water-repellent manufacturer's written instructions.
 - 1. Cast-in-Place Concrete, Air-Placed Concrete and Precast Concrete: Remove oil, curing compounds, laitance, and other substances that inhibit penetration or performance of water repellents according to ASTM E1857.

- C. Coordination with Sealant Joints: Do not apply water repellent until sealants for joints adjacent to surfaces receiving water-repellent treatment have been installed and cured.
 - 1. Water-repellent work may precede sealant application only if sealant adhesion and compatibility have been tested and verified using substrate, water repellent, and sealant materials identical to those required.

3.3 APPLICATION

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect the substrate before application of water repellent and to instruct Applicator on the product and application method to be used.
- B. Apply coating of water repellent on surfaces to be treated using 15 psi- (103 kPa-) pressure spray with a fan-type spray nozzle to the point of saturation. Apply coating in dual passes of uniform, overlapping strokes. Remove excess material; do not allow material to puddle beyond saturation. Comply with manufacturer's written instructions for application procedure unless otherwise indicated.
- C. Apply a second saturation coating, repeating first application. Comply with manufacturer's written instructions for limitations on drying time between coats and after rainstorm wetting of surfaces between coats. Consult manufacturer's technical representative if written instructions are not applicable to Project conditions.

3.4 FIELD QUALITY CONTROL

- A. Testing of Water-Repellent Material: City reserves the right to invoke the following procedure at any time and as often as City deems necessary during the period when water repellent is being applied:
 - 1. City will engage the services of a qualified testing agency to sample water-repellent material being used. Samples of material delivered to Project site will be taken, identified, sealed, and certified in presence of Contractor.
 - 2. Testing agency will perform tests for compliance of water-repellent material with product requirements.
 - 3. Owner may direct Contractor to stop applying water repellents if test results show material being used does not comply with product requirements. Contractor shall remove noncomplying material from Project site, pay for testing, and correct deficiency of surfaces treated with rejected materials, as approved by Engineer.
- B. Coverage Test: In the presence of Architect, hose down a dry, repellent-treated surface to verify complete and uniform product application. A change in surface color will indicate incomplete application.
 - 1. Notify Engineer seven days in advance of the dates and times when surfaces will be tested.
 - 2. Reapply water repellent until coverage test indicates complete coverage.

3.5 CLEANING

- A. Immediately clean water repellent from adjoining surfaces and surfaces soiled or damaged by water-repellent application as work progresses. Correct damage to work of other trades caused by water-repellent application, as approved by Architect.
- B. Comply with manufacturer's written cleaning instructions.

END OF SECTION 071900

SECTION 072500

WEATHER BARRIERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract - Standard Specifications for Public Works Construction 'The GREENBOOK' and City Supplement 'The WHITEBOOK', latest editions, including Supplemental Supplementary Provisions (SSPs), apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Building wrap.
 - 2. Flexible flashing.
 - 3. Drainage material.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. For building wrap, include data on air and water-vapor permeance based on testing according to referenced standards.
- B. Shop Drawings: Show details of building wrap at terminations, openings, and penetrations. Show details of flexible flashing applications.

1.4 INFORMATIONAL SUBMITTALS

- A. Evaluation Reports: For water-resistive barrier and flexible flashing, from ICC-ES.

PART 2 - PRODUCTS

2.1 WATER-RESISTIVE BARRIER

- A. Building Wrap: ASTM E1677, Type I air barrier; with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, when tested according to ASTM E84; UV stabilized; and acceptable to authorities having jurisdiction.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. Dorken Systems Inc.
 - b. DuPont Safety and Construction.
 - c. TYPAR.
 - d. Vaproshield.
 - e. Approved equal.
2. Water-Vapor Permeance: Not less than 75 perms (4300 ng/Pa x s x sq. m) per ASTM E96/E96M, Desiccant Method (Procedure A).
 3. Allowable UV Exposure Time: Not less than three months.
 4. Flame Propagation Test: Materials and construction shall be as tested according to NFPA 285.
- B. Building-Wrap Tape: Pressure-sensitive plastic tape recommended by building-wrap manufacturer for sealing joints and penetrations in building wrap.

2.2 FLEXIBLE FLASHING

- A. Butyl Rubber Flashing: Composite, self-adhesive, flashing product consisting of a pliable, butyl rubber compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.030 inch (0.8 mm).
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Protecto Wrap Company.
 - b. TYPAR.
 - c. Approved equal.
- B. Rubberized-Asphalt Flashing: Composite, self-adhesive, flashing product consisting of a pliable, rubberized-asphalt compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.030 inch (0.8 mm).
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Advanced Building Products Inc.
 - b. Carlisle Coatings & Waterproofing Inc.
 - c. TYPAR.
 - d. Approved equal.
- C. Primer for Flexible Flashing: Product recommended in writing by flexible flashing manufacturer for substrate.
- D. Nails and Staples: Product recommended in writing by flexible flashing manufacturer and complying with ASTM F1667.

2.3 DRAINAGE MATERIAL

- A. Drainage Material: Product shall maintain a continuous open space between water-resistive barrier and exterior cladding to create a drainage plane and shall be used under siding.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. DuPont Safety and Construction.
 - b. TYPAR.
 - c. Approved equal.

PART 3 - EXECUTION

3.1 WATER-RESISTIVE BARRIER INSTALLATION

- A. Cover exposed exterior surface of sheathing with water-resistive barrier securely fastened to framing immediately after sheathing is installed.
- B. Cover sheathing with water-resistive barrier as follows:
 - 1. Cut back barrier 1/2 inch (13 mm) on each side of the break in supporting members at expansion- or control-joint locations.
 - 2. Apply barrier to cover vertical flashing with a minimum 4-inch (100-mm) overlap unless otherwise indicated.
- C. Building Wrap: Comply with manufacturer's written instructions and warranty requirements.
 - 1. Seal seams, edges, fasteners, and penetrations with tape.
 - 2. Extend into jambs of openings and seal corners with tape.

3.2 FLEXIBLE FLASHING INSTALLATION

- A. Apply flexible flashing where indicated to comply with manufacturer's written instructions.
 - 1. Prime substrates as recommended by flashing manufacturer.
 - 2. Lap seams and junctures with other materials at least 4 inches (100 mm) except that at flashing flanges of other construction, laps need not exceed flange width.
 - 3. Lap flashing over water-resistive barrier at bottom and sides of openings.
 - 4. Lap water-resistive barrier 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.

3.3 DRAINAGE MATERIAL INSTALLATION

- A. Install drainage material over building wrap and flashing to comply with manufacturer's written instructions.

END OF SECTION 072500

SECTION 074113.13

FORMED METAL ROOF PANELS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract - Standard Specifications for Public Works Construction 'The GREENBOOK' and City Supplement 'The WHITEBOOK', latest editions, including Supplemental Supplementary Provisions (SSPs), apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Exposed-fastener, lap-seam, metal roof panels.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Meet with Owner, Architect, Owner's insurer if applicable, metal panel Installer, metal panel manufacturer's representative, structural-support Installer, and installers whose work interfaces with or affects metal panels, including installers of roof accessories and roof-mounted equipment.
 - 2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - 3. Review methods and procedures related to metal panel installation, including manufacturer's written instructions.
 - 4. Examine support conditions for compliance with requirements, including alignment between and attachment to structural members.
 - 5. Review structural loading limitations of deck, purlins and rafters during and after roofing.
 - 6. Review flashings, special details, drainage, penetrations, equipment curbs, and condition of other construction that affect metal panels.
 - 7. Review governing regulations and requirements for insurance, certificates, and tests and inspections if applicable.
 - 8. Review temporary protection requirements for metal panel systems during and after installation.
 - 9. Review procedures for repair of metal panels damaged after installation.
 - 10. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.4 ACTION 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 (1:10).
- C. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below:
 - 1. Metal Panels: 12 inches (305 mm) long by actual panel width. Include fasteners, closures, and other metal panel accessories.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Test Reports: For each product, for tests performed by a qualified testing agency.
- C. Field quality-control reports.
- D. Sample Warranties: For special warranties.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For metal panels to include in maintenance manuals.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1.8 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.
- E. Copper Panels: Wear gloves when handling to prevent fingerprints and soiling of surface.

1.9 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.

1.10 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.

1.11 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: 5 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 Delta E units when tested according to ASTM D2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D4214.

- 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. Solar Reflectance Index: Not less than 78 when calculated according to ASTM E 1980, based on testing identical products by a qualified testing agency.
- B. Energy Performance: Provide roof panels according to one of the following when tested according to CRRC-1:
 1. Three-year, aged solar reflectance of not less than 0.55 and emissivity of not less than 0.75.
 2. Three-year, aged Solar Reflectance Index of not less than 64 when calculated according to ASTM E1980.
- C. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E1592:
 1. Wind Loads: As indicated on Drawings.
 2. Other Design Loads: As indicated on Drawings.
 3. Deflection Limits: For wind loads, no greater than 1/180 of the span.
- D. Air Infiltration: Air leakage of not more than 0.06 cfm/sq. ft. (0.3 L/s per sq. m) when tested according to ASTM E1680 at the following test-pressure difference:
 1. Test-Pressure Difference: 6.24 lbf/sq. ft. (300 Pa).
- E. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E1646 at the following test-pressure difference:
 1. Test-Pressure Difference: 6.24 lbf/sq. ft. (300 Pa).
- F. 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 (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

2.2 EXPOSED-FASTENER, LAP-SEAM, METAL ROOF PANELS

- A. Provide factory-formed metal roof panels designed to be installed by lapping side edges of adjacent panels and mechanically attaching panels to supports using exposed fasteners in side laps. Include accessories required for weathertight installation.
- B. Corrugated-Profile, Exposed-Fastener Metal Roof Panels: Formed with alternating curved ribs spaced at 2.67 inches (68 mm) o.c. across width of panel.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. AEP Span; A BlueScope Steel Company.
 - b. Metal Sales Manufacturing Corporation.
 - c. Morin - A Kingspan Group Company.
 - 2. Metallic-Coated Steel Sheet: Zinc-coated (galvanized) steel sheet complying with ASTM A653/A653M, G90 (Z275) coating designation, or aluminum-zinc alloy-coated steel sheet complying with ASTM A792/A792M, Class AZ50 (Class AZM150) coating designation; structural quality. Prepainted by the coil-coating process to comply with ASTM A755/A755M.
 - a. Nominal Minimum Thickness: 0.036 inch (0.912 mm).
 - b. Exterior Finish: Two-coat fluoropolymer.
 - c. Color: Match existing color.
 - 3.

2.3 UNDERLAYMENT MATERIALS

- A. Self-Adhering, High-Temperature Underlayment: Provide self-adhering, cold-applied, sheet underlayment, a minimum of 30 mils (0.76 mm) thick, specifically designed to withstand high metal temperatures beneath metal roofing. Provide primer when recommended by underlayment manufacturer.
 - 1. Thermal Stability: Stable after testing at 220 deg F (111 deg C); ASTM D1970.
 - 2. Low-Temperature Flexibility: Passes after testing at minus 20 deg F (29 deg C); ASTM D1970.
 - 3. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Carlisle WIP Products; a brand of Carlisle Construction Materials.
 - b. Owens Corning.
 - c. Protecto Wrap Company.
- B. Slip Sheet: Manufacturer's recommended slip sheet, of type required for application.

2.4 MISCELLANEOUS MATERIALS

- A. Miscellaneous Metal Subframing and Furring: ASTM C645; cold-formed, metallic-coated steel sheet, ASTM A653/A653M, G90 (Z275 hot-dip galvanized) coating designation or ASTM A792/A792M, Class AZ50 (Class AZM150) aluminum-zinc-alloy 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, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- (25-mm-) 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. Gutters: Formed from same material as roof panels, complete with end pieces, outlet tubes, and other special pieces as required. Fabricate in minimum 96-inch- (2400-mm-) long sections, of size and metal thickness according to SMACNA's "Architectural Sheet Metal Manual." Furnish gutter supports spaced a maximum of 36 inches (914 mm) o.c., fabricated from same metal as gutters. Provide wire ball strainers of compatible metal at outlets. Finish gutters to match metal roof panels.
- E. Downspouts: Formed from same material as roof panels. Fabricate in 10-foot- (3-m-) long sections, complete with formed elbows and offsets, of size and metal thickness according to SMACNA's "Architectural Sheet Metal Manual." Finish downspouts to match gutters.
- F. Panel Fasteners: Self-tapping screws designed to withstand design loads. Provide exposed fasteners with heads matching color of metal panels by means of plastic caps or factory-applied coating. Provide EPDM or PVC sealing washers for exposed fasteners.
- G. Panel Sealants: Provide sealant types 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 (13 mm) wide and 1/8 inch (3 mm) thick.

2. Joint Sealant: ASTM C920; 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 C1311.

2.5 FABRICATION

- A. 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. Fabricate metal panel joints with factory-installed captive gaskets or separator strips that provide a weathertight seal and prevent metal-to-metal contact, and that minimize noise from movements.
- D. 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 for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
 3. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
 4. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate sealant and to comply with SMACNA standards.
 5. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
 6. 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 polyvinylidene fluoride (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 light-colored acrylic or polyester backer finish consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil (0.013 mm).

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 C754 and metal panel manufacturer's written recommendations.

3.3 INSTALLATION OF UNDERLAYMENT

- A. Self-Adhering Sheet Underlayment: Apply primer if required by manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation. Apply at locations indicated below, wrinkle free, in shingle fashion to shed water, and with end laps of not less than 6 inches (152 mm) staggered 24 inches (610 mm) between courses. Overlap side edges not less than 3-1/2 inches (90 mm). Extend underlayment into gutter trough. Roll laps with roller. Cover underlayment within 14 days.
 - 1. Apply over the entire roof surface, double-layer where required by roofing manufacturer.
- B. Slip Sheet: Apply slip sheet over underlayment before installing metal roof panels.
- C. Flashings: Install flashings to cover underlayment to comply with requirements specified in Section 076200 "Sheet Metal Flashing and Trim."

3.4 INSTALLATION OF METAL ROOF PANELS

- A. 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 are 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. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
 - 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 for surfaces exposed to the exterior; use galvanized-steel fasteners for surfaces exposed to the interior.
 - 2. Aluminum Panels: Use aluminum or stainless steel fasteners for surfaces exposed to the exterior; use aluminum or galvanized-steel fasteners for surfaces exposed to the interior.
 - 3. Copper Panels: Use copper, stainless steel, or hardware-bronze fasteners.
 - 4. Stainless 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.

POLICE RANGE REFURBISHMENT PROJECT – PHASE II

- D. Lap-Seam Metal Panels: Fasten metal panels to supports with fasteners at each lapped joint at location and spacing recommended by manufacturer.
1. Lap ribbed or fluted sheets one full rib. Apply panels and associated items true to line for neat and weathertight enclosure.
 2. Provide metal-backed washers under heads of exposed fasteners bearing on weather side of metal panels.
 3. Locate and space exposed fasteners in uniform vertical and horizontal alignment. Use proper tools to obtain controlled uniform compression for positive seal without rupture of washer.
 4. Install screw fasteners with power tools having controlled torque adjusted to compress washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes.
 5. Flash and seal panels with weather closures at perimeter of all openings.
- E. 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 panel manufacturer; or, if not indicated, provide types recommended in writing by metal panel manufacturer.
- F. 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. Install work with laps, joints, and seams that are permanently watertight.
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 performance.
 2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet (3 m) with no joints allowed within 24 inches (610 mm) of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with mastic sealant (concealed within joints).
- G. Gutters: Join sections with riveted and soldered or lapped and sealed joints. Attach gutters to eave with gutter hangers spaced not more than 36 inches (914 mm) o.c. using manufacturer's standard fasteners. Provide end closures and seal watertight with sealant. Provide for thermal expansion.
- H. Downspouts: Join sections with telescoping joints. Provide fasteners designed to hold downspouts securely 1 inch (25 mm) away from walls; locate fasteners at top and bottom and at approximately 60 inches (1524 mm) o.c. in between.
1. Provide elbows at base of downspouts to direct water away from building.

- I. Roof Curbs: Install flashing around bases where they meet metal roof panels.
- J. Pipe Flashing: Form flashing around pipe penetration and metal roof panels. Fasten and seal to metal roof panels as recommended by manufacturer.

3.5 ERECTION TOLERANCES

- A. Installation Tolerances: Shim and align metal panel units within installed tolerance of 1/4 inch in 20 feet (6 mm in 6 m) on slope and location lines and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.

3.6 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect completed metal panel installation, including accessories. Report results in writing.
- B. Remove and replace applications 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 074113.13

SECTION 074646
FIBER-CEMENT SIDING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract - Standard Specifications for Public Works Construction 'The GREENBOOK' and City Supplement 'The WHITEBOOK', latest editions, including Supplemental Supplementary Provisions (SSPs), apply to this Section.

1.2 SUMMARY

- A. Section includes fiber-cement siding.
- B. Related Requirements:
 - 1. Section 072500 "Weather Barriers" for weather-resistive barriers.

1.3 COORDINATION

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

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product. 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- (300-mm-) long-by-actual-width Sample of siding.
 - 2. 12-inch- (300-mm-) long-by-actual-width Samples of trim and accessories.

1.6 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of fiber-cement siding.

- B. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for fiber-cement siding.
- C. Research/Evaluation Reports: For each type of fiber-cement siding required, from ICC-ES.
- D. Sample Warranty: For special warranty.

1.7 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of product, including related accessories, to include in maintenance manuals.

1.8 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Furnish full lengths of fiber-cement siding including related accessories, in a quantity equal to 2 percent of amount installed.

1.9 QUALITY ASSURANCE

- A. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and to set quality standards for fabrication and installation.
 - 1. Build mockup of typical wall area as shown on Drawings.
 - 2. Build mockups for fiber-cement siding including accessories.
 - a. Size: 48 inches (1219 mm) long by 96 inches (2438 mm) high, minimum.
 - b. Include outside corner on one end of mockup, vertical joint on the other.
 - 3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store packaged materials in original containers with labels intact until time of use.
- B. Store materials on elevated platforms, under cover, and in a dry location.

1.11 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace products that fail 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 materials beyond normal weathering.
 - 2. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain products, including related accessories, from single source from single manufacturer.

2.2 FIBER-CEMENT SIDING

- A. General: ASTM C1186, Type A, Grade II, fiber-cement board, noncombustible when tested according to ASTM E136; with a flame-spread index of 25 or less when tested according to ASTM E84.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. CertainTeed Corporation.
 - b. GAF.
 - c. James Hardie Building Products, Inc.
- B. Labeling: Provide fiber-cement siding that is tested and labeled according to ASTM C1186 by a qualified testing agency acceptable to authorities having jurisdiction.
- C. Nominal Thickness: Not less than 5/16 inch (8 mm).
- D. Vertical Pattern: 48-inch- (1200-mm-) wide sheets with smooth texture.
- E. Factory Priming: Manufacturer's standard acrylic primer.

2.3 ACCESSORIES

- A. Siding Accessories, General: Provide starter strips, edge trim, outside and inside corner caps, and other items as recommended by siding manufacturer for building configuration.

POLICE RANGE REFURBISHMENT PROJECT – PHASE II

1. Provide accessories matching color and texture of adjacent siding unless otherwise indicated.
- B. Decorative Accessories: Provide the following fiber-cement decorative accessories as indicated:
 1. Corner posts.
 2. Door and window casings.
 3. Fasciae.
 4. Moldings and trim.
- C. Flashing: Provide aluminum flashing complying with Section 076200 "Sheet Metal Flashing and Trim" at window and door heads and where indicated.
 1. Finish for Aluminum Flashing: High-performance organic finish.
- D. Fasteners:
 1. For fastening to wood, use ribbed bugle-head screws of sufficient length to penetrate a minimum of 1 inch (25 mm) into substrate.
 2. 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.
 3. For fastening fiber cement, use stainless-steel fasteners.
- E. Continuous Soffit Vents: Aluminum, hat-channel shape, with perforations; 2 inches (51 mm) wide and not less than 96 inches (2438 mm) long.
 1. Net-Free Area: 4 sq. in./linear ft. (280 sq. cm/m).
 2. Finish: Paint per Section 099600 "High-Performance Coatings" custom-match color to "Range Green".

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of fiber-cement siding 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 manufacturer's written installation instructions applicable to products and applications indicated unless more stringent requirements apply.

POLICE RANGE REFURBISHMENT PROJECT – PHASE II

1. Do not install damaged components.
 2. Install fasteners no more than 24 inches (600 mm) o.c.
- B. Install joint sealants as specified in Section 079200 "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.

END OF SECTION 074646

SECTION 07 62 00

SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Low slope roof sheet metal fabrications.
- B. Related Requirements:
 - 1. Section 061000 "Rough Carpentry" for wood nailers, curbs, and blocking.
 - 2. Section 074113.13 "Formed Metal Roof Panels" for materials and installation of sheet metal flashing and trim integral with roofing.

1.3 COORDINATION

- A. Coordinate sheet metal flashing and trim layout and seams with sizes and locations of penetrations to be flashed, and joints and seams in adjacent materials.
- B. Coordinate sheet metal flashing and trim installation with adjoining roofing and wall materials, joints, and seams to provide leakproof, secure, and noncorrosive installation.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review construction schedule. Verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - 2. Review special roof details, roof drainage, roof-penetration flashing, equipment curbs, and condition of other construction that affect sheet metal flashing and trim.
 - 3. Review requirements for insurance and certificates if applicable.
 - 4. Review sheet metal flashing observation and repair procedures after flashing installation.

1.5 ACTION SUBMITTALS

A. Product Data: For each of the following

1. Underlayment materials.
2. Elastomeric sealant.
3. Butyl sealant.
4. Epoxy seam sealer.

B. Shop Drawings: For sheet metal flashing and trim.

1. Include plans, elevations, sections, and attachment details.
2. Detail fabrication and installation layouts, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled Work.
3. Include identification of material, thickness, weight, and finish for each item and location in Project.
4. Include details for forming, including profiles, shapes, seams, and dimensions.
5. Include details for joining, supporting, and securing, including layout and spacing of fasteners, cleats, clips, and other attachments. Include pattern of seams.
6. Include details of termination points and assemblies.
7. Include details of expansion joints and expansion-joint covers, including showing direction of expansion and contraction from fixed points.
8. Include details of roof-penetration flashing.
9. Include details of edge conditions, including eaves, ridges, valleys, rakes, crickets, flashings, and counterflashings.
10. Include details of special conditions.
11. Include details of connections to adjoining work.
12. Detail formed flashing and trim at scale of not less than 3 inches per 12 inches.

C. Samples: For each exposed product and for each color and texture specified, 12 inches (300 mm) long by actual width.

D. Samples for Initial Selection: For each type of sheet metal and accessory indicated with factory-applied finishes.

E. Samples for Verification: For each type of exposed finish.

1. Sheet Metal Flashing: 12 inches (300 mm) long by actual width of unit, including finished seam and in required profile. Include fasteners, cleats, clips, closures, and other attachments.
2. Trim, Metal Closures, Expansion Joints, Joint Intersections, and Miscellaneous Fabrications: 12 inches (300 mm) long and in required profile. Include fasteners and other exposed accessories.
3. Unit-Type Accessories and Miscellaneous Materials: Full-size Sample.
4. Anodized Aluminum Samples: Samples to show full range to be expected for each color required.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For fabricator.
- B. Product Certificates: For each type of coping and roof edge flashing that is ANSI/SPRI/FM 4435/ES-1 tested.
- C. Product Test Reports: For each product, for tests performed by a qualified testing agency.
- D. Evaluation Reports: For copings and roof edge flashing, from an agency acceptable to authority having jurisdiction showing compliance with ANSI/SPRI/FM 4435/ES-1.
- E. Sample Warranty: For special warranty.

1.7 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For sheet metal flashing and trim, and its accessories, to include in maintenance manuals.
- B. Special warranty.

1.8 QUALITY ASSURANCE

- A. Fabricator Qualifications: Employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.
 - 1. For copings and roof edge flashings that are ANSI/SPRI/FM 4435/ES-1 tested, shop shall be listed as able to fabricate required details as tested and approved.
- B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for fabrication and installation.
 - 1. Build mockup of typical roof eave, including fascia, approximately 10 feet (3.0 m) long, including supporting construction cleats, seams, attachments, underlayment, and accessories.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Owner specifically approves such deviations in writing.
 - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage.
 - 1. Store sheet metal flashing and trim materials away from uncured concrete and masonry.
 - 2. Protect stored sheet metal flashing and trim from contact with water.
- B. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to extent necessary for period of sheet metal flashing and trim installation.

1.10 WARRANTY

- A. Special Warranty on Finishes: Manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows 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 Delta units when tested in accordance with ASTM D2244.
 - b. Chalking in excess of a No. 8 rating when tested in accordance with ASTM D4214.
 - 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. General: Sheet metal flashing and trim assemblies, including cleats, anchors, and fasteners, shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.
- B. Sheet Metal Standard for Flashing and Trim: Comply with NRCA's "The NRCA Roofing Manual: Architectural Metal Flashing, Condensation and Air Leakage Control, and Reroofing" and SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.
- C. SPRI Wind Design Standard: Manufacture and install roof edge flashings tested in accordance with ANSI/SPRI/FM 4435/ES-1 and capable of resisting the following design pressure:

1. Design Pressure: As indicated on Drawings.

D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent 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: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

2.2 SHEET METALS

A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.

B. Metallic-Coated Steel Sheet: Provide zinc-coated (galvanized) steel sheet in accordance with ASTM A653/A653M, G90 (Z275) coating designation; prepainted by coil-coating process to comply with ASTM A755/A755M.

1. Surface: Smooth, flat.

2. Exposed Coil-Coated Finish:

a. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (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[for seacoast and severe environments].

3. Color: Matching roof panel, per Section 074113.13.

4. Concealed Finish at Solid Substrate: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with minimum total dry film thickness of 0.5 mil (0.013 mm).

5. Concealed Finish at Open Framing: Same as for Exposed Coil-Coated Finish, above.

a. Color: White.

2.3 UNDERLAYMENT MATERIALS

A. Self-Adhering, High-Temperature Sheet Underlayment: Minimum 30 mils (0.76 mm) thick, consisting of a slip-resistant polyethylene- or polypropylene-film top surface laminated to a layer of butyl- or SBS-modified asphalt adhesive, with release-paper backing; specifically designed to withstand high metal temperatures beneath metal roofing. Provide primer in accordance with underlayment manufacturer's written instructions.

1. Source Limitations: Obtain underlayment from single source from single manufacturer.

2. Low-Temperature Flexibility: ASTM D1970/D1970M; passes after testing at minus 20 deg F (29 deg C) or lower.

- B. Slip Sheet: Rosin-sized building paper, 3 lb/100 sq. ft. (0.16 kg/sq. m) minimum.

2.4 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, solder, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.
- B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.
 - 1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
 - a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating. Provide metal-backed EPDM or PVC sealing washers under heads of exposed fasteners bearing on weather side of metal.
 - b. Blind Fasteners: High-strength aluminum or stainless steel rivets suitable for metal being fastened.
 - c. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.
 - 2. Fasteners for Zinc-Coated (Galvanized) Steel Sheet: Series 300 stainless steel or hot-dip galvanized steel in accordance with ASTM A153/A153M or ASTM F2329.
 - 3. Fasteners for Zinc Sheet: Series 300 stainless steel or hot-dip galvanized steel in accordance with ASTM A153/A153M or ASTM F2329.
- C. Solder:
 - 1. For Zinc-Coated (Galvanized) Steel: ASTM B32, Grade Sn50, 50 percent tin and 50 percent lead or Grade Sn60, 60 percent tin and 40 percent lead.
- D. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch (13 mm) wide and 1/8 inch (3 mm) thick.
- E. Elastomeric Sealant: ASTM C920, elastomeric silicone polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
- F. Butyl Sealant: ASTM C1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.
- G. Bituminous Coating: Cold-applied asphalt emulsion in accordance with ASTM D1187/D1187M.

2.5 FABRICATION, GENERAL

- A. Custom fabricate sheet metal flashing and trim to comply with details indicated and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required.
 - 1. Fabricate sheet metal flashing and trim in shop to greatest extent possible.
 - 2. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
 - 3. Verify shapes and dimensions of surfaces to be covered and obtain field measurements for accurate fit before shop fabrication.
 - 4. Form sheet metal flashing and trim to fit substrates without excessive oil-canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
 - 5. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.

- B. Fabrication Tolerances:
 - 1. Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet (6 mm in 6 m) on slope and location lines indicated on Drawings and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.

- C. Expansion Provisions: Form metal for thermal expansion of exposed flashing and trim.
 - 1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with butyl sealant concealed within joints.
 - 2. Use lapped expansion joints only where indicated on Drawings.

- D. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal in accordance with cited sheet metal standard to provide for proper installation of elastomeric sealant.

- E. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.

- F. Fabricate cleats and attachment devices of sizes as recommended by cited sheet metal standard for application, but not less than one gauge heavier than thickness of metal being secured.

- G. Seams:
 - 1. Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use. Rivet joints where necessary for strength.

- H. Do not use graphite pencils to mark metal surfaces.

2.6 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

- A. Roof Edge Flashing and Fascia Cap: Fabricate in minimum 96-inch- (2400-mm-) long, but not exceeding 12-foot- (3.6-m-) long sections. Furnish with 6-inch- (150-mm-) wide, joint cover plates. Shop fabricate interior and exterior corners.
 - 1. Joint Style: Butted with expansion space and 6-inch- (150-mm-) wide, concealed backup plate.
 - 2. Fabricate from the following materials:
 - a. Same material as metal roof panels, refer to Section 071113.16 "Standing-Seam Metal Roof Panels".
- B. Roof-Penetration Flashing: Fabricate from the following materials:
 - 1. Stainless Steel: 0.019 inch (0.48 mm) thick.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with installer present, for compliance with requirements for installation tolerances, substrate, and other conditions affecting performance of the Work.
 - 1. Verify compliance with requirements for installation tolerances of substrates.
 - 2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF UNDERLAYMENT

- A. Self-Adhering, High-Temperature Sheet Underlayment:
 - 1. Install self-adhering, high-temperature sheet underlayment; wrinkle free.
 - 2. Prime substrate if recommended by underlayment manufacturer.
 - 3. Comply with temperature restrictions of underlayment manufacturer for installation; use primer for installing underlayment at low temperatures.
 - 4. Apply in shingle fashion to shed water, with end laps of not less than 6 inches (150 mm) staggered 24 inches (600 mm) between courses.
 - 5. Overlap side edges not less than 3-1/2 inches (90 mm). Roll laps and edges with roller.
 - 6. Roll laps and edges with roller.
 - 7. Cover underlayment within 14 days.
- B. Install slip sheet, wrinkle free, over underlayment before installing sheet metal flashing and trim.

1. Install in shingle fashion to shed water.
2. Lapp joints not less than 4 inches (100 mm).

3.3 INSTALLATION, GENERAL

- A. Install sheet metal flashing and trim to comply with details indicated and recommendations of cited sheet metal standard that apply to installation characteristics required unless otherwise indicated on Drawings.
1. Install fasteners, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
 2. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of sealant.
 3. Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement.
 4. Install sheet metal flashing and trim to fit substrates and to result in watertight performance.
 5. Install continuous cleats with fasteners spaced not more than 12 inches (300 mm) o.c.
 6. Install exposed sheet metal flashing and trim with limited oil-canning, and free of buckling and tool marks.
 7. Do not field cut sheet metal flashing and trim by torch.
- B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.
1. Coat concealed side of stainless-steel sheet metal flashing and trim with bituminous coating where flashing and trim contact wood, ferrous metal, or cementitious construction.
 2. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet.
- C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim.
1. Space movement joints at maximum of 10 feet (3 m) with no joints within 24 inches (600 mm) of corner or intersection.
 2. Form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with sealant concealed within joints.
- D. Fasteners: Use fastener sizes that penetrate substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.
- E. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.
- F. Seal joints as required for watertight construction.

1. Use sealant-filled joints unless otherwise indicated.
 - a. Embed hooked flanges of joint members not less than 1 inch (25 mm) into sealant.
 - b. Form joints to completely conceal sealant.
 - c. When ambient temperature at time of installation is between 40 and 70 deg F (4 and 21 deg C), set joint members for 50 percent movement each way.
 - d. Adjust setting proportionately for installation at higher ambient temperatures.
 - 1) Do not install sealant-type joints at temperatures below 40 deg F (4 deg C).
2. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."

3.4 INSTALLATION OF ROOF FLASHINGS

- A. Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and cited sheet metal standard.
 1. Provide concealed fasteners where possible, and set units true to line, levels, and slopes.
 2. Install work with laps, joints, and seams that are permanently watertight and weather resistant.
- B. Roof Edge Flashing:
 1. Install roof edge flashings in accordance with ANSI/SPRI/FM 4435/ES-1.
- C. Copings:
 1. Install roof edge flashings in accordance with ANSI/SPRI/FM 4435/ES-1.
- D. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending minimum of 4 inches (100 mm) over base flashing. Install stainless steel draw band and tighten.
- E. Counterflashing: Coordinate installation of counterflashing with installation of base flashing.
 1. Insert counterflashing in reglets or receivers and fit tightly to base flashing.
 2. Extend counterflashing 4 inches (100 mm) over base flashing.
 3. Lap counterflashing joints minimum of 4 inches (100 mm).
 4. Secure in waterproof manner by means of snap-in installation and sealant or lead wedges and sealant unless otherwise indicated.
- F. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with butyl sealant and clamp flashing to pipes that penetrate roof.

3.5 INSTALLATION TOLERANCES

- A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet (6 mm in 6 m) on slope and location lines indicated on Drawings and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.

3.6 CLEANING

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Clean and neutralize flux materials. Clean off excess solder.
- C. Clean off excess sealants.

3.7 PROTECTION

- A. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions.
- B. On completion of sheet metal flashing and trim installation, remove unused materials and clean finished surfaces as recommended in writing by sheet metal flashing and trim manufacturer.
- C. Maintain sheet metal flashing and trim in clean condition during construction.
- D. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures, as determined by Architect.

END OF SECTION 076200

SECTION 079200

JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract - Standard Specifications for Public Works Construction 'The GREENBOOK' and City Supplement 'The WHITEBOOK', latest editions, including Supplemental Supplementary Provisions (SSPs), apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Silicone joint sealants.
 - 2. Non-staining silicone joint sealants.
 - 3. Urethane joint sealants.
 - 4. Immersible joint sealants.
 - 5. Silyl-terminated polyether joint sealants.
 - 6. Mildew-resistant joint sealants.
 - 7. Polysulfide joint sealants.
 - 8. Butyl joint sealants.
 - 9. Latex joint sealants.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

- A. Product Data: For each joint-sealant product.
- 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 kind and color of joint sealant required, provide Samples with joint sealants in 1/2-inch- (13-mm-) wide joints formed between two 6-inch- (150-mm-) long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.
- D. 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.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified testing agency.
- B. Product Test Reports: For each kind of joint sealant, for tests performed by manufacturer and witnessed by a qualified testing agency, or a qualified testing agency.
- C. Preconstruction Laboratory Test Schedule: Include the following information for each joint sealant and substrate material to be tested:
 1. Joint-sealant location and designation.
 2. Manufacturer and product name.
 3. Type of substrate material.
 4. Proposed test.
 5. Number of samples required.
- D. Preconstruction Field-Adhesion-Test Reports: Indicate which sealants and joint preparation methods resulted in optimum adhesion to joint substrates based on testing specified in "Preconstruction Testing" Article.
- E. Field-Adhesion-Test Reports: For each sealant application tested.
- F. Sample Warranties: For special warranties.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.
- B. Product Testing: Test joint sealants using a qualified testing agency.
 1. Testing Agency Qualifications: Qualified according to ASTM C 1021 to conduct the testing indicated.
- C. Mockups: Install sealant in mockups of assemblies specified in other Sections that are indicated to receive joint sealants specified in this Section. Use materials and installation methods specified in this Section.

1.7 PRECONSTRUCTION TESTING

- A. Preconstruction Field-Adhesion Testing: Before installing sealants, field test their adhesion to Project joint substrates as follows:
1. Locate test joints where indicated on Project or, if not indicated, as directed by Architect.
 2. Conduct field tests for each kind of sealant and joint substrate.
 3. Notify Architect seven days in advance of dates and times when test joints will be erected.
 4. Arrange for tests to take place with joint-sealant manufacturer's technical representative present.
 - a. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1.1 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.
 5. 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.
 6. 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.

1.8 FIELD CONDITIONS

- A. 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 or are below 40 deg F (5 deg C).
 2. When joint substrates are wet.
 3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
 4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.9 WARRANTY

- A. Special Installer's Warranty: Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

POLICE RANGE REFURBISHMENT PROJECT – PHASE II

1. Warranty Period: Two years from date of Substantial Completion.
- B. Special Manufacturer's Warranty: Manufacturer agrees to furnish joint sealants to repair or replace those joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 1. Warranty Period: Five years from date of Substantial Completion.
- C. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:
 1. Movement of the structure caused by stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
 2. Disintegration of joint substrates from causes exceeding design specifications.
 3. Mechanical damage caused by individuals, tools, or other outside agents.
 4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 JOINT SEALANTS, 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 joint-sealant manufacturer, based on testing and field experience.
- B. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.2 SILICONE JOINT SEALANTS

- A. Silicone, S, P, 25, T, NT: Single-component, pourable, plus 25 percent and minus 25 percent movement capability, traffic- and nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade P, Class 25, Uses T and NT.
- B. Silicone, M, P, 100/50, T, NT: Multicomponent, pourable, plus 100 percent and minus 50 percent movement capability, traffic- and nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type M, Grade P, Class 100/50, Uses T and NT.

2.3 NONSTAINING SILICONE JOINT SEALANTS

- A. Nonstaining Joint Sealants: No staining of substrates when tested according to ASTM C 1248.

- B. Silicone, Nonstaining, S, NS, 50, NT: Nonstaining, single-component, nonsag, plus 50 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 50, Use NT.

2.4 URETHANE JOINT SEALANTS

- A. Urethane, S, NS, 25, NT: Single-component, nonsag, nontraffic-use, plus 25 percent and minus 25 percent movement capability, urethane joint sealant; ASTM C 920, Type S, Grade NS, Class 25, Use NT.

2.5 MILDEW-RESISTANT JOINT SEALANTS

- A. Mildew-Resistant Joint Sealants: Formulated for prolonged exposure to humidity with fungicide to prevent mold and mildew growth.
- B. Silicone, Mildew Resistant, Acid Curing, S, NS, 25, NT: Mildew-resistant, single-component, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, acid-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 25, Use NT.

2.6 BUTYL JOINT SEALANTS

- A. Butyl-Rubber-Based Joint Sealants: ASTM C 1311.

2.7 JOINT-SEALANT BACKING

- A. Sealant Backing Material, General: Nonstaining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
 - 1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
- B. Cylindrical Sealant Backings: ASTM C 1330,
 - 1. Type C (closed-cell material with a surface skin),
 - 2. Type O (open-cell material),
 - 3. Type B (bicellular material with a surface skin),
 - 4. or any of the preceding types, as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
- 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. Provide self-adhesive tape where applicable.

2.8 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 to 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 performance of the Work.
- 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.
 - 2. Clean porous joint substrate surfaces by brushing, grinding, 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 after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
 - a. Concrete.
 - b. Masonry.
 - 3. Remove laitance and form-release agents from concrete.

4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:
 - a. Metal.
 - b. Porcelain enamel.

- B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by 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 or primer 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 in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Install sealant backings of kind 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 backs of joints.
- E. Install sealants using proven techniques that 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 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 Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs

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 sealant from surfaces adjacent to joints.
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 profile per Figure 8A in ASTM C 1193 unless otherwise indicated.
4. Provide flush joint profile at joints between soffit panels according to Figure 8B in ASTM C 1193.
 - a. Use masking tape to protect surfaces adjacent to recessed tooled joints.

3.4 FIELD QUALITY CONTROL

A. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:

1. Extent of Testing: Test completed and cured sealant joints as follows:
 - a. Perform 4 tests for the first 500 feet of joint length for each kind of sealant and joint substrate.
2. 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.
 - a. 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.
3. Inspect tested joints and report on the following:
 - a. Whether sealants filled joint cavities and are free of voids.
 - b. Whether sealant dimensions and configurations comply with specified requirements.
 - c. Whether sealants in joints connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. Compare these results to determine if adhesion complies with sealant manufacturer's field-adhesion hand-pull test criteria.
4. Record test results in a field-adhesion-test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant material, sealant configuration, and sealant dimensions.
5. Repair sealants pulled from test area by applying new sealants following same procedures used originally to seal joints. Ensure that original sealant surfaces are clean and that new sealant contacts original sealant.

- B. Evaluation of Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

3.5 CLEANING

- A. Clean off excess 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.

3.6 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, remove, and repair damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

3.7 JOINT-SEALANT SCHEDULE

- A. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal nontraffic surfaces <JS-1>.
 - 1. Joint Locations:
 - a. Construction joints in cast-in-place concrete.
 - b. Joints between plant-precast architectural concrete units.
 - c. Control and expansion joints in unit masonry.
 - d. Joints in dimension stone cladding.
 - e. Joints in glass unit masonry assemblies.
 - f. Joints in exterior insulation and finish systems.
 - g. Joints between metal panels.
 - h. Joints between different materials listed above.
 - i. Perimeter joints between materials listed above and frames of doors, louvers and screening panels.
 - j. Control and expansion joints in ceilings, soffits, and other overhead surfaces.
 - k. Other joints as indicated on Drawings.
 - 2. Joint Sealant: Silicone, nonstaining, S, NS, 50, NT.
 - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- B. Joint-Sealant Application: Interior joints in horizontal traffic surfaces <JS-2>.

POLICE RANGE REFURBISHMENT PROJECT – PHASE II

1. Joint Locations:
 - a. Isolation joints in cast-in-place concrete slabs.
 - b. Other joints as indicated on Drawings.
 2. Joint Sealant: Urethane, S, P, 25, T, NT.
 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- C. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces <**JS-3**>.
1. Joint Locations:
 - a. Control and expansion joints on exposed interior surfaces of exterior walls.
 - b. Tile control and expansion joints.
 - c. Vertical joints on exposed surfaces of unit masonry, concrete, walls and partitions.
 - d. Other joints as indicated on Drawings.
 2. Joint Sealant: Urethane, S, NS, 25, NT.
 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- D. Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces <**JS-4**>.
1. Joint Locations:
 - a. Joints between plumbing fixtures and adjoining walls, floors, and counters.
 - b. Tile control and expansion joints where indicated.
 - c. Other joints as indicated on Drawings.
 2. Joint Sealant: Silicone, mildew resistant, acid curing, S, NS, 25, NT.
 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- E. Joint-Sealant Application: Concealed mastics <**JS-5**>.
1. Joint Locations:
 - a. Aluminum thresholds.
 - b. Sill plates.
 - c. Other joints as indicated on Drawings.
 2. Joint Sealant: Butyl-rubber based.
 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

POLICE RANGE REFURBISHMENT PROJECT – PHASE II

END OF SECTION 079200

SECTION 08 01 52.93

HISTORIC TREATMENT OF WOOD WINDOWS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract - Standard Specifications for Public Works Construction 'The GREENBOOK' and City Supplement 'The WHITEBOOK', latest editions, including Supplemental Supplementary Provisions (SSPs), apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Window member repair and patching.
 - 2. Window member replacement.
 - 3. Window sash replacement.
 - 4. Wood window unit removal and reinstallation.
 - 5. Wood window unit removal and replacement.
 - 6. Window hardware repair and replacement.
 - 7. Weather stripping.
- B. Related Sections include the following:
 - 1. Section 07 9200 - Joint Sealants, for sealing joints in restored wood windows.
 - 2. Section 09 0190.91 - Painting Restoration, for paint removal, surface preparation, and refinishing of wood windows in place.

1.3 WINDOW SYSTEM DESCRIPTIONS

- A. Window System Component Descriptions: Window component terminology shall be as identified in AWS's "Architectural Woodwork Standards," Section 6.
- B. Wood window components for historic treatment work include the following:
 - 1. Frame Components: Head, jamb, and sill.
 - 2. Sash Components: Stile and rails, parting bead, stop, and muntins.
 - 3. Exterior Trim: Exterior casing, brick mould, and drip cap.
 - 4. Interior Trim: Casing, stool, and apron.
- C. Glazing includes glass, glazing points, glazing compounds, and gaskets.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Verification: For each type of wood window replacement component required, prepared on Samples of size indicated below.
 - 1. Main Frame Member: 12-inch- long, full-size sections with applied finish.
 - 2. Repaired and Refinished Wood Window Member: Prepare Samples using existing wood window members removed from site, repaired with patching compound, and refinished.
 - 3. Hardware: Full-size units with factory-applied finish.
 - 4. Weather Stripping: 12-inch- long sections.
- C. Qualification Data: For historic treatment specialists.
- D. Historic Treatment Program: For each phase of historic treatment process, including protection of surrounding materials on the building and Project site during operations. Describe in detail the materials, methods, equipment, and sequence of operations to be used for each phase of historic treatment work.
 - 1. If materials and methods alternative to those indicated are proposed for any phase of historic treatment work, provide a written description, including evidence of successful use on other comparable projects, and a testing program to demonstrate their effectiveness for this Project.

1.5 QUALITY ASSURANCE

- A. Historic Treatment Specialist Qualifications: A firm or individual experienced in historic treatment of windows similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
 - 1. Historic Treatment Specialist Qualifications shall be provided at time of bidding incorporated with the bid package for City review.
 - 2. Field Supervision: Require that an experienced full-time supervisor be at Project site during times that historic treatment of wood windows is in progress.
- B. Mockups: Prepare existing windows to serve as mockups to demonstrate historic treatment methods and procedures for aesthetic effects and qualities of materials and execution. Use materials and methods proposed for completed Work and prepare mockups under same weather conditions to be expected during remainder of Work.
 - 1. Wood Window Repair: Prepare one entire window unit to serve as mockup to demonstrate sample repair of wood window members including frame, sash, glazing, and hardware.

2. Approved mockups shall become part of the completed Work if undisturbed at time of Substantial Completion.

C. AWS Quality Standard: Comply with applicable requirements in AWS's "Architectural Woodwork Standards" for construction, finishes, grades of wood windows, and other requirements.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver patching and repair compounds to Project site in manufacturer's original and unopened containers, labeled with description of contents and name of manufacturer.

B. Comply with manufacturer's written instructions for minimum and maximum temperature requirements for storage of patching materials.

1.7 SEQUENCING AND SCHEDULING

A. Perform historic treatment of wood windows in the following sequence:

1. Repair deteriorated and damaged wood members.
2. Replace damaged and missing wood window members.
3. Refinish existing wood windows.
4. Repair or replace existing window hardware.
5. Install new weather stripping.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Products: Subject to compliance with requirements, provide one of the products specified.
2. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 REPLACEMENT WOOD MATERIALS

A. Wood: Clear fine-grained lumber; kiln dried to a moisture content of 6 to 12 percent at time of fabrication; free of visible finger joints, blue stain, knots, pitch pockets, and surface checks larger than 1/32 inch deep by 2 inches wide; and treated with water-repellent preservative.

1. Species: Ponderosa pine or Western Red Cedar .

2.3 WOOD PATCHING MATERIALS

- A. Wood Pretreatment: Ready-to-use product designed for hardening and sealing soft fibers of wood materials that have deteriorated due to weathering and exposure and designed specifically to enhance the bond of wood patching compound to existing wood.

1. Products:

- a. Abatron, Inc.; Liquidwood.
- b. Advanced Repair Technology; Primatrate.
- c. Wood Care Systems; Liquid TIMBR.

- B. Wood Patching Compound: 2-part epoxy-resin wood compound with a 10- to 15-minute cure at 70 deg F, in knife grade formulation and recommended by manufacturer for type of wood repair indicated. Compound shall be designed for filling damaged wood materials that have deteriorated due to weathering and exposure. Compound shall be capable of filling deep holes and capable of spreading to feather edge.

1. Products:

- a. Abatron, Inc.; Liquidwood with WoodEpoxy.
- b. Advanced Repair Technology; Primatrate with Flex-Tec HV.
- c. Gougeon Brothers, Inc.; West System.
- d. Polymeric Systems Inc.; Quickwood.
- e. Wood Care Systems; Liquid TIMBR with TIMBR Flex.

2.4 REPLACEMENT WINDOW HARDWARE

- A. General: Provide complete sets of window hardware consisting of sash balances, hinges, pulls, latches, and accessories indicated for each window. Replacement window hardware shall be designed to smoothly operate, tightly close, and securely lock wood windows and be sized to accommodate sash or ventilator weight and dimensions.

- B. Repair and Refinish Existing Hardware: Remove window hardware and repair and refinish to match samples.

- C. Replacement Hardware: Replace existing damaged or missing window hardware with replacement hardware manufactured by one of the following, or equal:

1. Manufacturers:

- a. Ball and Ball.
- b. Bronze Craft Corporation (The).
- c. Craftsmen Hardware Co., Ltd.
- d. Phelps Company Architectural Specialties.

D. Window Hardware:

1. Material: Cast or wrought aluminum.
2. Design: Provide custom hardware to replicate existing hardware.
3. Replacement Window Hardware: Match existing window hardware of the following types:
 - a. Projected window hinge.
 - b. Window lock.
 - c. Window latch.
 - d. Handle.
 - e. Pole ring.
 - f. Window gasketing.

E. Window Hardware Finishes: Comply with BHMA A156.18 for base material and finish requirements indicated by the following:

1. BHMA 628: Satin aluminum, clear anodized, aluminum base metal.

2.5 REPLACEMENT WOOD WINDOWS

A. Replacement Wood Window Frames and Sashes: Custom-fabricated replacement wood windows to match existing materials and profiles, with operating and latching hardware.

1. Provide replacement wood windows fabricated to comply with AWS Sections 6 and 12 requirements for Custom grade.
2. Wood Species: Match wood species of exterior window trim and frame parts.
3. Wood Window Members: Match wood profiles of existing exterior window trim, frame and sash parts.
4. Exposed Hardware: Reuse existing exposed window hardware.
5. Storm Window Hardware: Provide hardware to secure storm window to window frames.

B. Manufacturers:

1. Allegheny Restoration & Builders Inc.
2. Dahlgrens, Inc.
3. Parrett Windows.
4. Shaw/Stewart Lumber Company.
5. WOODSTONE Company (The).
6. Woodward Thomsen Company.
7. Wood Window Workshop.

2.6 WEATHER STRIPPING

A. Manufacturers:

1. National Guard Products, Inc.

2. Pemko Manufacturing Co., Inc.
 3. Reese Enterprises, Inc.
 4. Zero International, Inc.
- B. Compression-Type Weather Stripping: Provide compressible weather stripping designed for permanently resilient sealing under bumper or wiper action and to be completely concealed when wood window is closed.
1. Weather-Stripping Material: Match existing materials and profiles.
 2. Weather-Stripping Material: Dense elastomeric gaskets complying with ASTM C 864.
- C. Replaceable Weather Seals: Comply with AAMA 701/702.

2.7 MISCELLANEOUS MATERIALS

- A. Cleaning Materials:
1. Detergent Solution: Solution prepared by mixing 2 cups of tetrasodium polyphosphate (TSPP), 1/2 cup of laundry detergent, 5 quarts of 5 percent sodium hypochlorite bleach, and 15 quarts of warm water for each 5 gal. of solution required.
 2. Mildewcide: Provide commercial proprietary mildewcide or a solution prepared by mixing 1/3 cup of household detergent, 1 quart of 5 percent sodium hypochlorite bleach, and 3 quarts of warm water.
- B. Adhesive: Wood adhesive with a 15- to 45-minute cure at 70 deg F, in gunnable formulation and recommended by adhesive manufacturer for exterior wood repair.
- C. Fasteners: Provide aluminum or stainless-steel fasteners compatible with window members, trim, hardware, anchors and other components.
- D. Anchors, Clips, and Accessories: Fabricate anchors, clips, and window accessories of aluminum, nonmagnetic stainless steel, or hot-dip zinc-coated steel complying with requirements in ASTM B 633 for SC 3 (Severe) service condition.

2.8 FABRICATION OF REPLACEMENT MEMBERS

- A. General: Fabricate window replacement members and units to comply with AWS Sections 6 and 12 requirements for Custom grade.
1. Fabricate replacement wood sash members and frame members that are reglazable without dismantling sash members or framing members.
 2. Weather Stripping: Provide full-perimeter weather stripping for each operable sash.
 - a. Hung Windows: Provide weather stripping only at horizontal rails of operable sash.

3. Mullions: Provide replacement mullions as shown, matching existing units, complete with anchors for support to structure and installation of window units.
4. Glazing Stops: Provide replacement glazing stops coordinated with glazing system indicated. Provide glazing stops to match sash frames.
5. Molded Profiles of Replacement Members: Match existing profiles.
6. Sash Members: Fabricate with mortise and tenon joints, coped, glued under pressure, and pinned. Half-lap muntin bars at intersections.
7. Frame Members: Dado, rabbet, and plant assemble.
8. Ease edges of replacement members as necessary to match existing members.

2.9 WOOD WINDOW FINISHES

- A. Factory-Primed Replacement Windows: Provide factory-prime coat on exposed exterior and interior wood surfaces.

PART 3 - EXECUTION

3.1 HISTORIC TREATMENT SPECIALIST

- A. Historic Treatment Specialists: Subject to compliance with requirements, engage an historic treatment specialist. Submit qualifications for approval at time of bidding.
- B. Responsibilities: Coordinate historic treatment of wood windows.

3.2 PREPARATION

- A. Protect adjacent materials from damage caused by historic treatment of wood windows.
- B. Clean existing wood windows of mildew, algae, moss, plant material, loose paint, grease, dirt, and other debris. Use bristle brush and mildewcide to kill mildew. After cleaning, rinse thoroughly with fresh water. Allow to dry before patching, repairing, or painting.
- C. Treat existing wood window members to remain in place with water-repellent preservative treatment; apply liberally by brush to all lap and butt joints, edges and ends of wood members, and bottoms of window frames. Apply treatment after wood members are patched and filled.
- D. Condition replacement wood members and replacement wood windows to prevailing conditions at installation areas before installing.

3.3 HISTORIC TREATMENT PROCEDURES, GENERAL

- A. Window Removal: Where sashes or windows or window components are indicated for removal, cover resultant openings with temporary enclosures so that openings are weathertight during repair period.

- B. Identify removed windows, sashes, and members with numbering system to ensure reinstallation in same location. Key windows, sashes, and members to Drawings showing location of each removed unit. Mark units in a location that will be concealed after reinstallation.

3.4 WOOD WINDOW MEMBER PATCHING

- A. Patch wood members that have been damaged and exhibit depressions, holes, or similar voids, and that have limited rotted or decayed wood. Remove rotted or decayed wood down to sound wood.
 - 1. Treat wood members with wood pretreatment prior to application of patching compound according to repair and patching material manufacturer's written instructions.
 - B. Apply patching compound to fill depressions, nicks, cracks, and other voids. Apply compound in layers as recommended by manufacturer until the void is completely filled. Sand patching compound smooth and flush, matching contour of existing wood member.
 - C. Clean spilled compound from adjacent materials immediately.

3.5 WOOD WINDOW MEMBER REPAIR

- A. Window Schedule: Repair wood members at locations indicated in the Historic Treatment of Wood Window Schedule at the end of Part 3.
 - 1. Repair wood members by pretreating and filling with patching compounds or by replacing with new members spliced into existing wood members as indicated in the schedule.
 - 2. Repair windows by splicing in replacement wood sections where deterioration is structural, including at meeting points of rails and meeting points of true muntins.
- B. Repair by Pretreatment and Patching Compound:
 - 1. Clean wood surfaces prior to consolidation treatment and patching.
 - 2. If rotted or soft wood remains, remove down to sound wood according to patching manufacturer's written instructions.
 - 3. Apply wood pretreatment to soft wood fibers to remain, complying with manufacturer's written instructions. Coat surface of wood with consolidation treatment by brushing, applying multiple coats until wood is saturated. Allow treatment to harden before filling void with patching compound.
 - 4. Mix only as much patching compound as can be applied according to manufacturer's written instructions.
 - 5. Apply patching compound to fill depressions, nicks, cracks, and other voids created by removed or missing wood. Apply compound in layers as recommended in writing by manufacturer until the void is completely filled. Sand patching compound smooth and flush and matching contour of existing wood member.
 - 6. Clean spilled compound from adjacent materials immediately.

POLICE RANGE REFURBISHMENT PROJECT – PHASE II

- C. Repair by Wood Member Replacement: Custom fabricate new wood members to replace missing members or members deteriorated beyond repair. Either replace entire wood member or splice new wood member into existing member.
- D. Cut out deteriorated or damaged sections of wood members and replace them by splicing replacement wood members into existing remaining wood members.
 - 1. Anchor new wood members by nailing and adhesive.
 - 2. Install wood members with concealed fasteners. Fill nail holes and touch up the finish to match surrounding wood finish.

3.6 WOOD WINDOW UNIT REPLACEMENT

- A. Window Unit Replacement: Where scheduled, replace existing wood windows with new custom-fabricated wood windows to match existing windows.
- B. Comply with manufacturer's written instructions for installing windows, hardware, accessories, and other components.
- C. Install windows level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction.
- D. Set sill members in bed of sealant or with gaskets, as indicated, for weathertight construction.
- E. Metal Protection: Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials.

3.7 HISTORIC TREATMENT OF WOOD WINDOW SCHEDULE

- A. Historic Wood Windows: Casement window. Location: All Clubhouse Windows, including all around Assembly Room (12), Kitchen (4), and Restroom (1).
 - 1. Repair and Limited Replacement: Repair existing wood window, including frame and sash, on-site using indicated treatments.
 - 2. Existing Paint Removal: Refer to Section 09 0190.91 - Painting Restoration.
 - 3. Wood Frame: Remain in place and repair.
 - 4. Wood Sash: Remove sash from opening and repair.
 - 5. Finish Treatment: Field application of finish coating as specified in Section 09 0190.91 - Painting Restoration.
 - 6. Hardware: Projected window hinge, Window lock, Window latch, Handle and Window gasketing.
- B. Historic Wood Window: Fixed sidelite windows paired with Doors 101 and 102 as indicated on Drawings. Location: East and West-facing entrances at exterior wall of Room 100 – Meeting Room, adjacent to new doors. Frame to remain, p and be repaired and refinished in place. Provide new entrance and sidelight as indicated.

POLICE RANGE REFURBISHMENT PROJECT – PHASE II

1. Existing Paint Removal: Refer to Section 09 0190.91 - Painting Restoration.
2. Wood Frame: Remain in place and repair.
3. Wood Sidelite Mullions, Muntins, Partial Frame: Provide new, fabricated in accordance with Secretary of Interior Standards for Reconstruction.
4. Finish Treatment: Field application of finish coating as specified in Section 09 0190.91 - Painting Restoration.

END OF SECTION 080152.93

SECTION 081113

HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract - Standard Specifications for Public Works Construction 'The GREENBOOK' and City Supplement 'The WHITEBOOK', latest editions, including Supplemental Supplementary Provisions (SSPs), apply to this Section.

1.2 SUMMARY

- A. Section includes:
 - 1. Interior standard steel doors and frames.
 - 2. Exterior standard steel doors and frames.
 - 3. Interior custom hollow-metal doors and frames.
 - 4. Exterior custom hollow-metal doors and frames.
- B. Related Requirements:
 - 1. Section 087100 "Door Hardware" for door hardware for hollow-metal doors.

1.3 DEFINITIONS

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

1.4 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.
- B. Coordinate requirements for installation of door hardware, electrified door hardware, and access control and security systems.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.

POLICE RANGE REFURBISHMENT PROJECT – PHASE II

1. Include construction details, material descriptions, core descriptions, and finishes.
 - B. Shop Drawings: Include the following:
 1. Elevations of each door type.
 2. Details of doors, including vertical- and horizontal-edge details and metal thicknesses.
 3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
 4. Locations of reinforcement and preparations for hardware.
 5. Details of each different wall opening condition.
 6. Details of anchorages, joints, field splices, and connections.
 7. Details of accessories.
 - C. Product Schedule: For hollow-metal doors and frames, 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.
- 1.6 DELIVERY, STORAGE, AND HANDLING
- A. Deliver hollow-metal doors and frames 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 doors and frames vertically under cover at Project site with head up. Place on minimum 4-inch- (102-mm-) high wood blocking. Provide minimum 1/4-inch (6-mm) space between each stacked door to permit air circulation.

PART 2 - PRODUCTS

2.1 EXTERIOR STANDARD STEEL DOORS AND FRAMES

- A. Construct hollow-metal doors and frames to comply with standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.
- B. Extra-Heavy-Duty Doors and Frames: SDI A250.8, Level 3; SDI A250.4, Level A. Locations include all doors accessing Storage Rooms including Doors 103, 104, 203 and 204.
 1. Doors:

POLICE RANGE REFURBISHMENT PROJECT – PHASE II

- a. Type: As indicated in the Door and Frame Schedule.
- b. Thickness: 1-3/4 inches (44.5 mm).
- c. Face: Metallic-coated steel sheet, minimum thickness of 0.053 inch (1.3 mm), with minimum A60 (ZF180) coating.
- d. Edge Construction: Model 2, Seamless.
- e. Edge Bevel: Provide manufacturer's standard beveled or square edges.
- f. Top Edge Closures: Close top edges of doors with flush closures of same material as face sheets. Seal joints against water penetration.
- g. Bottom Edges: Close bottom edges of doors with end closures or channels of same material as face sheets. Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape.
- h. Core: Vertical steel stiffener.

2. Frames:

- a. Materials: Metallic-coated steel sheet, minimum thickness of 0.053 inch (1.3 mm), with minimum A60 (ZF180) coating.
- b. Construction: Full profile welded.

3. Exposed Finish: Prime.

2.2 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.
- B. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.
- C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type 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.

2.3 FABRICATION

- A. Door Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch (19 mm) beyond edge of door on which astragal is mounted or as required to comply with published listing of qualified testing agency.
- B. Hollow-Metal Frames: Fabricate in one piece except where handling and shipping limitations require multiple sections. Where frames are fabricated in sections, provide alignment plates or angles at each joint, fabricated of metal of same or greater thickness as frames.

POLICE RANGE REFURBISHMENT PROJECT – PHASE II

1. Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by welding.
 2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
 3. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers as follows. Keep holes clear during construction.
 - a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
 - b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.
 4. Terminated Stops: Terminate stops 6 inches (152 mm) above finish floor with a 45-degree angle cut, and close open end of stop with steel sheet closure. Cover opening in extension of frame with welded-steel filler plate, with welds ground smooth and flush with frame.
- C. Hardware Preparation: Factory prepare hollow-metal doors and frames to receive templated mortised hardware, and electrical wiring; include cutouts, reinforcement, mortising, drilling, and tapping according to SDI A250.6, the Door Hardware Schedule, and templates.
1. Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.
 2. Comply with BHMA A156.115 for preparing hollow-metal doors and frames for hardware.

2.4 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 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. Touch up factory-applied finishes where spreaders are removed.
- B. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

3.2 INSTALLATION

- A. General: Install hollow-metal doors and frames plumb, rigid, properly aligned, and securely fastened in place. Comply with approved Shop Drawings and with manufacturer's written instructions.
- B. Hollow-Metal Frames: Comply with SDI A250.11.
 - 1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces without damage to completed Work.
 - a. Where frames are fabricated in sections, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces. Touch-up finishes.
 - b. Install frames with removable stops located on secure side of opening.
 - 2. Fire-Rated Openings: Install frames according to NFPA 80.
 - 3. Floor Anchors: Secure with postinstalled expansion anchors.
 - 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 frames to the following tolerances:
 - a. Squareness: Plus or minus 1/16 inch (1.6 mm), measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 - b. Alignment: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a horizontal line parallel to plane of wall.
 - c. Twist: Plus or minus 1/16 inch (1.6 mm), measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - d. Plumbness: Plus or minus 1/16 inch (1.6 mm), measured at jambs at floor.
- C. Hollow-Metal Doors: Fit and adjust hollow-metal doors accurately in frames, within clearances specified below.
 - 1. Non-Fire-Rated Steel Doors: Comply with SDI A250.8.

3.3 CLEANING AND TOUCHUP

- A. 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.
- B. Metallic-Coated Surface Touchup: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

END OF SECTION 081113

SECTION 081433

STILE AND RAIL WOOD DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract - Standard Specifications for Public Works Construction 'The GREENBOOK' and City Supplement 'The WHITEBOOK', latest editions, including Supplemental Supplementary Provisions (SSPs), apply to this Section.

1.2 SUMMARY

A. Section Includes:

- 1. Exterior stile and rail wood doors.
- 2. Interior stile and rail wood doors.
- 3. Factory fitting stile and rail wood doors to frames and factory machining for hardware.
- 4. Factory priming.

B. Related Requirements:

- 1. Section 099113 "Exterior Painting" for field finishing stile and rail doors.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product, including the following:

- 1. Details of construction and glazing.
- 2. Door frame construction.
- 3. Factory-machining criteria.
- 4. Factory-priming specifications.

B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each type of door; construction details not covered in Product Data, including those for stiles, rails, panels, and moldings (sticking); and other pertinent data, including the following:

- 1. Door schedule indicating door and frame location, type, size, fire protection rating, and swing.
- 2. Door elevations, dimensions and location of hardware, lite locations, and glazing thickness.
- 3. Details of frame for each frame type, including dimensions and profile.
- 4. Details of electrical raceway and preparation for electrified hardware, access control systems, and security systems.
- 5. Dimensions and locations of mortises and holes for hardware.

6. Clearances and undercuts.
7. Requirements for veneer matching.
8. Doors to be factory [primed] [finished] and application requirements.
9. Apply WI Certified Compliance Program label to Shop Drawings.

C. Samples for Verification:

1. Corner sections of doors, approximately 8 by 10 inches (200 by 250 mm), with door faces and edges representing actual materials to be used.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For door inspector.

1. Egress Door Inspector: Submit documentation of compliance with NFPA 101, section 7.2.1.15.4.
2. Submit copy of DHI Fire and Egress Door Assembly Inspector (FDAI) certificate.

B. Field quality control reports.

C. Sample Warranty: For special warranty.

1.5 CLOSEOUT SUBMITTALS.

A. Special warranties.

B. Quality Standard Compliance Certificates: WI Certified Compliance Program certificates.

C. Record Documents: For fire-rated doors, list of door numbers and applicable room name and number to which door accesses.

1.6 QUALITY ASSURANCE

A. Manufacturer's Certification: Licensed participant in WI's Certified Compliance Program.

B. Egress Door Inspector Qualifications: Inspector for field quality control inspections of egress door assemblies shall meet the qualifications set forth in NFPA 101, section 7.2.1.15.4 and the following:

1.7 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of referenced standard and manufacturer's written instructions.

B. Package doors individually in opaque plastic bags or cardboard cartons.

C. Mark each door on top and bottom rail with opening number used on Shop Drawings.

1.8 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining temperature and relative humidity levels designed for building occupants for the remainder of construction period.

1.9 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace doors and frames that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Delamination of veneer.
 - b. Warping (bow, cup, or twist) more than 1/4 inch (6.4 mm) in a 42-by-84-inch (1067-by-2134-mm) section.
 - c. Telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch (0.25 mm in a 76.2-mm) span.
 - 2. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors and frames.
 - 3. Warranty shall be in effect during specified period of time from date of Substantial Completion.
 - 4. Warranty Period for Exterior Doors: Five years.
 - 5. Insulating Glass Vision Panels: Five years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain stile and rail wood doors from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Exterior Door Thermal Transmittance: Maximum whole fenestration product U-factor of 0.45 (2.55), according to AAMA 1503, ASTM E1423, or NFRC 100.

2.3 MATERIALS

- A. Use only materials that comply with referenced standards and other requirements specified.
 - 1. Assemble exterior doors, including components, with wet-use adhesives complying with ASTM D5572 for finger joints and with ASTM D5751 for joints other than finger joints.

2. Assemble interior doors, including components, with either dry-use or wet-use adhesives complying with ASTM D5572 for finger joints and with ASTM D5751 for joints other than finger joints.

B. Panel Products: Any of the following unless otherwise indicated:

1. Particleboard: ANSI A208.1, Grade M-2.
2. Medium-density fiberboard (MDF,) complying with ANSI A208.2, Grade 130.
3. Hardboard complying with ANSI A135.4.
4. Veneer-core plywood.

C. Safety Glass: Provide products complying with testing requirements in 16 CFR 1201, for Category II materials, unless those of Category I are expressly indicated and permitted.

2.4 EXTERIOR STILE AND RAIL WOOD DOORS

A. Exterior Stile and Rail Wood Doors Type SRD-<1>: Exterior custom doors complying with the AWI, AWMAC, and WI's Architectural Woodwork Standards, or WDMA I.S. 6A, and with other requirements specified.

1. Architectural Woodwork Standards Grade: Custom.
2. Panel Designs: As indicated on Drawings.
 - a. Do not modify intended aesthetic effects, as judged solely by Engineer, except with Engineer's approval.
 - b. If modifications are proposed, submit comprehensive explanatory data to Engineer for review.
3. Finish: Opaque.
4. Door Construction for Opaque Finish:
 - a. Stile and Rail Construction: Clear softwood; may be edge glued for width and finger jointed.
 - b. Raised-Panel Construction: Clear softwood lumber; edge glued for width.
5. Stile and Rail Widths:
 - a. Stiles and Top Rail: Match interior clubhouse doors exactly.
 - b. Bottom Rails: 11-3/8 inches (289 mm).
6. Raised-Panel Thickness: Manufacturer's standard, but not less than 1-1/8 inches (29 mm).
7. Molding Profile (Sticking): match profile on interior Clubhouse doors exactly.
8. Glass: Uncoated, clear, insulating-glass units made from two lites of 3.0-mm-thick, fully tempered glass with 1/4-inch (6.4-mm) interspace, complying with Section 088000 "Glazing."

2.5 INTERIOR STILE AND RAIL WOOD DOORS

- A. Interior Stile and Rail Wood Doors Type SRD-<2>: Interior custom doors complying with AWI, AWMAC, and WI's Architectural Woodwork Standards and with other requirements specified.
1. Architectural Woodwork Standards Grade: Custom.
 2. Panel Designs: Match existing door exactly. Do not modify intended aesthetic effects, as judged solely by Engineer, except with Engineer's approval. If modifications are proposed, submit comprehensive explanatory data to Engineer for review.
 3. Finish: Opaque.
 4. Door Construction for Opaque Finish:
 - a. Stile and Rail Construction: Clear softwood; may be edge glued for width and finger jointed.
 - b. Raised-Panel Construction: Clear softwood lumber; edge glued for width.
 5. Stile and Rail Widths: Match existing interior Clubhouse doors exactly.
 6. Raised-Panel Thickness: Manufacturer's standard, but not less than 1-1/8 inches (29 mm).
 7. Molding Profile (Sticking): Match existing interior Clubhouse door exactly.

2.6 STILE AND RAIL WOOD DOOR FABRICATION

- A. Factory fit doors to suit frame-opening sizes indicated, with the following uniform clearances and bevels unless otherwise indicated:
1. Clearances:
 - a. Provide 1/8 inch (3 mm) at heads, jambs, and between pairs of doors.
 - b. Provide 1/2 inch (13 mm) from bottom of door to top of decorative floor finish or covering.
 - c. Where threshold is shown on Drawings or scheduled, provide not more than 3/8 inch (10 mm) from bottom of door to top of threshold.
 2. Bevel non-fire-rated doors 1/8 inch in 2 inches (3-1/2 degrees) at lock and hinge edges.
- B. Factory machine doors for hardware that is not surface applied.
1. Locate hardware to comply with DHI-WDHS-3.
 2. Comply with final hardware schedules, door frame Shop Drawings, BHMA-156.115-W, and hardware templates.
 3. For doors scheduled to receive electrified locksets, provide factory-installed raceway and wiring to accommodate specified hardware.
 4. Coordinate measurements of hardware mortises in metal frames to verify dimensions and alignment before factory machining.

- C. Glazed Openings: Factory install glazing in doors, complying with Section 088000 "Glazing." Install glass using manufacturer's standard elastomeric glazing sealant complying with ASTM C920. Secure glass in place with removable wood moldings. Miter wood moldings at corner joints.
- D. Side Panels:
 - 1. Fabricate matching panels with same construction, exposed surfaces, and finish as specified for associated doors.
- E. Exterior Doors: Factory treat exterior doors with water-repellent preservative after fabrication has been completed but before shop priming.
 - 1. Comply with WDMA I.S. 4.
 - 2. Flash top of outswinging doors with manufacturer's standard metal flashing.

2.7 FACTORY PRIMING

- A. Doors for Opaque Finish: Shop prime faces, all four edges, edges of cutouts, and mortises with one coat of wood primer specified in Section 099113 "Exterior Painting." and Section 099123 "Interior Painting."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine doors and installed door frames, with Installer present, before hanging doors.
 - 1. Verify that installed frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
 - 2. Reject doors with defects.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Hardware: For installation, see Section 087100 "Door Hardware."
- B. Install doors and frames to comply with manufacturer's written instructions and referenced quality standard, and as indicated.
- C. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.

3.3 FIELD QUALITY CONTROL

- A. Inspection Agency: Engage a qualified inspector to perform inspections and to furnish reports to Architect.
- B. Inspections:
 - 1. Provide inspection of installed Work through WI's Certified Compliance Program, certifying that woodwork, including installation, complies with requirements of the Architectural Woodwork Standards for the specified grade.
 - 2. Egress Door Inspections: Inspect each door equipped with panic hardware, each door equipped with fire exit hardware, each door located in an exit enclosure, each electrically controlled egress door, and each door equipped with special locking arrangements according to NFPA 101, section 7.2.1.15.
- C. Repair or remove and replace installations where inspections indicate that they do not comply with specified requirements.
- D. Reinspect repaired or replaced installations to determine if replaced or repaired door installations comply with specified requirements.

3.4 ADJUSTING

- A. Operation: Rehang or replace doors that do not swing or operate freely.
- B. Finished Doors: Replace doors that are damaged or do not comply with requirements. Doors may be repaired or refinished if Work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION 081433

SECTION 087100
DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract - Standard Specifications for Public Works Construction 'The GREENBOOK' and City Supplement 'The WHITEBOOK', latest editions, including Supplemental Supplementary Provisions (SSPs), apply to this Section.

1.2 SUMMARY

A. Section Includes:

- 1. Mechanical door hardware for the following:
 - a. Swinging doors.
 - b. Sliding doors.
 - c. Folding doors.
- 2. Cylinders for door hardware specified in other Sections.
- 3. Electrified door hardware.

B. Intent of Hardware Groups

- 1. Should items of hardware not definitely specified be required for completion of the Work, furnish such items of type and quality comparable to adjacent hardware and appropriate for service required.
- 2. Where items of hardware aren't definitively or correctly specified, and are required for completion of the Work, a written statement of such omission, error, or other discrepancy to be submitted to Architect, prior to date specified for receipt of bids for clarification by addendum; or, furnish such items in the type and quality established by this specification, and appropriate to the service intended.

C. Related Requirements:

- 1. Section 064116 "Plastic-Laminate-Clad Architectural Cabinets" for cabinet door hardware provided with cabinets.

1.3 COORDINATION

- A. Installation Templates: Distribute for doors, frames, and other work specified to be factory prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

POLICE RANGE REFURBISHMENT PROJECT – PHASE II

- B. Security: Coordinate installation of door hardware, keying, and access control with Owner's security consultant.
- C. Electrical System Roughing-In: Coordinate layout and installation of electrified door hardware with connections to power supplies and building safety and security systems.
- D. Existing Openings: Where hardware components are scheduled for application to existing construction or where modifications to existing door hardware are required, field verify existing conditions and coordinate installation of door hardware to suit opening conditions and to provide proper door operation.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Conference participants shall include Installer's Architectural Hardware Consultant, City Facilities Maintenance, City Public Works Project Manager, City Field Division Resident Engineer (RE), Architect.
- B. Keying Conference: Conduct conference at Project site.
 - 1. Conference participants shall include Installer's Architectural Hardware Consultant, City Field Division Resident Engineer (RE) and representative from City Lock Shop.
 - 2. Incorporate conference decisions into keying schedule after reviewing door hardware keying system including, but not limited to, the following:
 - a. Flow of traffic and degree of security required.
 - b. Preliminary key system schematic diagram.
 - c. Requirements for key control system.
 - d. Requirements for access control.
 - e. Address for delivery of keys.
 - f. Review of the above, and any other CITY SPECIFIC keying requirements as indicated by Facilities Maintenance and City Lock Shop representative.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Samples for Verification: For each type of exposed product, in each finish specified.
 - 1. Sample Size: Full-size units or minimum 2-by-4-inch (51-by-102-mm) Samples for sheet and 4-inch (102-mm) long Samples for other products.
 - a. Full-size Samples will be returned to Contractor. Units that are acceptable and remain undamaged through submittal, review, and field comparison

POLICE RANGE REFURBISHMENT PROJECT – PHASE II

process may, after final check of operation, be incorporated into the Work, within limitations of keying requirements.

2. Tag Samples with full product description to coordinate Samples with door hardware schedule.
- C. Door Hardware Schedule: Prepared by or under the supervision of Installer's Architectural Hardware Consultant. Coordinate door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
1. Submittal Sequence: Submit door hardware schedule concurrent with submissions of Product Data, Samples, and Shop Drawings. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate the fabrication of other work that is critical in Project construction schedule.
 2. Format: Use same scheduling sequence and format and use same door numbers as in door hardware schedule in the Contract Documents.
 3. Content: Include the following information:
 - a. Identification number, location, hand, fire rating, size, and material of each door and frame.
 - b. Locations of each door hardware set, cross-referenced to Drawings on floor plans and to door and frame schedule.
 - c. Complete designations, including name and manufacturer, type, style, function, size, quantity, function, and finish of each door hardware product.
 - d. Fastenings and other installation information.
 - e. Explanation of abbreviations, symbols, and designations contained in door hardware schedule.
 - f. Mounting locations for door hardware.
 - g. List of related door devices specified in other Sections for each door and frame.
- D. Keying Schedule: Prepared by or under the supervision of Installer's Architectural Hardware Consultant, detailing Owner's final keying instructions for locks. Include schematic keying diagram and index each key set to unique door designations that are coordinated with the Contract Documents.
- 1.6 INFORMATIONAL SUBMITTALS
- A. Qualification Data: For Installer and Architectural Hardware Consultant.
 - B. Product Test Reports: For compliance with accessibility requirements, for tests performed by manufacturer and witnessed by a qualified testing agency, for door hardware on doors located in accessible routes.
 - C. Field quality-control reports.
 - D. Sample Warranty: For special warranty.

1.7 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of door hardware to include in maintenance manuals.
 - 1. Submit 3 sets, in appropriately sized 3-ring binders, with cover sheets including project name, location, installer contact information, and project completion date.
- B. Schedules: Final door hardware and keying schedule.
 - 1. Edit Schedule(s) to reflect “AS-INSTALLED” for each item.
 - 2. Final “AS-INSTALLED” wiring diagrams for each electrified product.
- C. One set of special tools special tools required for maintenance and adjustment of hardware, including changing of cylinders.

1.8 MAINTENANCE MATERIAL SUBMITTALS

1.9 QUALITY ASSURANCE

- A. Installer Qualifications: Supplier of products and an employer of workers trained and approved by product manufacturers and of an Architectural Hardware Consultant who is available during the course of the Work to consult Contractor, Architect, and Owner about door hardware and keying.
 - 1. Warehousing Facilities: In Project's vicinity.
 - 2. Scheduling Responsibility: Preparation of door hardware and keying schedule.
- B. Architectural Hardware Consultant Qualifications: A person who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project and who is currently certified by DHI as an Architectural Hardware Consultant (AHC).

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up for door hardware delivered to Project site.
- B. Tag each item or package separately with identification coordinated with the final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package.
- C. Deliver keys and permanent cores to Owner by registered mail or overnight package service.

1.11 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:

POLICE RANGE REFURBISHMENT PROJECT – PHASE II

- a. Structural failures including excessive deflection, cracking, or breakage.
 - b. Faulty operation of doors and door hardware.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.
2. Warranty Period: Three years from date of Substantial Completion unless otherwise indicated below:
- a. Locks and Cylinders: Lifetime years from date of Substantial Completion.
 - b. Exit Devices: Five years from date of Substantial Completion.
 - c. Manual Closers: 10 years from date of Substantial Completion.
 - d. Concealed Floor Closers: 10 years from date of Substantial Completion.
 - e. All other Hardware: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. City-approved manufacturers are Best Access Systems, or Folger Adams with Best Lock.

2.2 PERFORMANCE REQUIREMENTS

- A. Means of Egress Doors: Latches do not require more than 5 lbf (22 N) to release the latch. Locks do not require use of a key, tool, or special knowledge for operation.
- B. Accessibility Requirements: For door hardware on doors in an accessible route, comply with the DOJ's "2010 ADA Standards for Accessible Design" and California Title 24 Building Standards Code.
 1. Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf (22.2 N).
 2. Comply with the following maximum opening-force requirements:
 - a. Interior, Non-Fire-Rated Hinged Doors: 5 lbf (22.2 N) applied perpendicular to door.
 - b. Sliding or Folding Doors: 5 lbf (22.2 N) applied parallel to door at latch.
 - c. Fire Doors: Minimum opening force allowable by authorities having jurisdiction.
 3. Bevel raised thresholds with a slope of not more than 1:2. Provide thresholds not more than 1/2 inch (13 mm) high.
 4. Adjust door closer sweep periods so that, from an open position of 90 degrees, the door will take at least 5 seconds to move to a position of 12 degrees from the latch.
 5. Adjust spring hinges so that, from an open position of 70 degrees, the door will take at least 1.5 seconds to move to the closed position.

- C. City Requirement: Door in the following locations will have locks which are ANSI series 1000 Grade 1 SECURITY and Grade 1 OPERATIONAL. Locks will meet UL 437 requirements.
 - 1. Rooms containing narcotics.
 - 2. Rooms that contain an armory.
 - 3. Exterior doors for Police Facilities.
 - 4. Exterior doors for Court Facilities.
 - 5. Doors to Judges Chambers.
 - 6. Any exterior door in a remote location or subject to high vandalism.

- D. City Requirement: Cylindrical lock sets may be used only on interior non-high-traffic openings. Locks will have a replaceable sheer lug which when broken will disable the lever. Clutch mechanisms will not be allowed. Locks will have 7-pin interchangeable cores. Cylindrical locks MAY NOT be installed on exterior doors.

2.3 SCHEDULED DOOR HARDWARE

- A. Provide products for each door that comply with requirements indicated in Part 2 and door hardware schedule.
 - 1. Door hardware is scheduled in Part 3.

2.4 HINGES

- A. Hinges: BHMA A156.1. Provide template-produced hinges for hinges installed on hollow-metal doors and hollow-metal frames.
- B. Self-Closing Hinges and Pivots: BHMA A156.17.
- C. Center-Hung and Offset Pivots: BHMA A156.4.
- D. Tested and approved by BHMA for all applicable ANSI Standards for type, size, function and finish
- E. UL10C listed for Fire rated doors
- F. Quantity per Door Leaf (Minimum) unless otherwise specified:

Door Height	Hinges
Up to 5'-0"	2
5'-1" to 7'-7"	3
7'-8" to 10'-0"	4
10'-1" to 12'-6"	5

- G. Hinge Height (Minimum) unless otherwise specified:

Door Width	Hinge Height
Up to 3'-0"	4-1/2"
3'-1" to 4'-0"	5"

POLICE RANGE REFURBISHMENT PROJECT – PHASE II

Over 4'-0" 6"

- H. Width: Minimum for clearance of trim and 180-degree swing.
- I. Exterior Hinges: Nonremovable pin.
 - 1. Non Removable Pin screws shall be slotted stainless steel screws.
- J. Joint Tolerance: 0.012 inch maximum, gauged in CLOSED position.
- K. Bearings are to be fully hardened.
- L. Bearing shell is to be consistent shape with barrel.
- M. Minimum of 2 permanently lubricated non-detachable bearings on standard weight hinge and 4 permanently lubricated bearing on heavy weight hinges.
- N. Equip with easily seated, non-rising pins.
- O. Hinges shall be full polished, front, back and barrel.
- P. Hinge pin is to be fully plated.
- Q. Bearing assembly is to be installed after plating.
- R. Furnish five knuckles with flush ball bearings.
- S. Provide hinge type as listed in schedule.
- T. Types and Manufacturers:

Description	Manufacturer	Model/Series	Finish
Mortise Hinge	McKinney	55860 TA 2714 26D NRP at reverse bevel door locks.	630 / US32D
Alternate	Stanley		
Full Surface Hinge	McKinney	57717B TA2714 26D NRP. Use for retrofit doors as appropriate.	630 / US32D
Alternate	Stanley		
Continuous Hinge	Pemko	For high traffic doors	628 / US28
Alternate	Markar		
Pivot Hinge	Rixon	180 626 Offset Top Pivot	626 / US26D
Alternate	Dorma	75120 626 Offset Top Pivot 75220 626 Intermediate Pivot	

NO ADDITIONAL ALTERNATES WILL BE CONSIDERED.

2.5 CONTINUOUS HINGES

- A. Continuous Hinges: Tested and approved by BHMA A156.26, Grade 1; minimum 0.120-inch- (3.0-mm-) thick, hinge leaves with minimum overall width of 4 inches (102 mm);

POLICE RANGE REFURBISHMENT PROJECT – PHASE II

fabricated to full height of door and frame and to template screw locations; with components finished after milling and drilling are complete.

- B. Continuous, Gear-Type Hinges: Extruded-aluminum, pinless, geared hinge leaves joined by a continuous extruded-aluminum channel cap; with concealed, self-lubricating thrust bearings.
- C. Width: Minimum for clearance of trim and 180-degree swing.
- D. Joint Tolerance: 0.012 inch maximum, gauged in CLOSED position.
- E. Anti-spinning through fastener.
- F. Non-handed.
- G. Lifetime Warranty.
- H. Types and Manufacturers:

Description	Manufacturer	Model/Series	Finish
Continuous Hinge	Pemko	For high traffic doors	628 / US28
Alternate	Markar		

NO ADDITIONAL ALTERNATES WILL BE CONSIDERED.

2.6 MECHANICAL LOCKS AND LATCHES

- A. Lock Functions: As indicated in door hardware schedule.
- B. Lock Throw: Comply with testing requirements for length of bolts required for labeled fire doors, and as follows:
 - 1. Bored Locks: Minimum 1/2-inch (13-mm) latchbolt throw.
 - 2. Mortise Locks: Minimum 3/4-inch (19-mm) latchbolt throw.
 - 3. Deadbolts: Solid Stainless Steel without internal riveted actuator. Minimum 1-inch (25-mm) bolt throw. Minimum 2-inch length of deadbolt to remain in lock case.
- C. Lock Backset: 2-3/4 inches (70 mm) unless otherwise indicated.
- D. Lock Trim:
 - 1. Description: As scheduled.
 - 2. Levers: Cast, solid.
 - a. Hollow levers will NOT be allowed.
 - 3. Escutcheons (Roses): Cast.
 - 4. Dummy Trim: Match lever lock trim and escutcheons.
- E. Strikes: Provide manufacturer's standard strike for each lock bolt or latchbolt complying with requirements indicated for applicable lock or latch and with strike box and curved lip extended to protect frame; finished to match lock or latch.

POLICE RANGE REFURBISHMENT PROJECT – PHASE II

1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
3. Aluminum-Frame Strike Box: Manufacturer's special strike box fabricated for aluminum framing.
4. Rabbet Front and Strike: Provide on locksets for rabbeted meeting stiles.

F. Bored Locks: BHMA A156.2; Grade 1; Series 4000.

Description	Manufacturer	Model/Series	Finish
Cylinders	Best	Mortise 1E74 x RP3 x cam required – NO ALTERNATE	626 / US26D

NO ADDITIONAL ALTERNATES WILL BE CONSIDERED.

Description	Manufacturer	Model/Series	Finish
Key System	Best	See Requirements below:	626 / US26D

- Removeable interchangeable core
- 7-pin Best “Patented/Standard” at Existing Improvements.
- 7-pin Best “Patented/CorMax” at New Construction.
- Best key system.
- 2 keys per lockset.
- All cylinder and cores must be manufactured by BEST.
- All cores are to be keyed into the existing Best Master key system.
- Provide all locksets and cylinders with construction cores for contractor use.
- Permanent cores provided at project completion.
- NO ADDITIONAL ALTERNATES WILL BE CONSIDERED.

Description	Model/Series
Deadbolt Lock/Single & Cylinder 2-3/4” BS	8T37KSTK 626 – NO ALTERNATE.
Deadbolt Lock/Single & Cylinder 2-3/8” BS	7T27KSTK 626 – NO ALTERNATE.

NO ADDITIONAL ALTERNATES WILL BE

G. Mortise Locks: Tested and approved by BHMA A156.13; Operational Grade 1, Extra Heavy-Duty; Security Grade 2; UL10C certified; stamped steel case with steel or brass parts; Series 1000.

1. Furnish UL or recognized independent laboratory certified mechanical operational testing to 4 million cycles minimum.
2. Provide 9001-Quality Management and 14001-Environmental Management.
3. Fit ANSI A115.1 door preparation
4. Functions and design as indicated in the hardware groups
5. Solid, one-piece, 3/4-inch (19mm) throw, anti-friction latchbolt made of self-lubricating stainless steel
6. Deadbolt functions shall have 1 inch (25mm) throw bolt made of hardened stainless steel
7. Latchbolt and Deadbolt are to extend into the case a minimum of 3/8 inch (9.5mm) when fully extended
8. Auxiliary deadlatch to be made of one piece stainless steel, permanently lubricated

POLICE RANGE REFURBISHMENT PROJECT – PHASE II

9. Provide sufficient curved strike lip to protect door trim
10. Lever handles must be of forged or cast brass, bronze or stainless steel construction and conform to ANSI A117.1. Levers that contain a hollow cavity are not acceptable
11. Lock shall have self-aligning, thru-bolted trim
12. Levers to operate a roller bearing spindle hub mechanism
13. Mortise cylinders of lock shall have a concealed internal setscrew for securing the cylinder to the lockset. The internal setscrew will be accessible only by removing the core, with the control key, from the cylinder body.
14. Spindle to be designed to prevent forced entry from attacking of lever
15. Provide locksets with 7-pin removable and interchangeable core cylinders
16. Each lever to have independent spring mechanism controlling it
17. Core face must be the same finish as the lockset
18. Types and Manufacturers:

Description	Manufacturer	Model/Series	Finish
Mortise Lock Set	Best	45H x J Escutcheon lever, as scheduled – NO ALTERNATE	626 / US26D
Lock Function		Room Type	
A		Entrance Lock	
R		Classroom Function	
D		Storeroom Function	
N		Passage	
L		Privacy	

NO ADDITIONAL ALTERNATES WILL BE CONSIDERED.

Description	Manufacturer	Model/Series	Finish
Lock Set	Best	93K x D Rose lever, as scheduled – NO ALTERNATE	626 / US26D
Lock Function		Room Type	
AB		Entrance Lock 9K37 AB 53 626	
R		Classroom Function 9K37 RD4D 53 626	
D		Storeroom Function 9K37 D14D 53 626	
N		Passage 9K30 N14D 53 626	
L		Privacy 9K30 L14D 53 626	

NO ADDITIONAL ALTERNATES WILL BE CONSIDERED.

2.7 EXIT DEVICES AND AUXILIARY ITEMS

A. Exit Devices and Auxiliary Items: BHMA A156.3.

Description	Manufacturer	Model/Series	Finish
Exit Device	Precision	See Below	630 / US32D

2100 Series Rim x 4900 Trim (single door)	
2300 Series Mortise	
2800 Series Concealed Vertical Rod	
	Use Escutcheon with lever 4900 where applicable.
	Lever handle shall match lockset design.
	Exits with cylinder dogging at all non-rated devices
	Provide 'FL' fire-rated devices at labeled openings.

NO ADDITIONAL ALTERNATES WILL BE CONSIDERED.

2.8 LOCK CYLINDERS

A. Lock Cylinders: Tumbler type, constructed from brass or bronze, stainless steel, or nickel silver.

1. Removeable and interchangeable core system: BEST CORMAX™ Patented 7-pin.
2. All cylinder and cores must be manufactured by BEST.
3. Best key system.
4. 2 keys per lockset.
5. All cores are to be keyed into the existing Best Master key system.
6. Provide all locksets and cylinders with construction cores for contractor use.
7. Permanent cores provided at project completion.
8. NO ADDITIONAL ALTERNATES WILL BE CONSIDERED

Description	Manufacturer	Model/Series	Finish
Cylinders	Best	Mortise 1E74 x RP3 x cam required – NO ALTERNATE	626 / US26D

NO ADDITIONAL ALTERNATES WILL BE CONSIDERED.

Description	Manufacturer	Model/Series	Finish
Key System	Best	See Requirements below:	626 / US26D

B. Standard Lock Cylinders: BHMA A156.5; Grade 1 permanent cores; face finished to match lockset.

1. Core Type: Interchangeable, Removable.

C. High-Security Lock Cylinders: BHMA A156.30; Grade 1 permanent cores that are removable; face finished to match lockset.

1. Type: M, mechanical.

D. Construction Cores: Provide construction cores that are replaceable by permanent cores. Provide 10 construction master keys.

1. Construction Cores will be installed by Contractor for security purposes. Construction cores will be keyed alike and interchangeable with Best cores. Cores provided by manufacturer.
2. Contractor will provide to the City Lock Shop copies of Control Key and Operating Key upon completion.

- E. Electric Meter Room: To have SDG&E lock installed. The cylinder will be keyed to Schlage keyway VTQP AA-10. Three keys shall be provided with lock. All keys are to be turned over to the City of San Diego Lock Shop at completion of project. The contractor will obtain lock from any contracted SDG&E Locksmith for installation.
- F. Any questions, contact:
 - 1. Carpenter Supervisor Martin Sorrell at 619-525-8550; or
 - 2. Lock Shop at 619-525-8552.

2.9 KEYING

- A. Provide keyed brass construction cores and keys during the construction period. Construction control and operating keys and core shall not be part of the Owner's permanent keying system or furnished in the same keyway (or key section) as the Owner's permanent keying system. Permanent cores and keys (prepared according to the accepted keying schedule) will be furnished to the Owner.
- B. The Owner, or the Owner's agent, will install permanent cores and return the construction cores to the Hardware Supplier. Construction cores and keys remain the property of the Hardware Supplier.
- C. Keying Schedule: Arrange for a keying meeting, and programming meeting with Architect Owner and hardware supplier, and other involved parties to ensure locksets and locking hardware, are functionally correct and keying and programming complies with project requirements. Furnish 3 typed copies of keying and programming schedule to Architect.
- D. Keying System: Factory registered, complying with guidelines in BHMA A156.28, appendix. Provide one extra key blank for each lock.
 - 1. Existing Factory-Registered Grand Master Key System:
 - a. Grand master key locks to Owner's existing system.
 - 2. Transmit Grand Masterkeys, Masterkeys and other Security keys to Owner by Registered Mail, return receipt requested.
 - 3. Furnish keys in the following quantities:
 - a. 1 each Grand Masterkeys.
 - b. 4 each Masterkeys.
 - c. 2 each Change keys each keyed core.
 - d. 15 each Construction masterkeys.
 - e. 1 each Control keys.
- E. Permanent Keys and Cores: Brass.
 - 1. Stamping: Stamped with the applicable key mark for identification. These visual key control marks or codes will not include the actual key cuts. Permanently inscribe each key with a visual key control number and include the following notation:
 - a. Notation: "CITY OF SAN DIEGO," and "DO NOT DUPLICATE."
 - 2. All keys will have visual key control.

POLICE RANGE REFURBISHMENT PROJECT – PHASE II

- F. Electric Meter Room: To have SDG&E lock installed. The cylinder will be keyed to Schlage keyway VTQP AA-10. Three keys shall be provided with lock. All keys are to be turned over to the City of San Diego Lock Shop at completion of project. The contractor will obtain lock from any contracted SDG&E Locksmith for installation.
- G. Any questions, contact:
 - 1. Carpenter Supervisor Martin Sorrell at 619-525-8550; or
 - 2. Lock Shop at 619-525-8552.

2.10 KEY CONTROL SYSTEM

- A. Key Control Cabinet: BHMA A156.28; metal cabinet with baked-enamel finish; containing key-holding hooks, labels, two sets of key tags with self-locking key holders, key-gathering envelopes, and temporary and permanent markers; with key capacity of 150 percent of the number of locks.

Description	Manufacturer	Model/Series
Manual Key Control	Telkee	Aristocrat wall-mounted AWC series Dual tag system. Key capability to accept all keyed locksets plus 50% expansion.

NO ADDITIONAL ALTERNATES WILL BE CONSIDERED.

- 1. Wall-Mounted Cabinet: Grade 1 cabinet with hinged-panel door equipped with key-holding panels and pin-tumbler cylinder door lock.
- B. Key Lock Boxes: Designed for storage of two keys.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. GE Security, Inc.
 - b. HPC, Inc.
 - c. Knox Company.

2.11 OPERATING TRIM

- A. Operating Trim: BHMA A156.6; stainless steel unless otherwise indicated.

2.12 ACCESSORIES FOR PAIRS OF DOORS

- A. Coordinators: BHMA A156.3; consisting of active-leaf, hold-open lever and inactive-leaf release trigger; fabricated from steel with nylon-coated strike plates; with built-in, adjustable safety release; and with internal override.

Description	Manufacturer	Model/Series	Finish
Coordinator	Trimco	Mounting bracket as required.	600

POLICE RANGE REFURBISHMENT PROJECT – PHASE II

Alternate	Rockwood		
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NO ADDITIONAL ALTERNATES WILL BE CONSIDERED.

- B. Carry-Open Bars: BHMA A156.3; prevent the inactive leaf from opening before the active leaf; provide polished brass or bronze carry-open bars with strike plate for inactive leaves of pairs of doors unless automatic or self-latching bolts are used.
- C. Astragals: BHMA A156.22.

Description	Manufacturer	Model/Series	Finish
Astragal	Pemko	357 SP	600
Alternate			

NO ADDITIONAL ALTERNATES WILL BE CONSIDERED.

2.13 SURFACE CLOSERS

- A. Surface Closers: Tested and approved by BHMA A156.4, Grade 1; UL10C Certified; rack-and-pinion hydraulic type with adjustable sweep and latch speeds controlled by key-operated valves and forged-steel main arm. Comply with manufacturer's written instructions for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force.
 - 1. Provide 9001-Quality Management and 14001-Environmental Management.
 - 2. Closer shall have extra-duty arms and knuckles
 - 3. Conform to ANSI 117.1
 - 4. Maximum 2 7/16 inch case projection with non-ferrous cover
 - 5. Separate adjusting valves for closing and latching speed, and backcheck
 - 6. Provide adapter plates, shim spacers and blade stop spacers as required by frame and door conditions
 - 7. Full rack and pinion type closer with 1½" minimum bore
 - 8. Mount closers on non-public side of door, unless otherwise noted in specification
 - 9. Closers shall be non-handed, non-sized and multi-sized.
 - 10. Types and Manufacturers:

Description	Manufacturer	Model/Series	Finish
Closers	LCN	See Below	689
4040XP RW/PA TBSRT			
4040XP SHCNS TBSRT			
1461 RW/PA TBSRT			
All door frames to be reinforced at closer.			
Provide 'SNB' Sex nuts and bolts as needed.			
35-40-EN			
Alternate	Sargent		

NO ADDITIONAL ALTERNATES WILL BE CONSIDERED.

2.14 CONCEALED CLOSERS

- A. Concealed Closers: BHMA A156.4; rack-and-pinion hydraulic type with adjustable sweep and latch speeds controlled by key-operated valves. Comply with manufacturer's written instructions for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force.

2.15 CLOSER HOLDER RELEASE DEVICES

- A. Closer Holder Release Devices: BHMA A156.15; Grade 1; closer connected with separate or integral releasing and fire- or smoke-detecting devices. Door shall become self-closing on interruption of signal to release device. Automatic release is activated by loss of power.

2.16 MECHANICAL STOPS AND HOLDERS

- A. Wall- and Floor-Mounted Stops: BHMA A156.16.

Description	Manufacturer	Model/Series	Finish
Door Stop	Trimco	Allow for max swing of doors. Backing required at wall stops.	630 /
			US32D /
Alternate	Rockwood		626 / US26D

NO ADDITIONAL ALTERNATES WILL BE CONSIDERED.

2.17 OVERHEAD STOPS AND HOLDERS

- A. Overhead Stops and Holders: BHMA A156.8.

Description	Manufacturer	Model/Series	Finish
Overhead Stop and Holder	Glynn & Johnson		630 / US32D
Alternate	Sargent		

NO ADDITIONAL ALTERNATES WILL BE CONSIDERED

2.18 DOOR GASKETING

- A. Door Gasketing: BHMA A156.22; with resilient or flexible seal strips that are easily replaceable and readily available from stocks maintained by manufacturer.

POLICE RANGE REFURBISHMENT PROJECT – PHASE II

- B. Weatherstripping: Provide at head and jambs only those units where resilient or flexible seal strip is easily replaceable. Where bar-type weatherstrip is used with parallel arm mounted closers install weatherstrip first.
 - 1. Weatherstrip shall be resilient seal of (Neoprene, Polyurethane, Vinyl, Pile, Nylon Brush, Silicone)
 - 2. UL10C Positive Pressure rated seal set when required.
- C. Door Bottoms/Sweeps: Surface mounted or concealed door bottom where listed in the hardware sets.
 - 1. Door seal shall be resilient seal of (Neoprene, Polyurethane, Nylon Brush, Silicone)
 - 2. UL10C Positive Pressure rated seal set when required.
- D. Types and Manufacturers:

Description	Manufacturer	Model/Series	Finish
Smoke Seal	Pemko	S88 (verify color)	
Alternate			
Weather Seal	Pemko	303_S (at head/jambs)	628
Alternate			

NO ADDITIONAL ALTERNATES WILL BE CONSIDERED.

- E. Maximum Air Leakage: When tested according to ASTM E 283 with tested pressure differential of 0.3-inch wg (75 Pa), as follows:
 - 1. Gasketing on Single Doors: 0.3 cfm/sq. ft. (3 cu. m per minute/sq. m) of door opening.
 - 2. Gasketing on Double Doors: 0.50 cfm per foot (0.000774 cu. m/s per m) of door opening.

2.19 THRESHOLDS

- A. Thresholds: BHMA A156.21; fabricated to full width of opening indicated.
- B. Thresholds shall be aluminum beveled type with maximum height of ½” for conformance with ADA requirements. Furnish as specified and per details. Provide fasteners and screws suitable for floor conditions.
- C. Types and Manufacturers:

Description	Manufacturer	Model/Series	Finish
Threshold	Pemko	Furnish as detailed on Drawings	628
Alternate			

NO ADDITIONAL ALTERNATES WILL BE CONSIDERED.

2.20 METAL PROTECTIVE TRIM UNITS

- A. Metal Protective Trim Units: BHMA A156.6; fabricated from 0.050-inch- (1.3-mm-) thick stainless steel; with manufacturer's standard machine or self-tapping screw fasteners.

2.21 AUXILIARY DOOR HARDWARE

- A. Auxiliary Hardware: BHMA A156.16.

Description	Manufacturer	Model/Series	Finish
Pull	Trimco		630
Alternate	Rockwood		
Push Plate	Trimco		630
Alternate	Rockwood		
Kick Plate	Trimco		630
Alternate	Rockwood		
Armor Plate	Trimco		630
Alternate	Rockwood		
Door Sweep	Pemko	345V	628
Alternate			

NO ADDITIONAL ALTERNATES WILL BE CONSIDERED

2.22 FABRICATION

- A. Manufacturer's Nameplate: Do not provide products that have manufacturer's name or trade name displayed in a visible location except in conjunction with required fire-rating labels and as otherwise approved by Architect.
 - 1. Manufacturer's identification is permitted on rim of lock cylinders only.
- B. Base Metals: Produce door hardware units of base metal indicated, fabricated by forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness. Furnish metals of a quality equal to or greater than that of specified door hardware units and BHMA A156.18.
- C. Fasteners: Provide door hardware manufactured to comply with published templates prepared for machine, wood, and sheet metal screws. Provide screws that comply with commercially recognized industry standards for application intended, except aluminum fasteners are not permitted. Provide Phillips flat-head screws with finished heads to match surface of door hardware unless otherwise indicated.
 - 1. Concealed Fasteners: For door hardware units that are exposed when door is closed, except for units already specified with concealed fasteners. Do not use through bolts for installation where bolt head or nut on opposite face is exposed unless it is the only means of securely attaching the door hardware. Where through bolts are used on hollow door and frame construction, provide sleeves for each through bolt.
 - 2. Fire-Rated Applications:
 - a. Wood or Machine Screws: For the following:
 - 1) Hinges mortised to doors or frames; use threaded-to-the-head wood screws for wood doors and frames.
 - 2) Strike plates to frames.

- 3) Closers to doors and frames.
- b. Steel Through Bolts: For the following unless door blocking is provided:
 - 1) Surface hinges to doors.
 - 2) Closers to doors and frames.
 - 3) Surface-mounted exit devices.
3. Spacers or Sex Bolts: For through bolting of hollow-metal doors.
4. Gasketing Fasteners: Provide noncorrosive fasteners for exterior applications and elsewhere as indicated.

2.23 FINISHES

- A. Provide finishes complying with BHMA A156.18 as indicated in door hardware schedule.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. 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 the same piece are not acceptable. 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.
- D. Powder coat door closers to match other hardware, unless otherwise noted.
- E. Aluminum items shall be finished to match predominant adjacent material. Seals to coordinate with frame color.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance of the Work.
- B. DOOR AND FRAME PREP (City requirements): Before hardware installation, verify that all doors and frames are properly prepared to receive the specified hardware. Hollow metal frames shall be prepared for ANSI strike plates per A115.1-2 (4-7/8" high), hinge preps will be mortised and reinforced with a minimum of 10 gauge reinforcement material; minimum of 14 gauge reinforcement material for closer. Hollow metal doors shall be properly prepared and reinforced with a minimum of 16 gauge material for either mortised or cylindrical locks as specified.
 1. Closer Reinforcement: All hollow metal doors receiving door closers shall have 14 gauge reinforcement. In the event this is not possible, the use of sex bolts is mandatory.
 2. Wood doors shall be factory prepared to receive the scheduled hardware.

- C. **HARDWARE INSTALLATION (City requirement):** The manufacturer’s representative for the locking devices and closing devices must inspect the prepared doors and frames, and approve in writing, prior to the installation of their product.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. **Mounting Heights:** Mount door hardware units at heights indicated on Drawings unless otherwise indicated or required to comply with governing regulations.
- B. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work. Do not install surface-mounted items until finishes have been completed on substrates involved.
 - 1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
 - 2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.
 - 3. Installed hardware using the manufacturers fasteners provided. Drill and tap all screw holes located in metallic materials. Do not use “Riv-Nuts” or similar products.
- C. **Hinges:** Install types and in quantities indicated in door hardware schedule, but not fewer than the number recommended by manufacturer for application indicated or one hinge for every 30 inches (750 mm) of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.
- D. **Intermediate Offset Pivots:** Where offset pivots are indicated, provide intermediate offset pivots in quantities indicated in door hardware schedule, but not fewer than one intermediate offset pivot per door and one additional intermediate offset pivot for every 30 inches (750 mm) of door height greater than 90 inches (2286 mm).
- E. **Lock Cylinders:** Install construction cores to secure building and areas during construction period.
 - 1. Furnish permanent cores to Owner for installation.
- F. **Key Control System:**
 - 1. **Key Control Cabinet:** Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule.
 - 2. **Key Lock Boxes:** Install where indicated or approved by Architect to provide controlled access for fire and medical emergency personnel.
 - 3. **Key Control System Software:** Set up multiple-index system based on final keying schedule.
- G. **Thresholds:** Set thresholds for exterior doors and other doors indicated in full bed of sealant complying with requirements specified in Section 079200 "Joint Sealants."

- H. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they will impede traffic.
- I. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
 - 1. Do not notch perimeter gasketing to install other surface-applied hardware.
- J. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.
- K. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.

3.3 FIELD QUALITY CONTROL

- A. Independent Architectural Hardware Consultant: Engage a qualified independent Architectural Hardware Consultant to perform inspections and to prepare inspection reports.
 - 1. Independent Architectural Hardware Consultant will inspect door hardware and state in each report whether installed work complies with or deviates from requirements, including whether door hardware is properly installed and adjusted.
- B. HARDWARE INSTALLATION (City requirement): The manufacturer's representative for the locking devices and closing devices must inspect the installed hardware, and approve in writing, following the installation of their product. Hardware installed incorrectly must be reported to the Engineer prior to Final Punch List.

3.4 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
 - 1. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.
 - 2. Spring Hinges: Adjust to achieve positive latching when door is allowed to close freely from an open position of 70 degrees and so that closing time complies with accessibility requirements of authorities having jurisdiction.
 - 3. Electric Strikes: Adjust horizontal and vertical alignment of keeper to properly engage lock bolt.
 - 4. Exit Devices: Check latchset, lockset, and exit devices are properly installed and adjusted to ensure proper operation.
 - a. Verify levers are free from binding.
 - b. Ensure latchbolts and dead bolts are engaged into strike and hardware is functioning.
 - 5. Report findings, in writing, to architect indicating that all hardware is installed and functioning properly. Include recommendations outlining corrective actions for improperly functioning hardware if required.

3.5 CLEANING AND PROTECTION

- A. Clean adjacent surfaces soiled by door hardware installation.
- B. Clean operating items as necessary to restore proper function and finish.
- C. Provide final protection and maintain conditions that ensure that door hardware is without damage or deterioration at time of Substantial Completion.

3.6 MAINTENANCE SERVICE

- A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

3.7 DOOR HARDWARE SCHEDULE

- A. See door schedule in drawings for hardware set assignments.
- B. The hardware sets represent the product design intent and direction of the owner and architect. They should not be considered a detailed hardware schedule. Detailed or omitted items not included in the following hardware set(s) should be scheduled and submitted with the appropriate additional hardware required for proper application and functionality.
- C. Manufacturer's Abbreviations:

- 1. BE BEST
- 2. LC LCN
- 3. NA National Guard Products
- 4. PR Precision
- 5. TR Trimco
- 6. NA NGP
- 7. LO Locinox Gate Hardware
- 8. KE Keedex
- 9. IV Ives

POLICE RANGE REFURBISHMENT PROJECT – PHASE II

SET #100 - GATE | Pair | Out-swing

Doors: G1, G2, G3, G4, G5

1	Cane Bolt	VSA-K-ALUMQF1BL		LO
1	Ground Catch	EGS	626	LO
1	Lockset	45H-7XR15H Cormax	626	BE
1	Weldable lock box	K-BXMOR2		KE
1	Vandal Resistant Trim	VR900LLP Series (Out-swing Only)	US32D	IV
1	Closer (act door)	4041XP SHCNS SRI	689	LC
1	Drop Plate	4040-18PA (as required)	689	LC
1	Bracket	4040-419 (as required)	689	LC
1	Bracket	4040-30 (as required)	689	LC
1	Spacer	4040-61 (as required)	689	LC
2	Kick Plate	K0050 10" x 2" LDW x CSK B4E	630	TR
2	Auxiliary Stop	As Required	626	DJ

NOTE: Balance of hardware (astragal, pivots, stops) provided by gate manufacturer.

NOTE: Fabricate gate as required for specified hardware.

NOTE: Coordinate gap between gates such that cane bolt tab and mortise latchbolt allow door to shut and latch properly.

SET #101 - GATE | Pair | In-swing

Doors: G6

1	Cane Bolt	VSA-K-ALUMQF1BL		LO
1	Ground Catch & Stop	OGS (In-swing Only)		LO
1	Storeroom Lockset	45H-7D15H Cormax	626	BE
1	Weldable lock box	K-BXMOR2		KE
1	Closer (act door)	4041XP SHCNS SRI	689	LC
1	Drop Plate	4040-18PA (as required)	689	LC
1	Bracket	4040-419 (as required)	689	LC
1	Bracket	4040-30 (as required)	689	LC
1	Spacer	4040-61 (as required)	689	LC
2	Kick Plate	K0050 10" x 2" LDW x CSK B4E	630	TR
2	Auxiliary Stop	As Required	626	DJ

NOTE: Balance of hardware (astragal, pivots, stops) provided by gate manufacturer.

NOTE: Fabricate gate as required for specified hardware.

NOTE: Coordinate gap between gates such that cane bolt tab and mortise latchbolt allow door to shut and latch properly.

POLICE RANGE REFURBISHMENT PROJECT – PHASE II

SET #103

Doors: 101, 102

3	Hinges	CB199 4 1/2 X 4 1/2 NRP	US26D	ST
1	Exit Device	2103 X 1703C CD	626W	PR
1	Rim Cylinder	12E-72 Cormax	626	BE
1	Closer	4041XP SHCNS	689	LC
1	Perimeter Seal	160S @ Head & Jambs		NA
1	Door Sweep	C699A		NA
1	Threshold	Per Detail	AL	NA
1	Kickplate	K0050.630 10" x 34"	630	TR

NOTE: Provide 5" minimum stiles to accommodate specified hardware.

SET #104 - Existing

Doors: 103, 104

1	Perimeter Seal	160S @ Head & Jambs		NA
1	Door Bottom	Per Detail		NA
1	Saddle Threshold	Per Detail	AL	NA
1	Kickplate	K0050.630 10" x 28"	630	TR

NOTE: Re-use balance of existing hardware.

SET #105 - Existing

Doors: 105, 106

1	Kickplate	K0050.630 10" x 28"	630	TR
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NOTE: Re-use balance of existing hardware.

SET #106

Doors: 301, 401

3	Hinges	CB191 4 1/2 X 4 1/2 NRP	US26D	ST
1	Storeroom Lockset	45H-7D15H Cormax	626	BE
1	Door Stop	1270WX or 1211 (as required)	630	TR
1	Latch Protector	ILP-212	SL	DJ
1	Perimeter Seal	160S @ Head & Jambs	NA	
1	Door Bottom	15NA	NA	
1	Saddle Threshold	Per Detail	AL	NA
1	Kickplate	K0050.630 10" x 34"	630	TR

NOTE: Coordinate threshold as required to prevent water intrusion for in-swinging door.

POLICE RANGE REFURBISHMENT PROJECT – PHASE II

SET #107 - Existing

Doors: 200, 202A

1	Perimeter Seal	160S @ Head & Jambs		NA
1	Door Bottom	Per Detail		NA
1	Saddle Threshold	Per Detail	AL	NA
1	Kickplate	K0050.630 10" x 34"	630	TR

NOTE: Re-use balance of existing hardware.

SET #108 - Existing

Doors: 201, 202B, 203, 204, 205

1	Kickplate	K0050.630 10" x 34"	630	TR
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NOTE: Re-use balance of existing hardware.

END OF SECTION 087100

SECTION 088000

GLAZING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract - Standard Specifications for Public Works Construction 'The GREENBOOK' and City Supplement 'The WHITEBOOK', latest editions, including Supplemental Supplementary Provisions (SSPs), apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Glass for windows, doors.
 - 2. Glazing sealants and accessories.
- B. Related Requirements:
 - 1. Section 088300 "Mirrors."

1.3 DEFINITIONS

- A. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.
- B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C1036.
- C. IBC: International Building Code.
- D. Interspace: Space between lites of an insulating-glass unit.

1.4 COORDINATION

- A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

1.5 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

POLICE RANGE REFURBISHMENT PROJECT – PHASE II

1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
2. Review temporary protection requirements for glazing during and after installation.

1.6 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Sustainable Design Submittals:
 1. Product Data: For sealants, indicating VOC content.
 2. Laboratory Test Reports: For sealants, indicating compliance with requirements for low-emitting materials.
- C. Glass Samples: For each type of glass product other than clear monolithic vision glass; 12 inches (300 mm) square.
 1. Tinted glass.
 2. Coated glass.
 3. Laminated glass.
 4. Insulating glass.
- D. Glazing Accessory Samples: For sealants and colored spacers, in 12-inch (300-mm) lengths. Install sealant Samples between two strips of material representative in color of the adjoining framing system.
- E. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.
- F. Delegated-Design Submittal: For glass indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.7 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer, manufacturers of insulating-glass units with sputter-coated, low-E coatings, glass testing agency, and sealant testing agency.
- B. Product Certificates: For glass.
- C. Product Test Reports: For tinted glass, coated glass, insulating glass, and glazing sealants, for tests performed by a qualified testing agency.
 1. For glazing sealants, provide test reports based on testing current sealant formulations within previous 36-month period.
- D. Preconstruction adhesion and compatibility test report.
- E. Sample Warranties: For special warranties.

1.8 QUALITY ASSURANCE

- A. Manufacturer Qualifications for Insulating-Glass Units with Sputter-Coated, Low-E Coatings: A qualified insulating-glass manufacturer who is approved[and certified] by coated-glass manufacturer.
- B. Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.
- C. Glass Testing Agency Qualifications: A qualified independent testing agency accredited according to the NFRC CAP 1 Certification Agency Program.
- D. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C1021 to conduct the testing indicated.
- E. Mockups: Build mockups to demonstrate aesthetic effects and to set quality standards for materials and execution.
 - 1. Install glazing in mockups specified in Section 081433 "Stile and Rail Wood Doors" to match glazing systems required for Project, including glazing methods.
 - 2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 PRECONSTRUCTION TESTING

- A. Preconstruction Adhesion and Compatibility Testing: Test each glass product, tape sealant, gasket, glazing accessory, and glass-framing member for adhesion to and compatibility with elastomeric glazing sealants.
 - 1. Testing is not required if data are submitted based on previous testing of current sealant products and glazing materials matching those submitted.
 - 2. Use ASTM C1087 to determine whether priming and other specific joint-preparation techniques are required to obtain rapid, optimum adhesion of glazing sealants to glass, tape sealants, gaskets, and glazing channel substrates.
 - 3. Test no fewer than [eight] <Insert number> Samples of each type of material, including joint substrates, shims, sealant backings, secondary seals, and miscellaneous materials.
 - 4. Schedule enough time for testing and analyzing results to prevent delaying the Work.
 - 5. For materials failing tests, submit sealant manufacturer's written instructions for corrective measures including the use of specially formulated primers.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Protect glazing materials according to manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

- B. Comply with insulating-glass manufacturer's written instructions for venting and sealing units to avoid hermetic seal ruptures due to altitude change.

1.11 FIELD CONDITIONS

- A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.
 - 1. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or are below 40 deg F (4.4 deg C).

1.12 WARRANTY

- A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer agrees to replace coated-glass units that deteriorate within specified warranty period. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in coating.
 - 1. Warranty Period: 10 years from date of Substantial Completion.
- B. Manufacturer's Special Warranty for Insulating Glass: Manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.
 - 1. Warranty Period: 10 years from date of Substantial Completion.
- C. Glazier's Warranty: Covers labor to replace insulating-glass units, or an alternative, a maintenance contract that incorporates unit prices for replacement labor. The alternative above is subject to approval of the Engineer if proposed in lieu of covering labor for replacement.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations for Glass: Obtain from single source from single manufacturer for each glass type.
 - 1. Obtain tinted glass from single source from single manufacturer.
 - 2. Obtain reflective-coated glass from single source from single manufacturer.

- B. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.

2.2 PERFORMANCE REQUIREMENTS

- A. General: Installed glazing systems shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.
- B. Delegated Design: Engage a qualified professional engineer, registered in the state of California, to design glazing.
- C. Structural Performance: Glazing shall withstand the following design loads within limits and under conditions indicated determined according to the IBC and ASTM E1300.
 - 1. Design Wind Pressures:
 - a. As indicated on Drawings.
 - 2. Maximum Lateral Deflection: For glass supported on all four edges, limit center-of-glass deflection at design wind pressure to not more than 1/50 times the short-side length or 1/8 inch (3 mm), whichever is less.
 - 3. Differential Shading: Design glass to resist thermal stresses induced by differential shading within individual glass lites.
- D. Safety Glazing: Where safety glazing is indicated, provide glazing that complies with 16 CFR 1201, Category II.
- E. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:
 - 1. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.
 - 2. U-Factors: Center-of-glazing values, according to NFRC 100 and based on LBL's WINDOW 5.2 computer program, expressed as Btu/sq. ft. x h x deg F (W/sq. m x K).
 - 3. Solar Heat-Gain Coefficient and Visible Transmittance: Center-of-glazing values, according to NFRC 200 and based on LBL's WINDOW 5.2 computer program.
 - 4. Visible Reflectance: Center-of-glazing values, according to NFRC 300.

2.3 GLASS PRODUCTS, GENERAL

- A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below unless more stringent requirements are indicated. See these publications for glazing terms not otherwise defined in this Section or in referenced standards.
 - 1. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."

- B. Safety Glazing Labeling: Where safety glazing is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction or manufacturer. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.
- C. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IGCC.
- D. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass that complies with performance requirements and is not less than the thickness indicated.
 - 1. Minimum Glass Thickness for Exterior Lites: 6 mm.
 - 2. Thickness of Tinted Glass: Provide same thickness for each tint color indicated throughout Project.
- E. Strength: Where annealed float glass is indicated, provide annealed float glass, heat-strengthened float glass, or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where heat-strengthened float glass is indicated, provide heat-strengthened float glass or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where fully tempered float glass is indicated, provide fully tempered float glass.

2.4 GLASS PRODUCTS

- A. Clear Annealed Float Glass: ASTM C1036, Type I, Class 1 (clear), Quality-Q3.
- B. Tinted Annealed Float Glass: ASTM C1036, Type I, Class 2 (tinted), Quality-Q3.
- C. Fully Tempered Float Glass: ASTM C1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.
 - 1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.
- D. Heat-Strengthened Float Glass: ASTM C1048, Kind HS (heat strengthened), Type I, Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.
 - 1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.
- E. Pyrolytic-Coated, Low-Maintenance Glass: Clear float glass with a coating on first surface having both photocatalytic and hydrophilic properties that act to loosen dirt and to cause water to sheet evenly over the glass instead of beading.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Vitro Architectural Glass.

- b. Or approved equal.

2.5 INSULATING GLASS

- A. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E2190.
 - 1. Sealing System: Dual seal, with manufacturer's standard primary and secondary sealants.
 - 2. Perimeter Spacer: Aluminum with powdered metal paint finish in color selected by Engineer.
 - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Technoform Glass Insulation NA, Inc.
 - 2) Thermix; a brand of Ensinger USA.
 - 3) Or approved equal.

2.6 GLAZING SEALANTS

- A. General:
 - 1. Compatibility: Compatible with one another and with other materials they contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
 - 2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
 - 3. Sealant shall have a VOC content of 250 g/L or less.
 - 4. Sealant shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
 - 5. Colors of Exposed Glazing Sealants: As selected by Engineer from manufacturer's full range.
- B. Glazing Sealant:
 - 1. Neutral-curing silicone glazing sealant complying with ASTM C920, Type S, Grade NS, Class 100/50, Use NT.
 - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) GE Construction Sealants; Momentive Performance Materials Inc.
 - 2) Pecora Corporation.
 - 3) Sika Corporation.

- 4) The Dow Chemical Company.
- 5) Tremco Incorporated.

2.7 GLAZING TAPES

- A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C1281 and AAMA 800 for products indicated below:
 1. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
 2. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.
- B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:
 1. AAMA 810.1, Type 1, for glazing applications in which tape acts as the primary sealant.
 2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.8 MISCELLANEOUS GLAZING MATERIALS

- A. General: Provide products of material, size, and shape complying with referenced glazing standard, with requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.
- B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
- C. Setting Blocks:
 1. Type recommended by sealant or glass manufacturer.
- D. Spacers:
 1. Type recommended by sealant or glass manufacturer.
- E. Edge Blocks:
 1. Type recommended by sealant or glass manufacturer.
- F. Cylindrical Glazing Sealant Backing: ASTM C1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

2.9 FABRICATION OF GLAZING UNITS

- A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.
 - 1. Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.
 - a. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine framing, glazing channels, and stops, with Installer present, for compliance with the following:
 - 1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
 - 2. Presence and functioning of weep systems.
 - 3. Minimum required face and edge clearances.
 - 4. Effective sealing between joints of glass-framing members.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.
- B. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that leave visible marks in the completed Work.

3.3 GLAZING, GENERAL

- A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.
- B. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass includes glass with edge damage or other imperfections that, when installed, could weaken glass, impair performance, or impair appearance.

- C. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.
 - D. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
 - E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
 - F. Provide spacers for glass lites where length plus width is larger than 50 inches (1270 mm).
 - 1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
 - 2. Provide 1/8-inch (3-mm) minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.
 - G. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.
 - H. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.
 - I. Set glass lites with proper orientation so that coatings face exterior or interior as specified.
 - J. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.
 - K. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.
- 3.4 TAPE GLAZING
- A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.
 - B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.
 - C. Cover vertical framing joints by applying tapes to heads and sills first, then to jambs. Cover horizontal framing joints by applying tapes to jambs, then to heads and sills.
 - D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.

- E. Do not remove release paper from tape until right before each glazing unit is installed.
- F. Center glass lites in openings on setting blocks, and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.

3.5 GASKET GLAZING (DRY)

- A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.
- B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.
- C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- E. Install gaskets so they protrude past face of glazing stops.

3.6 SEALANT GLAZING (WET)

- A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.
- B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.
- C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.7 CLEANING AND PROTECTION

- A. Immediately after installation remove nonpermanent labels and clean surfaces.
- B. Protect glass from contact with contaminating substances resulting from construction operations. Examine glass surfaces adjacent to or below exterior concrete and other

masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains.

1. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer. Remove and replace glass that cannot be cleaned without damage to coatings.
- C. Remove and replace glass that is damaged during construction period.
- D. Wash glass on both exposed surfaces not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

3.8 MONOLITHIC GLASS SCHEDULE

- A. Glass Type GL-1: Clear fully tempered float glass.
1. Basis-of-Design Product: Vitro; Clear 6mm.
 2. Minimum Thickness: 6 mm.
 3. Safety glazing required.

3.9 INSULATING GLASS SCHEDULE

- A. Glass Type GL-2: Low-E-coated, clear insulating glass.
1. Basis-of-Design Product: Vitro; Solarban 90 low-e coating on #2 face of Clear 6mm; 1/2" air space; Clear 6mm.
 2. Overall Unit Thickness: 1 inch (25 mm).
 3. Minimum Thickness of Each Glass Lite: 6 mm.
 4. Outdoor Lite: Fully tempered float glass.
 5. Interspace Content: Air.
 6. Indoor Lite: Fully tempered float glass.
 7. Low-E Coating: Sputtered on second surface.
 8. Summer Daytime U-Factor: 0.36 maximum.
 9. Visible Light Transmittance: 0.42 percent minimum.
 10. Solar Heat Gain Coefficient: 0.23 maximum.
 11. Safety glazing required.

END OF SECTION 088000

SECTION 08 88 56

BALLISTICS RESISTANT GLAZING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract - Standard Specifications for Public Works Construction 'The GREENBOOK' and City Supplement 'The WHITEBOOK', latest editions, including Supplemental Supplementary Provisions (SSPs), apply to this Section.

1.02 SECTION INCLUDES

- A. Ballistics resistant fiberglass armor sheets.

1.03 SUBMITTALS

- A. Comply with Standard Specifications for Public Works Construction 'The GREENBOOK' and City Supplement 'The WHITEBOOK', current editions, Section 2-5.3 for Shop Drawings and Submittals.
- B. Product Data: Provide data on specified component products.
- C. Physical Data: Manufacturer's printed product information, including product performance and installation.
- D. Shop Drawings: Indicate dimensions, adjacent construction, materials, thicknesses, fabrication details, required clearances, field jointing, tolerances, colors, finishes, methods of support and anchorages.
- E. Samples: Submit two samples, 8x16 inch in size, illustrating color, texture, and finish.
- F. Maintenance Data: Include instructions for stain removal, surface and gloss restoration.
- G. Material safety data sheet (MSDS), including guidelines for safe fabrication and handling.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Protect components from damage by retaining shipping protection in place until installation.
- B. Store at ambient temperatures. The material is combustible. Fire precautions similar to those appropriate for wood-based products should be observed.
- C. Wear heavy-duty work gloves to protect hands from sharp edges. This is particularly

important when handling thinner gauges.

- D. Wear eye protection during handling and fabrication.

1.05 FIELD CONDITIONS

- A. Do not install site fabricated components when site conditions may be detrimental to successful installation.
- B. Maintain temperature and humidity conditions favorable to proper curing of resin during and after installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis-of-Design Manufacturer:
 - 1. American Acrylic Corporation, Product: LUMAgard FIBERGLASS ARMOR SHEETS; www.americanacrylic.com .
 - a. Or approved equal in UL-approved performance rating, equal to or less in weight, and comparable visual appearance.
 - 2. Comply with Standard Specifications for Public Works Construction 'The GREENBOOK' and City Supplement 'The WHITEBOOK', latest editions, Section 4-1.6 for Substitutions.

2.02 MATERIALS – PUBLIC RANGE SHADE STRUCTURE

- A. Fiberglass structural armor (non-transparent). Model "LUMAgard AG-4".
- B. Standard Sheet Sizes: 3'x8', 4'x8', 4'x10'. Custom sizes can be provided in some products. Consult manufacturer. Base bid to reflect use and delivery of any size, standard or custom.
- C. Thickness: 1/2 inch.
- D. Weight: 5.0 lbs per square foot.
- E. Protection Level: UL 752 level 3 and Supplementary shotgun. Can resist .44 Magnum lead (240 gr) and 12-gauge (437 gr) rifled lead slug, 3 shots each.

2.03 MATERIALS – WEST AND RAPID FIRE RANGES SHADE STRUCTURES

- A. Fiberglass structural armor (non-transparent). Model "LUMAgard AG-5".
- B. Standard Sheet Sizes: 3'x8', 4'x8', 4'x10'. Custom sizes can be provided in some products. Consult manufacturer. Base bid to reflect use and delivery of any size,

standard or custom.

- C. Thickness: 1-5/16 inch.
- D. Weight: 13.5 lbs per square foot.
- E. Protection Level: UL 752 level 8. Can resist .762mm rifle fmj, lead core (150 gr), 5 shots.

2.04 FINISH

- A. Color: Frosted white.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate is ready to receive work and dimensions are as indicated on shop drawings.
- B. Examine site conditions, substrates and other conditions under which translucent roof panels are to be installed and notify the Engineer in writing of conditions detrimental to the proper and timely installation of the panels and completion of the Work. The Work shall not proceed until unsatisfactory conditions have corrected.
- C. Refer to MSDS for additional information including but not limited to hazard identification, special protection, storage and handling, and toxicity of material.

3.02 INSTALLATION

- A. Install fabrications in accordance with design drawings and fabricator's instructions.
- B. Fiberglass armor sheets are readily cut and drilled using tools commonly used to cut and drill metals. Wear eye protection. Dust generated can be hazardous. Wear a protective mask to avoid inhaling the dust. Refer to the material safety data sheet (MSDS) for other important safety information.
- C. Bullet-resistant sheets are ordinarily mechanically fastened to the side of the supporting structure that the threat is expected to come from. Install the largest continuous panel that is practical. Reinforce joints (in front or behind) with 4-inch wide strips of the same material.
- D. Pre-drill slightly oversize holes for fasteners. Use metal fasteners, with bonded (metal/rubber) washers to fasten panels in place. In vertical applications, hang the panel first (install fasteners adjacent to the top edge, but no closer than 1/2" from the edge) such that the panel is not resting on the bottom edge. Then install remaining fasteners working from top to bottom. Most sealants, including silicone varieties, work satisfactorily. For outdoor applications, acrylic foam tape is recommended under joints and fastener lines.

3.03 TOLERANCES

- A. Maximum variation from true position: 1/4 inch.
- B. Maximum offset from true alignment: 1/8 inch.

3.04 CLEANING

- A. Clean components of foreign material without damaging finished surface.
- B. LUMAgard™ sheets can be cleaned using detergent and water.
- C. Clean fabrications in accordance with fabricator's instructions.
- D. Maintenance of LUMAsite® sheets after installation primarily involves cleaning the surfaces of the material. Most dirt and soiling are readily removed using a non-abrasive soap and water applied with a sponge or soft brush, then rinsing. Do not use abrasive soaps or polishes. Note that using abrasive cleaners on the surface can change the reflectivity (making a shiny spot on the satin surface, for example), and can otherwise scratch the surfaces

END OF SECTION 088856

SECTION 090190.91

PAINTING RESTORATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract - Standard Specifications for Public Works Construction 'The GREENBOOK' and City Supplement 'The WHITEBOOK', latest editions, including Supplemental Supplementary Provisions (SSPs), apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Cleaning and paint removal for exterior and interior historic items and surfaces.
 - 2. Surface preparation for painting of exterior and interior historic items and surfaces.
 - 3. Patching of minor damage to surfaces of historic items to be painted.
 - 4. Custom color matching.
- B. Paint historic items and surfaces as indicated in the schedules at the end of Part 3.
 - 1. Comply with requirements in Section 099123 and 099600 for prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels.
- C. Related Sections include the following:
 - 1. Section 08 0152.93 - Historic Treatment of Wood Windows for patching and repair of historic wood windows.
 - 2. Sections 099123 and 099600 – Painting and Coating for use of modern (conventional) paint materials and application methods.

1.3 DEFINITIONS

- A. General: Standard coating terms defined in ASTM D 16 apply to this Section.

1.4 SUBMITTALS

- A. Product Data: For each paint system indicated.
 - 1. Material List: An inclusive list of required coating materials. Identify each material by manufacturer's number and classification.
 - 2. Manufacturer's Information: Manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each coating material.

POLICE RANGE REFURBISHMENT PROJECT – PHASE II

- B. Samples for Verification: For each color and material to be applied, with texture to simulate actual conditions, on representative Samples of the actual substrate.
 - 1. Provide stepped Samples, defining each separate coat, including block fillers and primers. Use representative colors when preparing Samples for review. Resubmit until required sheen, color, and texture are achieved.
 - 2. Provide a list of materials and applications for each coat of each Sample. Label each Sample for location and application.
 - 3. Submit Samples on the following substrates for University’s Representative’s review of color and texture:
 - a. Gypsum Wall Board: 4-by-8-inch Samples for each color and finish.
 - b. Painted Wood: 4-by-8-inch Samples for each color and material on hardboard.
 - c. Stained or Natural Wood: 4-by-8-inch Samples of natural- or stained-wood finish on representative surfaces.
 - d. Ferrous Metal: 4-by-8-inch Samples of flat metal and 8-inch-long Samples of solid metal for each color and finish.
- C. Color Matching Certification: Submit certification of computer color matching performed by paint manufacturer.
- D. Qualification Data: For painting restoration specialist. Provide at time of bidding.
- E. Restoration program for each phase of restoration process including protection of surrounding materials on the building and Project site during operations. Describe in detail the materials, methods, equipment, and sequence of operations to be used for each phase of the Work.
 - 1. If materials and methods alternative to those indicated are proposed for any phase of restoration work, provide a written description, including evidence of successful use on other comparable projects, and a testing program to demonstrate their effectiveness for this Project.

1.5 QUALITY ASSURANCE

- A. Painting Restoration Specialist Qualifications: A firm or individual experienced in painting restoration similar in material, design, and extent to that indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.
 - 1. Painting Restoration Specialist Qualifications: Provide at time of bidding, included in bid package, for City review.
 - 2. Field Supervision: Require that an experienced full-time supervisor be at Project site during times that painting restoration is in progress.

POLICE RANGE REFURBISHMENT PROJECT – PHASE II

- B. Benchmark Samples (Mockups): Provide a full-coat benchmark finish sample for each type of coating and substrate required. Comply with procedures specified in PDCA P5. Duplicate finish of approved sample submittals.
1. Engineer will select one surface to represent surfaces and conditions for application of each type of coating and substrate.
 - a. Surface-Preparation Mockup: On existing surfaces using applicable specified methods of cleaning and surface preparation, provide mockup sample of at least 4-by-8-inch.
 - b. Small Architectural Detail Areas and Items: Engineer will designate items or areas required for mockups.
 2. Apply benchmark samples, according to requirements for the completed Work, after permanent lighting and other environmental services have been activated. Provide required sheen, color, and texture on each surface.
 - a. After finishes are accepted, Engineer will use the surface to evaluate coating systems of a similar nature.
 3. Final approval of colors will be from benchmark samples.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in manufacturer's original, unopened packages and containers bearing manufacturer's name and the following information:
1. Product name or title of material.
 2. Product description (generic classification or binder type).
 3. Manufacturer's stock number and date of manufacture.
 4. Contents by volume, for pigment and vehicle constituents.
 5. Thinning instructions.
 6. Application instructions.
 7. Color name and number.
 8. VOC content.
- B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F. Maintain storage containers in a clean condition, free of foreign materials and residue.
1. Keep storage area neat and orderly. Remove oily rags and waste daily.

1.7 PROJECT CONDITIONS

- A. Apply waterborne paints only when temperatures of surfaces to be painted and surrounding air are between 50 and 90 deg F.

POLICE RANGE REFURBISHMENT PROJECT – PHASE II

- B. Apply solvent-thinned paints only when temperatures of surfaces to be painted and surrounding air are between 45 and 95 deg F.
- C. Do not apply paint in rain, fog, or mist; or when relative humidity exceeds 85 percent; or to damp or wet surfaces.
 - 1. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by manufacturer during application and drying periods.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Products: Subject to compliance with requirements, provide one of the products listed in other Part 2 articles.

2.2 PAINT CLEANING AND REMOVAL MATERIALS

- A. Alkaline Paste Paint Remover: Manufacturer's standard alkaline paste formulation for removing paint coatings from masonry, stone, wood, plaster, and metal.
 - 1. Provide chemical paint removers that do not contain methylene chloride.
 - 2. Products:
 - a. Back to Nature Products Company; Lift-n-Strip.
 - b. Dumond Chemicals, Inc.; Peel Away 1.
 - c. Minnesota Mining and Manufacturing Company (3M), Specified Construction Products Division; Paint Stripper.
- B. Biodegradable Paint Remover: Manufacturer's standard biodegradable formulation for removing paint coatings from masonry, stone, wood, plaster, and metal.
 - 1. Products:
 - a. Back to Nature Products Company; Multi-Strip.
 - b. Back to Nature Products Company; Ready-Strip.
- C. Solvent Paste Paint Remover: Manufacturer's standard solvent-based formulation for removing paint coatings from masonry, stone, wood, plaster, and metal.
 - 1. Products:
 - a. Dumond Chemicals, Inc.; Peel Away 6.
 - b. Dumond Chemicals, Inc.; Peel Away 7.
- D. Metal Paint Stripper: Paint stripper specifically designed to remove coatings from metal surfaces and recommended for use for applications indicated.

1. Products:

- a. Dumond Chemicals, Inc.; Peel Away ST1.
- b. ProSoCo, Inc.; Sure-Klean T1375.

E. Mineral-Powder-Based Paint Removal System: Cleaning and coating removal system for removing coating from masonry, stone, concrete, metals, and wood; apply with compressed air to scour coating without damaging substrate.

1. Products:

- a. ArmaKleen Company (The); ARMEX Cleaning and Coating Removal System.
- b. JOS-Quintek Corporation; Rotec Vortex Cleaning Process.

2.3 COLOR MATCHING

A. Custom Color Matching: Colors shall be selected by color codes indicated below. Obtain color chips indicated by color codes from one of the following color systems; computer match paint colors with color chips:

- 1. Munsell Color.

B. Designations for Color Matching:

- 1. Colors shall be matched using representative samples of each color and sheen level to be refinished, sourced from project site, at locations indicated by Engineer. Assign each color and sheen a designation (e.g., CLR-1, CLR-2... coded to a drawing or photograph of the areas to be refinished.

2.4 PATCHING MATERIALS

A. Wood Patching Compound: 2-part polyester or epoxy-resin wood compound with a 10- to 15-minute cure at 70 deg F, in knife grade formulation and recommended by manufacturer for type of wood repair indicated. Compound shall be produced for filling damaged wood materials that have deteriorated due to weathering and exposure. Filler shall be capable of filling deep holes and capable of spreading to featheredge.

B. Metal Patching Compound: 2-part polyester-resin metal patching compound with a 10- to 15-minute cure at 70 deg F, in knife grade formulation and recommended by manufacturer for type of metal repair indicated. Compound shall be produced for filling metal that has deteriorated due to corrosion. Filler shall be capable of filling deep holes and capable of spreading to featheredge.

C. Interior Cementitious Patching Compound Materials: Provide cementitious patching compounds and repair materials specifically manufactured for surface preparation and sanding prior to repainting.

2.5 MISCELLANEOUS MATERIALS

- A. Detergent Cleaning Solution: Mix 2 cups of tetrasodium polyphosphate, 1/2 cup of laundry detergent, 5 quarts of 5 percent sodium hypochlorite bleach, and 15 quarts of warm water for each 5 gal. of solution required.
- B. Job-Mixed Mold, Mildew, and Algae Remover: Mix 2 cups of tetrasodium polyphosphate, 5 quarts of 5 percent sodium hypochlorite bleach, and 15 quarts of hot water for every 5 gal. of solution required.

PART 3 - EXECUTION

3.1 PAINTING RESTORATION SPECIALIST

- A. Painting Restoration Specialist Firms: Subject to compliance with requirements, provide painting restoration by a Painting Restoration Specialist. Submit qualifications for approval.

3.2 EXAMINATION

- A. Examine substrates and conditions under which painting will be performed for compliance with paint application requirements.
 - 1. Comply with manufacturer's requirements for inspection.
 - 2. Start of painting will be construed as Applicator's acceptance of surfaces and conditions within a particular area.
 - 3. Apply paint only after unsatisfactory conditions have been corrected.
- B. Notify University's Representative a minimum of one working day prior to painting about possible problems resulting from using the specified materials over previously finished substrates.
- C. Conduct alkali testing with litmus paper on exposed plaster, cementitious, and masonry surfaces, and do not begin painting if surfaces exceed alkalinity allowed by paint manufacturer.
- D. Test moisture content of surfaces using an electronic moisture meter. Do not begin application of coatings unless moisture content of exposed surfaces is below the following maximum values:
 - 1. Gypsum Wallboard: 12 percent.
 - 2. Plaster: 12 percent.
 - 3. Masonry Surfaces: 12 percent.
 - 4. Finish Woodwork: 7 to 10 percent moisture content.
 - 5. Wood Surfaces: 18 percent.
 - 6. Vertical Concrete Surfaces: 12 percent.
 - 7. Horizontal Concrete Surfaces: 8 percent.

- E. Coordination of Work: Review other sections in which primers are specified to ensure compatibility for the total system with various substrates.

3.3 SURFACE PREPARATION, GENERAL REQUIREMENTS

- A. Prepare existing surfaces as follows:

1. Clean existing surfaces to remove loose dirt and dust.
2. Remove surface films that will prevent proper adhesion.
3. Treat paint finishes with gloss sheen to dull the surface with de-glosser.
4. Remove loose, blistered, or otherwise defective paint; smooth edges with sandpaper.
5. Clean corroded iron or steel surfaces to bright metal.
6. Spackle and sand gypsum and plaster surfaces.
7. Prime bare surfaces.

- B. If existing surfaces cannot be prepared to an acceptable condition for proper finishing by using specified surface-preparation methods, notify University's Representative in writing.

- C. Clean and prepare surfaces to be painted according to surface-preparation schedule at the end of Part 3 and with manufacturer's written instructions for each substrate condition.

1. Provide barrier coats over incompatible previously painted surfaces or primers or remove coats and prime prepared surfaces. Notify University's Representative in writing about possible problems resulting from using the specified finish-coat material over substrates previously finished.

- D. Deteriorated Paint: The following classifications of deteriorated paint films shall be used to determine the degree of surface preparation required. Measure adhesion by ASTM D 3359 Method A, tape test (multiply results by 2 to correlate with the 0 to 10 rating system).

1. Sound Existing Paint, Including Tightly Adhered Paint Film: No evidence of cracking, checking, blistering, or lack of adhesion; slight chalking and mildew may be present.
 - a. Adhesion: Rating of 10.
 - b. Wash areas to be repainted; use mild detergent solution, and rinse with clean water until all detergent has been removed.
 - c. Remove dirt and chalking from the surface without damaging the substrates or adjacent areas.
 - d. Allow washed areas to dry before painting.
2. Slightly to Moderately Deteriorated Paint Including Cracked or Loose Paint Film: Moderate cracking, checking, blistering, erosion, and loss of adhesion.
 - a. Adhesion: Rating of 6 to 8.

- b. Treat areas as specified for sound existing paint above.
 - c. After washing, carefully examine surface for cracking, blistering, peeling, or flaking paint.
 - d. Remove cracked, blistered, and nonadhering paint.
 - e. Wipe surface clean to remove remaining dust.
3. Severely Deteriorated Paint Including Extensive Cracked and Loose Paint Film: Considerable cracking, checking, blistering, erosion, loss of adhesion, and severe chalking or mildew.
- a. Adhesion: Rating of 0 to 4.
 - b. Remove old paint film down to bare substrate by using hand-tool removal, scraping and sanding, chemical removal, or a combination of all three methods.
- E. Selection of surface-preparation tools and methods shall be the responsibility of painting restoration specialist, provided surface preparation complies with requirements specified for type of existing surface condition. Comply with the following general requirements for equipment:
- 1. Do not use power tools including sanders, grinders, and power brushing tools.
 - 2. Heat gun (flameless) with temperature range of 700 to 1000 deg F maximum temperature may be used.

3.4 SURFACE-PREPARATION METHODS

- A. General: Use the cleaning methods specified in this article, using the gentlest appropriate method necessary to clean the surface.
- B. Wash surfaces by hand cleaning using clean rags, sponges, water, and detergent.
- C. Hand-Tool Cleaning: Use wet sanding and wet scraping methods only. Lightly mist substrate before sanding or scraping. Acceptable hand-tools include scrapers, wire brushes, sandpaper, steel wool, nonmetallic pads, and dusters. Because of varying substrates, selection of tools shall be the responsibility of Contractor. After hand-cleaning is attempted, power tool cleaning may be required to complete cleaning and surface preparation.
- D. Solvent Cleaning: Solvent cleaning may be used to remove oil, grease, smoke, tar, and asphalt from painted or unpainted surfaces before preparation work begins. In addition, if necessary, spot-solvent cleaning may be employed just prior to the commencement of paint application, provided enough time is allowed for complete evaporation. Clean solvent and clean rags shall be used for the final wash to ensure that all foreign materials have been removed.

3.5 PAINT REMOVAL METHODS

- A. Removal Methods, General: Where cleaning methods have been attempted and further removal of the paint is required because of incompatible or unsatisfactory surfaces for repainting, use paint removal methods specified in this Article. Completely remove paint film from those items indicated or specified to have existing paint completely removed.
- B. Chemical Removal: Chemical removal systems may be employed to remove parts or complete coatings of paint. Spread the remover over the surface from which coatings are to be removed. Remove the softened paint with a scraper (broad knife) or similar tool that painting restoration specialist may select. Repeat the procedure until all paint and residue are removed as directed by manufacturer's written instructions. Rinse and neutralize as required by remover manufacturer. Allow enough time to elapse to permit the surface to dry before proceeding with refinishing.
- C. Heat Removal: Use and selection of heat removal equipment shall be the responsibility of painting restoration specialist. Care must be taken to protect flammable materials. When a heat device is used, one hand shall direct the heat device to the surface and the other hand shall follow behind with the scraper. Scrape the paint off while it is soft and bubbling. Fire-fighting equipment shall be located directly at hand during this process. All burned-off surfaces shall be wet sanded and cleaned before coatings are applied.
- D. Mechanical Removal: Use and selection of mechanical removal equipment shall be the responsibility of painting restoration specialist. Use of hand or power paint removal tools shall be the option of Contractor. Acceptable tools for manual paint removal include scrapers, wire brushes, sandpaper, and steel wool.
- E. Mineral-Powder-Based Removal System: Remove existing deteriorated paint film with air-blasting, mineral-powder-based system according to manufacturer's written instructions.

3.6 SURFACE PREPARATION FOR EXISTING PAINTED WOOD

- A. Repair damaged wood areas including dents, holes, and cracks by filling with patching compound and wet sand smooth. Reset or remove protruding nail heads.
- B. Clean as required to remove existing deteriorated coatings and any foreign matter. Thick build-up of paint and runs and sags shall be wet sanded to achieve a smooth edge.
- C. Clean wood surfaces of dirt, oil, and other foreign substances with scrapers, mineral spirits, and sandpaper.

3.7 SURFACE PREPARATION FOR EXISTING PAINTED CEMENTITIOUS MATERIALS

- A. New and Bare Plaster: Neutralize surface of plaster with mild acid solution as recommended by paint manufacturer. In lieu of acid neutralization, provide manufacturer's written recommendation for plaster primer over alkaline plaster surfaces.

POLICE RANGE REFURBISHMENT PROJECT – PHASE II

- B. Concrete, Concrete Masonry Block, Plaster, and Mineral-Fiber-Reinforced Cement Panels: Remove efflorescence, chalk, dust, dirt, grease, oils, and release agents.
 - 1. If surfaces are sufficiently alkaline to cause the finish paint to blister and burn, correct this condition before applying paint.
 - C. Concrete Floors: Clean to the extent required to remove existing deteriorated coatings. Remove efflorescence, reporting recurrence if caused by structural defect. If there is no recurrence of efflorescence, acid wash the bare spots to neutralize surface alkalinity and rinse with clean water before applying coatings.
 - 1. If there is no evidence of efflorescence, scrub with mild detergent solution. Remove dirt and other foreign matter. Remove oil and grease by solvent cleaning.
- 3.8 SURFACE PREPARATION FOR EXISTING PAINTED PLASTER OR GYPSUM BOARD
- A. Sound Existing Paint System: Wash all areas to be painted with a mild detergent solution; rinse with clean water until all detergent has been removed. Remove dirt and chalk from the surface without damaging the substrates or adjacent areas. Allow washed areas to dry thoroughly before painting.
 - B. Rout out surface cracks to remove loose, unsound material; fill with patching compound and wet sand; spot-prime with specified primer.
- 3.9 SURFACE PREPARATION FOR EXISTING BARE AND PAINTED METAL
- A. Bare Metal Solvent Cleaning: Clean with solvents to remove oil, grease, and other contaminants before other cleaning treatments are used. Do not use solvents, including primer thinner and turpentine, that leave residue.
 - B. Ferrous Metals: Clean ungalvanized ferrous-metal surfaces; remove rust, oil, grease, dirt, and other foreign substances. Use removal or cleaning methods that comply with paint manufacturer's written recommendations.
 - 1. Touch up bare areas and prime coats that have been damaged. Wire-brush, clean with solvents recommended by paint manufacturer, and touch up with same primer as shop coat.
 - C. Galvanized Surfaces: Clean galvanized surfaces with nonpetroleum-based solvents until surfaces are free of oil and surface contaminants.
 - D. Metal Conditioner (Apply to Bare Metal): Apply phosphoric acid-based, etching-type surface treatments after solvent cleaning and according to manufacturers' written instructions. Rinse with clear water when reaction is complete. Allow at least 15 to 30 minutes but not less time than recommended by manufacturer for metal conditioner to condition the metal surface. Do not allow conditioner to dry before rinsing. If white rust

(zinc oxide) appears after drying, wash clean with denatured alcohol immediately before priming.

- E. Surface-Preparation Methods: Remove loose rust and mill scale, spatter, slag, and flux deposits. Prepare surfaces as follows:
 - 1. SSPC-SP 2, "Hand Tool Cleaning."
- F. Priming: Immediately after surface preparation, apply primer according to manufacturer's instructions and at rate to provide a dry film thickness of not less than 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.
 - 1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
 - 2. Apply two coats of shop paint to inaccessible surfaces.

3.10 APPLICATION, GENERAL

- A. Comply with manufacturers' requirements for application methods and with other Division 9 painting Sections.
- B. In addition to the number of coats specified in schedules in other Division 9 painting Sections, provide additional coats as required to produce the finishes to match sample and mockup finishes.
- C. Blending: When painting new substrates patched into existing surfaces, furnish finishes specified for the specific substrate. Final finish coat shall be applied over entire surface from edge to edge and corner to corner.

3.11 CLEANING

- A. Cleanup: At the end of each workday, remove empty cans, rags, rubbish, and other discarded paint materials from Project site.
 - 1. After completing painting, clean glass and paint-spattered surfaces. Remove spattered paint by washing and scraping without scratching or damaging adjacent finished surfaces.

3.12 PROTECTION

- A. Protect work of other trades, whether being painted or not, against damage from painting. Correct damage by cleaning, repairing or replacing, and repainting, as approved by University's Representative.
- B. Provide "Wet Paint" signs to protect newly painted finishes. After completing painting operations, remove temporary protective wrappings provided by others to protect their work.

POLICE RANGE REFURBISHMENT PROJECT – PHASE II

1. After work of other trades is complete, touch up and restore damaged or defaced painted surfaces. Comply with procedures specified in PDCA P1.

3.13 PAINT RESTORATION SCHEDULE

A. Clubhouse:

1. All Windows, Doors and Frames – interior and exterior.
2. Exterior surfaces exposed to view.

END OF SECTION 090190.91

SECTION 092216

NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract - Standard Specifications for Public Works Construction 'The GREENBOOK' and City Supplement 'The WHITEBOOK', latest editions, including Supplemental Supplementary Provisions (SSPs), apply to this Section.

1.2 SUMMARY

A. Section Includes:

- 1. Non-load-bearing steel framing systems for interior partitions.
- 2. Suspension systems for interior ceilings and soffits.
- 3. Grid suspension systems for gypsum board ceilings.

B. Related Requirements:

- 1. Section 054000 "Cold-Formed Metal Framing" for exterior and interior load-bearing and exterior non-load-bearing wall studs; floor joists; and roof rafters and ceiling joists.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of code-compliance certification for studs and tracks.
- B. Evaluation Reports: For embossed, high-strength steel studs and tracks, firestop tracks, post-installed anchors, and power-actuated fasteners, from ICC-ES or other qualified testing agency acceptable to authorities having jurisdiction.

1.5 QUALITY ASSURANCE

- A. Code-Compliance Certification of Studs and Tracks: Provide documentation that framing members are certified according to the product-certification program of the Steel Stud Manufacturers Association.

PART 2 - PRODUCTS

2.1 FRAMING SYSTEMS

- A. Framing Members, General: Comply with ASTM C754 for conditions indicated.
1. Steel Sheet Components: Comply with ASTM C645 requirements for steel unless otherwise indicated.
 2. Protective Coating: ASTM A653/A653M, G60 (Z180) unless otherwise indicated.
- B. Studs and Tracks: ASTM C645. Use either conventional steel studs and tracks or embossed, high-strength steel studs and tracks.
1. Steel Studs and Tracks:
 - a. Minimum Base-Steel Thickness: 0.0329 inch (0.836 mm).
 - b. Depth: 3-5/8 inches (92 mm).
 2. Embossed, High Strength Steel Studs and Tracks: Roll-formed and embossed with surface deformations to stiffen the framing members so that they are structurally comparable to conventional ASTM C645 steel studs and tracks.
 - a. Minimum Base-Steel Thickness: 0.0190 inch (0.483 mm).
 - b. Depth: 3-5/8 inches (92 mm).
- C. Slip-Type Head Joints: Where indicated, provide one of the following:
1. Clip System: Clips designed for use in head-of-wall deflection conditions that provide a positive attachment of studs to tracks while allowing 1-1/2-inch (38-mm) minimum vertical movement.
 2. Single Long-Leg Track System: ASTM C645 top track with 2-inch- (51-mm-) deep flanges in thickness not less than indicated for studs, installed with studs friction fit into top track and with continuous bridging located within 12 inches (305 mm) of the top of studs to provide lateral bracing.
 - a. Bridging: 1-1/2-inch (38-mm) cold-rolled steel channel.
 3. Deflection Track: Steel sheet top track manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.
- D. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.
1. Minimum Base-Steel Thickness: 0.0329 inch (0.836 mm).
- E. Cold-Rolled Channel Bridging: Steel, 0.0538-inch (1.367-mm) minimum base-steel thickness, with minimum 1/2-inch- (13-mm-) wide flanges.
1. Depth: 1-1/2 inches (38 mm).
 2. Clip Angle: Not less than 1-1/2 by 1-1/2 inches (38 by 38 mm), 0.068-inch- (1.72-mm-) thick, galvanized steel.
- F. Hat-Shaped, Rigid Furring Channels: ASTM C645.

POLICE RANGE REFURBISHMENT PROJECT – PHASE II

1. Minimum Base-Steel Thickness: 0.0329 inch (0.836 mm).
 2. Depth: As indicated on Drawings.
- G. Cold-Rolled Furring Channels: 0.053-inch (1.34-mm) uncoated-steel thickness, with minimum 1/2-inch- (13-mm-) wide flanges.
1. Depth: [As indicated on Drawings] [3/4 inch (19 mm)] <Insert depth>.
 2. Furring Brackets: Adjustable, corrugated-edge-type steel sheet with minimum uncoated-steel thickness of 0.0329 inch (0.8 mm).
 3. Tie Wire: ASTM A641/A641M, Class 1 zinc coating, soft temper, 0.062-inch- (1.59-mm-) diameter wire, or double strand of 0.048-inch- (1.21-mm-) diameter wire.
- H. Z-Shaped Furring: With slotted or nonslotted web, face flange of 1-1/4 inches (32 mm), wall attachment flange of 7/8 inch (22 mm), minimum uncoated-steel thickness of 0.0179 inch (0.455 mm), and depth required to fit insulation thickness indicated.

2.2 SUSPENSION SYSTEMS

- A. Furring Channels (Furring Members):
1. Hat-Shaped, Rigid Furring Channels: ASTM C645, 7/8 inch (22 mm) deep.
 - a. Minimum Base-Steel Thickness: 0.0329 inch (0.836 mm).

2.3 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards.
1. Fasteners for Steel Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.
- B. Isolation Strip at Exterior Walls: Provide the following:
1. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch (3.2 mm) thick, in width to suit steel stud size.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. Installation Standard: ASTM C754.
 - 1. Gypsum Plaster Assemblies: Also comply with requirements in ASTM C841 that apply to framing installation.
 - 2. Portland Cement Plaster Assemblies: Also comply with requirements in ASTM C1063 that apply to framing installation.
 - 3. Gypsum Veneer Plaster Assemblies: Also comply with requirements in ASTM C844 that apply to framing installation.
 - 4. Gypsum Board Assemblies: Also comply with requirements in ASTM C840 that apply to framing installation.
- B. Install framing and accessories plumb, square, and true to line, with connections securely fastened.
- C. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.
- D. Install bracing at terminations in assemblies.
- E. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

3.3 INSTALLING FRAMED ASSEMBLIES

- A. Install framing system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.
 - 1. Single-Layer Application: 16 inches (406 mm) o.c. unless otherwise indicated.
- B. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.
- C. Install studs so flanges within framing system point in same direction.
- D. Install tracks at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts that penetrate partitions above ceiling.
 - 1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
 - 2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install track section (for cripple studs) at head and secure to jamb studs.
 - a. Install two studs at each jamb unless otherwise indicated.

- b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch (13-mm) clearance from jamb stud to allow for installation of control joint in finished assembly.
 - c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.
 3. Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
- E. Direct Furring:
 1. Screw to wood framing.
 2. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches (610 mm) o.c.
- F. Z-Shaped Furring Members:
 1. Erect insulation, specified in Section 072100 "Thermal Insulation," vertically and hold in place with Z-shaped furring members spaced 24 inches (610 mm) o.c.
 2. Except at exterior corners, securely attach narrow flanges of furring members to wall with concrete stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches (610 mm) o.c.
 3. At exterior corners, attach wide flange of furring members to wall with short flange extending beyond corner; on adjacent wall surface, screw-attach short flange of furring channel to web of attached channel. At interior corners, space second member no more than 12 inches (305 mm) from corner and cut insulation to fit.
- G. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch (3 mm) from the plane formed by faces of adjacent framing.

3.4 INSTALLING CEILING SUSPENSION SYSTEMS

- A. Install suspension system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.
 1. Furring Channels (Furring Members): 16 inches (406 mm) o.c.
- B. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.
- C. Suspend hangers from building structure as follows:
 1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.
 - a. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.

2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.
 - a. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced installation standards.
 3. Wire Hangers: Secure by looping and wire tying, either directly to structures or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.
 4. Flat Hangers: Secure to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices and fasteners that are secure and appropriate for structure and hanger, and in a manner that will not cause hangers to deteriorate or otherwise fail.
 5. Do not attach hangers to steel roof deck.
 6. Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
 7. Do not attach hangers to rolled-in hanger tabs of composite steel floor deck.
 8. Do not connect or suspend steel framing from ducts, pipes, or conduit.
- D. Seismic Bracing: Sway-brace suspension systems with hangers used for support.
- E. Grid Suspension Systems: Attach perimeter wall track or angle where grid suspension systems meet vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.
- F. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet (3 mm in 3.6 m) measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

END OF SECTION 092216

SECTION 092900

GYPSUM BOARD

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract - Standard Specifications for Public Works Construction 'The GREENBOOK' and City Supplement 'The WHITEBOOK', latest editions, including Supplemental Supplementary Provisions (SSPs), apply to this Section.

1.2 SUMMARY

- A. Section Includes:

- 1. Interior gypsum board.

- B. Related Requirements:

- 1. Section 092216 "Non-Structural Metal Framing" for non-structural steel framing and suspension systems that support gypsum board panels.
 - 2. Section 093013 "Ceramic Tiling" for cementitious backer units installed as substrates for ceramic tile.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

1.5 FIELD CONDITIONS

- A. Environmental Limitations: Comply with ASTM C840 requirements or gypsum board manufacturer's written instructions, whichever are more stringent.
- B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.
- C. Do not install panels that are wet, moisture damaged, and mold damaged.

POLICE RANGE REFURBISHMENT PROJECT – PHASE II

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

2.2 GYPSUM BOARD, GENERAL

- A. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.3 INTERIOR GYPSUM BOARD

- A. Abuse-Resistant Gypsum Board: ASTM C1396/C1396M gypsum board, tested according to ASTM C1629/C1629M.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Georgia-Pacific Gypsum LLC.
 - b. National Gypsum Company.
 - c. USG Corporation.
 2. Core: 5/8 inch (15.9 mm), Type X.
 3. Surface Abrasion: ASTM C1629/C1629M, meets or exceeds Level 1 requirements.
 4. Indentation: ASTM C1629/C1629M, meets or exceeds Level 1 requirements.
 5. Soft-Body Impact: ASTM C1629/C1629M, meets or exceeds Level 1 requirements.
 6. Long Edges: Tapered.
 7. Mold Resistance: ASTM D3273, score of 10 as rated according to ASTM D3274.

2.4 TRIM ACCESSORIES

- A. Interior Trim: ASTM C1047.
 1. Material: Plastic.
 2. Shapes:
 - a. Cornerbead.
 - b. Bullnose bead.
 - c. LC-Bead: J-shaped; exposed long flange receives joint compound.
 - d. L-Bead: L-shaped; exposed long flange receives joint compound.
 - e. U-Bead: J-shaped; exposed short flange does not receive joint compound.

- f. Expansion (control) joint.
- g. Curved-Edge Cornerbead: With notched or flexible flanges.

2.5 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C475/C475M.
- B. Joint Tape:
 - 1. Interior Gypsum Board: Paper.
 - 2. Exterior Gypsum Soffit Board: Paper.
 - 3. Glass-Mat Gypsum Sheathing Board: 10-by-10 glass mesh.
 - 4. Tile Backing Panels: As recommended by panel manufacturer.
- C. Joint Compound for Interior Gypsum Board: For each coat, use formulation that is compatible with other compounds applied on previous or for successive coats.
 - 1. Prefilling: At open joints and damaged surface areas, use setting-type taping compound.
 - 2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping compound.
 - a. Use setting-type compound for installing paper-faced metal trim accessories.
 - 3. Fill Coat: For second coat, use setting-type, sandable topping compound.
 - 4. Finish Coat: For third coat, use setting-type, sandable topping compound.

2.6 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written instructions.
- B. Steel Drill Screws: ASTM C1002 unless otherwise indicated.
 - 1. Use screws complying with ASTM C954 for fastening panels to steel members from 0.033 to 0.112 inch (0.84 to 2.84 mm) thick.
- C. Acoustical Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E90.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Accumetric LLC.
 - b. Everkem Diversified Products, Inc.
 - c. Franklin International.
 - d. Grabber Construction Products.
 - e. Hilti, Inc.

- f. Pecora Corporation.
- g. Specified Technologies, Inc.
- h. USG Corporation.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and substrates including welded hollow-metal frames and support framing, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.
- B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLYING AND FINISHING PANELS, GENERAL

- A. Comply with ASTM C840.
- B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.
- C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch (1.5 mm) of open space between panels. Do not force into place.
- D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.
- E. Form control and expansion joints with space between edges of adjoining gypsum panels.
- F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.
 - 1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. (0.7 sq. m) in area.
 - 2. Fit gypsum panels around ducts, pipes, and conduits.
 - 3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch- (6.4- to 9.5-mm-) wide joints to install sealant.

- G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments. Provide 1/4- to 1/2-inch- (6.4- to 12.7-mm-) wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
- H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.
- I. Wood Framing: Install gypsum panels over wood framing, with floating internal corner construction. Do not attach gypsum panels across the flat grain of wide-dimension lumber, including floor joists and headers. Float gypsum panels over these members or provide control joints to counteract wood shrinkage.
- J. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C919 and with manufacturer's written instructions for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.
- K. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

3.3 APPLYING INTERIOR GYPSUM BOARD

- A. Install interior gypsum board in the following locations:
 - 1. Wallboard Type: Vertical surfaces unless otherwise indicated.
 - 2. Type X: Vertical surfaces unless otherwise indicated.
 - 3. Abuse-Resistant Type: Vertical surfaces unless otherwise indicated.
- B. Single-Layer Application:
 - 1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing unless otherwise indicated.
 - 2. On partitions/walls, apply gypsum panels vertically (parallel to framing) unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
 - a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
 - b. At stairwells and other high walls, install panels horizontally unless otherwise indicated or required by fire-resistance-rated assembly.
 - 3. On Z-shaped furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
 - 4. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

3.4 INSTALLING TRIM ACCESSORIES

- A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.
- B. Control Joints: Install control joints at locations indicated on Drawings.
- C. Interior Trim: Install in the following locations:
 - 1. Cornerbead: Use at outside corners unless otherwise indicated.
 - 2. LC-Bead: Use at exposed panel edges.
 - 3. L-Bead: Use where indicated.
 - 4. U-Bead: Use at exposed panel edges.

3.5 FINISHING GYPSUM BOARD

- A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.
- B. Prefill open joints, rounded or beveled edges, and damaged surface areas.
- C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.
- D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C840:
 - 1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
 - 2. Level 2: Panels that are substrate for tile.
 - 3. Level 3: Not Used.
 - 4. Level 4: At panel surfaces that will be exposed to view unless otherwise indicated.
 - a. Primer and its application to surfaces are specified in Section 099123 "Interior Painting."
 - 5. Level 5: Not Used.

3.6 PROTECTION

- A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.
- B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- C. Remove and replace panels that are wet, moisture damaged, and mold damaged.

POLICE RANGE REFURBISHMENT PROJECT – PHASE II

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 092900

SECTION 093013

CERAMIC TILING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract - Standard Specifications for Public Works Construction 'The GREENBOOK' and City Supplement 'The WHITEBOOK', latest editions, including Supplemental Supplementary Provisions (SSPs), apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Porcelain mosaic tile.
 - 2. Porcelain tile.
 - 3. Glazed wall tile.
 - 4. Tile backing panels.
 - 5. Waterproof membrane for thinset applications.
 - 6. Crack isolation membrane.
 - 7. Metal edge strips.
- B. Related Requirements:
 - 1. Section 079200 "Joint Sealants" for sealing of expansion, contraction, control, and isolation joints in tile surfaces.

1.3 DEFINITIONS

- A. General: Definitions in the ANSI A108 series of tile installation standards and in ANSI A137.1 apply to Work of this Section unless otherwise specified.
- B. ANSI A108 Series: ANSI A108.01, ANSI A108.02, ANSI A108.1A, ANSI A108.1B, ANSI A108.1C, ANSI A108.4, ANSI A108.5, ANSI A108.6, ANSI A108.8, ANSI A108.9, ANSI A108.10, ANSI A108.11, ANSI A108.12, ANSI A108.13, ANSI A108.14, ANSI A108.15, ANSI A108.16, and ANSI A108.17, which are contained in its "Specifications for Installation of Ceramic Tile."
- C. Face Size: Actual tile size, excluding spacer lugs.
- D. Module Size: Actual tile size plus joint width indicated.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1. Review requirements in ANSI A108.01 for substrates and for preparation by other trades.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples for Verification:
 1. Full-size units of each type and composition of tile and for each color and finish required.
 2. Full-size units of each type of trim and accessory for each color and finish required.
 3. Metal edge strips in 6-inch (150-mm) lengths.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Master Grade Certificates: For each shipment, type, and composition of tile, signed by tile manufacturer and Installer.
- C. Product Certificates: For each type of product.
- D. Product Test Reports: For tile-setting and -grouting products and certified porcelain tile.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match and are from same production runs as products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 1. Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed for each type, composition, color, pattern, and size indicated.
 2. Grout: Furnish quantity of grout equal to 3 percent of amount installed for each type, composition, and color indicated.

1.8 QUALITY ASSURANCE

- A. Installer Qualifications:
 1. Installer employs only Ceramic Tile Education Foundation Certified Installers or installers recognized by the U.S. Department of Labor as Journeyman Tile Layers for Project.
- B. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 1. Build mockup of floor tile installation.

2. Build mockup of wall tile installation.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirements in ANSI A137.1 for labeling tile packages.
- B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination can be avoided.
- D. Store liquid materials in unopened containers and protected from freezing.

1.10 FIELD CONDITIONS

- A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations for Tile: Obtain tile of each type and color or finish from single source or producer.
 1. Obtain tile of each type and color or finish from same production run and of consistent quality in appearance and physical properties for each contiguous area.
- B. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from single manufacturer and each aggregate from single source or producer.
 1. Obtain setting and grouting materials, except for unmodified Portland cement and aggregate, from single manufacturer.
 2. Obtain waterproof membrane and crack isolation membrane, except for sheet products, from manufacturer of setting and grouting materials.
- C. Source Limitations for Other Products: Obtain each of the following products specified in this Section from a single manufacturer:
 1. Stone thresholds.
 2. Waterproof membrane.
 3. Crack isolation membrane.
 4. Cementitious backer units.

5. Metal edge strips.

2.2 PRODUCTS, GENERAL

- A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.
 1. Provide tile complying with Standard grade requirements.
- B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.02, ANSI standards referenced in other Part 2 articles, ANSI standards referenced by TCNA installation methods specified in tile installation schedules, and other requirements specified.
- C. Factory Blending: For tile exhibiting color variations within ranges, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.
- D. Mounting: For factory-mounted tile, provide back- or edge-mounted tile assemblies as standard with manufacturer unless otherwise indicated.
 1. Where tile is indicated for installation in wet areas, do not use back- or edge-mounted tile assemblies unless tile manufacturer specifies in writing that this type of mounting is suitable for installation indicated and has a record of successful in-service performance.

2.3 TILE PRODUCTS

- A. Ceramic Tile Type - PLANK: Glazed porcelain tile.
 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Daltile. As indicated on Drawings. Refer to Finish Schedule for Color and Enlarged Plan for Pattern and Direction.
 2. Certification: Tile certified by the Porcelain Tile Certification Agency.
 3. Face Size: 3 by 36 inches (76 by 914 mm).
 4. Thickness: 5/16 inch (7.9 mm).
 5. Face: Unpolished, Undulated.
 6. Dynamic Coefficient of Friction: Not less than 0.42.
 7. Tile Color, Glaze, and Pattern: As indicated on Drawings.
 8. Grout Color: As selected by Engineer from manufacturer's full range.
 9. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile. Provide shapes as follows, selected from manufacturer's standard shapes:
 - a. Base Cap: Surface bullnose, module size 3 by 18 inches (76 by 457 mm).
 - b. Internal Corners: Field-buttet square corners.

B. Ceramic Tile Type - MOSAIC Factory-mounted unglazed ceramic mosaic tile.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Daltile. As indicated on Drawings. Refer to Finish Schedule for Color and Enlarged Plan for Pattern and Direction.
2. Composition: Porcelain.
3. Certification: Porcelain tile certified by the Porcelain Tile Certification Agency.
4. Module Size: 2 by 2 inches (50.8 by 50.8 mm).
5. Thickness: 1/4 inch (6.4 mm).
6. Face: Pattern of design indicated, with cushion edges.
7. Surface: Smooth, without abrasive admixture.
8. Dynamic Coefficient of Friction: Not less than 0.42.
9. Tile Color and Pattern: As indicated on Drawings.
10. Grout Color: As selected by Engineer from manufacturer's full range.
11. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile. Provide shapes as follows, selected from manufacturer's standard shapes:
 - a. Base Cove: Cove, module size 1 by 1 inch (25.4 by 25.4 mm).
 - b. Wainscot Cap for Flush Conditions: Regular flat tile for conditions where tile wainscot is shown flush with wall surface above it, same size as adjoining flat tile.
 - c. External Corners for Thinset Mortar Installations: Surface bullnose, module size 2 by 1 inch (50.8 by 25.4 mm).
 - d. Internal Corners: Cove, module size 1 by 1 inch (25.4 by 25.4 mm).
 - e. Bullnose: Surface bullnose, module size 2 by 2 inches (50.8 by 50.8 mm).

C. Ceramic Tile Type – SUBWAY: Glazed wall tile.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Daltile. As indicated on Drawings. Refer to Finish Schedule for Color and Enlarged Plan for Pattern and Direction.
2. Module Size: 4-1/4 by 8-1/2 inches (108 by 216 mm).
3. Thickness: 5/16 inch (8 mm).
4. Face: Plain with modified square edges.
5. Tile Color and Pattern: As indicated on Drawings.
6. Grout Color: As selected by Engineer from manufacturer's full range.
7. Mounting: Factory, back mounted.
8. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile. Provide shapes as follows, selected from manufacturer's standard shapes:

2.4 TILE BACKING PANELS

- A. Fiber-Cement Backer Board: ASTM C1288, in maximum lengths available to minimize end-to-end butt joints.
 - 1. Manufacturers: Subject to compliance with requirements, [provide products by the following] [provide products by one of the following] [available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:
 - a. CertainTeed Corporation.
 - b. James Hardie Building Products, Inc.
 - 2. Thickness: 1/2 inch (12.7 mm).

2.5 WATERPROOF MEMBRANE

- A. General: Manufacturer's standard product, that complies with ANSI A118.10 and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.
- B. Fabric-Reinforced, Fluid-Applied Membrane: System consisting of liquid-latex rubber or elastomeric polymer and continuous fabric reinforcement.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Custom Building Products.
 - b. LATICRETE SUPERCAP, LLC.
 - c. MAPEI Corporation.

2.6 CRACK ISOLATION MEMBRANE

- A. General: Manufacturer's standard product, selected from the following, that complies with ANSI A118.12 for standard performance and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.
- B. PVC Sheet: PVC heat-fused on both sides to facings of nonwoven polyester; 0.040-inch (1-mm) nominal thickness.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Compotite Corporation.
 - b. Approved equal.

2.7 SETTING MATERIALS

- A. Portland Cement Mortar (Thickset) Installation Materials: ANSI A108.02.

POLICE RANGE REFURBISHMENT PROJECT – PHASE II

1. Cleavage Membrane: Asphalt felt, ASTM D226/D226M, Type I (No. 15); or polyethylene sheeting, ASTM D4397, 4.0 mils (0.1 mm) thick.
2. Reinforcing Wire Fabric: Galvanized, welded-wire fabric, 2 by 2 inches (50.8 by 50.8 mm) by 0.062-inch (1.57-mm) diameter; comply with ASTM A185/A185M and ASTM A82/A82M, except for minimum wire size.

B. Modified Dry-Set Mortar (Thinset): ANSI A118.4.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Custom Building Products.
 - b. LATICRETE SUPERCAP, LLC.
 - c. MAPEI Corporation.
2. For wall applications, provide mortar that complies with requirements for nonsagging mortar in addition to the other requirements in ANSI A118.4.

C. Improved Modified Dry-Set Mortar (Thinset): ANSI A118.15.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Custom Building Products.
 - b. LATICRETE SUPERCAP, LLC.
 - c. MAPEI Corporation.
2. For wall applications, provide mortar that complies with requirements for nonsagging mortar in addition to the other requirements in ANSI A118.15.

2.8 GROUT MATERIALS

A. High-Performance Tile Grout: ANSI A118.7.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Custom Building Products.
 - b. LATICRETE SUPERCAP, LLC.
 - c. MAPEI Corporation.
2. Area of use: May be used at any non-shower areas, including floor and wall.

B. Water-Cleanable Epoxy Grout: ANSI A118.3[, with a VOC content of 65 g/L or less].

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Custom Building Products.
 - b. LATICRETE SUPERCAP, LLC.
 - c. MAPEI Corporation.

2. Provide product capable of withstanding continuous and intermittent exposure to temperatures of up to 140 and 212 deg F (60 and 100 deg C), respectively, and certified by manufacturer for intended use.
3. Area of use: Use in all shower areas and areas with mosaic tile, including floor and walls. May be used in all locations in lieu of ANSI A118.7 High-Performance Tile Grout.

2.9 MISCELLANEOUS MATERIALS

- A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.
- B. Vapor-Retarder Membrane: Polyethylene sheeting, ASTM D4397, 4.0 mils (0.1 mm) thick.
- C. Metal Edge Strips: Angle or L-shaped, height to match tile and setting-bed thickness, metallic or combination of metal and PVC or neoprene base, designed specifically for flooring applications; stainless steel, ASTM A276/A276M or ASTM A666, 300 Series exposed-edge material.
 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Schluter Systems L.P.
 - 1) Model: Jolly, for use at top of wall tile, wainscot.
- D. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.
- E. Floor Sealer: Manufacturer's standard product for sealing grout joints and that does not change color or appearance of grout.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Bonsal American, an Oldcastle company.
 - b. Custom Building Products.
 - c. Jamo Inc.
 2. Products shall comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.10 MIXING MORTARS AND GROUT

- A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.

- B. Add materials, water, and additives in accurate proportions.
- C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
 - 1. Verify that substrates for setting tile are firm; dry; clean; free of coatings that are incompatible with tile-setting materials, including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.
 - 2. Verify that concrete substrates for tile floors installed with bonded mortar bed or thinset mortar comply with surface finish requirements in ANSI A108.01 for installations indicated.
 - a. Verify that surfaces that received a steel trowel finish have been mechanically scarified.
 - b. Verify that protrusions, bumps, and ridges have been removed by sanding or grinding.
 - 3. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed.
 - 4. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with thinset mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.
- B. Where indicated, prepare substrates to receive waterproof membrane by applying a reinforced mortar bed that complies with ANSI A108.1A and is sloped 1/4 inch per foot (1:50) toward drains.
- C. Blending: For tile exhibiting color variations, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those

taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

3.3 INSTALLATION OF CERAMIC TILE

- A. Comply with TCNA's "Handbook for Ceramic, Glass, and Stone Tile Installation" for TCNA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 series "Specifications for Installation of Ceramic Tile" that are referenced in TCNA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.
 - 1. For the following installations, follow procedures in the ANSI A108 series of tile installation standards for providing 95 percent mortar coverage:
 - a. Tile floors in wet areas.
- B. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
- C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.
- D. Provide manufacturer's standard trim shapes where necessary to eliminate exposed tile edges.
- E. Jointing Pattern: Lay tile in grid pattern unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.
 - 1. For tile mounted in sheets, make joints between tile sheets same width as joints within tile sheets so joints between sheets are not apparent in finished work.
 - 2. Where adjoining tiles on floor, base, walls, or trim are specified or indicated to be same size, align joints.
 - 3. Where tiles are specified or indicated to be whole integer multiples of adjoining tiles on floor, base, walls, or trim, align joints unless otherwise indicated.
- F. Joint Widths: Unless otherwise indicated, install tile with the following joint widths:
 - 1. Ceramic Mosaic Tile: 1/8 inch (3.2 mm).
 - 2. Glazed Wall Tile: 1/16 inch (1.6 mm).
 - 3. Porcelain Tile: 3/16 inch (4.8 mm).
- G. Lay out tile wainscots to dimensions indicated or to next full tile beyond dimensions indicated.

- H. Expansion Joints: Provide expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated. Form joints during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.
 - 1. Where joints occur in concrete substrates, locate joints in tile surfaces directly above them.
- I. Metal Edge Strips: Install at locations where top of wall field is exposed, at dimension indicated in interior elevation drawings.
- J. Floor Sealer: Apply floor sealer to cementitious grout joints in tile floors according to floor-sealer manufacturer's written instructions. As soon as floor sealer has penetrated grout joints, remove excess sealer and sealer from tile faces by wiping with soft cloth.

3.4 INSTALLATION OF TILE BACKING PANEL

- A. Install panels and treat joints according to ANSI A108.11 and manufacturer's written instructions for type of application indicated. Use modified dry-set mortar for bonding material unless otherwise directed in manufacturer's written instructions.

3.5 INSTALLATION OF WATERPROOF MEMBRANE

- A. Install waterproof membrane to comply with ANSI A108.13 and manufacturer's written instructions to produce waterproof membrane of uniform thickness that is bonded securely to substrate.
- B. Allow waterproof membrane to cure and verify by testing that it is watertight before installing tile or setting materials over it.

3.6 INSTALLATION OF CRACK ISOLATION MEMBRANE

- A. Install crack isolation membrane to comply with ANSI A108.17 and manufacturer's written instructions to produce membrane of uniform thickness that is bonded securely to substrate.
- B. Allow crack isolation membrane to cure before installing tile or setting materials over it.

3.7 ADJUSTING AND CLEANING

- A. Remove and replace tile that is damaged or that does not match adjoining tile. Provide new matching units, installed as specified and in a manner to eliminate evidence of replacement.
- B. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.
 - 1. Remove grout residue from tile as soon as possible.

2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.

3.8 PROTECTION

- A. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear. If recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors.
- B. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.
- C. Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces.

3.9 INTERIOR CERAMIC TILE INSTALLATION SCHEDULE

- A. Interior Floor Installations, Concrete Subfloor:
 1. Ceramic Tile Installation <PLANK>: TCNA F122; thinset mortar on waterproof membrane.
 - a. Ceramic Tile Type: <PLANK>.
 - b. Thinset Mortar: Modified dry-set or Improved modified dry-set mortar.
 - c. Grout: High-performance unsanded grout.
- B. Interior Wall Installations, Wood or Metal Studs or Furring:
 1. Ceramic Tile Installation <SUBWAY>: TCNA W245; thinset mortar on glass-mat, water-resistant gypsum backer board.
 - a. Ceramic Tile Type: <SUBWAY>.
 - b. Thinset Mortar: Modified dry-set or Improved modified dry-set mortar.
 - c. Grout: High-performance unsanded grout.
- C. Shower Receptor and Wall Installations:
 1. Ceramic Tile Installation <MOSAIC>: TCNA B415; thinset mortar on waterproof membrane over cementitious backer units or fiber-cement backer board.
 - a. Ceramic Tile Type: <MOSAIC>.
 - b. Thinset Mortar: Improved modified dry-set mortar.
 - c. Grout: Water-cleanable epoxy grout.

END OF SECTION 093013

SECTION 095123

ACOUSTICAL TILE CEILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract - Standard Specifications for Public Works Construction 'The GREENBOOK' and City Supplement 'The WHITEBOOK', latest editions, including Supplemental Supplementary Provisions (SSPs), apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Acoustical tiles for interior ceilings.

1.3 PREINSTALLATION MEETINGS

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each exposed product and for each color and texture specified, 6 inches (150 mm) in size.
- C. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of sizes indicated below:
 - 1. Acoustical Tiles: Set of full-size Samples of each type, color, pattern, and texture.
 - 2. Concealed Suspension-System Members: 6-inch- (150-mm-) Sample of each type.
 - 3. Exposed Moldings and Trim: Set of [6-inch- (150-mm-)] <Insert dimension> long Samples of each type and color.
 - 4. Seismic Clips: Full size.
- D. Delegated-Design Submittal: For seismic restraints for ceiling systems.
 - 1. Include design calculations for seismic restraints including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing agency.
- B. Product Test Reports: For each acoustical tile ceiling, for tests performed by manufacturer and witnessed by a qualified testing agency or a qualified testing agency].
- C. Evaluation Reports: For each acoustical tile ceiling suspension system and anchor and fastener type, from ICC-ES.
- D. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For finishes to include in maintenance manuals.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Acoustical Ceiling Units: Full-size tiles equal to 2 percent of quantity installed.

1.8 QUALITY ASSURANCE

- A. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
 - 1. Build mockup of typical ceiling area as shown on Drawings.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver acoustical tiles, suspension-system components, and accessories to Project site and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.
- B. Before installing acoustical tiles, permit them to reach room temperature and a stabilized moisture content.

1.10 FIELD CONDITIONS

- A. Environmental Limitations: Do not install acoustical tile ceilings until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations:
 - 1. Suspended Acoustical Tile Ceilings: Obtain each type of acoustical ceiling tile and its suspension system from single source from single manufacturer.
 - 2. Directly Attached Acoustical Tile Ceilings: Obtain each type of acoustical ceiling tile from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Ceiling products shall comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- B. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design seismic restraints for ceiling systems.
- C. Seismic Performance: Suspended ceilings shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
- D. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Flame-Spread Index: Class A according to ASTM E1264.
 - 2. Smoke-Developed Index: 50 or less.

2.3 ACOUSTICAL TILES <Insert drawing designation>

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Armstrong World Industries, Inc.
 - 2. CertainTeed Corporation.
 - 3. USG Corporation. Model USG Orion 85.
- B. Acoustical Tile Standard: Provide manufacturer's standard tiles of configuration indicated that comply with ASTM E1264 classifications as designated by type, form, pattern, acoustical rating, and light reflectance unless otherwise indicated.

POLICE RANGE REFURBISHMENT PROJECT – PHASE II

- C. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 50 percent.
- D. Classification: Provide tiles as follows:
 - 1. Type and Form: Type IV, mineral base with painted finish; Form 1, nodular and Form 2, water felted.
 - 2. Pattern: E (lightly textured).
- E. Color: White.
- F. Light Reflectance (LR): Not less than 0.87.
- G. Noise Reduction Coefficient (NRC): Not less than 0.85.
- H. Edge/Joint Detail: Square, kerfed, and rabbeted; tongue and grooved; or butt.
- I. Thickness: 5/8 inch (15 mm).
- J. Modular Size: 24 by 24 inches (610 by 610 mm).
- K. Antimicrobial Treatment: Manufacturer's standard broad spectrum, antimicrobial formulation that inhibits fungus, mold, mildew, and gram-positive and gram-negative bacteria and showing no mold, mildew, or bacterial growth when tested according to ASTM D3273, ASTM D3274, or ASTM G21 and evaluated according to ASTM D3274 or ASTM G21.

2.4 ACCESSORIES

- A. Wire Hangers, Braces, and Ties: Provide wires as follows:
 - 1. Zinc-Coated, Carbon-Steel Wire: ASTM A641/A641M, Class 1 zinc coating, soft temper.
 - 2. Size: Wire diameter sufficient for its stress at three times hanger design load (ASTM C635/C635M, Table 1, "Direct Hung") will be less than yield stress of wire, but not less than 0.106-inch- (2.69-mm-) diameter wire.

2.5 METAL EDGE MOLDINGS AND TRIM <Insert drawing designation>

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Armstrong World Industries, Inc.
 - 2. Fry Reglet Corporation.
 - 3. USG Corporation.
- B. Extruded-Aluminum Edge Moldings and Trim: Where indicated, provide manufacturer's extruded-aluminum edge moldings and trim of profile indicated or referenced by manufacturer's designations, including splice plates, corner pieces, and attachment and other clips, complying with seismic design requirements.

1. Clear Anodic Finish: AAMA 611, AA-M12C22A31, Class II, 0.010 mm or thicker.

2.6 ACOUSTICAL SEALANT

- A. Acoustical Sealant: As specified in Section 079219 "Acoustical Joint Sealants."

2.7 MISCELLANEOUS MATERIALS

- A. Acoustical Tile Adhesive: Type recommended in writing by acoustical tile manufacturer, bearing UL label for Class 0-25 flame spread.
 1. Adhesives shall have a VOC content of 50 g/L or less.
 2. Adhesive shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, including structural framing and substrates to which acoustical tile ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine acoustical tiles before installation. Reject acoustical tiles that are wet, moisture damaged, or mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Testing Substrates: Before adhesively bonding tiles to wet-placed substrates such as cast-in-place concrete or plaster, test and verify that moisture level is below tile manufacturer's recommended limits.
- B. Measure each ceiling area and establish layout of acoustical tiles to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width tiles at borders unless otherwise indicated, and comply with layout shown on reflected ceiling plans.
- C. Layout openings for penetrations centered on the penetrating items.

3.3 INSTALLATION OF DIRECTLY ATTACHED ACOUSTICAL TILE CEILINGS

- A. Adhesive Installation: Install acoustical tile by bonding to substrate, using acoustical tile adhesive and procedure recommended in writing by tile manufacturer and as follows:
 - 1. Wipe and prime ceiling.
 - 2. Remove loose dust from backs of tiles by brushing.
 - 3. Install splines in joints between tiles and maintain bottom surface to a uniform level. Shim tile or correct substrate as required to maintain levelness.
 - 4. Maintain tight butt joints, aligned in both directions and coordinated with ceiling fixtures.
- B. Install edge moldings and trim of type indicated at perimeter of acoustical tile ceiling area and where necessary to conceal edges of acoustical units.
- C. Arrange directionally patterned acoustical tiles with pattern running in one direction parallel to long axis of space.

3.4 ERECTION TOLERANCES

- A. Directly Attached Ceilings: Install bottom surface of tiles to a tolerance of 1/8 inch in 12 feet (3 mm in 3.6 m) and not exceeding 1/4 inch (6 mm) cumulatively.
- B. Moldings and Trim: Install moldings and trim to substrate and level with ceiling suspension system to a tolerance of 1/8 inch in 12 feet (3 mm in 3.6 m) non-cumulative.

3.5 ADJUSTING

- A. Clean exposed surfaces of acoustical tile ceilings, including trim and edge moldings. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage.
- B. Remove and replace tiles and other ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 095123

SECTION 096513

RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract - Standard Specifications for Public Works Construction 'The GREENBOOK' and City Supplement 'The WHITEBOOK', latest editions, including Supplemental Supplementary Provisions (SSPs), apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Thermoplastic-rubber base.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Sustainable Design Submittals:
 - 1. Product Data: For adhesives, indicating VOC content.
 - 2. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.
 - 3. Product Data: For sealants, indicating VOC content.
 - 4. Laboratory Test Reports: For sealants, indicating compliance with requirements for low-emitting materials.
 - 5. Laboratory Test Reports: For resilient base and stair products and accessories, indicating compliance with requirements for low-emitting materials.
 - 6. Environmental Product Declaration: For each product.
 - 7. Health Product Declaration: For each product.
 - 8. Sourcing of Raw Materials: Corporate sustainability report for each manufacturer.
- C. Samples: For each exposed product and for each color and texture specified, not less than 12 inches (300 mm) long.
- D. Product Schedule: For resilient base and accessory products.

1.4 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

POLICE RANGE REFURBISHMENT PROJECT – PHASE II

1. Furnish not less than 10 linear feet (3 linear m) for every 500 linear feet (150 linear m) or fraction thereof, of each type, color, pattern, and size of resilient product installed.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F (10 deg C) or more than 90 deg F (32 deg C).

1.6 FIELD CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F (21 deg C) or more than 95 deg F (35 deg C), in spaces to receive resilient products during the following periods:
 1. 48 hours before installation.
 2. During installation.
 3. 48 hours after installation.
- B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F (13 deg C) or more than 95 deg F (35 deg C).
- C. Install resilient products after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Products shall comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.2 THERMOPLASTIC-RUBBER BASE

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Armstrong World Industries, Inc.
 2. Burke Mercer Flooring Products; a division of Burke Industries Inc.
 3. Johnsonite; a Tarkett company.
 4. Nora Systems, Inc.
 5. Roppe Corporation, USA.
- B. Product Standard: ASTM F1861, Type TP (rubber, thermoplastic).

POLICE RANGE REFURBISHMENT PROJECT – PHASE II

1. Group: I (solid, homogeneous).
2. Style and Location:
 - a. Style A, Straight: Provide in areas with carpet.
 - b. Style B, Cove: Provide in areas with resilient floor coverings.

- C. Thickness: 0.125 inch (3.2 mm).
- D. Height: 4 inches (102 mm).
- E. Lengths: Coils in manufacturer's standard length.
- F. Outside Corners: Preformed.
- G. Inside Corners: Preformed.

2.3 RUBBER MOLDING ACCESSORY <Insert drawing designation>

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Roppe Corporation, USA.
 2. VPI Corporation.
- B. Description: Rubber stair-tread nosing, cap for cove carpet, cap for cove resilient floor covering, carpet bar for tackless installations, carpet edge for glue-down applications, nosing for carpet, nosing for resilient floor covering, reducer strip for resilient floor covering, joiner for tile and carpet, transition strips.
- C. Profile and Dimensions: As indicated.
- D. Locations: Provide rubber molding accessories in areas indicated.

2.4 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based or blended hydraulic-cement-based formulation provided or approved by resilient-product manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by resilient-product manufacturer for resilient products and substrate conditions indicated.
 1. Adhesives shall have a VOC content of [50] <Insert value> g/L or less[and 60 g/L or less for rubber stair treads].

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
 - 1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
 - 1. Installation of resilient products indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.
- B. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.
- C. Do not install resilient products until materials are the same temperature as space where they are to be installed.
 - 1. At least 48 hours in advance of installation, move resilient products and installation materials into spaces where they will be installed.
- D. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient products.

3.3 RESILIENT BASE INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient base.
- B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.
- C. Install resilient base in lengths as long as practical without gaps at seams and with tops of adjacent pieces aligned.
- D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
- E. Do not stretch resilient base during installation.

- F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.
- G. Preformed Corners: Install preformed corners before installing straight pieces.

3.4 RESILIENT ACCESSORY INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient accessories.
- B. Resilient Stair Accessories:
 - 1. Use stair-tread-nose filler to fill nosing substrates that do not conform to tread contours.
 - 2. Tightly adhere to substrates throughout length of each piece.
- C. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of floor covering that would otherwise be exposed.

3.5 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protecting resilient products.
- B. Perform the following operations immediately after completing resilient-product installation:
 - 1. Remove adhesive and other blemishes from surfaces.
- C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
 - 1. Apply two coats.
- D. Cover resilient products subject to wear and foot traffic until Substantial Completion.

END OF SECTION 096513

SECTION 096519

RESILIENT TILE FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract - Standard Specifications for Public Works Construction 'The GREENBOOK' and City Supplement 'The WHITEBOOK', latest editions, including Supplemental Supplementary Provisions (SSPs), apply to this Section.

1.2 SUMMARY

- A. Section Includes:

- 1. Solid vinyl floor tile.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.

- B. Sustainable Design Submittals:

- 1. Product Data: For adhesives, indicating VOC content.
- 2. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.
- 3. Product Data: For chemical-bonding compounds, indicating VOC content.
- 4. Laboratory Test Reports: For chemical-bonding compounds, indicating compliance with requirements for low-emitting materials.
- 5. Product Data: For sealants, indicating VOC content.
- 6. Laboratory Test Reports: For sealants, indicating compliance with requirements for low-emitting materials.
- 7. Laboratory Test Reports: For flooring products, indicating compliance with requirements for low-emitting materials.
- 8. Environmental Product Declaration: For each product.
- 9. Health Product Declaration: For each product.
- 10. Sourcing of Raw Materials: Corporate sustainability report for each manufacturer.

- C. Shop Drawings: For each type of resilient floor tile.

- 1. Include floor tile layouts, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.
- 2. Show details of special patterns.

- D. Samples: Full-size units of each color, texture, and pattern of floor tile required.

1. For heat-welding bead, manufacturer's standard-size Samples, but not less than 9 inches (230 mm) long, of each color required.

E. Welded-Seam Samples: For seamless-installation technique indicated and for each floor covering product, color, and pattern required; with seam running lengthwise and in center of 6-by-9-inch (150-by-230-mm) Sample applied to a rigid backing and prepared by Installer for this Project.

F. Product Schedule: For floor tile.[Use same designations indicated on Drawings.]

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each type of floor tile to include in maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials[, from the same product run,] that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Floor Tile: Furnish one box for every 50 boxes or fraction thereof, of each type, color, and pattern of floor tile installed.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are competent in techniques required by manufacturer for floor tile installation and seaming method indicated.

1. Engage an installer who employs workers for this Project who are trained or certified by floor tile manufacturer for installation techniques required.

B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

1. Coordinate mockups in this Section with mockups specified in other Sections.
 - a. Size: Minimum 100 sq. ft. (9.3 sq. m) for each type, color, and pattern in locations directed by Engineer.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Store floor tile and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F (10 deg C) or more than 90 deg F (32 deg C). Store floor tiles on flat surfaces.

1.9 FIELD CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F (21 deg C) or more than 95 deg F (35 deg C), in spaces to receive floor tile during the following periods:
 1. 48 hours before installation.
 2. During installation.
 3. 48 hours after installation.
- B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F (13 deg C) or more than 95 deg F (35 deg C).
- C. Close spaces to traffic during floor tile installation.
- D. Close spaces to traffic for 48 hours after floor tile installation.
- E. Install floor tile after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: For resilient floor tile, as determined by testing identical products according to ASTM E648 or NFPA 253 by a qualified testing agency.
 1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.
- B. Flooring products shall comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.2 SOLID VINYL FLOOR TILE

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Mannington Mills, Inc.
- B. Tile Standard: ASTM F1700.
 1. Class: Class III, Printed Film Vinyl Tile.
 2. Type: B, Embossed Surface.
- C. Thickness: 0.098 inch (2.5 mm).
- D. Sizes:
 1. At Clubhouse: 9 by 36 inches (229 by 914 mm).
 2. At Staff Office: 6 by 36 inches (152 by 914 mm).

2.3 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based or blended hydraulic-cement-based formulation provided or approved by floor tile manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by floor tile and adhesive manufacturers to suit floor tile and substrate conditions indicated.
 1. Adhesives shall have a VOC content of 60 g/L or less.
 2. Adhesive shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
 3. Adhesive shall meet California SCAQMD Rule 1168.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
 1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of floor tile.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare substrates according to floor tile manufacturer's written instructions to ensure adhesion of resilient products.

- B. Concrete Substrates: Prepare according to ASTM F710.
1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
 2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by floor tile manufacturer. Do not use solvents.
 3. Alkalinity and Adhesion Testing: Perform tests recommended by floor tile manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than 10 pH.
 4. Moisture Testing: Perform tests so that each test area does not exceed 1000 sq. ft. (304.8 sq. m), and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
 - a. Anhydrous Calcium Chloride Test: ASTM F1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m) in 24 hours.
- C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.
- D. Do not install floor tiles until materials are the same temperature as space where they are to be installed.
1. At least 48 hours in advance of installation, move resilient floor tile and installation materials into spaces where they will be installed.
- E. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient floor tile.
- F. Special preparation for installation over existing VCT Flooring:
1. Strip existing VCT flooring to remove any floor finish, wax or polish by using John-Diversey Freedom floor stripper or equivalent diluted and applied in accordance with the manufacturers' instructions.
 2. Remove all residues by rinsing the floor thoroughly with warm water and extracting with a wet vacuum or finish the cleaning in accordance with the manufacturers' instructions.
 3. Mechanically abrade the existing flooring to provide a suitable bonding surface.
WARNING: Asbestos & Silica – Refer to the current Resilient Floor Covering Institute (RFCI) document "Recommended Work Practices for Removal of Existing Resilient Floor Coverings" for guidance.
 4. Clean the floor surface and examine existing flooring to ensure all tiles are intact and fully bonded.
 5. Remove all loose or broken tiles.
 6. Patch affected areas with a high quality Portland cement based leveling or patching material (minimum 3000 psi compressive strength according to ASTM C109).
NOTE: Only use leveling or patching materials recommended by the manufacturer for this type of application. Apply leveling or patching materials in accordance with the manufacturers' instructions.

7. Check that the surface of the existing floor is flat to 1/8" in 10 ft. Smooth the surface to prevent telegraphing and level with a high quality Portland cement based smoothing or leveling material.
8. When all preparatory work is satisfactorily completed, proceed with the installation of Amtico flooring.
9. Please contact Amtico International Technical Services at 877-238-7869 for additional information.

3.3 FLOOR TILE INSTALLATION

- A. Comply with manufacturer's written instructions for installing floor tile.
- B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.
 1. Lay tiles square with room axis.
- C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.
 1. Lay tiles with grain running in one direction, long direction parallel with long dimension of room.
- D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.
 1. NOTE: Move the Clubhouse bar and rail and install tile continuously below footprint. Do NOT leave in place and scribe around. Mark location and reinstall to original location.
- E. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.
- F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent marking device.
- G. Adhere floor tiles to substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

3.4 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protecting floor tile.
- B. Perform the following operations immediately after completing floor tile installation:
 1. Remove adhesive and other blemishes from surfaces.
 2. Sweep and vacuum surfaces thoroughly.

3. Damp-mop surfaces to remove marks and soil.
- C. Protect floor tile from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
- D. Cover floor tile until Substantial Completion.

END OF SECTION 096519

SECTION 096813

TILE CARPETING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract - Standard Specifications for Public Works Construction 'The GREENBOOK' and City Supplement 'The WHITEBOOK', latest editions, including Supplemental Supplementary Provisions (SSPs), apply to this Section.

1.2 SUMMARY

- A. Section Includes:

- 1. Modular carpet tile.

- B. Related Requirements:

- 1. Section 024119 "Selective Demolition" for removing existing floor coverings.
- 2. Section 096513 "Resilient Base and Accessories" for resilient wall base and accessories installed with carpet tile.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.

- 1. Include manufacturer's written data on physical characteristics, durability, and fade resistance.
- 2. Include manufacturer's written installation recommendations for each type of substrate.

- B. Sustainable Design Submittals:

- 1. Product Data: For adhesives, indicating VOC content.
- 2. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.
- 3. Laboratory Test Reports: For flooring products, indicating compliance with requirements for low-emitting materials.

- C. Shop Drawings: For carpet tile installation, plans showing the following:
 - 1. Columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required in carpet tiles.
 - 2. Carpet tile type, color, and dye lot.
 - 3. Type of subfloor.
 - 4. Type of installation.
 - 5. Pattern of installation.
 - 6. Pattern type, location, and direction.
 - 7. Pile direction.
 - 8. Type, color, and location of insets and borders.
 - 9. Type, color, and location of edge, transition, and other accessory strips.
 - 10. Transition details to other flooring materials.

- D. Samples: For each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.
 - 1. Carpet Tile: Full-size Sample.
 - 2. Exposed Edge, Transition, and Other Accessory Stripping: 12-inch- (300-mm-) long Samples.

- E. Product Schedule: For carpet tile. Use same designations indicated on Drawings.

- F. Sustainable Product Certification: Provide ANSI/NSF 140 certification for carpet products.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Test Reports: For carpet tile, for tests performed by a qualified testing agency.
- C. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For carpet tiles to include in maintenance manuals. Include the following:
 - 1. Methods for maintaining carpet tile, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
 - 2. Precautions for cleaning materials and methods that could be detrimental to carpet tile.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Carpet Tile: Full-size units equal to 5 percent of amount installed for each type indicated, but not less than 4 sq. yd. (3.3 sq. m).

1.8 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who is certified by the International Certified Floorcovering Installers Association at the Commercial II certification level.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Comply with the Carpet and Rug Institute's CRI 104.

1.10 FIELD CONDITIONS

- A. Comply with the Carpet and Rug Institute's CRI 104 for temperature, humidity, and ventilation limitations.
- B. Environmental Limitations: Do not deliver or install carpet tiles until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at levels planned for building occupants during the remainder of the construction period.
- C. Where demountable partitions or other items are indicated for installation on top of carpet tiles, install carpet tiles before installing these items.

1.11 WARRANTY

- A. Special Warranty for Carpet Tiles: Manufacturer agrees to repair or replace components of carpet tile installation that fail in materials or workmanship within specified warranty period.
 - 1. Warranty does not include deterioration or failure of carpet tile due to unusual traffic, failure of substrate, vandalism, or abuse.
 - 2. Failures include, but are not limited to, the following:
 - a. More than 10 percent edge raveling, snags, and runs.
 - b. Dimensional instability.
 - c. Excess static discharge.
 - d. Loss of tuft-bind strength.
 - e. Loss of face fiber.
 - f. Delamination.

3. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 CARPET TILE

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
 1. Mannington Mills, Inc.
 2. Or approved equal.
- B. Color: Match Engineer's sample.
- C. Pattern: Match Engineer's samples.
- D. Fiber Content: 100 percent nylon 6, 6.
- E. Fiber Type: Antron Lumena Type 6,6 Nylon.
- F. Pile Characteristic: Pattern Loop pile.
- G. Density: Average = 6,667 oz./cu. yd.
- H. Pile Thickness: 0.108 inches for finished carpet tile.
- I. Stitches: 9.83 per inch.
- J. Gage: 5/64 ends per inch.
- K. Tufted Yarn Weight: 20 oz./cu.yd.
- L. Total Weight: <133,334 oz./sq. yd. (g/sq. m)> for finished carpet tile.
- M. Dye Method: Solution.
- N. Primary Backing/Backcoating: Manufacturer's standard composite materials, 100% synthetic.
- O. Secondary Backing: Infinity Modular Reinforced Composite Closed Cell Polymer.
- P. Size: 24 by 24 inches (610 by 610 mm).
- Q. Sustainable Design Requirements:
 1. Sustainable Product Certification: [Silver] [Gold] [Platinum] level certification according to ANSI/NSF 140.
 2. Flooring products shall comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile

Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

R. Performance Characteristics:

1. Appearance Retention Rating: Moderate traffic, 2.5 minimum according to ASTM D7330.
2. Critical Radiant Flux Classification: Not less than 0.45 W/sq. cm according to NFPA 253.
3. Dry Breaking Strength: Not less than 100 lbf (445 N) according to ASTM D2646.
4. Tuft Bind: Not less than 6.2 lbf (28 N) according to ASTM D1335.
5. Delamination: Not less than 3.5 lbf/in. (0.6 N/mm) according to ASTM D3936.
6. Dimensional Tolerance: Within 1/32 inch (0.8 mm) of specified size dimensions, as determined by physical measurement.
7. Dimensional Stability: 0.2 percent or less according to ISO 2551 (Aachen Test).
8. Colorfastness to Crocking: Not less than 4, wet and dry, according to AATCC 165.
9. Colorfastness to Light: Not less than 4 after 60 AFU (AATCC fading units) according to AATCC 16, Option E.
10. Electrostatic Propensity: Less than 3.5 kV according to AATCC 134.

2.2 INSTALLATION ACCESSORIES

- A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer.
- B. Adhesives: Water-resistant, mildew-resistant, nonstaining, pressure-sensitive type to suit products and subfloor conditions indicated, that comply with flammability requirements for installed carpet tile, and are recommended by carpet tile manufacturer for releasable installation.
 1. Adhesives shall have a VOC content of 50 g/L or less.
 2. Adhesive shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- C. Metal Edge/Transition Strips: Extruded aluminum with mill finish of profile and width shown, of height required to protect exposed edge of carpet, and of maximum lengths to minimize running joints.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet tile performance.

- B. Examine carpet tile for type, color, pattern, and potential defects.
- C. Concrete Slabs: Verify that finishes comply with requirements specified in Section 033000 "Cast-in-Place Concrete" and that surfaces are free of cracks, ridges, depressions, scale, and foreign deposits.
 - 1. Moisture Testing: Perform tests so that each test area does not exceed 1000 sq. ft. (304.8 sq. m), and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
 - a. Anhydrous Calcium Chloride Test: ASTM F1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m) in 24 hours.
 - b. Perform additional moisture tests recommended in writing by adhesive and carpet tile manufacturers. Proceed with installation only after substrates pass testing.
- D. Wood Subfloors: Verify the following:
 - 1. Underlayment over subfloor complies with requirements specified in Section 061600 "Sheathing."
 - 2. Underlayment surface is free of irregularities and substances that may interfere with adhesive bond or show through surface.
- E. Metal Subfloors: Verify the following:
 - 1. Underlayment surface is free of irregularities and substances that may interfere with adhesive bond or show through surface.
- F. Painted Subfloors: Perform bond test recommended in writing by adhesive manufacturer.
 - 1. Underlayment surface is flat, smooth, evenly planed, tightly jointed, and free of irregularities, gaps greater than [1/8 inch (3 mm)] <Insert dimension>, protrusions more than 1/32 inch (0.8 mm), and substances that may interfere with adhesive bond or show through surface.
- G. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. General: Comply with the Carpet and Rug Institute's CRI 104 and with carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile.
- B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions 1/8 inch (3 mm) wide or wider, and protrusions more than 1/32 inch (0.8 mm) unless more stringent requirements are required by manufacturer's written instructions.

- C. Concrete Substrates: Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by adhesive and carpet tile manufacturers.
- D. Metal Substrates: Clean grease, oil, soil and rust, and prime if recommended in writing by adhesive manufacturer. Rough sand painted metal surfaces and remove loose paint. Sand aluminum surfaces, to remove metal oxides, immediately before applying adhesive.
- E. Broom and vacuum clean substrates to be covered immediately before installing carpet tile.

3.3 INSTALLATION

- A. General: Comply with the Carpet and Rug Institute's CRI 104, Section 10, "Carpet Tile," and with carpet tile manufacturer's written installation instructions.
- B. Installation Method: As recommended in writing by carpet tile manufacturer. Glue down; install every tile with full-spread, releasable, pressure-sensitive adhesive.
- C. Maintain dye-lot integrity. Do not mix dye lots in same area.
- D. Maintain pile-direction patterns recommended in writing by carpet tile manufacturer.
- E. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet tile manufacturer.
- F. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
- G. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on carpet tile as marked on subfloor. Use nonpermanent, nonstaining marking device.
- H. Install pattern parallel to walls and borders.

3.4 CLEANING AND PROTECTION

- A. Perform the following operations immediately after installing carpet tile:
 - 1. Remove excess adhesive and other surface blemishes using cleaner recommended by carpet tile manufacturer.
 - 2. Remove yarns that protrude from carpet tile surface.
 - 3. Vacuum carpet tile using commercial machine with face-beater element.
- B. Protect installed carpet tile to comply with the Carpet and Rug Institute's CRI 104, Section 13.7.

POLICE RANGE REFURBISHMENT PROJECT – PHASE II

- C. Protect carpet tile against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet tile manufacturer.

END OF SECTION 096813

SECTION 099123

INTERIOR PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract - Standard Specifications for Public Works Construction 'The GREENBOOK' and City Supplement 'The WHITEBOOK', latest editions, including Supplemental Supplementary Provisions (SSPs), apply to this Section.

1.2 SUMMARY

- A. Section includes surface preparation and the application of paint systems on interior substrates.

- 1. Concrete.
- 2. Cement board.
- 3. Clay masonry.
- 4. Concrete masonry units (CMUs).
- 5. Steel and iron.
- 6. Galvanized metal.
- 7. Aluminum (not anodized or otherwise coated).
- 8. Copper.
- 9. Stainless steel.
- 10. Wood.
- 11. Fiberglass.
- 12. Plastic.
- 13. Gypsum board.
- 14. Plaster.
- 15. Acoustic panels and tiles.
- 16. Spray-textured ceilings.
- 17. Cotton or canvas insulation covering.
- 18. ASJ insulation covering.
- 19. Bituminous-coated surfaces.

- B. Related Requirements:

- 1. "Section 051200 "Structural Steel Framing" and "Section 051213 "Architecturally Exposed Structural Steel Framing" for shop priming structural steel.
- 2. Section 055000 "Metal Fabrications" for shop priming metal fabrications.
- 3. Section 099600 "High-Performance Coatings" for exterior coatings.

1.3 DEFINITIONS

- A. MPI Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D523.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
 - 1. Include Printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
 - 2. Indicate VOC content.
- B. Sustainable Design Submittals:
 - 1. Product Data: For paints and coatings, indicating VOC content.
 - 2. Laboratory Test Reports: For paints and coatings, indicating compliance with requirements for low-emitting materials.
- C. Samples for Verification: For each type of paint system and in each color and gloss of topcoat.
 - 1. Submit Samples on rigid backing, 8 inches (200 mm) square.
 - 2. Apply coats on Samples in steps to show each coat required for system.
 - 3. Label each coat of each Sample.
 - 4. Label each Sample for location and application area.
- D. Product List: Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules. Include color designations.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Paint: Provide 3 gal. (11.4 L) of each material and color applied.

1.6 QUALITY ASSURANCE

- A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Engineer will select one surface to represent surfaces and conditions for application of each paint system.

POLICE RANGE REFURBISHMENT PROJECT – PHASE II

- a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft. (9 sq. m).
 - b. Other Items: Architect will designate items or areas required.
2. Final approval of color selections will be based on mockups.
 - a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Engineer at no added cost to City.
 3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Engineer specifically approves such deviations in writing.

1.7 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 (7 deg C).
 1. Maintain containers in clean condition, free of foreign materials and residue.
 2. Remove rags and waste from storage areas daily.

1.8 FIELD CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F (10 and 35 deg C).
- B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Benjamin Moore & Co.
 2. Dunn-Edwards Corporation (a Nippon Paint Holdings Co. Ltd. company).
 3. Sherwin-Williams Company (The).
- B. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to products listed in the Interior Painting Schedule for the paint category indicated.

2.2 PAINT, GENERAL

- A. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products Lists."
- B. Material Compatibility:
 - 1. Materials for use within each paint system shall be 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 paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.
- C. VOC Content: For field applications that are inside the weatherproofing system, paints and coatings shall comply with VOC content limits of authorities having jurisdiction and the following VOC content limits:
 - 1. Flat Paints and Coatings: 50 g/L.
 - 2. Nonflat Paints and Coatings: 50 g/L.
 - 3. Dry-Fog Coatings: 150 g/L.
 - 4. Primers, Sealers, and Undercoaters: 100 g/L.
 - 5. Rust-Preventive Coatings: 100 g/L.
 - 6. Zinc-Rich Industrial Maintenance Primers: 100 g/L.
 - 7. Pretreatment Wash Primers: 420 g/L.
 - 8. Shellacs, Clear: 730 g/L.
 - 9. Shellacs, Pigmented: 550 g/L.
- D. Low-Emitting Materials: For field applications that are inside the weatherproofing system, 90 percent of paints and coatings shall comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- E. Colors: As selected by 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.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 - 1. Concrete: 12 percent.
 - 2. Fiber-Cement Board: 12 percent.
 - 3. Masonry (Clay and CMUs): 12 percent.

4. Wood: 15 percent.
5. Gypsum Board: 12 percent.
6. Plaster: 12 percent.

- C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.
- D. Plaster Substrates: Verify that plaster is fully cured.
- E. Spray-Textured Ceiling Substrates: Verify that surfaces are dry.
- F. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.
- G. Proceed with coating application only after unsatisfactory conditions have been corrected.
 1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" and "MPI Maintenance Repainting Manual" applicable to substrates and paint systems indicated.
- 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 if any.
- C. Clean substrates of substances that could impair bond of paints, 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 paint systems indicated.
- D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
- E. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceeds that permitted in manufacturer's written instructions.
- F. Steel Substrates: Remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer but not less than the following:
 1. SSPC-SP 3.

- G. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. 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. 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 paints.
 - 1. If galvanized metal is chromate passivated, consult manufacturer for appropriate surface preparation and primers.
- I. Aluminum Substrates: Remove loose surface oxidation.
- J. Wood Substrates:
 - 1. In lieu of the below, Refer to “Section 090190.91 – Painting Restoration” for preparation of existing wood materials in designated historic structures.
 - 2. Scrape and clean knots, and apply coat of knot sealer before applying primer.
 - 3. Sand surfaces that will be exposed to view, and dust off.
 - 4. Prime edges, ends, faces, undersides, and backsides of wood.
 - 5. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.
- K. Cotton or Canvas Insulation Covering Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.

3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions and to recommendations in "MPI Manual."
 - 1. Use applicators and techniques suited for paint and substrate indicated.
 - 2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
 - 3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
 - 4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
 - 5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.
- B. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- C. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

- D. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
1. Paint the following work where exposed in equipment rooms:
 - a. Equipment, including panelboards.
 - b. Uninsulated metal piping.
 - c. Uninsulated plastic piping.
 - d. Pipe hangers and supports.
 - e. Metal conduit.
 - f. Plastic conduit.
 - g. Tanks that do not have factory-applied final finishes.
 - h. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
 2. Paint the following work where exposed in occupied spaces:
 - a. Equipment, including panelboards.
 - b. Uninsulated metal piping.
 - c. Uninsulated plastic piping.
 - d. Pipe hangers and supports.
 - e. Metal conduit.
 - f. Plastic conduit.
 - g. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
 - h. Other items as directed by Engineer.
 3. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.

3.4 FIELD QUALITY CONTROL

- A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.
1. Contractor shall touch up and restore painted surfaces damaged by testing.
 2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 INTERIOR PAINTING SCHEDULE

A. Concrete Substrates, Nontraffic Surfaces:

- 1. High-Performance Architectural Latex System **MPI INT 3.1C**:
 - a. Prime Coat: Primer, alkali resistant, water based, **MPI #3**.
 - b. Intermediate Coat: Latex, interior, high performance architectural, matching topcoat.
 - c. Topcoat: Latex, interior, high performance architectural (MPI Gloss Level 4), **MPI #140**.

B. Steel Substrates:

- 1. High-Performance Architectural Latex System **MPI INT 5.1RR**:
 - a. Prime Coat: Primer, alkyd, anti-corrosive, for metal, **MPI #79**.
 - b. Intermediate Coat: Latex, interior, high performance architectural, matching topcoat.
 - c. Topcoat: Latex, interior, high performance architectural (MPI Gloss Level 4), **MPI #140**.

C. Galvanized-Metal Substrates:

- 1. High-Performance Architectural Latex System **MPI INT 5.3M**:
 - a. Prime Coat: Primer, galvanized, water based, **MPI #134**.
 - b. Intermediate Coat: Latex, interior, high performance architectural, matching topcoat.
 - c. Topcoat: Latex, interior, high performance architectural (MPI Gloss Level 4), **MPI #140**.

D. Wood Substrates: Exposed framing.

- 1. High-Performance Architectural Latex System **MPI INT 6.2B**:
 - a. Prime Coat: Primer, latex, for interior wood, **MPI #39**.

POLICE RANGE REFURBISHMENT PROJECT – PHASE II

- b. Intermediate Coat: Latex, interior, high performance architectural, matching topcoat.
 - c. Topcoat: Latex, interior, high performance architectural (MPI Gloss Level 4), **MPI #140**.
- E. Wood Substrates: **Wood trim, Architectural woodwork, Doors, Windows**.
- 1. High-Performance Architectural Latex System **MPI INT 6.3A**:
 - a. Prime Coat: Primer, latex, for interior wood, **MPI #39**.
 - b. Intermediate Coat: Latex, interior, high performance architectural, matching topcoat.
 - c. Topcoat: Latex, interior, high performance architectural (MPI Gloss Level 4), **MPI #140**.
- F. Wood Substrates: **Casework**.
- 1. High-Performance Architectural Latex System **MPI INT 6.4S**:
 - a. Prime Coat: Primer, latex, for interior wood, **MPI #39**.
 - b. Intermediate Coat: Latex, interior, high performance architectural, matching topcoat.
 - c. Topcoat: Latex, interior, high performance architectural (MPI Gloss Level 4), **MPI #140**.
- G. **Gypsum Board and Plaster** Substrates:
- 1. High-Performance Architectural Latex System **MPI INT 9.2B**:
 - a. Prime Coat: Primer sealer, latex, interior, **MPI #50**.
 - b. Intermediate Coat: Latex, interior, high performance architectural, matching topcoat.
 - c. Topcoat: Latex, interior, high performance architectural (MPI Gloss Level 4), **MPI #140**.

END OF SECTION 099123

SECTION 09 96 00
HIGH-PERFORMANCE COATINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract - Standard Specifications for Public Works Construction 'The GREENBOOK' and City Supplement 'The WHITEBOOK', latest editions, including Supplemental Supplementary Provisions (SSPs), apply to this Section.

1.2 SUMMARY

- A. Section includes surface preparation and the application of high-performance coating systems on the following substrates:

- 1. Exterior Substrates:

- a. Concrete, vertical surfaces.
 - b. Fiber-cement board.
 - c. Steel.
 - d. Galvanized metal.
 - e. Wood.

- 2. Interior Substrates:

- a. NOT APPLICABLE. ALL SUBSTRATES ARE CONSIDERED EXTERIOR ON ALL SURFACES.

- B. Related Requirements:

- 1. Section 051200 "Structural Steel Framing" and Section 051213 "Architecturally Exposed Structural Steel Framing" for shop priming of structural steel with primers specified in this Section.

1.3 DEFINITIONS

- A. MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.
- B. MPI Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.
- C. MPI Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
 - 1. Include printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
 - 2. Indicate VOC content.
- B. Samples for Initial Selection: For each type of topcoat product indicated.
- C. Samples for Verification: For each type of coating system and each color and gloss of topcoat indicated.
 - 1. Submit Samples on rigid backing, 8 inches (200 mm) square.
 - 2. Apply coats on Samples in steps to show each coat required for system.
 - 3. Label each coat of each Sample.
 - 4. Label each Sample for location and application area.
- D. Product List: Cross-reference to coating system and locations of application areas. Use same designations indicated on Drawings and in schedules. Include color designations.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Coatings: 5 gallons of each material and color applied.

1.6 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 (7 deg C).
 - 1. Maintain containers in clean condition, free of foreign materials and residue.
 - 2. Remove rags and waste from storage areas daily.

1.7 FIELD CONDITIONS

- A. Apply coatings only when temperature of surfaces to be coated and ambient air temperatures are between 50 and 95 deg F (10 and 35 deg C).
- B. Do not apply coatings when relative humidity exceeds 85 percent; at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.
- C. Do not apply exterior coatings in snow, rain, fog, or mist.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Products: Subject to compliance with requirements, provide product listed in the Exterior High-Performance Coating Schedule for the coating category indicated.

2.2 HIGH-PERFORMANCE COATINGS, GENERAL

- A. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products Lists."
- B. Material Compatibility:
 - 1. Materials for use within each paint system shall be 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 paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.
 - 3. Products shall be of same manufacturer for each coat in a coating system.
- C. Colors: Match Architect's samples.

2.3 SOURCE QUALITY CONTROL

- A. Testing of Coating Materials: Owner reserves the right to invoke the following procedure:
 - 1. Owner will engage the services of a qualified testing agency to sample coating materials. Contractor will be notified in advance and may be present when samples are taken. If coating materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
 - 2. Testing agency will perform tests for compliance with product requirements.
 - 3. Owner may direct Contractor to stop applying coatings if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying coating materials from Project site, pay for testing, and recoat surfaces coated with rejected materials. Contractor will be required to remove rejected materials from previously coated surfaces if, on recoating with complying materials, the two coatings are incompatible.

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.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 - 1. Concrete: 12 percent.
 - 2. Fiber-Cement Board: 12 percent.
 - 3. Masonry (Clay and CMUs): 12 percent.
 - 4. Wood: 15 percent.
 - 5. Gypsum Board: 12 percent.
 - 6. Plaster: 12 percent.
- C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.
- D. Plaster Substrates: Verify that plaster is fully cured.
- E. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.
- F. Proceed with coating application only after unsatisfactory conditions have been corrected.
 - 1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and coating systems indicated.
- 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 if any.
- 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. Abrasive blast clean surfaces to comply with SSPC-SP 7/NACE No. 4.
- E. Masonry Substrates: Remove efflorescence and chalk. Do not coat surfaces if moisture content, alkalinity of surfaces, or alkalinity of mortar joints exceeds that permitted in manufacturer's written instructions.
1. Clean surfaces with pressurized water. Use pressure range of 1500 to 4000 psi (10 350 to 27 580 kPa) at 6 to 12 inches (150 to 300 mm).
- F. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.
- G. 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.
- H. Wood Substrates:
1. Scrape and clean knots. Before applying primer, apply coat of knot sealer that is recommended in writing by topcoat manufacturer for coating system indicated.
 2. Sand surfaces that will be exposed to view and dust off.
 3. Prime edges, ends, faces, undersides, and backsides of wood.
 4. After priming, fill holes and imperfections in the finish surfaces with filler that is recommended in writing by topcoat manufacturer for coating system indicated. Sand smooth when dried.

3.3 APPLICATION

- A. Apply high-performance coatings according to manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual."
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. Coat backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
 4. Do not apply coatings over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
- B. If undercoats or other conditions show through final coat, apply additional coats until cured film has a uniform coating finish, color, and appearance.

POLICE RANGE REFURBISHMENT PROJECT – PHASE II

- C. 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 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.

3.5 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 to work of other trades by cleaning, repairing, replacing, and recoating, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced coated surfaces.

3.6 EXTERIOR HIGH-PERFORMANCE COATING SCHEDULE

- A. Concrete Substrates, Vertical Surfaces:
 - 1. Clear Anti-graffiti system:
 - a. Manufacturer: Monopole, Inc. or approved equal.
 - b. First Coat: Aquaseal ME12 (Item 5200).
 - c. Second Coat: Permashield Base (Item 6100).
 - d. Third Coat: Permasheild Premium (Item 5600) Matte finish.
 - e. Fourth Coat: Permasheild Permium (Item 5600) Matte finish.
- B. Cement Board Substrates:
 - 1. Epoxy-Modified Latex System **MPI EXT 3.3D**

POLICE RANGE REFURBISHMENT PROJECT – PHASE II

- a. Prime Coat: Epoxy-modified latex, matching topcoat.
- b. Intermediate Coat: Epoxy-modified latex, matching topcoat.
- c. Topcoat: Epoxy-modified latex, semi-gloss (MPI Gloss Level 5), **MPI #215**.
 - 1) Sherwin Williams, or approved equal.

C. Steel Substrates – Shade Structures:

- 1. 1st Coat/Primer: SW ‘PRO-CRYL Universal Primer’ B66-310 Series (5-10 mils/wet, 2-4mils/dry).
 - a. Manufacturer Description: Advanced technology self cross-linking acrylic primer. Rust inhibitive, VOC compliant, single component, early moisture resistance, fast dry, low temperature application.
 - b. Color: As recommended by top coat manufacturer.
 - c. Finish: Low sheen.
 - d. VOC (EPA Method 24):Unreduced: <100g/L;<0.83 ob/gal.
 - e. Volume Solids: 39% +/- 2%.
 - f. Weight Solids: 53% +/- 2%.
 - g. Weight per Gallon: 10.8 lb.
 - h. Performance: Comparable to products formulated to federal specification: AA50557 and Paint Specification: SSPC-Paint 23.
 - i. Surface Preparation: SSPC-SP10.
 - j. Physical Properties:

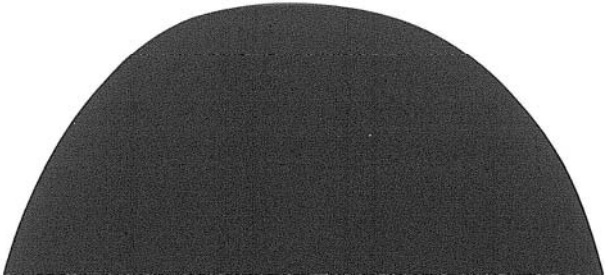
Physical Performance Test + Method	Result
Adhesion per ASTM D4541	500 psi
Corrosion Weathering per ASTM D5894, 10 cycles, 3360 hours	Passes
Direct Impact Resistance per ASTM D2794	>140 in lbs
Dry Heat Resistance per ASTM D2485	200 degrees F
Flexibility per ASTM D522, 180 degree bend, 1/4 inch mandrel	Passes
Moisture Condensation Resistance per ASTM D4585, 100 degrees F, 1250 hours	Passes
Pencil Hardness per ASTM D3363	H
Salt Fog Resistance per ASTM B117, 1250 hours	Passes

- 2. 2nd and 3rd Coats: SW ‘SuperPaint Exterior Latex Flat’ A80-100 Series (4 mils/wet, 1.6 mils/dry).
 - a. Manufacturer’s finest quality exterior flat finish.

POLICE RANGE REFURBISHMENT PROJECT – PHASE II

- b. Color: Custom color scanned by Sherwin Williams from existing sample. Order No. 8277-0060746 (see below for image of color formula).

SHERWIN-WILLIAMS 01/22/13
 Sher-Color(tm) Order# 8277-0060746
 EXTERIOR ARCHITECTURAL
 RESILIENCE LATEX
 FLAT IFC 8012N
 PISTOL RANGE GREEN
 CUSTOM SHER-COLOR MATCH
 CCEXCOLORANT 02 32 64 128
 W1-White - 11 - 1
 B1-Black - 33 1 1
 G2-New Green - - 1 1
 N1-Raw Umber - 14 - 1
 Y3-Deep Gold - 19 - 1
 QUART ULTRADEEP
 K42T00054 640413415



Non Returnable Tinted Color
 CAUTION: To assure consistent color, always order enough paint to complete the job and intermix all containers of the same color before application. Mixed colors may vary slightly from color strip or color chip.

 0060746-006

- c. Finish: Flat.
- d. VOC (less exempt solvents): 49 g/L; 0.41 lb/gal.
- e. Volume Solids: 36 +/- 2%.
- f. Weight Solids: 54 +/- 2%.
- g. Weight per Gallon: 11.4 lb.
- h. Vehicle Type: Acrylic 'A80W01151'.
- i. NOTE: Due to nature of acrylic coating and length of curing period. Top coat to be field applied to avoid damage that may otherwise occur during transportation from shop.

D. Steel Substrates – Other than Shade Structures:

- 1. Pigmented Polyurethane over Epoxy Zinc-Rich Primer System **MPI EXT 5.1P**:
 - a. Prime Coat: Primer, zinc rich, epoxy, **MPI #20**.
 - 1) Sherwin Williams Zinc Clad IV.
 - b. Intermediate Coat: Epoxy, gloss, **MPI #77**.
 - 1) Sherwin Williams Tile-Clad HS Epoxy.
 - c. Topcoat: Polyurethane, two component, pigmented, gloss (MPI Gloss Level 6), **MPI #72**.
 - 1) Sherwin Williams Acrolon 218 HS.

E. Galvanized-Metal Substrates:

1. Pigmented Polyurethane over Epoxy Primer System **MPI EXT 5.3L**:
 - a. Prime Coat: Primer, epoxy, anti-corrosive, for meta, **MPI #101**.
 - 1) Sherwin Williams Dura-Plate 235 Multi-Purpose Epoxy.
 - b. Intermediate Coat: Polyurethane, two component, pigmented, gloss matching topcoat.
 - c. Topcoat: Polyurethane, two component, pigmented, gloss (MPI Gloss Level 6), **MPI #72**.
 - 1) Sherwin Williams Acrolon 218 HS.
- F. Wood Substrates: Exposed framing.
 1. Pigmented Polyurethane System **MPI EXT 6.2J**:
 - a. Prime Coat: Polyurethane, two component, pigmented, gloss, matching topcoat.
 - b. Intermediate Coat: Polyurethane, two component, pigmented, gloss, matching topcoat.
 - c. Topcoat: Polyurethane, two component, pigmented, gloss (MPI Gloss Level 6), **MPI #72**.
 - 1) Sherwin Williams Acrolon 218 HS.
- G. Wood Substrates: Equipment Backboards.
 1. Latex System – Semi Gloss:
 - a. 1st Coat: S-W Exterior Latex Wood Primer, B42W8041.
 - b. 2nd Coat: S-W Sonoran Int/Ext Acrylic Latex Semi-Gloss, B40WJ9850 Series.
 - c. 3rd Coat: S-W Sonoran Int/Ext Acrylic Latex Semi-Gloss, B40WJ9850 Series.
- H. ARCHITECTURAL PVC, PLASTIC, FIBERGLASS (panels per Section 07 4233 – Plastic Wall Panels) (due to the variety of substrate, check for compatibility).
 1. Latex Systems – Semi Gloss.
 - a. 1st Coat: S-W DTM Bonding Primer.
 - b. 2nd Coat: S-W Pro-Industrial Zero VOC Semi-Gloss, B66-650 Series.
 - c. 3rd Coat: S-W Pro-Industrial Zero VOC Semi-Gloss, B66-650 Series.

END OF SECTION 099600

SECTION 10 14 23.13

ROOM-IDENTIFICATION SIGNAGE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract - Standard Specifications for Public Works Construction 'The GREENBOOK' and City Supplement 'The WHITEBOOK', latest editions, including Supplemental Supplementary Provisions (SSPs), apply to this Section.

1.2 SUMMARY

- A. Section includes room-identification signs that are directly attached to the building.

1.3 DEFINITIONS

- A. Accessible: In accordance with the accessibility standard.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For room-identification 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 other installers, and accessories.
 - 3. Show message list, typestyles, graphic elements, including raised characters and Braille, and layout for each sign at least half size.
- C. Product Schedule: For room-identification signs. Use same designations indicated on Drawings or specified.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and manufacturer.
- B. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For signs to include in maintenance manuals.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Tools: One set(s) of specialty tools for assembling signs and replacing variable sign components.

1.8 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Deterioration of finishes beyond normal weathering.
 - b. Deterioration of embedded graphic image.
 - c. Separation or delamination of sheet materials and components.
 - 2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Accessibility Standard: Comply with applicable provisions in the USDOJ's "2010 ADA Standards for Accessible Design" and 2016 California Building Code.

2.2 ROOM-IDENTIFICATION SIGNS

- A. Room-Identification Sign: Sign with smooth, uniform surfaces; with message and characters having uniform faces, eased or rounded corners, eased or chamfered edges, and precisely formed lines and profiles; and as follows:
 - 1. Panel Sign: Aluminum plate with raised graphics.
 - a. Thickness: .125 inch.
 - b. Color(s): As selected by Architect from manufacturer's full range.
 - 2. Mounting: Surface mounted to wall with countersunk flathead vandal-proof through fasteners and either adhesive or VHB two-face tape.
 - 3. Text and Typeface: Accessible raised characters and Braille. Finish raised characters to contrast with background color, and finish Braille to match background color.

- a. Neue Helvetica, or approved equal.

2.3 SIGN MATERIALS

- A. Aluminum Sheet and Plate: ASTM B 209 (ASTM B 209M), alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.
- B. Paints and Coatings for Sheet Materials: Inks, dyes, and paints that are recommended by manufacturer for optimum adherence to surface and are UV and water resistant for colors and exposure indicated.
- C. Braille: 100% domed, direct 3D-print Braille dots, coated with exterior grade acrylic polyurethane paint.
- D. Letters: Integrally colored 1/32" thick, adhesive-backed raised letters are applied after exterior grade paint application.

2.4 ACCESSORIES

- A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of signs, 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 stainless-steel devices unless otherwise indicated.
 - 3. Exposed Metal-Fastener Components, General:
 - a. Fabricated from same basic metal and finish of fastened sign unless otherwise indicated.
 - b. Fastener Heads: Use flathead or oval countersunk screws and bolts with tamper-resistant spanner-head slots unless otherwise indicated.
 - 4. Sign Mounting Fasteners:
 - a. Through Fasteners: Exposed metal fasteners matching sign finish, with type of head indicated, and installed in predrilled holes.
- B. Adhesive: As recommended by sign manufacturer.
- C. Two-Face Tape: Manufacturer's standard high-bond, foam-core tape, 0.045 inch (1.14 mm) thick, with adhesive on both sides.

2.5 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. Provide rabbets, lugs, and tabs 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.

2.6 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.

2.7 ALUMINUM FINISHES

- A. Color Anodic Finish: AAMA 611, Class I, 0.018 mm or thicker.
- B. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils (0.04 mm). Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
- C. Exterior grade high-performance acrylic polyurethane paint.
 1. Matthews Satin Acrylic Polyurethane, or equal.
 - a. Gloss level: in compliance with ADA and CBC.

PART 3 - EXECUTION

3.1 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.

- B. Accessibility: Install signs in locations on walls as indicated on Drawings and according to the 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. Through Fasteners: Drill holes in substrate using predrilled holes in sign as template. Countersink holes in sign if required. Place sign in position and flush to surface. Install through fasteners and tighten.
 - 3. Adhesive: Clean bond-breaking materials from substrate surface and remove loose debris. Apply linear beads or spots of adhesive symmetrically to back of sign and of suitable quantity to support weight of sign after cure without slippage. Keep adhesive away from edges to prevent adhesive extrusion as sign is applied and to prevent visibility of cured adhesive at sign edges. Place sign in position, and push to engage adhesive. Temporarily support sign in position until adhesive fully sets.
 - 4. 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.

3.2 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 101423.13

SECTION 10 28 00

TOILET AND BATH ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract - Standard Specifications for Public Works Construction 'The GREENBOOK' and City Supplement 'The WHITEBOOK', latest editions, including Supplemental Supplementary Provisions (SSPs), apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Public-use washroom accessories.
 - 2. Air dryers.
 - 3. Custodial accessories.

1.3 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.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
 - 2. Include anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
 - 3. Include electrical characteristics.
- 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 accessories using designations indicated.

1.5 INFORMATIONAL SUBMITTALS

- A. Sample Warranty: For manufacturer's special warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For accessories to include in maintenance manuals.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.2 PUBLIC-USE WASHROOM ACCESSORIES

- A. Source Limitations: Obtain public-use washroom accessories from single source from single manufacturer.
- B. Toilet Tissue (Roll) Dispenser < A >:
 - 1. Description: Roll-in-reserve dispenser with hinged front secured with tumbler lockset.
 - 2. Mounting: Recessed.
 - 3. Operation: Noncontrol delivery with theft-resistant spindle.
 - 4. Capacity: Designed for 5-inch- (127-mm-) diameter tissue rolls.
 - 5. Material and Finish: Stainless steel, No. 4 finish (satin).
- C. Liquid-Soap Dispenser < J >:
 - 1. Description: Designed for dispensing soap in liquid form.
 - 2. Mounting: Horizontally oriented, surface mounted.
 - 3. Capacity: 40 oz. (1.2 L).
 - 4. Materials: Stainless steel, 22 Ga, No. 4 finish (satin). Body is drawn, one-piece, seamless construction. Clear acrylic refill-indicator window. Black molded plastic push button and spout.
 - 5. Lockset: Tumbler type.
 - 6. Refill Indicator: Window type.
- D. Grab Bar < B >:
 - 1. Mounting: Flanges with concealed fasteners.
 - 2. Material: Stainless steel, 0.05 inch (1.3 mm) thick.
 - a. Finish: Smooth, No. 4 finish (satin).

POLICE RANGE REFURBISHMENT PROJECT – PHASE II

3. Outside Diameter: 1-1/2 inches (38 mm).
 4. Configuration and Length: Straight, 54 inches long.
- E. Grab Bar < C >:
1. Mounting: Flanges with concealed fasteners.
 2. Material: Stainless steel, 0.05 inch (1.3 mm) thick.
 - a. Finish: Smooth, No. 4 finish (satin).
 3. Outside Diameter: 1-1/2 inches (38 mm).
 4. Configuration and Length: Straight, 42 inches long.
- F. Grab Bar < E >:
1. Mounting: Flanges with concealed fasteners.
 2. Material: Stainless steel, 0.05 inch (1.3 mm) thick.
 - a. Finish: Smooth, No. 4 finish (satin).
 3. Outside Diameter: 1-1/2 inches (38 mm).
 4. Configuration and Length: Straight, 30 inches long.
- G. Sanitary-Napkin Disposal Unit < G >:
1. Mounting: Surface mounted.
 2. Door or Cover: Self-closing, disposal-opening cover and hinged face panel with tumbler lockset.
 3. Receptacle: Removable.
 4. Material and Finish: Stainless steel, No. 4 finish (satin).
- H. Paper Towel Dispenser < H >:
1. Mounting: Recess mounted.
 2. Minimum Capacity: 350 C-fold or 475 multifold paper towels.
 3. Exposed Material and Finish: Stainless steel, No. 4 finish (satin).
 4. Lockset: Tumbler type.
- I. Seat-Cover Dispenser < F >:
1. Mounting: Surface mounted.
 2. Minimum Capacity: 250 seat covers.
 3. Exposed Material and Finish: Stainless steel, No. 4 finish (satin).
 4. Lockset: Tumbler type.
- J. Mirror Unit < D >:
1. Frame: Stainless-steel channel.
 - a. Corners: Mitered and mechanically interlocked.
 2. Hangers: Produce rigid, tamper- and theft-resistant installation, using method indicated below.
 - a. One-piece, galvanized-steel, wall-hanger device with spring-action locking mechanism to hold mirror unit in position with no exposed screws or bolts.

3. Size: As indicated on Drawings.

K. Coat Hook < L >:

1. Description: Single-prong unit.
2. Material and Finish: Stainless steel, No. 4 finish (satin).

2.3 MATERIALS

- A. Stainless Steel: ASTM A 666, Type 304, 0.031-inch (0.8-mm) minimum nominal thickness unless otherwise indicated.
- B. Fasteners: Screws, bolts, and other devices of same material as accessory unit and tamper-and-theft resistant where exposed, and of galvanized steel where concealed.
- C. Mirrors: ASTM C 1503, Mirror Glazing Quality, clear-glass mirrors, nominal 6.0 mm thick.

2.4 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 Owner's representative.

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 (1112 N), 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 instructions.

POLICE RANGE REFURBISHMENT PROJECT – PHASE II

END OF SECTION 102800

SECTION 10 44 16
FIRE EXTINGUISHERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract - Standard Specifications for Public Works Construction 'The GREENBOOK' and City Supplement 'The WHITEBOOK', latest editions, including Supplemental Supplementary Provisions (SSPs), apply to this Section.

1.2 SUMMARY

- A. Section includes portable, hand-carried fire extinguishers and mounting brackets for fire extinguishers.
- B. Owner-Furnished Material: Hand-carried fire extinguishers.
- C. Related Requirements:
 - 1. Section 104413 "Fire Protection Cabinets."

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include rating and classification, material descriptions, dimensions of individual components and profiles, and finishes for fire extinguisher and mounting brackets.

1.4 INFORMATIONAL SUBMITTALS

- A. Warranty: Sample of special warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For fire extinguishers to include in maintenance manuals.

1.6 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace fire extinguishers that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Failure of hydrostatic test according to NFPA 10.
 - b. Faulty operation of valves or release levers.
 - 2. Warranty Period: Six years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."
- B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.

2.2 PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS

- A. Fire Extinguishers: Type, size, and capacity for each mounting bracket indicated.
 - 1. Valves: Manufacturer's standard.
 - 2. Handles and Levers: Stainless steel.
 - 3. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B, and bar coding for documenting fire-extinguisher location, inspections, maintenance, and recharging.
- B. Multipurpose Dry-Chemical Type in Steel Container: UL-rated 2-A:10-B:C, 5-lb (2.3-kg) nominal capacity, with monoammonium phosphate-based dry chemical in enameled-steel container.

2.3 MOUNTING BRACKETS

- A. Mounting Brackets: Manufacturer's standard galvanized steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated or red baked-enamel finish.
- B. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.
 - 1. Identify bracket-mounted fire extinguishers with the words "FIRE EXTINGUISHER" in red letter decals applied to mounting surface.

- a. Orientation: Vertical.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine fire extinguishers for proper charging and tagging.
 - 1. Remove and replace damaged, defective, or undercharged fire extinguishers.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Install fire extinguishers and mounting brackets in locations indicated and in compliance with requirements of authorities having jurisdiction.
 - 1. Mounting Brackets: 42 inches (1372 mm) above finished floor to top of fire extinguisher.
- B. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated.

END OF SECTION 104416

SECTION 116723

SHOOTING RANGE EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract - Standard Specifications for Public Works Construction 'The GREENBOOK' and City Supplement 'The WHITEBOOK', latest editions, including Supplemental Supplementary Provisions (SSPs), apply to this Section.

1.2 SUMMARY

A. Section Includes:

- 1. Modular, self-supporting, self-contained shooting range bullet backstop and containment trap for use on heavy use outdoor ranges.
- 2. Actuated target mount and turning system.
- 3. "Running man" target system.
- 4. Protective Kneewall.

B. Related Requirements:

- 1. Section 030000 "Cast-in-Place Concrete" for concrete trap installation pad.

1.3 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written instructions to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of off-site fabrications that are anchored to or that receive other work. 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. Deliver such items to Project site in time for installation.
- C. Coordinate with existing range equipment and utilities, including power, data network, controls, and compressed air system.

1.4 ACTION SUBMITTALS

A. Product Data: For the following:

- 1. Prefabricated modular bullet traps.

2. Manufactured target systems.
 3. Protective kneewall.
- B. Shop Drawings: Show fabrication and installation details. Include plans, elevations, sections, and details of fabrications and their connections. Show anchorage and accessory items. Provide Shop Drawings for the following:
1. Modular bullet backstop and containment traps.
 2. Modular bullet backstop and containment trap with actuated target mount and turning system.
 3. Installation of protective kneewall in relation to “running man” target system.
- C. Delegated-Design Submittal: For modular bullet backstop and containment traps (all ranges), and inverted actuated target mount and turning system suspended from top of trap (applies at East/Qualification Range only), including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For professional engineer's experience with providing delegated-design engineering services of the kind indicated, including documentation that engineer is licensed in the jurisdiction in which Project is located.
- B. Welding certificates.
- C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.
- D. Research Reports: For post-installed anchors.

1.6 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel in accordance with the following:
1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
 3. AWS D1.6/D1.6M, "Structural Welding Code - Stainless Steel."
- B. Manufacturer Qualifications
1. The manufacturer must have a minimum of one completed project of comparable size and complexity. Fabrication shall not be subcontracted out but must be done on-sight on manufacturer's property. Trap shall be installed by the manufacturer, with the installation supervisor also having one completed project of comparable size and complexity.
 2. Manufacturer shall provide a list of clients who have the same equipment of equal or greater size that is being bid (prior installations of the assembly, steel type and application meeting all specifications listed.)

3. Manufacturer shall stock all components for the Modular Bullet Trap and Containment System such that they shall be available for shipment within 24 hours of order.
4. Manufacturer must provide a toll-free telephone number and a dedicated toll-free customer service number with access to a customer service representative.

PART 2 - PRODUCTS

- A. Delegated Design: Engage a qualified professional engineer, registered as a professional engineering in the State of California, to design modular backstop and containment traps.
 1. All engineering and calculations necessary to satisfy the City of San Diego Development Services Department (DSD) for approval shall be included and performed by the manufacturer or manufacturer's engineer, including all features graphically illustrated on drawings and described in the following specification. Engineer shall be registered for practice in the state of California. See structural drawings for concrete slab and anchoring requirements only. See civil drawings for concrete slab finish surface elevation requirements.
 2. Contractor is responsible to obtain the deferred submittal approval through the City Development Services Department.
 3. Contractor shall submit to City DSD within 30 days of start of contract and allow adequate time in schedule for review and approval of the specified bullet trap system without causing delay to the Work.
 4. Prior to DSD Submittal, provide Engineer with a preliminary submittal for limited review of exposed items, major components and location on range.
 5. Once City approval is obtained, provide Engineer with record submittal, including drawings as issued by City Development Services Department.
- B. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.
 1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

2.2 METALS

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.
- B. Steel Plates, Shapes, and Bars: ASTM A36/A36M.
- C. Stainless Steel Sheet, Strip, and Plate: ASTM A240/A240M or ASTM A666, Type 304.
- D. Stainless Steel Bars and Shapes: ASTM A276/A276M, Type 304.
- E. Steel Tubing: ASTM A500/A500M, cold-formed steel tubing.

POLICE RANGE REFURBISHMENT PROJECT – PHASE II

- F. Steel Pipe: ASTM A53/A53M, Standard Weight (Schedule 40) unless otherwise indicated.
- G. Slotted Channel Framing: Cold-formed metal box channels (struts) complying with MFMA-4.
 - 1. Size of Channels: As required by manufacturer.
 - 2. Material: Cold-rolled steel, ASTM A1008/A1008M, thickness as required by manufacturer; hot-dip galvanized after fabrication.
- H. Aluminum Plate and Sheet: ASTM B209 (ASTM B209M), Alloy 6061-T6.
- I. Aluminum Extrusions: ASTM B221 (ASTM B221M), Alloy 6063-T6.
- J. Aluminum Castings: ASTM B26/B26M, Alloy 443.0-F.
- K. Abrasion Resistant Steel Plates: AR500 and AR550 series. Quenched, tempered, through-hardened, abrasion-resistant grade of steel plate. Specialized plate designed for severe impact and abrasion applications. Typical Brinell Hardness range 470-530.

2.3 FASTENERS

- A. General: Unless otherwise indicated, provide Type 304 stainless steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.
 - 1. Provide stainless steel fasteners for fastening aluminum stainless steel or nickel silver.
 - 2. Provide bronze fasteners for fastening bronze.
- B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A307, Grade A (ASTM F568M, Property Class 4.6); with hex nuts, ASTM A563 (ASTM A563M); and, where indicated, flat washers.
- C. Stainless Steel Bolts and Nuts: Regular hexagon-head annealed stainless steel bolts, ASTM F593 (ASTM F738M); with hex nuts, ASTM F594 (ASTM F836M); and, where indicated, flat washers; Alloy Group 1 (A1).
- D. Anchor Bolts: ASTM F1554, Grade 36, of dimensions indicated; with nuts, ASTM A563 (ASTM A563M); and, where indicated, flat washers.
 - 1. Hot-dip galvanize or provide mechanically deposited, zinc coating where item being fastened is indicated to be galvanized.
- E. Anchors, General: 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 in accordance with ASTM E488/E488M, conducted by a qualified independent testing agency.

- F. Cast-in-Place Anchors in Concrete: Either threaded or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A47/A47M malleable iron or ASTM A27/A27M cast steel. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F2329/F2329M.
- G. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors.
 - 1. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 (A1) stainless steel bolts, ASTM F593 (ASTM F738M), and nuts, ASTM F594 (ASTM F836M).

2.4 FABRICATION, GENERAL

- A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm) unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- D. Form exposed work with accurate angles and surfaces and straight edges.
- E. Weld corners and seams continuously to comply with the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.
- G. Fabricate seams and other connections that are exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
- I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

- J. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 by 1-1/2 inches (3.2 by 38 mm), with a minimum 6-inch (150-mm) embedment and 2-inch (50-mm) hook, not less than 8 inches (200 mm) from ends and corners of units and 24 inches (600 mm) o.c., unless otherwise indicated.

2.5 MODULAR BULLET BACKSTOP AND CONTAINMENT TRAP

- A. Basis of Design Manufacturer:
 - 1. Action Target; 3411 South Mountain Parkway, Provo, UT 84606; Tel: 801-705-9149; www.actiontarget.com ; Contact: Chris Hart, chrish@actiontarget.com .
 - 2. Product: Total Containment Trap (TCT).
 - 3. Or approved equal.
- B. The bullet trap and containment system shall be a self-supporting, self-contained bullet backstop and containment unit of steel plate construction for heavy use on outdoor high-volume ranges.
- C. The trap plate layout shall employ a sloping funnel design with 4 top and 4 bottom impact plates constructed of 3/8 or 1/2-inch thick steel with a mill certification of AR500.
- D. The bullet trap and containment system shall be fully modular such that it may be assembled on-site or disassembled and moved.
 - 1. Assembly shall not require “permanent” connection means such as welding, riveting, etc.
 - 2. All modular components shall be completely prefabricated for simple assembly on site and shall not require cutting of materials or other sizing operations.
 - 3. All modular components shall be small enough to be carried through a standard 36”-wide doorway.
- E. Trap plates shall be hot dip galvanized.
- F. No trap plates shall be subjected to flame cutting (oxygen fuel cutting, such as acetylene, propane or MAPP gas, etc.). All ballistic plate cutting must be done on computer-controlled plasma equipment.
- G. No welding shall be permitted on impact plates.
- H. No impact plate may be constructed of permeable or flammable materials such as rubber, wood, plastics, etc.
- I. All primary impact plates shall be arranged such that a bullet fired straight into the trap shall impact the plate at an angle of no greater than 16 degrees.
- J. Vertical joints that connect modular components shall not be located at or near the front edge of the trap and shall occupy no more than 6% of the total aperture height of the trap.
- K. All surfaces facing shooters shall be constructed of steel with a mill certification of AR500.

POLICE RANGE REFURBISHMENT PROJECT – PHASE II

- L. Trap aperture shall not contain any intermediate vertical supports from which the bullets could ricochet when fired into the chamber from adjacent lanes (cross lane shooting).
- M. Joints shall have no exposed bolt heads.
- N. Trap shall require no prior construction or site preparation other than a flat concrete pad with a prepared trench.
- O. The trap shall be capable of being fully self-supported with an appropriate concrete pad.
- P. Deflectors shall be installed on all blunt or joined surfaces and facing the firing line in order to deflect the bullet into the trap and reduce the possibility of ricochet.
- Q. Trap design shall allow the leading edge of the trap side plates to be situated within a wall trench to reduce the possibility of ricochet.
 - 1. For ranges without a wall trench, a wall deflector with an additional, easy-to-replace consumable wall deflector shall be installed uprange of the side plates to protect them from damage.
- R. The trap shall include a rib crimp style steel roof situated no more than 4” above the trap support structure and covering the entire area occupied by the trap with at least 1 ft. on each side of the trap and 3 ft. on the rear of the trap.
 - 1. The roof shall be watertight, protecting the trap and service area from precipitation.
 - 2. Provide 2-coat 70% PVDF fluoropolymer coating on all sides of steel roofing panels.

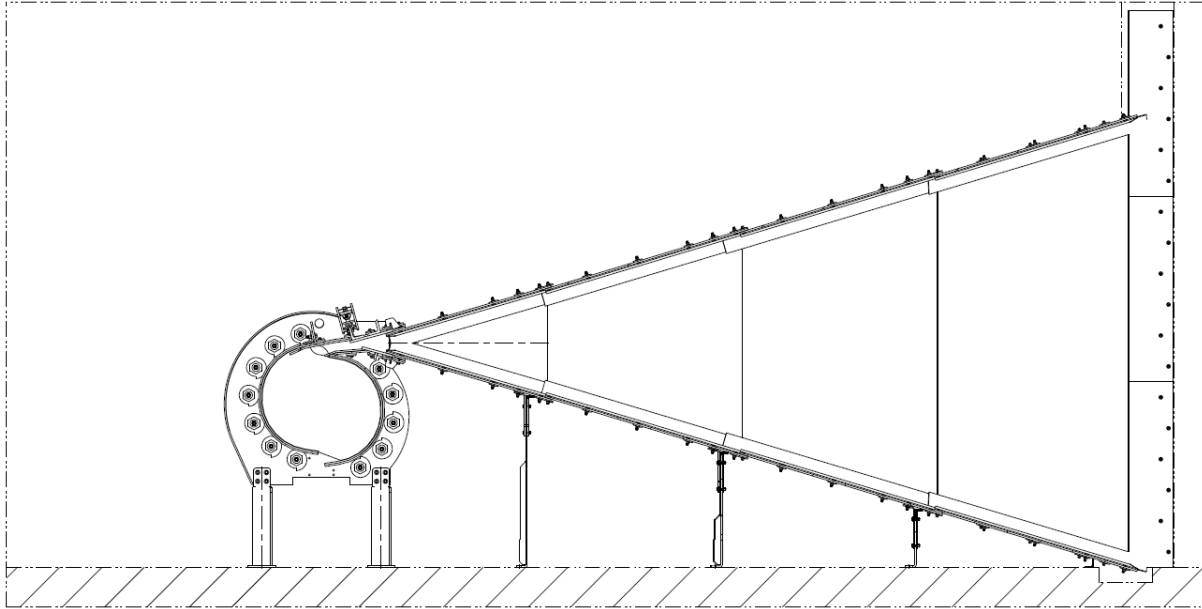


FIGURE 2: 4X4 TRAP PLATE LAYOUT

- S. The material of the chamber impact plates shall be mill certified AR500 steel with a minimum thickness of 3/8-inch.
- T. The material of the chamber's mouth shall be mill certified AR550 steel with a minimum thickness of 1/2".
- U. The material of the front chamber shell shall be mill certified AR500 steel.
- V. The material of the rear chamber shell shall be mill certified AR550 steel.
- W. The chamber shall be sealed with high-grade, closed-cell Neo/EPDM polymeric blend gaskets or high flexibility vulcanizing RTV adhesive gasket material in order to maintain negative pressure.
 - 1. No industrial grade, porous, or non-sealing materials (e.g. expanding spray foam) shall be used.
- X. Chambers may easily be disassembled for inspection and/or replacement of individual components to maintain range integrity.
- Y. Exterior chamber surfaces shall be galvanized and coated in paint that is resistant to high impact strikes.
 - 1. Paint shall sustain 60,000 rounds per chamber with no chipping.
 - 2. Chamber shall be blasted and prepared to be in compliance with painting specification SP 6.
- Z. Deceleration chamber shall consist of multiple bent or multiple individual surfaces at angles that decelerate and break down the bullet.
- AA. Deceleration chambers shall have an unobstructed open mouth design.

1. Deceleration chambers shall not contain any vertical impact surfaces from which the bullets could ricochet when fired into the chamber from adjacent lanes (cross lane shooting).

2.6 TRAP PERFORMANCE REQUIREMENTS

- A. Trap shall utilize steel impact plates to direct the bullet into an enclosed, sealed, and fully shielded chamber that safely captures the bullet and removes its velocity.
- B. Deceleration shall occur in free air and not in any other medium such as rubber, water, etc. Trap shall not require the use of or introduce any chemical media such as oils, anti-freezes, chlorine, etc.
 1. Trap shall not introduce any substance that is EPA regulated, e.g. ethylene glycol and antifreeze.
 2. Trap shall not introduce any substance that might act as a solvent for spent bullets or their by-products, e.g. water, which can be a solvent for some frangible materials.
- C. The inside of the chamber shall be readily accessible for inspection without requiring removal of any kind of internal deceleration medium such as rubber, sand, or water, etc.
- D. Bullet components that have lost their momentum shall be directed into a series of D.O.T. approved containers (BCS Basic 3 systems, or approved equal).
 1. Removal of contained lead shall not require any process such as scooping, pouring, shoveling, sifting, etc. that would disturb the settled state of the lead and lead particulates.
 2. Containers for BCS Basic 3 systems shall be located directly beneath the deceleration chambers.
 3. Containers for BCS Basic 3 systems shall be removable for recycling without requiring tools for this purpose
- E. Trap impact surfaces shall be UL 752 compliant and carry ATI Class 2 rating.
 1. Trap impact surfaces shall carry an ATI Class 2 rating when fired into at a point blank range from the front aperture. See Tables 1 and 2 below for included calibers in this rating*.
- F. Trap shall be able to capture a .50 BMG round when shot from 25 yards or farther from the mouth**.

TABLE 1: ATI CLASS 1 AND 2 BALLISTIC RATING PARAMETERS

Rating	Ammunition	Max Velocity	Max energy	Compliance
ATI Class 1	Pistol	1,485 fps	1,175 ft/lbs	Meets or exceeds UL 752 Level 3 standards
ATI Class 2	Rifle	3,388 fps	3,600 ft/lbs	Meets or exceeds UL 752 Level 5,7,8,9 &10 standards

TABLE 2: TYPICAL PISTOL AND RIFLE AMMUNITION

Typical Pistol Ammunition*			
Caliber	Cartridge Type	Max Velocity	Max energy
9mm	124gr FMJ	1,293 fps	460 ft/lbs
.357	158gr JSP	1,375 fps	663 ft/lbs
.40	180gr TMJ	1,000 fps	400 ft/lbs
.45	230gr TMJ	845 fps	365 ft/lbs
.44 mag	240gr SWC	1,485 fps	1,175 ft/lbs
Typical Rifle Ammunition*			
.22LR	40gr HP	1,260 fps	141 ft/lbs
5.56	55gr FMJ	3,388 fps	1,402ft/lbs
7.62	150gr FMJ	3,025 fps	3,048 ft/lbs
.308	150gr SPTZ	2,900 fps	2,800 ft/lbs
30:06	180gr SPTZ	2,900 fps	3,360 ft/lbs
300 Win.	190gr BTHP	2,900 fps	3,548 ft/lbs

* The above listed ammunitions are for demonstration purposes only. Certain ammunitions may fall outside stated safety ratings and should be used at user's risk.

** .50 BMG must be fired from at least 25 yards from the trap mouth. .50 BMG must not be fired from a fixed position. .50 BMG use will significantly decrease wear life of the trap. Damage due to .50 BMG use will not be covered under warranty.

2.7 ACTUATED TARGET MOUNT AND TURNING SYSTEM

- A. Basis of Design Manufacturer:
 - 1. Action Target; 3411 South Mountain Parkway, Provo, UT 84606; Tel: 801-705-9149; www.actiontarget.com ; Contact: Chris Hart, chrish@actiontarget.com .
 - 2. Or approved equal.
- B. Basis of Design Product: “DRM Pro” by Action Target, or approved equal.
- C. Runner system shall consist of two trolleys operating on parallel tracks.
 - 1. Trolleys shall:
 - a. Accept wooden 1 in. x 2 in. target holders.
 - b. Be adjustable for target widths ranging from 12 in. to 24 in.
- D. Speed of runner shall be controlled electronically.
 - 1. Speed of runner shall not be adjusted manually with knobs or switches.
- E. Runner shall use electronic braking to stop.
 - 1. Runner shall not require mechanical braking.
- F. Runner shall be able to operate without limit switches.
- G. Trolley shall not make contact with the bumpers except during calibration runs.
- H. Runner shall be able to operate in winds up to 30 mph.

POLICE RANGE REFURBISHMENT PROJECT – PHASE II

- I. Runner shall use a computerized control system.
 - 1. The computerized control system shall be capable of:
 - a. Automatic track length detection.
 - b. Automatic trolley drift compensation.
 - c. Programmable trolley speeds up to 20 fps.
 - 1) 10 fps requires a minimum of 21 ft. of track.
 - 2) 15 fps requires a minimum of 30 ft. of track.
 - 3) 20 fps requires a minimum of 48 ft. of track.
 - d. Accelerating up to 0.5 g.
 - e. Accelerating the carrier to 10 fps within 5 ft. of track.
 - f. Changing trolley direction and speed while moving.
 - g. Position control within 6 in.
 - h. Intelligent error reporting.
 - 1) Cable slip detection.
 - 2) Drive errors.
 - 3) Proximity sensor errors.
 - 4) Wiring errors.
 - i. Status monitoring.
 - 1) Calibration.
 - 2) System ready.
 - 3) Trolley position.
 - j. Data logging.
 - k. In-field programming for feature add-ons and bug fixes.
 - l. Capturing odometer data for maintenance scheduling and general use.
 - m. Real-time speedometer for validation of speeds for consistent training.
- J. Runner system shall have a motor section.
 - 1. Motor section shall have:
 - a. 3 phase induction motors for reliable and powerful trolley movement.
 - b. High precision sealed encoders for accurate and reliable control.
 - c. Hardened tool-steel pulleys for long life and abrasion resistance.
 - d. Urethane bumpers for trolley calibration and protection of motors and sensors.
- K. Runner system shall have an idler section.
 - 1. Idler Section shall consist of:
 - a. Steel idler pulleys on bronze bushings for smooth operation.
 - b. Urethane bumpers for trolley calibration.
- L. Runner system shall have two parallel lengths of track separated by spacers.
 - 1. Track shall be:
 - a. Available in 3 ft. increments from 15 ft. to 201 ft.
 - b. Modular so that individual damaged sections may be replaced or repaired.
 - c. Fabricated from pre-galvanized material for corrosion resistance.
 - 2. Track spacers, brackets, supports, and cable guides shall be zinc plated for corrosion resistance.
- M. Runner system shall have two (2) trolleys to carry targets.
 - 1. Trolleys shall:
 - a. Consist of powder coated and zinc coated components for corrosion resistance.

POLICE RANGE REFURBISHMENT PROJECT – PHASE II

- b. Utilize a ratcheting mechanism for quick cable adjustments and to take up slack as cable stretches.
 - c. Have tension indicators to allow for consistent and precise tensioning.
 - d. Be easily serviceable with the use of standard hand tools.
- N. Runner system shall have a downrange control panel.
 - 1. Downrange control panel shall:
 - a. Operate on a 208-240 volt single phase 20 amp service.
 - b. Be UL Listed.
 - c. Have pre-terminated connectors for quick installation and servicing.
 - d. Receive commands via Ethernet.
- O. Runner system shall use proximity sensors to reset trolley position and compensate for any drift.
- P. Runner system shall require no more than 2 ft. 2 in. in addition to the nominal track length for installation space.
- Q. Maximum trolley movement shall be the nominal length of the track minus the length of both buffers and an additional 3 ft. 2 in., i.e. Nominal track length - (buffer length + buffer length + 3 ft. 2 in.).
 - 1. 1 ft. buffer shall be required for nominal track lengths from 15 ft. to 29 ft.
 - 2. 2 ft. buffer shall be required for nominal track lengths from 30 ft. to 101 ft.
 - 3. 4 ft. buffer shall be required for nominal track lengths from 102 ft. to 201 ft.
- R. Runner system shall use 1/8 in. x 7 in. x 19 in. galvanized steel cable for trolley movement, which can be installed and tensioned using standard hand tools.
- S. All electronics shall be a minimum of IP54 rated for either indoor or outdoor use without modification.
- T. Wiring shall be protected by metal-lined wide-temperature flexible conduit.
- U. Mounting: Inverted mounting from channel strut.
- V. Provide the following Control Systems:
 - 1. Standalone Wireless Controls
 - a. Web-based graphical user interface for use with network-connected smartphones, tablets, and computers.
 - b. Independent trolley control.
 - c. 3 speed controls (reprogrammable).
 - d. Dynamic positioning (click and drag).
 - e. Real-time speed, position, and status feedback.
 - f. Delay function for standalone training.
 - g. Continuous mode function.
 - h. Status, settings, and configurations.
 - i. Error reports.
 - j. System reset function.
 - k. Built-in user manual.
 - 2. Master Control
 - a. Compatible with all Master Control functions and features.

- b. Requires server panel with Communications Bridge. Provide server panel as part of this contract.
- c. Includes standalone wireless controls.
- 3. Smart Range
 - a. Compatible with all Smart Range functions and features.
 - b. Requires server panel with Communications Bridge. Provide server panel as part of this contract.
 - c. Includes standalone wireless controls.

2.8 “RUNNING MAN” TARGET SYSTEM

- A. Basis of Design Manufacturer:
 - 1. Action Target; 3411 South Mountain Parkway, Provo, UT 84606; Tel: 801-705-9149; www.actiontarget.com ; Contact: Chris Hart, chrish@actiontarget.com .
 - 2. Or approved equal.
- B. Basis of Design Product: “Power 90” by Action Target, or approved equal.
- C. The actuator shall hold a cardboard target, or a plastic target, or a foam backer.
- D. Actuator shall have two positions: face and edge.
- E. Actuator shall be capable of turning a complete 90 degrees.
 - 1. Turning speeds in both directions shall be field adjustable with a screwdriver and wrench.
- F. Actuators shall be capable of independent or synchronized operation.
- G. The actuator shall be outdoor rated down to 0 degrees Fahrenheit (-17.8 degrees Celsius) and shall function in rain and wind.
- H. When actuating (e.g. turning target from face to edge), actuator airflow shall be no more than 4.9 cubic inches (80 milliliters) per actuation or .47 cubic feet (13.4 liters) per minute for typical usage.
- I. Air pressure shall be no more than 40 psi minimum and 80 psi maximum.
- J. Air supply shall be dry and filtered to ensure low temperature performance and long valve life.
- K. All air connections shall be flexible air tubing with quick-connect, push-in air fittings.
 - 1. Tools shall not be required to make air connections between actuators.
- L. Power requirements shall be 12V DC 200MA continuous per actuator.
- M. The actuator shall be totally field repairable such that a complete field rebuild operation may be accomplished using standard hand tools, such as a socket wrench, screwdriver, and span-ring pliers.
 - 1. The actuator shall not require the use of power tools such as impact wrenches (both air and electric) and electric drills.

POLICE RANGE REFURBISHMENT PROJECT – PHASE II

- N. Actuators shall be controlled by a Smart Range computer or a Smart Range wireless tablet.
 - 1. The actuator shall connect to a computer to allow multiple units to operate in a pre-programmed scenario.
- O. Actuator body shall be constructed of solid steel plate with a “hot dip” galvanized coating for long-term exposure to harsh weather conditions.
- P. All inner parts (hoses, piston, valves and access ports) shall be covered by a removable “zinc-electroplated” steel housing to protect all components from harsh weather conditions.
- Q. The mechanism shall be protected from splatter at all angles and shall inherently protect tubing and control wires running inside. Actuator shall provide standard ¾” conduit interface from the bottom or rear of unit.
- R. Actuator shall not utilize ball bearings or any ferrous bearing surfaces in any part of its mechanism. Rather, any bearings shall employ permanently lubricated thrust surfaces able to accommodate reliable operation under a variety of loads and radial displacements.
- S. Pistons shall be linear for a low-cost, simple, and reliable operation.
- T. Valves shall be easily accessible for field maintenance and repair.
- U. Actuator shall be completely self-standing and self-contained.
- V. Mounting: Ground-mount behind a protective knee-wall.
- W. Operation shall include:
 - 1. A push-button controlled wireless interface with the ability to run pre-programmed scenarios.
 - 2. A mechanical toggle switch.

2.9 GENERAL FINISH REQUIREMENTS

- A. Finish metal fabrications after assembly.
- B. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

2.10 STEEL AND IRON FINISHES

- A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A153/A153M for steel and iron hardware and with ASTM A123/A123M for other steel and iron products.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Install each fabrication and assembly per manufacturer's written instructions.
- B. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete inserts and through bolts.
- C. Corrosion Protection: Coat concealed surfaces of aluminum that come into contact with grout, concrete, masonry, wood, or dissimilar metals with the following:
 - 1. Cast Aluminum: Heavy coat of bituminous paint.
 - 2. Extruded Aluminum: Two coats of clear lacquer.

3.2 INSTALLATION OF MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.
- B. Anchor steel supports on solid concrete. Secure supports with anchor bolts embedded in concrete.

3.3 REPAIRS

- A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A780/A780M.

END OF SECTION 116723

SECTION 22 05 18
ESCUTCHEONS FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Escutcheons.
 2. Floor plates.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. BrassCraft Manufacturing Co.; a Masco company.
 2. Dearborn Brass.
 3. Mid-America Fittings, Inc.

2.2 ESCUTCHEONS

- A. One-Piece, Steel Type: With polished brass finish and setscrew fastener.
- B. Split-Plate, Stamped-Steel Type: With polished, chrome-plated finish; concealed and exposed-rivet hinge; and spring-clip fasteners.

2.3 FLOOR PLATES

- A. Split Floor Plates: Cast brass with concealed hinge.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install escutcheons for piping penetrations of walls, ceilings, and finished floors.
- B. Install escutcheons with ID to closely fit around pipe, tube, and insulation of insulated piping and with OD that completely covers opening.
 - 1. Escutcheons for New Piping and Relocated Existing Piping:
 - a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep pattern.
 - b. Chrome-Plated Piping: One-piece cast brass with polished, chrome-plated finish.
 - c. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece steel with polished, chrome-plated finish.
- C. Install floor plates with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.
 - 1. New Piping: Split floor plate.
 - 2. Existing Piping: Split floor plate.

3.2 FIELD QUALITY CONTROL

- A. Using new materials, replace broken and damaged escutcheons and floor plates.

END OF SECTION 22 05 18

SECTION 22 05 23.12

BALL VALVES FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Brass ball valves.
2. Bronze ball valves.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of valve.

1. Certification that products comply with NSF 61 and NSF 372.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR VALVES

A. Source Limitations for Valves: Obtain each type of valve from single source from single manufacturer.

B. ASME Compliance:

1. ASME B1.20.1 for threads for threaded end valves.
2. ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.
3. ASME B16.18 for solder-joint connections.
4. ASME B31.9 for building services piping valves.

C. NSF Compliance: NSF 61 and NSF 372 for valve materials for potable-water service.

D. Bronze valves shall be made with dezincification-resistant materials. Bronze valves made with copper alloy (brass) containing more than 15 percent zinc are not permitted.

E. Valve Pressure-Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.

F. Valve Sizes: Same as upstream piping unless otherwise indicated.

G. Valves in Insulated Piping:

1. Include 2-inch stem extensions.
2. Extended operating handles of nonthermal-conductive material and protective sleeves that allow operation of valves without breaking vapor seals or disturbing insulation.
3. Memory stops that are fully adjustable after insulation is applied.

2.2 BRASS BALL VALVES

A. Brass Ball Valves, One-Piece:

1. Description:
 - a. Standard: MSS SP-110.
 - b. CWP Rating: 400 psig.
 - c. Body Design: One piece.
 - d. Body Material: Forged brass or bronze.
 - e. Ends: Threaded and soldered.
 - f. Seats: PTFE.
 - g. Stem: Brass or stainless steel.
 - h. Ball: Chrome-plated brass or stainless steel.
 - i. Port: Reduced.

B. Brass Ball Valves, Two-Piece with Full Port and Brass Trim, Threaded or Soldered Ends:

1. Description:
 - a. Standard: MSS SP-110 or MSS SP-145.
 - b. CWP Rating: 600 psig.
 - c. Body Design: Two piece.
 - d. Body Material: Forged brass.
 - e. Ends: Threaded and soldered.
 - f. Seats: PTFE.
 - g. Stem: Brass.
 - h. Ball: Chrome-plated brass.
 - i. Port: Full.

2.3 BRONZE BALL VALVES

A. Bronze Ball Valves, One-Piece:

1. Description:
 - a. Standard: MSS SP-110.
 - b. CWP Rating: 400 psig.
 - c. Body Design: One piece.
 - d. Body Material: Bronze.
 - e. Ends: Threaded.
 - f. Seats: PTFE.
 - g. Stem: Bronze.
 - h. Ball: Chrome-plated brass.
 - i. Port: Reduced.

- B. Bronze Ball Valves, Two-Piece with Full Port, and Bronze or Brass Trim, Threaded or Soldered Ends:
 - 1. Description:
 - a. Standard: MSS SP-110 or MSS-145.
 - b. CWP Rating: 600 psig.
 - c. Body Design: Two piece.
 - d. Body Material: Bronze.
 - e. Ends: Threaded and soldered.
 - f. Seats: PTFE.
 - g. Stem: Bronze or brass.
 - h. Ball: Chrome-plated brass.
 - i. Port: Full.

PART 3 - EXECUTION

3.1 VALVE INSTALLATION

- A. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.
- B. Locate valves for easy access and provide separate support where necessary.
- C. Install valves in horizontal piping with stem at or above center of pipe.
- D. Install valves in position to allow full stem movement.

3.2 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS

- A. If valves with specified CWP ratings are unavailable, the same types of valves with higher CWP ratings may be substituted.
- B. Select valves with the following end connections:
 - 1. For Copper Tubing, NPS 2 and Smaller: Threaded ends except where solder-joint valve-end option is indicated in valve schedules below.
 - 2. For Steel Piping, NPS 2 and Smaller: Threaded ends.

3.3 DOMESTIC HOT- AND COLD-WATER VALVE SCHEDULE

- A. Pipe NPS 2 and Smaller:
 - 1. Brass ball valve, one piece. Provide with threaded or solder-joint ends.
 - 2. Bronze ball valve, one piece with bronze trim. Provide with threaded or solder-joint ends.

END OF SECTION 22 05 23.12

SECTION 22 07 19

PLUMBING PIPING INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes insulating the following plumbing piping services:
 - 1. Domestic cold-water piping.
 - 2. Domestic hot-water piping.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include thermal conductivity, water-vapor permeance thickness, and jackets (both factory and field applied if any).

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.
- B. Material Test Reports: From a qualified testing agency acceptable to authorities having jurisdiction indicating, interpreting, and certifying test results for compliance of insulation materials, sealers, attachments, cements, and jackets, with requirements indicated. Include dates of tests and test methods employed.
- C. Field quality-control reports.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.
- B. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products in accordance with ASTM E84 by a testing agency acceptable to authorities having jurisdiction. Factory label insulation and jacket

materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.

1. Insulation Installed Indoors: Flame-spread index of 25 or less and smoke-developed index of 50 or less.
2. Insulation Installed Outdoors: Flame-spread index of 75 or less and smoke-developed index of 150 or less.

C. Comply with the following applicable standards and other requirements specified for miscellaneous components:

1. Supply and Drain Protective Shielding Guards: ICC A117.1.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

1.7 COORDINATION

A. Coordinate clearance requirements with piping Installer for piping insulation application. Before preparing piping Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.

B. Coordinate installation and testing of heat tracing.

1.8 SCHEDULING

A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.

B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

A. Comply with requirements in "Piping Insulation Schedule, General," "Indoor Piping Insulation Schedule," "Outdoor, Aboveground Piping Insulation Schedule," and "Outdoor, Underground Piping Insulation Schedule" articles for where insulating materials shall be applied.

B. Products shall not contain asbestos, lead, mercury, or mercury compounds.

- C. Products that come into contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested in accordance with ASTM C871.
- D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable in accordance with ASTM C795.
- E. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.
- F. Cellular Glass: Inorganic, incombustible, foamed or cellulated glass with annealed, rigid, hermetically sealed cells. Comply with ASTM C552.
 - 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. Pittsburgh Corning Corporation.
 - b. Johns Manville; a Berkshire Hathaway company.
 - c. Knauf Insulation.
 - d. Owens Corning.
 - 2. Preformed Pipe Insulation: Type II, Class 1, without jacket.
 - 3. Preformed Pipe Insulation: Type II, Class 2, with factory-applied ASJ jacket.
 - 4. Factory fabricate shapes in accordance with ASTM C450 and ASTM C585.
 - 5. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
- G. Flexible Elastomeric: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C534/C534M, Type I for tubular materials.
 - 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. Aeroflex USA, Inc.
 - b. Armacell LLC.
 - c. K-Flex USA.

2.2 ADHESIVES

- A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated unless otherwise indicated.
- B. Cellular-Glass Adhesive: Two-component, thermosetting urethane adhesive containing no flammable solvents, with a service temperature range of minus 100 to plus 200 deg F.
- C. Flexible Elastomeric Adhesive: Solvent-based adhesive.

1. Flame-spread index shall be 25 or less and smoke-developed index shall be 50 or less as tested in accordance with ASTM E84.
2. Wet Flash Point: Below 0 deg F.
3. Service Temperature Range: 40 to 200 deg F.
4. Color: Black.

D. PVC Jacket Adhesive: Compatible with PVC jacket.

2.3 LAGGING ADHESIVES

- A. Adhesives shall comply with MIL-A-3316C, Class I, Grade A, and shall be compatible with insulation materials, jackets, and substrates.
1. Fire-resistant, water-based lagging adhesive and coating for use indoors to adhere fire-resistant lagging cloths over pipe insulation.
 2. Service Temperature Range: 20 to plus 180 deg F.
 3. Color: White.

2.4 SEALANTS

- A. Materials shall be as recommended by the insulation manufacturer and shall be compatible with insulation materials, jackets, and substrates.
- B. Joint Sealants:
1. Permanently flexible, elastomeric sealant.
 2. Service Temperature Range: Minus 58 to plus 176 deg F.
 3. Color: White or gray.
- C. PVC Jacket Flashing Sealants:
1. Fire- and water-resistant, flexible, elastomeric sealant.
 2. Service Temperature Range: Minus 40 to plus 250 deg F.
 3. Color: White.

2.5 FACTORY-APPLIED JACKETS

- A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:
1. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C1136, Type I.
 2. ASJ-SSL: ASJ with self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip; complying with ASTM C1136, Type I.
 3. FSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C1136, Type II.

2.6 FIELD-APPLIED JACKETS

- A. Field-applied jackets shall comply with ASTM C1136, Type I, unless otherwise indicated.

- B. PVC Jacket: High-impact-resistant, UV-resistant PVC complying with ASTM D1784, Class 16354-C; thickness as scheduled; roll stock ready for shop or field cutting and forming. Thickness is indicated in field-applied jacket schedules.
 - 1. Adhesive: As recommended by jacket material manufacturer.
 - 2. Color: White.
 - 3. Factory-fabricated fitting covers to match jacket if available; otherwise, field fabricate.
 - a. Shapes: 45- and 90-degree, short- and long-radius elbows, tees, valves, flanges, unions, reducers, end caps, soil-pipe hubs, traps, mechanical joints, and P-trap and supply covers for lavatories.

2.7 TAPES

- A. PVC Tape: White vapor-retarder tape matching field-applied PVC jacket with acrylic adhesive; suitable for indoor and outdoor applications.
 - 1. Width: 2 inches.
 - 2. Thickness: 6 mils.
 - 3. Adhesion: 64 ounces force/inch in width.
 - 4. Elongation: 500 percent.
 - 5. Tensile Strength: 18 lbf/inch in width.

2.8 SECUREMENTS

- A. Bands:
 - 1. Stainless Steel: ASTM A240/A240M, Type 304; 0.015 inch thick, 1/2 inch wide with wing seal.

2.9 PROTECTIVE SHIELDING GUARDS

- A. Protective Shielding Pipe Covers:
 - 1. Description: Manufactured plastic wraps for covering plumbing fixture hot- and cold-water supplies and trap and drain piping. Comply with Americans with Disabilities Act (ADA) requirements.
- B. Protective Shielding Piping Enclosures:
 - 1. Description: Manufactured plastic enclosure for covering plumbing fixture hot- and cold-water supplies and trap and drain piping. Comply with ADA requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.

1. Verify that systems to be insulated have been tested and are free of defects.
2. Verify that surfaces to be insulated are clean and dry.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.
- B. Clean and prepare surfaces to be insulated.
- C. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless steel surfaces, use demineralized water.

3.3 GENERAL INSTALLATION REQUIREMENTS

- A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of piping, including fittings, valves, and specialties.
- B. Install insulation materials, forms, vapor barriers or retarders, jackets, and of thicknesses required for each item of pipe system, as specified in insulation system schedules.
- C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.
- D. Install insulation with longitudinal seams at top and bottom of horizontal runs.
- E. Install multiple layers of insulation with longitudinal and end seams staggered.
- F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.
- G. Keep insulation materials dry during storage, application, and finishing. Replace insulation materials that get wet.
- H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.
- I. Install insulation with least number of joints practical.
- J. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.
 1. Install insulation continuously through hangers and around anchor attachments.

2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends attached to structure with vapor-barrier mastic.
 3. Install insert materials and insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
 4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.
- K. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.
- L. Install insulation with factory-applied jackets as follows:
1. Draw jacket tight and smooth.
 2. Cover circumferential joints with 3-inch-wide strips, of same material as insulation jacket. Secure strips with adhesive and outward-clinching staples along both edges of strip, spaced 4 inches o.c.
 3. Overlap jacket longitudinal seams at least 1-1/2 inches. Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward-clinching staples along edge at 4 inches o.c.
 - a. For below-ambient services, apply vapor-barrier mastic over staples.
 4. Cover joints and seams with tape, in accordance with insulation material manufacturer's written instructions, to maintain vapor seal.
 5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to pipe flanges and fittings.
- M. Cut insulation in a manner to avoid compressing insulation more than 25 percent of its nominal thickness.
- N. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.
- O. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches in similar fashion to butt joints.
- P. For above-ambient services, do not install insulation to the following:
1. Vibration-control devices.
 2. Testing agency labels and stamps.
 3. Nameplates and data plates.
 4. Cleanouts.

3.4 PENETRATIONS

- A. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.
- B. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions.
 - 1. Comply with requirements in Section 078413 "Penetration Firestopping" for firestopping and fire-resistive joint sealers.
- C. Insulation Installation at Floor Penetrations:
 - 1. Pipe: Install insulation continuously through floor penetrations.

3.5 GENERAL PIPE INSULATION INSTALLATION

- A. Requirements in this article generally apply to all insulation materials, except where more specific requirements are specified in various pipe insulation material installation articles.
- B. Insulation Installation on Fittings, Valves, Strainers, Flanges, Mechanical Couplings, and Unions:
 - 1. Install insulation over fittings, valves, strainers, flanges, mechanical couplings, unions, and other specialties with continuous thermal and vapor-retarder integrity unless otherwise indicated.
 - 2. Insulate pipe elbows using preformed fitting insulation made from same material and density as that of adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
 - 3. Insulate tee fittings with preformed fitting insulation of same material and thickness as that used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.
 - 4. Insulate valves using preformed fitting insulation of same material, density, and thickness as that used for adjacent pipe. Overlap adjoining pipe insulation by not less than 2 times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.
 - 5. For services not specified to receive a field-applied jacket, except for flexible elastomeric, install fitted PVC cover over elbows, tees, strainers, valves, flanges, and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing, using PVC tape.
- C. Install removable insulation covers at locations indicated. Installation shall conform to the following:

1. Make removable flange and union insulation from sectional pipe insulation of same thickness as that on adjoining pipe. Install same insulation jacket as that of adjoining pipe insulation.
2. When flange and union covers are made from sectional pipe insulation, extend insulation from flanges or union at least 2 times the insulation thickness over adjacent pipe insulation on each side of flange or union. Secure flange cover in place with stainless steel or aluminum bands. Select band material compatible with insulation and jacket.
3. Construct removable valve insulation covers in same manner as for flanges, except divide the two-part section on the vertical center line of valve body.

3.6 INSTALLATION OF CELLULAR-GLASS INSULATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of insulation to pipe with wire or bands, and tighten bands without deforming insulation materials.
2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
3. For insulation with factory-applied jackets on above-ambient services, secure laps with outward-clinched staples at 6 inches o.c.
4. For insulation with factory-applied jackets on below-ambient services, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive, as recommended by insulation material manufacturer, and seal with vapor-barrier mastic and flashing sealant.

B. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed sections of same material as that of straight segments of pipe insulation when available. Secure according to manufacturer's written instructions.
2. When preformed sections of insulation are not available, install mitered sections of cellular-glass insulation. Secure insulation materials with wire or bands.

C. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed sections of cellular-glass insulation to valve body.
2. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Install insulation to flanges as specified for flange insulation application.

3.7 INSTALLATION OF FLEXIBLE ELASTOMERIC INSULATION

A. Seal longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

B. Insulation Installation on Pipe Fittings and Elbows:

1. Install mitered sections of pipe insulation.

2. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

C. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed valve covers manufactured of same material as that of pipe insulation when available.
2. When preformed valve covers are not available, install cut sections of pipe and sheet insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Install insulation to flanges as specified for flange insulation application.
4. Secure insulation to valves and specialties, and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

3.8 FIELD-APPLIED JACKET INSTALLATION

- A. Where metal jackets are indicated, install with 2-inch overlap at longitudinal seams and end joints. Overlap longitudinal seams arranged to shed water. Seal end joints with weatherproof sealant recommended by insulation manufacturer. Secure jacket with stainless steel bands 12 inches o.c. and at end joints.

3.9 FINISHES

- A. Insulation with ASJ, Glass-Cloth, or Other Paintable Jacket Material: Paint jacket with paint system identified below.
 1. Flat Acrylic Finish: Two finish coats over a primer that is compatible with jacket material and finish coat paint. Add fungicidal agent to render fabric mildew proof.
 - a. Finish Coat Material: Interior, flat, latex-emulsion size.
- B. Flexible Elastomeric Thermal Insulation: After adhesive has fully cured, apply two coats of insulation manufacturer's recommended protective coating.
- C. Color: Final color as selected by Architect. Vary first and second coats to allow visual inspection of the completed Work.

3.10 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Tests and Inspections: Inspect pipe, fittings, strainers, and valves, randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to two locations of straight pipe and two locations of threaded valves for each pipe service defined in the "Piping Insulation Schedule, General" Article.

- C. All insulation applications will be considered defective if they do not pass tests and inspections.
- D. Prepare test and inspection reports.

3.11 PIPING INSULATION SCHEDULE, GENERAL

- A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.
- B. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:
 - 1. Drainage piping located in crawl spaces.
 - 2. Underground piping.
 - 3. Chrome-plated pipes and fittings unless there is a potential for personnel injury.

3.12 INDOOR PIPING INSULATION SCHEDULE

- A. Domestic Cold Water:
 - 1. NPS 1 and Smaller: Insulation shall be one of the following:
 - a. Cellular Glass: 1-1/2 inches thick.
 - b. Flexible Elastomeric: 3/4 inch Insert dimension thick.
- B. Domestic Hot Water:
 - 1. NPS 1-1/4 and Smaller: Insulation shall be one of the following:
 - a. Cellular Glass: 1-1/2 inches thick.
 - b. Flexible Elastomeric: 1-1/2 inch thick.
- C. Exposed Sanitary Drains, Domestic Water, Domestic Hot Water, and Stops for Plumbing Fixtures for People with Disabilities:
 - 1. All Pipe Sizes: Insulation shall be the following:
 - a. Flexible Elastomeric: 3/4 inch thick.

3.13 INDOOR, FIELD-APPLIED JACKET SCHEDULE

- A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.
- B. If more than one material is listed, selection from materials listed is Contractor's option.
- C. Piping, Concealed:

POLICE RANGE REFURBISHMENT PROJECT – PHASE II

1. None.
- D. Piping, Exposed:
1. PVC: 20 mils thick.

END OF SECTION 22 07 19

SECTION 22 11 16
DOMESTIC WATER PIPING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Copper tube and fittings.
 2. PVC pipe and fittings.
 3. Piping joining materials.

1.2 ACTION SUBMITTALS

- A. Product Data: For transition fittings and dielectric fittings.

1.3 PIPING MATERIALS

- A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.
- B. Potable-water piping and components shall comply with NSF 14, NSF 61, and NSF 372. Include marking "NSF-PW" on piping.

1.4 COPPER TUBE AND FITTINGS

- A. Hard Copper Tube: ASTM B 88, Type L and ASTM B 88, Type M water tube, drawn temper.
- B. Soft Copper Tube: ASTM B 88, Type K and ASTM B 88, Type L water tube, annealed temper.

1.5 PVC PIPE AND FITTINGS

- A. PVC Pipe: ASTM D 1785, Schedule 40 and Schedule 80.
- B. PVC Socket Fittings: ASTM D 2466 for Schedule 40 and ASTM D 2467 for Schedule 80.

1.6 PIPING JOINING MATERIALS

- A. Solder Filler Metals: ASTM B 32, lead-free alloys.
- B. Flux: ASTM B 813, water flushable.
- C. Brazing Filler Metals: AWS A5.8M/A5.8, BCuP Series, copper-phosphorus alloys for general-duty brazing unless otherwise indicated.
- D. Solvent Cements for Joining PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.

PART 2 - EXECUTION

2.1 PIPING INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of domestic water piping. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.
- B. Install shutoff valve immediately upstream of each dielectric fitting.
- C. Install domestic water piping level with 0.25 percent slope downward toward drain without pitch and plumb.
- D. Rough-in domestic water piping for water-meter installation according to utility company's requirements.
- E. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.
- F. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- G. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal, and coordinate with other services occupying that space.
- H. Install piping to permit valve servicing.
- I. Install nipples, unions, special fittings, and valves with pressure ratings the same as or higher than the system pressure rating used in applications below unless otherwise indicated.
- J. Install piping free of sags and bends.
- K. Install fittings for changes in direction and branch connections.

- L. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 220518 "Escutcheons for Plumbing Piping."

2.2 JOINT CONSTRUCTION

- A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- B. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.
- C. Soldered Joints for Copper Tubing: Apply ASTM B 813, water-flushable flux to end of tube. Join copper tube and fittings according to ASTM B 828 or CDA's "Copper Tube Handbook."
- D. Joint Construction for Solvent-Cemented Plastic Piping: Clean and dry joining surfaces. Join pipe and fittings according to the following:
 - 1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements. Apply primer.
 - 2. PVC Piping: Join according to ASTM D 2855.

2.3 CONNECTIONS

- A. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. When installing piping adjacent to equipment and machines, allow space for service and maintenance.
- C. Connect domestic water piping to exterior water-service piping. Use transition fitting to join dissimilar piping materials.

2.4 CLEANING

- A. Clean and disinfect potable domestic water piping as follows:
 - 1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
 - 2. Use purging and disinfecting procedures prescribed by authorities having jurisdiction; if methods are not prescribed, use procedures described in either AWWA C651 or AWWA C652 or follow procedures described below:
 - a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
 - b. Fill and isolate system according to either of the following:
 - 1) Fill system or part thereof with water/chlorine solution with at least 50 ppm of chlorine. Isolate with valves and allow to stand for 24 hours.

POLICE RANGE REFURBISHMENT PROJECT – PHASE II

- 2) Fill system or part thereof with water/chlorine solution with at least 200 ppm of chlorine. Isolate and allow to stand for three hours.
 - c. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.
 - d. Repeat procedures if biological examination shows contamination.
 - e. Submit water samples in sterile bottles to authorities having jurisdiction.
- B. Prepare and submit reports of purging and disinfecting activities. Include copies of water-sample approvals from authorities having jurisdiction.
- C. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.

2.5 PIPING SCHEDULE

- A. Transition and special fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.
- B. Flanges and unions may be used for aboveground piping joints unless otherwise indicated.
- C. Aboveground domestic water piping, NPS 2 and smaller, shall be one of the following:
 1. Hard copper tube, ASTM B 88, Type L ASTM B 88, Type M; wrought-copper, solder-joint fittings; and soldered joints.
 2. PVC, Schedule 40 Schedule 80; socket fittings; and solvent-cemented joints.

END OF SECTION 22 11 16

SECTION 22 13 16

SANITARY WASTE AND VENT PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Hub-and-spigot, cast-iron soil pipe and fittings.
2. Copper tube and fittings.
3. Specialty pipe fittings.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Components and installation shall be capable of withstanding the following minimum working pressure unless otherwise indicated:

1. Soil, Waste, and Vent Piping: 10-foot head of water.

2.2 PIPING MATERIALS

- A. Piping materials shall bear label, stamp, or other markings of specified testing agency.
- B. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

2.3 HUB-AND-SPIGOT, CAST-IRON SOIL PIPE AND FITTINGS

- A. Pipe and Fittings: ASTM A 74, Service class(es).
- B. Gaskets: ASTM C 564, rubber.
- C. Caulking Materials: ASTM B 29, pure lead and oakum or hemp fiber.

2.4 COPPER TUBE AND FITTINGS

- A. Copper Type DWV Tube: ASTM B 306, drainage tube, drawn temper.
- B. Copper Drainage Fittings: ASME B16.23, cast copper or ASME B16.29, wrought copper, solder-joint fittings.
- C. Solder: ASTM B 32, lead free with ASTM B 813, water-flushable flux.

2.5 PVC PIPE AND FITTINGS

- A. Comply with NSF 14, "Plastics Piping Systems Components and Related Materials," for plastic piping components. Include marking with "NSF-DWV" for plastic drain, waste, and vent piping and "NSF-sewer" for plastic sewer piping.
- B. Solid-Wall PVC Pipe: ASTM D 2665, drain, waste, and vent.
- C. Cellular-Core PVC Pipe: ASTM F 891, Schedule 40.
- D. PVC Socket Fittings: ASTM D 2665, made to ASTM D 3311, drain, waste, and vent patterns and to fit Schedule 40 pipe.
- E. Adhesive Primer: ASTM F 656.
- F. Solvent Cement: ASTM D 2564.

2.6 ENCASUREMENT FOR UNDERGROUND METAL PIPING

- A. Standard: ASTM A 674 or AWWA C105/A 21.5.
- B. Material: Linear low-density polyethylene film of 0.008-inch minimum thickness.
- C. Form: Sheet or tube.
- D. Color: Black or natural.

PART 3 - EXECUTION

3.1 PIPING INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems.
 - 1. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations.
 - 2. Install piping as indicated unless deviations to layout are approved on coordination drawings.

POLICE RANGE REFURBISHMENT PROJECT – PHASE II

- B. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.
- C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
- E. Install piping to permit valve servicing.
- F. Install piping at indicated slopes.
- G. Install piping free of sags and bends.
- H. Install fittings for changes in direction and branch connections.
- I. Install piping to allow application of insulation.
- J. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends.
 - 1. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical.
 - 2. Use long-turn, double Y-branch and 1/8-bend fittings if two fixtures are installed back to back or side by side with common drain pipe.
 - a. Straight tees, elbows, and crosses may be used on vent lines.
 - 3. Do not change direction of flow more than 90 degrees.
 - 4. Use proper size of standard increasers and reducers if pipes of different sizes are connected.
 - a. Reducing size of waste piping in direction of flow is prohibited.
- K. Lay buried building waste piping beginning at low point of each system.
 - 1. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream.
 - 2. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements.
 - 3. Maintain swab in piping and pull past each joint as completed.
- L. Install soil and waste and vent piping at the following minimum slopes unless otherwise indicated:
 - 1. Building Sanitary Waste: 2 percent downward in direction of flow for piping NPS 3 and smaller; 2 percent downward in direction of flow for piping NPS 4 and larger.
 - 2. Horizontal Sanitary Waste Piping: 2 percent downward in direction of flow.
 - 3. Vent Piping: 1 percent down toward vertical fixture vent or toward vent stack.

POLICE RANGE REFURBISHMENT PROJECT – PHASE II

- M. Install cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."
 - 1. Install encasement on underground piping according to ASTM A 674 or AWWA C105/A 21.5.
- N. Install aboveground copper tubing according to CDA's "Copper Tube Handbook."
- O. Plumbing Specialties:
 - 1. Install cleanouts at grade and extend to where building sanitary drains connect to building sanitary sewers in sanitary waste gravity-flow piping.
 - a. Comply with requirements for cleanouts specified in Section 22 13 19 "Sanitary Waste Piping Specialties."
 - 2. Install drains in sanitary waste gravity-flow piping.
 - a. Comply with requirements for drains specified in Section 22 13 19 "Sanitary Waste Piping Specialties."
- P. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.
- Q. Install escutcheons for piping penetrations of walls, ceilings, and floors.
 - 1. Comply with requirements for escutcheons specified in Section 22 05 18 "Escutcheons for Plumbing Piping."

3.2 JOINT CONSTRUCTION

- A. Join hub-and-spigot, cast-iron soil piping with gasket joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for compression joints.
- B. Join copper tube and fittings with soldered joints according to ASTM B 828. Use ASTM B 813, water-flushable, lead-free flux and ASTM B 32, lead-free-alloy solder.

3.3 CONNECTIONS

- A. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Connect soil and waste piping to exterior sanitary sewerage piping. Use transition fitting to join dissimilar piping materials.
- C. Connect waste and vent piping to the following:
 - 1. Plumbing Fixtures: Connect waste piping in sizes indicated, but not smaller than required by plumbing code.
 - 2. Plumbing Fixtures and Equipment: Connect atmospheric vent piping in sizes indicated, but not smaller than required by authorities having jurisdiction.

3. Plumbing Specialties: Connect waste and vent piping in sizes indicated, but not smaller than required by plumbing code.
 4. Install test tees (wall cleanouts) in conductors near floor and floor cleanouts with cover flush with floor.
- D. Where installing piping adjacent to equipment, allow space for service and maintenance of equipment.
- E. Make connections according to the following unless otherwise indicated:
1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.
 2. Install flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final connection to each piece of equipment.

3.4 FIELD QUALITY CONTROL

- A. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.
1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
 2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.
- B. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.
- C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.
- D. Test sanitary waste and vent piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:
1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired.
 - a. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
 2. Leave uncovered and unconcealed new, altered, extended, or replaced waste and vent piping until it has been tested and approved.
 - a. Expose work that was covered or concealed before it was tested.
 3. Roughing-in Plumbing Test Procedure: Test waste and vent piping except outside leaders on completion of roughing-in.
 - a. Close openings in piping system and fill with water to point of overflow, but not less than 10-foot head of water.

- b. From 15 minutes before inspection starts to completion of inspection, water level must not drop.
 - c. Inspect joints for leaks.
4. Finished Plumbing Test Procedure: After plumbing fixtures have been set and traps filled with water, test connections and prove they are gastight and watertight.
- a. Plug vent-stack openings on roof and building drains where they leave building. Introduce air into piping system equal to pressure of 1-inch wg.
 - b. Use U-tube or manometer inserted in trap of water closet to measure this pressure.
 - c. Air pressure must remain constant without introducing additional air throughout period of inspection.
 - d. Inspect plumbing fixture connections for gas and water leaks.
5. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
6. Prepare reports for tests and required corrective action.

3.5 CLEANING AND PROTECTION

- A. Clean interior of piping. Remove dirt and debris as work progresses.
- B. Protect sanitary waste and vent piping during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.
- C. Place plugs in ends of uncompleted piping at end of day and when work stops.
- D. Repair damage to adjacent materials caused by waste and vent piping installation.

3.6 PIPING SCHEDULE

- A. Flanges and unions may be used on aboveground pressure piping unless otherwise indicated.
- B. Aboveground, soil and waste piping NPS 4 and smaller shall be any of the following:
 1. Service class, cast-iron soil pipe and fittings; gaskets; and gasketed joints.
 2. Copper Type DWV tube, copper drainage fittings, and soldered joints.
- C. Aboveground, vent piping NPS 4 and smaller shall be any of the following:
 1. Service class, cast-iron soil pipe and fittings; gaskets; and gasketed joints.
 2. Copper Type DWV tube, copper drainage fittings, and soldered joints.
- D. Underground, soil, waste, and vent piping NPS 4 and smaller shall be any of the following:
 1. Service class, cast-iron soil piping; gaskets; and gasketed joints.

POLICE RANGE REFURBISHMENT PROJECT – PHASE II

2. Solid wall PVC pipe, PVC socket fittings, and solvent-cemented joints.

END OF SECTION 22 13 16

SECTION 22 13 19

SANITARY WASTE PIPING SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Cleanouts.
 - 2. Miscellaneous sanitary drainage piping specialties.

1.2 DEFINITIONS

- A. PVC: Polyvinyl chloride.

PART 2 - PRODUCTS

2.1 ASSEMBLY DESCRIPTIONS

- A. Sanitary waste piping specialties shall bear label, stamp, or other markings of specified testing agency.
- B. Comply with NSF 14 for plastic sanitary waste piping specialty components.

2.2 CLEANOUTS

- A. Cast-Iron Exposed Cleanouts:
 - 1. Standard: ASME A112.36.2M for cast iron for cleanout test tee.
 - 2. Size: Same as connected drainage piping
 - 3. Body Material: Hub-and-spigot, cast-iron soil pipe T-branch as required to match connected piping.
 - 4. Closure: Countersunk, cast-iron plug.
 - 5. Closure Plug Size: Same as or not more than one size smaller than cleanout size.
- B. Cast-Iron Exposed Floor Cleanouts:
 - 1. Size: Same as connected branch.
 - 2. Type: Adjustable housing Threaded, adjustable housing.
 - 3. Body or Ferrule: Cast iron.
 - 4. Clamping Device: Not required.
 - 5. Outlet Connection: Threaded.
 - 6. Closure: Brass plug with straight threads and gasket Cast-iron plug.
 - 7. Adjustable Housing Material: Cast iron with setscrews or other device.
 - 8. Frame and Cover Material and Finish: Nickel-bronze, copper alloy.

9. Frame and Cover Shape: Round.
10. Top Loading Classification: Light Duty.
11. Riser: ASTM A74, Service class, cast-iron drainage pipe fitting and riser to cleanout.

C. Cast-Iron Wall Cleanouts:

1. Standard: ASME A112.36.2M. Include wall access.
2. Size: Same as connected drainage piping.
3. Body: Hubless, cast-iron soil pipe test tee as required to match connected piping.
4. Closure Plug:
 - a. Brass.
 - b. Countersunk head.
 - c. Drilled and threaded for cover attachment screw.
 - d. Size: Same as or not more than one size smaller than cleanout size.
5. Wall Access: Round, deep, chrome-plated bronze cover plate with screw.
6. Wall Access: Round, wall-installation frame and cover.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install cleanouts in aboveground piping and building drain piping according to the following, unless otherwise indicated:
 1. Size same as drainage piping up to NPS 4. Use NPS 4 for larger drainage piping unless larger cleanout is indicated.
 2. Locate at each change in direction of piping greater than 45 degrees.
 3. Locate at minimum intervals of 50 feet for piping NPS 4 and smaller and 100 feet for larger piping.
 4. Locate at base of each vertical soil and waste stack.
- B. For floor cleanouts for piping below floors, install cleanout deck plates with top flush with finished floor.
- C. For cleanouts located in concealed piping, install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall.

3.2 CONNECTIONS

- A. Comply with requirements in Section 22 13 16 "Sanitary Waste and Vent Piping" for piping installation requirements. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install piping adjacent to equipment to allow service and maintenance.

3.3 PROTECTION

- A. Protect drains during remainder of construction period to avoid clogging with dirt or debris and to prevent damage from traffic or construction work.
- B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

END OF SECTION 22 13 19

SECTION 22 42 13.13
COMMERCIAL WATER CLOSETS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Water closets.
2. Toilet seats.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 FLOOR-MOUNTED, BOTTOM-OUTLET WATER CLOSETS

A. Water Closets: Floor mounted, bottom outlet, close-coupled flushometer tank.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. American Standard.
 - b. Kohler Co.
 - c. Sloan Valve Company.
2. Bowl:
 - a. Standards: ASME A112.19.2/CSA B45.1 and ASSE/ASME 1037/CSA B125.37.
 - b. Material: Vitreous china.
 - c. Type: Siphon jet.
 - d. Style: Pressure assisted.
 - e. Height: Handicapped/elderly, complying with ICC/ANSI A117.1.
 - f. Rim Contour: Elongated.
 - g. Water Consumption: Maximum 1.1 gal per flush.
 - h. Color: White.
3. Bowl-to-Drain Connecting Fitting: ASME A112.4.3.
4. Flushometer Tank: Pressure assisted.

2.2 TOILET SEATS

A. Toilet Seats:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Bemis Manufacturing Company.
 - b. Kohler Co.
 - c. TOTO USA, INC.
 - d. Zurn Industries, LLC.
2. Standard: IAPMO/ANSI Z124.5.
3. Material: Plastic.
4. Type: Commercial (Heavy duty).
5. Shape: Elongated rim, open front.
6. Hinge: Check.
7. Hinge Material: Noncorroding metal.
8. Seat Cover: Not required.
9. Color: White.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Water-Closet Installation:

1. Install level and plumb according to roughing-in drawings.
2. Install floor-mounted water closets on bowl-to-drain connecting fitting attachments to piping or building substrate.
3. Install accessible, wall-mounted water closets at mounting height for handicapped/elderly, according to ICC/ANSI A117.1.

B. Install toilet seats on water closets.

C. Wall Flange and Escutcheon Installation:

1. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations and within cabinets and millwork.
2. Install deep-pattern escutcheons if required to conceal protruding fittings.
3. Comply with escutcheon requirements specified in Section 220518 "Escutcheons for Plumbing Piping."

D. Joint Sealing:

1. Seal joints between water closets and walls and floors using sanitary-type, one-part, mildew-resistant silicone sealant.
2. Match sealant color to water-closet color.
3. Comply with sealant requirements specified in Section 079200 "Joint Sealants."

3.2 CONNECTIONS

- A. Connect water closets with water supplies and soil, waste, and vent piping. Use size fittings required to match water closets.
- B. Comply with water piping requirements specified in Section 221116 "Domestic Water Piping."
- C. Comply with soil and waste piping requirements specified in Section 221316 "Sanitary Waste and Vent Piping."
- D. Where installing piping adjacent to water closets, allow space for service and maintenance.

3.3 ADJUSTING

- A. Operate and adjust water closets and controls. Replace damaged and malfunctioning water closets, fittings, and controls.
- B. Adjust water pressure at flushometer valves to produce proper flow.

3.4 CLEANING AND PROTECTION

- A. Clean water closets and fittings with manufacturers' recommended cleaning methods and materials.
- B. Install protective covering for installed water closets and fittings.
- C. Do not allow use of water closets for temporary facilities unless approved in writing by Owner.

END OF SECTION 22 42 13.13

SECTION 22 42 16.13
COMMERCIAL LAVATORIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Lavatories.
 2. Faucets.
 3. Supports.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 VITREOUS-CHINA, WALL-MOUNTED LAVATORIES

- A. Lavatory: Vitreous china, wall mounted, with back.
1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. American Standard.
 - b. Kohler Co.
 - c. Zurn Industries, LLC.
 2. Fixture:
 - a. Standard: ASME A112.19.2/CSA B45.1.
 - b. Type: For wall hanging.
 - c. Nominal Size: Oval, 19 by 16 inches.
 - d. Faucet-Hole Punching: One hole.
 - e. Faucet-Hole Location: Top.
 - f. Color: White.
 - g. Mounting Material: Chair carrier.
 3. Support: Type II, concealed-arm lavatory carrier.
 4. Lavatory Mounting Height: Handicapped/elderly according to ICC A117.1.

2.2 SOLID-BRASS, MANUALLY OPERATED FAUCETS

- A. NSF Standard: Comply with NSF/ANSI 61 Annex G, "Drinking Water System Components - Health Effects," for faucet materials that will be in contact with potable water.
- B. Lavatory Faucets: Manual-type, single-control mixing, commercial, solid-brass valve.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. American Standard.
 - b. Delta Faucet Company.
 - c. T&S Brass and Bronze Works, Inc.
 - 2. Standard: ASME A112.18.1/CSA B125.1.
 - 3. General: Include hot- and cold-water indicators; coordinate faucet inlets with supplies and fixture hole punchings; coordinate outlet with spout and fixture receptor.
 - 4. Body Type: Centerset Single hole.
 - 5. Body Material: Commercial, solid brass.
 - 6. Finish: Polished chrome plate.
 - 7. Maximum Flow Rate: 0.5 gpm.
 - 8. Maximum Flow: 0.25 gal. per metering cycle.
 - 9. Mounting Type: Deck, exposed.
 - 10. Valve Handle(s): Push button.
 - 11. Spout: Rigid type.
 - 12. Spout Outlet: Aerator.
 - 13. Operation: Compression, manual.
 - 14. Drain: Not part of faucet.

2.3 SUPPORTS

- A. Type II Lavatory Carrier:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Jay R. Smith Mfg. Co.
 - b. WATTS.
 - c. Zurn Industries, LLC.
 - 2. Standard: ASME A112.6.1M.

2.4 SUPPLY FITTINGS

- A. NSF Standard: Comply with NSF/ANSI 61 Annex G, "Drinking Water System Components - Health Effects," for supply-fitting materials that will be in contact with potable water.

- B. Standard: ASME A112.18.1/CSA B125.1.
- C. Supply Piping: Chrome-plated-brass pipe or chrome-plated copper tube matching water-supply piping size. Include chrome-plated-brass or stainless-steel wall flange.
- D. Supply Stops: Chrome-plated-brass, one-quarter-turn, ball-type or compression valve with inlet connection matching supply piping.
- E. Operation: Loose key.
- F. Risers:
 - 1. NPS 3/8.
 - 2. Chrome-plated, soft-copper flexible tube riser.

2.5 WASTE FITTINGS

- A. Standard: ASME A112.18.2/CSA B125.2.
- B. Drain: Grid type with NPS 1-1/4 offset and straight tailpiece.
- C. Trap:
 - 1. Size: NPS 1-1/2 by NPS 1-1/4.
 - 2. Material: Chrome-plated, two-piece, cast-brass trap and swivel elbow with 0.032-inch-thick brass tube to wall; and chrome-plated, brass or steel wall flange.
 - 3. Material: Stainless-steel, two-piece trap and swivel elbow with 0.012-inch-thick stainless-steel tube to wall; and stainless-steel wall flange.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine roughing-in of water supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before lavatory installation.
- B. Examine counters and walls for suitable conditions where lavatories will be installed.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install lavatories level and plumb according to roughing-in drawings.
- B. Install supports, affixed to building substrate, for wall-mounted lavatories.
- C. Install accessible wall-mounted lavatories at handicapped/elderly mounting height for people with disabilities or the elderly, according to ICC/ANSI A117.1.

- D. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations. Use deep-pattern escutcheons if required to conceal protruding fittings. Comply with escutcheon requirements specified in Section 22 05 18 "Escutcheons for Plumbing Piping."
- E. Seal joints between lavatories and counters and walls using sanitary-type, one-part, mildew-resistant silicone sealant. Match sealant color to fixture color. Comply with sealant requirements specified in Section 07 92 00 "Joint Sealants."

3.3 CONNECTIONS

- A. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.
- B. Comply with water piping requirements specified in Section 22 11 16 "Domestic Water Piping."
- C. Comply with soil and waste piping requirements specified in Section 22 13 16 "Sanitary Waste and Vent Piping."

3.4 ADJUSTING

- A. Operate and adjust lavatories and controls. Replace damaged and malfunctioning lavatories, fittings, and controls.
- B. Adjust water pressure at faucets to produce proper flow.
- C. Install fresh batteries in battery-powered, electronic-sensor mechanisms.

3.5 CLEANING AND PROTECTION

- A. After completing installation of lavatories, inspect and repair damaged finishes.
- B. Clean lavatories, faucets, and other fittings with manufacturers' recommended cleaning methods and materials.
- C. Provide protective covering for installed lavatories and fittings.
- D. Do not allow use of lavatories for temporary facilities unless approved in writing by Owner.

END OF SECTION 22 42 16.13

SECTION 23 05 53

IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Equipment labels.
 - 2. Duct labels.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 EQUIPMENT LABELS

- A. Metal Labels for Equipment:
 - 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. Brady Corporation.
 - b. Brimar Industries, Inc.
 - c. Seton Identification Products.
 - 2. Material and Thickness: Brass, 0.032-inch aluminum, 0.032-inch or anodized aluminum, 0.032-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.
 - 3. Letter Color: White.
 - 4. Background Color: Black.
 - 5. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.

6. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-quarters the size of principal lettering.
 7. Fasteners: Stainless-steel rivets or self-tapping screws.
 8. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- B. Label Content: Include equipment's Drawing designation or unique equipment number, Drawing numbers where equipment is indicated (plans, details, and schedules), and the Specification Section number and title where equipment is specified.
- C. Equipment Label Schedule: For each item of equipment to be labeled, on 8-1/2-by-11-inch bond paper. Tabulate equipment identification number, and identify Drawing numbers where equipment is indicated (plans, details, and schedules) and the Specification Section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.

2.2 DUCT LABELS

- 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:
1. Brady Corporation.
 2. Carlton Industries, LP.
 3. Seton Identification Products.
- B. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/16 inch thick, and having predrilled holes for attachment hardware.
- C. Letter Color: Black.
- D. Background Color: White.
- E. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
- F. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
- G. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-quarters the size of principal lettering.
- H. Fasteners: Stainless-steel rivets or self-tapping screws.
- I. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

- J. Duct Label Contents: Include identification of duct service using same designations or abbreviations as used on Drawings; also include duct size and an arrow indicating flow direction.
 - 1. Flow-Direction Arrows: Integral with duct system service lettering to accommodate both directions or as separate unit on each duct label to indicate flow direction.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Clean equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

3.2 GENERAL INSTALLATION REQUIREMENTS

- A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- B. Coordinate installation of identifying devices with locations of access panels and doors.
- C. Install identifying devices before installing acoustical ceilings and similar concealment.

3.3 EQUIPMENT LABEL INSTALLATION

- A. Install or permanently fasten labels on each major item of mechanical equipment.
- B. Locate equipment labels where accessible and visible.

3.4 DUCT LABEL INSTALLATION

- A. Install self-adhesive duct labels with permanent adhesive on air ducts in the following color codes:
 - 1. Blue: For cold-air supply ducts.
 - 2. Yellow: For hot-air supply ducts.
 - 3. Green: For exhaust-, outside-, relief-, return-, and mixed-air ducts.
- B. Locate labels near points where ducts enter into and exit from concealed spaces and at maximum intervals of 50 feet in each space where ducts are exposed or concealed by removable ceiling system.

END OF SECTION 23 05 53

SECTION 23 31 13

METAL DUCTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Single-wall round ducts and fittings.
 - 2. Sheet metal materials.
 - 3. Sealants and gaskets.
 - 4. Hangers and supports.
- B. Related Sections:
 - 1. Section 233300 "Air Duct Accessories" for dampers and flexible ducts.
- C. Product Data: For each type of the following products:
 - 1. Sealants and gaskets.

1.3 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.

1.4 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel in accordance with the following:
 - 1. AWS D9.1/D9.1M, "Sheet Metal Welding Code," for duct joint and seam welding.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment," and Section 7 - "Construction and System Startup."

- B. ASHRAE/IES Compliance: Applicable requirements in ASHRAE/IES 90.1, Section 6.4.4 - "HVAC System Construction and Insulation."
- C. Duct Dimensions: Unless otherwise indicated, all duct dimensions indicated on Drawings are inside clear dimensions and do not include insulation or duct wall thickness.

2.2 SINGLE-WALL ROUND DUCTS AND FITTINGS

- A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Ch. 3, "Round, Oval, and Flexible Duct," based on indicated static-pressure class unless otherwise indicated.
 - 1. Construct ducts of galvanized sheet steel unless otherwise indicated.
- B. Transverse Joints: Select joint types and fabricate in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-1, "Round Duct Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
 - 1. Transverse Joints in Ducts Larger Than 60 Inches in Diameter: Flanged.
- C. Longitudinal Seams: Select seam types and fabricate in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-2, "Round Duct Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
 - 1. Fabricate round ducts larger than 90 inches in diameter with butt-welded longitudinal seams.
 - 2. Fabricate flat-oval ducts larger than 72 inches in width (major dimension) with butt-welded longitudinal seams.

2.3 SHEET METAL MATERIALS

- A. General Material Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.
- B. Galvanized Sheet Steel: Comply with ASTM A653/A653M.
 - 1. Galvanized Coating Designation: G60.
 - 2. Finishes for Surfaces Exposed to View: Mill phosphatized.

2.4 SEALANT AND GASKETS

- A. General Sealant and Gasket Requirements: Surface-burning characteristics for sealants and gaskets shall be a maximum flame-spread index of 25 and a maximum smoke-developed index of 50 when tested in accordance with UL 723; certified by an NRTL.
- B. Water-Based Joint and Seam Sealant:
 - 1. Application Method: Brush on.
 - 2. Solids Content: Minimum 65 percent.
 - 3. Shore A Hardness: Minimum 20.
 - 4. Water resistant.
 - 5. Mold and mildew resistant.
 - 6. VOC: Maximum 75 g/L (less water).
 - 7. Maximum Static-Pressure Class: 10 inch wg, positive and negative.
 - 8. Service: Indoor or outdoor.
 - 9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.

2.5 HANGERS AND SUPPORTS

- A. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct."
- B. Steel Cables for Galvanized-Steel Ducts: Galvanized steel complying with ASTM A603.
- C. Steel Cables for Stainless-Steel Ducts: Stainless steel complying with ASTM A492.
- D. Steel Cable End Connections: Galvanized-steel assemblies with brackets, swivel, and bolts designed for duct hanger service; with an automatic-locking and clamping device.
- E. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.

PART 3 - EXECUTION

3.1 DUCT INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of duct system. Indicated duct locations, configurations, and arrangements were used to size ducts and calculate friction loss for air-handling equipment sizing and for other design considerations. Install duct systems as indicated unless deviations to layout are approved on Shop Drawings and coordination drawings.
- B. Install ducts in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" unless otherwise indicated.

- C. Install ducts in maximum practical lengths with fewest possible joints.
- D. Install factory- or shop-fabricated fittings for changes in direction, size, and shape and for branch connections.
- E. Unless otherwise indicated, install ducts vertically and horizontally, and parallel and perpendicular to building lines.
- F. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.
- G. Install ducts with a minimum clearance of 1 inch.
- H. Route ducts to avoid passing through transformer vaults and electrical equipment rooms and enclosures.
- I. Where ducts pass through non-fire-rated interior partitions and exterior walls and are exposed to view, cover the opening between the partition and duct or duct insulation with sheet metal flanges of same metal thickness as the duct. Overlap openings on four sides by at least 1-1/2 inches.
- J. Protect duct interiors from moisture, construction debris and dust, and other foreign materials both before and after installation. Comply with SMACNA's "IAQ Guidelines for Occupied Buildings Under Construction," Appendix G, "Duct Cleanliness for New Construction Guidelines."

3.2 INSTALLATION OF EXPOSED DUCTWORK

- A. Protect ducts exposed in finished spaces from being dented, scratched, or damaged.
- B. Trim duct sealants flush with metal. Create a smooth and uniform exposed bead. Do not use two-part tape sealing system.
- C. Grind welds to provide smooth surface free of burrs, sharp edges, and weld splatter. When welding stainless steel with a No. 3 or 4 finish, grind the welds flush, polish the exposed welds, and treat the welds to remove discoloration caused by welding.
- D. Maintain consistency, symmetry, and uniformity in arrangement and fabrication of fittings, hangers and supports, duct accessories, and air outlets.
- E. Repair or replace damaged sections and finished work that does not comply with these requirements.

3.3 DUCT SEALING

- A. Seal ducts for duct static-pressure, seal classes, and leakage classes specified in "Duct Schedule" Article in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

- B. Seal ducts at a minimum to the following seal classes in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible":
1. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
 2. Outdoor, Supply-Air Ducts: Seal Class A.
 3. Outdoor, Exhaust Ducts: Seal Class C.
 4. Outdoor, Return-Air Ducts: Seal Class C.
 5. Unconditioned Space, Supply-Air Ducts in Pressure Classes 2-Inch wg and Lower: Seal Class B.
 6. Unconditioned Space, Supply-Air Ducts in Pressure Classes Higher Than 2-Inch wg: Seal Class A.
 7. Unconditioned Space, Exhaust Ducts: Seal Class C.
 8. Unconditioned Space, Return-Air Ducts: Seal Class B.
 9. Conditioned Space, Supply-Air Ducts in Pressure Classes 2-Inch wg and Lower: Seal Class C.
 10. Conditioned Space, Supply-Air Ducts in Pressure Classes Higher Than 2-Inch wg: Seal Class B.
 11. Conditioned Space, Exhaust Ducts: Seal Class B.
 12. Conditioned Space, Return-Air Ducts: Seal Class C.

3.4 HANGER AND SUPPORT INSTALLATION

- A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 5, "Hangers and Supports."
- B. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.
1. Where practical, install concrete inserts before placing concrete.
 2. Install powder-actuated concrete fasteners after concrete is placed and completely cured.
 3. Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than 4 inches thick.
 4. Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches thick.
 5. Do not use powder-actuated concrete fasteners for seismic restraints.
- C. Hanger Spacing: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct," for maximum hanger spacing; install hangers and supports within 24 inches of each elbow and within 48 inches of each branch intersection.
- D. Hangers Exposed to View: Threaded rod and angle or channel supports.
- E. Support vertical ducts with steel angles or channel secured to the sides of the duct with welds, bolts, sheet metal screws, or blind rivets; support at each floor and at a maximum intervals of 16 feet.

- F. Install upper attachments to structures. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

3.5 CONNECTIONS

- A. Make connections to equipment with flexible connectors complying with Section 233300 "Air Duct Accessories."
- B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.

3.6 PAINTING

- A. Paint interior of metal ducts that are visible through registers and grilles and that do not have duct liner. Apply one coat of flat, black, latex paint over a compatible galvanized-steel primer.

3.7 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Duct System Cleanliness Tests:
 - 1. Visually inspect duct system to ensure that no visible contaminants are present.
 - 2. Test sections of metal duct system, chosen randomly by Owner, for cleanliness in accordance with "Description of Method 3 - NADCA Vacuum Test" in NADCA ACR, "Assessment, Cleaning and Restoration of HVAC Systems."
 - a. Acceptable Cleanliness Level: Net weight of debris collected on the filter media shall not exceed 0.75 mg/100 sq. cm.
- C. Duct system will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.

3.8 STARTUP

- A. Air Balance: Comply with requirements in Section 230593 "Testing, Adjusting, and Balancing for HVAC."

3.9 DUCT SCHEDULE

- A. Fabricate ducts with galvanized sheet steel except as otherwise indicated and as follows:

1. Fabricate all ducts to achieve SMACNA pressure class, seal class, and leakage class as indicated below.
2. Underground Ducts: Concrete-encased, galvanized sheet steel.

B. Exhaust Ducts:

1. Ducts Connected to Fans Exhausting (ASHRAE 62.1, Class 1 and 2) Air:
 - a. Pressure Class: Negative 1-inch wg.
 - b. Minimum SMACNA Seal Class: A if negative pressure, and A if positive pressure.
 - c. SMACNA Leakage Class for Rectangular: 2.
 - d. SMACNA Leakage Class for Round and Flat Oval: .

C. Elbow Configuration:

1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-2, "Rectangular Elbows."
 - a. Velocity 1000 fpm or Lower:
 - 1) Radius Type RE 1 with minimum 0.5 radius-to-diameter ratio.
 - 2) Mitered Type RE 4 without vanes.
 - b. Velocity 1000 to 1500 fpm:
 - 1) Radius Type RE 1 with minimum 1.0 radius-to-diameter ratio.
 - 2) Radius Type RE 3 with minimum 0.5 radius-to-diameter ratio and two vanes.
 - 3) Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."
 - c. Velocity 1500 fpm or Higher:
 - 1) Radius Type RE 1 with minimum 1.5 radius-to-diameter ratio.
 - 2) Radius Type RE 3 with minimum 1.0 radius-to-diameter ratio and two vanes.
 - 3) Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."
2. Round Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-4, "Round Duct Elbows."
 - a. Minimum Radius-to-Diameter Ratio and Elbow Segments: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 3-1, "Mitered Elbows." Elbows with less than 90-degree change of direction have proportionately fewer segments.

- 1) Velocity 1000 fpm or Lower: 0.5 radius-to-diameter ratio and three segments for 90-degree elbow.
 - 2) Velocity 1000 to 1500 fpm: 1.0 radius-to-diameter ratio and four segments for 90-degree elbow.
 - 3) Velocity 1500 fpm or Higher: 1.5 radius-to-diameter ratio and five segments for 90-degree elbow.
 - 4) Radius-to Diameter Ratio: 1.5.
- b. Round Elbows, 12 Inches and Smaller in Diameter: Stamped or pleated.
- c. Round Elbows, 14 Inches and Larger in Diameter: Standing seam.

END OF SECTION 23 31 13

SECTION 23 34 23
HVAC POWER VENTILATORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Ceiling-mounted ventilators.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Construction details, material descriptions, dimensions of individual components and profiles, and finishes for fans.
 - 2. Rated capacities, operating characteristics, and furnished specialties and accessories.
 - 3. Certified fan performance curves with system operating conditions indicated.
 - 4. Certified fan sound-power ratings.
 - 5. Motor ratings and electrical characteristics, plus motor and electrical accessories.
 - 6. Material thickness and finishes, including color charts.
 - 7. Dampers, including housings, linkages, and operators.
 - 8. Prefabricated roof curbs.
 - 9. Fan speed controllers.

1.4 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For HVAC power ventilators to include in normal and emergency operation, and maintenance manuals.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Unusual Service Conditions
 - 1. Base fan-performance ratings on the following:
 - a. Ambient Temperature: 95 deg F.
 - b. Altitude: 1250 feet above sea level.

2.2 CEILING-MOUNTED VENTILATORS

- 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:
 - 1. Greenheck Fan Corporation.
 - 2. Loren Cook Company.
 - 3. PennBarry.
- B. Housing: Steel, lined with acoustical insulation.
- C. Fan Wheel: Centrifugal wheels directly mounted on motor shaft. Fan shrouds, motor, and fan wheel removable for service.
- D. Back-draft damper: Integral.
- E. Grille: Painted aluminum, louvered grille with flange on intake and thumbscrew or spring retainer attachment to fan housing.
- F. Electrical Requirements: Junction box for electrical connection on housing and receptacle for motor plug-in.
- G. Accessories:
 - 1. Variable-Frequency Motor Controller: Solid-state control to reduce speed from 100 to less than 50 percent.
 - 2. Manual Starter Switch: Single-pole rocker switch assembly with cover and pilot light.
 - 3. Time-Delay Switch: Assembly with single-pole rocker switch, timer, and cover plate.
 - 4. Motion Sensor: Motion detector with adjustable shutoff timer.
 - 5. Ceiling Radiation Damper: Fire-rated assembly with ceramic blanket, stainless steel springs, and fusible link.
 - 6. Filter: Washable aluminum to fit between fan and grille.
 - 7. Isolation: Rubber-in-shear vibration isolators.
 - 8. Manufacturer's standard roof jack or wall cap, and transition fittings.

2.3 MOTORS

- A. Comply with NEMA designation, temperature rating, service factor, and efficiency requirements for motors specified in Section 230513 "Common Motor Requirements for HVAC Equipment."
 - 1. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.

2.4 SOURCE QUALITY CONTROL

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and application.
- B. AMCA Certification: Fans shall comply with AMCA 11 and bear the AMCA-Certified Ratings Seal.
- C. Fan Sound Ratings: Comply with AMCA 311, and label fans with the AMCA-Certified Ratings Seal. Sound ratings shall comply with AMCA 301. The fans shall be tested according to AMCA 300.
- D. Fan Performance Ratings: Comply with AMCA 211 and label fans with AMCA-Certified Rating Seal. The fans shall be tested for air performance - flow rate, fan pressure, power, fan efficiency, air density, speed of rotation, and fan efficiency - according to AMCA 210/ASHRAE 51.
- E. Operating Limits: Classify according to AMCA 99.
- F. UL Standards: Power ventilators shall comply with UL 705. Power ventilators for use for restaurant kitchen exhaust shall also comply with UL 762.

PART 3 - EXECUTION

3.1 INSTALLATION OF HVAC POWER VENTILATORS

- A. Install power ventilators level and plumb.
- B. Ceiling Units: Suspend units from structure; use steel wire or metal straps.
- C. Install units with clearances for service and maintenance.
- D. Label units according to requirements specified in Section 230553 "Identification for HVAC Piping and Equipment."

3.2 DUCTWORK CONNECTIONS

- A. Drawings indicate general arrangement of ducts and duct accessories. Make final duct connections with flexible connectors.

3.3 ELECTRICAL CONNECTIONS

- A. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."
- B. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."
- C. Install electrical devices furnished by manufacturer, but not factory mounted, according to NFPA 70 and NECA 1.
 - 1. Nameplate shall be laminated acrylic or melamine plastic signs, as specified in Section 260553 "Identification for Electrical Systems."
 - 2. Nameplate shall be laminated acrylic or melamine plastic signs with a black background and engraved white letters at least 1/2 inch high.

3.4 CONTROL CONNECTIONS

- A. Install control and electrical power wiring to field-mounted control devices.

3.5 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- C. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
- D. Perform tests and inspections.
- E. Tests and Inspections:
 - 1. Verify that shipping, blocking, and bracing are removed.
 - 2. Verify that unit is secure on mountings and supporting devices and that connections to ducts and electrical components are complete. Verify that proper thermal-overload protection is installed in motors, starters, and disconnect switches.
 - 3. Verify that there is adequate maintenance and access space.
 - 4. Verify that cleaning and adjusting are complete.
 - 5. Disconnect fan drive from motor, verify proper motor rotation direction, and verify fan wheel free rotation and smooth bearing operation. Reconnect fan drive system, align and adjust belts, and install belt guards.
 - 6. Adjust belt tension.
 - 7. Adjust damper linkages for proper damper operation.
 - 8. Verify lubrication for bearings and other moving parts.

9. Verify that manual and automatic volume control and fire and smoke dampers in connected ductwork systems are in fully open position.
 10. Disable automatic temperature-control operators, energize motor and adjust fan to indicated rpm, and measure and record motor voltage and amperage.
 11. Shut unit down and reconnect automatic temperature-control operators.
 12. Remove and replace malfunctioning units and retest as specified above.
- F. Test and adjust controls and safeties. Controls and equipment will be considered defective if they do not pass tests and inspections.
- G. Prepare test and inspection reports.

3.6 DEMONSTRATION

- A. Train Owner's maintenance personnel to adjust, operate, and maintain centrifugal fans.

END OF SECTION 23 34 23

SECTION 23 34 39

HIGH-VOLUME, LOW-SPEED FANS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes high-volume, low-speed fans.

1.3 DEFINITIONS

- A. HVLS - High volume, low speed.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include rated capacities, furnished specialties, and accessories for each fan.
 - 2. Certified fan performance curves with system operating conditions indicated.
 - 3. Certified fan sound-power ratings.
 - 4. Motor ratings and electrical characteristics, plus motor and electrical accessories.
 - 5. Material thickness and finishes, including color charts.
 - 6. Fan speed controllers.

- B. Shop Drawings:

- 1. Include plans, elevations, sections, and mounting details.
- 2. Include details of equipment assemblies. Show dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
- 3. Include diagrams for power, signal, and control wiring.

1.5 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Floor plans and details, drawn to scale and coordinated with each other, using input from installers of the items involved.

B. Qualification Data:

1. For Installer: Certificate from HVLS fan manufacturer certifying that Installer has successfully completed prerequisite training administered by manufacturer for proper installation of systems, including but not limited to, equipment, controls, and accessories indicated and furnished for installation.

C. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For HVLS fans to include in emergency, operation, and maintenance manuals.

1.7 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Provide certification that manufacturer complies with the requirements of the most recent edition of ISO 9001.

- B. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by HVLS fan manufacturer.

1. Each employee shall be certified by manufacturer for proper installation of systems, including, but not limited to, equipment, controls, and accessories indicated and furnished for installation.
2. Installer certification shall be valid and current for duration of Project.
3. Retain copies of Installer certificates on-site and make available on request.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store products in a clean and dry place.
- B. Comply with manufacturer's written rigging and installation instructions for unloading and moving to final installed location.
- C. Handle products carefully to prevent damage, breaking, denting, and scoring. Do not install damaged products.
- D. Protect products from weather, dirt, dust, water, construction debris, and physical damage.
1. Retain factory-applied coverings on equipment to protect finishes during construction and remove just prior to operating unit.
 2. Cover unit openings before installation to prevent dirt and dust from entering inside of units. If required to remove coverings during unit installation, reapply coverings over openings after unit installation and remove just prior to operating unit.
- E. Replace installed products damaged during construction.

1.9 WARRANTY

- A. Warranty: Manufacturer and Installer agree to repair or replace components of fans that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period:
 - a. For Motor, Including Controls: Five year(s) from date of Substantial Completion.
 - b. For Parts, Including Blades and Hub: Five year(s) from date of Substantial Completion.
 - c. For Labor: One year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. UL Compliance: Listed and labeled to UL 507.
- C. CSA Compliance: Listed and labeled to CSA C22.2, No. 113.
- D. Comply with NFPA 13 requirements for HVLS fans.
- E. AMCA Compliance:
 - 1. Test HVLS fans according to AMCA 230.
 - 2. Certify HVLS fan performance according to AMCA 211.
- F. Performance Data: Comply with ANSI 230 test procedure standard, based on five rating points: 20-, 40-, 60-, 80-, and 100-percent of maximum speed. Comply with AMCA 211 for publication of performance data.
- G. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design HVLS ceiling fans.

2.2 CAPACITIES AND CHARACTERISTICS

- A. Fan:
 - 1. Type: HVLS Selectable.
 - 2. Number of Fan Blades: 6.
 - 3. Fan Diameter: 6 feet.
- B. Motor:
 - 1. As scheduled.

2.3 MANUFACTURERS

- 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:
1. Big Ass Fans.
 2. Hunter Fan Company; Industrial & Commercial Division.
 3. MacroAir.
- B. Source Limitations: Obtain HVLS fans from single source from single manufacturer.

2.4 HIGH-VOLUME, LOW-SPEED FANS

- A. Description: Factory-assembled and -tested horizontal, non-ducted fan unit, consisting of large-diameter blade set, direct-drive electric motor, with variable-speed motor controller.
1. Provide fan designed to circulate large air volume, vertically, at low velocity.
 2. Maximum Operating Temperature: 122deg F.
 3. Frame:
 - a. Material: Aluminum.
 - 1) Finish: Anodized.
 4. Diameter: 6 feet.
 5. Blades: Airfoil type.
 - a. Quantity: 6.
 - b. Material: Aluminum.
 - 1) Blade Finish: Anodized.
 6. Motor: ODP.
 7. Wiring and Controls Enclosure:
 - a. NEMA 250, Class 1.
 - b. Material: Aluminum.
 - 1) Enclosure Finish: Anodized.
 - c. Grounded.
 8. Controls: Provide wall-mounted digital controller.
 - a. Provide variable speed motor controller.
 - b. Controller shall be capable of controlling up to four HVLS fans per schedules.
 9. Standard Mounting Bracket: Steel beam/steel angle.

10. Mounting Bracket: Unistrut.
11. Accessories:
 - a. Mounting extension tube.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine conditions for compliance with requirements for installation tolerances and other conditions affecting HVLS fan performance, maintenance, and operations.
 1. Fan locations indicated on Drawings are approximate. Determine exact locations before roughing-in for mounting, control, and electrical connections.
- B. Examine roughing-in for mounting location, anchor-bolt sizes, and locations, to verify actual locations for mounting connections before installation of fan.
- C. Examine areas for suitable conditions where fan will be installed.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF HIGH-VOLUME LOW-SPEED FANS

- A. Install fan according to manufacturer's published instructions.
- B. Comply with NECA 1 and NFPA 70.
- C. Comply with NFPA 13 for installation of HVLS fans and maximum allowable fan diameter. Center HVLS fans between four adjacent sprinklers. Minimum vertical clearance from HVLS fan to sprinkler deflector is 3 feet.
- D. Comply with NFPA 72 and interlock HVLS fans to shut down upon receiving an alarm from fire alarm system.
- E. Equipment Mounting:
 1. Anchor fan to building structure with manufacturer's recommended mounting bracket for installed condition.
- F. Install unit to permit access for maintenance.
- G. Install parts and accessories shipped loose.

3.3 ELECTRICAL CONNECTIONS

- A. Connect wiring according to Section 260519 "Wires and Cables."

- B. Ground equipment according to Section 260526 "Grounding and Bonding."
- C. Install electrical devices furnished by manufacturer, but not factory mounted, according to NFPA 70 and NECA 1.
- D. Install nameplate for each electrical connection, indicating electrical equipment designation and circuit number feeding connection.
 - 1. Nameplate shall be laminated acrylic or melamine plastic signs, as specified in Section 260553 "Identification for Electrical Systems."
 - 2. Nameplate shall be laminated acrylic or melamine plastic signs with a black background and engraved white letters at least 1/2 inch high.
- E. Install power wiring to field-mounted electrical devices, furnished by fan manufacturer, but not factory mounted.

3.4 CONTROL CONNECTIONS

- A. Connect control wiring to field-mounted control devices.
- B. Connect control interlock wiring between HVLS fan and other equipment to provide a complete and functioning system.
- C. Connect control wiring between fan unit control interface and control system to provide remote control and monitoring.
- D. Install control devices furnished by manufacturer, but not factory mounted.
- E. Install control wiring to field-mounted control devices, furnished by fan manufacturer, but not factory mounted.
- F. Protect installed units from damage caused by other work.

3.5 FIELD QUALITY CONTROL

- A. Testing Agency, Owner Engaged: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Testing Agency, Contractor Engaged: Engage a qualified testing agency to perform tests and inspections.
- C. Perform the following tests and inspections with the assistance of a factory-authorized service representative:
 - 1. Fan Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
 - 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

- D. Fan or components will be considered defective if fan or components do not pass tests and inspections.
- E. Prepare and submit test and inspection reports.

3.6 STARTUP SERVICE

- A. Perform startup service.
 - 1. Complete installation and startup checks according to manufacturer's written instructions.
 - 2. Verify that fan is secure on mountings and supporting devices and that connections to electrical systems are complete. Verify that proper thermal-overload protection is installed in motors, controllers and switches.
 - 3. Verify proper motor rotation direction and free fan rotation.
 - 4. Check bearing and gearbox lubrication.
 - 5. Verify proper fan rotation. Set rotation selector to blow vertically downward during heating season, and vertically upward during cooling season.

3.7 ADJUSTING

- A. Comply with requirements in Section 230593 "Testing, Adjusting, and Balancing for HVAC" for air-handling system testing, adjusting, and balancing.

3.8 CLEANING

- A. Clean equipment externally; remove coatings applied for protection during shipping and storage, foreign material, and oily residue according to manufacturer's written instructions. Following manufacturer's cleaning procedures, and clean with manufacturer-recommended cleaning products.

3.9 DEMONSTRATION

- A. Train Owner's maintenance personnel to adjust, operate, and maintain HVLS fans.
- B. Video record the training sessions and provide electronic copy of video to Owner.

END OF SECTION 23 34 39

SECTION 26 05 00

GENERAL ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections.
- B. All Specification Sections under Division 26.

1.2 SUMMARY

- A. This Section includes:
 - 1. Definitions.
 - 2. Excavation.
 - 3. Coordination of work.
 - 4. Warranties.
 - 5. Field test.

1.3 REFERENCES

- A. American National Standards Institute, Inc. (ANSI) Publications:
 - 1. C2 - National Electrical Safety Code.
- B. California Code of Regulations (CCR) Publications:
 - 1. Title 8, Industrial Relations.
 - 2. Title 19, State Fire Marshal Regulations.
 - 3. Title 24, Part 2, Energy Conservation Standards.
 - 4. Title 24, Part 3, CCR, 2004 California Electrical Code.
 - 5. Title 24, Part 9, CCR, 2001 California Fire Code.
- C. National Electrical Manufacturers Association (NEMA) Publication: ICS6-93 Enclosures for Industrial Controls and Systems.
- D. National Fire Protection Association (NFPA) Publications:
 - 1. 70 National Electrical Code
 - 2. 70B Recommended Practice for Electrical Equipment Maintenance.
 - 3. NFPA 101 Life Safety Code.
- E. State of California Public Utilities Commission (Cal. P.U.C.) Publications:
 - 1. G.O. 128 Rules for Construction of Underground Electrical Supply and Communications Systems.

1.4 DEFINITIONS

- A. The following definitions apply to terms used in these standards.
- B. The words "work" or "electrical work" include products, labor, equipment, tools, appliances, transportation, and all related items directly or indirectly required to complete the specified and indicated electrical installation.
- C. The word "concealed" shall mean that the installation will not be visible when all permanent or removable elements of the construction are in place. The word "exposed" shall mean that the installation is visible when all permanent or removable elements of the construction are in place.
- D. The word "code" shall mean any and all regulations and requirements of regulatory bodies, public and private, having jurisdiction over the work involved.
- E. The word "product" used in Division 26 means all material, equipment, machinery, and/or appliances directly or indirectly required to complete the specified and/or indicated electrical work.
- F. The words "standard product" shall mean a manufactured product, illustrated and/or described in catalogs or brochures, which is in general distribution prior to the date of issue of construction documents. Products will generally be identified by means of a specific catalog number and manufacturer's name.
- G. "Provide" means furnish, install, connect and test unless otherwise noted.
- H. The words "conduit" and "duct" are used interchangeably and have the same meaning.
- I. "UFER" Ground: See Section 26 05 26, "Grounding and Bonding".

1.5 DRAWINGS AND SPECIFICATIONS

- A. Electrical drawings are diagrammatic but shall be followed as closely as actual construction and work of the other sections shall permit. Size and location of equipment is drawn to scale wherever possible.
- B. Drawings and specifications are for the assistance and guidance of the Contractor. Exact locations, distances, and levels will be governed by the site. The Contractor shall make use of data in all the contract documents to verify information at the building site.
- C. In any case where there appears to be a conflict or ambiguity between that which is shown on the electrical drawings or in the electrical specifications and any other part of the Contract Documents, the Contractor shall notify and secure directions from the Engineer.
- D. Drawings and specifications are intended to complement each other. Where a conflict or ambiguity exists between the requirements of the drawings and the specifications, request clarification. Do not proceed with work without direction.

POLICE RANGE REFURBISHMENT PROJECT - PHASE II

- E. The Engineer shall interpret the drawings and the specifications. The interpretation by the Engineer as to the true intent and meaning thereof and the quality, quantity, and sufficiency of the materials and workmanship furnished thereunder shall be accepted as final and conclusive.
- F. In the case of conflicts or ambiguities not clarified prior to the bidding deadline, use the most costly alternative (better quality, greater quantity, and larger size) in preparing the bid. A clarification will be issued to the successful bidder as soon as feasible after the award and, if appropriate, a deductive change order will be issued.
- G. Where items are specified in the singular, this division shall provide the quantity as shown on drawings plus any spares or extras indicated on the drawings or in the specifications.
- H. Record Drawings:
 - 1. On one (1) set of contract drawings, kept at the site during construction, mark all work that is installed differently from that shown on plans, including revised circuitry, material or equipment. Sufficient dimensions shall be provided to locate all materials installed beneath and outside the building including, but not limited to, underground conduits, cabling, ground rods, and stubouts.
 - 2. All changes or revisions to the contract drawings including, but not limited to, those indicate by amendment, change order, field order, written response to RFI/RFC or other contractual means shall be kept current as the work progresses and shall be incorporated onto the final record drawings.
 - 3. Accurately locate and dimension all underground and embedded conduit runs on the record drawings.
 - 4. The marked drawings shall be kept current as the work progresses and shall be available for inspection upon request. At the close of construction, prepare a set of accurate reproducible record drawings and turn them over to the Engineer. The correct and completed record drawings are a prerequisite to final contract payment.
 - a. As part of the reproducible record drawings, the Contractor shall produce full size reproducible drawings with the final panelboard schedules as modified during construction and final light fixture schedule as modified during construction.
 - b. These drawings shall be on Engineering base sheets and numerically sequenced to follow the last "E" sheet.

1.6 EXAMINATION OF SITE

- A. Examination of the building site shall be made by the Contractor. The Contractor shall compare it with the drawings and specification to satisfy himself as to the conditions under which work is to be performed. The Contractor shall, at such time, ascertain and check the locations of existing structures or equipment which may affect his work.

1.7 EXCAVATION

POLICE RANGE REFURBISHMENT PROJECT - PHASE II

- A. Prior to starting excavation or trenching, the Contractor shall perform an underground Site Survey utilizing an electronic locator to verify the exact location of all existing underground utility piping, conduits and conductors. The Contractor shall submit for approval a site survey report to the Engineer within five (5) working days after the survey is performed. The Site Survey Report shall show the horizontal location for existing utilities and identify any possible conflicts between the new work and existing utilities.
- B. All existing utilities that are disturbed by the contractor shall be immediately repaired at no cost to the City.

1.8 PERMITS, FEES AND INSPECTIONS

- A. Permits, fees, and inspections including all utility fees shall be arranged for and paid by the Contractor.
- B. The Contractor shall present to the Engineer properly signed certificates of the final inspection before work will be accepted.

1.9 SUBMITTALS

- A. Submittal requirements for Division 26 shall be in accordance with Division 1 except as modified herein. All time requirements shall be based on the notice to proceed date of the General Contract. All materials and equipment furnished under Division 26 shall; be submitted to the Engineer for approval. Such approval shall be in writing from the Engineer including that, which is exactly as specified. Any materials or equipment installed without written approval shall be subject to immediate removal. Approval of material or equipment shall in no way obviate compliance with the contract documents.
- B. Submittals shall be packaged separately for each system or major piece of equipment and reviewed by the Contractor for verification of compliance with the contract documents prior to submitting to the Engineer. Separate, bound submittals shall be provided for each specification section to the Engineer. Authorization to combine equipment or systems must be in writing from the Engineer. All interfaces between specification sections shall be indicated in each submittal.
- C. All materials and equipment shall be new and shall bear the inspection label of the Underwriters Laboratories (UL) where applicable. Materials and equipment shall be the latest standard product and shall be of the grade indicated by the trade names given.
- D. The work shown on the contract drawings is engineered and designed to accommodate the equipment described hereinafter in these specifications.
- E. Equipment submittals shall include manufacturer's name, model, type, number, finish, size and capacity of the equipment at the given conditions. This information shall be provided in bound submittals, each containing an index and all submittals. Provide seven (7) copies of each submittal. The title shall provide the project name, system identity, the specification number, and the Contractor's name and address. This

POLICE RANGE REFURBISHMENT PROJECT - PHASE II

submittal shall be in addition to the shop drawings hereinafter specified. Partial submittals of material submitted from time to time are not acceptable and may be returned without review.

- F. Submittals shall be reviewed by the Engineer for compliance with the contract documents. Submittals found to be incomplete or not in compliance with the contract documents shall be returned for resubmittal. The Engineer shall review the original submittal and one (1) resubmittal per section (if required). The Contractor shall reimburse the Engineer for all subsequent submittal reviews.
- G. Shop drawings for service entrance equipment shall be submitted to and approved by the San Diego Gas and Electric Company metering shop prior to submittal to the Engineer.
- H. Equipment Layout Drawings: "Equipment Layout Drawings" shall be provided for each equipment room, yard or area containing equipment items furnished under Division 26. Layout drawings shall consist of a plan view of the room or area (to a ¼ inch =1'-0" minimum scale) showing projected outlines of all equipment, complete with dotted lines indicating all required clearances, including all clearances needed for removal or service. Location of all conduit and pull boxes shall be indicated. Drawings shall indicate any and all conflicts with other trades.
- I. All electrical submittals shall also be routed through and reviewed by the City of San Diego Facilities Division electrical crew. All City comments will be prepared and forwarded within five (5) working days.

1.10 SUBSTITUTIONS

- A. Equipment submitted for substitution must fit the space conditions shown on the drawings, leaving adequate room for maintenance around all equipment. A minimum of 36 inches (or more if required by Code) must be maintained clear in front of all electrical panels, starters, gutters or other electrical apparatus. Submit drawings showing the layout, size, and exact method of interconnection of conduit, wiring and controls, which shall conform to the manufacturer's recommendations and these specifications. The scale of these drawings shall be the scale of the contract drawings. The Contractor shall bear the excess costs, by any and all crafts, for fitting the equipment into the space and the system designated. Where additional labor or material is required to permit equipment submitted for substitution to function in an approved manner, this shall be furnished and installed by the Contractor without additional cost to the Owner.
- B. No substitutions will be allowed for materials or equipment if three (3) or more manufacturers are indicated.
- C. An item submitted for substitution does not constitute an "equal" unless approval by the Engineer has been given in writing.
- D. Equipment submitted for substitution shall be approved in writing by the Engineer and shall be accompanied by the following:
 - 1.

POLICE RANGE REFURBISHMENT PROJECT - PHASE II

2. A sample of each item submitted for substitution shall accompany the submittal if requested by the Engineer.
 3. A unit price quotation shall be provided with each item intended for substitution. This quote shall include a unit price for the specified item and a unit price for the intended substitute item. The Contractor shall also provide a total (per item) of the differential payback to the City should the intended substitute item be approved as equivalent to that which is specified.
 4. The Contractor shall reimburse the City for the additional services required by the Engineer to review and process substitutions.
- E. Substitutions shall be approved in writing by the Engineer. The determination of the Engineer shall be final.

1.11 WARRANTY

- A. Warranty requirements for Division 26 shall be in accordance with Division 1 except as modified herein.
- B. All materials and equipment provided shall be warranted for a minimum period of one (1)-year from the official date of completion. In addition, provide two (2)-year extended warranty, for a total of three (3)-years, for the following items:
 1. Service Entrance and Metering Equipment.
 2. Circuit Breakers.
- C. Refer to Section 26 56 68, "Sports Lighting" for additional warranty requirements.
- D. The Contractor shall provide all labor and materials required to correct problems which develop during the warranty period due to defective materials or faulty workmanship. The labor and materials to do this work shall be provided at no additional cost to the City.
- E. Within one (1)-month prior to the expiration of the warranty period, the Contractor shall correct any and all defects covered by the warranty. This shall include tightening to original specifications of all bolted connections.
- F. Warranty certificates shall be made out to the City and shall be delivered to the Engineer at the completion of the installation.
- G. All equipment shall be guaranteed to be supported in such a way as to be free from objectionable vibration and noise.
- H. Additional warranty requirement shall be as indicated in the following sections of Division 26.

1.12 OPERATION AND MAINTENANCE MANUALS

- A. The Contractor shall furnish operation and maintenance manuals for each electrical system and for each piece of equipment. The complete manual, bound in hardback binders, or an approved equivalent, shall be provided to the Engineer. Provide Seven

(7) copies of each manual. One (1) manual shall be furnished prior to the time that system or equipment tests are performed, and the remaining manuals shall be furnished one (1) week before the final job visit is made. The following identification shall be inscribed on the cover; the words "OPERATION AND MAINTENANCE MANUAL", the name and location of the building, the name of the Contractor, and the contract number.

- B. The parts list for equipment shall indicate the sources of supply, recommended spare parts, and the service organization that is reasonably convenient to the building site. The manual shall be complete in all respects for all equipment, controls, and accessories provided.
- C. One (1) copy shall be forwarded to the City Facilities Maintenance Electrical Department prior to the final walk-through
- D. Send to: City of San Diego
General Services/Facilities Division
Electrical Crew, Suite A, Bldg 38
San Diego, CA 92102

1.13 COORDINATION OF ALL WORK

- A. Job Visits by the Engineer:
 - 1. Periodic visits to the job by the Engineer are for the express purpose of verifying compliance with the contract documents.
 - 2. Such visits shall not be construed as construction supervision. Neither shall such visits be construed as making the Engineer responsible for providing a safe place for the performance of the work by the Contractor or the Contractor's employees or the safety of the supplies of the Contractor or his Subcontractors.
- B. Temporary Electrical Service:
 - 1. The Contractor shall provide labor and materials required for the installation and maintenance of temporary lighting and required power sources for the Contractor's equipment inside the building or construction site and for pedestrian walkways during the period of construction.
 - 2. The construction site shall be sufficiently illuminated so that construction work can be safely performed. Special attention shall be given to adequately lighting stairs, ladders, pedestrian walkways, floor openings, etc. Walkway lights shall be controlled by a switch within the building or construction site.
- C. Posted Operating Instructions:
 - 1. Operating instructions shall be provided by the Contractor at the conclusion of the project for each system and each principal piece of equipment for the use of operating and maintenance personnel. The operating instructions shall include wiring and control diagrams showing the entire system, including, but not limited to, equipment, devices, and control sequences. The Engineer shall approve all operating instructions.
 - 2. Operating instructions shall be typewritten or engraved and shall be framed under glass or in approved laminated plastic and posted adjacent to each principal piece of equipment and shall include such instructions as start up,

POLICE RANGE REFURBISHMENT PROJECT - PHASE II

proper adjustment, operation, lubrication, shutdown, safety-precautions, procedure in the event of equipment failure, and any other necessary items of instructions as recommended by the manufacturer of unit.

3. Operating instructions exposed to the weather shall be made of weather-resisting materials or shall be suitably enclosed to be weather protected. Operating instructions shall not fade when exposed to sunlight and shall be secured to prevent easy removal or peeling.

1.14 TRAINING

- A. User staff and maintenance personnel shall be thoroughly trained (minimum four (4)-hours) in the use of each system or major piece of equipment installed. This training shall be provided a part of the Contractors bid to supply the system or equipment. Additional training requirements, shall be as specified in the subsequent sections of Division 26.

1.15 DELIVERY AND STORAGE

- A. Equipment and materials shall be properly stored, adequately protected, and carefully handled to prevent damage before and during installation. Equipment and materials shall be handled, stored, and protected in accordance with the manufacturer's recommendations and as approved by the Engineer. Electrical conduit shall be stored to provide protection from the weather and accidental damage. Plastic conduit shall be stored on even supports and in locations not subject to direct sunrays or excessive heat. Cables shall be sealed, stored, and handled carefully to avoid damage to the outer covering or insulation and damage from moisture and weather. Damaged or defective items shall be replaced with new items a no cost to the City. The Engineer shall determine if a damaged or defective item is to be replaced with a new item. The decisions by the Engineer in these matters shall be final.

1.16 FIELD TESTS

- A. As an exception to requirements that may be stated elsewhere in the contract, the Engineer shall be given five (5) working days notice prior to each test. The Contractor shall provide all test equipment, personnel and incidentals including, but not limited to, water, fuel, and lubricants necessary to perform the required tests. The Owner shall provide electrical power required for all tests. The Contractor shall submit five (5) typewritten copies of all test results to the Engineer within five (5) working days after each test.
- B. The information submitted shall include, but not limited to, the following:
 1. Scope of the test.
 2. Name and type of instrument used.
 3. Calibration date of instrument and name of calibration firm.
 4. Name and signature of testing personnel.
 5. Name of signature of Engineer.
 6. Analysis of test results.

POLICE RANGE REFURBISHMENT PROJECT - PHASE II

- C. The Contractor shall demonstrate to the Engineer the operation of all equipment and systems. All tests shall be completed to the satisfaction of the Engineer. Each test shall be performed the number of time indicated in the individual specification section. In the event the number of times the tests are to be completed is omitted, the Engineer shall determine the number.

1.17 FINAL WALK THOUGH

- A. The final project walk-through will be attended by the Architect, Engineer, Contractor, and City Facilities Electrical Department personnel. At that time an operational test of at least the following systems shall occur to verify correct operation:
 - 1. Emergency Systems
 - 2. Time clocks/Photocell controls
 - 3. Occupancy sensors and lighting switching
 - 4. Mechanical equipment and thermostat settings
 - 5. Sports lighting controls
 - 6. Other systems/components at the direction of the City.
- B. Project close-out submittals will include:
 - 1. As-Built drawings
 - 2. A spec book
 - 3. A book of final product submittals
 - 4. O&M manuals
 - 5. Signed off inspection reports and certificated

PART 2 - PRODUCTS (Not used)

PART 3 - EXECUTION (Not used)

END OF SECTION 26 05 00

SECTION 26 05 10

BASIC ELECTRICAL MATERIALS AND METHODS

PART - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections.
- B. All specification Sections under Division 26.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Supporting devices for electrical components.
 - 2. Cutting and patching for electrical construction.
 - 3. Touch-up painting.
 - 4. Tests of all electrical systems.
 - 5. Equipment Identification

1.3 ABBREVIATIONS

EMT: Electrical metallic tubing.

FMC: Flexible metal conduit.

IMC: Intermediate metal conduit.

LFMC: Liquid tight flexible metal conduit.

RNC: Rigid nonmetallic (PVC) conduit.

RMC: Rigid metallic conduit.

RGS: Rigid Galvanized Steel conduit.

1.4 REFERENCES

- A. National Fire Protection Association (NFPA) Publication 70 – National Electrical Code (NEC).
- B. California Code of Regulations (CCR) Publications:

POLICE RANGE REFURBISHMENT PROJECT - PHASE II

1. Title 24, Part 2, CCR California Building Code (CBC)
2. Title 24, Part 3, CCR, California Electrical Code. (CEC)
3. Title 24, Part 6, CCR, California Energy Code

C. Underwriters Laboratories, Inc. (U.L.) Publications

1. Standard for Flexible Metal Conduit.
2. Rigid Metallic Conduit.
3. Cabinet and Boxes.
4. Panelboards.
5. Thermoplastic Insulated Wires.

D. National Electrical Manufacturers Association (NEMA) – Wiring Devices (NEMA WD)

1.5 SUBMITTALS

A. The following information shall be submitted for review and approval in accordance with Section 26 05 00, "General Electrical Requirements".

B. Shop Drawings:

1. Provide shop drawing details, furnished by the manufacturer of the fire stop material, which show complete conformance to the U.L. system listing. These drawings shall be available to the Fire Marshal on site. The shop drawing shall be specific for each penetration with all variables defined.

C. Field Test Reports: Indicate and interpret test results for compliance with performance requirement

1.6 REGULATORY REQUIREMENTS

A. The Contractor shall conform to the requirements of the California Electrical Code and the City of San Diego Electrical Code, except where requirements herein are more stringent.

B. The Contractor shall furnish products listed and classified by Underwriters Laboratories, Inc. or as testing firm acceptable to the City as suitable for purpose specified and shown.

1.7 QUALITY ASSURANCE

A. 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.

B. Comply with California Electrical Code.

C. Comply with City of San Diego Electrical Code.

1.8 COORDINATION

- A. Coordinate chases, slots, inserts, sleeves, and openings with general construction work and arrange in building structure during progress of construction to facilitate the electrical installations that follow.
 - 1. Set inserts and sleeves in poured-in-place concrete, masonry work, and other structural components as they are constructed.
- B. Sequence, coordinate, and integrate installing electrical materials and equipment for efficient flow of the Work. Coordinate installing large equipment requiring positioning before closing in the building.
- C. Coordinate electrical service connections to components furnished by utility companies.
 - 1. Coordinate installation and connection of exterior underground and overhead utilities and services, including provision for electricity-metering components.
 - 2. Comply with requirements of authorities having jurisdiction and of utility company providing electrical power and other services.
- D. Where electrical identification devices are applied to field-finished surfaces, coordinate installation of identification devices with completion of finished surface.
- E. Where electrical identification markings and devices will be concealed by acoustical ceilings and similar finishes, coordinate installation of these items before ceiling installation.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Products and materials shall be as specified in the pertinent sections of Division 26.
- B. All products and materials shall be new and bear UL label whenever subject to such approval. Comply with ANSI, IEEE and NEMA standards where applicable.
- C. Wherever possible, all materials and equipment used in this installation shall be of the same manufacturer throughout for each class of material or equipment.

2.2 TOUCHUP PAINT

- A. For Equipment: Equipment manufacturer's paint selected to match installed equipment finish.
- B. Galvanized Surfaces: Zinc-rich paint recommended by item manufacturer.

2.3 WARNING LABELS AND SIGNS

POLICE RANGE REFURBISHMENT PROJECT - PHASE II

- A. Comply with NFPA 70 and 29 CFR 1910.145.
- B. Self-Adhesive Warning Labels: Factory-printed, multicolor, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment unless otherwise indicated.
- C. Baked-Enamel Warning Signs:
 - 1. Preprinted aluminum signs, punched or drilled for fasteners, with colors, legend, and size required for application.
 - 2. 1/4-inch (6.4-mm) grommets in corners for mounting.
 - 3. Nominal size, 7 by 10 inches (180 by 250 mm).
- D. Warning label and sign shall include, but are not limited to, the following legends:
 - 1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."
 - 2. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES (915 MM)".
 - 3. Emergency Stop Warning: "EMERGENCY SHUTOFF".
 - 4. Electrical Room Warning: "NOTICE – ELECTRICAL ROOM – NO STORAGE PERMITTED".
 - 5. Electrical Substation Yard: "DANGER – HIGH VOLTAGE – KEEP OUT"

2.4 INSTRUCTION SIGNS AND EQUIPMENT IDENTIFICATION LABELS

- A. Engraved, laminated acrylic or melamine plastic, minimum 1/16 inch (1.6 mm) thick for signs up to 20 sq. inches (129 sq. cm) and 1/8 inch (3.2 mm) thick for larger sizes.
 - 1. Engraved legend with black letters on white face.
 - 2. Punched or drilled for mechanical fasteners.

PART 3 - EXECUTION

3.1 INSTALLATION AND CONNECTION OF ELECTRICAL EQUIPMENT

- A. Equipment furnished by others shall be completely connected to the electrical system as required for correct operation. All conduit, wire, junction boxes, etc., shall be provided for proper connection and all required grounding shall be installed. Verify actual requirements with equipment supplier or Engineer prior to rough-in.
- B. All outlets, devices and equipment furnished under Division 26 shall be fully installed and connected.
- C. Provide all required flexible conduit, boxes, fittings, receptacles, caps, cords, and other material that may be required for the proper installation of all equipment. Refer to manufacturer's directions where applicable.

POLICE RANGE REFURBISHMENT PROJECT - PHASE II

- D. Coordinate the work carefully to ensure that all electrical requirements of equipment are met, and all systems are made complete and operational.
- E. All equipment shall be installed recessed (flush) unless otherwise noted or shown on plans.
- F. Install equipment to permit easy access for all maintenance.
 - 1. Maintain easy access to switches, motors, drives, pull boxes, receptacles, etc.
 - 2. Relocate items which interfere with access.

3.2 SEISMIC RESTRAINTS

- A. All electrical equipment shall be braced or anchored in accordance with the requirements of CBC.
 - 1. Horizontal seismic forces shall be determined from the applicable equations of the governing code.
 - 2. Provide all required seismic bracing, supports, bolts, washers, nuts, etc. for conduits and conduit supports.

3.3 MISCELLANEOUS WORK

- A. Do all miscellaneous metal and concrete work required; all cutting and patching; and provide all hangers, anchors, chases, supports, etc., required for the installation of the electrical systems.
- B. Touch-up or refinish damaged surfaces including, but not limited to, meter pedestal, light fixtures, etc., to the satisfaction of the Engineer.
- C. All work shall be in accordance with applicable sections of the specifications.

3.4 CLEANING AND PROTECTION OF PRODUCTS AND PREMISES

- A. At frequent intervals during the time on the site, the Contractor shall clean up after his work and remove his debris from the premises. The building and grounds shall be cleaned to the satisfaction of the Engineer. All equipment and material resulting from demolition for this project shall be removed.
- B. The Contractor shall take all necessary precautions to protect all materials, equipment and property, whether electrical or not, from damage as result of his work.
- C. The Contractor shall provide adequate protection for all material and equipment provided under Division 26. Material and equipment shall be stored in a clean dry place and shall be covered or protected from damage or contamination during storage and after installation.
- D. Before final inspection, all material and equipment furnished under Division 26 shall be thoroughly cleaned of cement, plaster, paint spatters and other foreign materials. All

surfaces shall be carefully wiped clean. Boxes, cabinets and enclosures shall be cleaned, inside and out.

3.5 CHECKING AND TESTING OF EQUIPMENT

- A. Switchboards, panelboards, and all other operable equipment worked on under this contract shall be inspected for defects and tested for proper operation.
- B. Systems shall be tested for short circuits, open circuits, wrong connections, and grounds. All system shall be free from mechanical and electrical defects.
- C. Circuits shall be tested for proper neutral and ground connections.
- D. Where required or directed, systems shall be tested in the presence of the Engineer to demonstrate that equipment furnished, installed, or connected functions in the manner intended.
- E. The contractor shall furnish all necessary instruments and equipment required for testing and shall immediately correct any defective work at no additional charge. Should the Contractor refuse or neglect to make tests necessary to satisfy the Engineer that he has carried out the true intent and meaning of the specifications, the Engineer may have such tests made and charge the expense thereof to the Contractor to be retained out of full final payment.
- F. Bolted connections shall be torque-tightened to manufacturer's specifications. The Contractor shall torque all connections with a wrench that has been calibrated within the last three (three) months. Submit proof of calibration to the Owner's Representative.
- G. Ground-Fault Circuit Interrupter Tests: Test each branch circuit having ground fault circuit protection to ensure that the ground fault circuit interrupter will not operate when subjected to a ground fault current of less than 4 milliamperes and will operate when subjected to ground fault current exceed 6 milliamperes. Perform tests using an instrument specifically designed and manufactured for testing ground fault circuit interrupters. Apply the test to the receptacle which is at the greatest distance from the ground fault interrupter. If ground-fault interrupter type receptacles are installed, test each receptacle for proper operation. "TEST" button operation will not be acceptable as a substitute for this test.
- H. For additional checking and testing of special systems, see the section where those systems are specified.

END OF SECTION 26 05 10

SECTION 26 05 19

WIRES AND CABLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Section 26 05 00 – General Electrical Requirements.
- C. Section 26 05 10 – Basic Electrical Materials and Methods.

1.2 SUMMARY

- A. This Section includes building wires and cables and associated connectors, splices, and terminations for wiring systems rated 600 V and less.

1.3 REFERENCES

- A. NEC National Electrical Code.
- B. NECA (National Electrical Contractors Association) – Standard of Installation.
- C. NETA (International Electrical Testing Association) – Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.
- D. ANSI/UL – Insulation of Conductors.

1.4 SUBMITTALS

- A. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.
- B. Product data: Submit for building wire and each cable assembly type.
- C. Select each length to complete set of manufacturer markings.
- D. Attach tag indicating cable size and application information.
- E. Product Record Documents: Record actual locations of components and circuits.
- F. Provide manufacturer's instruction for use of ground megger with proposed method indicated.

1.5 QUALITY ASSURANCE

- A. Manufacturer: Shall be specialized in manufacturing products specified in this section.
- B. Testing Agency: Company shall be a member of International Electrical Testing Association and specializing in testing products specified in this section.
- C. Listing and Labeling: Provide wires and cables specified in this Section as defined in CEC, Article 100.

1.6 REGULATORY REQUIREMENT

- A. Conform to ANSI/NFPA 7
- B. Conform to CCR Title 24, Part 6, California Energy Code.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Product Requirements: Products storage and handling requirements.
- B. Deliver wires and cables according to NEMA WC 26.

1.8 SCHEDULING OR COORDINATION

- A. Where wire and cable destination is indicated and routing is not shown, determine routing and lengths required.
- B. Coordinate layout and installation of wiring and cables with other installations.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- 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:
 - 1. Wires and Cables:
 - a. American Insulated Wire Corp.; Leviton Manufacturing Co.
 - b. Carol Cable Co., Inc.
 - c. Senator Wire & Cable Company.
 - d. Southwire Company.

2. Multiconductor Cable:
 - a. Belden
 - b. Southwire
 - c. West Penn
 - d. Or equal

3. Connectors for Wires and Cables:
 - a. AMP Incorporated.
 - b. General Signal; O-Z/Gedney Unit.
 - c. Monogram Co.; AFC.
 - d. Square D Co.; Anderson.

2.2 BUILDING WIRES AND CABLES

- A. Conductor Material: Copper
- B. All conductor sizes shall be designated by American Wire Gauge (AWG) or Thousand Circular Mills (kcmil).
- C. The date of manufacture shall not exceed six months prior to delivery to the site.
- D. All conductors shall be stranded. Minimum wire size shall be No. 12 AWG unless otherwise specified.
- E. Branch circuit conductors shall be type THWN-2 (90 degrees C).
- F. Feeder conductors 6 AWG and larger shall be type XHHW-2 (90 degrees C).
- G. All conductors shall be color-coded as follows:

120/208 Volts

Phase "A"	Black
Phase "B"	Red
Phase "C"	Blue
Neutral	White
Ground	Green

Where color other than black is not an integral part of insulation use 3M No. 35 tapes in the same color code to identify both ends on conductors No. 8 and larger. Use other colors as required to identify control or other special circuits. Ground conductor will have green insulation for 1/0 or smaller conductors, green tapes on other colors of insulation are NOT acceptable. All neutral wires shall be white with phase color strip running along entire length.

- H. Flat undercarpet wire shall not be used.

2.3 CONNECTORS AND SPLICES FOR POWER WIRING

- A. UL-listed, factory-fabricated wiring connectors of size, ampacity rating, material, type, and class for application and service indicated. Comply with Project's installation requirements.

2.4 CATEGORY 5e BALANCED TWISTED PAIR CABLE

- A. Description: Four-pair, balanced-twisted pair cable, certified to meet transmission characteristics of Category 5e cable at frequencies up to 100 MHz.
- B. 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:
 - 1. AMP NETCONNECT; a TE Connectivity Ltd. company.
 - 2. Belden Inc.
 - 3. CommScope, Inc.
 - 4. General Cable; General Cable Corporation.
 - 5. Mohawk; a division of Belden Networking, Inc.
 - 6. West Penn Wire.
- C. Standard: Comply with ICEA S-90-661, NEMA WC 63.1, and TIA-568-C.2 for Category 5e cables.
- D. Conductors: 100-ohm, 24 AWG solid copper.
- E. Shielding/Screening: Unshielded twisted pairs (UTP).
- F. Cable Rating: Riser.
- G. Jacket: White thermoplastic.

2.5 CONTROL-CIRCUIT CONDUCTORS

- 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:
 - 1. Encore Wire Corporation.
 - 2. General Cable; General Cable Corporation.
 - 3. Service Wire Co.
 - 4. Southwire Company.
- B. Class 1 Control Circuits: Stranded copper, Type THHN/THWN-2, complying with UL 83 in raceway.
- C. Class 2 Control Circuits: Stranded copper, power limited cable, Category 5e cable, or Type THHN/THWN-2, complying with UL 83 in raceway.

- D. Class 3 Remote-Control and Signal Circuits: Stranded copper, Type THHN/THWN-2, complying with UL 83 in raceway.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine raceways and building finishes to receive wires and cables for compliance with requirements for installation tolerances and other conditions affecting performance of wires and cables. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 WIRE AND CABLE INSTALLATION

- A. All wiring shall be installed in accordance with the California Electrical Code. All wiring shall be installed in conduit except where other raceway systems or methods are specifically shown on the drawings or required by the specifications.
- B. Thoroughly clean out all pathways and see that all parts are perfectly dry before pulling any wires. Lubricants shall be designed for use with the insulation type used and the temperature conditions. A mechanical wire puller may be used where directed, in which case a lubricant shall be used. Any wire damaged as a result of installation under this section shall be pulled out and replaced with new at no additional cost to the City.
- C. Make all connections necessary to properly complete the electrical wiring. Connections shall be made only in outlet boxes, or in switchboards, or panels having sufficient code-sized gutter space.
- D. Connections to equipment or busbars shall be made with approved solderless compression type copper lugs for all wires No. 8 AWG and larger. Special lugs or connections shall be as shown on the plans. Binding screws may be used for size No. 10 and smaller. Where stranded wire is connected to binding screws, nylon, self-insulated, ring tongue, pressure type terminals or equal, shall be used on the wire. Soldering will not be an acceptable method of connecting any power conductors. Clipping of wires from standard cable to fit connectors and terminal lugs shall not be permitted.
- E. All conductors shall be continuous from outlet to outlet and no splices shall be made except within outlet or junction boxes. At least 8" of wire shall be left at outlet boxes for connecting fixtures and devices.
- F. No wire smaller than No. 12 AWG shall be used, except for signal or control systems, or where otherwise indicated. No. 10 AWG wire shall be used for 20 ampere 120 volt branch circuits in excess of 100 feet in length. This is intended to reduce branch circuit voltage drop and takes precedence over No. 12 branch circuitry indicated in drawings. Record drawings shall indicate installed wire size.

POLICE RANGE REFURBISHMENT PROJECT - PHASE II

- G. Wires entering switchboards, panelboards and control panels shall be of sufficient length for proper termination without splicing within the equipment enclosure. Any wires installed that require splicing for terminating shall be removed and replaced with ones of the proper length. Wires shall be trained and supported in neat bundles.
- H. Wiring Bundles or Harnesses:
1. Multiple wires in bundles or harnesses terminating in control panels, switchboards, panelboards, etc. shall be bundled, trained and laced to achieve a neat and workmanlike appearance.
 2. Surplus wire protruding from the harness for termination shall be trimmed to proper length. Do not fold and stuff surplus wires into wiring gutters.
 3. Wires exiting the bundle or harness shall be carefully trained at a 90-degree angle to the termination point.
- I. Permanent tags shall be connected to all feeders in intermediate pullboxes (where used) to provide identification for future use.
- J. Cable Terminating: Terminations of insulated power and lighting cables shall be protected from accidental contact, deterioration of coverings, and moisture by the use of terminating devices and materials. Terminations shall be made using materials and methods as indicated or specified herein or as designated by the written instruction of the cable manufacturer and termination kit manufacturer.
- K. Neutrals shall not be shared (except multi-wire systems furniture feeds). All neutrals shall include a stripe matching the respective phase color installed.
- L. General Requirements for Low Voltage Cabling:
1. Comply with TIA-568-C Series of standards.
 2. Comply with BICSI ITSIMM, Ch. 5, "Copper Structured Cabling Systems."
 3. Terminate all conductors; no cable shall contain unterminated elements. Make terminations only at indicated outlets, terminals, and cross-connect and patch panels.
 4. Cables may not be spliced and shall be continuous from terminal to terminal. Do not splice cable between termination, tap, or junction points.
 5. Cables serving a common system may be grouped in a common raceway. Install network cabling and control wiring and cable in separate raceway from power wiring. Do not group conductors from different systems or different voltages.
 6. Secure and support cables at intervals not exceeding 30 inches and not more than 6 inches from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
 7. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI ITSIMM, Ch. 5, "Copper Structured Cabling Systems." Install lacing bars and distribution spools.
 8. Do not install bruised, kinked, scored, deformed, or abraded cable. Remove and discard cable if damaged during installation and replace it with new cable.
 9. Cold-Weather Installation: Bring cable to room temperature before dereeling. Do not use heat lamps for heating.
 10. Pulling Cable: Comply with BICSI ITSIMM, Ch. 5, "Copper Structured Cabling Systems." Monitor cable pull tensions.

FINAL DESIGN
MAY 10, 2019

CONDUCTORS AND
CABLES
26 05 19 - 6

POLICE RANGE REFURBISHMENT PROJECT - PHASE II

11. Support: Do not allow cables to lie on removable ceiling tiles.
12. Secure: Fasten securely in place with hardware specifically designed and installed so as to not damage cables.
13. Provide strain relief.
14. Keep runs short. Allow extra length for connecting to terminals. Do not bend cables in a radius less than 10 times the cable OD. Use sleeves or grommets to protect cables from vibration at points where they pass around sharp corners and through penetrations.
15. Ground wire shall be copper, and grounding methods shall comply with IEEE C2. Demonstrate ground resistance.

M. Balanced Twisted Pair Cable Installation:

1. Comply with TIA-568-C.2.
2. Install termination hardware as specified in Section 271513 "Communications Copper Horizontal Cabling" unless otherwise indicated.
3. Do not untwist balanced twisted pair cables more than 1/2 inch at the point of termination to maintain cable geometry.

N. Installation of Control-Circuit Conductors:

1. Install wiring in raceways.
2. Use insulated spade lugs for wire and cable connection to screw terminals.
3. Comply with requirements specified in Section 260533 "Raceways and Boxes for Electrical Systems."

O. Open-Cable Installation:

1. Install cabling with horizontal and vertical cable guides in telecommunications spaces with terminating hardware and interconnection equipment.
2. Suspend copper cable not in a wireway or pathway a minimum of 8 inches above ceilings by cable supports not more than 30 inches apart.
3. Cable shall not be run through or on structural members or in contact with pipes, ducts, or other potentially damaging items. Do not run cables between structural members and corrugated panels.

P. Separation from EMI Sources:

1. Comply with BICSI TDMM and TIA-569-D recommendations for separating unshielded copper voice and data communications cable from potential EMI sources including electrical power lines and equipment.
2. Separation between open communications cables or cables in nonmetallic raceways and unshielded power conductors and electrical equipment shall be as follows:
 - a. Electrical Equipment or Circuit Rating Less Than 2 kVA: A minimum of 5 inches.
 - b. Electrical Equipment or Circuit Rating between 2 and 5 kVA: A minimum of 12 inches.
 - c. Electrical Equipment or Circuit Rating More Than 5 kVA: A minimum of 24 inches.

3. Separation between communications cables in grounded metallic raceways and unshielded power lines or electrical equipment shall be as follows:
 - a. Electrical Equipment or Circuit Rating Less Than 2 kVA: A minimum of 2-1/2 inches.
 - b. Electrical Equipment or Circuit Rating between 2 and 5 kVA: A minimum of 6 inches.
 - c. Electrical Equipment or Circuit Rating More Than 5 kVA: A minimum of 12 inches.
4. Separation between communications cables in grounded metallic raceways and power lines and electrical equipment located in grounded metallic conduits or enclosures shall be as follows:
 - a. Electrical Equipment or Circuit Rating Less Than 2 kVA: No requirement.
 - b. Electrical Equipment or Circuit Rating between 2 and 5 kVA: A minimum of 3 inches.
 - c. Electrical Equipment or Circuit Rating More Than 5 kVA: A minimum of 6 inches.
5. Separation between Communications Cables and Electrical Motors and Transformers, 5 kVA or 5 HP and Larger: A minimum of 48 inches.
6. Separation between Communications Cables and Fluorescent Fixtures: A minimum of 5 inches.

3.3 CONNECTIONS

- A. Conductor Splices: Avoid splices wherever possible.
- B. Wiring at Outlets: Install conductor at each outlet, with at least 12 inches (300 mm) of slack.
- C. Connect outlets and components to wiring and to ground as indicated and instructed by manufacturer.
- D. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.4 FIELD TESTS

- A. As an exception to requirements that may be stated elsewhere in the contract, the Engineer shall be given five (5) working days' notice prior to each test.
- B. Testing Equipment: The testing equipment and devices used in performing the required tests shall have a calibration sticker affixed to the device stating the date when calibrated, date due for re-calibration, and the signature of the individual who did the calibration. In addition to the sticker a certificate shall also contain the brand name and the serial number of the device.

POLICE RANGE REFURBISHMENT PROJECT - PHASE II

C. Insulation Resistance Test for System 600 Volts and Less: After all wiring is completed and connected ready for operation, but prior to placing system in service and before any branch circuit breakers are closed, insulation resistance tests shall be made in all feeder and subfeeder circuits. The insulation resistance between conductors and between each conductor and ground shall be measured. Measurements shall be made with an instrument capable of marking measurements at an applied potential of 500 volts. Readings shall be taken after the voltage has been applied for a minimum of one minute. The minimum insulation resistance for circuits of No. 12 AWG conductors shall be 1,000,000 ohms. For circuits of No. 10 AWG or larger conductors, a resistance based on the allowable ampacity of the conductor as fixed by the CEC shall be as follows:

- | | | |
|----|-------------------------|--------------|
| 1. | 25 through 40 amperes | 250,000 ohms |
| 2. | 51 through 100 amperes | 100,000 ohms |
| 3. | 101 through 200 amperes | 50,000 ohms |
| 4. | 201 through 400 amperes | 25,000 ohms |
| 5. | 401 through 800 amperes | 12,000 ohms |
| 6. | Over 800 amperes | 5,000 ohms |

D. Test Report (Submit four (4) copies in writing):

1. 600-volt cables (identify each cable and test results).

END OF SECTION 26 05 19

SECTION 26 05 26
GROUNDING AND BONDING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections.
- B. Section 26 05 00 – General Electrical Requirements.
- C. Section 26 05 10 – Basic Materials and Methods.

1.2 SUMMARY

- A. This Section specifies the minimum materials and performance standards for grounding and bonding.
- B. Sections include:
 - 1. Grounding electrodes and conductors.
 - 2. Grounding electrodes.
 - 3. Equipment grounding conductors.
 - 4. Bonding.

1.3 REFERENCES

- A. American National Standards Institute (ANSI) Publication C2-97 – National Electrical Safety Code.
- B. Institute of Electrical and Electronic Engineers (IEEE) Publication 142 – Recommended Practice for Grounding of Industrial and Commercial Power Systems.
- C. National Fire Protection Association (NFPA) Publication:
 - 1. 70 – National Electrical Code.
 - 2. 780 – Lightning Protection Code.
- D. Underwriters Laboratories, Inc. (U.L.) Publication:
 - 1. 83 - Thermoplastic Insulated Wires.
 - 2. 467 - Grounding and Bonding Equipment.
 - 3. 486A - Wire Connectors and Soldering Lugs for Use with Copper Conductors.

1.4 REGULATORY REQUIREMENTS

- A. The Contractor shall conform to requirements of the California Electrical Code
- B. The Contractor shall furnish products listed and classified by Underwriters Laboratories, Inc. or testing firm acceptable to the City as suitable for purpose specified and shown.

1.5 PERFORMANCE REQUIREMENTS

- A. Grounding system resistance shall be 5 ohms or less unless otherwise indicated. Lengthen rods or provide additional rods where necessary to meet this requirement.

1.6 SUBMITTALS

- A. The following information shall be submitted for review and approval in accordance with Section 26 05 00, "General Electrical Requirements".
 - 1. Catalog Cut:
 - a. Ground Rod.
 - b. Ground Connectors
 - 2. Ground resistance from each major piece of equipment to the ground electrode. Equipment shall include, but not be limited to the following:
 - a. Building main panelboards
 - 3. Thermal (or Exothermic) Weld Process

1.7 WARRANTY

- A. Warranty shall comply with the provisions of Section 26 05 00, "General Electrical Requirements".

PART 2 - PRODUCTS

- 2.1 A grounding electrode conductor, sized in accordance with Section 25 0. 66 of CEC for the derived phase conductors, shall be used to bond the grounded conductor of the derived system to the grounding electrodes.

2.2 GROUND RODS

- A. Provide copper clad steel rods with adequate diameter to permit driving full length of the rod in the earth but not less than 3/4-inch. Length shall be 10-feet unless otherwise indicated. Provide couplings and driving pins where required.

2.3 EXOTHERMIC WELDS

- A. Provide exothermic welds which require no outside source of heat or power. Welds shall be accomplished by reduction of copper oxide and aluminum powered metals in a mold. Weld shall provide connection of conductor to device, device to device or conductor to conductor as required. Weld shall be of proper size to provide continuous rating of devices or conductors which are connected.

2.4 GROUNDING AND BONDING CONDUCTORS

- A. Grounding and bonding conductors shall be sized in accordance with CEC Table 250.122 for equipment grounding conductors and with CEC Table 250.66 for grounding electrode and equipment bonding conductors.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Make mechanical and electrical contact at all panelboards, outlet boxes, junction boxes, and wherever the conduit run is connected. Permanently and effectively ground all conduit and other equipment as required by all applicable codes, regulations and standards.
- B. Install a code sized green insulated equipment ground wire in all feeder and branch circuit conduits unless a larger size is indicated on plans.
- C. System neutrals shall only be grounded at the main service and separately derived systems. The service neutral shall be connected to the grounding electrodes indicated. Neutral conductors of separately derived systems shall be connected to the grounding electrodes indicated.
- D. Drive ground rods full length in a depression at least six (6)-inches below finished grade. When more than one (1) rod is driven, space them at least the full length of the rod.
- E. Make all grounding connections which are to be buried or otherwise normally unaccessible by thermal welds or by using a mechanical connector and brazing over completely. Thermal welds which have puffed up or shown convex surfaces (indicating improper cleaning at the surfaces) are not acceptable. No mechanical connector is required at the thermal weldments.
- F. The green insulated ground (bond) wire will be spliced together within all outlet boxes. A green insulated bonding jumper will be provided from the splice to the box body. Attachment to the box body will be provided using a tapped #10-31 x 3/8" screw minimum. A green insulated bonding jumper will be provided from the splice to the receptacle ground screw including all self-grounding receptacle.

3.2 TESTS

FINAL DESIGN
MAY 10, 2019

GROUNDING AND
BONDING
26 05 26 - 3

POLICE RANGE REFURBISHMENT PROJECT - PHASE II

- A. All testing shall be performed by an independent testing agency.
- B. As an exception to requirements that may be stated elsewhere in the contract, the Engineer shall be given five (5) working days notice prior to each test.
- C. The testing equipment and devices used in performing the required tests shall have a calibration sticker affixed to the device stating the date when calibrated, date due for re-calibration, and the signature of the individual who did the calibration. In addition to the sticker, a certificate shall also contain the brand name and the serial number of the device.
- D. Ground Rod Test: Test ground rods for ground resistance value before any wire is connected. A portable testing megger shall be used to test each ground or group of grounds. The auxiliary or reference ground rods shall be $\frac{3}{4}$ -inch copper clad steel, not less than 4-feet in length and driven 3-1/2 feet deep and shall be installed in a straight line from the ground being tested. Number 14 AWG stranded wire leads with at least 600-volt rubber insulation shall be connected to binding post on the instrument.
 - 1. When there is more than one (1) ground within a circle of 10-feet at a particular location, the reference rods as driven for the "first" test shall be used for tests on the other rods without changing their location. The instrument shall be equipped with a meter reading directly in ohms or fractions thereof to indicate the ground value of the ground electrode under test. Provide one (1) copy of the megger manufacturer's directions for use of the ground megger indicating the methods to be used.
- E. Test Report (Submit four (4) copies in writing):
 - 1. Grounding electrodes and systems (identifying electrodes and systems, each test).

END OF SECTION 26 05 26

SECTION 26 05 43
RACEWAYS AND BOXES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections.
- B. Section 26 05 00, "General Electrical Requirements"
- C. Section 26 05 10, "Basic Electrical Materials and Methods"

1.2 SUMMARY

- A. The following information shall be submitted for review and approval in accordance with Section 26 05 00, "General Electrical Requirements".
- B. Conduits and tubing for conductors shall be delivered to the site in standard lengths with each length bearing the manufacturer's trademark or stamp and U.L. labeled.
- C. Warning Tape: The Contractor shall submit a ten (10) foot sample of the warning tape. The sample will be retained for comparison with the installed tape.
- D. Field Test Reports:
 - 1. Provide field test report for compaction tests.
- E. Shop Drawings:
 - 1. Precast or Factory-Fabricated Underground Utility Structures:
 - a. Include plans, elevations, sections, details, attachments to other work, and accessories.
 - b. Include duct entry provisions, including locations and duct sizes.
 - c. Include reinforcement details.
 - d. Include frame and cover design.
 - e. Include grounding details.
 - f. Include dimensioned locations of pulling-in irons.
- F. Product Certificates: For concrete and steel used in precast concrete handholes, as required by ASTM C 858.

1.3 REFERENCES

POLICE RANGE REFURBISHMENT PROJECT - PHASE II

- A. National Electrical Manufacturer's Association (NEMA) Publications.
- B. American Society for Testing and Materials (ASTM) Publications.
- C. American Association of State Highway and Transportation Officials (AASHTO).
- D. National Fire Protection Association (NFPA) Publications.
- E. State of California Public Utilities Commission (Cal P.U.C.) Publications.
- F. Underwriters Laboratories, Inc., (UL) Publications.

1.4 WARRANTY

- A. Warranty shall comply with the provisions of Section 26 05 00, "General Electrical Requirements".

PART 2 - PRODUCTS

2.1 CONDUITS AND FITTINGS

- A. Standard weight rigid galvanized steel (RGS) conduit shall be hot dipped galvanized or sherardized. All fittings shall be of the screw thread type. Couplings, locknuts, bushings, etc., shall be hot dipped galvanized or sherardized. Where indicated, rigid steel conduit shall be PVC coated (minimum 40 mils).
- B. Flexible conduit shall be galvanized steel. Where used in damp or wet locations or where indicated herein, it shall be of the liquid-tight type with outer neoprene jacket and suitable liquid-tight fittings.
- C. Straight lengths of rigid non-metallic conduit shall be polyvinylchloride (PVC) Schedule 40, U.L. listed. All couplings, fittings, solvent cement, etc., shall be manufactured specifically for the type of material with which they are used. Plastic conduit shall be stored on a flat surface and protected from direct sunlight.
- D. PVC coated rigid metal conduit couplings with green urethane interior coating to connect coated conduit sections and/or parts, as manufactured by Perma-Cote or approved equal.
- E. All PVC elbows shall be Schedule 80.

2.2 WARNING TAPE

- A. Warning tape shall be 5.5 mil composition film, 6-inches wide containing one layer of metalized foil laminated between two (2) layers of inert plastic film specifically formulated for prolonged use underground. Tape shall be highly resistant to alkalis, acids and other destructive agents found in the soil. Warning tape shall bear a continuous printed message warning of the exact location of underground installations.

This message shall be in permanent ink specifically formulated for prolonged use underground. Tape shall have black letter (minimum ½ inch high) on red background with the message "ELECTRICAL" printed on twelve (12)-inch centers for the entire length of the tape.

2.3 PULLROPE

- A. The pull rope shall be polypropylene with a minimum tensile strength of 200-pounds.

2.4 BOXES, ENCLOSURES, AND CABINETS

- 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:
 - 1. Orbit Industries, Inc.
 - 2. Crouse-Hinds, an Eaton business.
 - 3. Hoffman; a brand of nVent.
 - 4. Kraloy.
 - 5. Milbank Manufacturing Co.
 - 6. RACO; Hubbell.
 - 7. Thomas & Betts Corporation; A Member of the ABB Group.
- B. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.
- C. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.
- D. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, ferrous alloy, Type FD, with gasketed cover.
- E. Nonmetallic Outlet and Device Boxes: Comply with NEMA OS 2 and UL 514C.
- F. Luminaire Outlet Boxes: Nonadjustable, designed for attachment of luminaire weighing 50 lb. Outlet boxes designed for attachment of luminaires weighing more than 50 lb shall be listed and marked for the maximum allowable weight.
- G. Paddle Fan Outlet Boxes: Nonadjustable, designed for attachment of paddle fan weighing 70 lb.
 - 1. Listing and Labeling: Paddle fan outlet boxes shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- H. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.
- I. Box extensions used to accommodate new building finishes shall be of same material as recessed box.
- J. Device Box Dimensions: 4 inches square by 2-1/8 inches deep.

- K. Gangable boxes are prohibited.
- L. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, Type 3R with continuous-hinge cover with flush latch unless otherwise indicated.
 - 1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
 - 2. Nonmetallic Enclosures: Plastic.
 - 3. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.
- M. Cabinets:
 - 1. NEMA 250, Type 3R galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
 - 2. Hinged door in front cover with flush latch and concealed hinge.
 - 3. Key latch to match panelboards.
 - 4. Metal barriers to separate wiring of different systems and voltage.
 - 5. Accessory feet where required for freestanding equipment.
 - 6. Nonmetallic cabinets shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.5 METAL WIREWAYS AND AUXILIARY GUTTERS

- 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:
 - 1. Orbit Industries, Inc.
 - 2. B-line, an Eaton business.
 - 3. Hoffman; a brand of nVent.
 - 4. Square D.
- B. Description: Sheet metal, complying with UL 870 and NEMA 250, Type 3R unless otherwise indicated, and sized according to NFPA 70.
 - 1. Metal wireways installed outdoors shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. Fittings and Accessories: Include covers, couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.
- D. Wireway Covers: Hinged type unless otherwise indicated.

2.6 Finish: Manufacturer's standard enamel finish.

2.7 PRECAST CONCRETE HANDHOLES AND BOXES

POLICE RANGE REFURBISHMENT PROJECT - PHASE II

- 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:
1. Christy Concrete Products.
 2. Elmhurst-Chicago Stone Co.
 3. Oldcastle Precast Group.
 4. Rinker Group, Ltd.
 5. Riverton Concrete Products.
 6. U.S. Precast Group
 7. Utility Concrete Products, LLC.
 8. Utility Vault Co.
 9. Wausau Tile Inc.
- B. Comply with ASTM C 858 for design and manufacturing processes.
- C. Description: Factory-fabricated, reinforced-concrete, monolithically poured walls and bottom unless open-bottom enclosures are indicated. Frame and cover shall form top of enclosure and shall have load rating consistent with that of handhole or box.
1. Frame and Cover: Weatherproof cast-iron frame, with cast-iron cover with recessed cover hook eyes and tamper-resistant, captive, cover-securing bolts.
 2. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.
 3. Cover Legend: Molded lettering, "ELECTRIC."
 4. Configuration: Units shall be designed for flush burial and have open bottom unless otherwise indicated.
 5. Duct Entrances in Handhole Walls: Cast end-bell or duct-terminating fitting in wall for each entering duct.
 - a. Type and size shall match fittings to duct or conduit to be terminated.
 - b. Fittings shall align with elevations of approaching ducts and be located near interior corners of handholes to facilitate racking of cable.
 6. Handholes 12 inches wide by 24 inches long and larger shall have inserts for pulling-in irons installed before concrete is poured.
 7. Provide grounding lug on underside of metallic cover. Lug shall be bronze and attached to cover with stainless steel bolt. Cast iron covers shall be drilled and tapped for attachment bolt.

PART 3 - EXECUTION

3.1 USES PERMITTED

- A. Rigid Galvanized Conduit (RGS):
1. Where exposed to weather (including rooftop and under canopy locations).
 2. For roof penetrations.
 3. In concrete or masonry construction.

4. For all or any portion of exposed conduits less than five (5)-feet above finished floor.
5. Where shown on drawings or indicated herein.

B. Liquid-tight Flexible Metal Conduit:

1. Final connections of conduit systems to all motors, generators and direct wired vibrating equipment (including transformers) for interior and exterior locations not to exceed three (3)-feet long.
2. At seismic separations or building expansion joints.

C. Rigid Non-metallic Conduit (PVC):

1. Rigid non-metallic conduit (PVC-40) may be installed in place of PVC coated RGS underground, outside of the building foundation.
2. Concrete or masonry walls or concrete slabs except bottom floor.
3. Where shown on drawings.

D. PVC Elbows:

1. Conduit stub-ups from underground including the final 90 degree sweep and the riser.
2. Underground bends or sweeps in PVC conduit for vertical risers shall be according to the following formula, as a minimum: For conduits under 2 inch diameter sweep radius shall be six times the diameter; for conduits 2 inch and larger diameter sweep radius shall be twelve times the diameter.
3. Where shown on drawings.
4. The smaller inside diameter of Schedule 80 elbows shall be reamed at the connection to Schedule 40 conduit to prevent damage to conductor installation.

E. Handholes and Boxes for 600 V and Less:

1. Units in Roadways and Other Deliberate Traffic Paths: Precast concrete, AASHTO HB 17, H-20 structural load rating.
2. Units in Driveway, Parking Lot, and Off-Roadway Locations, Subject to Occasional, Nondeliberate Loading by Heavy Vehicles: Precast concrete, AASHTO HB 17, H-20 structural load rating.
3. Units in Sidewalk and Similar Applications with a Safety Factor for Non-Deliberate Loading by Vehicles: Precast concrete, AASHTO HB 17, H-10 structural load rating.
4. Cover design load shall not exceed the design load of the handhole or box.

3.2 CONDUIT SIZES

- A. The minimum conduit size shall be 1-inch for lighting and power branch circuit wiring.
- B. Condulets for conduits larger than 1-1/2 inch I.D. shall be of the mogul design secured within 6 inches of each conduit connection.

3.3 INSTALLATION

- A. All conduits shall contain an insulated equipment ground wire whether indicated or not. The equipment ground wire shall be sized in accordance with Table 250.122 of the CEC, unless otherwise noted.
- B. All conduit systems shall be mechanically and electrically continuous.
- C. Conduits shall not be encased in concrete floor slabs on grade.
- D. Seal service entrance conduits and all underground conduit runs with "Duct Seal" or equal. Make gas-tight. Seal in junction boxes, handholes and metering switchboard.
- E. Conduits shall be run concealed, except in certain approved and indicated locations. Conduits shall be grouped in neat parallel lines following the lines of the building structure.
- F. The ends of all conduit shall be square, carefully reamed out to full size, shouldered in the fittings, and bushed or capped wherever stubbed.
- G. Upon completion of any run of conduit, test the run and see that it is free of obstruction. Plug each end with conduit pennies and bushings and leave plugged until ready to pull wire or cable.
- H. Not more than four (4) 90 degrees ells or bends or the equivalent shall be used in any single run of conduit.
- I. Conduit installed on equipment shall not obstruct any removable panel, access door, or control. Control apparatus, outlet, junction, and pullboxes, shall be installed so as not to interfere with any piping, fixtures, or equipment.
- J. Precast Concrete Handhole and Manhole Installation:
 - 1. Comply with ASTM C 891 unless otherwise indicated.
 - 2. Install units level and plumb and with orientation and depth coordinated with connecting ducts, to minimize bends and deflections required for proper entrances.
 - 3. Unless otherwise indicated, support units on a level bed of crushed stone or gravel, graded from 1-inch sieve to No. 4 sieve and compacted to same density as adjacent undisturbed earth.
 - 4. Handhole Covers: In paved areas and trafficways, set surface flush with finished grade. Set covers of other handholes 1 inch above finished grade.
 - 5. Bond equipment ground conductor to handhole cover as indicated.

3.4 EARTHWORK

- A. Excavate trenches to depths indicated except that if hard material is encountered, the provisions of the contract respecting an adjustment for changed conditions shall apply, subject to the requirements of notification thereunder being given. Hard material shall be defined as solid rock, firmly cemented unstratified masses or conglomerate deposits

POLICE RANGE REFURBISHMENT PROJECT - PHASE II

possessing the characteristics of solid rock not ordinarily removed without systematic drilling and blasting, and any boulder, masonry, or concrete (except pavement), exceeding ½-cubic yard in volume.

- B. Excavated materials not required or suitable for backfill shall be removed from the project site. Provide sheeting and shoring as necessary for protection of work and safety of personnel. Remove water from excavation by pumping or other approved method.
- C. Backfilling: Provide a plastic warning tape approximately six (6)-inches below the top of the trench in the backfill. Backfill shall be placed in layers not more than six (6)-inches thick and each layer shall be compacted. Backfilling shall be free from roots, wood scrap material, and other vegetable matter and refuse. Compaction of backfill shall be to 95 percent of maximum density.
 - 1. Backfilling around structures shall consist of earth, loam sandclay, or sand and gravel, free from large clods of earth or stones over one inch in size. Backfill materials shall be placed symmetrically on all sides in loose layers not more than nine (9)-inches deep. Each layer shall be moistened, if necessary, and compacted with mechanical or hand tampers to 95 percent compaction.

3.5 GROUNDING

- A. Grounding shall be accordance with Section 26 05 26, "Grounding and Bonding".

END OF SECTION 26 05 43

SECTION 26 05 53

IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:

- 1. Color and legend requirements for raceways, conductors, and warning labels and signs.
- 2. Labels.
- 3. Bands and tubes.
- 4. Tapes and stencils.
- 5. Tags.
- 6. Signs.
- 7. Cable ties.
- 8. Paint for identification.
- 9. Fasteners for labels and signs.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.

- 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for electrical identification products.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Comply with ASME A13.1.
- B. Comply with NFPA 70.
- C. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.
- D. Comply with ANSI Z535.4 for safety signs and labels.

- E. Comply with NFPA 70E requirements for arc-flash warning labels.
- F. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

2.2 COLOR AND LEGEND REQUIREMENTS

- A. Raceways and Cables Carrying Circuits at 600 V or Less:
 - 1. Black letters on an orange field.
 - 2. Legend: Indicate voltage and system or service type.
- B. Color-Coding for Phase- and Voltage-Level Identification, 600 V or Less: Use colors listed below for ungrounded feeder and branch-circuit conductors.
 - 1. Color shall be factory applied or field applied for sizes larger than No. 8 AWG if authorities having jurisdiction permit.
 - 2. Colors for 208/120-V Circuits:
 - a. Phase A: Black.
 - b. Phase B: Red.
 - c. Phase C: Blue.
 - 3. Color for Neutral: White.
 - 4. Color for Equipment Grounds: Green.
- C. Warning Label Colors:
 - 1. Identify system voltage with black letters on an orange background.
- D. Warning labels and signs shall include, but are not limited to, the following legends:
 - 1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."
 - 2. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES."
- E. Equipment Identification Labels:
 - 1. Black letters on a white field.
 - 2. Refer to specific sections for nameplate requirements.

2.3 LABELS

- A. Self-Adhesive Wraparound Labels: Preprinted, 3-mil-thick, polyester flexible label with acrylic pressure-sensitive adhesive.

POLICE RANGE REFURBISHMENT PROJECT - PHASE II

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. Brady Corporation.
 - b. Brother International Corporation.
 - c. Grafoplast Wire Markers.
 - d. Ideal Industries, Inc.
 - e. Panduit Corp.
2. Self-Lamination: Clear; UV-, weather- and chemical-resistant; self-laminating, protective shield over the legend. Labels sized such that the clear shield overlaps the entire printed legend.
3. Marker for Labels: Machine-printed, permanent, waterproof, black ink recommended by printer manufacturer.

B. Self-Adhesive Labels: Polyester, thermal, transfer-printed, 3-mil-thick, multicolor, weather- and UV-resistant, pressure-sensitive adhesive labels, configured for intended use and location.

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. Brady Corporation.
 - b. Brother International Corporation.
 - c. Grafoplast Wire Markers.
 - d. HellermannTyton.
 - e. Ideal Industries, Inc.
 - f. Panduit Corp.
2. Minimum Nominal Size:
 - a. 1-1/2 by 6 inches for raceway and conductors.
 - b. 3-1/2 by 5 inches for equipment.
 - c. As required by authorities having jurisdiction.

2.4 TAPES AND STENCILS

A. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.

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. Carlton Industries, LP.
 - b. HellermannTyton.
 - c. Ideal Industries, Inc.
 - d. Panduit Corp.

POLICE RANGE REFURBISHMENT PROJECT - PHASE II

- B. Self-Adhesive Vinyl Tape: Colored, heavy duty, waterproof, fade resistant; not less than 3 mils thick by 1 to 2 inches wide; compounded for outdoor use.
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. Brady Corporation.
 - b. Carlton Industries, LP.
 - c. emedco.
 - d. Marking Services, Inc.
- C. Underground-Line Warning Tape:
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. Brady Corporation.
 - b. Ideal Industries, Inc.
 - c. Marking Services, Inc.
 - d. Seton Identification Products.
 2. Tape:
 - a. Recommended by manufacturer for the method of installation and suitable to identify and locate underground electrical and communications utility lines.
 - b. Printing on tape shall be permanent and shall not be damaged by burial operations.
 - c. Tape material and ink shall be chemically inert and not subject to degradation when exposed to acids, alkalis, and other destructive substances commonly found in soils.
 3. Color and Printing:
 - a. Comply with ANSI Z535.1, ANSI Z535.2, ANSI Z535.3, ANSI Z535.4, and ANSI Z535.5.
 - b. Inscriptions for Red-Colored Tapes: "ELECTRIC LINE, HIGH VOLTAGE".
 - c. Inscriptions for Orange-Colored Tapes: "TELEPHONE CABLE, PA CABLE, COMMUNICATIONS CABLE, OPTICAL FIBER CABLE".

2.5 TAGS

- A. Nonmetallic Preprinted Tags: Polyethylene tags, 0.015 inch thick, color-coded for phase and voltage level, with factory screened permanent designations; punched for use with self-locking cable tie fastener.
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:

POLICE RANGE REFURBISHMENT PROJECT - PHASE II

- a. Brady Corporation.
- b. Carlton Industries, LP.
- c. Grafoplast Wire Markers.
- d. LEM Products Inc.
- e. Marking Services, Inc.
- f. Panduit Corp.
- g. Seton Identification Products.

B. Write-on Tags:

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. Carlton Industries, LP.
 - b. LEM Products Inc.
 - c. Seton Identification Products.
2. Polyester Tags: 0.015 inch thick, with corrosion-resistant grommet and cable tie for attachment.
3. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.

2.6 SIGNS

A. Laminated Acrylic or Melamine Plastic Signs:

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. Brady Corporation.
 - b. Carlton Industries, LP.
 - c. emedco.
 - d. Marking Services, Inc.
2. Engraved legend.
3. Thickness:
 - a. For signs up to 20 sq. in., minimum 1/16 inch thick.
 - b. For signs larger than 20 sq. in., 1/8 inch thick.
 - c. Engraved legend with black letters on white face
 - d. Punched or drilled for mechanical fasteners with 1/4-inch grommets in corners for mounting.

2.7 CABLE TIES

- 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:

POLICE RANGE REFURBISHMENT PROJECT - PHASE II

1. HellermannTyton.
 2. Ideal Industries, Inc.
 3. Marking Services, Inc.
 4. Panduit Corp.
- B. UV-Stabilized Cable Ties: Fungus inert, designed for continuous exposure to exterior sunlight, self-extinguishing, one piece, self-locking, and Type 6/6 nylon.
1. Minimum Width: 3/16 inch.
 2. Tensile Strength at 73 Deg F according to ASTM D638: 12,000 psi.
 3. Temperature Range: Minus 40 to plus 185 deg F.
 4. Color: Black.

2.8 MISCELLANEOUS IDENTIFICATION PRODUCTS

- A. Paint: Comply with requirements in painting Sections for paint materials and application requirements. Retain paint system applicable for surface material and location (exterior or interior).
- B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Self-Adhesive Identification Products: Before applying electrical identification products, clean substrates of substances that could impair bond, using materials and methods recommended by manufacturer of identification product.

3.2 INSTALLATION

- A. Verify and coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and operation and maintenance manual. Use consistent designations throughout Project.
- B. Install identifying devices before installing acoustical ceilings and similar concealment.
- C. Verify identity of each item before installing identification products.
- D. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and operation and maintenance manual.
- E. Apply identification devices to surfaces that require finish after completing finish work.
- F. Install signs with approved legend to facilitate proper identification, operation, and maintenance of electrical systems and connected items.

POLICE RANGE REFURBISHMENT PROJECT - PHASE II

- G. System Identification for Raceways and Cables under 600 V: Identification shall completely encircle cable or conduit. Place identification of two-color markings in contact, side by side.
 - 1. Secure tight to surface of conductor, cable, or raceway.
- H. System Identification for Raceways and Cables over 600 V: Identification shall completely encircle cable or conduit. Place adjacent identification of two-color markings in contact, side by side.
 - 1. Secure tight to surface of conductor, cable, or raceway.
- I. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.
- J. Elevated Components: Increase sizes of labels, signs, and letters to those appropriate for viewing from the floor.
- K. Accessible Fittings for Raceways: Identify the covers of each junction and pull box of the following systems with the wiring system legend and system voltage. System legends shall be as follows:
 - 1. "POWER."
 - 2. "SIGNAL".
- L. Self-Adhesive Wraparound Labels: Secure tight to surface at a location with high visibility and accessibility.
- M. Self-Adhesive Labels:
 - 1. On each item, install unique designation label that is consistent with wiring diagrams, schedules, and operation and maintenance manual.
 - 2. Unless otherwise indicated, provide a single line of text with 1/2-inch-high letters on 1-1/2-inch-high label; where two lines of text are required, use labels 2 inches high.
- N. Marker Tapes: Secure tight to surface at a location with high visibility and accessibility.
- O. Self-Adhesive Vinyl Tape: Secure tight to surface at a location with high visibility and accessibility.
 - 1. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding.
- P. Tape and Stencil: Comply with requirements in painting Sections for surface preparation and paint application.
- Q. Underground Line Warning Tape:
 - 1. During backfilling of trenches, install continuous underground-line warning tape directly above cable or raceway at 6 to 8 inches below finished grade. Use

POLICE RANGE REFURBISHMENT PROJECT - PHASE II

multiple tapes where width of multiple lines installed in a common trench or concrete envelope exceeds 16 inches overall.

2. Install underground-line warning tape for direct-buried cables and cables in raceways.

R. Nonmetallic Preprinted Tags:

1. Place in a location with high visibility and accessibility.
2. Secure using UV-stabilized cable ties.

S. Write-on Tags:

1. Place in a location with high visibility and accessibility.
2. Secure using UV-stabilized cable ties.

T. Laminated Acrylic or Melamine Plastic Signs:

1. Attach signs that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
2. Unless otherwise indicated, provide a single line of text with 1/2-inch-high letters on 1-1/2-inch-high sign; where two lines of text are required, use labels 2 inches high.

U. Cable Ties: General purpose, for attaching tags, except as listed below:

1. Outdoors: UV-stabilized nylon.

3.3 IDENTIFICATION SCHEDULE

- A. Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment. Install access doors or panels to provide view of identifying devices.

- B. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, pull points, and locations of high visibility. Identify by system and circuit designation.

- C. Accessible Fittings for Raceways and Cables within Buildings: Identify the covers of each junction and pull box of the following systems with self-adhesive labels containing the wiring system legend and system voltage. System legends shall be as follows:

1. "POWER."
2. "SIGNAL".

- D. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use self-adhesive vinyl tape to identify the phase.

1. Locate identification at changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.

POLICE RANGE REFURBISHMENT PROJECT - PHASE II

- E. Control-Circuit Conductor Identification: For conductors and cables in pull and junction boxes, manholes, and handholes, use self-adhesive labels with the conductor or cable designation, origin, and destination.
- F. Control-Circuit Conductor Termination Identification: For identification at terminations, provide self-adhesive labels with the conductor designation.
- G. Conductors to Be Extended in the Future: Attach write-on tags to conductors and list source.
- H. Locations of Underground Lines: Underground-line warning tape for power, lighting, communication, and control wiring and optical-fiber cable.
- I. Instructional Signs: Self-adhesive labels, including the color code for grounded and ungrounded conductors.
- J. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Self-adhesive labels.
 - 1. Apply to exterior of door, cover, or other access.
- K. Arc Flash Warning Labeling: Self-adhesive labels.
- L. Operating Instruction Signs: Laminated acrylic or melamine plastic signs.
- M. Equipment Identification Labels:
 - 1. Indoor Equipment: Laminated acrylic or melamine plastic sign.
 - 2. Outdoor Equipment: Laminated acrylic or melamine sign.
 - 3. Equipment to Be Labeled:
 - a. Panelboards: Typewritten directory of circuits in the location provided by panelboard manufacturer. Panelboard identification shall be in the form of an engraved, laminated acrylic or melamine label.
 - b. Enclosures and electrical cabinets.
 - c. Access doors and panels for concealed electrical items.
 - d. Enclosed switches.
 - e. Enclosed circuit breakers.
 - f. Enclosed controllers.
 - g. Variable-speed controllers.
 - h. Push-button stations.
 - i. Contactors.
 - j. Remote-controlled switches, dimmer modules, and control devices.
 - k. Monitoring and control equipment.

END OF SECTION 26 05 53

SECTION 26 05 73

OVERCURRENT PROTECTIVE DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 REFERENCES

- A. National Electrical Manufacturers Association FU 1.
- B. National Electrical Code (NEC).

1.3 SUMMARY

- A. Circuit breakers (each type and style).
- B. Circuit breaker handle padlock assembly.
- C. Enclosures (each type and style).

1.4 WARRANTY

- A. Warranty shall comply with the provisions of Section 26 05 00, "General Electrical Requirements".

PART 2 - PRODUCTS

2.1 FUSIBLE SWITCHES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. ABB Inc.
 - 2. Eaton.
 - 3. General Electric Company.
 - 4. Siemens Industry, Inc., Energy Management Division.
 - 5. Square D; by Schneider Electric.
- B. Type HD, Heavy Duty:

1. Single throw.
2. Two or Three pole as indicated.
3. 240-V ac.
4. 200 A and smaller.
5. UL 98 and NEMA KS 1, horsepower rated, with clips or bolt pads to accommodate specified fuses.
6. Lockable handle with capability to accept three padlocks and interlocked with cover in closed position.

C. Accessories:

1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
3. Class R Fuse Kit: Provides rejection of other fuse types when Class R fuses are specified.
4. Lugs: Mechanical type, suitable for number, size, and conductor material.

2.2 NONFUSIBLE SWITCHES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Eaton.
2. General Electric Company.
3. Siemens Industry, Inc., Energy Management Division.
4. Square D; by Schneider Electric.

B. Type HD, Heavy Duty, Three Pole, Single Throw, 240-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

C. Accessories:

1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
3. Lugs: Mechanical type, suitable for number, size, and conductor material.

2.3 CIRCUIT BREAKERS

A. Circuit breakers for main service equipment and panelboards shall be bolt-on type. Handle ties and dual, quad or tandem breakers are not acceptable. Mounting hardware, accessories, faceplates, enclosures, etc., shall be provided as required. Each and every circuit breaker shall be provided with a handle padlock attachment. This attachment shall allow the circuit breaker to be padlocked in either the "ON" or

"OFF" position. Circuit breakers for main service equipment shall be as specified in Section 26 24 13, "Service Entrance and Metering Equipment."

- B. Circuit breakers shall be quick-break on manual and automatic operation, and the handle mechanism shall be trip-free to prevent holding contact closed against a short circuit or sustained overload. Contacts shall be of high pressure butt-type and shall be made of a silver alloy material. Arc chutes shall be provided. Automatic thermal and magnetic tripping devices shall be located in each pole for the breaker.
- C. Short circuit interrupting capacity shall be as indicated on the plans and shall in no case be less than 10,000A symmetrical at 120/240 volts, or 14,000A symmetrical at 277/480 volts.
- D. Circuit breakers with frame sizes 225A through 350A shall have adjustable magnetic trip setting.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Bolted connections shall be torque-tightened to manufacturer's specifications.
- B. Clipping of wires from standard cable to fit connector shall not be permitted. Appropriate connecting device shall be provided for multiple or oversized cable connections.
- C. Install series rated warning labels where overcurrent devices are series-rated to achieve adequate short circuit current rating.

3.2 ENCLOSURE ENVIRONMENTAL RATING APPLICATIONS

- A. Enclosed Switches and Circuit Breakers: Provide enclosures at installed locations with the following environmental ratings.
 - 1. Indoor, Dry and Clean Locations: NEMA 250, Type 1.
 - 2. Outdoor Locations: NEMA 250, Type 3R.
 - 3. Other Wet or Damp, Indoor Locations: NEMA 250, Type 4.

3.3 INSTALLATION

- A. Coordinate layout and installation of switches, circuit breakers, and components with equipment served and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.
- B. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated.

POLICE RANGE REFURBISHMENT PROJECT - PHASE II

- C. Temporary Lifting Provisions: Remove temporary lifting of eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.
- D. Install fuses in fusible devices.
- E. Comply with NFPA 70 and NECA 1.

3.4 IDENTIFICATION

- A. Comply with requirements in Section 26 05 53 "Identification for Electrical Systems."
 - 1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
 - 2. Label each enclosure with engraved metal or laminated-plastic nameplate.

3.5 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Perform tests and inspections.
- C. Tests and Inspections for Switches:
 - 1. Visual and Mechanical Inspection:
 - a. Inspect physical and mechanical condition.
 - b. Inspect anchorage, alignment, grounding, and clearances.
 - c. Verify that the unit is clean.
 - d. Verify blade alignment, blade penetration, travel stops, and mechanical operation.
 - e. Verify that fuse sizes and types match the Specifications and Drawings.
 - f. Verify that each fuse has adequate mechanical support and contact integrity.
 - g. Inspect bolted electrical connections for high resistance using one of the two following methods:
 - 1) Use a low-resistance ohmmeter.
 - a) Compare bolted connection resistance values to values of similar connections. Investigate values that deviate from those of similar bolted connections by more than 50 percent of the lowest value.
 - 2) Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method in accordance with manufacturer's published data or NETA ATS Table 100.12.
 - a) Bolt-torque levels shall be in accordance with manufacturer's published data. In the absence of manufacturer's published data, use NETA ATS Table 100.12.

- h. Verify correct phase barrier installation.
- i. Verify lubrication of moving current-carrying parts and moving and sliding surfaces.

2. Electrical Tests:

- a. Perform resistance measurements through bolted connections with a low-resistance ohmmeter. Compare bolted connection resistance values to values of similar connections. Investigate values that deviate from adjacent poles or similar switches by more than 50 percent of the lowest value.
- b. Measure contact resistance across each switchblade fuseholder. Drop values shall not exceed the high level of the manufacturer's published data. If manufacturer's published data are not available, investigate values that deviate from adjacent poles or similar switches by more than 50 percent of the lowest value.
- c. Perform insulation-resistance tests for one minute on each pole, phase-to-phase and phase-to-ground with switch closed, and across each open pole. Apply voltage in accordance with manufacturer's published data. In the absence of manufacturer's published data, use Table 100.1 from the NETA ATS. Investigate values of insulation resistance less than those published in Table 100.1 or as recommended in manufacturer's published data.
- d. Measure fuse resistance. Investigate fuse-resistance values that deviate from each other by more than 15 percent.

D. Tests and Inspections for Molded Case Circuit Breakers:

1. Visual and Mechanical Inspection:

- a. Verify that equipment nameplate data are as described in the Specifications and shown on the Drawings.
- b. Inspect physical and mechanical condition.
- c. Inspect anchorage, alignment, grounding, and clearances.
- d. Verify that the unit is clean.
- e. Operate the circuit breaker to ensure smooth operation.
- f. Inspect bolted electrical connections for high resistance using one of the two following methods:
 - 1) Use a low-resistance ohmmeter.
 - a) Compare bolted connection resistance values to values of similar connections. Investigate values that deviate from those of similar bolted connections by more than 50 percent of the lowest value.
 - 2) Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method in accordance with manufacturer's published data or NETA ATS Table 100.12.

POLICE RANGE REFURBISHMENT PROJECT - PHASE II

- a) Bolt-torque levels shall be in accordance with manufacturer's published data. In the absence of manufacturer's published data, use NETA ATS Table 100.12.
 - g. Inspect operating mechanism, contacts, and chutes in unsealed units.
 - h. Perform adjustments for final protective device settings in accordance with the coordination study.
2. Electrical Tests:
- a. Perform resistance measurements through bolted connections with a low-resistance ohmmeter. Compare bolted connection resistance values to values of similar connections. Investigate values that deviate from adjacent poles or similar switches by more than 50 percent of the lowest value.
 - b. Perform insulation-resistance tests for one minute on each pole, phase-to-phase and phase-to-ground with circuit breaker closed, and across each open pole. Apply voltage in accordance with manufacturer's published data. In the absence of manufacturer's published data, use Table 100.1 from the NETA ATS. Investigate values of insulation resistance less than those published in Table 100.1 or as recommended in manufacturer's published data.
 - c. Perform a contact/pole resistance test. Drop values shall not exceed the high level of the manufacturer's published data. If manufacturer's published data are not available, investigate values that deviate from adjacent poles or similar switches by more than 50 percent of the lowest value.
 - d. Test functionality of the trip unit by means of primary current injection. Pickup values and trip characteristics shall be as specified and within manufacturer's published tolerances.
3. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
- E. Perform the following infrared scan tests and inspections and prepare reports:
- 1. Initial Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each enclosed switch and circuit breaker. Remove front panels so joints and connections are accessible to portable scanner.
 - 2. Instruments and Equipment: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
- F. Test and adjust controls, remote monitoring, and safeties. Replace damaged and malfunctioning controls and equipment.
- G. Enclosed switches and circuit breakers will be considered defective if they do not pass tests and inspections.
- H. Prepare test and inspection reports.
- 1. Test procedures used.

POLICE RANGE REFURBISHMENT PROJECT - PHASE II

2. Include identification of each enclosed switch and circuit breaker tested and describe test results.
3. List deficiencies detected, remedial action taken, and observations after remedial action.

3.6 ADJUSTING

- A. Adjust moving parts and operable components to function smoothly and lubricate as recommended by manufacturer.

3.7 TESTS

- A. Each circuit breaker shall be operated under load a minimum of three (3) times.
- B. Test switches a minimum of three (3) times to ensure correct operation.
- C. Measure contact resistance and perform trip unit test on all circuit breakers 100A trip and larger. Submit typewritten report to owner. Correct all deficiencies and retest. Test report entries shall identify each circuit breaker and metering pedestal.

END OF SECTION 26 05 73

SECTION 26 09 23

LIGHTING CONTROL DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Time switches.
 - 2. Photoelectric switches.
 - 3. Indoor occupancy sensors.
 - 4. Lighting contactors.
- B. Related Requirements:
 - 1. Section 26 27 26 "Wiring Devices" for wall-box dimmers, wall-switch occupancy sensors, and manual light switches.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Show installation details for occupancy and light-level sensors.
 - 1. Interconnection diagrams showing field-installed wiring.
 - 2. Include diagrams for power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For each type of lighting control device to include in emergency, operation, and maintenance manuals.

PART 2 - PRODUCTS

2.1 INDOOR OCCUPANCY SENSORS

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
1. Bryant Electric; a Hubbell company.
 2. Cooper Industries, Inc.
 3. Hubbell Building Automation, Inc.
 4. Leviton Mfg. Company Inc.
 5. Lightolier Controls.
 6. Lithonia Lighting; Acuity Lighting Group, Inc.
 7. Lutron Electronics Co., Inc.
 8. NSi Industries LLC; TORK Products.
 9. RAB Lighting.
 10. Sensor Switch, Inc.
 11. Square D; a brand of Schneider Electric.
 12. Watt Stopper.
- B. General Requirements for Sensors: Wall- or ceiling-mounted, solid-state indoor occupancy sensors with a separate power pack.
1. Listed and labeled as defined in CEC, by a qualified testing agency, and marked for intended location and application.
 2. Certified by the manufacturer to the California Energy Commission as compliant with CCR Title 24 Part 6 California Energy Code.
 3. Operation: Unless otherwise indicated, turn lights on when coverage area is occupied, and turn them off when unoccupied; with a time delay for turning lights off, adjustable over a minimum range of 1 to 15 minutes.
 4. Sensor Output: Contacts rated to operate the connected relay, complying with UL 773A. Sensor is powered from the power pack.
 5. Power Pack: Dry contacts rated for 20-A ballast load at 120- and 277-V ac, for 13-A tungsten at 120-V ac, and for 1 HP at 120-VAC. Sensor has 24-VDC, 150-mA, Class 2 power source, as defined by CEC.
 6. Mounting:
 - a. Sensor: Suitable for mounting in any position on a standard outlet box.
 - b. Relay: Externally mounted through a 1/2-inch knockout in a standard electrical enclosure.
 - c. Time-Delay and Sensitivity Adjustments: Recessed and concealed behind hinged door.
 7. Indicator: Digital display, to show when motion is detected during testing and normal operation of sensor.
 8. Bypass Switch: Override the "on" function in case of sensor failure.
 9. Automatic Light-Level Sensor: Adjustable from 2 to 200 fc; turn lights off when selected lighting level is present.
- C. Dual-Technology Type: Ceiling mounted; detect occupants in coverage area using PIR and ultrasonic detection methods. The particular technology or combination of technologies that control on-off functions is selectable in the field by operating controls on unit.
1. Sensitivity Adjustment: Separate for each sensing technology.

2. Detector Sensitivity: Detect occurrences of 6-inch- minimum movement of any portion of a human body that presents a target of not less than 36 sq. in., and detect a person of average size and weight moving not less than 12 inches in either a horizontal or a vertical manner at an approximate speed of 12 inches/s.
3. Detection Coverage (Standard Room): Detect occupancy anywhere within a circular area of 1000 sq. ft. when mounted on a 96-inch- high ceiling.

2.2 SWITCHBOX-MOUNTED OCCUPANCY SENSORS

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
 1. Bryant Electric; a Hubbell company.
 2. Cooper Industries, Inc.
 3. Hubbell Building Automation, Inc.
 4. Leviton Mfg. Company Inc.
 5. Lightolier Controls.
 6. Lithonia Lighting; Acuity Lighting Group, Inc.
 7. Lutron Electronics Co., Inc.
 8. Sensor Switch, Inc.
 9. Watt Stopper.
- B. General Requirements for Sensors: Automatic-wall-switch occupancy sensor, suitable for mounting in a single gang switchbox.
 1. Listed and labeled as defined in CEC, by a qualified testing agency, and marked for intended location and application.
 2. Certified by the manufacturer to the California Energy Commission as compliant with CCR Title 24 Part 6 California Energy Code.
 3. Operating Ambient Conditions: Dry interior conditions, 32 to 120 deg F.
 4. Switch Rating: Not less than 800-VA fluorescent at 120 V, 1200-VA fluorescent at 277 V, and 800-W incandescent.
 5. Provide stainless steel plates for exterior locations and white plates for interior locations along with white color sensors.
- C. Wall-Switch:
 1. Standard Range: 180-degree field of view, field adjustable from 180 to 40 degrees; with a minimum coverage area of 900 sq. ft.
 2. Sensing Technology: Dual technology - PIR and ultrasonic.
 3. Switch Type: single or dual relay (circuit) as required to provide switching pattern indicated on drawings.
 4. Voltage: Match the circuit voltage.
 5. Ambient-Light Override: Concealed, field-adjustable, light-level sensor from 10 to 150 fc. The switch prevents the lights from turning on when the light level is higher than the setpoint of the sensor.
 6. Concealed, field-adjustable, "off" time-delay selector at up to 30 minutes.
 7. Adaptive Technology: Self-adjusting circuitry detects and memorizes usage patterns of the space and helps eliminate false "off" switching.

2.3 CONDUCTORS AND CABLES

- A. Power Wiring to Supply Side of Remote-Control Power Sources: Not smaller than No. 12 AWG. Comply with requirements in Section 26 05 19 "Wires and Cables."
- B. Classes 2 and 3 Control Cable: Multiconductor cable with stranded-copper conductors not smaller than No. 18 AWG. Comply with requirements in Section 26 05 19 "Wires and Cables."
- C. Class 1 Control Cable: Multiconductor cable with stranded-copper conductors not smaller than No. 14 AWG. Comply with requirements in Section 26 05 19 "Wires and Cables."

PART 3 - EXECUTION

3.1 SENSOR INSTALLATION

- A. Coordinate layout and installation of ceiling-mounted devices with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, ceiling fans, smoke detectors, fire-suppression systems, and partition assemblies.
- B. Install and aim sensors in locations to achieve not less than 90 percent coverage of areas indicated. Do not exceed coverage limits specified in manufacturer's written instructions.
- C. Adjust time delay off setpoint to 30 minutes where applicable.

3.2 WIRING INSTALLATION

- A. Wiring Method: Comply with Section 26 05 19 "Wires and Cables." Minimum conduit size shall be 3/4 inch.
- B. Wiring within Enclosures: Comply with NECA 1. Separate power-limited and non-power-limited conductors according to conductor manufacturer's written instructions.
- C. Size conductors according to lighting control device manufacturer's written instructions unless otherwise indicated.
- D. Splices, Taps, and Terminations: Make connections only on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures.

3.3 IDENTIFICATION

- A. Identify components and power and control wiring according to Section 26 05 53 "Identification for Electrical Systems."
 - 1. Identify controlled circuits in lighting contactors.

2. Identify circuits or luminaires controlled by photoelectric and occupancy sensors at each sensor.

- B. Label time switches and contactors with a unique designation.

3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to evaluate lighting control devices and perform tests and inspections.
- B. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
- C. Perform the following tests and inspections with the assistance of a factory-authorized service representative:
 1. Operational Test: After installing time switches and sensors, and after electrical circuitry has been energized, start units to confirm proper unit operation.
 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- D. Lighting control devices will be considered defective if they do not pass tests and inspections.
- E. Prepare test and inspection reports.

3.5 ADJUSTING

- A. Occupancy Adjustments: When requested within 12 months from date of Substantial Completion, provide on-site assistance in adjusting sensors to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.
 1. For occupancy and motion sensors, verify operation at outer limits of detector range. Set time delay to suit Owner's operations.
 2. For daylighting controls, adjust setpoints and deadband controls to suit Owner's operations.

3.6 DEMONSTRATION

- A. Coordinate demonstration of products specified in this Section with demonstration requirements for low-voltage, programmable lighting control systems specified in Section 26 09 43.23 "Relay-Based Lighting Controls."
- B. Train Owner's maintenance personnel to adjust, operate, and maintain lighting control devices.

END OF SECTION 26 09 23

SECTION 26 09 43.23

RELAY-BASED LIGHTING CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes: Lighting control panels using mechanically held relays for switching.
- B. Section Includes: Networked lighting control panels using control-voltage relays for switching and that are interoperable with BAS.

1.3 DEFINITIONS

- A. BAS: Building automation system.
- B. CBC: California Building Code (CCR Title 24, Part 2).
- C. CEC: California Electrical Code (CCR Title 24, Part 3).
- D. IP: Internet protocol.
- E. Monitoring: Acquisition, processing, communication, and display of equipment status data, metered electrical parameter values, power quality evaluation data, event and alarm signals, tabulated reports, and event logs.
- F. PC: Personal computer; sometimes plural as "PCs."
- G. RS-485: A serial network protocol, similar to RS-232, complying with TIA-485-A.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for control modules, power distribution components, relays, manual switches and plates, and conductors and cables.
 - 2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

- B. Shop Drawings: For each relay panel and related equipment.
 - 1. Include dimensioned plans, elevations, sections, and details. Show tabulations of installed devices, equipment features, and ratings.
 - 2. Detail enclosure types and details for types other than NEMA 250, Type 1.
 - 3. Detail wiring partition configuration, current, and voltage ratings.
 - 4. Short-circuit current rating of relays.
 - 5. Include diagrams for power, signal, and control wiring.
 - 6. Block Diagram: Show interconnections between components specified in this Section and devices furnished with power distribution system components. Indicate data communication paths and identify networks, data buses, data gateways, concentrators, and other devices to be used. Describe characteristics of network and other data communication lines.

1.5 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Submit evidence that lighting controls are compatible with connected monitoring and control devices and systems specified in other Sections.
 - 1. Show interconnecting signal and control wiring, and interface devices that prove compatibility of inputs and outputs.
 - 2. For networked controls, list network protocols and provide statements from manufacturers that input and output devices comply with interoperability requirements of the network protocol.
- B. Qualification Data: For testing agency.
- C. Field quality-control reports.
- D. Software licenses and upgrades required by and installed for operation and programming of digital and analog devices.
- E. Sample Warranty: For manufacturer's special warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For lighting controls to include in emergency, operation, and maintenance manuals.
- B. Software and Firmware Operational Documentation:
 - 1. Software operating and upgrade manuals.
 - 2. Program Software Backup: On magnetic media or compact disk, complete with data files.
 - 3. Device address list.
 - 4. Printout of software application and graphic screens.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Lighting Control Relays: Equal to ten percent of amount installed for each size indicated, but no fewer than three.

1.8 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Member company of NETA or an NRTL.
 - 1. Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Handle and prepare panels for installation according to NECA 407 "Recommended Practice for Installing and Maintaining Panelboards".

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

- A. Input signal from field-mounted manual switches, or digital signal sources, shall open or close one or more lighting control relays in the lighting control panels. Any combination of inputs shall be programmable to any number of control relays.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in CEC, by a qualified testing agency, and marked for intended location and application.
- C. Comply with 47 CFR, Subparts A and B, for Class A digital devices.
- D. Comply with UL 916 "Energy Management Equipment".

2.2 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Lighting control panels shall withstand the effects of earthquake motions determined according to CBC.
 - 1. The term "withstand" means "the unit will remain in place without separation of any parts when subjected to the seismic forces specified."
 - 2. Component Importance Factor: As indicated on drawings
- B. BAS Interface: Provide hardware and software to enable the BAS to monitor, control, display, and record data for use in processing reports.

1. Hardwired Points:
 - a. Monitoring: On-off status
 - b. Control: On-off operation
2. Communication Interface: Comply with ASHRAE 135 BACnet A Data Communication Protocol for Building Automation and Control Networks The communication interface shall enable the BAS operator to remotely control and monitor lighting from a BAS operator workstation. Control features and monitoring points displayed locally at lighting panel shall be available through the BAS.

2.3 NETWORKED LIGHTING CONTROL PANELS

- A. Products: The existing lighting control panels on site are WattStopper LMCP-series. Subject to compliance with requirements, new lighting control panels shall match the existing system installed under Phase I.
- B. Description: Lighting control panels using mechanically latched relays to control lighting and appliances. The panels shall be capable of being interconnected with digital communications to appear to the operator as a single lighting control system.
- C. Lighting Control Panels:
 1. A single enclosure with incoming lighting branch circuits, control circuits, switching relays, and on-board timing and control unit.
 2. A vertical barrier separating branch circuits from control wiring.
- D. Main Control Unit: Installed in the main lighting control panel only; powered from the branch circuit of the standard control unit.
 1. Ethernet Communications: Comply with MS Windows TCP/IP protocol. The main control unit shall provide for programming of all control functions of the main and all networked slave lighting control panels including timing, sequencing, and overriding.
 2. Compliance with ASHRAE 135: Controllers shall support serial MS/TP and Ethernet IP communications, and shall be able to communicate directly via BAS RS-485 serial networks and Ethernet 10Base-T networks as a native device.
 3. Web Server: Display information listed below over a standard Web-enabled server for displaying information over a standard browser.
 - a. A secure, password-protected login screen for modifying operational parameters, accessible to authorized users via Web page interface.
 - b. Panel summary showing the master and slave panels connected to the controller.
 - c. Controller diagnostic information.
 - d. Show front panel mimic screens for setting up controller parameters, input types, zones, and operating schedules. These mimic screens shall also allow direct breaker control and zone overrides.

4. Timing Unit:
 - a. 365-day calendar, astronomical clock, and automatic adjustments for daylight savings and leap year.
 - b. Clock configurable for 12-hour (A.M./P.M.) or 24-hour format.
 - c. Four independent schedules, each having 24 time periods.
 - d. Schedule periods settable to the minute.
 - e. Day-of-week, day-of-month, day-of-year with one-time or repeating capability.
 - f. 16 special date periods.
5. Time Synchronization: The timing unit shall be updated not less than every 12 hour(s) with the network time server.
6. Sequencing Control with Override:
 - a. Automatic sequenced on and off switching of selected relays at times set at the timing unit, allowing timed overrides from external switches.
 - b. Sequencing control shall operate relays one at a time, completing the operation of all connected relays in not more than 10 seconds.
 - c. Override control shall allow any relay connected to it to be switched on or off by a field-deployed manual switch or by an automatic switch, such as an occupancy sensor.
 - d. Override control "blinking warning" shall warn occupants approximately five minutes before actuating the off sequence.
 - e. Activity log, storing previous relay operation, including the time and cause of the change of status.
 - f. Download firmware to the latest version offered by manufacturer.
- E. Standard Control Unit, Installed in All Lighting Control Panels: Contain electronic controls for programming the operation of the relays in the control panel, contain the status of relays, and contain communications link to enable the digital functions of the main control unit. Comply with UL 916.
 1. Electronic control for operating and monitoring individual relays, and display relay on-time.
 2. Nonvolatile memory shall retain all setup configurations. After a power failure, the controller shall automatically reboot and return to normal system operation.
 3. Integral keypad and digital-display front panel for local setup, including the following:
 - a. Blink notice, time adjustable from software.
 - b. Ability to log and display relay on-time.
 - c. Capability for accepting downloadable firmware so that the latest production features may be added in the future without replacing the module.
- F. Relays: Electrically operated, mechanically held single-pole switch, rated at 20 A at 277 V. Short-circuit current rating shall be not less than 5 kA. Control shall be digital control network.

POLICE RANGE REFURBISHMENT PROJECT - PHASE II

- G. Relays: Electrically operated, mechanically held single-pole switch, rated at 20 A at 120-V tungsten, 30 A at 277-V ballast, 1.5 hp at 120 V, and 3 hp at 277 V. Short-circuit current rating shall be not less than 14 kA. Control shall be digital control network.
- H. Power Supply: NFPA 70, Class 2, UL listed, sized for connected equipment, plus not less than 20 percent spare capacity. Powered from a dedicated branch circuit of the panelboard that supplies power to the line side of the relays, sized to provide control power for the local panel-mounted relays, bus system, low-voltage inputs, field-installed occupancy sensors, and low-voltage photo sensors.
- I. Operator Interface: At the main control unit, provide interface for a tethered connection of a portable PC running MS Windows for configuring all networked lighting control panels using setup software designed for the specified operating system. Include one portable device for initial programming of the system and training of Owner's personnel. That device shall remain the property of Owner.
- J. Software:
 - 1. Menu-driven data entry.
 - 2. Online and offline programming and editing.
 - 3. Provide for entry of the room or space designation for the load side of each relay.
 - 4. Monitor and control all relays, showing actual relay state and the name of the automatic actuating control, if any.
 - 5. Size the software appropriate to the system.

2.4 MANUAL SWITCHES AND PLATES

- A. Push-Button Switches: Modular, momentary contact, three wire, for operating one or more relays and to override automatic controls.
 - 1. Match color and style specified in Section 26 27 26 "Wiring Devices."
 - 2. Integral green LED pilot light to indicate when circuit is on.
 - 3. Internal white LED locator light to illuminate when circuit is off.
- B. Wall Plates: Single and multigang plates as specified in Section 26 27 26 "Wiring Devices."
- C. Legend: Engraved or permanently silk-screened on wall plate where indicated. Use designations indicated on Drawings.

2.5 CONDUCTORS AND CABLES

- A. Power Wiring to Supply Side of Class 2 Power Source: Not smaller than No. 12 AWG, complying with Section 26 05 19 "Wires and Cables."
- B. Classes 2 and 3 Control Cables: Multiconductor cable with copper conductors not smaller than No. 22 AWG, complying with Section 26 05 19 "Wires and Cables."

POLICE RANGE REFURBISHMENT PROJECT - PHASE II

- C. Class 1 Control Cables: Multiconductor cable with copper conductors not smaller than No. 16 AWG, complying with Section 26 05 19 "Wires and Cables."
- D. Digital and Multiplexed Signal Cables: Unshielded, twisted-pair cable with copper conductors, complying with TIA/EIA-568-B.2, Category 6 for horizontal copper cable and with Section 26 05 19 "Wires and Cables."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Receive, inspect, handle, and store panels according to NECA 407.
- B. Examine panels before installation. Reject panels that are damaged or rusted or have been subjected to water saturation.
- C. Examine elements and surfaces to receive panels for compliance with installation tolerances and other conditions affecting performance of the Work.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 WIRING INSTALLATION

- A. Comply with NECA 1 and CEC.
- B. Wiring Method: Install cables in raceways and cable trays except within consoles, cabinets, desks, and counters. Conceal raceway and cables except in unfinished spaces.
 - 1. Install plenum cable in environmental air spaces, including plenum ceilings.
 - 2. Comply with requirements for cable trays specified in Section 26 05 36 "Cable Trays for Electrical Systems."
 - 3. Comply with requirements for raceways and boxes specified in Section 26 05 43 "Raceways and Boxes."
- C. Wiring Method: Conceal conductors and cables in accessible ceilings, walls, and floors where possible.
- D. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Install lacing bars and distribution spools.

3.3 PANEL INSTALLATION

- A. Comply with NECA 1 and CEC.
- B. Install panels and accessories according to NECA 407.

POLICE RANGE REFURBISHMENT PROJECT - PHASE II

- C. Comply with mounting and anchoring requirements specified in Section 26 05 48 "Vibration and Seismic Controls for Electrical Systems."
- D. Mount top of trim 90 inches above finished floor unless otherwise indicated.
- E. Mount panel cabinet plumb and rigid without distortion of box.
- F. Install filler plates in unused spaces.

3.4 IDENTIFICATION

- A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 26 05 53 "Identification for Electrical Systems."
- B. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs complying with Section 26 05 53 "Identification for Electrical Systems."
- C. Create a directory to indicate loads served by each relay; incorporate Owner's final room designations. Obtain approval before installing. Use a PC or typewriter to create directory; handwritten directories are not acceptable.
- D. Lighting Control Panel Nameplates: Label each panel with a nameplate complying with requirements for identification specified in Section 26 05 53 "Identification for Electrical Systems."

3.5 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
- C. Perform the following tests and inspections with the assistance of a factory-authorized service representative:
 - 1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
 - 2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
- D. Acceptance Testing Preparation:
 - 1. Test continuity of each circuit.
- E. Lighting control panel will be considered defective if it does not pass tests and inspections.

- F. Prepare test and inspection reports, including a certified report that identifies lighting control panels and describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations made after remedial action.

3.6 STARTUP SERVICE

- A. Engage a factory-authorized service representative to perform startup service.
 - 1. Complete installation and startup checks according to manufacturer's written instructions.
 - 2. Confirm correct communications wiring, initiate communications between panels, and program the lighting control system according to approved configuration schedules, time-of-day schedules, and input override assignments.

3.7 ADJUSTING

- A. Occupancy Adjustments: When requested within 12 months from date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

3.8 SOFTWARE SERVICE AGREEMENT

- A. Technical Support: Beginning at Substantial Completion, service agreement shall include software support for two years.
- B. Upgrade Service: At Substantial Completion, update software to latest version. Install and program software upgrades that become available within [two] years from date of Substantial Completion. Upgrading software shall include operating system and new or revised licenses for using software.
 - 1. Upgrade Notice: At least 30 days to allow Owner to schedule and access the system and to upgrade computer equipment if necessary.

3.9 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain the control unit and operator interface.

END OF SECTION 26 09 43.23

SECTION 26 24 16

PANELBOARDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Distribution panelboards.
 - 2. Lighting and appliance branch-circuit panelboards.

1.3 DEFINITIONS

- A. CBC: California Building Code (CCR Title 24, Part 2)
- B. CEC: California Electrical Code (CCR Title 24, Part 3)

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of panelboard, switching and overcurrent protective device, transient voltage suppression device, accessory, and component indicated. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.
- B. Shop Drawings: For each panelboard and related equipment.
 - 1. Include dimensioned plans, elevations, sections, and details. Show tabulations of installed devices, equipment features, and ratings.
 - 2. Detail enclosure types and details for types other than NEMA 250, Type 1.
 - 3. Detail bus configuration, current, and voltage ratings.
 - 4. Short-circuit current rating of panelboards and overcurrent protective devices.
 - 5. Include evidence of NRTL listing for series rating of installed devices.
 - 6. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
 - 7. Include wiring diagrams for power, signal, and control wiring.
 - 8. Include time-current coordination curves, including manufacturer's curve numbers for each type and rating of overcurrent protective device included in

panelboards. Submit on translucent log-log graft paper; include selectable ranges for each type of overcurrent protective device.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified testing agency.
- B. Seismic Qualification Certificates: Submit certification that panelboards, overcurrent protective devices, accessories, and components will withstand seismic forces defined in Section 26 05 48 "Vibration and Seismic Controls for Electrical Systems." Include the following:
 - 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - 2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 - 3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
- C. Field Quality-Control Reports:
 - 1. Test procedures used.
 - 2. Test results that comply with requirements.
 - 3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.
- D. Panelboard Schedules: For installation in panelboards. Submit final versions after load balancing.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For panelboards and components to include in emergency, operation, and maintenance manuals. In addition to items specified in Section 01 78 23 "Operation and Maintenance Data," include the following:
 - 1. Manufacturer's written instructions for testing and adjusting overcurrent protective devices.
 - 2. Time-current curves, including selectable ranges for each type of overcurrent protective device that allows adjustments.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Keys: Two spares for each type of panelboard cabinet lock.
 - 2. Circuit Breakers Including GFCI and Ground Fault Equipment Protection (GFEP) Types: Two spares for each panelboard.

POLICE RANGE REFURBISHMENT PROJECT - PHASE II

3. Fuses for Fused Switches: Equal to 10 percent of quantity installed for each size and type, but no fewer than three of each size and type.

1.8 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Member company of NETA or an NRTL.
 1. Testing Agency's Field Supervisor: Currently certified by NETA to supervise on-site testing.
- B. Source Limitations: Obtain panelboards, overcurrent protective devices, components, and accessories from single source from single manufacturer.
- C. Product Selection for Restricted Space: Drawings indicate maximum dimensions for panelboards including clearances between panelboards and adjacent surfaces and other items. Comply with indicated maximum dimensions.
- D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in CEC, by a qualified testing agency, and marked for intended location and application.
- E. Comply with NEMA PB 1.
- F. Comply with CEC.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Remove loose packing and flammable materials from inside panelboards; install temporary electric heating (250 W per panelboard) to prevent condensation.
- B. Handle and prepare panelboards for installation according to NECA 407 "Recommended Practice for Installing and Maintaining Panelboards."

1.10 PROJECT CONDITIONS

- A. Environmental Limitations:
 1. Do not deliver or install panelboards until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above panelboards is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
 2. Rate equipment for continuous operation under the following conditions unless otherwise indicated:
 - a. Ambient Temperature: Not exceeding 23 deg F to plus 104 deg F.
 - b. Altitude: Not exceeding 6600 feet.
- B. Service Conditions: NEMA PB 1, usual service conditions, as follows:

POLICE RANGE REFURBISHMENT PROJECT - PHASE II

1. Ambient temperatures within limits specified.
 2. Altitude not exceeding 6600 feet.
- C. Interruption of Existing Electric Service: Do not interrupt electric service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electric service according to requirements indicated:
1. Notify Architect no fewer than five days in advance of proposed interruption of electric service.
 2. Do not proceed with interruption of electric service without Architect's written permission.
 3. Comply with NFPA 70E.

1.11 COORDINATION

- A. Coordinate layout and installation of panelboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, encumbrances to workspace clearance requirements, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.
- B. Coordinate sizes and locations of concrete bases with actual equipment provided. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified with concrete.

1.12 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace transient voltage suppression devices that fail in materials or workmanship within specified warranty period.
 1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR PANELBOARDS

- A. Fabricate and test panelboards according to IEEE 344 to withstand seismic forces.
- B. Enclosures: Flush- and/or surface-mounted cabinets as indicated on drawings.
 1. Rated for environmental conditions at installed location.
 - a. Indoor Dry and Clean Locations: NEMA 250, Type 1.
 - b. Outdoor Locations: NEMA 250, Type 3R.

2. Front: Secured to box with concealed trim clamps. For surface-mounted fronts, match box dimensions; for flush-mounted fronts, overlap box.
3. Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim cover.
4. Finishes:
 - a. Panels and Trim: Steel, factory finished immediately after cleaning and pretreating with manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat.
 - b. Back Boxes: Galvanized steel.
 - c. Fungus Proofing: Permanent fungicidal treatment for overcurrent protective devices and other components.
5. Directory Card: Inside panelboard door, mounted in metal frame with transparent protective cover.

C. Incoming Mains Location: As indicated on drawings.

D. Phase, Neutral, and Ground Buses:

1. Material: Hard-drawn copper, 98 percent conductivity.
2. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment grounding conductors; bonded to box.

E. Conductor Connectors: Suitable for use with conductor material and sizes.

1. Material: Tin-plated aluminum.
2. Main and Neutral Lugs: Mechanical type.
3. Ground Lugs and Bus-Configured Terminators: Mechanical type.

F. Future Devices: Mounting brackets, bus connections, filler plates, and necessary appurtenances required for future installation of devices.

G. Panelboard Short-Circuit Current Rating: Fully rated to interrupt symmetrical short-circuit current available at terminals.

2.2 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Panelboards shall withstand the effects of earthquake motions determined according to CBC and SEI/ASCE 7.

1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified"

2.3 ACCEPTABLE MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Eaton Electrical Inc.; Cutler-Hammer Business Unit

POLICE RANGE REFURBISHMENT PROJECT - PHASE II

2. General Electric Company; GE Consumer & Industrial – Electrical Distribution
3. Siemens Energy and Automation
4. Square D; a brand of Schneider Electric

2.4 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

- A. Panelboards: NEMA PB 1, lighting and appliance branch-circuit type.
- B. Branch Overcurrent Protective Devices: Bolt-on circuit breakers, replaceable without disturbing adjacent units.
 1. External Control-Power Source: 120-V branch circuit.
- C. Doors: Concealed hinges; secured with flush latch with tumbler lock; keyed alike.

2.5 ACCESSORY COMPONENTS AND FEATURES

- A. Accessory Set: Include tools and miscellaneous items required for overcurrent protective device test, inspection, maintenance, and operation.
- B. Portable Test Set: For testing functions of solid-state trip devices without removing from panelboard. Include relay and meter test plugs suitable for testing panelboard meters and switchboard class relays.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Receive, inspect, handle, and store panelboards according to NECA 407.
- B. Examine panelboards before installation. Reject panelboards that are damaged or rusted or have been subjected to water saturation.
- C. Examine elements and surfaces to receive panelboards for compliance with installation tolerances and other conditions affecting performance of the Work.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install panelboards and accessories according to NECA 407.
- B. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from panelboards.
- C. Comply with mounting and anchoring requirements specified in Section 26 05 48 "Vibration and Seismic Controls for Electrical Systems."

- D. Mount top of trim 90 inches above finished floor unless otherwise indicated.
- E. Mount panelboard cabinet plumb and rigid without distortion of box. Mount recessed panelboards with fronts uniformly flush with wall finish and mating with back box.
- F. Install overcurrent protective devices and controllers not already factory installed.
 - 1. Set field-adjustable, circuit-breaker trip ranges using settings determined by the Architect. Provide 5-day notice to Architect before adjusting trip settings.
- G. Install filler plates in unused spaces.
- H. Comply with NECA 1.

3.3 IDENTIFICATION

- A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs complying with Section 26 05 53 "Identification for Electrical Systems."
- B. Create a directory to indicate installed circuit loads; incorporate Owner's final room designations. Obtain approval before installing. Use a computer or typewriter to create directory; handwritten directories are not acceptable.
- C. Panelboard Nameplates: Label each panelboard with a nameplate complying with requirements for identification specified in Section 26 05 53 "Identification for Electrical Systems."
- D. Device Nameplates: Label each branch circuit device in distribution panelboards with a nameplate complying with requirements for identification specified in Section 26 05 53 "Identification for Electrical Systems."

3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.
- C. Perform tests and inspections.
 - 1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
- D. Acceptance Testing Preparation:
 - 1. Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit.
 - 2. Test continuity of each circuit.

E. Tests and Inspections:

1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
3. Perform the following infrared scan tests and inspections and prepare reports:
 - a. Initial Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each panelboard. Remove front panels so joints and connections are accessible to portable scanner.
 - b. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each panelboard 11 months after date of Substantial Completion.
 - c. Instruments and Equipment:
 - 1) Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.

F. Panelboards will be considered defective if they do not pass tests and inspections.

G. Prepare test and inspection reports, including a certified report that identifies panelboards included and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action. Infrared testing reports shall include color photos indicating device temperature test results.

3.5 ADJUSTING

- A. Adjust moving parts and operable component to function smoothly and lubricate as recommended by manufacturer.
- B. Set field-adjustable circuit-breaker trip ranges.

END OF SECTION 26 24 16

SECTION 26 27 26

WIRING DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes:
 - 1. Snap switches
 - 2. Duplex receptacles
 - 3. GFCI receptacles
 - 4. Special purpose receptacles
 - 5. Device plates

1.3 DEFINITIONS

- A. CEC: California Electrical Code (CCR Title 24, Part 3) based on the National Electrical Code.
- B. CBC: California Building Code (CCR Title 24, Part 2)
- C. GFCI: Ground-fault Circuit Interrupter
- D. NECA 1: Standard Practice of Good Workmanship in Electrical Contracting

1.4 QUALITY ASSURANCE

- A. Comply with CEC and NECA 1.

1.5 SUBMITTALS

- A. Product Data
 - 1. Material List: A material list with names of manufacturers, model numbers, and technical information on all equipment proposed.
 - 2. Product technical information sheets for each principal component in the proposed system. Identify by arrow, circle or similar means products being proposed. Submittals consisting of unmodified catalog pages with no markings will be rejected.
- B. Shop Drawings

POLICE RANGE REFURBISHMENT PROJECT - PHASE II

- C. Samples: when requested by Architect
- D. Operation and Maintenance (O&M) Manuals: Furnish composite "Systems Operation and Maintenance" manuals in indexed three-ring binders, sized to hold the material below, plus 50% excess. Each manual shall contain, but not be limited to:
 - 1. Instruction for proper operation.
 - 2. Factory issued technical, installation, and maintenance manuals.
 - 3. Factory issued operations and programming (software) manuals.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in CEC, by a qualified testing agency, and marked for intended location and application.

2.2 ACCEPTABLE MANUFACTURERS

- A. Source Limitations: Obtain materials and accessories from single source from single manufacturer.

2.3 SWITCHES

- A. AC general use snap switches shall be industrial grade toggle handle, quiet operating, UL 20 listed and verified to meet Federal Specification W S 896 and NEMA WD 1 heavy duty tests.
- B. Switches shall be rated 120/277V, 20A.
- C. Toggle handle color shall be white.
- D. Switches shall be constructed with oversized silver cadmium alloy contacts, permanent lubrication, and binding head screws suitable for #10 AWG wire, back & side wire. Connection shall be made by wrapping the wire around the screw or tightening a screw clamp. Push in type connections are not acceptable. Switches may have built in pigtail connection in lieu of screw connection. Switches shall be self-grounding.
- E. Acceptable Manufacturers:
 - 1. Cooper (Arrow Hart) 1221
 - 2. Hubbell HBL1221
 - 3. Leviton 1221-2
 - 4. Pass & Seymour #PS20AC1

2.4 RECEPTACLES

- A. General receptacle outlets shall be hard-use industrial grade 20A, 125 volt, 2 pole, 3 wire NEMA 5-20R. The attachment screw shall have an automatic grounding clip. A green grounding screw shall be mounted on the bridge which shall run around the back of a break and impact resistant plastic body. The bridge shall be securely locked to the

POLICE RANGE REFURBISHMENT PROJECT - PHASE II

body. Outlets shall be UL 498 listed and verified to meet Federal Specification WC 596 and NEMA WD 1 heavy duty performance tests. Contacts shall be extra heavy-duty copper alloy or bronze double wipe type. Outlets shall have binding head screws suitable for #10 AWG wire. Connection shall be made by wrapping the wire around the screw or tightening a clamp. Push in type connections are not acceptable. Outlets may have built in pigtail connection in lieu of screw connection.

- B. Receptacle outlet faces shall be white. Exception: receptacles that are controlled by occupancy sensors as switched plug loads shall be gray.
 - 1. Acceptable Manufacturers:
 - a. Cooper (Arrow Hart) AH5362
 - b. Hubbell HBL5362
 - c. Leviton 5362
 - d. Pass & Seymour 5362
- C. Receptacles installed outdoors or in other damp or wet locations shall be listed weather-resistant.
- D. Ground fault circuit interrupter (GFCI) outlets shall be specification grade UL 498 NEMA 5-20R 125V 20A duplex grounding non-feed-through type self-testing receptacle, designed to prevent normal operation when miswired, suitable for mounting in a standard outlet box. A ground current of 5 milliamps or higher shall trip the circuit open in less than 1/30 second. There shall be a test button and a reset button on the front. Each GFCI outlet shall be tested after installation and results of the test submitted in writing.
 - 1. Acceptable Manufacturers:
 - a. Cooper (Arrow Hart)
 - b. Hubbell GF20ST
 - c. Leviton S7899
 - d. Pass & Seymour 2094
- E. Industrial type outlets shall be by Crouse Hinds, Appleton, or Russell and Stoll, and shall be rated for the amps, volts, poles, and wires indicated on the drawings.
- F. Special power outlets, not listed above, shall be standard NEMA configuration as noted on drawings and shall be of at least equal grade and quality to those listed above. Special receptacles not available in color may be silver or black finish.

2.5 DEVICE PLATES

- A. Acceptable Manufacturers:
 - 1. Cooper (Arrow Hart)
 - 2. Hubbell
 - 3. Leviton
 - 4. Pass & Seymour
- B. Plates for flush wiring devices, including telephone outlets, shall be satin finish type 304 stainless steel in range tunnels, and white thermoplastic in indoor finished locations. Wiring devices and device plates shall be the same manufacturer.
- C. Provide switch and device plates with engraved designations wherever called for by words, set off in quotation marks near a switch location, or by symbol. If inscription is not detailed on drawings request it from the Owner's representative. Engraving shall

POLICE RANGE REFURBISHMENT PROJECT - PHASE II

be in 1/8" high block type letters filled with black enamel.

- D. Finish plates for all surface mounted devices shall be pressed steel galvanized. Cover plates for flush mounted junction boxes in finished areas shall be selected by Owner's representative.
- E. For surface interior outlet and junction boxes of the pressed steel knockout type, use 1/2" raised galvanized steel plates for devices and flat galvanized steel for blank plates.
- F. Weatherproof faceplates shall consist of a hinged outlet cover/enclosure clearly marked "Suitable For Wet Locations While In Use" and "UL Listed". A gasket shall be provided between the enclosure and the mounting surface, and between the hinged cover and mounting plate/base. TayMac #10310 or equal.

PART 3 - EXECUTION

3.1 INSTALLATION OF OUTLETS AND EQUIPMENT

- A. All outlets, wall switches and wiring devices may be relocated within a radius of 12 feet at no additional charge to the Owner if such request is made prior to installation of the rough-in for the item.
- B. Accurately place outlet boxes independently and securely fasten to the structure and, in concealed work, provide with plaster rings and set flush with finished surface of walls or ceilings.
- C. Coordinate the location and mounting heights of wall-mounted receptacles, fire alarm and signal devices, and switches with casework, shelving, furniture, and other equipment shown on Architectural and Interiors drawings and fabrication shop drawings and comply with the Americans with Disabilities Act (ADA), CBC, ANSI, and all other applicable codes governing the project. Conflicts shall immediately be brought to the attention of the District's representative for resolution before the installation of the rough-in for the devices.
- D. Outlet and junction boxes for interior use shall be galvanized, one piece pressed or welded steel, knockout type, except where other types of boxes are indicated or specified. In masonry or concrete construction waterproof boxes manufactured for that purpose shall be used. Plastic, fiber or composition boxes will not be permitted.
- E. Protectively cover all devices, outlet boxes, cabinets, etc., before plastering and painting.
- F. All receptacles for restrooms, toilet rooms, custodial closets, locker rooms, kitchens, electric water coolers, vending machines and on building exterior shall be GFCI type.

3.2 FACEPLATE INSTALLATION

- A. Provide a plate for each outlet, receptacle, switch, device and box.
- B. Each switch, receptacle device, etc. which is installed in an outlet box with coverplate shall have the panel and circuit number engraved with 1/8" high black filled lettering at

POLICE RANGE REFURBISHMENT PROJECT - PHASE II

top of coverplate.

- C. Plates for outdoor locations shall be weatherproof.
- D. Ganged devices shall have gang plates exactly matching the arrangement and quantity of devices. All plates shall fit the box perfectly with no field modification necessary. Plates on surface mounted boxes shall not overhang the box. All plates shall be manufactured specifically for the type of outlet, device and box to which they are applied.

3.3 FIELD QUALITY CONTROL

- A. GFCI receptacles and GFCI branch circuit breakers shall be tested by applying a ground current of 5 mA, + 1 mA, which shall trip the unit off. Each test shall be recorded, and the record shall include the type of test equipment used, results of test, location of device tested, date of test, and name of test technician. "Test" button operation shall be successfully demonstrated but will not be acceptable as a substitute for the trip test described.
- B. Where required or directed, systems shall be tested in the presence of the City's representative to demonstrate that equipment furnished, installed or connected functions in the manner intended.
- C. Contractor shall furnish all necessary instruments and equipment and all power sources and connections required for making required tests and shall immediately correct any defective work at no additional charge.

END OF SECTION 26 27 26

SECTION 26 51 00

INTERIOR LIGHTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Provide U.L. listed and labeled lighting fixtures complete with light engines at light outlets indicated on the drawings. Each fixture shall bear the U.L. label and shall comply with Code Requirements.
- B. Fixtures are listed and described in the Lighting Fixture Schedule and in the following paragraphs. Fixture catalog numbers are to be used as a guide only and shall be understood to be followed by the words "except as modified by the total fixture description". Provide all accessories, features and adaptations necessary to meet the requirements of the description.
- C. Related Sections:
 - 1. Section 26 09 23 "Lighting Control Devices" for automatic control of lighting.
 - 2. Section 26 27 26 "Wiring Devices" for manual light switches.

1.3 DEFINITIONS

- A. CEC: Latest adopted version of California Electrical Code (CCR Title 24, Part 3) based on the National Electrical Code.

1.4 QUALITY ASSURANCE

- A. Products shall be UL listed and labeled.
- B. Comply with CEC.

1.5 SUBMITTALS

- A. Product Data
 - 1. Material List: A material list with names of manufacturers, model numbers, and technical information on all equipment proposed.
 - 2. Catalog cuts for each fixture including complete photometric data in IES format.
 - 3. Weight and dimensions.
 - 4. Product technical information sheets for each principal component in the proposed system. Identify by arrow, circle or similar means products being proposed. Submittals consisting of unmodified catalog pages with no markings will be rejected.

POLICE RANGE REFURBISHMENT PROJECT - PHASE II

- B. Samples: when requested by Architect.
- C. Operation and Maintenance (O&M) Manuals: Furnish composite "Systems Operation and Maintenance" manuals in indexed three-ring binders, sized to hold the material below, plus 50% excess. Each manual shall contain, but not be limited to:
 - 1. Operational procedures for the overall lighting systems including the "Sequence of Operation".
 - 2. Test procedures and test results.
 - 3. Instruction for the proper operation and maintenance of the lighting system.
 - 4. Factory issued technical, installation, and maintenance manuals.
 - 5. A replacement parts list complete with part numbers and name, address, and phone number of suppliers used by the Contractor. A spare parts list recommended for purchase by the District shall be included.
 - 6. All portions of the material list and shop drawings which are not included in the foregoing.

1.6 LAMP REPLACEMENT

- A. Replace lamps and light engines which burn out after Owner's use or acceptance of the project (or of an area in the case of beneficial occupancy).
- B. Lamps and light engines which burn out within 120 days.

1.7 FIELD REPLACEMENT LIGHT ENGINE

- A. Integrate LEDs, driver, power supply, thermal management components, and optical mixing components.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Products: Subject to compliance with requirements, provide one of the products indicated on Drawings.

2.2 GENERAL REQUIREMENTS FOR LIGHTING FIXTURES AND COMPONENTS

- A. Recessed Fixtures: Comply with NEMA LE 4 for ceiling compatibility for recessed fixtures.
- B. Metal Parts: Free of burrs and sharp corners and edges.
- C. Sheet Metal Components: Steel unless otherwise indicated. Form and support to prevent warping and sagging.

2.3 EXIT SIGNS

- A. General Requirements for Exit Signs: Comply with UL 924; for sign colors, visibility, luminance, and lettering size, comply with authorities having jurisdiction.

2.4 LIGHTING FIXTURE SUPPORT COMPONENTS

- A. Comply with Section 26 05 10 "Basic Electrical Materials and Methods".
- B. Single-Stem Hangers: 1/2-inch steel tubing with swivel ball fittings and ceiling canopy. Finish same as fixture.
- C. Support Wires: ASTM A 641/A 641M, Class 3, soft temper, zinc-coated steel, 12 gauge.

PART 3 - EXECUTION

3.1 ACCEPTANCE TESTING

- A. Complete the testing and documentation requirements of Title 24 Energy Code Acceptance Testing procedures. Complete and sign the Acceptance Testing Forms and submit to City Inspector.

3.2 UTILITY DESIGN INCENTIVE PROGRAM

- A. Furnish the Utility Company representative with the itemized, paid proof of purchase/invoice for the purchase and installation of energy efficient equipment.
- B. Assist the Utility in the verification by Utility representative of both the purchase and installation of the energy efficient equipment, including providing the representative access to the Construction Project, at reasonable times, for verification of installation of the equipment.
- C. Provide the Utility with a written request for payment of the Incentives calculated, when the Construction Project is completed and occupied.

3.3 INSTALLATION

- A. Lighting fixtures:
 - 1. Set level, plumb, and square with ceilings and walls unless otherwise indicated.
 - 2. Install lamps in each luminaire.
- B. Suspended Lighting Fixture Support:
 - 1. Pendants and Rods: Where longer than 48 inches, brace to limit swinging.
- C. Connect wiring according to Section 26 05 19 "Wires and Cables."

POLICE RANGE REFURBISHMENT PROJECT - PHASE II

3.4 IDENTIFICATION

- A. Install labels with panel and circuit numbers on concealed junction and outlet boxes. Comply with requirements for identification specified in Section 26 05 10 "Basic Electrical Materials and Methods."

3.5 FIELD QUALITY CONTROL

- A. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery and retransfer to normal.
- B. Prepare a written report of tests, inspections, observations, and verifications indicating and interpreting results. If adjustments are made to lighting system, retest to demonstrate compliance with standards.

3.6 ADJUSTING

- A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting aimable luminaires to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose. Some of this work may be required after dark.
 - 1. Adjust aimable luminaires in the presence of Architect.

END OF SECTION 26 51 00

SECTION 26 56 00
EXTERIOR LIGHTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

- 1. Exterior luminaires with lamps and ballasts.
- 2. Poles and accessories.

B. Related Sections:

- 1. Section 26 51 00 "Interior Lighting" for exterior luminaires normally mounted on exterior surfaces of buildings.

1.3 DEFINITIONS

- A. CCT: Correlated color temperature.
- B. CEC: California Electrical Code (CCR Title 24, Part 3).
- C. CRI: Color-rendering index.
- D. LER: Luminaire efficacy rating.
- E. Luminaire: Complete lighting fixture, including ballast housing if provided.
- F. Pole: Luminaire support structure, including tower used for large area illumination.
- G. Standard: Same definition as "Pole" above.

1.4 INFORMATIONAL SUBMITTALS

- A. Pole and Support Component Certificates: Signed by manufacturers of poles, certifying that products are designed for indicated load requirements in AASHTO LTS-4-M and that load imposed by luminaire and attachments has been included in design. The certification shall be based on design calculations by a professional engineer.

POLICE RANGE REFURBISHMENT PROJECT - PHASE II

- B. Qualification Data: For qualified agencies providing photometric data for lighting fixtures.
- C. Field quality-control reports.
- D. Warranty: Sample of special warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For luminaires, poles and luminaire lowering devices to include in operation and maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Lamps: One for every 100 of each type and rating installed. Furnish at least one of each type.
 - 2. Glass and Plastic Lenses, Covers, and Other Optical Parts: One for every 100 of each type and rating installed. Furnish at least one of each type.
 - 3. Ballasts: One for every 100 of each type and rating installed. Furnish at least one of each type.
 - 4. Globes and Guards: One for every 20 of each type and rating installed. Furnish at least one of each type.

1.7 QUALITY ASSURANCE

- A. Luminaire Photometric Data Testing Laboratory Qualifications: Provided by manufacturers' laboratories that are accredited under the National Volunteer Laboratory Accreditation Program for Energy Efficient Lighting Products.
- B. Luminaire Photometric Data Testing Laboratory Qualifications: Provided by an independent agency, with the experience and capability to conduct the testing indicated, that is an NRTL as defined by OSHA in 29 CFR 1910.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- D. Comply with IEEE C2, "National Electrical Safety Code."
- E. Comply with CEC.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Package poles for shipping according to ASTM B 660.

POLICE RANGE REFURBISHMENT PROJECT - PHASE II

- B. Store poles on decay-resistant-treated skids at least 12 inches above grade and vegetation. Support poles to prevent distortion and arrange to provide free air circulation.
- C. Retain factory-applied pole wrappings on metal poles until right before pole installation. For poles with nonmetallic finishes, handle with web fabric straps.

1.9 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace products that fail in materials or workmanship; that corrode; or that fade, stain, perforate, erode, or chalk due to effects of weather or solar radiation within specified warranty period. Manufacturer may exclude lightning damage, hail damage, vandalism, abuse, or unauthorized repairs or alterations from special warranty coverage.
 - 1. Warranty Period for Luminaires: Five years from date of Substantial Completion.
 - 2. Warranty Period for Metal Corrosion: Five years from date of Substantial Completion.
 - 3. Warranty Period for Color Retention: Five years from date of Substantial Completion.
 - 4. Warranty Period for Poles: Repair or replace lighting poles and standards that fail in finish, materials, and workmanship within manufacturer's standard warranty period, but not less than three years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Products: Subject to compliance with requirements.

2.2 GENERAL REQUIREMENTS FOR LUMINAIRES

- A. Luminaires shall comply with UL 1598 and be listed and labeled for installation in wet locations by an NRTL acceptable to authorities having jurisdiction.
 - 1. LER Tests Fluorescent Fixtures: Where LER is specified, test according to NEMA LE 5 and NEMA LE 5A as applicable.
- B. Metal Parts: Free of burrs and sharp corners and edges.
- C. Sheet Metal Components: Corrosion-resistant aluminum unless otherwise indicated. Form and support to prevent warping and sagging.
- D. Housings: Rigidly formed, weather- and light-tight enclosures that will not warp, sag, or deform in use. Provide filter/breather for enclosed luminaires.
- E. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools.

POLICE RANGE REFURBISHMENT PROJECT - PHASE II

Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position. Doors shall be removable for cleaning or replacing lenses. Designed to disconnect ballast when door opens.

- F. Light Shields: Metal baffles, factory installed and field adjustable, arranged to block light distribution to indicated portion of normally illuminated area or field.
- G. Reflecting surfaces shall have minimum reflectance as follows unless otherwise indicated:
 - 1. White Surfaces: 85 percent.
 - 2. Specular Surfaces: 83 percent.
 - 3. Diffusing Specular Surfaces: 75 percent.
- H. Lenses and Refractors Gaskets: Use heat- and aging-resistant resilient gaskets to seal and cushion lenses and refractors in luminaire doors.
- I. Luminaire Finish: Manufacturer's standard paint applied to factory-assembled and -tested luminaire before shipping. Where indicated, match finish process and color of pole or support materials.
- J. Factory-Applied Finish for Steel Luminaires: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
 - 1. Surface Preparation: Clean surfaces to comply with SSPC-SP 1, "Solvent Cleaning," to remove dirt, oil, grease, and other contaminants that could impair paint bond. Grind welds and polish surfaces to a smooth, even finish. Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning," or SSPC-SP 8, "Pickling."
 - 2. Exterior Surfaces: Manufacturer's standard finish consisting of one or more coats of primer and two finish coats of high-gloss, high-build polyurethane enamel.
 - a. Color: As indicated on drawings.
- K. Factory-Applied Finish for Aluminum Luminaires: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
 - 1. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
 - 2. Natural Satin Finish: Provide fine, directional, medium satin polish (AA-M32); buff complying with AA-M20; and seal aluminum surfaces with clear, hard-coat wax.
 - 3. Class I, Clear Anodic Finish: AA-M32C22A41 (Mechanical Finish: medium satin; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.
 - 4. Class I, Color Anodic Finish: AA-M32C22A42/A44 (Mechanical Finish: medium satin; Chemical Finish: etched, medium matte; Anodic Coating: Architectural

POLICE RANGE REFURBISHMENT PROJECT - PHASE II

Class I, integrally colored or electrolytically deposited color coating 0.018 mm or thicker) complying with AAMA 611.

- a. Color: As indicated on drawings.
- L. Factory-Applied Labels: Comply with UL 1598. Labels shall be located where they will be readily visible to service personnel, but not seen from normal viewing angles when fixture is in use.
 - 1. Label shall include the following characteristics:
 - a. "USES ONLY" and include specific limitations.
 - b. CCT and CRI for all luminaires.

2.3 COMPONENTS

- A. Structural Characteristics: Comply with AASHTO LTS-4-M.
 - 1. Wind-Load Strength of Poles: Adequate at indicated heights above grade without failure, permanent deflection, or whipping in steady winds of speed indicated in "Structural Analysis Criteria for Pole Selection" Article.
 - 2. Strength Analysis: For each pole, multiply the actual equivalent projected area of luminaires and brackets by a factor of 1.1 to obtain the equivalent projected area to be used in pole selection strength analysis.
- B. Luminaire Attachment Provisions: Comply with luminaire manufacturers' mounting requirements. Use stainless-steel fasteners and mounting bolts unless otherwise indicated.
- C. Mountings, Fasteners, and Appurtenances: Corrosion-resistant items compatible with support components.
 - 1. Materials: Shall not cause galvanic action at contact points.
 - 2. Anchor Bolts, Leveling Nuts, Bolt Caps, and Washers: Hot-dip galvanized after fabrication unless otherwise indicated.
 - 3. Anchor-Bolt Template: Plywood or steel.
- D. Handhole: Oval-shaped, with minimum clear opening of 2-1/2 by 5 inches, with cover secured by stainless-steel captive screws.
- E. Concrete Pole Foundations: Cast in place, with anchor bolts to match pole-base flange. Concrete, reinforcement, and formwork are specified in Section 03 30 00 "Cast-in-Place Concrete."

2.4 STEEL POLES

- A. Poles: Comply with ASTM A 500, Grade B, carbon steel with a minimum yield of 46,000 psig; one-piece construction up to 40 feet in height with access handhole in pole wall.

POLICE RANGE REFURBISHMENT PROJECT - PHASE II

1. Shape: Square, straight.
 2. Mounting Provisions: Butt flange for bolted mounting on foundation or breakaway support.
- B. Brackets for Luminaires: Detachable, cantilever, without underbrace.
1. Adapter fitting welded to pole, allowing the bracket to be bolted to the pole mounted adapter, then bolted together with galvanized-steel bolts.
 2. Cross Section: Tapered oval, with straight tubular end section to accommodate luminaire.
 3. Match pole material and finish.
- C. Grounding and Bonding Lugs: Welded 1/2-inch threaded lug, complying with requirements in Section 26 05 26 "Grounding and Bonding", listed for attaching grounding and bonding conductors of type and size listed in that Section, and accessible through handhole.
- D. Cable Support Grip: Wire-mesh type with rotating attachment eye, sized for diameter of cable and rated for a minimum load equal to weight of supported cable times a 5.0 safety factor.
- E. Factory-Painted Finish: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
1. Surface Preparation: Clean surfaces to comply with SSPC-SP 1, "Solvent Cleaning," to remove dirt, oil, grease, and other contaminants that could impair paint bond. Grind welds and polish surfaces to a smooth, even finish. Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning," or with SSPC-SP 8, "Pickling."
 2. Interior Surfaces of Pole: One coat of bituminous paint, or otherwise treat for equal corrosion protection.
 3. Exterior Surfaces: Manufacturer's standard finish consisting of one or more coats of primer and two finish coats of high-gloss, high-build polyurethane enamel.
 - a. Color: As indicated on drawings.

2.5 POLE ACCESSORIES

- A. Base Covers: Manufacturers' standard metal units, arranged to cover pole's mounting bolts and nuts. Finish same as pole.

PART 3 - EXECUTION

3.1 LUMINAIRE INSTALLATION

- A. Install lamps in each luminaire.

- B. Fasten luminaire to indicated structural supports.
 - 1. Use fastening methods and materials selected to resist seismic forces defined for the application and approved by manufacturer.

3.2 POLE INSTALLATION

- A. Alignment: Align pole foundations and poles for optimum directional alignment of luminaires and their mounting provisions on the pole.
- B. Clearances: Maintain the following minimum horizontal distances of poles from surface and underground features unless otherwise indicated on Drawings:
 - 1. Fire Hydrants and Storm Drainage Piping: 60 inches.
 - 2. Water, Gas, Electric, Communication, and Sewer Lines: 10 feet.
 - 3. Trees: 15 feet from tree trunk.
- C. Concrete Pole Foundations: Set anchor bolts according to anchor-bolt templates furnished by pole manufacturer. Concrete materials, installation, and finishing requirements are specified in Section 03 30 00 "Cast-in-Place Concrete."

3.3 CORROSION PREVENTION

- A. Aluminum: Do not use in contact with earth or concrete. When in direct contact with a dissimilar metal, protect aluminum by insulating fittings or treatment.
- B. Steel Conduits: Comply with Section 26 05 43 "Raceways and Boxes." In concrete foundations, wrap conduit with 0.010-inch-thick, pipe-wrapping plastic tape applied with a 50 percent overlap.

3.4 GROUNDING

- A. Ground metal poles and support structures according to Section 26 05 26 "Grounding and Bonding."
 - 1. Install grounding electrode for each pole unless otherwise indicated.
 - 2. Install grounding conductor pigtail in the base for connecting luminaire to grounding system.

3.5 FIELD QUALITY CONTROL

- A. Inspect each installed fixture for damage. Replace damaged fixtures and components.
- B. Illumination Observations: Verify normal operation of lighting units after installing luminaires and energizing circuits with normal power source.
 - 1. Verify operation of photoelectric controls.

- C. Illumination Tests:
1. Measure light intensities at night. Use photometers with calibration referenced to NIST standards. Comply with the following IESNA testing guide(s):
 - a. IESNA LM-5, "Photometric Measurements of Area and Sports Lighting Installations."
 - b. IESNA LM-64, "Photometric Measurements of Parking Areas."
- D. Prepare a written report of tests, inspections, observations, and verifications indicating and interpreting results. If adjustments are made to lighting system, retest to demonstrate compliance with standards.

END OF SECTION 26 56 00

SECTION 26 56 68

SPORTS LIGHTING

PART 1 – GENERAL

1.1 SUMMARY

- A. Work covered by this section of the specifications shall conform to the contract documents, engineering plans as well as state and local codes.
- B. The purpose of is to define the lighting system performance and design standards for San Diego Police Department Firing Range using an LED Lighting source. The manufacturer / contractor shall supply lighting equipment to meet or exceed the standards set forth in these specifications.
- C. The sports lighting will be for the following venues:
 - 1. West Range
 - 2. East Range
- E. The primary goals of this sports lighting project are:
 - 1. **Guaranteed Light Levels:** Selection of appropriate light levels impact the safety of the players and the enjoyment of spectators. Therefore, light levels are guaranteed to not drop below specified target values for a period of 25 years.
 - 2. **Environmental Light Control:** It is the primary goal of this project to minimize spill light to adjoining properties and glare to the players, spectators and neighbors. The LED design should provide better control than a good HID design.
 - 3. **Life-cycle Cost:** In order to reduce the operating budget, the preferred lighting system shall be energy efficient and cost effective to operate. All maintenance costs shall be eliminated for the duration of the warranty.
 - 4. **Control and Monitoring:** To allow for optimized use of labor resources and avoid unneeded operation of the facility, customer requires a remote on/off control system for the lighting system. Fields should be proactively monitored to detect luminaire outages over a 25-year life cycle. All communication and monitoring costs for 25-year period shall be included in the bid.

1.2 LIGHTING PERFORMANCE

- A. **Illumination Levels and Design Factors:** Playing surfaces shall be lit to an average target illumination level and uniformity as specified in the chart below. Lighting calculations shall be developed, and field measurements taken on the grid spacing with the minimum number of grid points specified below. Appropriate light loss factors shall be applied and submitted for the basis of design. Average illumination level shall be measured in accordance with the IESNA LM-5-04 (IESNA Guide for Photometric Measurements of Area and Sports Lighting Installations). Illumination levels shall not to drop below desired target values in accordance to IES RP-6-15, Page 2, Maintained Average Illuminance and shall be guaranteed for the full warranty period.

POLICE RANGE REFURBISHMENT PROJECT - PHASE II

Area of Lighting	Average Target Illumination Levels	Maximum to Minimum Uniformity Ratio	Grid Points	Grid Spacing
West Range	30 footcandles	4.0:1.0	140	10' x 10'
West Range Targets	50 footcandles	2.5:1.0	58	5' x 5'
East Range	30 footcandles	4.0:1.0	150	10' x 10'
East Range Targets	50 footcandles	2.5:1.0	40	5' x 5'

B. Hours of usage: Designs shall be based on the following hours of usage

Area of Lighting	Annual Usage Hours	25 year Usage Hours
West Range and East Range	200	10,000

C. Color: The lighting system shall have a minimum color temperature of 5700K and a CRI of 75.

D. Mounting Heights: To ensure proper aiming angles for reduced glare and to provide better playability, minimum mounting heights shall be as described below. Higher mounting heights may be required based on photometric report and ability to ensure the top of the field angle is a minimum of 10 degrees below horizontal.

# of Poles	Pole Designation	Pole Height
2	R1, R2	50'
2	R4, R5	60'

1.3 ENVIRONMENTAL LIGHT CONTROL

- A. Light Control Luminaires: All luminaires shall utilize spill light and glare control devices including, but not limited to, internal shields, louvers and external shields. No symmetrical beam patterns are accepted.
- B. Glare Control: Maximum candela viewed from any one fixture shall not exceed 5,000 candela at a distance of 150' from the playing field. Environmental glare impact scans must be submitted showing the maximum candela from the field edge on a map of the surrounding area until 500 candela or less is achieved.
- C. Spill Scans: Spill scans must be submitted indicating the amount of horizontal and vertical footcandles along the specified lines. Light levels shall be taken at 30-foot intervals along the boundary line. Readings shall be taken with the meter orientation at both horizontal and aimed towards the most intense bank of lights. Illumination level shall be measured in accordance with the IESNA LM-5-04 after 1 hour warm up.
- D. The first page of a photometric report for all luminaire types proposed showing horizontal and vertical axial candle power shall be provided to demonstrate the capability of achieving the specified performance. Reports shall be certified by a qualified independent testing laboratory or by a manufacturer's laboratory with a current accreditation under the National Voluntary Laboratory Accreditation Program for Energy Efficient Lighting Products. A summary of the horizontal and vertical aiming angles for each luminaire shall be included with the photometric report.

1.4 LIFE-CYCLE COSTS

- A. Manufacturer shall submit a 25-year life cycle cost calculation as outlined in the required submittal information.
- B. Preventative and Spot Maintenance: Manufacturer shall provide all preventative and spot maintenance, including parts and labor for 25 years from the date of equipment shipment. Individual outages shall be repaired when the usage of any field is materially impacted. Owner agrees to check fuses in the event of a luminaire outage.

PART 2 – PRODUCTS

2.1 SPORTS LIGHTING SYSTEM CONSTRUCTION

- A. Manufacturing Requirements: All components shall be designed and manufactured as a system. All luminaires, wire harnesses, drivers and other enclosures shall be factory assembled, aimed, wired and tested.
- B. Durability: All exposed components shall be constructed of corrosion resistant material and/or coated to help prevent corrosion. All exposed carbon steel shall be hot dip galvanized per ASTM A123. All exposed aluminum shall be powder coated with high performance polyester or anodized. All exterior reflective inserts shall be anodized, coated, and protected from direct environmental exposure to prevent reflective degradation or corrosion. All exposed hardware and fasteners shall be stainless steel of 18-8 grade or better, passivated and coated with aluminum-based thermosetting epoxy resin for protection against corrosion and stress corrosion cracking. Structural fasteners may be carbon steel and galvanized meeting ASTM A153 and ISO/EN 1461 (for hot dipped galvanizing), or ASTM B695 (for mechanical galvanizing). All wiring shall be enclosed within the cross-arms, pole, or electrical components enclosure.

POLICE RANGE REFURBISHMENT PROJECT - PHASE II

- C. System Description: Lighting system shall consist of the following:
1. Galvanized steel poles and cross-arm assembly.
 2. Non-approved pole technology:
 - a. Square static cast concrete poles will not be accepted.
 - b. Direct bury steel poles which utilize the extended portion of the steel shaft for their foundation will not be accepted due to potential for internal and external corrosive reaction to the soils and long term performance concerns.
 3. Lighting systems shall use concrete foundations. See Section 2.3 for details.
 - a. For a foundation using a pre-stressed concrete base embedded in concrete backfill the concrete shall be air-entrained and have a minimum compressive design strength at 28 days of 3,000 PSI. 3,000 PSI concrete specified for early pole erection, actual required minimum allowable concrete strength is 1,000 PSI. All piers and concrete backfill must bear on and against firm undisturbed soil.
 - b. For anchor bolt foundations or foundations using a pre-stressed concrete base in a suspended pier or re-inforced pier design pole erection may occur after 7 days. Or after a concrete sample from the same batch achieves a certain strength.
 4. Manufacturer will supply all drivers and supporting electrical equipment
 - a. Remote drivers and supporting electrical equipment shall be mounted approximately 10 feet above grade in aluminum enclosures. The enclosures shall be touch-safe and include drivers and fusing with indicator lights on fuses to notify when a fuse is to be replaced for each luminaire. Disconnect per circuit for each pole structure will be located in the enclosure.
 5. Manufacturer shall provide surge protection at the pole equal to or greater than 40 kA for each line to ground (Common Mode) as recommended by IEEE C62.41.2_2002.
 6. Wire harness complete with an abrasion protection sleeve, strain relief and plug-in connections for fast, trouble-free installation.
 7. All luminaires, visors, and cross-arm assemblies shall withstand 150 mph winds and maintain luminaire aiming alignment.
 8. Control cabinet to provide remote on-off control and monitoring of the lighting system. See Section 2.4 for further details.
 9. Manufacturer shall provide lightning grounding as defined by NFPA 780 and be UL Listed per UL 96 and UL 96A.
 - a. Integrated grounding via concrete encased electrode grounding system.
 - b. If grounding is not integrated into the structure, the manufacturer shall supply grounding electrodes, copper down conductors, and exothermic weld kits. Electrodes and conductors shall be sized as required by NFPA 780. The grounding electrode shall be minimum size of 5/8 inch diameter and 8 feet long, with a minimum of 10 feet embedment. Grounding electrode shall be connected to the structure by a grounding electrode conductor with a minimum size of 2 AWG for poles with 75 feet mounting height or less, and 2/0 AWG for poles with more than 75 feet mounting height.
- D. Safety: All system components shall be UL listed for the appropriate application.

2.2 ELECTRICAL

- A. Electric Power Requirements for the Sports Lighting Equipment:
 - 1. Electric power: 208 Volts, 3 Phase
 - 2. Maximum total voltage drop: Voltage drop to the disconnect switch located on the poles shall not exceed five (5) percent of the rated voltage.
- B. Energy Consumption: The kW consumption for the field lighting system shall be 18.4 kW.

2.3 STRUCTURAL PARAMETERS

- A. Wind Loads: Wind loads shall be based on the 2016 California Building Code. Wind loads to be calculated using ASCE 7-10, an ultimate design wind speed of 110 mph and exposure category C.
- B. Pole Structural Design: The stress analysis and safety factor of the poles shall conform to 2013 AASHTO Standard Specification for Structural Supports for Highway Signs, Luminaires, and Traffic Signals (LTS-6).
- C. Foundation Design: The foundation design shall be based on soils that meet or exceed those of a Class 5 material as defined by 2015 IBC Table 1806.2.
- C. Foundation Drawings: Project specific foundation drawings stamped by a registered engineer in the state where the project is located are required. The foundation drawings must list the moment, shear (horizontal) force, and axial (vertical) force at ground level for each pole. These drawings must be submitted at time of bid to allow for accurate pricing.

2.4 CONTROL

- A. Instant On/Off Capabilities: System shall provide for instant on/off of luminaires.
- B. Lighting contactor cabinet(s) constructed of NEMA Type 4 aluminum, designed for easy installation with contactors, labeled to match field diagrams and electrical design. Manual off-on-auto selector switches shall be provided.
- C. Remote Lighting Control System: System shall allow owner and users with a security code to schedule on/off system operation via a web site, phone, fax or email up to ten years in advance. Manufacturer shall provide and maintain a two-way TCP/IP communication link. Trained staff shall be available 24/7 to provide scheduling support and assist with reporting needs.

The owner may assign various security levels to schedulers by function and/or fields. This function must be flexible to allow a range of privileges such as full scheduling capabilities for all fields to only having permission to execute "early off" commands by phone. Scheduling tool shall be capable of setting curfew limits.

Controller shall accept and store 7-day schedules, be protected against memory loss during power outages, and shall reboot once power is regained and execute any commands that would have occurred during outage.

- D. Remote Monitoring System: System shall monitor lighting performance and notify manufacturer if individual luminaire outage is detected so that appropriate maintenance can be scheduled. The controller shall determine switch position (manual or auto) and contactor status (open or closed).

- E. Management Tools: Manufacturer shall provide a web-based database and dashboard tool of actual field usage and provide reports by facility and user group. Dashboard shall also show current status of luminaire outages, control operation and service. Mobile application will be provided suitable for IOS, Android and Blackberry devices.
- Hours of Usage: Manufacturer shall provide a means of tracking actual hours of usage for the field lighting system that is readily accessible to the owner.
1. Cumulative hours: shall be tracked to show the total hours used by the facility
 2. Report hours saved by using early off and push buttons by users.
- F. Communication Costs: Manufacturer shall include communication costs for operating the controls and monitoring system for a period of 25 years.

PART 3 – EXECUTION

3.1 SOIL QUALITY CONTROL

- A. It shall be the Contractor's responsibility to notify the Owner if soil conditions exist other than those on which the foundation design is based, or if the soil cannot be readily excavated. Contractor may issue a change order request / estimate for the Owner's approval / payment for additional costs associated with:
1. Providing engineered foundation embedment design by a registered engineer in the State of California for soils other than specified soil conditions;
 2. Additional materials required to achieve alternate foundation;
 3. Excavation and removal of materials other than normal soils, such as rock, caliche, etc.

3.2 DELIVERY TIMING

- A. Equipment On-Site: The equipment must be on-site 6-8 weeks from receipt of approved submittals.

3.3 FIELD QUALITY CONTROL

- A. Illumination Measurements: Upon substantial completion of the project and in the presence of the Contractor, Project Engineer, Owner's Representative, and Manufacturer's Representative, illumination measurements shall be taken and verified. The illumination measurements shall be conducted in accordance with IESNA LM-5-04.
- B. Field Light Level Accountability
1. Light levels are guaranteed not to fall below the target maintained light levels for the entire warranty period of 25 Years.
 2. The contractor/manufacturer shall be responsible for an additional inspection one year from the date of commissioning of the lighting system and will utilize the owner's light meter in the presence of the owner.
 3. The contractor/manufacturer will be held responsible for any and all changes needed to bring these fields back to compliance for light levels and uniformities. Contractor/Manufacturer will be held responsible for any damage to the fields during these repairs.
- C. Correcting Non-Conformance: If, in the opinion of the Owner or his appointed Representative, the actual performance levels including footcandles and uniformity ratios are not in conformance with the requirements of the performance specifications and

submitted information, the Manufacturer shall be required to make adjustments to meet specifications and satisfy Owner.

3.4 WARRANTY AND GUARANTEE

- A. 25-Year Warranty: Each manufacturer shall supply a signed warranty covering the entire system for 25 years from the date of shipment. Warranty shall guarantee specified light levels. Manufacturer shall maintain specifically-funded financial reserves to assure fulfillment of the warranty for the full term. Warranty does not cover weather conditions events such as lightning or hail damage, improper installation, vandalism or abuse, unauthorized repairs or alterations, or product made by other manufacturers.
- B. Maintenance: Manufacturer shall monitor the performance of the lighting system, including on/off status, hours of usage and luminaire outage for 25 years from the date of equipment shipment. Parts and labor shall be covered such that individual luminaire outages will be repaired when the usage of any field is materially impacted. Owner agrees to check fuses in the event of a luminaire outage.

PART 4 – DESIGN APPROVAL

4.0 PRE-BID SUBMITTAL REQUIREMENTS (Non-Musco)

- A. Design Approval: The owner / engineer will review pre-bid submittals per section 4.0.B from all the manufacturers to ensure compliance to the specification 10 days prior to bid. If the design meets the design requirements of the specifications, a letter and/or addendum will be issued to the manufacturer indicating approval for the specific design submitted.
- B. Approved Product: Musco's Light-Structure System™ with TLC for LED™ is the approved product. All substitutions must provide a complete submittal package for approval as outlined in Submittal Information at the end of this section at least 10 days prior to bid. Special manufacturing to meet the standards of this specification may be required. An addendum will be issued prior to bid listing any other approved lighting manufacturers and designs.
- C. All listed manufacturers not pre-approved shall submit the information at the end of this section at least 10 days prior to bid. An addendum will be issued prior to bid; listing approved lighting manufacturers and the design method to be used.
- D. Bidders are required to bid only products that have been approved by this specification or addendum by the owner or owner's representative. Bids received that do not utilize an approved system/design, will be rejected.

END OF SECTION 26 56 68

POLICE RANGE REFURBISHMENT PROJECT - PHASE II
 REQUIRED SUBMITTAL INFORMATION FOR ALL MANUFACTURERS
 (NOT PRE-APPROVED) 15 DAYS PRIOR TO BID

All items listed below are mandatory, shall comply with the specification and be submitted according to pre-bid submittal requirements. Complete the Yes/No column to indicate compliance (Y) or noncompliance (N) for each item. Submit checklist below with submittal.

Yes / No	Tab	Item	Description
	A	Letter/ Checklist	Listing of all information being submitted must be included on the table of contents. List the name of the manufacturer's local representative and his/her phone number. Signed submittal checklist to be included.
	B	Equipment Layout	Drawing(s) showing field layouts with pole locations
	C	On Field Lighting Design	Lighting design drawing(s) showing: <ul style="list-style-type: none"> a. Field Name, date, file number, prepared by b. Outline of field(s) being lighted, as well as pole locations referenced to the center of the field (x & y), Illuminance levels at grid spacing specified c. Pole height, number of fixtures per pole, horizontal and vertical aiming angles, as well as luminaire information including wattage, lumens and optics d. Height of light test meter above field surface. e. Summary table showing the number and spacing of grid points; average, minimum and maximum illuminance levels in foot candles (fc); uniformity including maximum to minimum ratio, coefficient of variance (CV), coefficient of utilization (CU) uniformity gradient; number of luminaires, total kilowatts, average tilt factor; light loss factor.
	D	Off Field Lighting Design	Lighting design drawing showing initial spill light levels along the boundary line (defined on bid drawings) in footcandles. Light levels shall be taken at 30-foot intervals along the boundary line. Readings shall be taken with the meter orientation at both horizontal and aimed towards the most intense bank of lights.
	E	Environmental Light Control Design	Environmental glare impact scans must be submitted showing the maximum candela from the field edge on a map of the surrounding area until 500 candela or less is achieved.
	F	Photometric Report	Provide first page of photometric report for all luminaire types being proposed showing candela tabulations as defined by IESNA Publication LM-35-02. Photometric data shall be certified by laboratory with current National Voluntary Laboratory Accreditation Program or an independent testing facility.

	G	Performance Guarantee	Provide performance guarantee including a written commitment to undertake all corrections required to meet the performance requirements noted in these specifications at no expense to the owner. Light levels must be guaranteed to not fall below target levels for warranty period.
	H	Structural Calculations	Pole structural calculations and foundation design showing foundation shape, depth backfill requirements, rebar and anchor bolts (if required). Pole base reaction forces shall be shown on the foundation drawing along with soil bearing pressures. Design must be stamped by a structural engineer in the state of California, if required by owner.
	I	Control & Monitoring System	Manufacturer of the control and monitoring system shall provide written definition and schematics for automated control system to include monitoring. They will also provide ten (10) references of customers currently using proposed system in the state of California.
	J	Electrical Distribution Plans	Manufacturer bidding an alternate product must include a revised electrical distribution plan including changes to service entrance, panels and wire sizing, signed by a licensed Electrical Engineer in the state of California.
	K	Warranty	Provide written warranty information including all terms and conditions. Provide ten (10) references of customers currently under specified warranty in the state of California.
	L	Project References	Manufacturer to provide a list of (1) projects where the technology and specific fixture proposed for this project has been installed in the state of California. Reference list will include project name, project city, installation date, and if requested, contact name and contact phone number.
	M	Product Information	Complete bill of material and current brochures/cut sheets for all product being provided.
	N	Delivery	Manufacturer shall supply an expected delivery timeframe from receipt of approved submittals and complete order information.
	O	Non-Compliance	Manufacturer shall list all items that do not comply with the specifications. If in full compliance, tab may be omitted.
	P	Life-cycle Cost Calculation	Document life-cycle cost calculations as defined in the specification. Identify energy costs for operating the luminaires. Maintenance cost for the system must be included in the warranty. All costs should be based on 25 Years. (complete table below)

25-Year Life Cycle Operating Cost			
a.	Luminaire energy consumption _____ luminaires x _____ kW demand per luminaire x <u>0.10</u> kWh rate x <u>200</u> annual usage hours x 25 years		
b.	Cost for maintenance, not covered, for 25 years Assume 7 repairs at \$500 each if not included with the bid	+	
	TOTAL 25 -Year Life-cycle Operating Cost	=	

POLICE RANGE REFURBISHMENT PROJECT - PHASE II

The information supplied herein shall be used for the purpose of complying with the specifications for San Diego Police Department Firing Range. By signing below I agree that all requirements of the specifications have been met and that the manufacturer will be responsible for any future costs incurred to bring their equipment into compliance for all items not meeting specifications and not listed in the Non-Compliance section.

Manufacturer: _____ Signature: _____

Contact Name: _____ Date: ____/____/____

Contractor: _____ Signature: _____

SECTION 27 5116

PUBLIC ADDRESS AND MASS NOTIFICATION SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions.

1.2 SUMMARY

- A. Section Includes:

This Section includes Public Address System components to extend the existing system provided under Phase I. Refer to the drawings for extent of system requirements.

1. Power amplifiers.
2. Microphones.
3. Volume limiter/compressors.
4. Equipment rack.
5. Telephone paging adapters.
6. Tone generator.
7. Loudspeakers and Cables.
8. Noise-operated gain controllers.
9. Microphone and headphone outlets.

For Reference Only
(Provided under Phase I)

1.3 DEFINITIONS

- A. Channels: Separate parallel signal paths, from sources to loudspeakers or loudspeaker zones, with separate amplification and switching that permit selection between paths for speaker alternative program signals.
- B. VU: Volume unit.
- C. Zone: Separate group of loudspeakers and associated supply wiring that may be arranged for selective switching between different channels.

1.4 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design supports and seismic restraints for control consoles, equipment cabinets and racks, and components, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

1.5 ACTION SUBMITTALS

- A. The following information shall be submitted for review and approval in accordance with Section 260500, "General Electrical Requirements".

- B. Product Data: For each type of product indicated.
- C. Shop Drawings: For supports and seismic restraints for control consoles, equipment cabinets and racks, and components. Include plans, elevations, sections, details, and attachments to other work.
 - 1. Detail equipment assemblies and indicate dimensions, weights, required clearances, method of field assembly, components, and location and size of each field connection.
 - 2. Console layouts.
 - 3. Rack arrangements.
 - 4. Calculations: For sizing backup battery.
 - 5. Wiring Diagrams: For power, signal, and control wiring.
 - a. Identify terminals to facilitate installation, operation, and maintenance.
 - b. Single-line diagram showing interconnection of components.
 - c. Cabling diagram showing cable routing.
- D. Delegated-Design Submittal: For supports and seismic restraints for control consoles, equipment cabinets and racks, and components indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 - 1. Detail fabrication and assembly of supports and seismic restraints for control consoles, equipment cabinets and racks, and components.

1.6 INFORMATIONAL SUBMITTALS

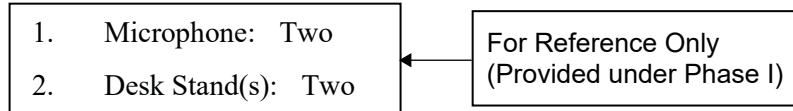
- A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which ceiling-mounted items including lighting fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings are shown and coordinated with each other, using input from installers of the items involved.
- B. Qualification Data: For qualified Installer
- C. Field quality-control reports.

1.7 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For public address and mass notification systems to include in emergency, operation, and maintenance manuals.

1.8 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.



1.9 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
 - 1. Personnel certified by NICET as Audio Systems Level II Technician.
- B. Testing Agency Qualifications: Qualified agency, with the experience and capability to conduct testing indicated.
 - 1. Testing Agency's Field Supervisor: Currently certified by NICET at Level III to supervise on-site testing.
- C. Source Limitations: Obtain public address and mass notification systems from single source from single manufacturer. Match system provided under Phase I.
- D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- E. Comply with NFPA 70.

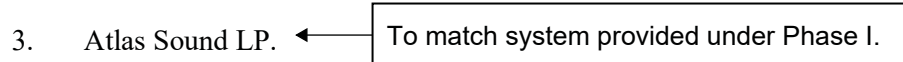
1.10 COORDINATION

- A. Coordinate layout and installation of system components and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements:



2.2 FUNCTIONAL DESCRIPTION OF SYSTEM

A. System Functions:

1. Selectively connect any zone to any available signal channel.
2. Selectively control sound from microphone outlets and other inputs.
3. "All-call" feature shall connect the all-call sound signal simultaneously to all zones regardless of zone or channel switch settings.
4. Telephone paging adapter shall allow paging by dialing an extension from any local telephone instrument and speaking into the telephone.
5. Produce a program-signal tone that is amplified and sounded over all speakers, overriding signals currently being distributed.
6. Reproduce high-quality sound that is free of noise and distortion at all loudspeakers at all times during equipment operation including standby mode with inputs off; output free of nonuniform coverage of amplified sound.

2.3 GENERAL EQUIPMENT AND MATERIAL REQUIREMENTS

- A. Compatibility of Components: Coordinate component features to form an integrated system. Match components and interconnections for optimum performance of specified functions.
- B. Equipment: Comply with UL 813. Equipment shall be modular, using solid-state components, and fully rated for continuous duty unless otherwise indicated. Select equipment for normal operation on input power usually supplied at 110 to 130 V, 60 Hz.
- C. Equipment Mounting: Where rack, cabinet, or console mounting is indicated, equipment shall be designed to mount in a 19-inch (483-mm) housing complying with TIA/EIA-310-D.
- D. Weather-Resistant Equipment: Listed and labeled by a qualified testing agency for duty outdoors or in damp locations.

2.5

POWER AMPLIFIERS	For Reference Only (Provided under Phase I)
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- A. Mounting: Rack.
- B. Output Power: 70-V balanced line. 80 percent of the sum of wattage settings of connected for each station and speaker connected in all-call mode of operation, plus an allowance for future stations.
- C. Total Harmonic Distortion: Less than 3 percent at rated power output from 50 to 12,000 Hz.
- D. Minimum Signal-to-Noise Ratio: 60 dB, at rated output.

- E. Frequency Response: Within plus or minus 2 dB from 50 to 12,000 Hz.
- F. Output Regulation: Less than 2 dB from full to no load.
- G. Controls: On-off, input levels, and low-cut filter.
- H. Input Sensitivity: Matched to preamplifier and to provide full-rated output with sound-pressure level of less than 10 dynes/sq. cm impinging on speaker microphone or handset transmitter.

2.6

TRANSFER TO STANDBY AMPLIFIER

For Reference Only
(Provided under Phase I)

- A. Monitoring Circuit and Sensing Relay: Detect reduction in output of power amplifier of 40 percent or more and, in such event, transfer load and signal automatically to standby amplifier.

2.7

MICROPHONES

For Reference Only
(Provided under Phase I)

- A. Paging Microphone:
 1. Type: Dynamic, with cardioidpolar characteristic.
 2. Impedance: 150 ohms.
 3. Frequency Response: Uniform, 50 to 14,000 Hz.
 4. Output Level: Minus 58 dB, minimum.
 5. Finish: Satin chrome.
 6. Cable: C25J.
 7. Mounting: Desk stand with integral-locking, press-to-talk switch.

2.8

VOLUME LIMITER/COMPRESSOR

For Reference Only
(Provided under Phase I)

- A. Minimum Performance Requirements:
 1. Frequency Response: 45 to 15,000 Hz, plus or minus 1 dB minimum.
 2. Signal Reduction Ratio: At least a 10:1 and 5:1 selectable capability.
 3. Distortion: 1 percent, maximum.
 4. Rated Output: Minimum of plus 14 dB.
 5. Inputs: Minimum of two inputs with variable front-panel gain controls and VU or decibel meter for input adjustment.
 6. Rack mounting.

2.9

CONTROL CONSOLE

For Reference Only
(Provided under Phase I)

- A. Cabinet: Modular, desktop complying with TIA/EIA-310-D.
- B. Housing: Steel, 0.0478 inch (1.2 mm) minimum, with removable front and rear panels. Side panels are removable for interconnecting side-by-side mounting.

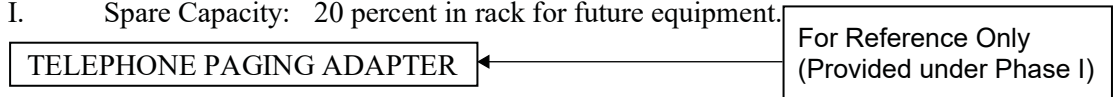
- C. Panel for Equipment and Controls: Rack mounted.
- D. Controls:
 1. Switching devices to select signal sources for distribution channels.
 2. Program selector switch to select source for each program channel.
 3. Switching devices to select zones for paging.
 4. All-call selector switch.
- E. Indicators: A visual annunciation for each distribution channel to indicate source being used.
- F. Self-Contained Power and Control Unit: A single assembly of basic control, electronics, and power supply necessary to accomplish specified functions.
- G. Spare Positions: 20 percent spare zone control and annunciation positions on console.
- H. Microphone jack.

2.10



- A. Racks: 19 inches (483 mm) standard, complying with TIA/EIA-310-D.
- B. Power-Supply Connections: Compatible plugs and receptacles.
- C. Enclosure Panels: Ventilated rear and sides and solid top. Use louvers in panels to ensure adequate ventilation.
- D. Finish: Uniform, baked-enamel factory finish over rust-inhibiting primer.
- E. Power-Control Panel: On front of equipment housing, with master power on-off switch and pilot light; and with socket for 5-A cartridge fuse for rack equipment power.
- F. Service Light: At top rear of rack with an adjacent control switch.
- G. Vertical Plug Strip: Grounded receptacles, 12 inches (300 mm) o.c.; the full height of rack.
- H. Maintenance Receptacles: Duplex convenience outlets supplied independent of vertical plug strip and located in front and bottom rear of rack.
- I. Spare Capacity: 20 percent in rack for future equipment.

2.11



- A. Adapters shall accept voice signals from telephone extension dialing access and automatically provide amplifier input and program override for preselected zones.
 1. Minimum Frequency Response: Flat, 200 to 2500 Hz.
 2. Impedance Matching: Adapter matches telephone line to public address equipment input.

3. Rack mounting.

2.12

TONE GENERATOR

For Reference Only
(Provided under Phase I)

- A. Generator shall provide clock and program interface with public address and mass notification system.
- B. Signals: Minimum of seven distinct, audible signal types including wail, warble, high/low, alarm, repeating and single-stroke chimes, and tone.
- C. Pitch Control: Chimes and tone.
- D. Volume Control: All outputs.
- E. Activation-Switch Network: Establishes priority and hierarchy of output signals produced by different activation setups.
- F. Mounting: Rack.

2.13

MONITOR PANEL

For Reference Only
(Provided under Phase I)

- A. Monitor power amplifiers.
- B. Components: VU or dB meter, speaker with volume control, and multiple-position rotary selector switch.
- C. Selector Switch and Volume Control: Selective monitoring of output of each separate power amplifier via VU or dB meter and speaker.
- D. Mounting: Rack.

2.14

LOUDSPEAKERS

- A. Cone-Type Loudspeakers:
 - 1. Minimum Axial Sensitivity: 91 dB at one meter, with 1-W input.
 - 2. Frequency Response: Within plus or minus 3 dB from 50 to 15,000 Hz.
 - 3. Size: 8 inches (200 mm) with 1-inch (25-mm) voice coil and minimum 5-oz. (140-g) ceramic magnet.
 - 4. Minimum Dispersion Angle: 100 degrees.
 - 5. Rated Output Level: 10 W.
 - 6. Matching Transformer: Full-power rated with four taps. Maximum insertion loss of 0.5 dB.
 - 7. Surface-Mounting Units: Ceiling, wall, or pendant mounting, as indicated, in steel back boxes, acoustically dampened. Front face of at least 0.0478-inch (1.2-mm) steel and whole assembly rust proofed and shop primed for field painting.
 - 8. Flush-Ceiling-Mounting Units: In steel back boxes, acoustically dampened. Metal ceiling grille with white baked enamel.

B. Horn-Type Loudspeakers:

1. Type: Single-horn units, double-reentrant design, with minimum full-range power rating of 15 W.
2. Matching Transformer: Full-power rated with four standard taps. Maximum insertion loss of 0.5 dB.
3. Frequency Response: Within plus or minus 3 dB from 250 to 12,000 Hz.
4. Dispersion Angle: 130 by 110 degrees.
5. Mounting: Integral bracket.
6. Units in Hazardous (Classified) Locations: Listed and labeled for environment in which they are located.

2.15

NOISE-OPERATED GAIN CONTROLLER

For Reference Only
(Provided under Phase I)

- A. Gain controller shall be designed to continuously sense space noise level and automatically adjust signal level to local speakers.
- B. Frequency Response: 20 to 20,000 Hz, plus or minus 1 dB.
- C. Level Adjustment Range: 20 dB minimum.
- D. Maximum Distortion: 1 percent.
- E. Control: Permits adjustment of sensing level of device.

2.16

OUTLETS

For Reference Only
(Provided under Phase I)

- A. Volume Attenuator Station: Wall-plate-mounted autotransformer type with paging priority feature.
 1. Wattage Rating: 10 W unless otherwise indicated.
 2. Attenuation per Step: 3 dB, with positive off position.
 3. Insertion Loss: 0.4 dB maximum.
 4. Attenuation Bypass Relay: Single pole, double throw. Connected to operate and bypass attenuation when all-call, paging, program signal, or prerecorded message features are used. Relay returns to normal position at end of priority transmission.
 5. Label: "PA Volume."
- B. Microphone Outlet: Three-pole, polarized, locking-type, microphone receptacles in single-gang boxes. Equip wall outlets with brushed stainless-steel device plates. Equip floor outlets with gray tapered rubber or plastic cable nozzles and fixed outlet covers.
- C. Headphone Outlet (for the Hearing Impaired): Microphone receptacles in single-gang boxes. Equip wall outlets with brushed stainless-steel device plates. Equip floor outlets with gray tapered rubber or plastic cable nozzles and fixed-outlet covers.

- 2.17 **BATTERY BACKUP POWER UNIT** ← For Reference Only
(Provided under Phase I)
- A. Unit shall be rack mounted, consisting of time-delay relay, sealed lead-calcium battery, battery charger, on-off switch, "normal" and "emergency" indicating lights, and adequate capacity to supply maximum equipment power requirements for one hour of continuous full operation.
 - B. Unit shall supply public address equipment with 12- to 15-V dc power automatically during an outage of normal 120-V ac power.
 - C. Battery shall be on float charge when not supplying system and to transfer automatically to supply system after three to five seconds of continuous outage of normal power, as sensed by time-delay relay.
 - D. Unit shall automatically retransfer system to normal supply when normal power has been reestablished for three to five seconds continuously.

2.18 **CONDUCTORS AND CABLES**

- A. Jacketed, twisted pair and twisted multipair, untinned solid copper.
 - 1. Insulation for Wire in Conduit: Thermoplastic, not less than 1/32 inch (0.8 mm) thick.
 - 2. Microphone Cables: Neoprene jacketed, not less than 2/64 inch (0.8 mm) thick, over shield with filled interstices. Shield No. 34 AWG, tinned, soft-copper strands formed into a braid or approved equivalent foil. Shielding coverage on conductors is not less than 60 percent.
 - 3. Plenum Cable: Listed and labeled for plenum installation.

2.20 **RACEWAYS**

- A. Conduit and Boxes: Comply with Section 260533 "Raceway and Boxes for Electrical Systems"

PART 3 - EXECUTION

3.1 **WIRING METHODS**

- A. Wiring Method: Install cables in raceways except within consoles, cabinets, desks, and counters. Conceal raceway and cables except in unfinished spaces.
 - 1. Install plenum cable in environmental air spaces, including plenum ceilings.
 - 2. Comply with requirements for raceways and boxes specified in Section 260533 "Raceway and Boxes for Electrical Systems."
- B. Wiring Method: Conceal conductors and cables in accessible ceilings, walls, and floors where possible.

- C. Wiring within Enclosures: Bundle, lace, and train cables to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Provide and use lacing bars and distribution spools.

3.2 INSTALLATION OF RACEWAYS

- A. Comply with requirements in Section 260533 "Raceway and Boxes for Electrical Systems" for installation of conduits and wireways.
- B. Install manufactured conduit sweeps and long-radius elbows whenever possible.

3.3 INSTALLATION OF CABLES

- A. Comply with NECA 1.
- B. General Cable Installation Requirements:
 - 1. Terminate conductors; no cable shall contain unterminated elements. Make terminations only at outlets and terminals.
 - 2. Splices, Taps, and Terminations: Arrange on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures. Cables may not be spliced.
 - 3. Secure and support cables at intervals not exceeding 30 inches (760 mm) and not more than 6 inches (150 mm) from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
 - 4. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii. Install lacing bars and distribution spools.
 - 5. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.
- C. Open-Cable Installation:
 - 1. Install cabling with horizontal and vertical cable guides in telecommunications spaces with terminating hardware and interconnection equipment.
 - 2. Suspend speaker cable not in a wireway or pathway a minimum of 8 inches (200 mm) above ceiling by cable supports not more than 60 inches apart.
 - 3. Cable shall not be run through structural members or be in contact with pipes, ducts, or other potentially damaging items.
- D. Separation of Wires: Separate speaker-microphone, line-level, speaker-level, and power wiring runs. Install in separate raceways or, where exposed or in same enclosure, separate conductors at least 12 inches (300 mm) apart for speaker microphones and adjacent parallel power and telephone wiring. Separate other intercommunication equipment conductors as recommended by equipment manufacturer.

3.4 INSTALLATION

- A. Match input and output impedances and signal levels at signal interfaces. Provide matching networks where required.
- B. Identification of Conductors and Cables: Color-code conductors and apply wire and cable marking tape to designate wires and cables so they identify media in coordination with system wiring diagrams.
- C. Equipment Cabinets and Racks:
 - 1. Group items of same function together, either vertically or side by side, and arrange controls symmetrically. Mount monitor panel above the amplifiers.
 - 2. Arrange all inputs, outputs, interconnections, and test points so they are accessible at rear of rack for maintenance and testing, with each item removable from rack without disturbing other items or connections.
 - 3. Blank Panels: Cover empty space in equipment racks so entire front of rack is occupied by panels.
- D. Volume Limiter/Compressor: Equip each zone with a volume limiter/compressor. Install in central equipment cabinet. Arrange to provide a constant input to power amplifiers.
- E. Wall-Mounted Outlets: Flush mounted.
- F. Floor-Mounted Outlets: Conceal in floor and install cable nozzles through outlet covers. Secure outlet covers in place. Trim with carpet in carpeted areas.
- G. Conductor Sizing: Unless otherwise indicated, size speaker circuit conductors from racks to loudspeaker outlets not smaller than No. 18 AWG and conductors from microphone receptacles to amplifiers not smaller than No. 22 AWG.
- H. Weatherproof Equipment: For units that are mounted outdoors, in damp locations, or where exposed to weather, install consistent with requirements of weatherproof rating.
- I. Speaker-Line Matching Transformer Connections: Make initial connections using tap settings indicated on Drawings.
- J. Connect wiring according to Section 260519 "Wires and Cables".

3.5 GROUNDING

- A. Ground cable shields and equipment to eliminate shock hazard and to minimize ground loops, common-mode returns, noise pickup, cross talk, and other impairments.
- B. Signal Ground Terminal: Locate at main equipment cabinet. Isolate from power system and equipment grounding.
- C. Install grounding electrodes as specified in Section 260526 "Grounding and Bonding".

3.6 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.
- C. Perform tests and inspections.
 - 1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
- D. Tests and Inspections:
 - 1. Schedule tests with at least seven days' advance notice of test performance.
 - 2. After installing public address and mass notification systems and after electrical circuitry has been energized, test for compliance with requirements.
 - 3. Operational Test: Perform tests that include originating program and page messages at microphone outlets, preamplifier program inputs, and other inputs. Verify proper routing and volume levels and that system is free of noise and distortion.
 - 4. Signal-to-Noise Ratio Test: Measure signal-to-noise ratio of complete system at normal gain settings as follows:
 - a. Disconnect microphone at connector or jack closest to it and replace it in the circuit with a signal generator using a 1000-Hz signal. Replace all other microphones at corresponding connectors with dummy loads, each equal in impedance to microphone it replaces. Measure signal-to-noise ratio.
 - b. Repeat test for each separately controlled zone of loudspeakers.
 - c. Minimum acceptance ratio is 50 dB.
 - 5. Distortion Test: Measure distortion at normal gain settings and rated power. Feed signals at frequencies of 50, 200, 400, 1000, 3000, 8000, and 12,000 Hz into each preamplifier channel. For each frequency, measure distortion in the paging and all-call amplifier outputs. Maximum acceptable distortion at any frequency is 3 percent total harmonics.
 - 6. Acoustic Coverage Test: Feed pink noise into system using octaves centered at 500 and 4000 Hz. Use sound-level meter with octave-band filters to measure level at five locations in each zone. For spaces with seated audiences, maximum permissible variation in level is plus or minus 2 dB. In addition, the levels between locations in same zone and between locations in adjacent zones must not vary more than plus or minus 3 dB.

7. Power Output Test: Measure electrical power output of each power amplifier at normal gain settings of 50, 1000, and 12,000 Hz. Maximum variation in power output at these frequencies must not exceed plus or minus 1 dB.

8. Signal Ground Test: Measure and report ground resistance at public address equipment signal ground. Comply with testing requirements specified in Section 260526 "Grounding and Bonding for Electrical Systems."

- E. Inspection: Verify that units and controls are properly labeled and interconnecting wires and terminals are identified. Prepare a list of final tap settings of paging speaker-line matching transformers.
- F. Public address and mass notification systems will be considered defective if they do not pass tests and inspections.
- G. Prepare test and inspection reports.
 - 1. Include a record of final speaker-line matching transformer-tap settings, and signal ground-resistance measurement certified by Installer.

3.7 STARTUP SERVICE

- A. Engage a factory-authorized service representative to perform startup service.
 - 1. Verify that electrical wiring installation complies with manufacturer's submittal and installation requirements.
 - 2. Complete installation and startup checks according to manufacturer's written instructions.

3.8 ADJUSTING

- A. On-Site Assistance: Engage a factory-authorized service representative to provide on-site assistance in adjusting sound levels, resetting transformer taps, and adjusting controls to meet occupancy conditions.
- B. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

3.9 DEMONSTRATION

- A. Engage a factory-authorized service representative to train City's maintenance personnel to adjust, operate, and maintain the public address and mass notification systems and equipment.

END OF SECTION 27 5116

SECTION 313236

SOIL NAIL RETAINING WALL

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract - Standard Specifications for Public Works Construction 'The GREENBOOK' and City Supplement 'The WHITEBOOK', latest editions, including Supplemental Supplementary Provisions (SSPs), apply to this Section.

1.02 SECTION INCLUDES

- A. Construction of a permanent soil nailed wall with reinforced shotcrete facing.
- B. Soil nail anchors and accessories.
- C. Verification and Proof Testing of nails.
- D. Geocomposite Drainage System and underdrain collection and weeping system.

1.03 RELATED REQUIREMENTS

- A. 2018 Standard Specifications for Public Works Construction 'The GREENBOOK', 2018 City Supplement 'The WHITEBOOK', and Supplementary Special Provisions - Section 303.2 for Air-Placed Concrete. (Shotcrete)
- B. Comply with Drawings including general notes, details and project specific instructions.

1.04 REFERENCE STANDARDS

- A. AASHTO: American Association of State Highway and Transportation Officials.
- B. ASTM A 36 - Standard Specification for Carbon Structural Steel.
- C. ASTM A 615 - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
- D. ASTM A 775 - Standard Specification for Epoxy-Coated Steel Reinforcing Bars.
- E. ASTM A 1064 - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.
- F. ASTM C 33 - Standard Specification for Concrete Aggregates.

- G. ASTM C 109 - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50-mm] Cube Specimens).
- H. ASTM C 150 - Standard Specification for Portland Cement.
- I. ASTM C 494 - Standard Specification for Chemical Admixtures for Concrete.
- J. ASTM D 1621 - Standard Test Method for Compressive Properties Of Rigid Cellular Plastics.
- K. ASTM D 1784 – Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds
- L. ASTM D 1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
- M. ASTM D 3034 - Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
- N. ASTM D 4716 - Standard Test Method for Determining the (In-plane) Flow Rate per Unit Width and Hydraulic Transmissivity of a Geosynthetic Using a Constant Head.

1.05 SCOPE OF WORK

- A. This work consists of constructing a permanent soil nailed wall as specified herein and as shown on the plans. The Contractor shall furnish all labor, materials, and equipment required to complete the work. The Contractor shall select the excavation, drilling, and grouting methods to meet the performance requirements specified herein or shown on the plans.
- B. The work shall include excavating in staged lifts in accordance with the approved Contractor's plan; grouting the nails; providing and installing the specified drainage features; providing and installing bearing plates, washers, nuts, and other required miscellaneous materials; and constructing the required shotcrete face and constructing the final structural facing.
- C. The work shall include any preparatory trimming and cleaning of soil/rock surfaces and shotcrete cold joints to receive new shotcrete.

1.06 CONTRACTOR QUALIFICATIONS

- A. Contractor Qualifications shall be submitted at time of bidding, with bid package, for City review.
- B. The soil nailing contractor shall have completed at least 1 permanent soil nail retaining wall project totaling at least 8,000 ft² (750 m²) of wall face area and at least 400 permanent soil nails.

- Cp. Provide a Professional Engineer, registered in the state of California, with experience in the construction of permanent soil nail retaining walls on at least 1 completed project of comparable size and complexity. The Contractor may not use consultants or manufacturer’s representatives to meet the requirements of this section. Provide on-site supervisors and drill operators with experience installing permanent soil nails on at least one project of comparable size and complexity.
- 1.07 SUBMITTALS – Submit the following to Engineer for review and acceptance at least 30 day before placing soil nails:
- A. Comply with Standard Specifications for Public Works Construction ‘The GREENBOOK’ and City Supplement ‘The WHITEBOOK’, latest editions, Section 3-8 for Shop Drawings and Submittals.
 - B. Product Data: Submit manufacturer’s product data and installation instructions for each material and product used. Include manufacturer’s Material Safety Data Sheets.
 - C. The Contractor shall submit a brief description of at least 1 project, including the owning agency’s name, address, and current phone number; location of project; project contract value; and scheduled completion date and actual completion date for the project.
 - D. At least 60 calendar days before starting soil nail work, identify the Engineer, on-site supervisors, and drill operators assigned to the project, and submit a summary of each individual’s experience. Only those individuals designated as meeting the qualifications requirements shall be used for the project. The Contractor cannot substitute for any of these individuals without written approval of the City or the City’s Engineer.
 - E. The Contractor is responsible for providing the necessary survey and alignment control during the excavation for each lift, locating drillholes and verifying limits of wall installation. At least 30 days before starting soil nail work, submit a Construction Plan to the Engineer that includes the following.
 - 1. The start date and proposed detailed wall construction sequence. Include the proposed method of excavating to ensure wall and slope stability.
 - 2. Drilling and grouting methods and equipment, including the drillhole diameter proposed to achieve the specified pullout resistance values shown on the plans and any variation of these along the wall alignment.
 - 3. Nail grout mix design, including compressive strength test results (per ASTM C109) supplied by a qualified independent testing lab verifying the specified minimum 3-day and 28-day grout compressive strengths. Previous test results for the same grout mix completed within one year of the start of grouting may be submitted for verification of the required compressive strengths.
 - 4. Nail grout placement procedures and equipment.

5. Temporary shotcrete materials and methods.
 6. Soil nail testing methods and equipment setup.
 7. Identification number and certified calibration records for each test jack and pressure gauge and load cell to be used. Jack and pressure gauge shall be calibrated as a unit. Calibration records shall include the date tested, the device identification number, and the calibration test results and shall be certified for an accuracy of at least 2 percent of the applied certification loads by a qualified independent testing laboratory within 90 days prior to submittal.
 8. Manufacturer Certificates of Compliance for the soil nail ultimate strength, nail bar steel, Portland cement, centralizers, bearing plates, epoxy coating, and encapsulation.
- F. Approval of the Construction Plan does not relieve the Contractor of his responsibility for the successful completion of the work.
- G. Samples:
1. Soil nail anchors. Provide 4 samples, 12 inch length.
 2. Geocomposite Drain Board. Provide 4 samples, 12 in x 12in.
 3. Continuous Geocomposite Drain Collection product. Provide 4 samples, 12 in length.
 4. PVC weep pipes and drain grate. Provide 4 samples of each.
- H. Minutes of Pre-installation Conference.
- I. Project Record Documents: Accurately record actual locations of installed soil nails and components that will be concealed from view upon completion of concrete work.

1.08 DELIVERY, STORAGE AND HANDLING

- A. Deliver products in original unopened packaging, labeled with product identification, manufacturer, batch number and shelf life.
- B. Store products in a dry area, above ground. Protect from moisture, humidity and direct sunlight. Protect from freezing.
- C. Handle products in accordance with manufacturer's printed recommendations.
- D. Store and handle soil nail bars in a manner to avoid damage or corrosion. Replace bars exhibiting abrasions, cuts, welds, weld splatter, corrosion, or pitting. Repair or replace any bars exhibiting damage to encapsulation or epoxy coating. Repaired epoxy coating areas shall have a minimum 0.3-mm (0.012-in.) thick coating.

1.09 SEQUENCING AND SCHEDULING

- A. Schedule installation of drainage system components to allow cover of material within 60 days maximum from installation, or as otherwise indicated as allowable by manufacturer, to avoid degradation of materials by UV radiation.
- B. Allow in scheduling for delivery and installation of materials in phases as dictated by Project phasing requirements.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Soil Nails

- 1. Nail Solid Bar. ASTM A615, Grade 100, continuous without splices or welds, new, straight, undamaged, bare, or epoxy-coated, or encapsulated as shown on the Plans. Threaded, a minimum of 300 mm (12 in.) on the wall anchorage end, to allow proper attachment of bearing plate and nut. Threading to be continuous spiral deformed ribbing provided by the bar deformations (continuous thread bars).
- 2. Bar Coupler. Bar couplers shall develop the full ultimate tensile strength of the bar as certified by the manufacturer.
- 3. Fusion Bonded Epoxy Coating. ASTM A 775. Minimum 0.4 mm (0.016 in.) thickness electrostatically applied. Bend test requirements are waived. Coating at the wall anchorage end of epoxy-coated bars may be omitted over the length provided for threading the nut against the bearing plate.
- 4. Encapsulation. Minimum 1-mm (0.04-in.) thick, corrugated, HDPE tube or corrugated PVC tube conforming to ASTM D1784, Class 13464-B.

B. Soil Nail Appurtenances

- 1. Centralizer. Manufactured from Schedule 40 PVC pipe or tube, steel, or other material not detrimental to the nail steel (wood shall not be used); securely attached to the nail bar; sized to position the nail bar within 25 mm (1 in.) of the center of the drillhole; sized to allow tremie pipe insertion to the bottom of the drillhole; and sized to allow grout to freely flow up the drillhole.
- 2. Nail Grout. Neat cement or sand/cement mixture with a minimum 3-day compressive strength of 1,500 psi and a minimum 28-day compressive strength as indicated on Drawings, per ASTM C109.
- 3. Fine Aggregate. ASTM C33.
- 4. Portland Cement. ASTM C150, Type V.

5. Admixtures. ASTM C494. Admixtures that control bleed, improve flowability, reduce water content, and retard set may be used in the grout subject to review and acceptance by the Engineer. Accelerators are not permitted. Expansive admixtures may only be used in grout used for filling sealed encapsulations. Admixtures shall be compatible with the grout and mixed in accordance with the manufacturer's recommendations.
- C. Bearing Plates, Nuts, and Welded Stud Shear Connectors.
 1. Bearing Plates. ASTM A36.
 2. Nuts. ASTM A563, grade B, hexagonal, fitted with beveled washer or spherical seat to provide uniform bearing.
 3. Shear Connectors: As indicated on Drawings.
 - D. Reinforcing Steel. As specified in Section 033000 "Cast In Place Concrete"; and as indicated on Drawings.
 - E. Geocomposite Sheet Drain. As specified in Section 334600 "Subdrainage."
 - F. PVC Connector, Drain Pipes, and Drain Grate
 1. Pipe. ASTM 1785 Schedule 40 PVC solid and perforated wall; cell classification 12454-B or 12354-C, wall thickness SDR 35, with solvent weld or elastomeric joints.
 2. Fittings. ASTM D3034, Cell classification 12454-B or C, wall thickness SDR 35, with solvent or elastomeric joints.
 - G. Shotcrete. Submit for approval, all materials, methods, and control procedures for this work. Shotcrete, as specified in 2018 Standard Specifications for Public Works Construction 'The GREENBOOK', 2018 City Supplement 'The WHITEBOOK', and Supplemental Special Provisions - Section 303.2 for Air-Placed Concrete.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates and conditions under which materials will be installed. Do not proceed with installation until unsatisfactory conditions are corrected.
- B. Coordinate installation with adjacent work to ensure proper sequence on construction. Protect adjacent areas and landscaping from damage.

3.02 EXCAVATION

- A. The height of exposed unsupported final excavation face cut shall not exceed the vertical nail spacing plus the required reinforcing lap or the short-term stand-up height of the ground, whichever is less. Complete excavation to the final wall excavation line and apply shotcrete in the same work shift, unless otherwise approved by the Engineer. Application of the shotcrete may be delayed up to 24 hours if the contractor can demonstrate that the delay will not adversely affect the excavation face stability.
- B. Excavation of the next-lower lift shall not proceed until nail installation, reinforced shotcrete placement, attachment of bearing plates and nuts, and nail testing have been completed and accepted in the current lift. Nail grout and shotcrete shall have cured for at least 72 hours or attained at least their specified 3-day compressive strength before excavating the next underlying lift.

3.03 NAIL INSTALLATION

- A. Provide nail length and drillhole diameter necessary to develop the load capacity to satisfy the acceptance criteria for the design load required, but not less than the lengths or diameters shown in the plans. Drill holes for the soil nails at the locations, elevations, orientations, and lengths shown on the Drawings. Select drilling equipment and methods suitable for the ground conditions and in accordance with the accepted installation methods submitted by the Contractor. The use of drilling muds or other fluids to remove cuttings will not be allowed. If caving ground is encountered, use cased drilling methods to support the sides of the drillholes. The use of self-drilling nail bars (also known as hollow, self-grouting or pressure grouted nail bars) will not be allowed. Provide nail bars as shown in the Drawings. Provide centralizers sized to position the bar within 25 mm (1 in.) of the center of the drillhole. Position centralizers as shown on the Plans so that their maximum center-to-center spacing does not exceed 2.5 m (8.2 ft). Also locate centralizers within 0.5 m (1.5 ft) from the top and bottom of the drillhole. Secure centralizers to soil nails with tie wire. Taping alone to maintain position will not be permitted.
- B. At no time shall the inspector allow the nails to slide against the fork and into the hole. Nails shall be manually lifted and inserted into the hole.

3.04 GROUTING

- A. Grout the drillhole after installation of the nail bar and within 2 hours of completion of drilling. Inject the grout at the lowest point of each drillhole through a grout tube, casing, hollow-stem auger, or drill rods. Keep the outlet end of the conduit delivering grout below the surface of the grout as the conduit is withdrawn to prevent the creation of voids. Completely fill the drillhole in one continuous operation. Cold joints in the grout column are not allowed except at the top of the test bond length of proof tested production nails.
- B. Test nail grout according to ASTM C109 at a frequency of one test per mix design and a minimum of one test for every 40 m³ (52 cy) of grout placed. Provide grout cube test results to the Engineer within 24 hours of testing.

3.05 NAIL TESTING

- A. Perform both verification and proof testing of designated test nails. Perform verification tests on sacrificial test nails at locations shown on the Plans. Perform proof tests on production nails at locations selected by the Engineer. Testing of any nail shall not be performed until the nail grout and shotcrete facing have cured for at least 72 hours or attained at least their specified 3-day compressive strength.
- B. Testing equipment shall include 2 dial gauges, dial gauge support, jack and pressure gauge, electronic load cell, and a reaction frame. The pressure gauge shall be graduated in 500 kPa (75 psi) increments or less. Measure the nail head movement with a minimum of 2 dial gauges capable of measuring to 0.025 mm (0.001 in.).

3.06 VERIFICATION TESTING OF SACRIFICIAL NAILS

- A. Perform verification testing prior to installation of production nails to confirm the appropriateness of the Contractor’s drilling and installation methods, and verify the required nail pullout resistance.
- B. Verification test nails shall have both grouted and ungrouted lengths. The grouted length of the soil nail during verification tests, LBVT, shall be at least 3 m (10 ft) but not longer than a maximum length, LBVT max, such that the nail load does not exceed 90 percent of the nail bar tensile allowable load during the verification test. Therefore, the following requirements shall be met:

$$L_{BVT} \leq \begin{cases} 3\text{m (10ft)} \\ L_{BVT\text{max}} \end{cases}$$

The length $L_{BVT\text{max}}$ is defined as:

$$L_{BVT\text{max}} = \frac{C_{RT} \times A_t \times f_Y}{Q_{ALL} \times FS_{T\text{ver}}}$$

where,

C_{RT} = Reduction coefficient. Use $C_{RT} = 0.9$ for 420 and 520 MPa (Grade 60 and 75) bars. *If 1,035 MPa (Grade 150) bars are allowed in the job, use $C_{RT} = 0.8$;*

NOTE: 1,035 MPa (Grade 150) bars are NOT allowed in the job.

A_t = Nail bar cross-sectional area;

f_Y = Nail bar yield tensile strength;

Q_{ALL} = Allowable pullout resistance per unit length ($Q_{ALL} = Q_u/FS_p$), as specified herein or in plans; and

$FS_{T\text{ver}}$ = Factor of safety against tensile failure during verification tests (use 2.5 or, preferably, 3).

The maximum grouted length shall be preferably based on production nail maximum bar grade. Provide larger bar sizes, if required, to meet the 3-m (10-ft) minimum test bonded length requirement at no additional cost.

The Design Test Load (DTL) shall be determined as follows:

$$DTL = LBVT \times QALL$$

DTL shall be calculated based on as-built bonded lengths.

- C. Perform verification tests by incrementally loading the verification test nails to failure or a maximum test load of 300 percent of the DTL in accordance with the following loading schedule. Record the soil nail movements at each load increment.

Verification Test Loading Schedule.

Load	Hold Time
0.05 DTL max.(AL)	1 minute
0.25 DTL	10 minutes
0.50 DTL	10 minutes
0.75 DTL	10 minutes
1.00 DTL	10 minutes
1.25 DTL	10 minutes
1.50 DTL (Creep Test)	60 minutes
1.75 DTL	10 minutes
2.00 DTL	10 minutes
2.50 DTL	10 minutes max.
3.0 DTL or Failure	10 minutes max.
0.05 DTL max. (AL)	1 minute (record permanent set)

The alignment load (AL) should be the minimum load required to align the testing apparatus and should not exceed 5 percent of the DTL. Dial gauges should be set to “zero” after the alignment load has been applied. Following application of the maximum load (3.0 DTL) reduce the load to the alignment load (0.05 DTL maximum) and record the permanent set.

- D. Hold each load increment for at least 10 minutes. Monitor the verification test nail for creep at the 1.50 DTL load increment. Measure and record nail movements during the creep portion of the test in increments of 1 minute, 2, 3, 5, 6, 10, 20, 30, 50, and 60 minutes. Maintain the load during the creep test within 2 percent of the intended load by use of the load cell.

3.07 PROOF TESTING OF PRODUCTION NAILS

- A. Perform successful proof testing on 5 percent of the production soil nails in each nail row or a minimum of 1 per row. The Engineer shall determine the locations and number of proof tests prior to nail installation in each row. Production proof test nails shall have both grouted and temporary ungrouted lengths. The grouted length of the soil nail during proof production tests, LBPT, shall be the least of 3 m (10 ft) and a maximum length, LBPT max, such that the nail load does not exceed 90 percent of an allowable value of the nail bar tensile load during the proof production test. Therefore, the following requirements shall be met:

$$L_{BPT} \leq \begin{cases} 3\text{m (10ft)} \\ L_{BPT\text{max}} \end{cases}$$

The length $L_{BPT\text{max}}$ is defined as:

$$L_{BPT\text{max}} = \frac{C_{RT} \times A_t \times f_Y}{Q_{ALL} \times FS_{T\text{proof}}}$$

where,

- C_{RT} = Reduction coefficient. Use 0.9 for 420 and 520 MPa (Grade 60 and 75) bars. *If 1,035 MPa (Grade 150) bars are allowed in the job, use $C_{RT} = 0.8$;*
- A_t = Nail bar cross-sectional area;
- f_Y = Nail bar yield tensile strength;
- Q_{ALL} = Allowable pullout resistance per unit length ($Q_{ALL} = Q_u/FS_P$), as specified herein or in plans; and
- $FS_{T\text{proof}}$ = Factor of safety against tensile failure during proof production tests (use 1.5).

The maximum grouted length shall be based on production nail maximum bar grade.

The Design Test Load (DTL) shall be determined as follows:

$$DTL = LBPT \times Q_{ALL}$$

DTL shall be calculated based on as-built bonded lengths.

- B. Perform proof tests by incrementally loading the proof test nail to 150 percent of the DTL in accordance with the following loading schedule. Record the soil nail movements at each load increment.

Proof Test Loading Schedule.

Load	Hold Time
0.05 DTL max. (AL)	Until Movement Stabilizes
0.25 DTL	Until Movement Stabilizes
0.50 DTL	Until Movement Stabilizes
0.75 DTL	Until Movement Stabilizes
1.00 DTL	Until Movement Stabilizes
1.25 DTL	Until Movement Stabilizes
1.50 DTL (Max. Test Load)	Creep Test (see below)

The alignment load (AL) should be the minimum load required to align the testing apparatus and should not exceed 5 percent of the DTL. Dial gauges should be set to “zero” after the alignment load has been applied.

- C. The creep period shall start as soon as the maximum test load (1.50 DTL) is applied and the nail movement shall be measured and recorded at 1 minute, 2, 3, 5, 6, and 10 minutes. Where the nail movement between 1 minute and 10 minutes exceeds 1 mm (0.04 in.), maintain the maximum test load for an additional 50 minutes and record movements at 20 minutes, 30, 50, and 60 minutes. Maintain all load increments within 5 percent of the intended load.

3.08 TEST NAIL ACCEPTANCE CRITERIA

- A. A test nail shall be considered acceptable when all of the following criteria are met:
 1. For verification tests, the total creep movement is less than 2 mm (0.08 in.) between the 6- and 60-minute readings and the creep rate is linear or decreasing throughout the creep test load hold period.
 2. For proof tests, the total creep movement is less than 1 mm (0.04 in.) during the 10-minute readings or the total creep movement is less than 2 mm (0.08 in.) during the 60-minute readings and the creep rate is linear or decreasing throughout the creep test load hold period.
 3. For verification and proof tests, the total measured movement at the maximum test load exceeds 80 percent of the theoretical elastic elongation of the test nail unbonded length.
 4. A pullout failure does not occur at 3.0 DTL under verification testing and 1.5 DTL test load under proof testing. Pullout failure is defined as the inability to further increase the test load while there is continued pullout movement of the test nail. Record the pullout failure load as part of the test data.

- B. Maintaining stability of the temporary ungrouted test length for subsequent grouting is the Contractor's responsibility. If the ungrouted test length of production proof test nails cannot be satisfactorily grouted subsequent to testing; the proof test nail shall become sacrificial and shall be replaced with an additional production nail installed at no additional cost to the City.

3.09 TEST NAIL REJECTION CRITERIA

- A. If a test nail does not satisfy the acceptance criterion:
 - 1. For verification test nails, the Engineer will evaluate the results of each verification test. Installation methods that do not satisfy the nail testing requirements shall be rejected. The Contractor shall propose alternative methods and install replacement verification test nails. Replacement test nails shall be installed and tested at no additional cost.
 - 2. For proof test nails, the Engineer may require the Contractor to replace some or all of the installed production nails between a failed proof test nail and the adjacent passing proof test nail. Alternatively, the Engineer may require the installation and testing of additional proof test nails to verify that adjacent previously installed production nails have sufficient load carrying capacity. Installation and testing of additional proof test nails or installation of additional or modified nails as a result of proof test nail failure(s) will be at no additional cost.

3.10 WALL DRAINAGE NETWORK

- A. Install and secure all elements of the wall drainage network as shown on the Plans. The drainage network shall consist of installing geocomposite drain strips, continuous collection system, wall footing drains, and PVC weepholes as shown on the Plans. Exclusive of the wall footing drains, all elements of the drainage network shall be installed prior to shotcreting. Secure drainage elements to the excavation face with a reinforcing pin prior to shotcrete application.
 - 1. Geocomposite Drain Sheets. Install geocomposite drain sheets centered between the columns of nails as shown on the Plans. The drain sheets shall be at least 48 in. wide and placed with the geotextile side against the earth/soil. Secure the sheets to the excavation face and prevent shotcrete from contaminating the earth side of the geotextile. Drain sheets will be vertically continuous. Make splices with a 12 in. minimum overlap, and otherwise per manufacturer instructions, such that the flow of water is not impeded. Install drain grate and connector pipe at base of each strip. The joint between drain grate and the drain sheet and the discharge end of the connector pipe shall be sealed to prevent shotcrete intrusion. Repair any damage to the geocomposite drain sheets, which may interrupt the flow of water.
 - 2. Footing Drains. Install footing drains at the bottom of each wall as shown on the Plans. The drainage geotextile shall envelope the footing drain aggregate and pipe and conform to the dimensions of the trench. Overlap the drainage geotextile

on top of the drainage aggregate as shown on the Plans. Replace or repair damaged or defective drainage geotextile.

3. Weep holes. Prevent shotcrete intrusion into the discharge end of the pipe during the application of shotcrete.
4. Extreme care must be taken by the nozzleman to avoid placing shotcrete behind the drainage panels (between the panels and the earth/soil substrate).

3.11 SHOTCRETE FACING

- A. Provide construction shotcrete facing and permanent shotcrete facing in accordance with 2018 Standard Specifications for Public Works Construction 'The GREENBOOK', 2018 City Supplement 'The WHITEBOOK', and Supplement Special Provisions - Section 303.2 for Air-Placed Concrete.
- B. Attachment of Nail Head Bearing Plate and Nut. Attach a bearing plate, washers, and nut to each nail head as shown on the Plans. While the shotcrete construction facing is still plastic and before its initial set, uniformly seat the plate on the shotcrete by hand-wrench tightening the nut. Where uniform contact between the plate and the shotcrete cannot be provided, set the plate in a bed of grout. After grout has set for 24 hours, hand-wrench tighten the nut. Ensure bearing plates with headed studs are located within the tolerances shown on the Plans.
- C. Final Face Finish: Shotcrete finish shall comply with the 2018 Standard Specifications for Public Works Construction 'The GREENBOOK', 2018 City Supplement 'The WHITEBOOK', and Supplemental Special Provisions - Section 303.2 for Air-Placed Concrete and the reference photographs found at the end of this Section.

3.12 BACKFILLING BEHIND WALL FACING UPPER CANTILEVER

- A. Compact backfill within 1 m (3 ft) behind the wall facing upper cantilever using light mechanical tampers.
- B. Backfill shall be relatively free draining granular material.

3.13 ACCEPTANCE

- A. Material for the soil nail retaining wall will be accepted based on the manufacturer production certification or from production records. Construction of the soil nail retaining wall will be accepted based on visual inspection and the relevant production testing records.

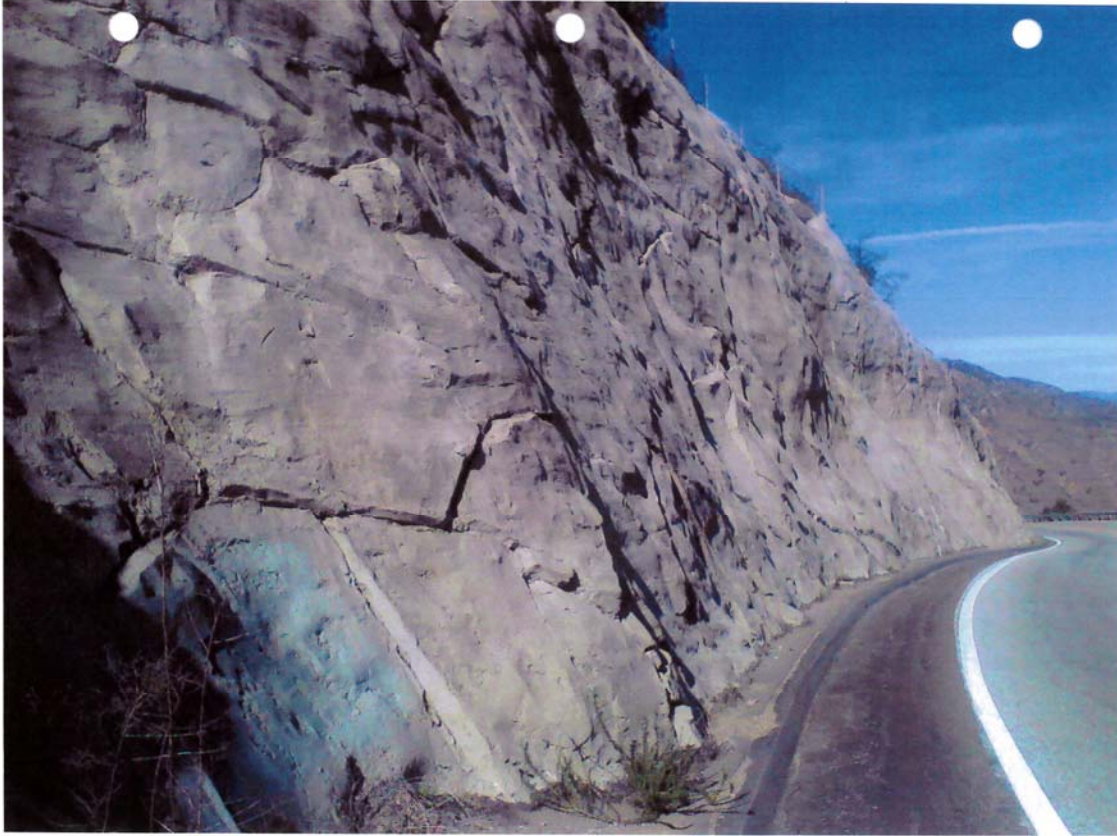
3.14 REFERENCE PHOTOGRAPHS



SOIL NAIL WALL - TEXTURE

FINAL DESIGN
MAY 10, 2019

SOIL NAIL RETAINING WALL
313236 - 14



SOIL NAIL WALL - TEXTURE

END OF SECTION 31 32 36

FINAL DESIGN
MAY 10, 2019

SOIL NAIL RETAINING WALL
313236 - 15

SECTION 323132

COMPOSITE FENCES AND GATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract - Standard Specifications for Public Works Construction 'The GREENBOOK' and City Supplement 'The WHITEBOOK', latest editions, including Supplemental Supplementary Provisions (SSPs), apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Steel framework fence with composite material facing.
 - 2. Steel framework swing gate with composite material facing.
- B. Related Requirements:
 - 1. Section 087100 "Door Hardware " for gate hardware.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Inspect and discuss preparatory work specified elsewhere.
 - 2. Review required testing, inspecting, and certifying procedures.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for the following:
 - a. Fence and gate posts, rails, and fittings.
 - b. Composite plastic planks, and fasteners. Also provide:
 - 1) Preparation instructions and manufacturer recommendations.
 - 2) Storage and handling requirements.
 - 3) Installation methods.
 - 4) Instructions on care and cleaning of composite wood products.
 - c. Gates and hardware.
- B. Shop Drawings: For each type of fence and gate assembly.

POLICE RANGE REFURBISHMENT PROJECT – PHASE II

1. Include plans, elevations, sections, details, and attachments to other work.
2. Include accessories, hardware, gate operation, and operational clearances.

C. Samples for Verification: For each type of component with factory-applied finish, prepared on Samples of size indicated below:

D. Delegated-Design Submittal: For structural performance of composite fence and gate frameworks, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For professional engineer, testing agency, factory-authorized service representative.

B. Product Certificates: For each type of composite fence materials.

C. Field quality-control reports.

D. Sample Warranty: For special warranty.

1.6 QUALITY ASSURANCE

A. Mockups: Build mockups to set quality standards for fabrication and installation.

1. Build mockup for typical composite fence and gate, including accessories.

- a. Size: 12-foot (3.6 m) length of fence, with at least one gate.

1.7 FIELD CONDITIONS

A. Field Measurements: Verify layout information for composite fences and gates shown on Drawings in relation to property survey and existing structures. Verify dimensions by field measurements.

1.8 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of composite fences and gates that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

- a. Failure to comply with performance requirements.
 - b. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - c. Checking, splitting, splintering, rotting, structural damage from termites, and fungal decay of wood composite materials.

2. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, registered as a professional engineer in the State of California, to design fence and gate frameworks.
- B. Structural Performance:
 1. Fence and gate frameworks shall withstand the design wind loads and stresses for fence height(s) and under exposure conditions indicated according to ASCE/SEI 7.
 2. Design Wind Load: 110 MPH steady wind and 130 MPH gusting wind tests.
 - a. Minimum Post Size: Determine for post spacing not to exceed 8 feet (2.4 m) for square HSS steel as indicated per plan.
- C. Lightning Protection System: Maximum resistance-to-ground value of 25 ohms at each grounding location along fence under normal dry conditions.

2.2 BASIS OF DESIGN MANUFACTURER

- A. Acceptable Manufacturer: Trex Fencing; 160 Exeter Dr.; Winchester, VA 22603; Web: www.trefencing.com.
- B. Approved equal.

2.3 WOOD COMPOSITE PLANKS

- A. General: Reclaimed wood and plastic with integral coloring; free from toxic chemicals and preservatives:
 1. Characteristics:
 - a. Abrasion resistance: 0.01 inch wear per 1000 revolutions, tested to ASTM D 2394.
 - b. Hardness: 1124 pounds, tested to ASTM D 143.
 - c. Self ignition temperature: 743 degrees F, tested to ASTM D 1929.
 - d. Flash ignition temperature: 698 degrees F, tested to ASTM D 1929.
 - e. Flame spread rating: 80, tested to ASTM E 84.
 - f. Water absorption, 24 hour immersion, tested to ASTM D 1037:
 - 1) Sanded surface: 4.3 percent.
 - 2) Unsanded surface: 1.7 percent.
 - g. Thermal expansion coefficient, 36 inch long samples:
 - 1) Width: 35.2 x 10⁻⁶ to 42.7 x 10⁻⁶.
 - 2) Length: 16.1 x 10⁻⁶ to 19.2 x 10⁻⁶.
 - h. Fastener withdrawal, tested to ASTM D 1761:

- 1) Nail: 163 pounds per inch.
- 2) Screw: 558 pounds per inch.
- i. Static coefficient of friction:
 - 1) Dry: 0.53 to 0.55, tested to ASTM D 2047.
 - 2) Dry: 0.59 to 0.70, tested to ASTM F 1679.
 - 3) Wet: 0.70 to 0.75, tested to ASTM F 1679.
- j. Fungus resistance, white and brown rot: No decay, tested to ASTM D 1413.
- k. Termite resistance: 9.6 rating, tested to AWPA E-1.
- l. Specific gravity: 0.91 to 0.95, tested to ASTM D 2395.
- m. Compression:
 - 1) Parallel: 1806 PSI ultimate, 550 PSI design, tested to ASTM D 198.
 - 2) Perpendicular: 1944 PSI ultimate, 625 PSI design, tested to ASTM D 143.
- n. Tensile strength: 854 PSI ultimate, 250 PSI design, tested to ASTM D 198.
- o. Shear strength: 561 PSI ultimate, 200 PSI design, tested to ASTM D 143.
- p. Modulus of rupture: 1423 PSI ultimate, 250 PSI design, tested to ASTM D 4761.
- q. Modulus of elasticity: 175,000 PSI ultimate, 100,000 PSI design, tested to ASTM D 4761.
- r. Thermal conductivity: 1.57 BTU per inch per hour per square foot at 85 degrees F, tested to ASTM C

2.4 FENCE FRAMEWORK

- A. Posts and Rails: Framework, including rails, braces, and line; terminal; and corner posts. All members shall be square or rectangular HSS shapes. Provide members with minimum dimensions and wall thickness based on the following:
 - 1. Fence Height: 96 inches (2440 mm).
 - 2. Horizontal Framework Members: Square or rectangular HSS shapes as indicated on Drawings.
 - 3. Fabrication: All welded connections. Cap all exposed ends of HSS members with plate of matching material and thickness. Weld all around and grind smooth prior to hot dip galvanizing.
 - 4. Metallic Coating for Steel Framework:
 - a. Type A: Not less than minimum 2.0-oz./sq. ft. (0.61-kg/sq. m) average zinc coating according to ASTM A123/A123M or 4.0-oz./sq. ft. (1.22-kg/sq. m) zinc coating according to ASTM A653/A653M.
 - 5. High Performance Coating on steel framework.
 - a. Coating as specified for galvanized surfaces in Section 099600 “High-Performance Coatings”.
 - b. Color: Olive green – match custom range color in Section 099600 “High-Performance Coatings”.

2.5 SWING GATES

- A. General: Gate posts, single and double swing gate types as indicated on Drawings. In all instances provide gate posts with header to form a 3-sided frame.
 - 1. Gate Leaf Width: As indicated.
 - 2. Framework Member Sizes and Strength: Based on gate height as indicated.
- B. HSS Tubing:
 - 1. Zinc-Coated Steel: ASTM A123.
 - 2. Gate Posts: HSS Rectangular tubular steel.
 - 3. Gate Frames and Bracing: HSS Rectangular tubular steel.
- C. Frame Corner Construction: Miter cut and Welded. Grind welds smooth.
- D. Hardware:
 - 1. Refer to NOTES and hardware specified in Section 087100 “Door Hardware”. Fabricate gates as required for specified hardware.
 - 2. Hinges or Pivots: 180-degree outward swing. Provide hardware as required, accounting for weight of gate, to meet 5 lbf maximum opening force requirement of 2016 CBC Chapter 11B-404.2.9.
 - 3. Latch: Permitting operation from both sides of gate. As specified in Section 0871000 “Door Hardware”.
 - 4. Lock: As specified in Section 087100 “Door Hardware”.
 - 5. Closer: As specified in Section 087100 “Door Hardware”.
 - 6. Cane Bolt: As specified in Section 087100 “Door Hardware”. Coordinate gap between gates (at double gates) such that cane bolt tab and mortise latchbolt allow gate to shut and latch properly.

2.6 ACCESSORIES

- A. Fasteners: 1-5/8 inch stainless steel self-drilling screws.
- B. Concrete: Provide as specified in Section 201, Table 201-1.1.2 for Fence Post Foundations.

2.7 GROUT AND ANCHORING CEMENT

- A. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107/C1107M. Provide grout, recommended in writing by manufacturer, for exterior applications.
- B. Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound. Provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating, and that is recommended in writing by manufacturer for exterior applications.

2.8 GROUNDING MATERIALS

- A. Comply with requirements in Section 260526 "Grounding and Bonding."
- B. Connectors and Grounding Rods: Listed and labeled for complying with UL 467.
 - 1. Connectors for Below-Grade Use: Exothermic welded type.
 - 2. Grounding Rods: Copper-clad steel, 5/8 by 96 inches (16 by 2440 mm).

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for site clearing, earthwork, pavement work, and other conditions affecting performance of the Work.
 - 1. Do not begin installation before final grading is completed unless otherwise permitted by Architect.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Stake locations of fence lines, gates, and terminal posts. Do not exceed intervals of 500 feet (152 m) or line of sight between stakes. Indicate locations of utilities, lawn sprinkler system, underground structures, benchmarks, and property monuments.

3.3 FENCE INSTALLATION

- A. Install composite fencing according to Drawings and more stringent requirements specified.
- B. Post Excavation: Drill or hand-excavate holes for posts to diameters and spacings indicated, in firm, undisturbed soil. Provide equipment and load time schedule with the expectation to encounter rocky soils during excavation.
- C. Post Setting: Set posts in concrete at indicated spacing into firm, undisturbed soil.
 - 1. Verify that posts are set plumb, aligned, and at correct height and spacing, and hold in position during setting with concrete or mechanical devices.
 - 2. Concrete Fill: Place concrete around posts to dimensions indicated and vibrate or tamp for consolidation. Protect aboveground portion of posts from concrete splatter.
 - a. Concealed Concrete: Place top of concrete 4 inches (100 mm) below finished surface elevation to allow covering with surface material.
- D. Cut and drill wood composite using carbide tipped blades and bits.

- E. Fasteners: Screw wood composite planks directly to steel framework.

3.4 GROUNDING AND BONDING

- A. Comply with requirements in Section 260526 "Grounding and Bonding for Electrical Systems."
- B. Fence and Gate Grounding:
 - 1. Ground for fence and fence posts shall be a separate system from ground for gate and gate posts.
 - 2. Install ground rods and connections at maximum intervals of 1500 feet (450 m).
 - 3. Fences within 100 Feet (30 m) of Buildings, Structures, Walkways, and Roadways: Ground at maximum intervals of 750 feet (225 m).
 - 4. Ground fence on each side of gates and other fence openings.
 - a. Bond metal gates to gate posts.
- C. Protection at Crossings of Overhead Electrical Power Lines: Ground fence at location of crossing and at a ground rod located a maximum distance of 150 feet (45 m) on each side of crossing.
- D. Grounding Method: At each grounding location, drive a grounding rod vertically until the top is 6 inches (152 mm) below finished grade. Connect rod to fence with No. 6 AWG conductor. Connect conductor to each fence component at grounding location.
- E. Connections:
 - 1. Make connections with clean, bare metal at points of contact.
 - 2. Make aluminum-to-steel connections with stainless-steel separators and mechanical clamps.
 - 3. Make aluminum-to-galvanized-steel connections with tin-plated copper jumpers and mechanical clamps.
 - 4. Make above-grade ground connections with mechanical fasteners.
 - 5. Make below-grade ground connections with exothermic welds.
 - 6. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.

3.5 ADJUSTING

- A. Gates: Adjust gates to operate smoothly, easily, and quietly, free of binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Confirm that latches and locks engage accurately and securely without forcing or binding.
- B. Lubricate hardware and other moving parts.

3.6 CLEANING

- A. Clean wood composite to remove stains:
 - 1. Mold, mildew, and berry and leaf stains: Clean surfaces with conventional deck wash containing detergent or sodium hypochlorite.
 - 2. Rust and ground-in dirt: Clean surfaces with cleaner containing oxalic or phosphoric acid.
 - 3. Oil and grease: Clean surfaces with detergent containing degreasing agent.

3.7 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

3.8 DEMONSTRATION

- A. Engage a factory-authorized service representative to train City's maintenance personnel to adjust, operate, and maintain fences and gates.

END OF SECTION 323132

SECTION 334600

SUBDRAINAGE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract - Standard Specifications for Public Works Construction 'The GREENBOOK' and City Supplement 'The WHITEBOOK', latest editions, including Supplemental Supplementary Provisions (SSPs), apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Perforated-wall pipe and fittings.
 - 2. Drainage conduits.
 - 3. Drainage panels.
 - 4. Geotextile filter fabrics.

1.3 ACTION SUBMITTALS

- A. Product Data:
 - 1. Drainage conduits, including rated capacities.
 - 2. Drainage panels, including rated capacities.
 - 3. Geotextile filter fabrics.

PART 2 - PRODUCTS

2.1 PERFORATED-WALL PIPES AND FITTINGS

- A. Perforated PE Pipe and Fittings:
 - 1. NPS 6 (DN 150) and Smaller: ASTM F405 or AASHTO M 252, Type CP; corrugated, for coupled joints.
 - 2. NPS 8 (DN 200) and Larger: ASTM F667; AASHTO M 252, Type CP; or AASHTO M 294, Type CP; corrugated; for coupled joints.
 - 3. Couplings: Manufacturer's standard, band type.

2.2 DRAINAGE CONDUITS

- A. Molded-Sheet Drainage Conduits: Prefabricated geocomposite with cusped, molded-plastic drainage core wrapped in geotextile filter fabric.
1. Manufacturers: Subject to compliance with requirements, provide products by the following.
 - a. JDR Enterprises, Inc.
 - b. Approved equal.
 2. Nominal Size: 18 inches (457 mm) high by approximately 1 inch (25 mm) thick.
 - a. Minimum In-Plane Flow: 30 gpm (114 L/min.) at hydraulic gradient of 1.0 when tested according to ASTM D4716.
 3. Compressive Strength: 9,500 psf (455 kN/m²) when tested in accordance with ASTM D1621.
 4. Filter Fabric: PP geotextile.
 5. Fittings: HDPE with combination NPS 4 and NPS 6 (DN 100 and DN 150) outlet connection.

2.3 DRAINAGE PANELS

- A. Molded-Sheet Drainage Panels: Prefabricated geocomposite, 36 to 60 inches (915 to 1525 mm) wide with drainage core faced with geotextile filter fabric.
1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. JDR Enterprises, Inc.
 - b. Approved equal.
 2. Drainage Core: Three-dimensional, nonbiodegradable, molded PP.
 - a. Minimum Compressive Strength: 21,000 lbf/sq. ft. (1005 kPa) when tested according to ASTM D1621.
 - b. Minimum In-Plane Flow Rate: 23 gpm/ft. (286 L/min. per m) of unit width at hydraulic gradient of 1.0 and compressive stress of [25 psig (172 kPa) when tested according to ASTM D4716.
 3. Filter Fabric: Nonwoven needle-punched geotextile, manufactured for subsurface drainage, made from polyolefins or polyesters; with elongation greater than 50 percent; complying with the following properties determined according to AASHTO M 288:
 - a. Survivability: Class 1.
 - b. Apparent Opening Size: No. 80 (0.18-mm)] sieve, maximum.
 - c. Permittivity: 0.1 per second, minimum.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine surfaces and areas for suitable conditions where subdrainage systems are to be installed.
- B. Verify that drainage panels installed as part of foundation wall waterproofing is properly positioned to drain into subdrainage system.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 EARTHWORK

- A. Excavating, trenching, and backfilling are specified in Section 300 "Earthwork."

3.3 RETAINING-WALL DRAINAGE INSTALLATION

- A. Lay flat-style geotextile filter fabric in trench and overlap trench sides.
- B. Encase pipe with sock-style geotextile filter fabric before installing pipe. Connect sock sections with adhesive.
- C. Install drainage piping as indicated in Part 3 "Piping Installation" Article for retaining-wall subdrainage.
- D. Add drainage course to width of at least 6 inches (150 mm) on side away from wall and to top of pipe to perform tests.
- E. After satisfactory testing, cover drainage piping to width of at least 6 inches (150 mm) on side away from footing and above top of pipe to within 12 inches (300 mm) of finish grade.
- F. Place drainage course in layers not exceeding 3 inches (75 mm) in loose depth; compact each layer placed and wrap top of drainage course with flat-style geotextile filter fabric.
- G. Place layer of flat-style geotextile filter fabric over top of drainage course, overlapping edges at least 4 inches (100 mm).
- H. Install drainage panels on wall as follows:
 - 1. Coordinate placement with other drainage materials.
 - 2. If weep holes are used instead of drainage pipe, cut 1/2-inch- (13-mm-) diameter holes on core side at weep-hole locations. Do not cut fabric.
 - 3. Mark horizontal chalk line on wall at a point 6 inches (150 mm) less than panel width above footing bottom. Before marking wall, subtract footing width.
 - 4. Separate 4 inches (100 mm) of fabric at beginning of roll and cut away 4 inches (100 mm) of core. Wrap fabric around end of remaining core.

POLICE RANGE REFURBISHMENT PROJECT – PHASE II

5. Attach panel to wall at horizontal mark and at beginning of wall corner. Place core side of panel against wall. Use concrete nails with washers through product. Place nails from 2 to 6 inches (50 to 150 mm) below top of panel, approximately 48 inches (1200 mm) apart. Do not penetrate waterproofing. Before using adhesives, discuss with waterproofing manufacturer.
6. If another panel is required on same row, cut away 4 inches (100 mm) of installed panel core and wrap fabric over new panel.
7. If additional rows of panel are required, overlap lower panel with 4 inches (100 mm) of fabric.
8. Cut panel as necessary to keep top 12 inches (300 mm) below finish grade.
9. For inside corners, bend panel. For outside corners, cut core to provide 3 inches (75 mm) for overlap.

END OF SECTION 334600

SUPPLEMENTARY SPECIAL PROVISIONS
APPENDICES

APPENDIX A

MITIGATED NEGATIVE DECLARATION/NOTICE OF EXEMPTION



ENTITLEMENTS DIVISION
(619) 446-5460

MITIGATED NEGATIVE DECLARATION

Project No.224708
SCH# N/A

SUBJECT: San Diego Police Pistol Range: AMENDMENT TO SITE DEVELOPMENT PERMIT (SDP) No. 8318 to allow for the extension of SDP Condition #11, which required the construction of an office for the Canine/SWAT facility. In addition to the amendment the project would include the following improvements: demolition of existing bullet backstops, construction of new bullet backstops (traps), repaving of an existing parking area, construction of a new parking area, construction of retaining walls, ADA improvements, landscaping improvements, replacement of dirt berms with tilt up walls, restoration of the historical shade structures and the installation of bio-retention filters and vegetated swales. The project site is located at 4002-4008 Federal Boulevard within the City Heights Neighborhood of the Mid City Community Planning Area. Legal Description: A portion of Blocks 32, 33, 35, 40, and 41 of Marilou Park Map No. 517. Applicant: City of San Diego Police Department/ Engineering &Capital Projects Department.

Update 11/28/2011

Revisions to this document have been made when compared to the Draft Mitigated Negative Declaration (DMND) dated October 21, 2011. Minor revisions have been made that clarifies the project description. The modifications to the FMND are denoted by ~~strikeout~~ and underline format. In accordance with the California Environmental Quality Act, Section 15073.5 (c)(4), the addition of new information that clarifies, amplifies, or makes insignificant modification does not require recirculation as there are no new impacts and no new mitigation identified. An environmental document need only be recirculated when there is identification of new significant environmental impact or the addition of a new mitigation measure required to avoid a significant environmental impact. The addition of corrected mitigation language within the environmental document does not affect the environmental analysis or conclusions of the MND.

Currently, the 7.73 acre project site consists of an operational San Diego Police Facility including a vehicle maintenance garage, ~~and~~ four firing ranges and temporary modular offices for the San Diego Police facility K-9/SWAT training/kennels to the east. The southern portion of the site is relatively flat, ranging in elevation from 90 to 95 feet above Mean Sea Level (MSL) while

the northern portion of the site is fairly steep ranging in elevation from 100 feet above MSL to 145 feet above MSL. The site is primarily developed and consists of asphalt paving, building structures, and sparse non-native and ornamental vegetation. A 0.317 acre portion of the project site is owned by The United States Navy. As a condition of the Site Development Permit the City of San Diego will acquire an easement for the purposes of operation, maintenance, and repair of the pistol range facilities together with rights of ingress and egress through this portion of land.

The existing bullet traps located at the north end of the ranges would be removed and replaced with concrete bullet trap lead containment systems. New integral colored concrete walls would be installed north of bullet traps to retain the disturbed slopes at the north end of the site. The retaining walls would vary in height from six to eighteen feet, with an average height of eleven and one half feet. The shade structures supporting the firing ranges would be reconstructed to match the existing structures minus the support member for the baffle. The support member would be replaced with steel members to match the size of the wood members and painted a matte finish. Roofing shall be corrugated metal to match the existing roof. Presently there are two earthen berms located on site, one between the west range and the civilian use range and one between the east range and rapid the fire range. These berms would be replaced with ten-foot-high concrete tilt-up dividing walls. Bioretention and vegetated swale areas would be constructed on site and would act to remove pollutants from storm water before it discharges into the existing storm drain system.

In addition to the project features described above, the project would repave existing parking areas as well as add an additional 13 parking spaces including three accessible spaces, bringing the total to 237 spaces. Landscape and hardscape improvements would include ADA accessible pedestrian walkways, masonry trash enclosures, ADA restroom improvements and plantings consisting of African sumac trees and red New Zealand flax.

- I. PROJECT DESCRIPTION: See attached Initial Study.
- II. ENVIRONMENTAL SETTING: See attached Initial Study.
- III. DETERMINATION:

The City of San Diego conducted an Initial Study which determined that the proposed project could have a significant environmental effect in the following areas(s): **Public Health and Safety, Historic Resources (Archaeology.)** Subsequent revisions in the project proposal create the specific mitigation identified in Section V of this Mitigated Negative Declaration. The project as revised now avoids or mitigates the potentially significant environmental effects previously identified, and the preparation of an Environmental Impact Report will not be required.

- IV. DOCUMENTATION:

The attached Initial Study documents the reasons to support the above Determination.

V. MITIGATION, MONITORING AND REPORTING PROGRAM:

A. GENERAL REQUIREMENTS – PART I

Plan Check Phase (prior to permit issuance)

1. Prior to the issuance Bid Opening/Bid Award or beginning any construction related activity on-site, the Development Services Department (DSD) Director’s Environmental Designee (ED) shall review and approve all Construction Documents (CD), (plans, specification, details, etc.) to ensure the MMRP requirements have been incorporated.
2. In addition, the ED shall verify that the MMRP Conditions/Notes that apply ONLY to the construction phases of this project are included VERBATIM, under the heading, “ENVIRONMENTAL/MITIGATION REQUIREMENTS.”
3. These notes must be shown within the first three (3) sheets of the construction documents in the format specified for engineering construction document templates as shown on the City website:

<http://www.sandiego.gov/development-services/industry/standtemp.shtml>

4. The **TITLE INDEX SHEET** must also show on which pages the “Environmental/Mitigation Requirements” notes are provided.

B. GENERAL REQUIREMENTS – PART II

Post Plan Check (After permit issuance/Prior to start of construction)

1. **PRE CONSTRUCTION MEETING IS REQUIRED TEN (10) WORKING DAYS PRIOR TO BEGINNING ANY WORK ON THIS PROJECT.** The PERMIT HOLDER/OWNER is responsible to arrange and perform this meeting by contacting the CITY RESIDENT ENGINEER (RE) of the Field Engineering Division and City staff from MITIGATION MONITORING COORDINATION (MMC). Attendees must also include the Permit holder’s Representative(s), Job Site Superintendent and the following consultants:

Archaeologist, Native American Monitor, Environmental Services Department (ESD) Office, Asbestos and Lead Management Program (ALMP) representative

Note: Failure of all responsible Permit Holder’s representatives and consultants to attend shall require an additional meeting with all parties present.

CONTACT INFORMATION:

- a) The **PRIMARY POINT OF CONTACT** is the **RE** at the **Field Engineering Division – 858-627-3200**

b) For Clarification of ENVIRONMENTAL REQUIREMENTS, it is also required to call **RE and MMC at 858-627-3360**

2. **MMRP COMPLIANCE:** This Project, Project Tracking System (PTS) 224708, shall conform to the mitigation requirements contained in the associated Environmental Document and implemented to the satisfaction of the DSD’s ED, MMC and the City Engineer (RE). The requirements may not be reduced or changed but may be annotated (i.e. to explain when and how compliance is being met and location of verifying proof, etc.). Additional clarifying information may also be added to other relevant plan sheets and/or specifications as appropriate (i.e., specific locations, times of monitoring, methodology, etc

Note:

Permit Holder’s Representatives must alert RE and MMC if there are any discrepancies in the plans or notes, or any changes due to field conditions. All conflicts must be approved by RE and MMC BEFORE the work is performed.

3. **OTHER AGENCY REQUIREMENTS:** Evidence that any other agency requirements or permits have been obtained or are in process shall be submitted to the RE and MMC for review and acceptance prior to the beginning of work or within one week of the Permit Holder obtaining documentation of those permits or requirements. Evidence shall include copies of permits, letters of resolution or other documentation issued by the responsible agency.

Not Applicable for this project.

4. **MONITORING EXHIBITS:** All consultants are required to submit, to RE and MMC, a monitoring exhibit on a 11x17 reduction of the appropriate construction plan, such as site plan, grading, landscape, etc., marked to clearly show the specific areas including the **LIMIT OF WORK**, scope of that discipline’s work, and notes indicating when in the construction schedule that work will be performed. When necessary for clarification, a detailed methodology of how the work will be performed shall be included.

5. **OTHER SUBMITTALS AND INSPECTIONS:** The Permit Holder/Owner’s representative shall submit all required documentation, verification letters, and requests for all associated inspections to the RE and MMC for approval per the following schedule:

Document Submittal/Inspection Checklist

<i>Issue Area</i>	<i>Document submittal</i>	<i>Associated Inspection/Approvals/Note</i>
General	Consultant Qualification Letters meeting	Prior to Pre-construction
General	Consultant Const. Monitoring	Prior to or at the Pre-Construction meeting
Archaeology Final MMRP	Archaeology Reports	Archaeological observation Final MMRP Inspection

PUBLIC HEALTH AND SAFETY

- I. Prior to Start of Construction/Preconstruction Meeting**
 - A. Verification of Contractor's Abatement Plan and Certification
 - 1. Prior to start of construction The City of San Diego Environmental Services Department (ESD), Asbestos and Lead Management Program (ALMP) representative shall provide verification to MMC that the contractor's abatement plan and certification has been approved.
- II. During Construction**
 - A. Monitoring
 - 1. ALMP shall monitor contractor work practices and take environmental sampling to verify contamination is not taking place outside the work area.
- III. End of Remediation**
 - A. Final Clearance
 - 1. Prior to a work area being cleared, ALMP would perform visual and environmental sampling to verify lead levels are within regulatory thresholds. ALMP will provide MMC with final approval verification.

HISTORICAL RESOURCES (ARCHAEOLOGY)

- I. Prior to Permit Issuance or Bid Opening/Bid Award**
 - A. Entitlements Plan Check
 - 1. Prior to permit issuance or Bid Opening/Bid Award, whichever is applicable, the Assistant Deputy Director (ADD) Environmental designee shall verify that the requirements for Archaeological Monitoring and Native American monitoring have been noted on the applicable construction documents through the plan check process.
 - B. Letters of Qualification have been submitted to ADD
 - 1. Prior to Bid Award, the applicant shall submit a letter of verification to Mitigation Monitoring Coordination (MMC) identifying the Principal Investigator (PI) for the project and the names of all persons involved in the archaeological monitoring program, as defined in the City of San Diego Historical Resources Guidelines (HRG). If applicable, individuals involved in the archaeological monitoring program must have completed the 40-hour HAZWOPER training with certification documentation.
 - 2. MMC will provide a letter to the applicant confirming the qualifications of the PI and all persons involved in the archaeological monitoring of the project meet the qualifications established in the HRG.
 - 3. Prior to the start of work, the applicant must obtain written approval from MMC for any personnel changes associated with the monitoring program.
- II. Prior to Start of Construction**
 - A. Verification of Records Search
 - 1. The PI shall provide verification to MMC that a site specific records search (1/4 mile radius) has been completed. Verification includes, but is not limited to a

copy of a confirmation letter from South Coastal Information Center, or, if the search was in-house, a letter of verification from the PI stating that the search was completed.

2. The letter shall introduce any pertinent information concerning expectations and probabilities of discovery during trenching and/or grading activities.
3. The PI may submit a detailed letter to MMC requesting a reduction to the ¼ mile radius.

B. PI Shall Attend Precon Meetings

1. Prior to beginning any work that requires monitoring; the Applicant shall arrange a Precon Meeting that shall include the PI, Native American consultant/monitor (where Native American resources may be impacted), Construction Manager (CM) and/or Grading Contractor, Resident Engineer (RE), Building Inspector (BI), if appropriate, and MMC. The qualified Archaeologist and Native American Monitor shall attend any grading/excavation related Precon Meetings to make comments and/or suggestions concerning the Archaeological Monitoring program with the Construction Manager and/or Grading Contractor.
 - a. If the PI is unable to attend the Precon Meeting, the Applicant shall schedule a focused Precon Meeting with MMC, the PI, RE, CM or BI, if appropriate, prior to the start of any work that requires monitoring.
2. Acknowledgement of Responsibility for Curation (CIP or Other Public Projects)
The applicant shall submit a letter to MMC acknowledging their responsibility for the cost of curation associated with all phases of the archaeological monitoring program.
3. Identify Areas to be Monitored
 - a. Prior to the start of any work that requires monitoring, the PI shall submit an Archaeological Monitoring Exhibit (AME) (with verification that the AME has been reviewed and approved by the Native American consultant/monitor when Native American resources may be impacted) based on the appropriate construction documents (reduced to 11x17) to MMC identifying the areas to be monitored including the delineation of grading/excavation limits.
 - b. The AME shall be based on the results of a site specific records search as well as information regarding the age of existing pipelines, laterals and associated appurtenances and/or any known soil conditions (native or formation).
 - c. MMC shall notify the PI that the AME has been approved.
4. When Monitoring Will Occur
 - a. Prior to the start of any work, the PI shall also submit a construction schedule to MMC through the RE indicating when and where monitoring will occur.
 - b. The PI may submit a detailed letter to MMC prior to the start of work or during construction requesting a modification to the monitoring program. This request shall be based on relevant information such as review of final construction documents which indicate conditions such as age of existing pipe to be replaced, depth of excavation and/or site graded to bedrock, etc., which may reduce or increase the potential for resources to be present.
5. Approval of AME and Construction Schedule
After approval of the AME by MMC, the PI shall submit to MMC written authorization of the AME and Construction Schedule from the CM.

III. During Construction

A. Monitor Shall be Present During Grading/Excavation/Trenching

1. The Archaeological Monitor shall be present full-time during all soil disturbing and grading/excavation/trenching activities which could result in impacts to archaeological resources as identified on the AME. **The Construction Manager is responsible for notifying the RE, PI, and MMC of changes to any construction activities such as in the case of a potential safety concern within the area being monitored. In certain circumstances OSHA safety requirements may necessitate modification of the AME.**
2. The Native American consultant/monitor shall determine the extent of their presence during soil disturbing and grading/excavation/trenching activities based on the AME and provide that information to the PI and MMC. If prehistoric resources are encountered during the Native American consultant/monitor's absence, work shall stop and the Discovery Notification Process detailed in Section III.B-C and IV.A-D shall commence.
3. The PI may submit a detailed letter to MMC during construction requesting a modification to the monitoring program when a field condition such as modern disturbance post-dating the previous grading/trenching activities, presence of fossil formations, or when native soils are encountered that may reduce or increase the potential for resources to be present.
4. The archaeological and Native American consultant/monitor shall document field activity via the Consultant Site Visit Record (CSVSR). The CSVSR's shall be faxed by the CM to the RE the first day of monitoring, the last day of monitoring, monthly (**Notification of Monitoring Completion**), and in the case of ANY discoveries. The RE shall forward copies to MMC.

B. Discovery Notification Process

1. In the event of a discovery, the Archaeological Monitor shall direct the contractor to temporarily divert all soil disturbing activities, including but not limited to digging, trenching, excavating or grading activities in the area of discovery and in the area reasonably suspected to overlay adjacent resources and immediately notify the RE or BI, as appropriate.
2. The Monitor shall immediately notify the PI (unless Monitor is the PI) of the discovery.
3. The PI shall immediately notify MMC by phone of the discovery, and shall also submit written documentation to MMC within 24 hours by fax or email with photos of the resource in context, if possible.
4. No soil shall be exported off-site until a determination can be made regarding the significance of the resource specifically if Native American resources are encountered.

C. Determination of Significance

1. The PI and Native American consultant/monitor, where Native American resources are discovered shall evaluate the significance of the resource. If Human Remains are involved, follow protocol in Section IV below.
 - a. The PI shall immediately notify MMC by phone to discuss significance determination and shall also submit a letter to MMC indicating whether additional mitigation is required.

- b. If the resource is significant, the PI shall submit an Archaeological Data Recovery Program (ADRP) and obtain written approval of the program from MMC, CM and RE. ADRP and any mitigation must be approved by MMC, RE and/or CM before ground disturbing activities in the area of discovery will be allowed to resume. **Note: If a unique archaeological site is also an historical resource as defined in CEQA Section 15064.5, then the limits on the amount(s) that a project applicant may be required to pay to cover mitigation costs as indicated in CEQA Section 21083.2 shall not apply.**
 - (1). Note: For pipeline trenching and other linear projects in the public Right-of-Way, the PI shall implement the Discovery Process for Pipeline Trenching projects identified below under “D.”
 - c. If the resource is not significant, the PI shall submit a letter to MMC indicating that artifacts will be collected, curated, and documented in the Final Monitoring Report. The letter shall also indicate that that no further work is required.
 - (1). Note: For Pipeline Trenching and other linear projects in the public Right-of-Way, if the deposit is limited in size, both in length and depth; the information value is limited and is not associated with any other resource; and there are no unique features/artifacts associated with the deposit, the discovery should be considered not significant.
 - (2). Note, for Pipeline Trenching and other linear projects in the public Right-of-Way, if significance can not be determined, the Final Monitoring Report and Site Record (DPR Form 523A/B) shall identify the discovery as Potentially Significant.
- D. Discovery Process for Significant Resources - Pipeline Trenching and other Linear Projects in the Public Right-of-Way

The following procedure constitutes adequate mitigation of a significant discovery encountered during pipeline trenching activities or for other linear project types within the Public Right-of-Way including but not limited to excavation for jacking pits, receiving pits, laterals, and manholes to reduce impacts to below a level of significance:

1. Procedures for documentation, curation and reporting
 - a. One hundred percent of the artifacts within the trench alignment and width shall be documented in-situ, to include photographic records, plan view of the trench and profiles of side walls, recovered, photographed after cleaning and analyzed and curated. The remainder of the deposit within the limits of excavation (trench walls) shall be left intact.
 - b. The PI shall prepare a Draft Monitoring Report and submit to MMC via the RE as indicated in Section VI-A.
 - c. The PI shall be responsible for recording (on the appropriate State of California Department of Park and Recreation forms-DPR 523 A/B) the resource(s) encountered during the Archaeological Monitoring Program in accordance with the City’s Historical Resources Guidelines. The DPR forms shall be submitted to the South Coastal Information Center for either a Primary Record or SDI Number and included in the Final Monitoring Report.
 - d. The Final Monitoring Report shall include a recommendation for monitoring of any future work in the vicinity of the resource.

IV. Discovery of Human Remains

If human remains are discovered, work shall halt in that area and no soil shall be exported off-site until a determination can be made regarding the provenance of the human remains; and the following procedures as set forth in CEQA Section 15064.5(e), the California Public Resources Code (Sec. 5097.98) and State Health and Safety Code (Sec. 7050.5) shall be undertaken:

A. Notification

1. Archaeological Monitor shall notify the RE or BI as appropriate, MMC, and the PI, if the Monitor is not qualified as a PI. MMC will notify the appropriate Senior Planner in the Environmental Analysis Section (EAS) of the Development Services Department to assist with the discovery notification process.
2. The PI shall notify the Medical Examiner after consultation with the RE, either in person or via telephone.

B. Isolate discovery site

1. Work shall be directed away from the location of the discovery and any nearby area reasonably suspected to overlay adjacent human remains until a determination can be made by the Medical Examiner in consultation with the PI concerning the provenience of the remains.
2. The Medical Examiner, in consultation with the PI, will determine the need for a field examination to determine the provenience.
3. If a field examination is not warranted, the Medical Examiner will determine with input from the PI, if the remains are or are most likely to be of Native American origin.

C. If Human Remains **ARE** determined to be Native American

1. The Medical Examiner will notify the Native American Heritage Commission (NAHC) within 24 hours. By law, **ONLY** the Medical Examiner can make this call.
2. NAHC will immediately identify the person or persons determined to be the Most Likely Descendent (MLD) and provide contact information.
3. The MLD will contact the PI within 24 hours or sooner after the Medical Examiner has completed coordination, to begin the consultation process in accordance with CEQA Section 15064.5(e), the California Public Resources and Health & Safety Codes.
4. The MLD will have 48 hours to make recommendations to the property owner or representative, for the treatment or disposition with proper dignity, of the human remains and associated grave goods.
5. Disposition of Native American Human Remains will be determined between the MLD and the PI, and, if:
 - a. The NAHC is unable to identify the MLD, **OR** the MLD failed to make a recommendation within 48 hours after being notified by the Commission, **OR**;
 - b. The landowner or authorized representative rejects the recommendation of the MLD and mediation in accordance with PRC 5097.94 (k) by the NAHC fails to provide measures acceptable to the landowner, **THEN**
 - c. To protect these sites, the landowner shall do one or more of the following:
 - (1) Record the site with the NAHC;
 - (2) Record an open space or conservation easement; or

(3) Record a document with the County.

- d. Upon the discovery of multiple Native American human remains during a ground disturbing land development activity, the landowner may agree that additional conferral with descendants is necessary to consider culturally appropriate treatment of multiple Native American human remains. Culturally appropriate treatment of such a discovery may be ascertained from review of the site utilizing cultural and archaeological standards. Where the parties are unable to agree on the appropriate treatment measures the human remains and items associated and buried with Native American human remains shall be reinterred with appropriate dignity, pursuant to Section 5.c., above.

D. If Human Remains are NOT Native American

1. The PI shall contact the Medical Examiner and notify them of the historic era context of the burial.
2. The Medical Examiner will determine the appropriate course of action with the PI and City staff (PRC 5097.98).
3. If the remains are of historic origin, they shall be appropriately removed and conveyed to the San Diego Museum of Man for analysis. The decision for internment of the human remains shall be made in consultation with MMC, EAS, the applicant/landowner, any known descendant group, and the San Diego Museum of Man.

V. Night and/or Weekend Work

A. If night and/or weekend work is included in the contract

1. When night and/or weekend work is included in the contract package, the extent and timing shall be presented and discussed at the precon meeting.
2. The following procedures shall be followed.

a. No Discoveries

In the event that no discoveries were encountered during night and/or weekend work, the PI shall record the information on the CSV and submit to MMC via fax by 8AM of the next business day.

b. Discoveries

All discoveries shall be processed and documented using the existing procedures detailed in Sections III - During Construction, and IV - Discovery of Human Remains. Discovery of human remains shall always be treated as a significant discovery.

c. Potentially Significant Discoveries

If the PI determines that a potentially significant discovery has been made, the procedures detailed under Section III - During Construction and IV-Discovery of Human Remains shall be followed.

d. The PI shall immediately contact the RE and MMC, or by 8AM of the next business day to report and discuss the findings as indicated in Section III-B, unless other specific arrangements have been made.

B. If night and/or weekend work becomes necessary during the course of construction

1. The Construction Manager shall notify the RE, or BI, as appropriate, a minimum of 24 hours before the work is to begin.
2. The RE, or BI, as appropriate, shall notify MMC immediately.

C. All other procedures described above shall apply, as appropriate.

VI. Post Construction

A. Submittal of Draft Monitoring Report

1. The PI shall submit two copies of the Draft Monitoring Report (even if negative), prepared in accordance with the Historical Resources Guidelines (Appendix C/D) which describes the results, analysis, and conclusions of all phases of the Archaeological Monitoring Program (with appropriate graphics) to MMC via the RE for review and approval within 90 days following the completion of monitoring. **It should be noted that if the PI is unable to submit the Draft Monitoring Report within the allotted 90-day timeframe as a result of delays with analysis, special study results or other complex issues, a schedule shall be submitted to MMC establishing agreed due dates and the provision for submittal of monthly status reports until this measure can be met.**
 - a. For significant archaeological resources encountered during monitoring, the Archaeological Data Recovery Program or Pipeline Trenching Discovery Process shall be included in the Draft Monitoring Report.
 - b. Recording Sites with State of California Department of Parks and Recreation The PI shall be responsible for recording (on the appropriate State of California Department of Park and Recreation forms-DPR 523 A/B) any significant or potentially significant resources encountered during the Archaeological Monitoring Program in accordance with the City's Historical Resources Guidelines, and submittal of such forms to the South Coastal Information Center with the Final Monitoring Report.
2. MMC shall return the Draft Monitoring Report to the PI via the RE for revision or, for preparation of the Final Report.
3. The PI shall submit revised Draft Monitoring Report to MMC via the RE for approval.
4. MMC shall provide written verification to the PI of the approved report.
5. MMC shall notify the RE or BI, as appropriate, of receipt of all Draft Monitoring Report submittals and approvals.

B. Handling of Artifacts

1. The PI shall be responsible for ensuring that all cultural remains collected are cleaned and catalogued
2. The PI shall be responsible for ensuring that all artifacts are analyzed to identify function and chronology as they relate to the history of the area; that faunal material is identified as to species; and that specialty studies are completed, as appropriate.

C. Curation of artifacts: Accession Agreement and Acceptance Verification

1. The PI shall be responsible for ensuring that all artifacts associated with the survey, testing and/or data recovery for this project are permanently curated with an appropriate institution. This shall be completed in consultation with MMC and the Native American representative, as applicable.
2. When applicable to the situation, the PI shall include written verification from the Native American consultant/monitor indicating that Native American resources were treated in accordance with state law and/or applicable agreements. If the resources were reinterred, verification shall be provided to show what protective measures were taken to ensure no further disturbance occurs in accordance with Section IV – Discovery of Human Remains, Subsection C.

3. The PI shall submit the Accession Agreement and catalogue record(s) to the RE or BI, as appropriate for donor signature with a copy submitted to MMC.
 4. The RE or BI, as appropriate shall obtain signature on the Accession Agreement and shall return to PI with copy submitted to MMC.
 5. The PI shall include the Acceptance Verification from the curation institution in the Final Monitoring Report submitted to the RE or BI and MMC.
- D. Final Monitoring Report(s)
1. The PI shall submit one copy of the approved Final Monitoring Report to the RE or BI as appropriate, and one copy to MMC (even if negative), within 90 days after notification from MMC of the approved report.
 2. The RE shall, in no case, issue the Notice of Completion until receiving a copy of the approved Final Monitoring Report from MMC which includes the Acceptance Verification from the curation institution.

VI. PUBLIC REVIEW DISTRIBUTION:

Draft copies or notice of this Mitigated Negative Declaration were distributed to:

City of San Diego

- Council Member Gloria, District 3
- Historical Resource Board (87)
- City Heights/Weingart Branch Library (81G)
- Oak Park Branch Library (81U)
- City Attorney (MS 56A)
 - Shannon Thomas (MS 93C)
- Engineering and Capital Projects
 - Allison Sherwood (MS 908A)
 - Darren Greenhaugh (MS 908A)
 - George Freiha (MS 908A)
 - Marc Cass (MS 908A)
- Development Services Department
 - Helene Deisher (MS 301)
 - Julius Ocen-Odoge (MS 501)
 - Myra Herrmann (MS 501)
 - Kamran Khaligh (MS 501)
 - Jodi Brown (MS 501)
 - Bill Tripp (MS 501)
 - Bill Prinz (MS 606L)
- San Diego Police Department
 - Scott Fuller (MS 770)
- Library Dept.-Gov. Documents MS 17 (81)

Other

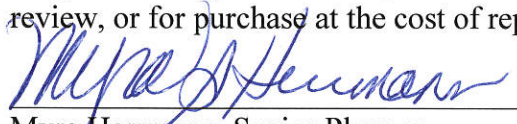
- Jose Lopez (295)
- William D. Jones (296)
- Oak Park Community Council (299)
- Theresa Quiroz (294)
- Fairmount Park Neighborhood Association (303)

John Stump (304)
 Chollas Restoration Enhancement and Conservancy (451)
 City Heights Area Planning Committee (287)
 Fairmount Park Neighborhood Association (303)
 San Diego Gas and Electric (114)
 Carmen Lucas (206)
 Clint Linton (215B)
 South Coastal Information Center @ San Diego State University (210)
 San Diego Historical Society (211)
 San Diego Archaeological Center (212)
 Save Our Heritage Organization (214)
 Ron Christman (215)
 Louie Guassac (215A)
 San Diego County Archaeological Society (218)
 Kumeyaay Cultural Heritage Preservation (223)
 Kumeyaay Cultural Repatriation Committee (225)
 Native American Distribution (NOTICE ONLY 225A-R)

VII. RESULTS OF PUBLIC REVIEW:

- () No comments were received during the public input period.
- () Comments were received but did not address the draft Mitigated Negative Declaration finding or the accuracy/completeness of the Initial Study. No response is necessary. The letters are attached.
- (X) Comments addressing the findings of the draft Mitigated Negative Declaration and/or accuracy or completeness of the Initial Study were received during the public input period. The letters and responses follow.

Copies of the draft Mitigated Negative Declaration, the Mitigation, Monitoring and Reporting Program and any Initial Study material are available in the office of the Entitlements Division for review, or for purchase at the cost of reproduction.


 Myra Herrmann, Senior Planner
 Development Services Department

October 21, 2011
 Date of Draft Report

November 28, 2011
 Date of Final Report

Analyst: Jeffrey Szymanski

Figure 1- Location/Vicinity Map
 Figure 2- Site Plan
 Initial Study Checklist

THERESA QUIROZ (11/7/2011)

1. The first comment provides background information regarding the entitlement history of the project site and does not address the adequacy of the CEQA document No. 224708. To clarify, a Mitigated Negative Declaration (MND) No. 4955 was prepared for the previous entitlements and provided mitigation for biological resources, archaeological resources, paleontological resources, human health and safety (contaminated soils) and water quality. Condition # 11 of SDP No. 8313 required the replacement of temporary modular offices for the Canine/SWAT facility to be replaced with permanent office structures by September 23, 2009. The MND included analysis for the placement of the permanent office structure. Condition #11 was not completed due to a lack of available funds. Since the MND included analysis for the K-9/SWAT office structure, not constructing the office building in place of the modular buildings does not result in changes to any of the mitigation measures in the Mitigation, Monitoring and Reporting Program (MMRP) for MND No. 4955. As such, not constructing the K-9/SWAT office building does not affect the adequacy of MND No. 224708 for the current project.
2. With respect to the current funding for the site, the Police Department has included the need for funding to implement Conditions 11 and 22 of the SDP No. 8318 in their budget proposal to City Council every year since approval of the SDP No. 8313 in 2003. The City Council has never approved funding the cost of the improvements (most recently identified as \$3.5 million). The funding for the improvements proposed in this SDP amendment are derived from new sources of funding, which carry restrictions that would limit their ability to be used for the previously identified improvements. The current funding sources are the City's Deferred Maintenance Budget and the Pueblo Land/Police Department Facilities Management Budget.

Site Development Permit No. 800689, which would amend SDP No. 8313, includes a date certain for the previous unfulfilled condition # 11. Specifically, the amended or new condition reads as follows, "The temporary modular offices for the Canine/SWAT facility shall be replaced with the permanent planned office structure by September 23, 2019." Additionally, the construction of the Canine/SWAT office building is not a mitigation measure and does not render the current MND No. 224708 inadequate under CEQA.
3. The K-9/SWAT facilities potential environmental impacts were analyzed under the previous MND No. 4955 and determined to be below a level of significance. The current proposal would not change anything on the K-9/SWAT portion of the site that has not already been analyzed under CEQA. See comment #1 for further discussion.

Szymanski, Jeffrey

From: Szymanski, Jeffrey
Sent: Monday, November 07, 2011 9:42 AM
To: Szymanski, Jeffrey
Subject: FW: Project #: 224708

From: Theresa Quiroz [mailto:quiroz@cox.net]
Sent: Monday, November 07, 2011 8:25 AM
To: DSD EAS
Subject: Project #: 224708

Mr. Jeffrey Szymanski:

This letter is my comment on the Mitigated Negative Declaration for the San Diego Pistol Range (MND WBS# B-10012.02.06, Project # 224708). Please reply to this message that it has been received.

History:

- 1 On August 5, 2003, the City Council approved MND 4955, amendments to the Mid-City Communities Plan, and granted SDP 8318 which reflected the mitigation requirements for the MND. All of these approvals were for the construction of the Vehicle Maintenance Facility (VMF) at Federal and Home Avenues, and the construction of a new K-9 facility. The VMF construction was necessitated by the City's intent to build a new downtown library at the site of the then-current VMF location.

The MND for that action (MND 4955) was based on the stated fact that the K-9 units would be constructed of concrete or stucco over masonry with decorative rock pilasters and sloped roves with red tile.

The aesthetic of the construction were of major importance to the neighboring communities because of the dilapidated state of the previous SWAT/K-9 modular facilities.

At the last minute, the city made an agreement with the community that, due to a lack of funds, the K-9 facility would be built at a later date, but no later than September 23, 2009, as specified in the Site Development Permit (SDP). It was determined that since the project would be completed by that date, the MND was still valid. It was also determined that the art component of the project - which was required by Municipal Code at the time - would also be included in the later phase. It was agreed that the determination of the date of completion in the SDP (Condition 11) made that portion also valid under MND 4955.
- 2 Response to MND # 224708.

Funds Available -

Since the City of San Diego now has the funds available to complete the SDP # 8318, that project should be completed as required rather than using the funds to start a new project.

Length of extension -

This MND, 224708, describes the project as "allows for the extension of SDP Condition number 11". However, there is no date to which the requirement is extended. The extension is, therefore, in perpetuity. The course of conduct by the city in the past thirty years on this site indicates that the length of the extension can reasonably be expected to be in perpetuity.

That unlimited extension and its significant impacts on the area are not considered by the MND. Furthermore, the failure to establish a firm deadline for this mitigation condition renders the mitigation ineffective. This is a violation of CEQA because mitigation measures must be enforceable with a firm deadline so that the significant impact is not endured after the project is otherwise completed.
- 3 Effect on prior decisions -

SDP 8318 states, "All of the conditions contained in this permit have been considered and have been determined necessary in order to make the findings required for this permit." Therefore, a full review of the original approval needs to be made before one of the conditions is invalidated. That would include a review of MND 4955 which was a requirement of the project, and which did not consider, or mitigate for, the significant impacts of the unlimited extension.

Project area -

4) SDP 8318 Condition number 11 refers to the construction of the K-9 building. The project description under review, 224708, does not include the K-9 facility. It states that the project is "surrounded by the San Diego K-9 training/kennels".

5) It is unclear how an amendment to a project not covered under the study area of the MND can be included as part of the project description. Since the K-9 modulars are not part of the study, the effects of them remaining on site have not been reviewed, despite the fact that the extension of the requirement for replacement is part of the project. In essence, you have failed to consider the K-9 facility's environmental impacts as part of the project otherwise covered by the MND.

6) Aesthetics -

The initial study in MND 224708 claims that the project will not substantially degrade the existing visual character or quality of the site. However, the course of conduct of the city over the past thirty years proves that the project will, indeed, substantially degrade the visual character or quality of the site.

Before this project was constructed, the SWAT/K-9 facilities were modulars. The city had been required to replace the modulars for approximately 30 years prior to the VMF project being approved. No action was ever taken to replace them. The modulars were an eyesore on the community and substantially degraded the visual quality of the site.

7) When the VMF project was approved, the city once again did not replace the modulars with permanent buildings. Once again, requirements to replace the modulars were ignored. The SDP 8318 required the replacement to have been completed by September 23, 2009 - and yet no effort has been made to abide by the terms of the permit.

The historical facts lead one to believe that there is no enforceable means by which to make the city abide by its requirements. It is clear that the outcome of the project being reviewed is that the modulars will be left on site in perpetuity to become the eyesore they once were to the area.

That significant impact must be mitigated. In this regard, it is not enough to require completion of permanent facilities by a specified date because that mitigation has already been ignored and proven ineffective. You must include additional mitigation to ensure that the significant impact is avoided.

8) Artwork -

As a requirement of the original project and MND 4955, the city was required to put in place artwork around the project. The community agreed to allow that artwork to be constructed with the K-9 facility by September 23, 2009. Without that artwork, there are other impacts to the visual quality that were considered during the original MND, but have not been considered now that placement of the artwork will be extended to perpetuity. This is another instance of mitigation being ineffective. You must include additional mitigation to ensure that the significant impact is avoided.

I would request the following:

9) 1) The City remove the extension of the SDP Condition # 11 from the MND since the effects of that action have not been studied within the MND.

10) 2) The City use the available funds to fulfill its requirements under condition # 11.

11) 3) The City then approve MND 224708 - without the extension - and move forward with preparing to construct the new project, while collecting the funds needed to replace that spent on complying with its legal requirement.

THERESA QUIROZ (11/7/2011) continued

4. Existing site conditions within MND No. 224708 will be modified to include the description of the modular K-9 units. The current proposal would not change anything on the K-9/SWAT portion of the site that has not already been analyzed under the previously certified CEQA document (MND No. 4955). Furthermore, MND No. 4955 analyzed the K-9 facilities and determined that with mitigation, all environmental impacts could be reduced to below a level of significance.

5. The amendment to Site Development Permit 8318 and extension of permit condition 11 is a component of the San Diego Police Pistol Range project; therefore, the inclusion of these actions in the MND is appropriate. Please see response no. 4. The current proposal would not change anything on the K-9/SWAT portion of the site that has not already been analyzed under the previously certified CEQA document (MND No. 4955). Furthermore, MND No. 4955 analyzed the K-9 facilities and determined that with mitigation, all environmental impacts could be reduced to below a level of significance.

6. With respect to the aesthetics of the site, the pistol range project would dramatically improve the visual quality of the site as many of the current structures are dilapidated and in need of repair or replacement. The existing modular facilities do not trigger a new significant visual quality impact under CEQA because they are an existing condition. As such, project implementation would not result in a significant visual quality impact under CEQA and mitigation would not be required.

7. Please see response 6. Furthermore, the construction of the permanent K-9 buildings was not a CEQA mitigation measure and significant visual quality impacts were not identified in the previously certified CEQA document.

8. With respect to the public artwork element of the original project, this was included in the original SDP No. 8313 as one of the improvements that were not completed. The public artwork element was not included as mitigation for visual quality in MND No. 4955 because the Initial Study that was completed did not identify a significant impact to visual quality under CEQA. Instead, the artwork, along with other improvements, was included as a condition of approval under SDP No 8313. Installation of public artwork would be accomplished after construction of the permanent K-9/SWAT facilities.

9. Please see response no.5. The amendment to Site Development Permit 8318 and extension of permit condition 11 is a component of the San Diego Police Pistol Range project; therefore, the inclusion of these actions in the MND is appropriate. The current proposal would not change anything on the K-9/SWAT portion of the site that has not already been analyzed under the previously certified CEQA document.

10. The City use of funds is not a CEQA related issue and no response is required.

11. Please see response no. 5.



San Diego County Archaeological Society, Inc.

Environmental Review Committee

9 November 2011

To: Mr. Jeffrey Szymanski
Development Services Department
City of San Diego
1222 First Avenue, Mail Station 501
San Diego, California 92101

Subject: Draft Mitigated Negative Declaration
San Diego Police Pistol Range

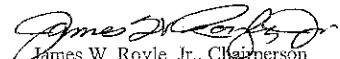
Dear Mr. Szymanski:

I have reviewed the subject DMND on behalf of this committee of the San Diego County Archaeological Society.

⑫ Based on the information in the initial study, DMND and historical report for the project, we agree with the impact analysis and mitigation measures as presented.

Thank you for affording us this opportunity to participate in the City's environmental review process for this project.

Sincerely,

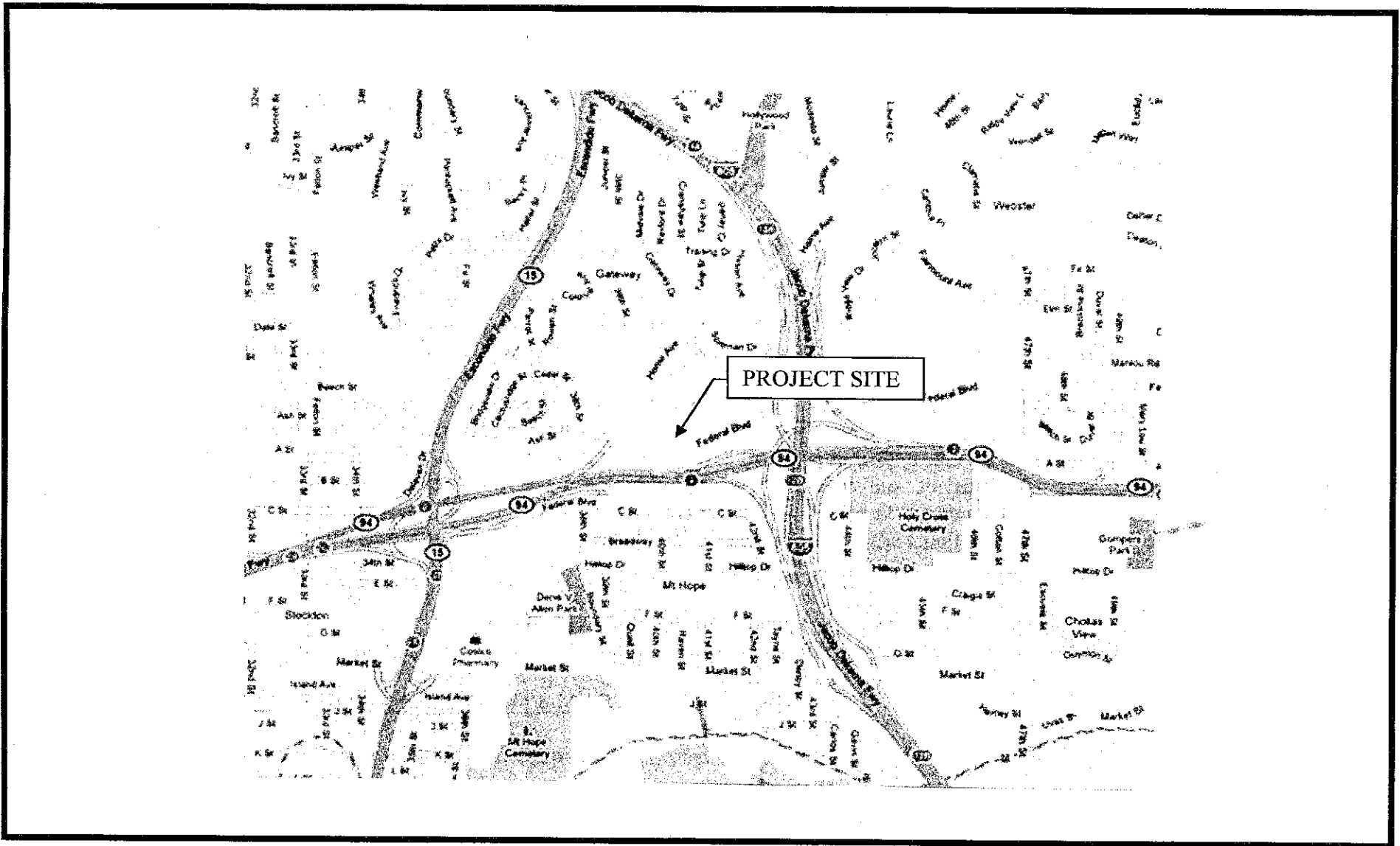

James W. Royle, Jr., Chairperson
Environmental Review Committee

cc: Cultural Land Planning & Research
SDCAS President
File

P.O. Box 81106 • San Diego, CA 92138-1106 • (858) 538-0935

SAN DIEGO COUNTY ARCHAEOLOGICAL SOCIETY INC. (11/9/2011)

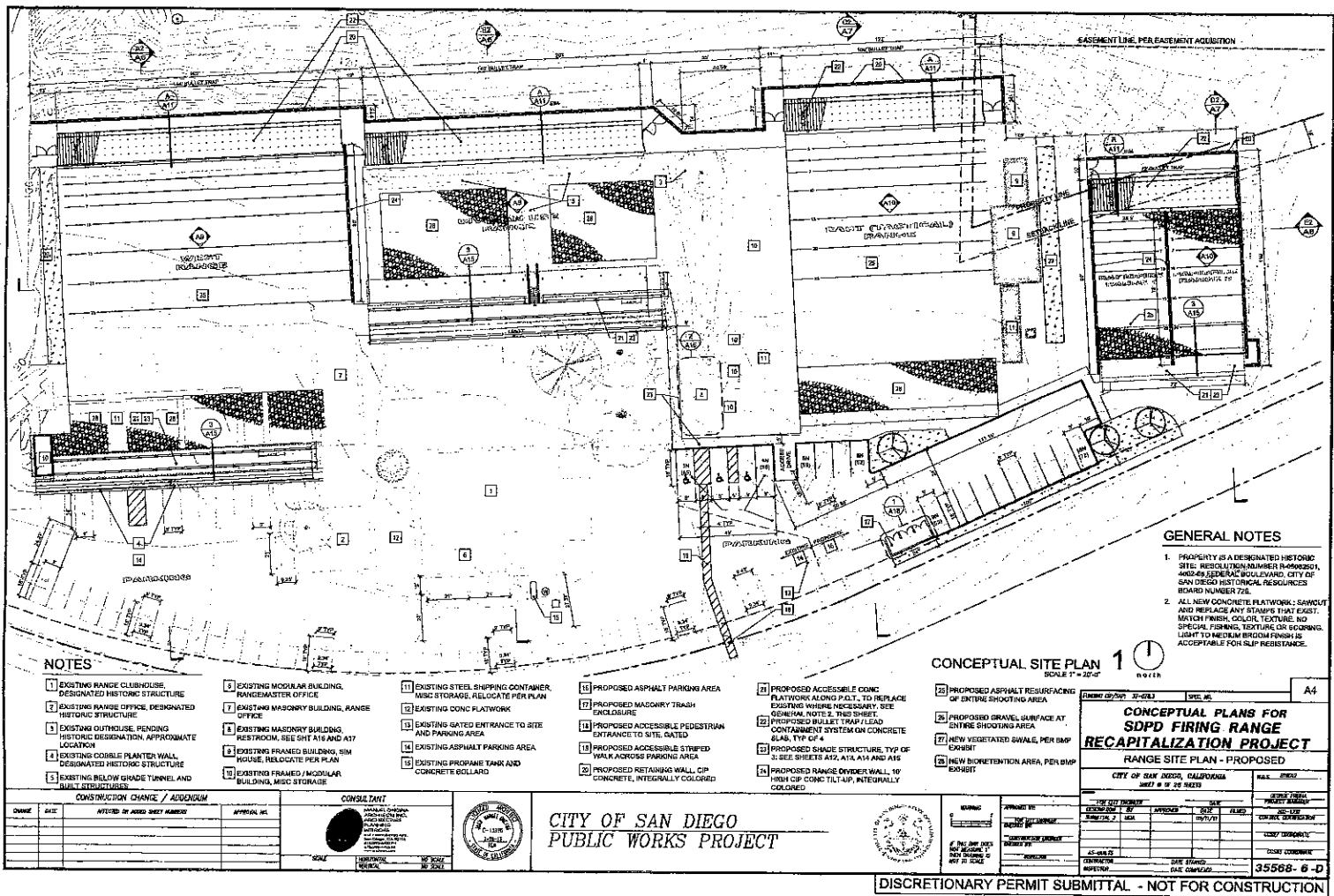
12. Comment noted.



Location Map

San Diego Police Pistol Range / Project No. 224708
 City of San Diego – Development Services Department

FIGURE
No. 1



SDPD FIRING RANGE RECAPITALIZATION PROJECT



Site Plan

San Diego Police Pistol Range / Project No. 224708
City of San Diego – Development Services Department

**FIGURE
No. 2**

INITIAL STUDY CHECKLIST

1. Project Title/Project number: San Diego Police Pistol Range/Project No. 224708
2. Lead agency name and address: City of San Diego, Development Services Department, 1222 First Avenue, MS 501, San Diego, CA 92101
3. Contact person and phone number: Jeff Szymanski, Associate Planner, 619-446-5324
4. Project location: The project site is located at 4002-4008 Federal Boulevard within the City Heights Neighborhood of the Mid City Community Planning Area. Legal Description: A portion of Blocks 32, 33, 35, 40, and 41 of Marilou Park Map No. 517.
5. Project Applicant/Sponsor's name and address: City of San Diego Police Department/ Engineering & Capital Projects Department, 600 B Street, MS 908A, San Diego, CA 92101. Contact George Freiha (619) 533-7449.
6. General Plan designation: The Mid-City Community Plan designates the site as Open Space and Institutional.
7. Zoning: The site is zoned MCCPD-MR-3000 and RS-1-7
8. Description of project (Describe the whole action involved, including but not limited to, later phases of the project, and any secondary, support, or off-site features necessary for its implementation.): San Diego Police Pistol Range: AMENDMENT TO SITE DEVELOPMENT PERMIT (SDP) No. 8318 to allow for the extension of SDP Condition #11, which required the construction of an office for the Canine/SWAT facility. In addition to the amendment the project would include the following improvements: demolition of existing bullet backstops, construction of new bullet backstops (traps), repaving of an existing parking area, construction of a new parking area, construction of retaining walls, ADA improvements, landscaping improvements, replacement of dirt berms with tilt up walls, restoration of the historical shade structures and the installation of bio-retention filters and vegetated swales.

Currently, the 7.73 acre project site consists of an operational San Diego Police Facility including a vehicle maintenance garage and four firing ranges. The southern portion of the site is relatively flat, ranging in elevation from 90 to 95 feet above Mean Sea Level (MSL) while the northern portion of the site is fairly steep ranging in elevation from 100 feet above MSL to 145 feet above MSL. The site is primarily developed and consists of asphalt paving, building structures, and sparse non-native and ornamental vegetation. A 0.317 acre portion of the project site is owned by The United States Navy. As a condition of the Site Development Permit the City of San Diego will acquire an easement for the purposes of operation, maintenance, and repair of the pistol range facilities together with rights of ingress and egress through this portion of land.

The existing bullet traps located at the north end of the ranges would be removed and replaced with concrete bullet trap lead containment systems. New integral colored concrete walls would be installed north of bullet traps to retain the disturbed slopes at the north end of the site. A cast in place retaining wall would be constructed that would support the slopes on the north side of the project. The retaining walls would vary in height from six to eighteen feet, with an average height of eleven and one half feet. The shade structures supporting the firing ranges would be reconstructed to match the existing structures minus the support member for the baffle. The support member would be replaced with steel members to match the size of the wood members and painted a matte finish. Roofing shall be corrugated metal to match the existing roof. Presently there are two earthen berms located on site, one between the west range and the civilian use range and one between the east range and rapid the fire range. These berms would be replaced with ten-foot-high concrete tilt-up dividing walls. Bioretention and vegetated swale areas would be constructed on site and would act to remove pollutants from storm water before it discharges into the existing storm drain system.

In addition to the project features described above, the project would repave existing parking areas as well as add an additional 13 parking spaces including three accessible spaces, bringing the total to 237 spaces. Landscape and hardscape improvements would include ADA accessible pedestrian walkways, masonry trash enclosures, ADA restroom improvements and plantings consisting of African sumac trees and red New Zealand flax.

9. Surrounding land uses and setting. Briefly describe the project's surroundings: The project site is located at 4008 Federal Boulevard in the Mid-City Community Planning area and is surrounded by the temporary modular offices for the San Diego Police facility K-9/SWAT training/kennels to the east and City Open Space east of that, Federal Boulevard and the I-94 to the south and Multi-Unit Residential to the north of the property. The southern portion of the site is relatively flat ranging in elevation from 90 to 95 feet above Mean Sea Level (MSL) while the northern portion of the site is fairly steep ranging in elevation from 100 feet above MSL to 145 feet above MSL.
10. Other public agencies whose approval is required (e.g., permits, financing approval, or participation agreement.): None.

ENVIRONMENTAL FACTORS POTENTIALLY AFFECTED:

The environmental factors checked below would be potentially affected by this project, involving at least one impact that is a "Potentially Significant Impact" as indicated by the checklist on the following pages.

- | | | |
|---|---|---|
| <input type="checkbox"/> Aesthetics | <input type="checkbox"/> Greenhouse Gas Emissions | <input type="checkbox"/> Population/Housing |
| <input type="checkbox"/> Agriculture and Forestry Resources | <input checked="" type="checkbox"/> Hazards & Hazardous Materials | <input type="checkbox"/> Public Services |
| <input type="checkbox"/> Air Quality | <input type="checkbox"/> Hydrology/Water Quality | <input type="checkbox"/> Recreation |
| <input type="checkbox"/> Biological Resources | <input type="checkbox"/> Land Use/Planning | <input type="checkbox"/> Transportation/Traffic |
| <input checked="" type="checkbox"/> Cultural Resources | <input type="checkbox"/> Mineral Resources | <input type="checkbox"/> Utilities/Service System |
| <input type="checkbox"/> Geology/Soils | <input type="checkbox"/> Noise | <input checked="" type="checkbox"/> Mandatory Findings Significance |

DETERMINATION: (To be completed by Lead Agency)

On the basis of this initial evaluation:

- The proposed project COULD NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.
- Although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because revisions in the project have been made by or agreed to by the project proponent. A MITIGATED NEGATIVE DECLARATION will be prepared.
- The proposed project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.
- The proposed project MAY have a “potentially significant impact” or “potentially significant unless mitigated” impact on the environment, but at least one effect (a) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and (b) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An ENVIRONMENTAL IMPACT REPORT is required.
- Although the proposed project could have a significant effect on the environment, because all potentially significant effects (a) have been analyzed adequately in an earlier EIR or (MITIGATED) NEGATIVE DECLARATION pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier EIR or (MITIGATED) NEGATIVE DECLARATION, including revisions or mitigation measures that are imposed upon the proposed project, nothing further is required.

Issue	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
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D) AESTHETICS – Would the project:

- a) Have a substantial adverse effect on a scenic vista?

The project would not impact any designated scenic vista as outlined in the Mid-City Community Plan (MCCP). Additionally, a recommendation in the MCCP is to comply with setbacks adjacent to Open Space in order to preserve public views from uplands to lowland areas. The project does not propose development in the Open Space area on-site and complies with appropriate setbacks. As such, project implementation would not substantially affect public views including scenic vistas.

- b) Substantially damage scenic resources, including but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?

The project is not located within or adjacent to a state scenic highway. As such, project implementation would not result in such an impact.

- c) Substantially degrade the existing visual character or quality of the site and its surroundings?

The project would improve the visual quality and character of the site and at the same time preserve the designated historic structures. The shade structures have been determined to be contributing features to the historicity of the site. As such, the proposed improvements to the structures have been designed in such a way as to closely match the elements of the existing shade structures. The proposed design achieves the preservation of the aesthetic value of the site and improves the safety operations of the site.

New integral colored concrete walls would be installed north of bullet traps to retain the disturbed slopes at the north end of the site. The retaining walls would vary in height from six to eighteen feet, with an average height of eleven and one half feet. The bullet trap system and existing structures would be located in front of the retaining walls and the majority of the walls would not be visible from any public vantage point.

Furthermore, from the public right-of-way (looking north from Federal Boulevard and the 94 Freeway), the site improvements would ultimately improve the visual quality of the site because the existing condition of the structures and associated elements are in poor condition and are in need of improvement. As such, project implementation would not result in a substantial degradation of the site and/or its surroundings.

- d) Create a new source of substantial light or glare that would adversely

Issue	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
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affect day or nighttime views in the area?

The project would utilize construction materials that are not highly reflective. Additionally, the line-of-sight from the public right-of-way to the various structures on-site is not distracting. As such, project implementation would not result in an adverse affect to daytime or nighttime views.

II) **AGRICULTURAL AND FOREST RESOURCES:** In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Department of Conservation as an optional model to use in assessing impacts on agriculture and farmland. In determining whether impacts to forest resources, including timberland, are significant environmental effects, lead agencies may refer to information compiled by the California Department of Forestry and Fire Protection regarding the state’s inventory of forest land, including the Forest and Range Assessment Project and the Forest Legacy Assessment project; and forest carbon measurement methodology provided in Forest Protocols adopted by the California Air Resources Board. – Would the project:

a) Converts Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?

The project site is not classified as farmland by the Farmland Mapping and Monitoring Program (FMMP). Similarly, land surrounding the project is not in agricultural production and is not classified as farmland by the FMMP. Therefore, the project would not result in the conversion of farmland to non-agricultural uses.

b) Conflict with existing zoning for agricultural use, or a Williamson Act Contract?

Please see II.a

c) Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 1220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))?

Issue	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
The zoning of the project site does not impact forest land. Therefore, the project would not conflict with existing zoning for forest land.				

d) Result in the loss of forest land or conversion of forest land to non-forest use?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
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See II d).

e) Involve other changes in the existing environment, which, due to their location or nature, could result in conversion of Farmland to non-agricultural use or conversion of forest land to non-forest use?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
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The project would not involve a change in land use and would not impact farmland or forestland.

III. AIR QUALITY – Where available, the significance criteria established by the applicable air quality management or air pollution control district may be relied on to make the following determinations - Would the project:

a) Conflict with or obstruct implementation of the applicable air quality plan?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
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The project would not involve any future actions that would generate emissions as a result of the proposed use (e.g. vehicle miles traveled, etc). The project proposes to revitalize an existing shooting range, which would not generate additional traffic. However, emissions would occur during the construction phase of the project. The emissions would be minimal and would only occur temporarily during construction. Additionally, the construction equipment typically involved in small-scale projects generates relatively few emissions. During grading activities, dust suppression methods would be included.

b) Violate any air quality standard or contribute substantially to an existing or projected air quality violation?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
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Please see III.a

c) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
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Issue	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
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(including releasing emissions which exceed quantitative thresholds for ozone precursors)?

As described above, construction operations could temporarily increase the emissions of dust and other pollutants. However, construction emissions would be temporary and implementation of Best Management Practices (BMPs) would reduce temporary dust impacts. Additionally, the scope and nature of the project would not result in an increase in Vehicle Miles Traveled (VMTs) and associated emissions. Therefore, the project would not result in a cumulatively considerable net increase of any criteria pollutant for which the project is non-attainment in the region under applicable federal or state ambient air quality standards.

- d) Expose sensitive receptors to substantial pollutant concentrations?

The project site is surrounded by freeways and is not in close proximity to any sensitive receptors. Additionally, project implementation would result in minimal and temporary air quality emissions during construction activities. As such, project implementation would not expose sensitive receptors to substantial concentrations of pollution.

- e) Create objectionable odors affecting a substantial number of people?

Operation of construction equipment and vehicles could generate odors associated with fuel combustion. However, these odors would dissipate into the atmosphere upon release. Therefore, the project would not create substantial amounts of objectionable odors affecting a substantial number of people.

IV. BIOLOGICAL RESOURCES – Would the project:

- a) Have substantial adverse effects, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?

The project would not impact local, state or federally protected species. The project site is developed and lacks sensitive biological resources. Project implementation would not result in an adverse effect to sensitive biological resources.

Issue	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
b) Have a substantial adverse effect on any riparian habitat or other community identified in local or regional plans, policies, and regulations or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

The project site is just north of Federal Boulevard with Chollas Creek located on the south side of Federal Boulevard. Project implementation would not impact any jurisdictional wetlands or riparian habitat.

c) Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including but not limited to marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
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See IV b).

d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
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The developed police facility does not support any migratory wildlife corridors. Project implementation would not impact any native resident or migratory fish.

e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
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The project would not conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance. Project implementation would not impact *Sensitive Biological Resources* as defined in the Land Development Code. With respect to polices found in the Chollas Creek Enhancement Plan (CCEP), the project would be consistent with the goals and objectives of the CCEP.

f) Conflict with the provisions of an	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
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Issue	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?				

The project would be consistent with the goals, policies and objective of the City’s Multiple Species Conservation Program (MSCP) as project implementation would not occur within or adjacent to the City’s Multi-Habitat Planning Area (MHPA) and would not impact *Sensitive Biological Resource* as defined in the Land Development Code (LDC). Additionally, the project would be consistent with the policies found in the Chollas Creek Enhancement Plan (CCEP).

V. CULTURAL RESOURCES – Would the project:

- a) Cause a substantial adverse change in the significance of an historical resource as defined in §15064.5?

The purpose and intent of the *Historical Resources Regulations of the Land Development Code (Chapter 14, Division 3, and Article 2)* is to protect, preserve and, where damaged, restore the historical resources of San Diego. The regulations apply to all proposed development within the City of San Diego when historical resources are present on the premises.

CEQA requires that before approving discretionary projects, the Lead Agency must identify and examine the significant adverse environmental effects, which may result from that project. A project that may cause a substantial adverse change in the significance of a historical resource may have a significant effect on the environment (Sections 15064.5(b) and 21084.1). A substantial adverse change is defined as demolition, destruction, relocation, or alteration activities, which would impair historical significance (Sections 15064.5(b)(1)). Any historical resource listed in, or eligible to be listed in the California Register of Historical Resources, including archaeological resources, is considered to be historically or culturally significant.

The project site located at 4002-4008 Federal Blvd., APN 541-251-04 and is a designated historic resource listed as Historic Resources Board Site #726-San Diego Police Pistol Range. In order to assess the historical significance of the structures on-site, a Historical Resource Evaluation Report, *The San Diego Police Pistol Range* (May, July 2005 and amended October 2010), was prepared and is summarized herein. Two cobble-stone buildings, the clubhouse and office/residence, were built during the years 1934-1936. These buildings are significant historical resources as they are examples of a late period of Arts & Crafts architecture at its most organic and functional stage. In addition to the cobble-stone buildings, the shade structure model was analyzed for historical significance and found to be a “contributing” structure to the overall site.

The scope of the proposed project does not include any modifications to the two historic, cobble-

Issue	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
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stone buildings. However, the shade structures would be reconstructed to match the existing one, minus the support member for the baffle. The support member would be replaced with steel members to match the size of the wood members and painted a matte finish. Roofing for the structures shall be corrugated metal to match the existing roof. The shade structures have been designed to incorporate many of the same elements of the existing shade structures while improving the operational safety of the firing ranges. City of San Diego Historic Resources Board Staff has reviewed the proposal and determined that the project would be consistent with the U.S. Secretary of the Interior's Standards for the Treatment of Historic Properties. Therefore, the project would not result in a substantial adverse change in the significance of an historical resource and mitigation is not required.

- b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?

During the mass grading of the project area for the Central Police Facility, several historic trash deposits were identified by the archaeological monitor (artifacts range from the 1880's to modern trash intrusions). It was determined that these deposits were an extension of CA-SDI-10528H, which lies to the north of the project. CA-SDI-10528H is recorded as a City dump that was in use from circa 1908-1915. Based upon the very disturbed nature of both the recorded site to the north and its extension within the project's boundary it was determined that neither deposit is historically significant.

Qualified City Staff (Jeff Szymanski RPA) conducted a field visit and surface components of the previously identified historic deposits were not identified. Furthermore, it was determined that the new improvements are not located where the historic deposits were recorded. Based upon the negative site visit and the scope of work, archaeological testing of extension of CA-SDI-10528H is not required. However, due to the project's proposed ground disturbing activities, archaeological monitoring would be required in case additional components of CA-SDI-10528H are present. As such, mitigation has been incorporated into Section V of the Mitigated Negative Declaration and would reduce impacts to historical resources to below a level of significance.

- c) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?

The site is previously developed and the project would not result in grading quantities that would exceed 10 feet in depth into undisturbed formation. Much of the project grading would be a result of the new bullet traps and retaining walls that would occur at the northern portion of the site. Excavation for the retaining walls would require excavation of 18 feet of cut into a slope. This area of the site has been previously disturbed and does not support exposed and undisturbed geologic formations with high sensitivity. Therefore, based on the disturbed nature of the hillside, paleontological monitoring would not be required.

- d) Disturb any human remains,

Issue	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
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including those interred outside of formal cemeteries?

Based upon previous archaeological research in the area the likelihood of encountering human remains is low. However, the project proposes ground disturbing activities and therefore there is a potential to discover human remains. Therefore, monitoring is required with Native American participation. In addition, mitigation measures that address the discovery of human remains are included in Section V of the MMRP. Implementation of these measures would reduce potential impacts to below a level of significance. As such, project implementation would not result in a significant impact to human remains.

Furthermore, standard language outlined in the *City of San Diego Standard Specifications for Public Works Construction* (“WHITEBOOK”) would be included in the construction documents. This language requires that upon notification by the Contractor of the discovery of human remains of unknown origin, the Engineer shall immediately notify the San Diego County Coroner to start the investigation process, in accordance with the California Health and Safety Code §§7050.5 and 7051.

VI. GEOLOGY AND SOILS – Would the project:

a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:

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| <p>i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.</p> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
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The City of San Diego’s Seismic Safety Map does not indicate the presence of a known earthquake fault mapped within the project area. Therefore, no impact would occur from a known earthquake fault.

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| <p>ii) Strong seismic ground shaking?</p> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
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Based on a Probabilistic Seismic Hazard Assessment for the Western United States, issued

Issue	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
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by the United States Geological Survey (1997), the project site is located in a zone where the horizontal peak ground acceleration having a 10 percent probability of exceedance in 50 years is 0.26g (26 percent of the acceleration of gravity). Engineering design considerations and utilization of standard construction practices would ensure that potential impacts would remain less than significant.

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| iii) Seismic-related ground failure, including liquefaction? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
|--|--------------------------|--------------------------|--------------------------|-------------------------------------|

A Geotechnical Evaluation, prepared by Ninyo and Moore, dated May 29, 2001, evaluated the Central Police Facility and the dog kennel (both sides of the firing ranges) for geologic issues including liquefaction. The analysis concluded that based on the cemented character of the formational material as well as the absence of groundwater encountered in the exploratory borings, the potential for seismic-related ground failure, liquefaction is low. Additionally, the analysis indicated a low potential and no indication of landslides.

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|-----------------|--------------------------|--------------------------|-------------------------------------|--------------------------|
| iv) Landslides? | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
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See VI (iii). In addition, the site is underlain by the geologic San Diego Formation, fill, topsoil and alluvium. The engineering design and utilization of standard construction practices would ensure that potential impacts based on regional geologic hazards would remain less than significant.

- | | | | | |
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| b) Result in substantial soil erosion or the loss of topsoil? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
|---|--------------------------|--------------------------|--------------------------|-------------------------------------|

The project would result in 3,700 cubic-yards of cut at a maximum depth of approximately 18 feet (this depth would occur into the previously disturbed manufactured slope immediately behind the bullet traps). Grading would occur over 0.48-acres of the site. The majority of the grading would occur at the northern portion of the site for construction of the bullet traps and retaining walls. The project would not result in a substantial loss of topsoil as the grading quantities are relatively small. With respect to erosion control, the current storm water is discharged to a concrete lined, impermeable channel. As such, no undercutting erosion, slope stability or vegetative stress is anticipated. With incorporation of vegetated swales and bioretention areas into the drainage design, project implementation would not increase runoff volume, velocity or frequency at any of the basin outfalls, nor will it significantly reduce existing infiltration rates. As a result, project implementation would not significantly impact the existing flow regime and downstream conditions such as erosion and habitat impacts are anticipated

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| c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
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Issue	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
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Project implementation would not result in such an impact. See VI (iii)

- d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
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Project implementation would not result in such an impact. See VI (iii)

- e) Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
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The project does not propose any septic tanks or alternative waste disposal methods.

VII. GREENHOUSE GAS EMISSIONS - Would the project:

- a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?

<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
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The City of San Diego is utilizing the California Air Pollution Control Officers Association (CAPCOA) report “CEQA and Climate Change” (CAPCOA 2009) to determine whether a GHG analysis would be required for submitted projects. The CAPCOA report references a 900 metric ton guideline as a conservative threshold for requiring further analysis and possible mitigation. This emission level is based on the amount of vehicle trips, the typical energy and water use associated with projects, and other factors.

CAPCOA identifies project types that are estimated to emit approximately 900 metric tons of GHG’s annually. This 900 metric ton threshold is roughly equivalent to 35,000 square feet of office space, 11,000 square feet of retail, 50 single-family residential units, 70 multi-family residential units and 6,300 square feet of supermarkets.

Since the proposed recapitalization of the Central Police Firing Range and associated improvements does not fit in the categories listed above, a GHG modeling analysis was conducted to determine the level of GHG emissions. The Urbemis Model (2007 9.2.4) was utilized to generate GHGs emissions estimates for the project. The model utilizes project information (e.g. total construction months, project type, construction equipment, grading quantities and the total disturbance area, etc.) to quantify GHG emissions from heavy-duty construction equipment, haul trucks, and worker commute

Issue	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
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trips associated with linear construction projects.

The result of the model indicates approximately 250 annualized metric tons of emissions. The output for the project falls well below the 900 metric ton per year figure. Therefore, based upon the analysis showed above the project would result in a less than significant CEQA Greenhouse gas impact and mitigation would not be required.

- b) Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases?

Please see VII.a. The project would not conflict with any applicable plans, policies, or regulations related to greenhouse gases.

VIII. HAZARDS AND HAZARDOUS MATERIALS – Would the project:

- a) Create a significant hazard to the public or the environment through routine transport, use, or disposal of hazardous materials?

A Phase I Environmental Site Assessment was prepared by Ninyo and Moore, dated February 7, 2002 for the undeveloped land at the southeast corner of Federal Boulevard and Home Avenue (across the street from the Pistol Range). According to County DEH records reviewed for the 2002 report lead removal had occurred at the facility in 1994 and 1998 under the supervision of the City of San Diego and completed to the satisfaction of the City.

Given the continued use of the shooting range for training purposes, additional lead contamination has occurred since the last removal effort in 1998. The project would be required to safely remove the lead and any asbestos containing materials that would be affected during the construction process. As a result, a hazardous material abatement plan for the removal of the contamination would be required. Prior to the construction of the project the abatement plan would be reviewed and approved by the City of San Diego Environmental Services Department (ESD) Office, Asbestos and Lead Management Program (ALMP) as outlined in the mitigation measures found in Section V of the MND.

Furthermore, section 803 “*Encountering or Releasing Hazardous Substances or Petroleum Products*” of the *City of San Diego Standard Specifications for Public Works Construction (“WHITEBOOK”)*, would be made part of the construction documents and would ensure the proper handling and disposal of any contaminated soils. Additionally, state and federal law require the proper treatment and disposal of any such discovery that would fall under their jurisdiction. As such, the project would incorporate measures to meet the local, state and federal requirements to address such hazardous materials should they be discovered during construction. Therefore, incorporation of the mitigation in Section V of the MND would mitigate impacts to below a level of significance.

- b) Create a significant hazard to the

Issue	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
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public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?

See VIII a)

- c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?

Project implementation would involve the disposal of hazardous substances; however, the site is not located within one-quarter mile of an existing or proposed school. Additionally, the project is required to comply with mitigation in Section V of the MND. Furthermore, section 803 of the City of San Diego's "WHITEBOOK" would ensure that appropriate specifications are included in the contract documents. As such, impacts regarding the handling or discovery of hazardous waste within close proximity to a school would be mitigated to below a level of significance.

- d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?

Please see VIII, mitigation would be required to safely remove hazardous materials from the site.

- e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two mile of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?

The proposed project is not located within the Airport Influence Area (AIA) of the San Diego International Airport's Airport Land Use Compatibility Plan (ALUCP).

- f) For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?

Issue	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
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The project is not located within the vicinity of a private airstrip. As such, the project would not result in a safety hazard for people residing or working in the project area.

- g) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?

The project does not include work within the public Right-of-Way and therefore it is not anticipated to interfere within an adopted emergency response or evacuation plan.

- h) Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?

The project site is mostly developed and is not adjacent to wildlands or areas that are susceptible for wild fires. As such, project implementation would not expose people or structures to fires.

IX. HYDROLOGY AND WATER QUALITY - Would the project:

- a) Violate any water quality standards or waste discharge requirements?

A Water Quality Technical Report (WQTR) was prepared to address potential water quality issues that could occur on-site resulting from project implementation (WQTR For San Diego Police Department Pistol Range Improvements, Nasland Engineering, October 2010). The report was prepared to identify information related to pollutants of concern generated by the project then describes how Permanent Storm Water Best Management Practices (BMPs), Treatment Control BMPs, Low Impact Development (LID) BMPs, and Source Control BMPs would be implemented to meet storm water requirements.

The potentially affected water bodies include Chollas Creek (adjacent to Federal Boulevard immediately south of the site) and the San Diego Bay Shoreline, located approximately 2.6 miles southwest of the site. Both water bodies are listed in Section 303 (d) of the Clean Water Act as being impaired. Chollas Creek is listed for being polluted or stressed by copper, lead and zinc. The San Diego Bay Shoreline is listed for being polluted or stressed by Benthic Community Effects and Sediment Toxicity.

The project would comply with the City of San Diego's Storm Water Standards. As identified in the report, the project is considered a priority development project and has incorporated permanent BMPs (including LID, source control and treatment control BMPs) into the design. As part of the project design, the project includes 11,600 square-feet of bio-retention areas in front of each of the firing ranges and two 900 square-foot vegetated swales running north/south between the eastern

Issue	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
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ranges and on the western side of the western-most range. Prior to construction, a Storm Water Pollution Prevention Plan (SWPPP) would ensure implementation of the priority BMPs.

The WQTR has concluded that through the incorporation of vegetated swales and bioretention areas into the drainage design, the project would not increase the runoff volume, velocity or frequency at any of the basin outfalls, nor will it significantly reduce existing infiltration rates. Because the project will not significantly impact the existing flow regime, no alterations to existing downstream conditions such as erosion and habitat characteristics are anticipated.

- b) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?

The project does not propose the use of groundwater nor would it impact groundwater during grading activities. Furthermore, the project would not introduce a substantially large amount of new impervious surfaces over ground that could interfere with groundwater recharge. Therefore, the project would not substantially deplete groundwater supplies or interfere substantially with groundwater recharge.

- c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner, which would result in substantial erosion or siltation on- or off-site?

A preliminary Hydrology Study (Nasland Engineering, October 2010) was prepared for the project which concluded that the project would not negatively impact existing hydrologic conditions and would not result in a substantial impact to the drainage pattern. Upon project completion, the runoff volume would not increase. With respect to erosion control, a concrete drainage ditch would be constructed at the top of all proposed retaining walls so as to prevent storm water from flowing over the wall. The concrete drainage ditch would collect potential off-site runoff, convey it into new storm drain laterals and ultimately connect to the existing storm drain system. Additionally, any vegetation removed during construction of the proposed retaining wall shall be replaced with native or drought tolerant landscaping in order to minimize erosion.

- d) Substantially alter the existing drainage pattern of the site or area,

Issue	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
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including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner, which would result in flooding on- or off-site?

Please see IX.c.

- e) Create or contribute runoff water, which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?

The project would not result in an increase in storm water volume, frequency or velocity at any of the basin outfalls, nor will it significantly reduce existing infiltration rates.

- f) Otherwise substantially degrade water quality?

See IX-a.

- g) Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?

The project would result in improvement to the existing firing ranges and does not propose any habitable structures.

- h) Place within a 100-year flood hazard area, structures that would impede or redirect flood flows?

The project is partially within the FEMA 100-year Flood Hazard Zone AE. However, project implementation would not result in an increase to the base-flood elevation and would not impact the floodway or increase the floodplain. The engineering analysis verifying a no-rise in base-flood elevation would be verified by the City Engineer. Therefore, the project is consistent with Council Policy 600-14 and would not impede or redirect flood flows or result in on or off site impacts on upstream or downstream properties.

Issue	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
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i) Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?

The project would not result in the exposure of people or structures to floods as a result of a levee or dam. The project site is not downstream from either a levee or dam. As such, no impact would occur.

j) Inundation by seiche, tsunami, or mudflow?

The project would not include any new features that would increase the risk associated with seiche, tsunami, or mudflow beyond those of the existing conditions.

X. LAND USE AND PLANNING – Would the project:

a) Physically divide an established community?

The existing San Diego Police Pistol Range was constructed over a period of three years: 1934-1936. The proposed amendment to Site Development Permit No. 8313 would result in improvements to the existing firing ranges. The project site is located just north of the I-94 freeway, just east of I-15 and just west of I-805. Existing multi-dwelling residential development sits just to the north of the subject site, beyond the top of the slope. Therefore, project implementation would not result in the division of an established community.

b) Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?

The project is consistent with the policies, goals and recommendations of the General Plan, Mid-City Community Plan and the Chollas Creek Enhancement Plan (CCEP). The CCEP was adopted with the overarching policy of preserving, restoring and enhancing riparian habitat along Chollas Creek. The project site is just north of Federal Boulevard with Chollas Creek located adjacent to Federal Boulevard immediately to the south. Project implementation would be consistent with the applicable Design/Development Guidelines which call for erosion control, water quality maintenance and enhancement of the CCEP. Additionally, project implementation would not impact any jurisdictional wetlands.

Issue	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
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The site drains to two basin outfalls located at the southern portion of the site and ultimately discharges into a concrete lined channel portion of the Chollas Creek located near the site just south of Federal Boulevard. Per the Countywide Standard Urban Stormwater Mitigation Plan (SUSMP), Chollas Creek is listed as having set Total Maximum Daily Loads (TMDL) for Daizinon, Copper, Lead and Zinc. Heavy metals (lead) are identified as a pollutant of concern for the project. In order to address the TMDL requirements, treatment BMPs, which have high removal efficiency for heavy metals, have been selected and incorporated into the project. As such, the project is consistent with the water quality objectives of the CCEP and the overall policies and objectives of the enhancement plan.

- c) Conflict with any applicable habitat conservation plan or natural community conservation plan?

The project site is not located within or adjacent to the City's Multi-Habitat Planning Area (MHPA) and would be consistent with the CCEP, see X-b) for further discussion. As such, project implementation would not conflict with any habitat conservation plan.

XI. MINERAL RESOURCES – Would the project?

- a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?

The areas surrounding the project are not being used for the recovery of mineral resources. Similarly, these areas surrounding the project site are not designated for the recovery of mineral resources on the City of San Diego General Plan Land Use Map. Therefore, the project would not result in the loss of availability of a known mineral resource.

- b) Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?

The project would not result in the loss of the availability of a locally important mineral resource. There are no existing quarries within close proximity to the site. As such, project implementation would not impact the operations of any existing quarries.

XII. NOISE – Would the project result in:

- a) Exposure of persons to, or generation of, noise levels in excess of standards established in the local general plan or noise ordinance, or applicable

Issue	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
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standards of other agencies?

The project would not result in a permanent substantial increase in the existing noise environment. The existing use is a police firing range and no change of use would occur. The project would result in improved firing range facilities and would not result in an increase in usage of the site. Furthermore, existing noise levels are elevated because of the projects adjacency to I-94. Therefore, the firing range noise would not exceed noise levels beyond those of existing and mitigation would not be required.

- b) Exposure of persons to, or generation of, excessive ground borne vibration or ground borne noise levels?

The project would not result in people being exposed to excessive ground borne noise levels.

- c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?

The project would not result in permanent substantial increase in the existing noise environment. The existing use is a police firing range. Furthermore, existing noise levels are elevated because of the projects adjacency to I-94. Therefore, the firing range noise would not exceed noise levels beyond those of existing and mitigation would not be required.

- d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above existing without the project?

The project would not result in a substantial increase in the ambient noise environment. However, during construction and grading activities, there is the potential for construction noise to occur. Noise occurring during construction activities would be temporary and would be regulated under San Diego Municipal Code Section (SDMC) 59.5.0404, "Noise Abatement and Control." Given that the construction of the project would result in temporary noise and would be regulated by the SDMC, the project would not result in a significant noise environment.

- e) For a project located within an airport land use plan, or, where such a plan has not been adopted, within two miles of a public airport or public use airport would the project expose people residing or working in the area to excessive noise levels?

The project is not located within the Airport Influence Area (AIA) of the San Diego International Airport's Airport Land Use Compatibility Plan (ALUCP) or a within a private airstrip. Therefore,

Issue	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
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people residing or working in the area of the project would not be exposed to excessive airport noise.

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| f) For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
|--|--------------------------|--------------------------|--------------------------|-------------------------------------|

The project is not located within the vicinity of a private airport; therefore, people residing or working in the area of the project would not be exposed to excessive airport noise.

XIII. POPULATION AND HOUSING – Would the project:

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| a) Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
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The project does not propose any residential structures or any other infrastructure improvements. Therefore, project implementation would not induce substantial population growth.

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| b) Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
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Project implementation would not displace any housing. Therefore, the construction of housing elsewhere would not be necessitated.

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|---|--------------------------|--------------------------|--------------------------|-------------------------------------|
| c) Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
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See XIII b).

XIV. PUBLIC SERVICES

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|--|--|--|--|--|
| a) Would the project result in substantial adverse physical impacts associated with the provisions of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in | | | | |
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Issue	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
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order to maintain acceptable service rations, response times or other performance objectives for any of the public services:

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| i) Fire Protection | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
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The project would not alter any fire protection response times, facilities or impact the operation of fire personnel.

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|-----------------------|--------------------------|--------------------------|--------------------------|-------------------------------------|
| ii) Police Protection | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
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The project would result in the improved operation of the Central Police Station Firing Ranges. The revitalization of the firing ranges would include a new bullet trap system with a concrete pad and a lead containment system, better designed and more functional shade structures, retaining walls, range divider walls, lead remediation, landscaping and resurfaced parking areas. The project would substantially improve the site from a public health, and safety standpoint as well as from an aesthetic standpoint.

- | | | | | |
|--------------|--------------------------|--------------------------|--------------------------|-------------------------------------|
| iii) Schools | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
|--------------|--------------------------|--------------------------|--------------------------|-------------------------------------|

The project would not physically alter any schools.

- | | | | | |
|----------|--------------------------|--------------------------|--------------------------|-------------------------------------|
| v) Parks | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
|----------|--------------------------|--------------------------|--------------------------|-------------------------------------|

The project would not physically alter any parks.

- | | | | | |
|-----------------------------|--------------------------|--------------------------|--------------------------|-------------------------------------|
| vi) Other public facilities | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
|-----------------------------|--------------------------|--------------------------|--------------------------|-------------------------------------|

The project would not result in the increased demand for electricity, gas, or other public facilities. The project would improve the police firing ranges and would not impact any other public facilities.

XV. RECREATION –

- | | | | | |
|--|--------------------------|--------------------------|--------------------------|-------------------------------------|
| a) Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
|--|--------------------------|--------------------------|--------------------------|-------------------------------------|

The project would not result in the building of residential units and would therefore not result in an increase in demand for recreational facilities.

- | | | | | |
|---|--------------------------|--------------------------|--------------------------|-------------------------------------|
| b) Does the project include recreational facilities or require the construction | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
|---|--------------------------|--------------------------|--------------------------|-------------------------------------|

Issue	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
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or expansion of recreational facilities, which might have an adverse physical effect on the environment?

See XV a).

XVI. TRANSPORTATION/TRAFFIC – Would the project?

- a) Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit?

The project would improve site circulation, but would not adversely affect neighboring circulation systems. Additionally, project implementation would not result in an increase in Vehicle-Miles Traveled (VMT) as the project would not increase the intensity of the use.

- b) Conflict with an applicable congestion management program, including, but not limited to level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways?

See XVI a)

- c) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?

See XVI a., the project would not have any such impacts.

- d) Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or

Issue	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
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incompatible uses (e.g., farm equipment)?

The project has been designed in such a way as to improve the operation of the site and the public health and safety. No such hazards resulting from a design feature would occur.

- e) Result in inadequate emergency access?

Due to the improvements to the parking areas the project would result in improved circulation and would allow for easier movement throughout the site in the event of an emergency.

- f) Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities?

The project would not conflict with any such plans.

XVII. UTILITIES AND SERVICE SYSTEMS – Would the project:

- a) Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?

The project would not result in an increase in the intensity of the use and would not exceed wastewater treatment requirements.

- b) Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?

The project would not result in an increase in the intensity of the use and would not be required to construct a new water or wastewater treatment facility.

- c) Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?

The project would not result in a substantial impact to the drainage pattern. Upon project

Issue	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
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completion, the runoff volume would not increase.

- d) Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
--------------------------	--------------------------	--------------------------	-------------------------------------

The project would not increase the intensity of use of the site and would therefore be served by the existing water supplies available to the site.

- e) Result in a determination by the wastewater treatment provided which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
--------------------------	--------------------------	--------------------------	-------------------------------------

See XVII c)

- f) Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?

<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------	-------------------------------------	--------------------------

Construction of the project would likely generate minimal waste. This waste would be disposed of in conformance with all applicable local and state regulations pertaining to solid waste including permitting capacity of the landfill serving the project area. Operation of the project would not generate waste and, therefore, would not affect the permitted capacity of the landfill serving the project area. Future removal of lead would be done in compliance with all federal, state, and local regulations related to hazardous materials.

- g) Comply with federal, state, and local statutes and regulation related to solid waste?

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
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See XVII f). Any solid waste generated during construction related activities would be recycled or disposed of in accordance with all applicable local, state and federal regulations.

XVIII. MANDATORY FINDINGS OF SIGNIFICANCE –

- a) Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species,

<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	-------------------------------------	--------------------------	--------------------------

Issue	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
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cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?

The project is located in a developed urbanized neighborhood and would not degrade the quality of the surrounding environment. Implementation of the MMRP would reduce potential impacts to historical resources to below a level of significance. No biological resources are present on site and therefore, impacts to such resources would not result from the project. The on-site improvements were determined to be consistent with the U.S. Secretary of the Interior’s Standards for the Treatment of Historic Properties and no impacts would occur to the Historic Designated structures and the contributing shade structure. As a result, project implementation would not result in a significant impact to these resources.

- b) Does the project have impacts that are individually limited, but cumulatively considerable? (“Cumulatively considerable” means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable futures projects)?

The project may result in minimal dust and GHGs during the construction process. However, these emissions would be relatively minor and would not be considerable. When viewed in connection with the effects of other projects in the Mid-City area, construction activities have the potential to impact cultural resources which could incrementally contribute to a cumulative loss of non-renewable resources. However, with implementation of the mitigation measures in Section V of the MND, incremental impacts would be reduced to below a level of significance.

- c) Does the project have environmental effects, which will cause substantial adverse effects on human beings, either directly or indirectly?

As stated previously, potentially significant impacts have been identified for Archaeological Resources and Public Health and Safety. Impacts associated with Historical Resources are individually significant and when taken into consideration with other past projects in the vicinity, may contribute to a cumulative impact; specifically with respect to non-renewable resources.

Issue	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
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However, with implementation of the MMRP, the information associated with these resources will be collected catalogued and included in technical reports available to researchers for use on future projects, thereby reducing the cumulative impact to below a level of significance. Mitigation has been included in Section V of this MND to reduce impacts to below a level of significance. As such, project implementation would not result in substantial adverse impact to human beings.

INITIAL STUDY CHECKLIST

REFERENCES

I. AESTHETICS / NEIGHBORHOOD CHARACTER

- City of San Diego General Plan.
- Community Plan.
- Local Coastal Plan.

II. AGRICULTURAL RESOURCES & FOREST RESOURCES

- City of San Diego General Plan.
- U.S. Department of Agriculture, Soil Survey - San Diego Area, California, Part I and II, 1973.
- California Agricultural Land Evaluation and Site Assessment Model (1997)
- Site Specific Report:

III. AIR QUALITY

- California Clean Air Act Guidelines (Indirect Source Control Programs) 1990.
- Regional Air Quality Strategies (RAQS) - APCD.
- Site Specific Report:

IV. BIOLOGY

- City of San Diego, Multiple Species Conservation Program (MSCP), Subarea Plan, 1997
- City of San Diego, MSCP, "Vegetation Communities with Sensitive Species and Vernal Pools" Maps, 1996.
- City of San Diego, MSCP, "Multiple Habitat Planning Area" maps, 1997.
- Community Plan - Resource Element.
- California Department of Fish and Game, California Natural Diversity Database, "State and Federally-listed Endangered, Threatened, and Rare Plants of California," January 2001.
- California Department of Fish & Game, California Natural Diversity Database, "State and Federally-listed Endangered and Threatened Animals of California," January 2001.
- City of San Diego Land Development Code Biology Guidelines.
- Site Specific Report:

V. CULTURAL RESOURCES (INCLUDES HISTORICAL RESOURCES)

- City of San Diego Historical Resources Guidelines.
- City of San Diego Archaeology Library.
- Historical Resources Board List.
- Community Historical Survey:
- Site Specific Report: "The San Diego Police Pistol Range," prepared by Vonn Marie May, July 2005 and subsequently amended October 2010.

VI. GEOLOGY/SOILS

- City of San Diego Seismic Safety Study.
- U.S. Department of Agriculture Soil Survey - San Diego Area, California, Part I and II, December 1973 and Part III, 1975.
- Site Specific Report: A Geotechnical Evaluation, prepared by Ninyo and Moore, dated May 29, 2001

VII. GREENHOUSE GAS EMISSIONS

- Site Specific Report: City of San Diego Engineering and Capital Projects GHG Urbemis Model (2007 9.2.4) for the San Diego Police Pistol Range Project.

VIII. HAZARDS AND HAZARDOUS MATERIALS

- San Diego County Hazardous Materials Environmental Assessment Listing
- San Diego County Hazardous Materials Management Division
- FAA Determination
- State Assessment and Mitigation, Unauthorized Release Listing, Public Use Authorized.
- Airport Land Use Compatibility Plan.
- Site Specific Report: Phase I Environmental site Assessment, prepared by Ninyo & Moore, dated February 7, 2002.

IX. HYDROLOGY/WATER QUALITY

- Flood Insurance Rate Map (FIRM).
- Federal Emergency Management Agency (FEMA), National Flood Insurance Program - Flood Boundary and Floodway Map.
- Clean Water Act Section 303(b) list, http://www.swrcb.ca.gov/tmdl/303d_lists.html).

Site Specific Report: Water Quality Technical Report, prepared by Nasland Engineering, dated October 14, 2010. Preliminary Hydrology Study, prepared by Nasland Engineering dated October 14, 2010

X. LAND USE AND PLANNING

City of San Diego General Plan.

Community Plan. Mid-City Community Plan and the Chollas Creek Enhancement Plan (CCEP).

Airport Land Use Compatibility Plan: Lindberg Field

City of San Diego Zoning Maps

FAA Determination

XI. MINERAL RESOURCES

California Department of Conservation - Division of Mines and Geology, Mineral Land Classification.

Division of Mines and Geology, Special Report 153 - Significant Resources Maps.

California Geological Survey - SMARA Mineral Land Classification Maps.

Site Specific Report:

XII. NOISE

Community Plan

San Diego International Airport Master Plan CNEL Maps.

MCAS Miramar ACLUP

Brown Field Airport Master Plan CNEL Maps.

Montgomery Field CNEL Maps.

San Diego Association of Governments - San Diego Regional Average Weekday Traffic Volumes.

San Diego Metropolitan Area Average Weekday Traffic Volume Maps, SANDAG.

City of San Diego General Plan.

Site Specific Report:

XIII. PALEONTOLOGICAL RESOURCES

City of San Diego Paleontological Guidelines.

Deméré, Thomas A., and Stephen L. Walsh, "Paleontological Resources City of San Diego," Department of Paleontology San Diego Natural History Museum, 1996.

Kennedy, Michael P., and Gary L. Peterson, "Geology of the San Diego Metropolitan Area, California. Del Mar, La Jolla, Point Loma, La Mesa, Poway, and SW 1/4 Escondido 7 1/2 Minute Quadrangles," California Division of Mines and Geology Bulletin 200, Sacramento, 1975.

Kennedy, Michael P., and Siang S. Tan, "Geology of National City, Imperial Beach and Otay Mesa Quadrangles, Southern San Diego Metropolitan Area, California," Map Sheet 29, 1977.

Site Specific Report:

XIV. POPULATION / HOUSING

City of San Diego General Plan.

Community Plan.

Series 11 Population Forecasts, SANDAG.

Other:

XV. PUBLIC SERVICES

City of San Diego General Plan.

Community Plan.

XVI. RECREATIONAL RESOURCES

City of San Diego General Plan.

Community Plan.

Department of Park and Recreation

City of San Diego - San Diego Regional Bicycling Map

Additional Resources:

XVII. TRANSPORTATION / CIRCULATION

City of San Diego General Plan.

Community Plan.

San Diego Metropolitan Area Average Weekday Traffic Volume Maps, SANDAG.

San Diego Region Weekday Traffic Volumes, SANDAG.

Site Specific Report:

XVIII. UTILITIES

X City of San Diego General Plan.

X Community Plan.

___ Site Specific Report:

XIX. WATER CONSERVATION

___ City of San Diego General Plan.

___ Community Plan.

___ Sunset Magazine, New Western Garden Book. Rev. ed. Menlo Park, CA: Sunset Magazine.

___ Site Specific Report:

NOTICE OF EXEMPTION

(Check one or both)

TO: RECORDER/COUNTY CLERK
P.O. BOX 1750, MS A-33
1600 PACIFIC HWY, ROOM 260
SAN DIEGO, CA 92101-2422

FROM: CITY OF SAN DIEGO
PUBLIC WORKS DEPARTMENT
525 B STREET, SUITE 750, MS 908A
SAN DIEGO, CA 92101

OFFICE OF PLANNING AND RESEARCH
1400 TENTH STREET, ROOM 121
SACRAMENTO, CA 95814

PROJECT/WBS NO.: B-10012.02.06/S-10018.02.06 PROJECT TITLE: San Diego Police Department (SDPD) Firing Range Tenant Improvements

PROJECT LOCATION-SPECIFIC: Project is located at 4002 Federal Boulevard, San Diego, CA 92105 in the Mid-City: City Heights Community Planning Area (Council District 9).

PROJECT LOCATION-CITY/COUNTY: San Diego/San Diego

DESCRIPTION OF NATURE, PURPOSE, AND BENEFICIARIES OF PROJECT: This project proposes tenant improvements for the clubhouse and the staff office. Improvements for the clubhouse include removal and replacement of: two (2) entrance doors (frames and sidelights); one (1) interior door; cabinetry, counter and sink in kitchen; two (2) ceiling-hung space heaters; all interior light fixtures; all restroom fixtures and accessories; as well as a new sloped walkway to existing platform, installation of new audio/visual equipment for training, and new floor and wall finishes. Improvements to the staff office building include: removal and replacement of all interior light fixtures and electrical panels; as well as new floor, wall and ceiling finishes and modifications to cabinetry. The facility is designated by the Historic Resources Board (HRB) as "Site #726-San Diego Police Pistol Range." Historic staff reviewed and found the project to be in conformance with the City's Historic Resources Regulations and the United States Secretary of Interior's Standards and Guidelines for Rehabilitation of Historic Buildings.

NAME OF PUBLIC AGENCY APPROVING PROJECT: San Diego/San Diego

NAME OF PERSON OR AGENCY CARRYING OUT PROJECT: City of San Diego, Public Works Contact: George Freiha; 525 B Street, Suite 750, San Diego, CA 92101; Ph: (619) 533-7449

EXEMPT STATUS: (CHECK ONE)

- MINISTERIAL (SEC. 21080(b)(1); 15268);
- DECLARED EMERGENCY (SEC. 21080(b)(3); 15269(a));
- EMERGENCY PROJECT (SEC. 21080(b)(4); 15269 (b)(c))
- CATEGORICAL EXEMPTION: 15301 (Existing Facilities), 15303 (New Construction or Conversion of Small Structures), and 15304 (Minor Alterations to Land)
- STATUTORY EXEMPTIONS:

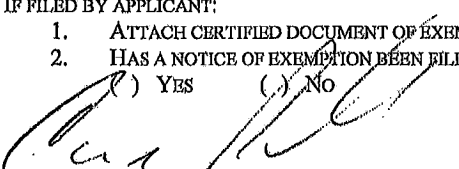
REASONS WHY PROJECT IS EXEMPT: The City of San Diego conducted an environmental review which determined that the project meets the categorical exemption criteria set forth in CEQA State Guidelines, Sections 15301(a and d) which allows for minor alterations to existing public structures, facilities, mechanical equipment or topographical features, involving negligible or no expansion of use including interior and exterior, repairs or rehabilitation of buildings or structures, 15303(c) which allows for new construction or conversion of small structures within the existing buildings and minor exterior improvements where the facility will continue to be used for the same purpose and capacity; 15304(a) which allows minor alteration to the condition of land which do not involve removal of healthy, mature, scenic trees where the improvements for the new sloped walkway will be completed on land with a slope of less than 10 percent; and where the exceptions listed in Section 15300.2 would not apply.

LEAD AGENCY CONTACT PERSON: JAMES ARNHART, SENIOR PLANNER

TELEPHONE: (619) 533-5275

IF FILED BY APPLICANT:

1. ATTACH CERTIFIED DOCUMENT OF EXEMPTION FINDING.
2. HAS A NOTICE OF EXEMPTION BEEN FILED BY THE PUBLIC AGENCY APPROVING THE PROJECT?
 YES NO


CARRIE PURCELL, PRINCIPAL PLANNER

12/23/15
DATE

CHECK ONE:

- SIGNED BY LEAD AGENCY
- SIGNED BY APPLICANT

DATE RECEIVED FOR FILING AT OPR:

Revised December 24, 2015 JA

APPENDIX B
FIRE HYDRANT METER PROGRAM

CITY OF SAN DIEGO CALIFORNIA DEPARTMENT INSTRUCTIONS	NUMBER DI 55.27	DEPARTMENT Water Department
SUBJECT FIRE HYDRANT METER PROGRAM (FORMERLY: CONSTRUCTION METER PROGRAM)	PAGE 1 OF 10	EFFECTIVE DATE October 15, 2002
	SUPERSEDES DI 55.27	DATED April 21, 2000

1. **PURPOSE**

1.1 To establish a Departmental policy and procedure for issuance, proper usage and charges for fire hydrant meters.

2. **AUTHORITY**

2.1 All authorities and references shall be current versions and revisions.

2.2 San Diego Municipal Code (NC) Chapter VI, Article 7, Sections 67.14 and 67.15

2.3 Code of Federal Regulations, Safe Drinking Water Act of 1986

2.4 California Code of Regulations, Titles 17 and 22

2.5 California State Penal Code, Section 498B.0

2.6 State of California Water Code, Section 110, 500-6, and 520-23

2.7 Water Department Director

Reference

2.8 State of California Guidance Manual for Cross Connection Programs

2.9 American Water Works Association Manual M-14, Recommended Practice for Backflow Prevention

2.10 American Water Works Association Standards for Water Meters

2.11 U.S.C. Foundation for Cross Connection Control and Hydraulic Research Manual

3. **DEFINITIONS**

3.1 **Fire Hydrant Meter:** A portable water meter which is connected to a fire hydrant for the purpose of temporary use. (These meters are sometimes referred to as Construction Meters.)

CITY OF SAN DIEGO CALIFORNIA DEPARTMENT INSTRUCTIONS	NUMBER DI 55.27	DEPARTMENT Water Department
SUBJECT FIRE HYDRANT METER PROGRAM (FORMERLY: CONSTRUCTION METER PROGRAM)	PAGE 2 OF 10	EFFECTIVE DATE October 15, 2002
	SUPERSEDES DI 55.27	DATED April 21, 2000

- 3.2 **Temporary Water Use:** Water provided to the customer for no longer than twelve (12) months.
- 3.3 **Backflow Preventor:** A Reduced Pressure Principal Assembly connected to the outlet side of a Fire Hydrant Meter.

4. **POLICY**

- 4.1 The Water Department shall collect a deposit from every customer requiring a fire hydrant meter and appurtenances prior to providing the meter and appurtenances (see Section 7.1 regarding the Fees and Deposit Schedule). The deposit is refundable upon the termination of use and return of equipment and appurtenances in good working condition.
- 4.2 Fire hydrant meters will have a 2 ½" swivel connection between the meter and fire hydrant. The meter shall not be connected to the 4" port on the hydrant. All Fire Hydrant Meters issued shall have a Reduced Pressure Principle Assembly (RP) as part of the installation. Spanner wrenches are the only tool allowed to turn on water at the fire hydrant.
- 4.3 The use of private hydrant meters on City hydrants is prohibited, with exceptions as noted below. All private fire hydrant meters are to be phased out of the City of San Diego. All customers who wish to continue to use their own fire hydrant meters must adhere to the following conditions:
 - a. Meters shall meet all City specifications and American Water Works Association (AWWA) standards.
 - b. Customers currently using private fire hydrant meters in the City of San Diego water system will be allowed to continue using the meter under the following conditions:
 - 1. The customer must submit a current certificate of accuracy and calibration results for private meters and private backflows annually to the City of San Diego, Water Department, Meter Shop.

CITY OF SAN DIEGO CALIFORNIA DEPARTMENT INSTRUCTIONS	NUMBER DI 55.27	DEPARTMENT Water Department
SUBJECT FIRE HYDRANT METER PROGRAM (FORMERLY: CONSTRUCTION METER PROGRAM)	PAGE 3 OF 10	EFFECTIVE DATE October 15, 2002
	SUPERSEDES DI 55.27	DATED April 21, 2000

2. The meter must be properly identifiable with a clearly labeled serial number on the body of the fire hydrant meter. The serial number shall be plainly stamped on the register lid and the main casing. Serial numbers shall be visible from the top of the meter casing and the numbers shall be stamped on the top of the inlet casing flange.
3. All meters shall be locked to the fire hydrant by the Water Department, Meter Section (see Section 4.7).
4. All meters shall be read by the Water Department, Meter Section (see Section 4.7).
5. All meters shall be relocated by the Water Department, Meter Section (see Section 4.7).
6. These meters shall be tested on the anniversary of the original test date and proof of testing will be submitted to the Water Department, Meter Shop, on a yearly basis. If not tested, the meter will not be allowed for use in the City of San Diego.
7. All private fire hydrant meters shall have backflow devices attached when installed.
8. The customer must maintain and repair their own private meters and private backflows.
9. The customer must provide current test and calibration results to the Water Department, Meter Shop after any repairs.
10. When private meters are damaged beyond repair, these private meters will be replaced by City owned fire hydrant meters.

CITY OF SAN DIEGO CALIFORNIA DEPARTMENT INSTRUCTIONS	NUMBER DI 55.27	DEPARTMENT Water Department
SUBJECT FIRE HYDRANT METER PROGRAM (FORMERLY: CONSTRUCTION METER PROGRAM)	PAGE 4 OF 10	EFFECTIVE DATE October 15, 2002
	SUPERSEDES DI 55.27	DATED April 21, 2000

11. When a private meter malfunctions, the customer will be notified and the meter will be removed by the City and returned to the customer for repairs. Testing and calibration results shall be given to the City prior to any re-installation.
 12. The register shall be hermetically sealed straight reading and shall be readable from the inlet side. Registration shall be in hundred cubic feet.
 13. The outlet shall have a 2 ½ “National Standards Tested (NST) fire hydrant male coupling.
 14. Private fire hydrant meters shall not be transferable from one contracting company to another (i.e. if a company goes out of business or is bought out by another company).
- 4.4 All fire hydrant meters and appurtenances shall be installed, relocated and removed by the City of San Diego, Water Department. All City owned fire hydrant meters and appurtenances shall be maintained by the City of San Diego, Water Department, Meter Services.
- 4.5 If any fire hydrant meter is used in violation of this Department Instruction, the violation will be reported to the Code Compliance Section for investigation and appropriate action. Any customer using a fire hydrant meter in violation of the requirements set forth above is subject to fines or penalties pursuant to the Municipal Code, Section 67.15 and Section 67.37.

4.6 Conditions and Processes for Issuance of a Fire Hydrant Meter

Process for Issuance

- a. Fire hydrant meters shall only be used for the following purposes:
 1. Temporary irrigation purposes not to exceed one year.

CITY OF SAN DIEGO CALIFORNIA DEPARTMENT INSTRUCTIONS	NUMBER DI 55.27	DEPARTMENT Water Department
SUBJECT FIRE HYDRANT METER PROGRAM (FORMERLY: CONSTRUCTION METER PROGRAM)	PAGE 5 OF 10	EFFECTIVE DATE October 15, 2002
	SUPERSEDES DI 55.27	DATED April 21, 2000

2. Construction and maintenance related activities (see Tab 2).
 - b. No customer inside or outside the boundaries of the City of San Diego Water Department shall resell any portion of the water delivered through a fire hydrant by the City of San Diego Water Department.
 - c. The City of San Diego allows for the issuance of a temporary fire hydrant meter for a period not to exceed 12 months (365 days). An extension can only be granted in writing from the Water Department Director for up to 90 additional days. A written request for an extension by the consumer must be submitted at least 30 days prior to the 12 month period ending. No extension shall be granted to any customer with a delinquent account with the Water Department. No further extensions shall be granted.
 - d. Any customer requesting the issuance of a fire hydrant meter shall file an application with the Meter Section. The customer must complete a "Fire Hydrant Meter Application" (Tab 1) which includes the name of the company, the party responsible for payment, Social Security number and/or California ID, requested location of the meter (a detailed map signifying an exact location), local contact person, local phone number, a contractor's license (or a business license), description of specific water use, duration of use at the site and full name and address of the person responsible for payment.
 - e. At the time of the application the customer will pay their fees according to the schedule set forth in the Rate Book of Fees and Charges, located in the City Clerk's Office. All fees must be paid by check, money order or cashiers check, made payable to the City Treasurer. Cash will not be accepted.
 - f. No fire hydrant meters shall be furnished or relocated for any customer with a delinquent account with the Water Department.
 - g. After the fees have been paid and an account has been created, the

CITY OF SAN DIEGO CALIFORNIA DEPARTMENT INSTRUCTIONS	NUMBER DI 55.27	DEPARTMENT Water Department
SUBJECT FIRE HYDRANT METER PROGRAM (FORMERLY: CONSTRUCTION METER PROGRAM)	PAGE 6 OF 10	EFFECTIVE DATE October 15, 2002
	SUPERSEDES DI 55.27	DATED April 21, 2000

meter shall be installed within 48 hours (by the second business day). For an additional fee, at overtime rates, meters can be installed within 24 hours (within one business day).

4.7 Relocation of Existing Fire Hydrant Meters

- a. The customer shall call the Fire Hydrant Meter Hotline (herein referred to as “Hotline”), a minimum of 24 hours in advance, to request the relocation of a meter. A fee will be charged to the existing account, which must be current before a work order is generated for the meter’s relocation.
- b. The customer will supply in writing the address where the meter is to be relocated (map page, cross street, etc). The customer must update the original Fire Hydrant Meter Application with any changes as it applies to the new location.
- c. Fire hydrant meters shall be read on a monthly basis. While fire hydrant meters and backflow devices are in service, commodity, base fee and damage charges, if applicable, will be billed to the customer on a monthly basis. If the account becomes delinquent, the meter will be removed.

4.8 Disconnection of Fire Hydrant Meter

- a. After ten (10) months a “Notice of Discontinuation of Service” (Tab 3) will be issued to the site and the address of record to notify the customer of the date of discontinuance of service. An extension can only be granted in writing from the Water Department Director for up to 90 additional days (as stated in Section 4.6C) and a copy of the extension shall be forwarded to the Meter Shop Supervisor. If an extension has not been approved, the meter will be removed after twelve (12) months of use.
- b. Upon completion of the project the customer will notify the Meter Services office via the Hotline to request the removal of the fire hydrant meter and appurtenances. A work order will be generated

CITY OF SAN DIEGO CALIFORNIA DEPARTMENT INSTRUCTIONS	NUMBER DI 55.27	DEPARTMENT Water Department
SUBJECT FIRE HYDRANT METER PROGRAM (FORMERLY: CONSTRUCTION METER PROGRAM)	PAGE 7 OF 10	EFFECTIVE DATE October 15, 2002
	SUPERSEDES DI 55.27	DATED April 21, 2000

for removal of the meter.

- c. Meter Section staff will remove the meter and backflow prevention assembly and return it to the Meter Shop. Once returned to the Meter Shop the meter and backflow will be tested for accuracy and functionality.
- d. Meter Section Staff will contact and notify Customer Services of the final read and any charges resulting from damages to the meter and backflow or its appurtenance. These charges will be added on the customer's final bill and will be sent to the address of record. Any customer who has an outstanding balance will not receive additional meters.
- e. Outstanding balances due may be deducted from deposits and any balances refunded to the customer. Any outstanding balances will be turned over to the City Treasurer for collection. Outstanding balances may also be transferred to any other existing accounts.

5. **EXCEPTIONS**

- 5.1 Any request for exceptions to this policy shall be presented, in writing, to the Customer Support Deputy Director, or his/her designee for consideration.

6. **MOBILE METER**

- 6.1 Mobile meters will be allowed on a case by case basis. All mobile meters will be protected by an approved backflow assembly and the minimum requirement will be a Reduced Pressure Principal Assembly. The two types of Mobile Meters are vehicle mounted and floating meters. Each style of meters has separate guidelines that shall be followed for the customer to retain service and are described below:

- a) **Vehicle Mounted Meters:** Customer applies for and receives a City owned Fire Hydrant Meter from the Meter Shop. The customer mounts the meter on the vehicle and brings it to the Meter Shop for

CITY OF SAN DIEGO CALIFORNIA DEPARTMENT INSTRUCTIONS	NUMBER DI 55.27	DEPARTMENT Water Department
SUBJECT FIRE HYDRANT METER PROGRAM (FORMERLY: CONSTRUCTION METER PROGRAM)	PAGE 8 OF 10	EFFECTIVE DATE October 15, 2002
	SUPERSEDES DI 55.27	DATED April 21, 2000

inspection. After installation is approved by the Meter Shop the vehicle and meter shall be brought to the Meter Shop on a monthly basis for meter reading and on a quarterly basis for testing of the backflow assembly. Meters mounted at the owner's expense shall have the one year contract expiration waived and shall have meter or backflow changed if either fails.

b) **Floating Meters:** Floating Meters are meters that are not mounted to a vehicle. **(Note: All floating meters shall have an approved backflow assembly attached.)** The customer shall submit an application and a letter explaining the need for a floating meter to the Meter Shop. The Fire Hydrant Meter Administrator, after a thorough review of the needs of the customer, (i.e. number of jobsites per day, City contract work, lack of mounting area on work vehicle, etc.), may issue a floating meter. At the time of issue, it will be necessary for the customer to complete and sign the "Floating Fire Hydrant Meter Agreement" which states the following:

- 1) The meter will be brought to the Meter Shop at 2797 Caminito Chollas, San Diego on the third week of each month for the monthly read by Meter Shop personnel.
- 2) Every other month the meter will be read and the backflow will be tested. This date will be determined by the start date of the agreement.

If any of the conditions stated above are not met the Meter Shop has the right to cancel the contract for floating meter use and close the account associated with the meter. The Meter Shop will also exercise the right to refuse the issuance of another floating meter to the company in question.

Any Fire Hydrant Meter using reclaimed water shall not be allowed use again with any potable water supply. The customer shall incur the cost of replacing the meter and backflow device in this instance.

CITY OF SAN DIEGO CALIFORNIA DEPARTMENT INSTRUCTIONS	NUMBER DI 55.27	DEPARTMENT Water Department
SUBJECT FIRE HYDRANT METER PROGRAM (FORMERLY: CONSTRUCTION METER PROGRAM)	PAGE 9 OF 10	EFFECTIVE DATE October 15, 2002
	SUPERSEDES DI 55.27	DATED April 21, 2000

7. **FEE AND DEPOSIT SCHEDULES**

- 7.1 **Fees and Deposit Schedules:** The fees and deposits, as listed in the Rate Book of Fees and Charges, on file with the Office of the City Clerk, are based on actual reimbursement of costs of services performed, equipment and materials. These deposits and fees will be amended, as needed, based on actual costs. Deposits, will be refunded at the end of the use of the fire hydrant meter, upon return of equipment in good working condition and all outstanding balances on account are paid. Deposits can also be used to cover outstanding balances.

All fees for equipment, installation, testing, relocation and other costs related to this program are subject to change without prior notification. The Mayor and Council will be notified of any future changes.

8. **UNAUTHORIZED USE OF WATER FROM A HYDRANT**

- 8.1 Use of water from any fire hydrant without a properly issued and installed fire hydrant meter is theft of City property. Customers who use water for unauthorized purposes or without a City of San Diego issued meter will be prosecuted.
- 8.2 If any unauthorized connection, disconnection or relocation of a fire hydrant meter, or other connection device is made by anyone other than authorized Water Department personnel, the person making the connection will be prosecuted for a violation of San Diego Municipal Code, Section 67.15. In the case of a second offense, the customer's fire hydrant meter shall be confiscated and/or the deposit will be forfeited.
- 8.3 Unauthorized water use shall be billed to the responsible party. Water use charges shall be based on meter readings, or estimates when meter readings are not available.
- 8.4 In case of unauthorized water use, the customer shall be billed for all applicable charges as if proper authorization for the water use had been obtained, including but not limited to bi-monthly service charges, installation charges and removal charges.

CITY OF SAN DIEGO CALIFORNIA DEPARTMENT INSTRUCTIONS	NUMBER DI 55.27	DEPARTMENT Water Department
SUBJECT FIRE HYDRANT METER PROGRAM (FORMERLY: CONSTRUCTION METER PROGRAM)	PAGE 10 OF 10	EFFECTIVE DATE October 15, 2002
	SUPERSEDES DI 55.27	DATED April 21, 2000

- 8.5 If damage occurs to Water Department property (i.e. fire hydrant meter, backflow, various appurtenances), the cost of repairs or replacements will be charged to the customer of record (applicant).

Water Department Director

- Tabs: 1. Fire Hydrant Meter Application
2. Construction & Maintenance Related Activities With No Return To Sewer
3. Notice of Discontinuation of Service

APPENDIX

Administering Division: Customer Support Division

Subject Index: Construction Meters
Fire Hydrant
Fire Hydrant Meter Program
Meters, Floating or Vehicle Mounted
Mobile Meter
Program, Fire Hydrant Meter

Distribution: DI Manual Holders



Application for Fire Hydrant Meter (EXHIBIT A)

(For Office Use Only)

NS REQ	FAC#
DATE	BY

METER SHOP (619) 527-7449

Meter Information

Application Date	Requested Install Date:
------------------	-------------------------

Fire Hydrant Location: (Attach Detailed Map//Thomas Bros. Map Location or Construction drawing.) <u>Zip:</u>	T.B.	G.B. (CITY USE)
Specific Use of Water:		
Any Return to Sewer or Storm Drain, if so, explain:		
Estimated Duration of Meter Use: <input type="text"/>	<input type="checkbox"/>	Check Box if Reclaimed Water

Company Information

Company Name:			
Mailing Address:			
City:	State:	Zip:	Phone: ()
*Business license#		*Contractor license#	
A Copy of the Contractor's license OR Business License is required at the time of meter issuance.			
Name and Title of Billing Agent: <small>(PERSON IN ACCOUNTS PAYABLE)</small>			Phone: ()
Site Contact Name and Title:			Phone: ()
Responsible Party Name:			Title:
Cal ID#			Phone: ()
Signature:		Date:	
<small>Guarantees Payment of all Charges Resulting from the use of this Meter. Insures that employees of this Organization understand the proper use of Fire Hydrant Meter</small>			

Fire Hydrant Meter Removal Request	Requested Removal Date:
Provide Current Meter Location if Different from Above:	
Signature:	Title: Date:
Phone: ()	Pager: ()

<input type="checkbox"/> City Meter	<input type="checkbox"/> Private Meter
Contract Acct #:	Deposit Amount: \$ 936.00 Fees Amount: \$ 62.00
Meter Serial #	Meter Size: 05 Meter Make and Style: 6-7
Backflow #	Backflow Size: Backflow Make and Style:
Name:	Signature: Date:

WATER USES WITHOUT ANTICIPATED CHARGES FOR RETURN TO SEWER

Auto Detailing
Backfilling
Combination Cleaners (Vactors)
Compaction
Concrete Cutters
Construction Trailers
Cross Connection Testing
Dust Control
Flushing Water Mains
Hydro Blasting
Hydro Seeing
Irrigation (for establishing irrigation only; not continuing irrigation)
Mixing Concrete
Mobile Car Washing
Special Events
Street Sweeping
Water Tanks
Water Trucks
Window Washing

Note:

1. If there is any return to sewer or storm drain, then sewer and/or storm drain fees will be charges.

Date

Name of Responsible Party
Company Name and Address
Account Number: _____

Subject: Discontinuation of Fire Hydrant Meter Service

Dear Water Department Customer:

The authorization for use of Fire Hydrant Meter # _____, located at *(Meter Location Address)* ends in 60 days and will be removed on or after *(Date Authorization Expires)*. Extension requests for an additional 90 days must be submitted in writing for consideration 30 days prior to the discontinuation date. If you require an extension, please contact the Water Department, or mail your request for an extension to:

City of San Diego
Water Department
Attention: Meter Services
2797 Caminito Chollas
San Diego, CA 92105-5097

Should you have any questions regarding this matter, please call the Fire Hydrant Hotline at (619) _____ - _____.

Sincerely,

Water Department

APPENDIX C

MATERIALS TYPICALLY ACCEPTED BY CERTIFICATE OF COMPLIANCE

MATERIALS TYPICALLY ACCEPTED BY CERTIFICATE OF COMPLIANCE

1. Soil amendment
2. Fiber mulch
3. PVC or PE pipe up to 16 inch diameter
4. Stabilizing emulsion
5. Lime
6. Preformed elastomeric joint seal
7. Plain and fabric reinforced elastomeric bearing pads
8. Steel reinforced elastomeric bearing pads
9. Waterstops (Special Condition)
10. Epoxy coated bar reinforcement
11. Plain and reinforcing steel
12. Structural steel
13. Structural timber and lumber
14. Treated timber and lumber
15. Lumber and timber
16. Aluminum pipe and aluminum pipe arch
17. Corrugated steel pipe and corrugated steel pipe arch
18. Structural metal plate pipe arches and pipe arches
19. Perforated steel pipe
20. Aluminum underdrain pipe
21. Aluminum or steel entrance tapers, pipe downdrains, reducers, coupling bands and slip joints
22. Metal target plates
23. Paint (traffic striping)
24. Conductors
25. Painting of electrical equipment
26. Electrical components
27. Engineering fabric
28. Portland Cement
29. PCC admixtures
30. Minor concrete, asphalt
31. Asphalt (oil)
32. Liquid asphalt emulsion
33. Epoxy

APPENDIX D

SAMPLE CITY INVOICE WITH CASH FLOW FORECAST

WBS #:	B18108
Date Submitted:	10/10/2018
NTP Date:	3/23/2018
Final Statement of WD Date:	5/23/2020
Contract #:	K-XX-XXXX-XXX-X
Contract Amount:	\$5,617,000

Construction Cash Flow Forecast

"Sewer and Water Group Job 965 (W)"

Year	January	February	March	April	May	June	July	August	September	October	November	December
2018				15,000	25,000	52,000	52,000	100,000	10,000	100,000	100,000	100,000
2019	10,000	10,000	85,000	58,000	100,000	100,000	100,000	100,000	100,000	100,000	1,000,000	1,000,000
2020	100,000	100,000	100,000	1,000,000	1,000,000							
2021												
2022												
2023												
2024												
2025												

SAMPLE REFERENCE

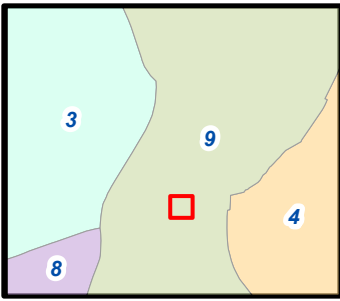
APPENDIX E
LOCATION MAP

SDPD FIRING RANGE REFURBISHMENT PROJECT - PHASE II

SENIOR ENGINEER
 GEORGE FREIHA
 (619)-533-7449

PROJECT MANAGER
 MICHELLE GARCIA-QUILICO
 (619)-533-6635

FOR QUESTIONS ABOUT THIS PROJECT
 Call: (619)-533-4207
 Email: engineering@sandiego.gov



Legend

 SDPD Firing Range Refurbishment Project - Phase II



COMMUNITY NAME: MID-CITY: CITY HEIGHTS

COUNCIL DISTRICT: 9

SAP ID: S-18005

Date: May 24, 2018



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APPENDIX F
HAZARDOUS LABEL/FORMS

HAZARDOUS WASTE

STATE AND FEDERAL LAW PROHIBITS IMPROPER DISPOSAL
IF FOUND, CONTACT THE NEAREST POLICE, OR PUBLIC SAFETY
AUTHORITY, OR THE U.S. ENVIRONMENTAL PROTECTION AGENCY
OR THE CALIFORNIA DEPARTMENT OF HEALTH SERVICES

GENERATOR NAME _____

ADDRESS _____ 24 HR. PHONE () _____

CITY _____ STATE _____ ZIP _____

EPA ID NO. _____ MANIFEST DOCUMENT NO. _____

EPA WASTE NO. _____ CA WASTE NO. _____ ACCUMULATION START DATE _____ / ____ / ____

CONTENTS, COMPOSITION _____

PROPER DOT SHIPPING NAME _____

TECHNICAL NAME (S) _____

UN/NA NO. WITH PREFIX _____

PHYSICAL STATE | HAZARDOUS PROPERTIES FLAMMABLE TOXIC
 SOLID LIQUID | CORROSIVE REACTIVE OTHER _____

HANDLE WITH CARE!
CONTAINS HAZARDOUS OR TOXIC WASTES

INCIDENT/RELEASE ASSESSMENT FORM ¹

If you have an emergency, Call 911

Handlers of hazardous materials are required to report releases. The following is a tool to be used for assessing if a release is reportable. Additionally, a non-reportable release incident form is provided to document why a release is not reported (see back).

Questions for Incident Assessment:

	YES	NO
1. Was anyone killed or injured, or did they require medical care or admitted to a hospital for observation?	<input type="checkbox"/>	<input type="checkbox"/>
2. Did anyone, other than employees in the immediate area of the release, evacuate?	<input type="checkbox"/>	<input type="checkbox"/>
3. Did the release cause off-site damage to public or private property?	<input type="checkbox"/>	<input type="checkbox"/>
4. Is the release greater than or equal to a reportable quantity (RQ)?	<input type="checkbox"/>	<input type="checkbox"/>
5. Was there an uncontrolled or unpermitted release to the air?	<input type="checkbox"/>	<input type="checkbox"/>
6. Did an uncontrolled or unpermitted release escape secondary containment, or extend into any sewers, storm water conveyance systems, utility vaults and conduits, wetlands, waterways, public roads, or off site?	<input type="checkbox"/>	<input type="checkbox"/>
7. Will control, containment, decontamination, and/or clean up require the assistance of federal, state, county, or municipal response elements?	<input type="checkbox"/>	<input type="checkbox"/>
8. Was the release or threatened release involving an unknown material or contains an unknown hazardous constituent?	<input type="checkbox"/>	<input type="checkbox"/>
9. Is the incident a threatened release (a condition creating a substantial probability of harm that requires immediate action to prevent, reduce, or mitigate damages to persons, property, or the environment)?	<input type="checkbox"/>	<input type="checkbox"/>
10. Is there an increased potential for secondary effects including fire, explosion, line rupture, equipment failure, or other outcomes that may endanger or cause exposure to employees, the general public, or the environment?	<input type="checkbox"/>	<input type="checkbox"/>

If the answer is YES to any of the above questions – report the release to the California Office of Emergency Services at 800-852-7550 and the local CUPA daytime: (619) 338-2284, after hours: (858) 565-5255. Note: other state and federal agencies may require notification depending on the circumstances.

Call 911 in an emergency

If all answers are NO, complete a Non Reportable Release Incident Form (page 2 of 2) and keep readily available. Documenting why a “no” response was made to each question will serve useful in the event questions are asked in the future, and to justify not reporting to an outside regulatory agency.

If in doubt, report the release.

¹ This document is a guide for accessing when hazardous materials release reporting is required by Chapter 6.95 of the California Health and Safety Code. It does not replace good judgment, Chapter 6.95, or other state or federal release reporting requirements.

NON REPORTABLE RELEASE INCIDENT FORM

1. RELEASE AND RESPONSE DESCRIPTION

Incident # _____

Date/Time Discovered	Date/Time Discharge	Discharge Stopped <input type="checkbox"/> Yes <input type="checkbox"/> No
Incident Date / Time:		
Incident Business / Site Name:		
Incident Address:		
Other Locators (Bldg, Room, Oil Field, Lease, Well #, GIS)		
Please describe the incident and indicate specific causes and area affected. Photos Attached?: <input type="checkbox"/> Yes <input type="checkbox"/> No		
Indicate actions to be taken to prevent similar releases from occurring in the future.		

2. ADMINISTRATIVE INFORMATION

Supervisor in charge at time of incident:	Phone:
Contact Person:	Phone:

3. CHEMICAL INFORMATION

Chemical	Quantity <input type="checkbox"/> GAL <input type="checkbox"/> LBS <input type="checkbox"/> FT ³
Chemical	Quantity <input type="checkbox"/> GAL <input type="checkbox"/> LBS <input type="checkbox"/> FT ³
Chemical	Quantity <input type="checkbox"/> GAL <input type="checkbox"/> LBS <input type="checkbox"/> FT ³
Clean-Up Procedures & Timeline:	
Completed By:	Phone:
Print Name:	Title:

EMERGENCY RELEASE FOLLOW - UP NOTICE REPORTING FORM

A	BUSINESS NAME	FACILITY EMERGENCY CONTACT & PHONE NUMBER () -						
B	INCIDENT DATE	MO	DAY	YR	TIME OES NOTIFIED	(use 24 hr time)	OES CONTROL NO.	
C	INCIDENT ADDRESS LOCATION			CITY / COMMUNITY	COUNTY	ZIP		
D	CHEMICAL OR TRADE NAME (print or type)					CAS Number		
D	CHECK IF CHEMICAL IS LISTED IN 40 CFR 355, APPENDIX A <input type="checkbox"/>				CHECK IF RELEASE REQUIRES NOTIFICATION UNDER 42 U.S.C. Section 9603 (a) <input type="checkbox"/>			
D	PHYSICAL STATE CONTAINED		PHYSICAL STATE RELEASED			QUANTITY RELEASED		
	<input type="checkbox"/> SOLID	<input type="checkbox"/> LIQUID	<input type="checkbox"/> GAS	<input type="checkbox"/> SOLID	<input type="checkbox"/> LIQUID	<input type="checkbox"/> GAS		
D	ENVIRONMENTAL CONTAMINATION			TIME OF RELEASE	DURATION OF RELEASE			
	<input type="checkbox"/> AIR	<input type="checkbox"/> WATER	<input type="checkbox"/> GROUND	<input type="checkbox"/> OTHER			— DAYS — HOURS — MINUTES	
E	ACTIONS TAKEN							
F	KNOWN OR ANTICIPATED HEALTH EFFECTS (Use the comments section for addition information)							
	<input type="checkbox"/> ACUTE OR IMMEDIATE (explain) _____							
	<input type="checkbox"/> CHRONIC OR DELAYED (explain) _____							
	<input type="checkbox"/> NOTKNOWN (explain) _____							
G	ADVICE REGARDING MEDICAL ATTENTION NECESSARY FOR EXPOSED INDIVIDUALS							
H	COMMENTS (INDICATE SECTION (A - G) AND ITEM WITH COMMENTS OR ADDITIONAL INFORMATION)							
I	CERTIFICATION: I certify under penalty of law that I have personally examined and I am familiar with the information submitted and believe the submitted information is true, accurate, and complete.							
	REPORTING FACILITY REPRESENTATIVE (print or type) _____							
	SIGNATURE OF REPORTING FACILITY REPRESENTATIVE _____ DATE: _____							

EMERGENCY RELEASE FOLLOW-UP NOTICE REPORTING FORM INSTRUCTIONS

GENERAL INFORMATION:

Chapter 6.95 of Division 20 of the California Health and Safety Code requires that written emergency release follow-up notices prepared pursuant to 42 U.S.C. § 11004, be submitted using this reporting form. Non-permitted releases of reportable quantities of Extremely Hazardous Substances (listed in 40 CFR 355, appendix A) or of chemicals that require release reporting under section 103(a) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 [42 U.S.C. § 9603(a)] must be reported on the form, as soon as practicable, but no later than 30 days, following a release. The written follow-up report is required in addition to the verbal notification.

BASIC INSTRUCTIONS:

- The form, when filled out, reports follow-up information required by 42 U.S.C § 11004. Ensure that all information requested by the form is provided as completely as possible.
- If the incident involves reportable releases of more than one chemical, prepare one report form for each chemical released.
- If the incident involves a series of separate releases of chemical(s) at different times, the releases should be reported on separate reporting forms.

SPECIFIC INSTRUCTIONS:

Block A: Enter the name of the business and the name and phone number of a contact person who can provide detailed facility information concerning the release.

Block B: Enter the date of the incident and the time that verbal notification was made to OES. The OES control number is provided to the caller by OES at the time verbal notification is made. Enter this control number in the space provided.

Block C: Provide information pertaining to the location where the release occurred. Include the street address, the city or community, the county and the zip code.

Block D: Provide information concerning the specific chemical that was released. Include the chemical or trade name and the Chemical Abstract Service (CAS) number. Check all categories that apply. Provide best available information on quantity, time and duration of the release.

Block E: Indicate all actions taken to respond to and contain the release as specified in 42 U.S.C. § 11004(c).

Block F: Check the categories that apply to the health effects that occurred or could result from the release. Provide an explanation or description of the effects in the space provided. Use Block H for additional comments/information if necessary to meet requirements specified in 42 U.S.C. § 11004(c).

Block G: Include information on the type of medical attention required for exposure to the chemical released. Indicate when and how this information was made available to individuals exposed and to medical personnel, if appropriate for the incident, as specified in 42 U.S.C. § 11004(c).

Block H: List any additional pertinent information.

Block I: Print or type the name of the facility representative submitting the report. Include the official signature and the date that the form was prepared.

MAIL THE COMPLETED REPORT TO:

**State Emergency Response Commission (SERC)
Attn: Section 304 Reports
Hazardous Materials Unit
3650 Schriever Avenue
Mather, CA 95655**

NOTE: Authority cited: Sections 25503, 25503.1 and 25507.1, Health and Safety Code. Reference: Sections 25503(b)(4), 25503.1, 25507.1, 25518 and 25520, Health and Safety Code.

APPENDIX G
SAMPLE ARCHAEOLOGY INVOICE

(FOR ARCHAEOLOGY ONLY)

Company Name

Address, telephone, fax

Date: Insert Date

To: Name of Resident Engineer
City of San Diego
Field Engineering Division
9485 Aero Drive
San Diego, CA 92123-1801

Project Name: Insert Project Name

SAP Number (WBS/IO/CC): Insert SAP Number

Drawing Number: Insert Drawing Number

Invoice period: Insert Date to Insert Date

Work Completed: Bid item Number – Description of Bid Item – Quantity – Unit Price– Amount

Detailed summary of work completed under this bid item: Insert detailed description of Work related to Archaeology Monitoring Bid item. See Note 1 below.

Summary of charges:

Description of Services	Name	Start Date	End Date	Total Hours	Hourly Rate	Amount
Field Archaeologist	Joe Smith	8/29/2011	9/2/2011	40	\$84	\$3,360
Laboratory Assistant	Jane Doe	8/29/2011	9/2/2011	2	\$30	\$60
Subtotal						\$3,420

Work Completed: Bid item Number – Description of Bid Item – Quantity – Unit Price– Amount

Detailed summary of work completed under this bid item: Insert detailed description of Work related to Archaeology Curation/Discovery Bid item. See Note 2 below.

Summary of charges:

Description of Services	Where work occurred (onsite vs offsite/lab)	Name	Start Date	End Date	Total Hours	Hourly Rate	Amount
Field Archaeologist		Joe Smith	8/29/2011	9/2/2011	40	\$84	\$3,360
Laboratory Assistant		Jane Doe	8/29/2011	9/2/2011	2	\$30	\$60
Subtotal							\$3,420

Total this invoice: \$ _____

Total invoiced to date: \$ _____

Note 1:

For monitoring related bid items or work please include summary of construction work that was monitored from Station to Station, Native American monitors present, MMC coordination, status and nature of monitoring and if any discoveries were made.

Note 2:

For curation/discovery related bid items or work completed as part of a discovery and curation process, the PI must provide a response to the following questions along with the invoice:

1. Preliminary results of testing including tentative recommendations regarding eligibility for listing in the California Register of Historical Resources (California Register).
 - a. Please briefly describe your application (consideration) of all four California Register criteria.
 - b. If the resource is eligible under Criterion D, please define the important information that may be present.
 - c. Were specialized studies performed? How many personnel were required? How many Native American monitors were present?
 - d. What is the age of the resource?
 - e. Please define types of artifacts to be collected and curated, including quantity of boxes to be submitted to the San Diego Archaeological Center (SDAC). How many personnel were required? How many Native American monitors were present?
2. Preliminary results of data recovery and a definition of the size of the representative sample.
 - a. Were specialized studies performed? Please define types of artifacts to be collected and curated, including quantity of boxes to be submitted to the SDAC. How many personnel were required? How many Native American monitors were present?
3. What resources were discovered during monitoring?
4. What is the landform context and what is the integrity of the resources?
5. What additional studies are necessary?
6. Based on application of the California Register criteria, what is the significance of the resources?
 - a. If the resource is eligible for the California Register, can the resource be avoided by construction?
 - b. If not, what treatment (mitigation) measures are proposed? Please define data to be recovered (if necessary) and what material will be submitted to the SDAC for curation. Are any specialized studies proposed?

(After the first invoice, not all the above information needs to be re-stated, just revise as applicable).

APPENDIX H

ADVANCED METERING INFRASTRUCTURE (AMI) DEVICE PROTECTION

Protecting AMI Devices in Meter Boxes and on Street Lights

The Public Utilities Department (PUD) has begun the installation of the Advanced Metering Infrastructure (AMI) technology as a new tool to enhance water meter reading accuracy and efficiency, customer service and billing, and to be used by individual accounts to better manage the efficient use of water. **All AMI devices shall be protected per Section 5-2, "Protection", of the 2015 Whitebook.**

AMI technology allows water meters to be read electronically rather than through direct visual inspection by PUD field staff. This will assist PUD staff and customers in managing unusual consumption patterns which could indicate leaks or meter tampering on a customer's property.

Three of the main components of an AMI system are the:

- A. Endpoints, see Photo 1:

Photo 1



B. AMI Antenna attached to Endpoint (antenna not always required), see Photo 2:

Photo 2



Network Devices, see Photo 3:

Photo 3



AMI endpoints transmit meter information to the AMI system and will soon be on the vast majority of meters in San Diego. These AMI devices provide interval consumption data to the PUD's Customer Support Division. If these devices are damaged or communication is interrupted, this Division will be alerted of the situation. The endpoints are installed in water meter boxes, coffins, and vaults adjacent to the meter. A separate flat round antenna may also be installed through the meter box lid. This antenna is connected to the endpoint via cable. The following proper installation shall be implemented when removing the lid to avoid damaging the antenna, cable, and/or endpoint. Photo 4 below demonstrates a diagram of the connection:

Photo 4



The AMI device ERT/Endpoint/Transmitter shall be positioned and installed as discussed in this Appendix. If the ERT/Endpoint/Transmitter is disturbed, it shall be re-installed and returned to its original installation with the end points pointed upwards as shown below in Photo 5.

The PUD's code compliance staff will issue citations and invoices to you for any damaged AMI devices that are not re-installed as discussed in the Contract Document

Photo 5 below shows a typical installation of an AMI endpoint on a water meter.

Photo 5

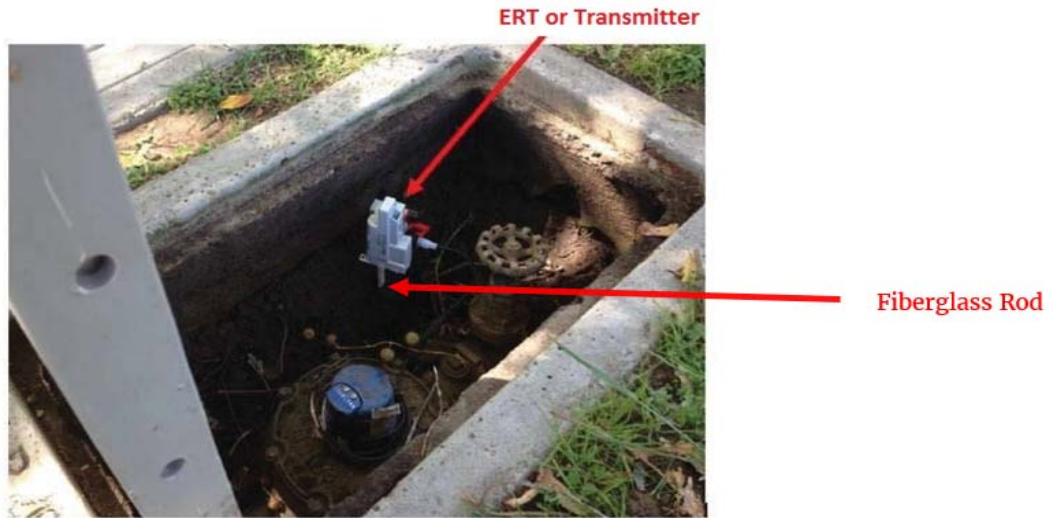


Photo 6 below is an example of disturbance that shall be avoided:

Photo 6



You are responsible when working in and around meter boxes. If you encounter these endpoints, use proper care and do not disconnect them from the registers on top of the water meter. If the lid has an antenna drilled through, do not change or tamper with the lid and inform the Resident Engineer immediately about the location of that lid. Refer to Photo 7 below:

Photo 7



Another component of the AMI system are the Network Devices. The Network Devices are strategically placed units (mainly on street light poles) that collect interval meter reading data from multiple meters for transmission to the Department Control Computer. **If you come across any of these devices on street lights that will be removed or replaced (refer to Photos 8 and 9 below), notify AMI Project Manager Arwa Sayed at (619) 362-0121 immediately.**

Photo 8 shows an installed network device on a street light. On the back of each Network Device is a sticker with contact information. See Photo 9. **Call PUD Water Emergency Repairs at 619-515-3525 if your work will impact these street lights.** These are assets that belong to the City of San Diego and you shall be responsible for any costs of disruption of this network.

Photo 8



Network Device

Photo 9



If you encounter any bad installations, disconnected/broken/buried endpoints, or inadvertently damage any AMI devices or cables, notify the Resident Engineer immediately. The Resident Engineer will then immediately contact the AMI Project Manager, Arwa Sayed, at (619) 362-0121.

APPENDIX I

LEAD CONTAINING MATERIALS AND UNIVERSAL WASTE ABATEMENT SPECIFICATION



Environmental Services Department
Disposal & Environmental Protection

HAZARDOUS MATERIALS ABATEMENT FOR SITE PREPARATION, ASBESTOS, AND LEAD PAINT SPECIFICATION

for

POLICE RANGE REFURBISHMENT PROJECT, PHASE II

March 22, 2019

Prepared by:

Wm. Brad Blondet
Asbestos, Lead & Mold Program
Inspector
CA CSST #99-2689
CDPH Lead IA/PM/S #5464

Reviewed by:

Jessica Weislogel
Asbestos, Lead & Mold Program
Manager
CDPH Lead IA/PM #25571

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Contents

GENERAL OVERVIEW OF ALL ABATEMENT - SECTION 02000	5
PART 1 - GENERAL	5
APPENDIX A-SECTION 02000	10
INSPECTION REPORT ASBESTOS AND LEAD.....	10
HAZARDOUS MATERIALS ABATEMENT FOR SITE PREPARATION - SECTION 02050	12
PART 1 - GENERAL	12
1.1 LEAD DEMOLITION SCOPE OF WORK FOR SITE PREPARATION	12
1.2 RELATED SECTIONS	12
1.3 STANDARD SPECIFICATIONS	12
1.4 APPLICABLE REGULATIONS.....	13
1.5 DEFINITIONS.....	13
1.6 SUBMITTALS	14
PART 2 - HAZARDOUS WASTE MANAGEMENT	17
2.1 EMPLOYEE TRAINING.....	17
2.2 WASTE CHARACTERIZATION.....	17
2.3 SAMPLING AND ANALYTICAL TESTING REQUIREMENTS.....	18
2.4 PRE-TRANSPORTATION REQUIREMENTS	18
2.5 ACCUMULATION TIME.....	20
2.6 TRANSPORTATION REQUIREMENTS	20
SECTION 02081 - ASBESTOS ABATEMENT.....	24
Part 1 — GENERAL.....	24
1.1 SCOPE OF WORK	24
1.2 DEFINITIONS.....	25
1.3 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS.....	29
1.4 SUBMITTALS	35
1.5 AIR MONITORING, STOP WORK LEVELS, & CLEARANCE SAMPLING.....	43
1.6 PROJECT DECONTAMINATION	47
1.7 CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS:	50
1.8 WORKER PROTECTION	54
1.9 RESPIRATORY PROTECTION	62
Part 2 — PRODUCTS.....	64
2.1 MISCELLANEOUS PRODUCTS.....	64
2.2 PROTECTIVE CLOTHING:.....	65
2.3 RESPIRATORY.....	66
2.4 HEPA FILTERED FAN UNITS	66
Part 3 — EXECUTION	68

3.1	CONTAINMENT SYSTEM	68
3.2	NEGATIVE PRESSURE ENCLOSURE	74
3.3	DISPOSAL OF HAZARDOUS WASTE:	79
3.4	REMOVAL OF ASBESTOS-CONTAINING MATERIALS	82
SECTION 02090 – LEAD-CONTAINING COATINGS.....		90
Part 1 — GENERAL.....		90
1.1	WORK OF THIS SECTION	90
1.2	DEFINITIONS.....	90
1.3	REFERENCE SPECIFICATIONS, CODES, AND STANDARDS.....	94
1.4	SUBMITTALS	97
1.5	TEST LABORATORY SERVICES	104
1.6	PROJECT CLEARANCE.....	105
1.7	PROJECT DECONTAMINATION	106
1.8	CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS:	106
1.9	WORKER PROTECTION	110
1.10	RESPIRATORY PROTECTION	115
1.11	GENERAL PROVISIONS.....	116
Part 2 — PRODUCTS.....		117
2.1	MISCELLANEOUS PRODUCTS.....	117
2.2	PROTECTIVE CLOTHING:.....	117
2.3	RESPIRATORY.....	118
Part 3 — EXECUTION		118
3.1	INTERIOR REGULATED AREA	118
3.2	DISPOSAL OF HAZARDOUS WASTE	120
LEAD APPENDIX A		124
SUBMITTAL CHECKLIST FOR THE ABATEMENT CONTRACTOR		124
LEAD APPENDIX B		126
CERTIFICATE OF ABATEMENT WORKER'S ACKNOWLEDGMENT		126
LEAD APPENDIX C		128
CERTIFICATE OF WORKER'S ACKNOWLEDGMENT FOR SUB-CONTRACTORS.....		128
LEAD APPENDIX D.....		130
CERTIFICATION OF VISUAL INSPECTION.....		130

GENERAL OVERVIEW OF ALL ABATEMENT - SECTION 02000

PART 1 - GENERAL

- A. **PROJECT OVERVIEW** - The project will accomplish the demolition of the firing range embankment structures and refurbishment of two of the permanent structures at the SDPD Police Firing Range located at 4008 Federal Blvd. This specification section pertains to the following hazardous materials: asbestos building materials, lead contaminated soils, paint and wood with embedded lead and creosote. The ABATEMENT CONTRACTOR, working under the GENERAL CONTRACTOR, shall remove all the materials mentioned above, keep the soil covered at the site, and dispose of hazardous materials and contaminated waste based on testing of those materials. A summary of the survey results is located in this section and the full survey is attached as Appendix A of Section 02000.
- B. A mandatory pre-bid meeting will be held to affirm all bidders are aware of the requirements of this project.
- C. All work is to be performed during normal business hours from Monday through Friday, excluding recognized City holidays.
- D. All work is to be coordinated with the Range Master and the scheduling of the SDPD range activities.
- E. Water and Power are available on-site but it is the ABATEMENT CONTRACTOR's responsibility to hook up to the existing water and power sources.
- F. Temporary toilets facilities and hand washing stations to be provided by the GENERAL CONTRACTOR for the duration of the project.
- G. A clean break area shall be maintained for the duration of the project and no food or drinks will be allowed in the Work areas.
- H. Hearing protection and access restrictions to active range operations will be the responsibility of the GENERAL CONTRACTOR.
- I. **Project Scope of Work**
 - 1. **The ABATEMENT CONTRACTOR shall provide all labor, equipment, tools and materials for the mitigation of dust during the excavation, covering, and backfilling of lead contaminated soils, and the removal and disposal of all wood with embedded lead projectiles in accordance with Section 2050 for demolition and site preparation.**
 - 2. **The ABATEMENT CONTRACTOR shall provide all labor, equipment, tools and materials for the mitigation, removal and disposal of all identified asbestos-containing materials to facilitate the building scope of work in accordance with Section 2081.**
 - 3. **The ABATEMENT CONTRACTOR shall provide all labor, equipment,**

tools and materials for the stabilization of lead based paint coatings, the disposal of components with lead based paint, and the disposal of the resulting waste paint chips in accordance with Section 2090.

- 4. The ABATEMENT CONTRACTOR shall provide all labor, equipment, tools and materials for maintaining a decontamination facility for all contractors accessing lead contaminated soil areas and maintain cleanliness for the duration of the project.**

J. Summary of Hazardous Materials Abatement

- 1. The City of San Diego's Asbestos & Lead Management Program (ALMP) has performed the investigation to determine the extent of lead contaminated soils, lead contaminated wood, asbestos containing building materials, and lead based paint coatings covered by this specification. The survey was limited to readily accessible suspect materials. It shall be the GENERAL CONTRACTOR's and the ABATEMENT CONTRACTOR's responsibility to visit this project site before starting the work to assess the confirm locations and quantities of the materials to be abated and any physical restrictions related with the removal.**
- 2. During the preparation of the area some method of preventing soil contact should be considered. Gravel or wood chips can provide a barrier to soil contact and should be added by the GENERAL CONTRACTOR to mitigate tracking and contact where feasible.**

K. Summary of Asbestos Containing Materials

The following list summarizes the locations of asbestos containing materials that must be removed. The estimated amounts are only approximations and should not be used for bidding purposes. Actual amounts must be verified by the responsible GENERAL CONTRACTOR and ABATEMENT CONTRACTOR.

- 1. Estimated 700 SF of asbestos containing floor tiles and mastic in facility 293 Staff Office.**
- 2. Estimated 5 SF of asbestos containing exterior window putty on facility 293 Staff Office.**
- 3. Estimated 2,500 SF of asbestos containing floor tiles and mastic in facility 286 Clubhouse.**

L. Summary of Lead Containing Materials

The following list summarizes the locations of lead containing materials that must be handled by a lead abatement contractor. Actual amounts must be verified by the responsible ABATEMENT CONTRACTOR.

- 1. All lead contaminated soils in bunkers and berms.**

2. All wood with embedded lead projectiles.
3. All lead based painted components listed in the survey.
4. Wood used in the construction of the bunkers containing creosote.

M. Asbestos Bulk Sample Laboratory Results

Materials previously identified as asbestos containing in facilities 286 and 293 in 2010:

Location	Material	Estimated Quantities	Condition	Asbestos (%)
Facility 293 Staff Office	Floor tiles and black mastics	Est. 700 SF	Intact	5% Chrysotile
Facility 293 Staff Office	Exterior Window Putty	5 SF	Intact	<1% Chrysotile
Facility 286 Clubhouse	Black Floor tile mastic under 12" x 12" beige floor tile	2,500 SF	Intact	5% Chrysotile
Facility 286 Clubhouse	Roof Mastics	-	-	Abated 2014

N. Lead Paint XRF Analysis Results

Results from lead paint survey performed in 2010:

Structure	Room	Side	Component	Substrate	Condition	Color	Lead Concentration mg/cm ²
Staff Office	Outside	C	Window Sill	Wood	Poor	Pink	1.1
Staff Office	Outside	C	Window	Wood	Poor	Pink	.5
Staff Office	Outside	C	Upper Trim	Wood	Poor	Pink	.5
Staff Office	Outside	C	Vault Door	Metal	Intact	Brown	.5
Staff Office	Outside	C	Vault Door Frame	Metal	Intact	Brown	.7
Clubhouse	Outside	A	Window	Wood	Poor	Beige	1.5
Clubhouse	Outside	B	Window	Wood	Poor	Beige	9.8
Clubhouse	Outside	C	Eaves	Wood	Intact	Beige	2.7
Clubhouse	Outside	C	Upper Trim	Wood	Intact	Beige	10.6
Clubhouse	Hall	B	Window Sill	Wood	Poor	Brown	11
Clubhouse	Kitchen	A	Wall	Wood	Fair	Beige	7.2
Clubhouse	Kitchen	A	Window	Wood	Poor	Beige	6.7
Clubhouse	Kitchen	C	Door	Wood	Poor	Beige	.8
Backstop	Range 1	C	Column	Wood	Poor	Green	3.4
Backstop	Range 2	C	Horizontal Beam	Wood	Poor	Green	1

Structure	Room	Side	Component	Substrate	Condition	Color	Lead Concentration mg/cm ²
Backstop	Range 2	C	Column	Wood	Poor	Green	1.8
Backstop	Range 3	C	Column	Wood	Poor	Green	2.5
Backstop	Range 3	D	Column	Wood	Poor	Green	1.8
Shed	Range 3	B	Wall	Metal	Poor	Blue	2.4
Shed	Range 3	C	Door	Metal	Poor	Blue	2.7
Shed	Range 3	D	Door	Metal	Poor	Blue	1.7
Backstop	Range 4	D	Window	Wood	Poor	Brown	5.6
Ticket Booth	Range 4	D	Window	Wood	Poor	Green	.5
Shade Structure	Range 1	A	Column	Wood	Poor	Green	1.8

O. Lead Contaminated Soil

1. Soils tested high for lead concentrations, therefore all soils are contaminated with lead dust, lead fragments, and lead projectiles. Detailed results are available in the Survey performed in 2010 in Appendix A of this section.

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APPENDIX A-SECTION 02000

INSPECTION REPORT ASBESTOS AND LEAD



Environmental Services Department
Disposal & Environmental Protection

INSPECTION REPORT ASBESTOS AND LEAD

for

SDPD FIRING RANGE - FACILITY 286, 289, 293 POLICE RANGE REFURBISHMENT-PHASE II

March 13, 2019

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1. Overview

An Inspector from the City of San Diego's Environmental Services Department, Asbestos, Lead and Mold Program (ALMP) visited the site on March 12, 2019 to verify and update the inspection report of the Police Firing Range at 4008 Federal Blvd originally conducted on April 19th, 2010 for asbestos and lead. The inspection included facility numbers 286 (Clubhouse), 289 (range covers), and 293 (Staff office).

PROJECT OVERVIEW, the SDPD range buildings and shooting embankments will undergo a refurbishment of the structures and replacement of the sand bullet traps and covers. All soils are contaminated with lead and special handling will be enforced throughout the project. Construction materials expected to be disturbed that contain asbestos or lead will be abated or stabilized.

The ALMP Inspector that performed the inspection possesses a current State of California Division of Occupational Safety and Health (DOSH) Site Surveillance Technician and State of California Lead Inspector/Risk Assessor credential, and he has maintained his certificate for the Environmental Protection Agency (EPA) Asbestos Hazard Emergency Response Act (AHERA) Building Inspector course included in Attachment #3.

In the event that asbestos, lead or mold contaminated materials are detected and may be impacted by the PROJECT, ALMP will provide the required abatement specifications for the PROJECT to the requesting department. The contractor is to verify locations, quantities and condition of all asbestos containing material (ACM) and lead before work begins.

2. Laboratory Information

The City of San Diego contracts with the laboratories that are listed below. All samples collected as part of this inspection were submitted to and analyzed by either:

HM Pitt Labs, Inc., 4901 Morena Blvd., Suite 203 San Diego, CA 92117 (619) 474-8548	LA Testing 520 Mission St. Pasadena, CA 91030 (323)-254-9960	EMSL Analytical, Inc. (formerly EMS) 7916 Convoy Court San Diego CA (858) 499-1303
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HM Pitt Labs, Inc., LA Testing, and EMSL maintain accreditations for asbestos analysis under the National Voluntary Laboratory Accreditation Program (NVLAP) and the California Department of Public Health Service's Environmental Laboratory Accreditation Program (ELAP). Asbestos content analysis was conducted in accordance with methods specified in Appendix E, Subpart E, 40 CFR 763- "Interim Method for the Determination of Asbestos in Bulk Insulation Samples" (EPA-600/M4-82-020 Dec. 1982) as Modified by "Method for the Determination of Asbestos in Bulk Building Materials" (EPA/600/R-93/116 July 1993).

3. Summary of Asbestos Containing Materials (ACM)

This inspection was conducted to identify any asbestos containing material that may be impacted as part of this PROJECT. If the below materials are to be impacted then the materials will require abatement by a qualified abatement contractor with a DOSH license and trained certified asbestos workers. The summary table below lists the ACM found in each building along with estimated quantities, concentrations, locations and material

condition. A complete list of the materials that have been tested for asbestos and the results are included in Attachment #1.

Due to the non-destructive nature of the inspection materials within interstitial spaces such as wall cavities, pipe chases and above ceilings may not have been tested. If suspect materials are encountered during PROJECT activities and are not listed in Attachment #1 of this report, work must stop immediately and the ALMP contacted so additional testing can be performed.

Location	Material	Estimated Quantities	Condition	Asbestos (%)
Facility 293 Staff Office	Floor tiles and black mastics	Est. 700 SF	Intact	5% Chrysotile
Facility 293 Staff Office	Exterior Window Putty	5 SF	Intact	<1% Chrysotile
Facility 286 Clubhouse	Black Floor tile mastic under 12" x 12" beige floor tile	2,500 SF	Intact	5% Chrysotile
Facility 286 Clubhouse	Roof Mastics	-	-	Abated 2014

4. Summary of Lead Paint

Lead concentrations were found to be above threshold levels in various tested components identified in the following table. Threshold concentrations are levels of lead where if it is disturbed during renovations, maintenance, or repairs, exposure to lead may occur. Components with conditions listed as Fair or Poor must be stabilized prior to renovation or demolition activities.

Paint containing lead concentration in excess of 1.0 mg/cm² or 5,000 mg/kg is considered lead based paint. The City of San Diego's Lead Hazard Control Ordinance requires the use of Lead Safe Work Practices when disturbing paint that contains above 0.5 mg/cm² or 1,000 mg/kg lead.

The exterior paint on the Staff building, Clubhouse, and shade structures are in poor condition. Lead Paint stabilization is necessary.

The summary below lists the areas of paint with greater than 600ppm or 0.5 mg/cm² where Cal OSHA protective precautions are required. A complete list of components tested for lead can be found in Attachment #2 of this report.

Structure	Room	Side	Component	Substrate	Condition	Color	Pb Concentration mg/cm ²
Staff Bldg	Outside	C	Window Sill	Wood	Poor	Pink	1.1
Staff Bldg	Outside	C	Window	Wood	Poor	Pink	.5
Staff Bldg	Outside	C	Upper Trim	Wood	Poor	Pink	.5
Staff Bldg	Outside	C	Vault Door	Metal	Intact	Brown	.5
Staff Bldg	Outside	C	Vault Door Frame	Metal	Intact	Brown	.7
Clubhouse	Outside	A	Window	Wood	Poor	Beige	1.5

Structure	Room	Side	Component	Substrate	Condition	Color	Pb Concentration mg/cm ²
Clubhouse	Outside	B	Window	Wood	Poor	Beige	9.8
Clubhouse	Outside	C	Eaves	Wood	Intact	Beige	2.7
Clubhouse	Outside	C	Upper Trim	Wood	Intact	Beige	10.6
Clubhouse	Hall	B	Window Sill	Wood	Poor	Brown	11
Clubhouse	Kitchen	A	Wall	Wood	Fair	Beige	7.2
Clubhouse	Kitchen	A	Window	Wood	Poor	Beige	6.7
Clubhouse	Kitchen	C	Door	Wood	Poor	Beige	.8
Backstop	Range 1	C	Column	Wood	Poor	Green	3.4
Backstop	Range 2	C	Horizontal Beam	Wood	Poor	Green	1
Backstop	Range 2	C	Column	Wood	Poor	Green	1.8
Backstop	Range 3	C	Column	Wood	Poor	Green	2.5
Backstop	Range 3	D	Column	Wood	Poor	Green	1.8
Shed	Range 3	B	Wall	Metal	Poor	Blue	2.4
Shed	Range 3	C	Door	Metal	Poor	Blue	2.7
Shed	Range 3	D	Door	Metal	Poor	Blue	1.7
Backstop	Range 4	D	Window	Wood	Poor	Brown	5.6
Ticket Booth	Range 4	D	Window	Wood	Poor	Green	.5
Shade Structure	Range 1	A	Column	Wood	Poor	Green	1.8

A complete XRF report showing results of all surfaces tested in 2010 is attached to this report. The above list includes a re-evaluation of the paint conditions in the planned areas of work.

5. Summary of Lead Dust on Horizontal Surfaces

Dust wipe samples were collected on exterior horizontal surfaces throughout the site that may be impacted by planned renovations. Exterior surfaces with dust levels at or over 1,000 ug/sq.ft are considered hazardous by State of California Title 17.

All exterior horizontal surfaces at the site that will be impacted by the planned renovations are considered to contain hazardous levels of lead dust. This includes all shade structure benches, floors, and tables, and all concrete surfaces. To prevent worker contamination all workers must practice dust control methods while on the site and utilize a decontamination and hand washing station. A laboratory report showing results of all dust samples collected along with a schematic of their locations are attached to this report.

6. Summary of Title 22 Metals in Soil

Surface soil samples were collected in all areas of the site where soil may be removed or otherwise impacted by planned renovations. The samples were then analyzed to determine whether any metals exceeded thresholds that would require disposal of the soil as hazardous. A Total Threshold Limit Concentration (TTLC) was performed for all Title 22 metals. For

those samples below the TTLC hazardous threshold (1,000 ppm for lead) and still greater than 10x the STLC threshold (50 for lead) a second test, Solubility Threshold Limit Concentration (STLC), was performed as required by the California Department of Substance Control (DTSC). Areas sampled include the embankment behind the firing berm structures up to and including the dirt road, all berms, the bare soil north of the shade structure of range 1, the bare soil west of the staff offices, soil on range 3 just south of where the concrete ends, and soil 10 and 20 feet south of the shade structure of range 4. Berms used for catching bullets were not sampled during this inspection but are assumed to be very high in lead concentrations. Soil leaving the site would have to be disposed of as hazardous waste, therefore no soil should leave the site. Any areas tested that will not be impacted by removal or other forms of disturbance will require an abatement option since bare soil on public facilities containing over 1,000 ppm is illegal per California regulations. All bare soil areas must be treated by planting grass or other vegetation over the bare soil. Hydro-seeding or use of mulch chips are also an option. A laboratory report showing results of all soil samples collected along with a schematic of their locations is attached to this report.

7. Attachments

1. Asbestos Sample Logs and Laboratory Reports
2. Lead Sample Logs, Laboratory Reports and XRF Readings
3. Inspector Certifications
4. Site Diagrams


Attachment # 1

ASBESTOS SAMPLE LOGS & LABORATORY REPORTS

Report No: 136889 Customer: City of San Diego
 Date: April 15, 2010 9601 Ridgheaven Ct. #320
 Date Received: April 9, 2010 San Diego, CA 92123
 Date Analyzed: April 15, 2010 Attention: Jeff Jones
 Date/Time Collected: by Jeff Jones Reference: 1078974; 6447
 Subject: Polarized Light Microscopy Analysis for Asbestos 65 Samples
 Methodology: "Method for Determination of Asbestos in Bulk Building Materials." EPA 600/R-93/116
 Accredited: NVLAP Lab Code 101218-0
 Certified: California Department of Health Services Environmental Testing Laboratory ELAP 1119
 County Sanitation Districts of Los Angeles County, Lab ID No. 10120

Quality Control Sample (SRM 1866 Glass Fibers as the blank): None Detected

Sample ID	Location / Description	Visual Description	Asbestiform Minerals	Other Fibrous Materials	Non-fibrous Materials
6447-1A	NON-FRIABLE	BLACK/BROWN TAR LIKE	NONE DETECTED	SYNTHETICS 15%	GRANULAR MINERALS, OPAQUES
6447-1B SHINGLE	NON-FRIABLE	BLACK/BROWN TAR LIKE	NONE DETECTED	SYNTHETICS 15%	GRANULAR MINERALS, OPAQUES
6447-1B FELT	NON-FRIABLE	BLACK TAR LIKE	NONE DETECTED	SYNTHETICS 15%	GRANULAR MINERALS, OPAQUES
6447-2	NON-FRIABLE	WHITE/GRAY RUBBERY	NONE DETECTED	NONE DETECTED	GRANULAR MINERALS, OPAQUES
6447-3A	NON-FRIABLE	WHITE/TAN SOLID	NONE DETECTED	NONE DETECTED	GRANULAR MINERALS, OPAQUES
6447-3B	NON-FRIABLE	WHITE/TAN SOLID	CHRYSTOLE - LESS THAN 1%	NONE DETECTED	GRANULAR MINERALS, OPAQUES
6447-4A FT	NON-FRIABLE	BEIGE SOLID	**NONE DETECTED	NONE DETECTED	GRANULAR MINERALS, OPAQUES
6447-4A M	NON-FRIABLE	YELLOW STICKY	NONE DETECTED	NONE DETECTED	GRANULAR MINERALS, OPAQUES
6447-4B FT	NON-FRIABLE	GREEN SOLID	**NONE DETECTED	NONE DETECTED	GRANULAR MINERALS, OPAQUES
6447-4B M	NON-FRIABLE	YELLOW STICKY	NONE DETECTED	CELLULOSE - LESS THAN 1%	GRANULAR MINERALS, OPAQUES
6447-5A	NON-FRIABLE	WHITE/BROWN FIBROUS	NONE DETECTED	CELLULOSE 98%	OPAQUES
6447-5B	NON-FRIABLE	BLACK/BROWN FIBROUS	NONE DETECTED	CELLULOSE 98%	OPAQUES
6447-6A FT	NON-FRIABLE	BROWN SOLID	CHRYSTOLE - GREATER THAN 1%	NONE DETECTED	GRANULAR MINERALS, OPAQUES
6447-6A M	NON-FRIABLE	BLACK STICKY	NONE DETECTED	NONE DETECTED	GRANULAR MINERALS, OPAQUES
6447-6B FT	NOT ANALYZED - STOP AT FIRST POSITIVE				
6447-6B M	NON-FRIABLE	BLACK STICKY	NONE DETECTED	CELLULOSE - LESS THAN 1%	GRANULAR MINERALS, OPAQUES


 Wesene Sebhat, Optical Microscopist
 BMK/mt

 B.M. Kolk, Laboratory Director

The EPA method is a semi-quantitative procedure. The detection limit is between 0.1 - 1% by area and is dependent upon the size of the asbestos fibers, the means of sampling and the matrix of the sampled material.
 The test results reported are for the sample(s) delivered to us and may not represent the entire material from which the samples was taken. The EPA recommends three samples or more be taken from a "homogenous sampling area" before friable material is considered non-asbestos-containing.
 ** Negative floor tile samples may contain significant amounts (>1%) of very thin asbestos fibers which cannot be detected by PLM. Confirmation by XRD or TEM is recommended by the EPA (Federal Register Vol. 59, No. 146).
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 Samples were received in good condition unless otherwise noted.

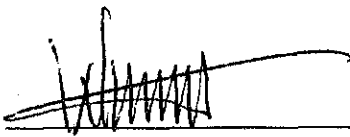
Report No:

136889

Client:

City of San Diego

Sample ID	Location / Description	Visual Description	Asbestiform Minerals	Other Fibrous Materials	Non-fibrous Materials
6447-7A FT	NON-FRIABLE	BEIGE SOLID	**NONE DETECTED	CELLULOSE 2%	GRANULAR MINERALS, OPAQUES
6447-7A M	NON-FRIABLE	BLACK STICKY	NONE DETECTED	CELLULOSE 2%	GRANULAR MINERALS, OPAQUES
6447-7B FT	NON-FRIABLE	BLACK STICKY	**NONE DETECTED	CELLULOSE 4%	GRANULAR MINERALS, OPAQUES
6447-7B M	NON-FRIABLE	BEIGE SOLID	NONE DETECTED	CELLULOSE - LESS THAN 1%	GRANULAR MINERALS, OPAQUES
6447-8A	NON-FRIABLE	WHITE GRANULAR, BROWN FIBROUS	NONE DETECTED	CELLULOSE 20%	GRANULAR MINERALS, OPAQUES
6447-8B	NON-FRIABLE	WHITE GRANULAR, BROWN FIBROUS	NONE DETECTED	CELLULOSE 20%	GRANULAR MINERALS, OPAQUES
6447-9A SHINGLE	NON-FRIABLE	BLACK/GREEN TAR LIKE	NONE DETECTED	CELLULOSE 20%	OPAQUES
6447-9A FELT	NON-FRIABLE	BLACK TAR LIKE	NONE DETECTED	CELLULOSE 60%	OPAQUES
6447-9B SHINGLE	NON-FRIABLE	BLACK/GRAY TAR LIKE	NONE DETECTED	CELLULOSE 30%	OPAQUES
6447-9B FELT	NON-FRIABLE	BLACK TAR LIKE	NONE DETECTED	CELLULOSE 60%	OPAQUES
6447-10A	NON-FRIABLE	BLACK/GRAY STICKY, FIBROUS	CHRYSTOLE 5%	NONE DETECTED	OPAQUES
6447-10B	NOT ANALYZED - STOP AT FIRST POSITIVE				
6447-11A	NON-FRIABLE	WHITE/GRAY SOLID	NONE DETECTED	NONE DETECTED	GRANULAR MINERALS, OPAQUES
6447-11B	NON-FRIABLE	WHITE/GRAY SOLID	NONE DETECTED	NONE DETECTED	GRANULAR MINERALS, OPAQUES
6447-12A	NON-FRIABLE	WHITE/BROWN FIBROUS	NONE DETECTED	CELLULOSE 95%; FIBERGLASS 2%	OPAQUES
6447-12B	NON-FRIABLE	WHITE/BROWN FIBROUS	NONE DETECTED	CELLULOSE 95%; FIBERGLASS 2%	OPAQUES
6447-13A FT(1)	NON-FRIABLE	GRAY SOLID	CHRYSTOLE - GREATER THAN 1%	NONE DETECTED	GRANULAR MINERALS, OPAQUES
6447-13A M(1)	NON-FRIABLE	BLACK STICKY	NONE DETECTED	CELLULOSE 5%	OPAQUES
6447-13A FT(2)	NON-FRIABLE	BROWN SOLID	CHRYSTOLE - GREATER THAN 1%	NONE DETECTED	GRANULAR MINERALS, OPAQUES
6447-13A M(2)	NON-FRIABLE	BROWN STICKY	NONE DETECTED	CELLULOSE - LESS THAN 1%	GRANULAR MINERALS, OPAQUES
6447-13B FT	NOT ANALYZED - STOP AT FIRST POSITIVE				
6447-13B M	NON-FRIABLE	BROWN STICKY	NONE DETECTED	CELLULOSE - LESS THAN 1%	GRANULAR MINERALS, OPAQUES



Wesene Sebhat, Optical Microscopist
BMK/mt

B.M. Kolk, Laboratory Director

The EPA method is a semi-quantitative procedure. The detection limit is between 0.1 - 1% by area and is dependent upon the size of the asbestos fibers, the means of sampling and the matrix of the sampled material.

The test results reported are for the sample(s) delivered to us and may not represent the entire material from which the samples was taken. The EPA recommends three samples or more be taken from a "homogenous sampling area" before friable material is considered non-asbestos-containing.

** Negative floor tile samples may contain significant amounts (>1%) of very thin asbestos fibers which cannot be detected by PLM. Confirmation by XRD or TEM is recommended by the EPA (Federal Register Vol. 59, No. 146).

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Samples were received in good condition unless otherwise noted.

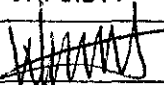
Report No:

136889

Client:

City of San Diego

Sample ID	Location / Description	Visual Description	Asbestiform Minerals	Other Fibrous Materials	Non-fibrous Materials
6447-14A	NON-FRIABLE	WHITE/GRAY GRANULAR	NONE DETECTED	NONE DETECTED	GRANULAR MINERALS, OPAQUES
6447-14B	NON-FRIABLE	WHITE/GRAY GRANULAR	NONE DETECTED	CELLULOSE 2%	GRANULAR MINERALS, OPAQUES
6447-14C	NON-FRIABLE	WHITE/GRAY GRANULAR	NONE DETECTED	NONE DETECTED	GRANULAR MINERALS, OPAQUES
6447-15A SHINGLE	NON-FRIABLE	WHITE/GRAY GRANULAR	NONE DETECTED	CELLULOSE 25%	OPAQUES
6447-15A FELT	NON-FRIABLE	BLACK TAR LIKE	NONE DETECTED	CELLULOSE 60%	OPAQUES
6447-15B SHINGLE	NON-FRIABLE	WHITE/BLACK TAR LIKE	NONE DETECTED	CELLULOSE 20%	OPAQUES
6447-15B FELT	NON-FRIABLE	BLACK FIBROUS	NONE DETECTED	CELLULOSE 60%	OPAQUES
6447-16A	NON-FRIABLE	BLACK/GRAY TAR LIKE	CHRYSTOLE 3%	NONE DETECTED	GRANULAR MINERALS, OPAQUES
6447-16B	NOT ANALYZED - STOP AT FIRST POSITIVE				
6447-17A	NON-FRIABLE	WHITE/BEIGE SOLID	NONE DETECTED	NONE DETECTED	GRANULAR MINERALS, OPAQUES
6447-17B	NON-FRIABLE	WHITE/TAN SOLID	NONE DETECTED	NONE DETECTED	GRANULAR MINERALS, OPAQUES
6447-18A	NON-FRIABLE	WHITE/BLACK TAR LIKE	NONE DETECTED	FIBERGLASS 20%	OPAQUES
6447-18B	NON-FRIABLE	WHITE/GRAY TAR LIKE	NONE DETECTED	FIBERGLASS 20%	OPAQUES
6447-18C LAYER 1	NON-FRIABLE	WHITE/BLACK TAR LIKE	NONE DETECTED	FIBERGLASS 15%	GRANULAR MINERALS, OPAQUES
6447-18C LAYER 2	NON-FRIABLE	WHITE/BLACK TAR LIKE	NONE DETECTED	CELLULOSE 30%	GRANULAR MINERALS, OPAQUES
6447-18C LAYER 3	NON-FRIABLE	WHITE/BLACK/BROWN TAR LIKE	NONE DETECTED	CELLULOSE 30%	GRANULAR MINERALS, OPAQUES
6447-19A	NON-FRIABLE	BLACK/GRAY FIBROUS	CHRYSTOLE 5%	NONE DETECTED	GRANULAR MINERALS, OPAQUES
6447-19B	NOT ANALYZED - STOP AT FIRST POSITIVE				
6447-20A	NON-FRIABLE	BEIGE/GRAY SOLID	NONE DETECTED	NONE DETECTED	GRANULAR MINERALS, OPAQUES
6447-20B	NON-FRIABLE	BEIGE/GRAY SOLID	NONE DETECTED	NONE DETECTED	GRANULAR MINERALS, OPAQUES
6447-21A FT	NON-FRIABLE	GRAY SOLID	**NONE DETECTED	CELLULOSE 2%	GRANULAR MINERALS, OPAQUES
6447-21A M	NON-FRIABLE	BLACK STICKY	CHRYSTOLE 5%	NONE DETECTED	OPAQUES
6447-21A LC	NON-FRIABLE	WHITE GRANULAR	NONE DETECTED	CELLULOSE - LESS THAN 1%	GRANULAR MINERALS, OPAQUES
6447-21B FT	NON-FRIABLE	BEIGE STICKY	NONE DETECTED	CELLULOSE 2%	GRANULAR MINERALS, OPAQUES


Wesene Sebhat, Optical Microscopist
BMK/mt

B.M. Kolk, Laboratory Director

The EPA method is a semi-quantitative procedure. The detection limit is between 0.1 - 1% by area and is dependent upon the size of the asbestos fibers, the means of sampling and the matrix of the sampled material.

The test results reported are for the sample(s) delivered to us and may not represent the entire material from which the samples was taken. The EPA recommends three samples or more be taken from a "homogenous sampling area" before friable material is considered non-asbestos-containing.

** Negative floor tile samples may contain significant amounts (>1%) of very thin asbestos fibers which cannot be detected by PLM. Confirmation by XRD or TEM is recommended by the EPA (Federal Register Vol. 59, No. 146).

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Samples were received in good condition unless otherwise noted.

Report No: 136889 Client: City of San Diego

Sample ID	Location / Description	Visual Description	Asbestiform Minerals	Other Fibrous Materials	Non-fibrous Materials
6447-21B M	NOT ANALYZED - STOP AT FIRST POSITIVE				
6447-21C FT	NON-FRIABLE	GRAY SOLID	NONE DETECTED	CELLULOSE 2%	GRANULAR MINERALS, OPAQUES
6447-21C M	NOT ANALYZED - STOP AT FIRST POSITIVE				



Wesene Sebhat, Optical Microscopist
BMK/mt

B.M. Kolk, Laboratory Director

The EPA method is a semi-quantitative procedure. The detection limit is between 0.1 - 1% by area and is dependent upon the size of the asbestos fibers, the means of sampling and the matrix of the sampled material.

The test results reported are for the sample(s) delivered to us and may not represent the entire material from which the samples was taken. The EPA recommends three samples or more be taken from a "homogenous sampling area" before friable material is considered non-asbestos-containing.

** Negative floor tile samples may contain significant amounts (>1%) of very thin asbestos fibers which cannot be detected by PLM. Confirmation by XRD or TEM is recommended by the EPA (Federal Register Vol. 59, No. 146).

This report, from a NIST-accredited laboratory through NVLAP, must not be used by the client to claim product endorsement by NVLAP or any agency of the U.S. government. This report shall not be reproduced, except in full, without the written approval of EMS Laboratories.

Samples were received in good condition unless otherwise noted.

SUBMITTAL FORM/Laboratory Services

136889

PAGE 1 OF 3

5 day T/A

CLIENT City of San Diego
 ADDRESS 9601 Ridgehaven Ct. #320
San Diego, CA 92123

TELEPHONE 858-573-1277
 CONTACT Jeff Jones

RELINQUISHED BY Jeff Jones
 TIME / DATE 4/8/10
 DATE OF SHIPMENT 4/8/10 CARRIER FedEx
 CLIENT P.O. NO. 1078974
 CLIENT JOB/PROJECT ID NO(S). 6447

PACKAGE SHIPPED FROM San Diego

RESULTS REQUESTED VIA Email: jjones@sandiego.gov
 (NOTE: Complete written reports will follow all analyses, in addition to any prior transmitted verbal or fax results.)

DATE/TIME OF SAMPLE COLLECTION _____
 SAMPLE PRESERVATIVES _____ HOLDING TIMES _____
 NO. OF SAMPLES SENT 44 SAMPLER'S NAME [Signature] / Jeff Jones
SIGNATURE PRINTED
 TYPE: WATER WASTE WATER SOIL FILTER SORBENT TUBE IMPINGER OTHER _____

36889

(FOR EMS ONLY) EMS Sample No.	CLIENT SAMPLE NO.	DESCRIPTION/LOCATION/ANALYSIS	VOLUME/ TIME/WEIGHT (IF APPLICABLE)
-1A	6447-1A	Roof core	PLM Staff Offices
1B	6447-1B	Roof core stop pos	
2	6447-2	Rubber penetration mastic	
3A	6447-3A	Window putty	
3B	6447-3B	Window putty stop pos	
4A	6447-4A	Floor tile	
4B	6447-4B	Floor tile stop pos	
5A	6447-5A	Ceiling tile	
5B	6447-5B	Ceiling tile stop pos	
6A	6447-6A	Floor tile and black mastic	
6B	6447-6B	Floor tile and black mastic stop pos	
7A	6447-7A	Floor tile and black mastic	
7B	6447-7B	Floor tile and black mastic stop pos	
8A	6447-8A	Drywall/mud composite	
8B	6447-8B	Drywall/mud composite stop pos	

(SF 5/00)

Laboratory No. 136889 Received By [Signature] Time 9:34
 Date of Package Delivery 4/9/10 Shipping Bill Retained: YES NONE
 Condition of Package on Receipt OK Condition of Custody Seal None
 (NOTE: If the package has sustained substantial damage or the custody seal is broken, stop and contact the project manager and the shipper.)
 No. of Samples 44 Chain-of-Custody Signature _____
 Date of Acceptance into Sample Bank 4/9/10 Misc. Info. stop pos: stop if > 1%
 Disposition of Samples EMS Labs

FOR EMS ONLY

EMS LABORATORIES 117 West Bellevue Drive / Pasadena CA 91105-2503 / 626-568-4065

SUBMITTAL FORM/Laboratory Services

5 day T/A

◆ RELINQUISHED BY Jeff Jones
 ◆ TIME / DATE 4/8/10
 ◆ CLIENT City of San Diego ◆ DATE OF SHIPMENT 4/8/10 ◆ CARRIER FedEx
 ◆ ADDRESS 9601 Ridgehaven Ct. #320 ◆ CLIENT P.O. NO. 1078974
San Diego, CA 92123 ◆ CLIENT JOB/PROJECT ID NO(S). 6447
 ◆ TELEPHONE 858-573-1277 ◆ PACKAGE SHIPPED FROM San Diego
 ◆ CONTACT Jeff Jones

◆ RESULTS REQUESTED VIA Email: jjones@sandiego.gov
 (NOTE: Complete written reports will follow all analyses, in addition to any prior transmitted verbal or fax results.)

◆ DATE/TIME OF SAMPLE COLLECTION _____
 ◆ SAMPLE PRESERVATIVES _____ HOLDING TIMES _____
 ◆ NO. OF SAMPLES SENT _____ SAMPLER'S NAME Jeff Jones
 (SIGNATURE) (PRINTED)
 ◆ TYPE: WATER WASTE WATER SOIL FILTER SORBENT TUBE IMPINGER OTHER _____

(FOR EMS ONLY)	CLIENT SAMPLE NO.	DESCRIPTION/LOCATION/ANALYSIS	VOLUME, TIME, WEIGHT (IF APPLICABLE)
EMS Sample No. <u>136889-9A</u>	6447-9A	Roof shingles (2 layers) PLM	Caretaker's house
<u>9B</u>	6447-9B	Roof shingles (2 layers) stop pos	Not in Scope
<u>10A</u>	6447-10A	Roof penetration mastic	
<u>10B</u>	6447-10B	Roof penetration mastic stop pos	
<u>11A</u>	6447-11A	Window putty	
<u>11B</u>	6447-11B	Window putty stop pos	
<u>12A</u>	6447-12A	Ceiling tile	
<u>12B</u>	6447-12B	Ceiling tile stop pos	
<u>13A</u>	6447-13A	Floor tile (2 layers) and black mastic	
<u>13B</u>	6447-13B	Floor tile	
<u>14A</u>	6447-14A	Wall plaster	
<u>14B</u>	6447-14B	Wall plaster stop pos	
<u>14C</u>	6447-14C	Wall plaster	
<u>15A</u>	6447-15A	Roof shingles (2 layers)	
<u>15B</u>	6447-15B	Roof shingles (2 layers) stop pos	

(SF 5/00)

◆ Laboratory No. 136889 ◆ Received By _____ ◆ Time _____
 ◆ Date of Package Delivery _____ ◆ Shipping Bill Retained: YES NONE
 ◆ Condition of Package on Receipt _____ ◆ Condition of Custody Seal _____
 (NOTE: If the package has sustained substantial damage or the custody seal is broken, stop and contact the project manager and the shipper.)
 ◆ No. of Samples _____ ◆ Chain-of-Custody Signature _____
 ◆ Date of Acceptance into Sample Bank _____ ◆ Misc. Info. _____
 ◆ Disposition of Samples _____

FOR EMS ONLY

SUBMITTAL FORM/Laboratory Services

5 day T/A

◆ CLIENT City of San Diego
 ◆ ADDRESS 9601 Ridgehaven Ct. #320
San Diego, CA 92123
 ◆ TELEPHONE 858-573-1277
 ◆ CONTACT Jeff Jones

◆ RELINQUISHED BY Jeff Jones
 ◆ TIME / DATE 4/8/10
 ◆ DATE OF SHIPMENT 4/8/10 ◆ CARRIER FedEx
 ◆ CLIENT P.O. NO. 1078974
 ◆ CLIENT JOB/PROJECT ID NO(S) 6447
 ◆ PACKAGE SHIPPED FROM San Diego

◆ RESULTS REQUESTED VIA Email: jjones@sandiego.gov
 (NOTE: Complete written reports will follow all analyses, in addition to any prior transmitted verbal or fax results.)

◆ DATE/TIME OF SAMPLE COLLECTION _____
 ◆ SAMPLE PRESERVATIVES _____ HOLDING TIMES _____
 ◆ NO. OF SAMPLES SENT _____ SAMPLER'S NAME Jeff Jones
SIGNATURE [Signature] PRINTED
 ◆ TYPE: WATER WASTE WATER SOIL FILTER SORBENT TUBE IMPINGER OTHER _____

(FOR EMS ONLY) EMS Sample No.	CLIENT SAMPLE NO.	DESCRIPTION/LOCATION/ANALYSIS	VOLUME/ TIME/WEIGHT (IF APPLICABLE)
<u>136889-16A</u>	6447-16A	Roof mastic → PLM	Clubhouse
<u>16B</u>	6447-16B	Roof mastic → stop pos	
<u>17A</u>	6447-17A	Window putty →	
<u>17B</u>	6447-17B	Window putty → stop pos	
<u>18A</u>	6447-18A	Roof core →	
<u>18B</u>	6447-18B	Roof core → stop pos	
<u>18C</u>	6447-18C	Roof core →	
<u>19A</u>	6447-19A	Roof mastic →	
<u>19B</u>	6447-19B	Roof mastic → stop pos	
<u>20A</u>	6447-20A	Window putty →	
<u>20B</u>	6447-20B	Window putty → stop pos	
<u>21A</u>	6447-21A	Floor tile and black mastic →	
<u>21B</u>	6447-21B	Floor tile and black mastic → stop pos	
<u>21C</u>	6447-21C	Floor tile and black mastic →	
<u>1</u>			

(SF 5/00)

FOR EMS ONLY

◆ Laboratory No. 136889 ◆ Received By _____ ◆ Time _____
 ◆ Date of Package Delivery see pg. 1 ◆ Shipping Bill Retained: YES NONE
 ◆ Condition of Package on Receipt _____ ◆ Condition of Custody Seal _____
 (NOTE: If the package has sustained substantial damage or the custody seal is broken, stop and contact the project manager and the shipper.)
 ◆ No. of Samples _____ ◆ Chain-of-Custody Signature _____
 ◆ Date of Acceptance into Sample Bank _____ ◆ Misc. Info. _____
 ◆ Disposition of Samples _____

Attachment # 2

**LEAD SAMPLE LOGS, LABORATORY REPORTS, AND XRF
READINGS**

SUBMITTAL FORM/Laboratory Services

137367

Standard T/A

CLIENT City of San Diego
 ADDRESS 9601 Ridgehaven Ct. #320
 San Diego, CA 92123
 TELEPHONE 858-573-1277
 CONTACT Jeff Jones

RELINQUISHED BY Jeff Jones
 TIME / DATE 4/29/10
 DATE OF SHIPMENT 4/29/10 CARRIER FedEx
 CLIENT P.O. NO. 1078974
 CLIENT JOB/PROJECT ID NO(S). 6447
 PACKAGE SHIPPED FROM San Diego

RESULTS REQUESTED VIA Email: jjones@sandiego.gov
 (NOTE: Complete written reports will follow in addition to any prior transmitted verbal or fax results.)

DATE/TIME OF SAMPLE COLLECTION _____
 SAMPLE PRESERVATIVES _____ HOLDING TIMES _____
 NO. OF SAMPLES SENT _____ SAMPLER'S NAME Jeff Jones
 TYPE: WATER WASTE WATER SOIL FILTER SORBENT TUBE IMPINGER OTHER _____

(FOR EMS ONLY)	CLIENT SAMPLE NO.	DESCRIPTION/LOCATION/ANALYSIS	VOLUME/ TIME/WEIGHT (IF APPLICABLE)
EMS Sample No. 137367-50	6447-50	Wipe AA/Pb	1 SF
	6447-51	Wipe AA/Pb	1 SF
	6447-52	Wipe AA/Pb	1 SF
	6447-53	Wipe AA/Pb	.92 SF
	6447-54	Wipe AA/Pb	1 SF
	6447-55	Wipe AA/Pb	1 SF
	6447-56	Soil All Metal TTLC	
	6447-57	Soil All Metal TTLC	
	6447-58	Soil All Metal TTLC	
	6447-59	Soil All Metal TTLC	
	6447-60	Soil All Metal TTLC	
	6447-62	Wipe AA/Pb	1 SF
	6447-63	Wipe AA/Pb	1 SF
	6447-64	Wipe AA/Pb	1 SF
	6447-65	Wipe AA/Pb	1 SF

(SF 5/00)

15 times

137367

FOR EMS ONLY

Laboratory No. _____
 Date of Package Delivery 4/30/10
 Condition of Package on Receipt OK
 No. of Samples 99 + 13
 Date of Acceptance into Sample Bank 4/30/10
 Disposition of Samples EMC LABS

Shipped By [Signature] Time 9:45
 Shipping Bill Retained: YES NONE
 Condition of Custody Seal NONE
 Chain-of-Custody Signature [Signature]
 Misc. Info. _____

EMS LABORATORIES 117 West Bellevue Drive / Pasadena CA 91105-2503 / 626-568-4065

SUBMITTAL FORM/Laboratory Services

137367

Standard T/A

RELINQUISHED BY Jeff Jones
 TIME / DATE 4/29/10
 CLIENT City of San Diego DATE OF SHIPMENT 4/29/10 CARRIER FedEx
 ADDRESS 9601 Ridgehaven Ct. #320 CLIENT P.O. NO. 1078974
San Diego, CA 92123 CLIENT JOB/PROJECT ID NO(S). 6447
 TELEPHONE 858-573-1277
 CONTACT Jeff Jones PACKAGE SHIPPED FROM San Diego

RESULTS REQUESTED VIA Email: jjones@sandiego.gov
 (NOTE: Complete written reports will follow all analyses, in addition to any prior transmitted verbal or fax results.)

DATE/TIME OF SAMPLE COLLECTION _____
 SAMPLE PRESERVATIVES _____ HOLDING TIMES _____
 NO. OF SAMPLES SENT _____ SAMPLER'S NAME Jeff Jones
 TYPE: WATER WASTE WATER SOIL FILTER SORBENT TUBE IMPINGER OTHER _____

(FOR EMS ONLY) EMS Sample No.	CLIENT SAMPLE NO.	DESCRIPTION/LOCATION/ANALYSIS	VOLUME TIME/WEIGHT (IF APPLICABLE)
<u>137367-66</u>	6447-66	Wipe	1 SF
	6447-67	Wipe	1 SF
	6447-68	Wipe	1 SF
	6447-69	Wipe	1 SF
	6447-70	Wipe	1 SF
	6447-71	Soil	All Metal TTLC
	6447-72		
	6447-73		
	6447-74		
	6447-75		
	6447-76		
	6447-77		
	6447-78		
	6447-79		
	6447-80		

(SF 5/00)

-80

15 lines

137367

FOR EMS ONLY

Laboratory No. _____
 Date of Package Delivery 4/30/10 Received By [Signature] Time 9:45
 Condition of Package on Receipt OK Shipping Bill Retained: YES NONE
 (NOTE: If the package has sustained substantial damage or the custody seal is broken, stop and contact the project manager and the shipper.) Condition of Custody Seal NONE
 No. of Samples 99 + 13 Chain-of-Custody Signature [Signature]
 Date of Acceptance into Sample Bank 4/30/10 Misc. Info. _____
 Disposition of Samples EMSLABS

SUBMITTAL FORM/Laboratory Services **137367**

Standard T/A

CLIENT City of San Diego
 ADDRESS 9601 Ridgehaven Ct. #320
San Diego, CA 92123
 TELEPHONE 858-573-1277
 CONTACT Jeff Jones

RELINQUISHED BY Jeff Jones
 TIME / DATE 4/29/10
 DATE OF SHIPMENT 4/29/10 CARRIER FedEx
 CLIENT P.O. NO. 1078974
 CLIENT JOB/PROJECT ID NO(S). 6447
 PACKAGE SHIPPED FROM San Diego

RESULTS REQUESTED VIA Email: jjones@sandiego.gov
 (NOTE: Complete written reports will follow all analyses, in addition to any prior transmitted verbal or fax results.)

DATE/TIME OF SAMPLE COLLECTION _____
 SAMPLE PRESERVATIVES _____ HOLDING TIMES _____
 NO. OF SAMPLES SENT _____ SAMPLER'S NAME Jeff Jones
 TYPE: WATER WASTE WATER SOIL FILTER SORBENT TUBE IMPINGER OTHER _____

(FOR EMS ONLY)	CLIENT SAMPLE NO.	DESCRIPTION/LOCATION/ANALYSIS	VOLUME/ TIME/WEIGHT (IF APPLICABLE)
EMS Sample No. <u>137367-81</u>	6447-81	Soil	All Metal TTLC
<u>↓ -82</u>	6447-82	Soil	All Metal TTLC
<u>137367-83</u>	6447-83	Roof core	PLM
<u>↓ -84</u>	6447-84	Roof core <u>Stop Positive</u>	PLM
<u>137367-85</u>	6447-85	Soil	All Metal TTLC
<u>↓</u>	6447-86	<u>↓</u>	<u>↓</u>
<u>↓</u>	6447-87	<u>↓</u>	<u>↓</u>
<u>↓</u>	6447-88	Wipe	AA/Pb 1 SF
<u>↓</u>	6447-90	<u>↓</u>	<u>↓</u>
<u>↓</u>	6447-91	<u>↓</u>	<u>↓</u>
<u>↓</u>	6447-95	Soil	All Metal TTLC
<u>↓</u>	6447-96	<u>↓</u>	<u>↓</u>
<u>↓</u>	6447-97	<u>↓</u>	<u>↓</u>
<u>↓</u>	6447-98	<u>↓</u>	<u>↓</u>
<u>↓ -99</u>	6447-99	<u>↓</u>	<u>↓</u>

(SF 5/00)

137367

FOR EMS ONLY

Laboratory No. _____
 Date of Package Delivery 4/30/10
 Condition of Package on Receipt OK
 No. of Samples 99 + 13
 Date of Acceptance into Sample Bank 4/30/10
 Disposition of Samples EMC LABS

Received By Vicki M. Wilcox Time 945
 Shipping Bill Retained: YES NONE
 Condition of Custody Seal NONE
 Chain-of-Custody Signature FJK
 Misc. Info. _____

SUBMITTAL FORM/Laboratory Services

137367

Standard T/A

RELINQUISHED BY Jeff Jones
 TIME / DATE 4/29/10
 CLIENT City of San Diego DATE OF SHIPMENT 4/29/10 CARRIER FedEx
 ADDRESS 9601 Ridgehaven Ct. #320 CLIENT P.O. NO. 1078974
San Diego, CA 92123 CLIENT JOB/PROJECT ID NO(S). 6447
 TELEPHONE 858-573-1277
 CONTACT Jeff Jones PACKAGE SHIPPED FROM San Diego

RESULTS REQUESTED VIA Email: jjones@sandiego.gov
 (NOTE: Complete written reports will follow all analyses, in addition to any prior transmitted verbal or fax results.)

DATE/TIME OF SAMPLE COLLECTION _____
 SAMPLE PRESERVATIVES _____ HOLDING TIMES _____
 NO. OF SAMPLES SENT _____ SAMPLER'S NAME Jeff Jones PRINTED
 TYPE: WATER WASTE WATER SOIL FILTER SORBENT TUBE IMPINGER OTHER _____
 SIGNATURE _____

(FOR EMS ONLY) EMS Sample No.	CLIENT SAMPLE NO.	DESCRIPTION/LOCATION/ANALYSIS	VOLUME/ TIME/WEIGHT (IF APPLICABLE)
137367-100	6447-100	Soil	All Metal TTLC
	6447-101		
	6447-102		
	6447-103		
	6447-104		
	6447-105		
	6447-106		
	6447-107		
137367.1-108	6447-108	Roof core	PLM
	6447-109	Roof core > Stop Positive	PLM
137367-110	6447-110	Wipe	AA/Pb 1 SF
	6447-111		
	6447-112		
	6447-113		
	6447-114		

(SF 5/00)

Laboratory No. 137367 Received By Kip M. [Signature] Time 9:45
 Date of Package Delivery 4/30/10 Shipping Bill Retained: YES NONE
 Condition of Package on Receipt OK Condition of Custody Seal NONE
 (NOTE: If the package has sustained substantial damage or the custody seal is broken, stop and contact the project manager and the shipper.)
 No. of Samples 99+13 Chain-of-Custody Signature [Signature]
 Date of Acceptance into Sample Bank 4/30/10 Misc. Info. _____
 Disposition of Samples EMS LABS

EMS LABORATORIES 117 West Bellevue Drive / Pasadena CA 91105-2503 / 626-568-4065

SUBMITTAL FORM/Laboratory Services

137367

Standard T/A

CLIENT City of San Diego
 ADDRESS 9601 Ridgehaven Ct. #320
San Diego, CA 92123
 TELEPHONE 858-573-1277
 CONTACT Jeff Jones
 RELINQUISHED BY Jeff Jones
 TIME / DATE 4/29/10
 DATE OF SHIPMENT 4/29/10 CARRIER FedEx
 CLIENT P.O. NO. 1078974
 CLIENT JOB/PROJECT ID NO(S) 6447
 PACKAGE SHIPPED FROM San Diego

RESULTS REQUESTED VIA Email: jjones@sandiego.gov
 (NOTE: Complete written reports will follow all analyses, in addition to any pilot transmitted verbal or fax results.)

DATE/TIME OF SAMPLE COLLECTION _____
 SAMPLE PRESERVATIVES _____ HOLDING TIMES _____
 NO. OF SAMPLES SENT _____ SAMPLER'S NAME Jeff Jones
 TYPE: WATER WASTE WATER SOIL FILTER SORBENT TUBE IMPINGER OTHER _____
 SIGNATURE [Signature] PRINTED _____

(FOR EMS ONLY) EMS Sample No.	CLIENT SAMPLE NO.	DESCRIPTION/LOCATION/ANALYSIS	VOLUME/ TIME/WEIGHT (IF APPLICABLE)
137367-115	6447-115	Wipe	1 SF
	6447-116	↓	↓
	6447-117	↓	↓
	6447-118	↓	↓
	6447-119	Soil	All Metal TTLC
	6447-120	↓	↓
	6447-121	↓	↓
	6447-122	↓	↓
	6447-123	↓	↓
	6447-124	↓	↓
	6447-125	↓	↓
	6447-126	↓	↓
	6447-127	↓	↓
	6447-128	↓	↓
	6447-129	↓	↓

(SF 5/00)

Laboratory No. 137367 Received By [Signature] Time 945
 Date of Package Delivery 4/30/10 Shipping Bill Retained: YES NONE
 Condition of Package on Receipt OK Condition of Custody Seal NONE
 (NOTE: If the package has sustained substantial damage or the custody seal is broken, stop and contact the project manager and the shipper.)
 No. of Samples 99 + 13 Chain-of-Custody Signature [Signature]
 Date of Acceptance into Sample Bank 4/30/10 Misc. Info. _____
 Disposition of Samples EMC LABS

EMS LABORATORIES 117 West Bellevue Drive / Pasadena CA 91105-2503 / 626-568-4065

SUBMITTAL FORM/Laboratory Services

137367

Standard T/A

CLIENT City of San Diego
 ADDRESS 9601 Ridgehaven Ct. #320
 San Diego, CA 92123
 TELEPHONE 858-573-1277
 CONTACT Jeff Jones

RELINQUISHED BY Jeff Jones
 TIME / DATE 4/29/10
 DATE OF SHIPMENT 4/29/10 CARRIER FedEx
 CLIENT P.O. NO. 1078974
 CLIENT JOB/PROJECT ID NO(S) 6447
 PACKAGE SHIPPED FROM San Diego

RESULTS REQUESTED VIA Email: jjones@sandiego.gov
 (NOTE: Complete written reports will follow all analyses, in addition to any prior transmitted verbal or fax results.)

DATE/TIME OF SAMPLE COLLECTION
 SAMPLE PRESERVATIVES HOLDING TIMES
 NO. OF SAMPLES SENT SAMPLER'S NAME Jeff Jones
 TYPE: WATER WASTE WATER SOIL FILTER SORBENT TUBE IMPINGER OTHER

(FOR EMS ONLY) EMS Sample No.	CLIENT SAMPLE NO.	DESCRIPTION/LOCATION/ANALYSIS	VOLUME TIME/WEIGHT (IF APPLICABLE)
137367-130	6447-130	Soil	All Metal TTLC
	6447-131		
	6447-132		
	6447-133		
	6447-136		
	6447-137		
	6447-138		
	6447-139		
	6447-140		
	6447-141		
	6447-142		
	6447-143		
	6447-144		
	6447-145		
✓ -146	6447-146		

(SF 5/00)

Laboratory No. 137367 Received By KIRK M... Time 945
 Date of Package Delivery 4/30/10 Shipping Bill Retained: YES NONE
 Condition of Package on Receipt OK Condition of Custody Seal NONE
 No. of Samples 99 + 13 Chain-of-Custody Signature [Signature]
 Date of Acceptance into Sample Bank 4/30/10 Misc. Info.
 Disposition of Samples EMC LABS

EMS LABORATORIES 117 West Bellevue Drive / Pasadena CA 91105-2503 / 626-568-4065

SUBMITTAL FORM/Laboratory Services

137367

Standard T/A

◆ CLIENT City of San Diego
 ◆ ADDRESS 9601 Ridgehaven Ct. #320
 San Diego, CA 92123
 ◆ TELEPHONE 858-573-1277
 ◆ CONTACT Jeff Jones
 ◆ RELINQUISHED BY Jeff Jones
 ◆ TIME / DATE 4/29/10
 ◆ DATE OF SHIPMENT 4/29/10 ◆ CARRIER FedEx
 ◆ CLIENT P.O. NO. 1078974
 ◆ CLIENT JOB/PROJECT ID NO(S) 6447
 ◆ PACKAGE SHIPPED FROM San Diego

◆ RESULTS REQUESTED VIA Email: jjones@sandiego.gov
 (NOTE: Complete written reports will follow all analyses, in addition to any prior transmitted verbal or fax results.)

◆ DATE/TIME OF SAMPLE COLLECTION _____
 ◆ SAMPLE PRESERVATIVES _____ HOLDING TIMES _____
 ◆ NO. OF SAMPLES SENT _____ SAMPLER'S NAME Jeff Jones
 SIGNATURE [Signature] PRINTED _____
 ◆ TYPE: WATER WASTE WATER SOIL FILTER SORBENT TUBE IMPINGER OTHER _____

(FOR EMS ONLY)	CLIENT SAMPLE NO.	DESCRIPTION/LOCATION/ANALYSIS	VOLUME/ TIME/W/IGHT (IF APPLICABLE)
EMS Sample No. <u>137367-147</u>	6447-147	Soil	All Metal TTLC
↓	6447-148	Wipe	AA/Pb 1 SF
	6447-149	Wipe	AA/Pb 1 SF
	6447-150	Soil	All Metal TTLC
	6447-151	↓	↓
	6447-152	↓	↓
EMS Sample No. <u>137367-1-153</u>	6447-153	Roof core	PLM
↓	6447-154	Roof core	
	6447-155	Roof core	
	6447-156	Roof core	
	6447-157	Window putty	
	6447-158	Roof core	
	6447-159	Roof core	
	6447-160	Roof core	
	6447-161	Roof core	
	↓		

(SF 5/00)

◆ Laboratory No. 137367 ◆ Received By [Signature] ◆ Time 945
 ◆ Date of Package Delivery 4/30/10 ◆ Shipping Bill Retained: YES NONE
 ◆ Condition of Package on Receipt OK ◆ Condition of Custody Seal NONE
 (NOTE: If the package has sustained substantial damage or the custody seal is broken, stop and contact the project manager and the shipper.)
 ◆ No. of Samples 99+13 ◆ Chain-of-Custody Signature [Signature]
 ◆ Date of Acceptance into Sample Bank 4/30/10 ◆ Misc. Info. _____
 ◆ Disposition of Samples EMS LABS

Laboratory Report

Sample Info

Date of Analysis: 4/30/2010
 Lab ID: 137367
 Client: City of San Diego
 Date Received: 4/30/2010
 Project Number: 1078974
 Analyte: Pb
 Matrix: WIPE
 Method: NIOSH 7082,ISSUE 2
 Comments:

Reporting Limit (ug): 8
 Method blank (ug): <8

Sample Results

Sample Name	Wipe Area (sq. ft.)	Pb Weight (ug)	Pb Concentration (ug/sq.ft)
6647-50	1.00	570	570
6647-51	1.00	280	280
6647-52	1.00	1100	1100
6647-53	0.92	130	140
6647-54	1.00	2100	2100
6647-55	1.00	1200	1200
6647-62	1.00	1900	1900
6647-63	1.00	2600	2600
6647-64	1.00	3000	3000
6647-65	1.00	750	750
6647-66	1.00	2800	2800
6647-67	1.00	19000	19000
6647-68	1.00	2000	2000
6647-69	1.00	2000	2000
6647-70	1.00	12000	12000
6647-88	1.00	79000	79000
6647-90	1.00	990	990
6647-91	1.00	11000	11000

Chemist:

FJA



Laboratory Report

Sample Info

Date of Analysis: 4/30/2010
 Lab ID: 137367
 Client: City of San Diego
 Date Received: 4/30/2010
 Project Number: 1078974
 Analyte: Pb
 Matrix: WIPE
 Method: NIOSH 7082,ISSUE 2
 Comments:

Reporting Limit (ug): 8
 Method blank (ug): <8

Sample Results

Sample Name	Wipe Area (sq. ft.)	Pb Weight (ug)	Pb Concentration (ug/sq.ft)
6447-110	1.00	7000	7000
6447-111	1.00	3400	3400
6447-112	1.00	23000	23000
6447-113	1.00	10000	10000
6447-114	1.00	8600	8600
6447-115	1.00	480	480
6447-116	1.00	4200	4200
6447-117	1.00	1100	1100
6447-118	1.00	4300	4300
6447-162	1.00	4700	4700
6447-163	1.00	6500	6500
6447-164	1.00	1100	1100
6447-165	1.00	730	730
6447-166	1.00	8000	8000
6447-167	1.00	2100	2100
6447-168	1.00	13000	13000

Chemist: *FSL*

EMS LABORATORIES CHEMISTRY REPORT

CLIENT: City of San Diego
 LABORATORY ID: 137367
 PROJECT NO: 6447
 MATRIX: BULK
 ANALYTICAL METHOD: EPA 6010B
 DATE OF ANALYSIS: 5/3/2010

Sample ID	Unit	Be	V	Cr	Co	Ni	Cu	Zn	As
6447-56	ppm	<1.0	24	53	3.4	8.2	278	522	<5.0
6447-57	ppm	<1.0	18	39	3.0	5.1	89	100	<5.0
6447-58	ppm	<1.0	19	17	2.4	<5.0	1680	326	<5.0
6447-59	ppm	<1.0	43	50	6.9	10	176	528	<5.0
6447-60	ppm	<1.0	11	6.8	<2.0	<5.0	37	188	<5.0
6447-71	ppm	<1.0	17	7.1	2.2	<5.0	13	36	<5.0
6447-72	ppm	<1.0	18	9.1	2.3	<5.0	15	51	<5.0
6447-73	ppm	<1.0	18	10	<2.0	<5.0	8.1	18	<5.0
6447-74	ppm	<1.0	21	12	2.6	5.5	45	158	<5.0
6447-75	ppm	<1.0	22	6.4	2.8	<5.0	11	16	<5.0
Reporting Limit	µg	1.0	5.0	2.0	2.0	5.0	5.0	5.0	5.0

Sample ID	Unit	Se	Mo	Ag	Cd	Ba	Tl	Pb	Sb
6447-56	ppm	<5.0	<5.0	<2.0	2.5	541	<5.0	5180	34
6447-57	ppm	<5.0	<5.0	<2.0	1.8	362	<5.0	5590	59
6447-58	ppm	<5.0	<5.0	<2.0	1.6	197	<5.0	1800	17
6447-59	ppm	<5.0	<5.0	<2.0	4.6	456	<5.0	6150	44
6447-60	ppm	<5.0	<5.0	<2.0	1.0	82	<5.0	880	<5.0
6447-71	ppm	<5.0	<5.0	<2.0	1.1	29	<5.0	370	<5.0
6447-72	ppm	<5.0	<5.0	<2.0	1.4	37	<5.0	362	<5.0
6447-73	ppm	<5.0	<5.0	<2.0	1.0	21	<5.0	201	<5.0
6447-74	ppm	<5.0	<5.0	<2.0	1.5	59	<5.0	1350	<5.0
6447-75	ppm	<5.0	<5.0	<2.0	1.3	26	<5.0	153	<5.0
Reporting Limit	µg	5.0	5.0	2.0	1.0	5.0	5.0	5.0	5.0

Chemist 

CHEM-13A/B/C

EMS LABORATORIES CHEMISTRY REPORT

CLIENT: City of San Diego
 LABORATORY ID: 137367
 PROJECT NO: 6447
 MATRIX: BULK
 ANALYTICAL METHOD: EPA 6010B
 DATE OF ANALYSIS: 5/3/2010

Sample ID	Unit	Be	V	Cr	Co	Ni	Cu	Zn	As
6447-76	ppm	<1.0	17	6.6	<2.0	<5.0	33	34	<5.0
6447-77	ppm	<1.0	14	10	2.1	<5.0	8.2	19	<5.0
6447-78	ppm	<1.0	21	8.6	<2.0	<5.0	<5.0	14	<5.0
6447-79	ppm	<1.0	12	11	<2.0	<5.0	<5.0	12	<5.0
6447-80	ppm	<1.0	25	14	4.6	<5.0	<5.0	21	<5.0
6447-81	ppm	<1.0	21	13	2.5	<5.0	8.4	26	<5.0
6447-82	ppm	<1.0	23	11	3.3	<5.0	<5.0	17	<5.0
6447-85	ppm	<1.0	26	16	3.4	<5.0	19	59	<5.0
6447-86	ppm	<1.0	22	9.3	3.1	<5.0	37	40	<5.0
6447-87	ppm	<1.0	17	8.1	<2.0	<5.0	50	24	<5.0
Reporting Limit	µg	1.0	5.0	2.0	2.0	5.0	5.0	5.0	5.0

Sample ID	Unit	Se	Mo	Ag	Cd	Ba	Tl	Pb	Sb
6447-76	ppm	<5.0	<5.0	<2.0	1.0	47	<5.0	22200	12
6447-77	ppm	<5.0	<5.0	<2.0	<1.0	48	<5.0	389	<5.0
6447-78	ppm	<5.0	<5.0	<2.0	1.1	22	<5.0	8.0	<5.0
6447-79	ppm	<5.0	<5.0	<2.0	<1.0	22	<5.0	135	<5.0
6447-80	ppm	<5.0	<5.0	<2.0	1.3	41	<5.0	<5.0	<5.0
6447-81	ppm	<5.0	<5.0	<2.0	1.4	47	<5.0	138	<5.0
6447-82	ppm	<5.0	<5.0	<2.0	1.3	35	<5.0	33	<5.0
6447-85	ppm	<5.0	<5.0	<2.0	1.8	34	<5.0	319	<5.0
6447-86	ppm	<5.0	<5.0	<2.0	1.5	33	<5.0	1210	7.7
6447-87	ppm	<5.0	<5.0	<2.0	<1.0	26	<5.0	5870	117
Reporting Limit	µg	5.0	5.0	2.0	1.0	5.0	5.0	5.0	5.0

Chemist *FJA*

CHEM-13A/B/C

EMS LABORATORIES CHEMISTRY REPORT

CLIENT: City of San Diego
 LABORATORY ID: 137367
 PROJECT NO: 6447
 MATRIX: BULK
 ANALYTICAL METHOD: EPA 6010B
 DATE OF ANALYSIS: 5/3/2010

Sample ID	Unit	Be	V	Cr	Co	Ni	Cu	Zn	As
6447-95	ppm	<1.0	10	5.6	2.4	<5.0	12	26	<5.0
6447-96	ppm	<1.0	10	5.9	2.1	<5.0	16	47	<5.0
6447-97	ppm	<1.0	9.5	3.4	<2.0	<5.0	16	20	<5.0
6447-98	ppm	<1.0	8.4	5.4	<2.0	<5.0	8.3	14	<5.0
6447-99	ppm	<1.0	15	12	3.4	<5.0	16	44	<5.0
6447-100	ppm	<1.0	12	8.6	3.2	<5.0	20	56	<5.0
6447-101	ppm	<1.0	10	4.8	<2.0	<5.0	27	29	<5.0
6447-102	ppm	<1.0	13	5.6	3.1	<5.0	26	44	<5.0
6447-103	ppm	<1.0	10	5.4	2.7	<5.0	13	17	<5.0
6447-104	ppm	<1.0	11	7.9	2.7	<5.0	14	22	<5.0
Reporting Limit	µg	1.0	5.0	2.0	2.0	5.0	5.0	5.0	5.0

Sample ID	Unit	Se	Mo	Ag	Cd	Ba	Tl	Pb	Sb
6447-95	ppm	<5.0	<5.0	<2.0	<1.0	31	<5.0	233	<5.0
6447-96	ppm	<5.0	<5.0	<2.0	<1.0	37	<5.0	522	<5.0
6447-97	ppm	<5.0	<5.0	<2.0	<1.0	32	<5.0	710	<5.0
6447-98	ppm	<5.0	<5.0	<2.0	<1.0	21	<5.0	369	<5.0
6447-99	ppm	<5.0	<5.0	<2.0	1.5	48	<5.0	542	<5.0
6447-100	ppm	<5.0	<5.0	<2.0	1.3	59	<5.0	680	<5.0
6447-101	ppm	<5.0	<5.0	<2.0	<1.0	33	<5.0	3900	<5.0
6447-102	ppm	<5.0	<5.0	<2.0	1.4	80	<5.0	2040	<5.0
6447-103	ppm	<5.0	<5.0	<2.0	<1.0	39	<5.0	450	<5.0
6447-104	ppm	<5.0	<5.0	<2.0	1.1	36	<5.0	817	<5.0
Reporting Limit	µg	5.0	5.0	2.0	1.0	5.0	5.0	5.0	5.0

Chemist *FVL*

CHEM-13A/B/C

EMS LABORATORIES CHEMISTRY REPORT

CLIENT: City of San Diego
 LABORATORY ID: 137367
 PROJECT NO: 6447
 MATRIX: BULK
 ANALYTICAL METHOD: EPA 6010B
 DATE OF ANALYSIS: 5/3/2010

Sample ID	Unit	Be	V	Cr	Co	Ni	Cu	Zn	As
6447-105	ppm	<1.0	9.0	6.8	2.3	<5.0	6.2	14	<5.0
6447-106	ppm	<1.0	10	5.8	<2.0	<5.0	19	15	<5.0
6447-107	ppm	<1.0	15	6.1	3.2	<5.0	26	37	<5.0
6447-119	ppm	<1.0	12	5.8	2.5	<5.0	10	24	<5.0
6447-120	ppm	<1.0	9.2	7.5	2.2	<5.0	15	20	<5.0
6447-121	ppm	<1.0	6.9	2.9	2.3	<5.0	<5.0	9.2	<5.0
6447-122	ppm	<1.0	11	4.6	3.0	484	22	24	<5.0
6447-123	ppm	<1.0	10	5.0	2.5	<5.0	7.7	13	<5.0
6447-124	ppm	<1.0	7.7	3.2	<2.0	<5.0	8.8	14	<5.0
6447-125	ppm	<1.0	12	6.4	2.8	<5.0	19	35	<5.0
Reporting Limit	µg	1.0	5.0	2.0	2.0	5.0	5.0	5.0	5.0

Sample ID	Unit	Se	Mo	Ag	Cd	Ba	Tl	Pb	Sb
6447-105	ppm	<5.0	<5.0	<2.0	<1.0	31	<5.0	899	<5.0
6447-106	ppm	<5.0	<5.0	<2.0	<1.0	22	<5.0	335	<5.0
6447-107	ppm	<5.0	<5.0	<2.0	1.4	55	<5.0	3400	<5.0
6447-119	ppm	<5.0	<5.0	<2.0	1.0	39	<5.0	2440	<5.0
6447-120	ppm	<5.0	<5.0	<2.0	<1.0	26	<5.0	31300	183
6447-121	ppm	<5.0	<5.0	<2.0	<1.0	20	<5.0	220	<5.0
6447-122	ppm	<5.0	<5.0	<2.0	<1.0	33	<5.0	26900	120
6447-123	ppm	<5.0	<5.0	<2.0	<1.0	27	<5.0	433	<5.0
6447-124	ppm	<5.0	<5.0	<2.0	<1.0	20	<5.0	1920	<5.0
6447-125	ppm	<5.0	<5.0	<2.0	1.1	42	<5.0	653	<5.0
Reporting Limit	µg	5.0	5.0	2.0	1.0	5.0	5.0	5.0	5.0

Chemist FVL

CHEM-13A/B/C

EMS LABORATORIES CHEMISTRY REPORT

CLIENT: City of San Diego
 LABORATORY ID: 137367
 PROJECT NO: 6447
 MATRIX: BULK
 ANALYTICAL METHOD: EPA 6010B
 DATE OF ANALYSIS: 5/4/2010

Sample ID	Unit	Be	V	Cr	Co	Ni	Cu	Zn	As
6447-126	ppm	<1.0	6.6	2.6	<2.0	<5.0	46	33	<5.0
6447-127	ppm	<1.0	12	4.5	2.1	<5.0	17	18	<5.0
6447-128	ppm	<1.0	8.4	3.1	<2.0	<5.0	19	11	<5.0
6447-129	ppm	<1.0	7.1	3.6	<2.0	<5.0	7.4	14	<5.0
6447-130	ppm	<1.0	12	6.3	2.9	<5.0	<5.0	11	<5.0
6447-131	ppm	<1.0	16	7.4	2.7	<5.0	21	26	<5.0
6447-132	ppm	<1.0	16	8.0	3.2	<5.0	5.7	15	<5.0
6447-133	ppm	<1.0	14	7.7	2.8	<5.0	<5.0	14	<5.0
6447-136	ppm	<1.0	14	6.8	2.6	<5.0	10	30	<5.0
6447-137	ppm	<1.0	13	5.6	2.9	<5.0	14	30	<5.0
6447-138	ppm	<1.0	11	4.9	<2.0	<5.0	6.5	20	<5.0
Reporting Limit	µg	1.0	5.0	2.0	2.0	5.0	5.0	5.0	5.0

Sample ID	Unit	Se	Mo	Ag	Cd	Ba	Tl	Pb	Sb
6447-126	ppm	<5.0	<5.0	<2.0	<1.0	28	<5.0	2510	<5.0
6447-127	ppm	<5.0	<5.0	<2.0	<1.0	45	<5.0	2630	<5.0
6447-128	ppm	<5.0	<5.0	<2.0	<1.0	28	<5.0	3260	<5.0
6447-129	ppm	<5.0	<5.0	<2.0	<1.0	21	<5.0	932	<5.0
6447-130	ppm	<5.0	<5.0	<2.0	<1.0	29	<5.0	9.4	<5.0
6447-131	ppm	<5.0	<5.0	<2.0	1.2	35	<5.0	2390	<5.0
6447-132	ppm	<5.0	<5.0	<2.0	1.2	31	<5.0	433	<5.0
6447-133	ppm	<5.0	<5.0	<2.0	1.2	30	<5.0	18	<5.0
6447-136	ppm	<5.0	<5.0	<2.0	1.2	35	<5.0	321	<5.0
6447-137	ppm	<5.0	<5.0	<2.0	1.1	37	<5.0	4080	12
6447-138	ppm	<5.0	<5.0	<2.0	<1.0	24	<5.0	214	<5.0
Reporting Limit	µg	5.0	5.0	2.0	1.0	5.0	5.0	5.0	5.0

Chemist ASL

CHEM-13A/B/C

EMS LABORATORIES CHEMISTRY REPORT

CLIENT: City of San Diego
 LABORATORY ID: 137367
 PROJECT NO: 6447
 MATRIX: BULK
 ANALYTICAL METHOD: EPA 6010B
 DATE OF ANALYSIS: 5/4/2010

Sample ID	Unit	Be	V	Cr	Co	Ni	Cu	Zn	As
6447-139	ppm	<1.0	15	5.6	2.9	<5.0	19	26	<5.0
6447-140	ppm	<1.0	15	6.1	2.5	<5.0	29	22	<5.0
6447-141	ppm	<1.0	13	5.4	2.2	<5.0	27	67	<5.0
6447-142	ppm	<1.0	15	6.5	2.8	<5.0	19	29	<5.0
6447-143	ppm	<1.0	14	6.5	2.7	<5.0	421	95	<5.0
6447-144	ppm	<1.0	13	7.0	2.6	<5.0	25	45	<5.0
6447-145	ppm	<1.0	11	5.7	2.2	<5.0	84	36	<5.0
6447-146	ppm	<1.0	11	7.3	2.7	<5.0	27	50	<5.0
6447-147	ppm	<1.0	8.9	6.1	<2.0	<5.0	22	29	<5.0
6447-150	ppm	<1.0	11	6.8	2.1	<5.0	119	53	<5.0
6447-151	ppm	<1.0	7.5	3.1	<2.0	<5.0	19	38	<5.0
6447-152	ppm	<1.0	8.0	4.0	<2.0	<5.0	26	28	<5.0
Reporting Limit	µg	1.0	5.0	2.0	2.0	5.0	5.0	5.0	5.0

Sample ID	Unit	Se	Mo	Ag	Cd	Ba	Tl	Pb	Sb
6447-139	ppm	<5.0	<5.0	<2.0	1.1	33	<5.0	826	<5.0
6447-140	ppm	<5.0	<5.0	<2.0	1.0	28	<5.0	129	<5.0
6447-141	ppm	<5.0	<5.0	<2.0	<1.0	35	<5.0	4290	<5.0
6447-142	ppm	<5.0	<5.0	<2.0	1.2	40	<5.0	672	<5.0
6447-143	ppm	<5.0	<5.0	<2.0	1.3	56	56	13000	9.2
6447-144	ppm	<5.0	<5.0	<2.0	1.2	39	39	1810	<5.0
6447-145	ppm	<5.0	<5.0	<2.0	<1.0	43	<5.0	14200	27
6447-146	ppm	<5.0	<5.0	<2.0	<1.0	39	<5.0	22400	165
6447-147	ppm	<5.0	<5.0	<2.0	<1.0	32	<5.0	3030	6.7
6447-150	ppm	<5.0	<5.0	<2.0	1.0	45	<5.0	16100	18
6447-151	ppm	<5.0	<5.0	<2.0	<1.0	25	<5.0	2690	9.5
6447-152	ppm	<5.0	<5.0	<2.0	<1.0	24	<5.0	2680	<5.0
Reporting Limit	µg	5.0	5.0	2.0	1.0	5.0	5.0	5.0	5.0

Chemist FSL

CHEM-13A/B/C

Chemistry Report

Date of Analysis: 5/6/2010
 Lab Number: 137367
 Client: City of San Diego
 Date Received: 4/30/2010
 Project Number: 6447
 Analyte: Hg
 Matrix: Bulk
 Method: EPA 7471A
 Comment:

Reporting Limit (ppm): 2.0
 Blank (ppm): <2.0

Sample ID	Bulk Weight (g)	Hg Weight (μ g)	Concentration (ppm)
6447-81	0.8379	< 0.40	< 2.0
6447-82	0.8041	< 0.40	< 2.0
6447-85	0.8765	< 0.40	< 2.0
6447-86	0.8716	< 0.40	< 2.0
6447-87	0.8485	< 0.40	< 2.0
6447-95	0.8264	< 0.40	< 2.0
6447-96	0.8652	< 0.40	< 2.0
6447-97	0.8620	< 0.40	< 2.0
6447-98	0.8715	< 0.40	< 2.0
6447-99	0.8297	< 0.40	< 2.0
6447-100	0.8169	< 0.40	< 2.0
6447-101	0.8696	< 0.40	< 2.0
6447-102	0.8738	< 0.40	< 2.0
6447-103	0.8200	< 0.40	< 2.0
6447-104	0.7986	< 0.40	< 2.0

Chemist

JSZ

Chemistry Report

Date of Analysis: 5/7/2010
 Lab Number: 137367
 Client: City of San Diego
 Date Received: 4/30/2010
 Project Number: 6447
 Analyte: Hg
 Matrix: Bulk
 Method: EPA 7471A
 Comment:

Reporting Limit (ppm): 2.0
 Blank (ppm): <2.0

Sample ID	Bulk Weight (g)	Hg Weight (µg)	Concentration (ppm)
6447-105	0.7758	< 0.40	< 2.0
6447-106	0.8012	< 0.40	< 2.0
6447-107	0.8105	< 0.40	< 2.0
6447-119	0.7891	< 0.40	< 2.0
6447-120	0.8015	< 0.40	< 2.0
6447-121	0.7984	< 0.40	< 2.0
6447-122	0.8128	< 0.40	< 2.0
6447-123	0.8107	< 0.40	< 2.0
6447-124	0.8111	< 0.40	< 2.0
6447-125	0.7971	< 0.40	< 2.0
6447-126	0.7873	< 0.40	< 2.0
6447-127	0.7799	< 0.40	< 2.0
6447-128	0.8008	< 0.40	< 2.0
6447-129	0.8409	< 0.40	< 2.0
6447-130	0.8043	< 0.40	< 2.0

Chemist



Chemistry Report

Date of Analysis: 5/10/2010
 Lab Number: 137367
 Client: City of San Diego
 Date Received: 4/30/2010
 Project Number: 6447
 Analyte: Hg
 Matrix: Bulk
 Method: EPA 7471A
 Comment:

Reporting Limit (ppm): 2.0
 Blank (ppm): <2.0

Sample ID	Bulk Weight (g)	Hg Weight (µg)	Concentration (ppm)
6447-131	0.8654	< 0.40	< 2.0
6447-132	0.8231	< 0.40	< 2.0
6447-133	0.8566	< 0.40	< 2.0
6447-136	0.8412	< 0.40	< 2.0
6447-137	0.8263	< 0.40	< 2.0
6447-138	0.844	< 0.40	< 2.0
6447-139	0.852	< 0.40	< 2.0
6447-140	0.8105	< 0.40	< 2.0
6447-141	0.8126	< 0.40	< 2.0
6447-142	0.817	< 0.40	< 2.0
6447-143	0.8211	< 0.40	< 2.0
6447-144	0.8254	< 0.40	< 2.0
6447-145	0.8188	< 0.40	< 2.0
6447-146	0.8235	< 0.40	< 2.0
6447-147	0.8254	< 0.40	< 2.0
6447-150	0.8425	< 0.40	< 2.0
6447-151	0.8336	< 0.40	< 2.0
6447-152	0.8102	< 0.40	< 2.0

Chemist

FLZ



XRF Assay Results

Reading No	Time	Type	Duration	Units	Sequence	Component	Substrate	Side	Condition	Color	Site	Inspector	Room	Misc 1	PbC	PbC Error
5	4/8/10 7:57	SHUTTER_CAL	114.61	cps	Final										3.32	0
6	4/8/10 8:15	PAINT	8.52	mg / cm ^2	Final	cal				RED	firing range				1.1	0.1
7	4/8/10 8:15	PAINT	4.01	mg / cm ^2	Final	cal				RED	firing range				1.1	0.1
8	4/8/10 8:15	PAINT	4.75	mg / cm ^2	Final	cal				RED	firing range				1.2	0.1
9	4/8/10 8:17	PAINT	8.48	mg / cm ^2	Final	WINDOW sill	WOOD	C	FAIR	PINK	firing range	ma	OUTSIDE	staff	1.1	0.2
10	4/8/10 8:18	PAINT	5.76	mg / cm ^2	Final	WINDOW	WOOD	C	FAIR	PINK	firing range	ma	OUTSIDE	staff	0.5	0.1
11	4/8/10 8:19	PAINT	2	mg / cm ^2	Final	DOOR	WOOD	C	FAIR	PINK	firing range	ma	OUTSIDE	staff	0.4	0.2
12	4/8/10 8:19	PAINT	1.76	mg / cm ^2	Final	DOOR frame	WOOD	C	FAIR	PINK	firing range	ma	OUTSIDE	staff	0.4	0.2
13	4/8/10 8:20	PAINT	3.51	mg / cm ^2	Final	upper trim	WOOD	C	FAIR	PINK	firing range	ma	OUTSIDE	staff	0.5	0.1
15	4/8/10 8:54	PAINT	6.77	mg / cm ^2	Final	WALL	CONCRETE	A	INTACT	BEIGE	firing range	ma	OFFICE	staff	0.14	0.03
16	4/8/10 8:55	PAINT	3.51	mg / cm ^2	Final	desk	WOOD	A	INTACT	BROWN	firing range	ma	OFFICE	staff	< LOD	0.03
17	4/8/10 8:56	PAINT	6.99	mg / cm ^2	Final	DOOR	WOOD	C	INTACT	BROWN	firing range	ma	OFFICE	staff	< LOD	0.03
18	4/8/10 8:56	PAINT	4.51	mg / cm ^2	Final	DOOR frame	WOOD	C	INTACT	BROWN	firing range	ma	OFFICE	staff	< LOD	0.03
19	4/8/10 8:57	PAINT	1.75	mg / cm ^2	Final	vault door	METAL	C	INTACT	BROWN	firing range	ma	OFFICE	staff	0.5	0.3
20	4/8/10 8:58	PAINT	5.5	mg / cm ^2	Final	vault door frame	METAL	C	INTACT	BROWN	firing range	ma	OFFICE	staff	0.7	0.1
21	4/8/10 8:59	PAINT	3.75	mg / cm ^2	Final	WALL	CONCRETE	B	INTACT	BEIGE	firing range	ma	OFFICE	staff	0.14	0.03
22	4/8/10 8:59	PAINT	3.73	mg / cm ^2	Final	DOOR	WOOD	D	INTACT	BEIGE	firing range	ma	OFFICE	staff	0.22	0.09
23	4/8/10 9:00	PAINT	4.5	mg / cm ^2	Final	DOOR frame	WOOD	D	INTACT	BEIGE	firing range	ma	OFFICE	staff	0.29	0.1
24	4/8/10 9:01	PAINT	5.75	mg / cm ^2	Final	WALL	DRYWALL	C	INTACT	BEIGE	firing range	ma	front office	staff	< LOD	0.03
25	4/8/10 9:02	PAINT	1.75	mg / cm ^2	Final	WALL	DRYWALL	B	INTACT	BEIGE	firing range	ma	front office	staff	< LOD	0.03
26	4/8/10 9:02	PAINT	1.5	mg / cm ^2	Final	DOOR	WOOD	B	INTACT	BEIGE	firing range	ma	front office	staff	< LOD	0.03
27	4/8/10 9:03	PAINT	2	mg / cm ^2	Final	DOOR frame	WOOD	B	INTACT	BEIGE	firing range	ma	front office	staff	< LOD	0.03
28	4/8/10 9:04	PAINT	3.51	mg / cm ^2	Final	WINDOW frame	METAL	C	INTACT	BEIGE	firing range	ma	front office	staff	0.22	0.11
29	4/8/10 9:04	PAINT	1.75	mg / cm ^2	Final	CEILING	DRYWALL	C	INTACT	WHITE	firing range	ma	front office	staff	< LOD	0.03
30	4/8/10 9:07	PAINT	2	mg / cm ^2	Final	WINDOW frame	WOOD	D	INTACT	BEIGE	firing range	ma	OUTSIDE	revolver club	9.7	3
31	4/8/10 9:08	PAINT	1.76	mg / cm ^2	Final	DOOR frame	WOOD	D	INTACT	BEIGE	firing range	ma	OUTSIDE	revolver club	2.2	0.7
32	4/8/10 9:10	PAINT	3.5	mg / cm ^2	Final	WINDOW sill	WOOD	D	INTACT	BEIGE	firing range	ma	OUTSIDE	revolver club	< LOD	0.04
33	4/8/10 9:10	PAINT	1.5	mg / cm ^2	Final	WINDOW	WOOD	C	INTACT	BEIGE	firing range	ma	OUTSIDE	revolver club	6.4	2.8
34	4/8/10 9:11	PAINT	2	mg / cm ^2	Final	upper trim	WOOD	C	INTACT	BEIGE	firing range	ma	OUTSIDE	revolver club	3.3	1.1
35	4/8/10 9:12	PAINT	2	mg / cm ^2	Final	DOOR	WOOD	D	FAIR	BEIGE	firing range	ma	OUTSIDE	revolver club	< LOD	0.03
36	4/8/10 9:13	PAINT	4.01	mg / cm ^2	Final	DOOR frame	WOOD	D	FAIR	BEIGE	firing range	ma	OUTSIDE	revolver club	0.8	0.2
37	4/8/10 9:14	PAINT	2.49	mg / cm ^2	Final	elec closet	WOOD	A	FAIR	PINK	firing range	ma	OUTSIDE	revolver club	1.8	0.6
38	4/8/10 9:15	PAINT	1.5	mg / cm ^2	Final	eaves	WOOD	C	FAIR	PINK	firing range	ma	OUTSIDE	revolver club	1.9	0.9
39	4/8/10 9:16	PAINT	2.52	mg / cm ^2	Final	beam	WOOD	C	FAIR	PINK	firing range	ma	OUTSIDE	revolver club	24	4.3
40	4/8/10 9:17	PAINT	3.24	mg / cm ^2	Final	WALL	CONCRETE	C	FAIR	PINK	firing range	ma	OUTSIDE	revolver club	< LOD	0.03
42	4/8/10 9:25	PAINT	2.75	mg / cm ^2	Final	DOOR frame	METAL	D	FAIR	BEIGE	firing range	ma	INSIDE - REAR	revolver club	2	0.9
43	4/8/10 9:26	PAINT	1.24	mg / cm ^2	Final	DOOR	METAL	D	FAIR	BEIGE	firing range	ma	INSIDE - REAR	revolver club	< LOD	0.05
44	4/8/10 9:26	PAINT	2.25	mg / cm ^2	Final	DOOR	METAL	D	FAIR	BEIGE	firing range	ma	INSIDE - REAR	revolver club	< LOD	0.03
45	4/8/10 9:27	PAINT	3.51	mg / cm ^2	Final	WALL	DRYWALL	C	INTACT	BEIGE	firing range	ma	INSIDE - REAR	revolver club	1.8	0.5
46	4/8/10 9:35	PAINT	2.51	mg / cm ^2	Final	CABINET	DRYWALL	A	INTACT	BEIGE	firing range	ma	INSIDE - REAR	revolver club	3.5	1.6
47	4/8/10 9:36	PAINT	1.75	mg / cm ^2	Final	CABINET	DRYWALL	A	INTACT	BEIGE	firing range	ma	INSIDE - REAR	revolver club	3.8	2.1



City of San Diego/Asbestos and Lead Management Program

Project 6447 Firing Range

XRF Assay Results



Reading No	Time	Type	Duration	Units	Sequence	Component	Substrate	Side	Condition	Color	Site	Inspector	Room	Misc 1	PbC	PbC Error
48	4/8/10 9:36	PAINT	2.26	mg / cm ^2	Final	WINDOW sill	WOOD	A	INTACT	BEIGE	firing range	ma	INSIDE - REAR	revolver club	0.25	0.12
50	4/8/10 9:37	PAINT	5.26	mg / cm ^2	Final	door frame	WOOD	A	INTACT	BEIGE	firing range	ma	INSIDE - REAR	revolver club	1.6	0.6
51	4/8/10 9:38	PAINT	1.75	mg / cm ^2	Final	door	WOOD	A	INTACT	BEIGE	firing range	ma	INSIDE - REAR	revolver club	< LOD	0.11
52	4/8/10 9:38	PAINT	3.5	mg / cm ^2	Final	WALL	WOOD	A	INTACT	BEIGE	firing range	ma	INSIDE - REAR	revolver club	4.8	1.2
53	4/8/10 9:40	PAINT	4.01	mg / cm ^2	Final	WALL	CONCRETE	C	INTACT	BEIGE	firing range	ma	INSIDE - REAR	revolver club	0.15	0.04
54	4/8/10 9:41	PAINT	1.99	mg / cm ^2	Final	CABINET	WOOD	D	INTACT	BEIGE	firing range	ma	INSIDE - REAR	revolver club	< LOD	0.03
55	4/8/10 9:41	PAINT	2	mg / cm ^2	Final	WINDOW	WOOD	B	INTACT	BEIGE	firing range	ma	INSIDE - FRONT	revolver club	< LOD	0.03
56	4/8/10 9:42	PAINT	3.74	mg / cm ^2	Final	WINDOW frame	METAL	B	INTACT	BEIGE	firing range	ma	INSIDE - FRONT	revolver club	5.3	1.1
57	4/8/10 9:42	PAINT	2.26	mg / cm ^2	Final	WINDOW frame	WOOD	A	INTACT	BEIGE	firing range	ma	INSIDE - FRONT	revolver club	6.1	2.2
58	4/8/10 9:43	PAINT	3.51	mg / cm ^2	Final	WINDOW	METAL	A	INTACT	BEIGE	firing range	ma	INSIDE - FRONT	revolver club	8.4	1.3
59	4/8/10 10:21	PAINT	2.26	mg / cm ^2	Final	WINDOW	WOOD	A	POOR	BEIGE	firing range	ma	OUTSIDE	clubhouse	1.5	0.4
60	4/8/10 10:23	PAINT	3.49	mg / cm ^2	Final	WINDOW sill	CONCRETE	A	POOR	BEIGE	firing range	ma	OUTSIDE	clubhouse	0.16	0.05
61	4/8/10 10:24	PAINT	1.5	mg / cm ^2	Final	DOOR	WOOD	A	FAIR	BEIGE	firing range	ma	OUTSIDE	clubhouse	< LOD	0.03
62	4/8/10 10:24	PAINT	2.25	mg / cm ^2	Final	DOOR frame	WOOD	A	FAIR	BEIGE	firing range	ma	OUTSIDE	clubhouse	< LOD	0.03
63	4/8/10 10:25	PAINT	1.25	mg / cm ^2	Final	WINDOW	WOOD	B	FAIR	BEIGE	firing range	ma	OUTSIDE	clubhouse	9.8	4
64	4/8/10 10:26	PAINT	3.75	mg / cm ^2	Final	WINDOW sill	WOOD	B	FAIR	BEIGE	firing range	ma	OUTSIDE	clubhouse	0.06	0.03
65	4/8/10 10:26	PAINT	3.75	mg / cm ^2	Final	DOOR	WOOD	C	FAIR	BEIGE	firing range	ma	OUTSIDE	clubhouse	< LOD	0.03
66	4/8/10 10:27	PAINT	2	mg / cm ^2	Final	patio post	WOOD	C	INTACT	BROWN	firing range	ma	OUTSIDE	clubhouse	< LOD	0.05
67	4/8/10 10:29	PAINT	2.5	mg / cm ^2	Final	downspout	WOOD	C	INTACT	BROWN	firing range	ma	OUTSIDE	clubhouse	< LOD	0.03
68	4/8/10 10:47	PAINT	0.75	mg / cm ^2	Final	eaves	WOOD	C	INTACT	BEIGE	firing range	ma	OUTSIDE	clubhouse	2.7	1.4
69	4/8/10 10:48	PAINT	1.26	mg / cm ^2	Final	upper trim	WOOD	C	INTACT	BEIGE	firing range	ma	OUTSIDE	clubhouse	10.6	4.1
70	4/8/10 10:50	PAINT	3.99	mg / cm ^2	Final	upper trim	WOOD	C	INTACT	BEIGE	firing range	ma	OUTSIDE	clubhouse	< LOD	0.03
71	4/8/10 11:00	PAINT	3.49	mg / cm ^2	Final	DOOR	METAL	A	INTACT	BEIGE	firing range	ma	OUTSIDE	outdoor restroom	0.6	0.1
72	4/8/10 11:00	PAINT	2.51	mg / cm ^2	Final	DOOR frame	METAL	A	INTACT	BEIGE	firing range	ma	OUTSIDE	outdoor restroom	0.7	0.3
73	4/8/10 11:01	PAINT	3.5	mg / cm ^2	Final	WALL	CONCRETE	A	INTACT	BEIGE	firing range	ma	mens	outdoor restroom	< LOD	0.1
74	4/8/10 11:01	PAINT	5.25	mg / cm ^2	Final	WALL	CONCRETE	C	INTACT	BEIGE	firing range	ma	mens	outdoor restroom	0.14	0.03
75	4/8/10 11:04	PAINT	53.58	mg / cm ^2	Final	WALL	CONCRETE	C	INTACT	BEIGE	firing range	ma	mens	outdoor restroom	0.07	0.02
76	4/8/10 11:05	PAINT	6.24	mg / cm ^2	Final	WINDOW	METAL	C	INTACT	BEIGE	firing range	ma	mens	outdoor restroom	0.27	0.06
77	4/8/10 11:06	PAINT	7.75	mg / cm ^2	Final	WINDOW	CONCRETE	B	INTACT	BEIGE	firing range	ma	mens	outdoor restroom	0.05	0.03
79	4/8/10 11:08	PAINT	17.75	mg / cm ^2	Final	stall divider	WOOD	C	INTACT	BEIGE	firing range	ma	mens	outdoor restroom	0.06	0.03
80	4/8/10 11:10	PAINT	3.25	mg / cm ^2	Final	DOOR	WOOD	A	INTACT	BEIGE	firing range	ma	womens	outdoor restroom	0.5	0.2
81	4/8/10 11:11	PAINT	9.76	mg / cm ^2	Final	stall door	WOOD	A	INTACT	BEIGE	firing range	ma	womens	outdoor restroom	0.06	0.02
82	4/8/10 11:11	PAINT	4.73	mg / cm ^2	Final	WINDOW	METAL	D	INTACT	BEIGE	firing range	ma	womens	outdoor restroom	0.2	0.06
83	4/8/10 11:12	PAINT	1.26	mg / cm ^2	Final	eaves	METAL	D	INTACT	BEIGE	firing range	ma	OUTSIDE	outdoor restroom	< LOD	0.45
84	4/8/10 11:13	PAINT	3.75	mg / cm ^2	Final	eaves	METAL	D	INTACT	BEIGE	firing range	ma	OUTSIDE	outdoor restroom	0.4	0.1
85	4/8/10 11:14	PAINT	3.51	mg / cm ^2	Final	uppe trim	METAL	D	INTACT	BEIGE	firing range	ma	OUTSIDE	outdoor restroom	0.4	0.1
86	4/8/10 11:20	PAINT	4.74	mg / cm ^2	Final	deck	WOOD	D	INTACT	BEIGE	firing range	ma	OUTSIDE	outdoor restroom	< LOD	0.03
87	4/8/10 11:21	PAINT	7.52	mg / cm ^2	Final	beam	WOOD	D	INTACT	BEIGE	firing range	ma	OUTSIDE	outdoor restroom	< LOD	0.07
88	4/8/10 11:22	PAINT	2.26	mg / cm ^2	Final	WALL	WOOD	D	INTACT	BEIGE	firing range	ma	OUTSIDE	outdoor restroom	< LOD	0.03
89	4/8/10 11:25	PAINT	4.01	mg / cm ^2	Final	CABINET	WOOD	D	INTACT	BROWN	firing range	ma	HALL	clubhouse	< LOD	0.04
90	4/8/10 11:26	PAINT	3.01	mg / cm ^2	Final	DOOR	WOOD	A	INTACT	BROWN	firing range	ma	HALL	clubhouse	< LOD	0.04



Project 6447 Firing Range

XRF Assay Results

Reading No	Time	Type	Duration	Units	Sequence	Component	Substrate	Side	Condition	Color	Site	Inspector	Room	Misc 1	PbC	PbC Error
91	4/8/10 11:27	PAINT	3.25	mg / cm ^2	Final	WINDOW sill	CONCRETE	A	INTACT	BROWN	firing range	ma	HALL	clubhouse	< LOD	0.05
92	4/8/10 11:28	PAINT	1.75	mg / cm ^2	Final	WINDOW sill	WOOD	B	INTACT	BROWN	firing range	ma	HALL	clubhouse	11	3.5
93	4/8/10 11:30	PAINT	6.24	mg / cm ^2	Final	rafters	WOOD	B	INTACT	WHITE	firing range	ma	HALL	clubhouse	0.06	0.03
96	4/8/10 11:34	PAINT	14.75	mg / cm ^2	Final	CABINET	WOOD	A	INTACT	BEIGE	firing range	ma	KITCHEN	clubhouse	0.15	0.04
98	4/8/10 11:35	PAINT	1.25	mg / cm ^2	Final	WALL	WOOD	A	INTACT	BEIGE	firing range	ma	KITCHEN	clubhouse	7.2	3.4
99	4/8/10 11:36	PAINT	7.5	mg / cm ^2	Final	WALL	stone	A	INTACT	BEIGE	firing range	ma	KITCHEN	clubhouse	< LOD	0.03
100	4/8/10 11:37	PAINT	5.01	mg / cm ^2	Final	CABINET	stone	A	INTACT	BEIGE	firing range	ma	KITCHEN	clubhouse	< LOD	0.03
101	4/8/10 11:38	PAINT	1.75	mg / cm ^2	Final	WINDOW	WOOD	A	INTACT	BEIGE	firing range	ma	KITCHEN	clubhouse	6.7	2.7
102	4/8/10 11:38	PAINT	12.26	mg / cm ^2	Final	DOOR	WOOD	C	INTACT	BEIGE	firing range	ma	KITCHEN	clubhouse	0.8	0.1
103	4/8/10 11:45	PAINT	20.21	mg / cm ^2	Final	cal				RED	firing range	ma			1	0.1
104	4/8/10 11:46	PAINT	20.26	mg / cm ^2	Final	cal				RED	firing range	ma			1	0.1
105	4/8/10 11:47	PAINT	20.23	mg / cm ^2	Final	cal				RED	firing range	ma			1	0.1



City of San Diego/Asbestos and Lead Management Program

Project 6447 Firing Range



XRF Assay Results

Reading No	Time	Type	Duration	Units	Component	Substrate	Side	Condition	Color	Site	Inspector	Location	PbC	PbC Error
1	4/19/2010 11:54	SHUTTER CAL	118.58	cps									3.36	0
2	4/19/2010 11:56	PAINT	6.41	mg / cm ^2	cal				RED	shooting range			0.9	0.1
3	4/19/2010 11:57	PAINT	20.19	mg / cm ^2	cal				RED	shooting range			1	0.1
4	4/19/2010 11:58	PAINT	11.06	mg / cm ^2	cal				RED	shooting range			1	0.1
5	4/19/2010 11:59	PAINT	20.39	mg / cm ^2	cal				RED	shooting range			1	0.1
6	4/19/2010 12:00	PAINT	10.06	mg / cm ^2	cal				RED	shooting range			1	0.1
7	4/19/2010 12:01	PAINT	20.16	mg / cm ^2	cal				RED	shooting range			1	0.1
8	4/19/2010 12:03	PAINT	1.97	mg / cm ^2	COLUMN	WOOD	C	FAIR	GREEN	shooting range	ma	range 1 - backstop	3.4	1.8
9	4/19/2010 12:04	PAINT	1.71	mg / cm ^2	COLUMN	WOOD	B	FAIR	GREEN	shooting range	ma	range 1 - backstop	< LOD	0.19
10	4/19/2010 12:04	PAINT	1.96	mg / cm ^2	POST	WOOD	B	FAIR	GREEN	shooting range	ma	range 1 - backstop	< LOD	0.07
11	4/19/2010 12:07	PAINT	1.98	mg / cm ^2	COLUMN	WOOD	C	FAIR	GREEN	shooting range	ma	range 2 - backstop	< LOD	0.2
12	4/19/2010 12:07	PAINT	1.47	mg / cm ^2	horizontal beam	WOOD	C	FAIR	GREEN	shooting range	ma	range 2 - backstop	< LOD	0.03
13	4/19/2010 12:08	PAINT	3.93	mg / cm ^2	horizontal beam	WOOD	C	FAIR	GREEN	shooting range	ma	range 2 - backstop	1	0.2
14	4/19/2010 12:09	PAINT	3.69	mg / cm ^2	COLUMN	WOOD	C	FAIR	GREEN	shooting range	ma	range 2 - backstop	1.8	0.6
15	4/19/2010 12:10	PAINT	3.95	mg / cm ^2	COLUMN	WOOD	C	FAIR	GREEN	shooting range	ma	range 2 - backstop	0.12	0.04
16	4/19/2010 13:16	PAINT	1.98	mg / cm ^2	COLUMN	WOOD	C	FAIR	GREEN	shooting range	ma	range 3 - backstop	2.5	1.5
17	4/19/2010 13:17	PAINT	3.93	mg / cm ^2	COLUMN	WOOD	D	FAIR	GREEN	shooting range	ma	range 3 - backstop	1.8	0.6
18	4/19/2010 13:19	PAINT	1.48	mg / cm ^2	WALL	WOOD	C	FAIR	BEIGE	shooting range	ma	range 3 north storage	< LOD	0.13
19	4/19/2010 13:20	PAINT	1.48	mg / cm ^2	WALL	WOOD	D	FAIR	BEIGE	shooting range	ma	range 3 north storage	< LOD	0.05
20	4/19/2010 13:20	PAINT	1.24	mg / cm ^2	WALL	WOOD	D	INTACT	BEIGE	shooting range	ma	range 3 north storage	< LOD	0.06
21	4/19/2010 13:20	PAINT	1.96	mg / cm ^2	WALL	WOOD	D	INTACT	BEIGE	shooting range	ma	range 3 north storage	< LOD	0.05
22	4/19/2010 13:21	PAINT	2.22	mg / cm ^2	DOOR	WOOD	D	INTACT	BEIGE	shooting range	ma	range 3 north storage	< LOD	0.06
23	4/19/2010 13:21	PAINT	1.97	mg / cm ^2	DOOR	WOOD	A	INTACT	BEIGE	shooting range	ma	range 3 north storage	< LOD	0.06
24	4/19/2010 13:22	PAINT	3.91	mg / cm ^2	WALL	METAL	C	INTACT	BEIGE	shooting range	ma	range 3 south storage	< LOD	0.03
25	4/19/2010 13:23	PAINT	2.48	mg / cm ^2	WALL	METAL	D	INTACT	BEIGE	shooting range	ma	range 3 south storage	< LOD	0.04
26	4/19/2010 13:23	PAINT	2.71	mg / cm ^2	DOOR	METAL	D	INTACT	BEIGE	shooting range	ma	range 3 south storage	0.3	0.19
27	4/19/2010 13:26	PAINT	1.96	mg / cm ^2	DOOR	METAL	D	INTACT	GREEN	shooting range	ma	restrm 1 story storige	< LOD	0.03
28	4/19/2010 13:26	PAINT	1.73	mg / cm ^2	DOOR	METAL	D	INTACT	GREEN	shooting range	ma	restrm 1 story storige	< LOD	0.03
29	4/19/2010 13:27	PAINT	2.21	mg / cm ^2	WALL	WOOD	D	INTACT	GREEN	shooting range	ma	restrm 1 story storige	< LOD	0.03
30	4/19/2010 13:27	PAINT	4.68	mg / cm ^2	WALL	WOOD	C	INTACT	GREEN	shooting range	ma	restrm 1 story storige	< LOD	0.05
31	4/19/2010 13:29	PAINT	27.13	mg / cm ^2	WALL	WOOD	C	INTACT	GREEN	shooting range	ma	restrm 2 story	0.09	0.02
32	4/19/2010 13:31	PAINT	24.39	mg / cm ^2	WALL	WOOD	C	INTACT	GREEN	shooting range	ma	restrm 2 story	0.09	0.02
33	4/19/2010 13:32	PAINT	5.9	mg / cm ^2	WALL	WOOD	A	INTACT	GREEN	shooting range	ma	restrm 2 story	0.16	0.06
34	4/19/2010 13:33	PAINT	8.61	mg / cm ^2	DOOR	WOOD	C	INTACT	GREEN	shooting range	ma	restrm 2 story	0.14	0.04
35	4/19/2010 13:33	PAINT	3.95	mg / cm ^2	DOOR frame	WOOD	C	INTACT	GREEN	shooting range	ma	restrm 2 story	0.28	0.09
36	4/19/2010 13:36	PAINT	1.48	mg / cm ^2	WALL	METAL	B	INTACT	BLUE	shooting range	ma	range 3blue shed	2.4	0.8
37	4/19/2010 13:37	PAINT	3.2	mg / cm ^2	DOOR	METAL	B	INTACT	BLUE	shooting range	ma	range 3blue shed	< LOD	0.03
38	4/19/2010 13:37	PAINT	1.47	mg / cm ^2	DOOR	METAL	C	INTACT	BLUE	shooting range	ma	range 3blue shed	2.7	0.8
39	4/19/2010 13:37	PAINT	1.97	mg / cm ^2	DOOR	METAL	D	INTACT	BLUE	shooting range	ma	range 3blue shed	1.7	0.5
40	4/19/2010 13:40	PAINT	3.45	mg / cm ^2	COLUMN	WOOD	A	FAIR	BEIGE	shooting range	ma	range 4 shade structure	< LOD	0.04
41	4/19/2010 13:41	PAINT	1.97	mg / cm ^2	WALL	WOOD	D	FAIR	BEIGE	shooting range	ma	range 4 shade structure	< LOD	0.05



City of San Diego/Asbestos and Lead Management Program

Project 6447 Firing Range



XRF Assay Results

Reading No	Time	Type	Duration	Units	Component	Substrate	Side	Condition	Color	Site	Inspector	Location	PbC	PbC Error
42	4/19/2010 13:42	PAINT	2.94	mg / cm ^2	upper trim	WOOD	D	FAIR	BEIGE	shooting range	ma	range 4 shade structure	< LOD	0.04
43	4/19/2010 13:44	PAINT	1.73	mg / cm ^2	COLUMN	WOOD	D	FAIR	BROWN	shooting range	ma	range 4 backstop	5.6	2.4
44	4/19/2010 13:48	PAINT	1.97	mg / cm ^2	WALL	PLASTER	D	INTACT	GREEN	shooting range	ma	ticket booth	< LOD	0.04
45	4/19/2010 13:48	PAINT	5.4	mg / cm ^2	WALL	PLASTER	D	INTACT	GREEN	shooting range	ma	ticket booth	< LOD	0.03
46	4/19/2010 13:49	PAINT	4.69	mg / cm ^2	WALL	PLASTER	D	INTACT	GREEN	shooting range	ma	ticket booth	< LOD	0.04
47	4/19/2010 13:50	PAINT	3.45	mg / cm ^2	WINDOW	WOOD	D	FAIR	GREEN	shooting range	ma	ticket booth	0.5	0.1
48	4/19/2010 13:51	PAINT	32.28	mg / cm ^2	WINDOW frame	WOOD	D	FAIR	GREEN	shooting range	ma	ticket booth	0.14	0.04
49	4/19/2010 13:53	PAINT	17.48	mg / cm ^2	uper trim	WOOD	A	FAIR	GREEN	shooting range	ma	ticket booth	0.1	0.03
50	4/19/2010 13:54	PAINT	2.47	mg / cm ^2	DOOR	WOOD	A	FAIR	BEIGE	shooting range	ma	ticket booth	< LOD	0.03
51	4/19/2010 13:58	PAINT	26.1	mg / cm ^2	bench	WOOD	A	FAIR	GREEN	shooting range	ma	range 1 shade structure	0.12	0.02
52	4/19/2010 13:58	PAINT	2.46	mg / cm ^2	COLUMN	WOOD	A	FAIR	GREEN	shooting range	ma	range 1 shade structure	1.8	0.5
53	4/19/2010 13:59	PAINT	4.2	mg / cm ^2	table	WOOD	A	FAIR	GREEN	shooting range	ma	range 1 shade structure	0.05	0.03
54	4/19/2010 13:59	PAINT	2.21	mg / cm ^2	deck	WOOD	A	FAIR	GREEN	shooting range	ma	range 1 shade structure	< LOD	0.03
55	4/19/2010 14:01	PAINT	8.65	mg / cm ^2	cal				RED	shooting range	ma	range 1 shade structure	1	0.1
56	4/19/2010 14:02	PAINT	9.13	mg / cm ^2	cal				RED	shooting range	ma	range 1 shade structure	1.1	0.1
57	4/19/2010 14:03	PAINT	16.8	mg / cm ^2	cal				RED	shooting range	ma	range 1 shade structure	1	0.1
58	4/19/2010 14:04	PAINT	20.76	mg / cm ^2	cal				RED	shooting range	ma	range 1 shade structure	1	0.1
59	4/19/2010 14:05	PAINT	20.75	mg / cm ^2	cal				RED	shooting range	ma	range 1 shade structure	1	0.1

Attachment # 3

INSPECTOR CERTIFICATES

Certificate of Training

This is to certify that

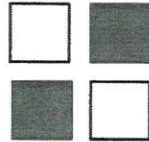
William Blondet

has successfully completed 4 hours of formal training entitled

AHERA Building Inspector Refresher

as approved by the California Division of Occupational Safety and Health
and as certified by the Environmental Protection Agency and approved by AHERA under TSCA Title II

Presented by



Design For Health Training Center

2667 Camino del Rio South, Suite #207

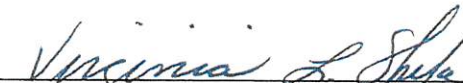
San Diego, CA 92108

Phone: (619) 291-1777 Fax: (619) 291-4318

dfhtcsd@gmail.com

www.designforhealthtrainingcenter.com

By:


Virginia L. Shefa B.S., M.N., Sc., CAC
President

DOSH Approval #011-06
Certificate # 0918BIR184927
Course Date(s) 09/05/2018
Exam Date: N/A

This is an annual certification. It must be renewed by: 09/05/2019

State of California
Division of Occupational Safety and Health
Certified Site Surveillance Technician

William Bradley Blondet



Name

Certification No. 99-2689

Expires on 12/10/19

This certification was issued by the Division of Occupational Safety and Health as authorized by Sections 7180 et seq. of the Business and Professions Code.

State of California Department of Public Health

Lead-Related
Construction
Certificate

Certificate
Type

Expiration
Date



Inspector/Assessor	07/01/2019
Supervisor	07/01/2019
Project Monitor	07/01/2019

William B. Blondet

ID #: 5464

Asbestos Training Program

This is to certify

Jeff Jones
3373

Has successfully completed 4 hours of formal training
required by section 206 of TSCA II entitled

Building Inspector
Refresher

Presented By
Environmental Compliance Training
PO BOX 16555
San Diego, CA. 92176-6555
(858) 558-7465

Director: 
Walter T. Amenta, CIH, Approval Number CA-029-06

Class Dates: 12-1-2010
Exam Date: n/a
Expiration Date: 12-1-2011
Certification Number: 1210ABCA53201

Asbestos Training Program

This is to certify

Mike Anderson
4308

Has successfully completed 4 hours of formal training
required by section 206 of TSCA II entitled

Building Inspector
Refresher

Presented By
Environmental Compliance Training
PO BOX 16555
San Diego, CA. 92176-6555
(858) 558-7465

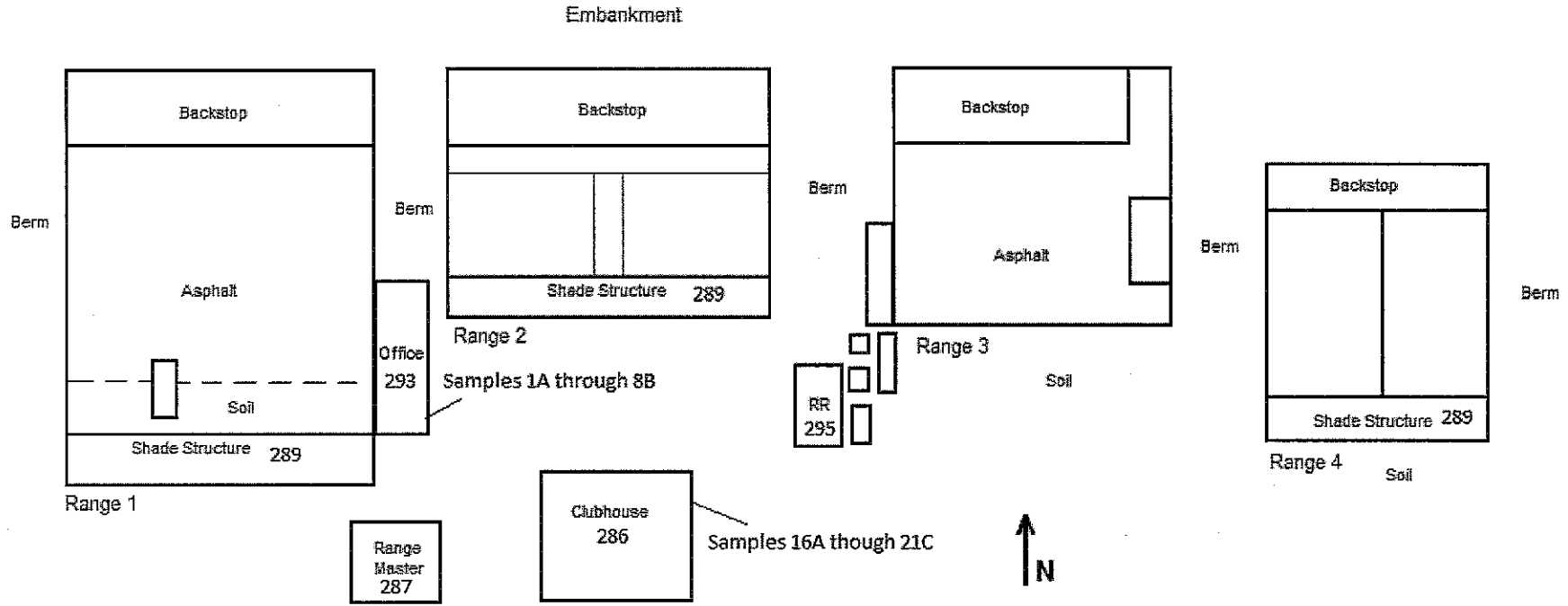
Director: 
Walter T. Amenta, CIH, Approval Number CA-029-06

Class Dates: 11-13-2009
Exam Date: n/a
Expiration Date: 11-13-2010
Certification Number: 1109ABCA45304

Attachment # 4

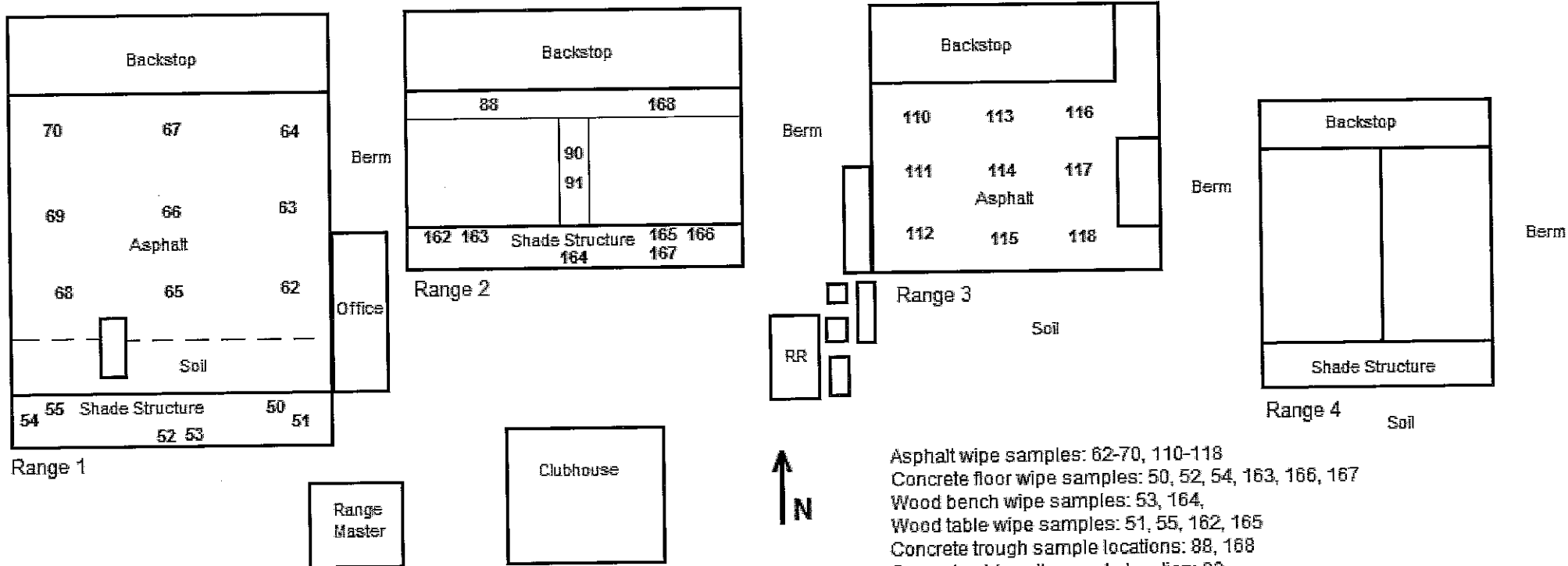
SITE DIAGRAM

Dirt Road



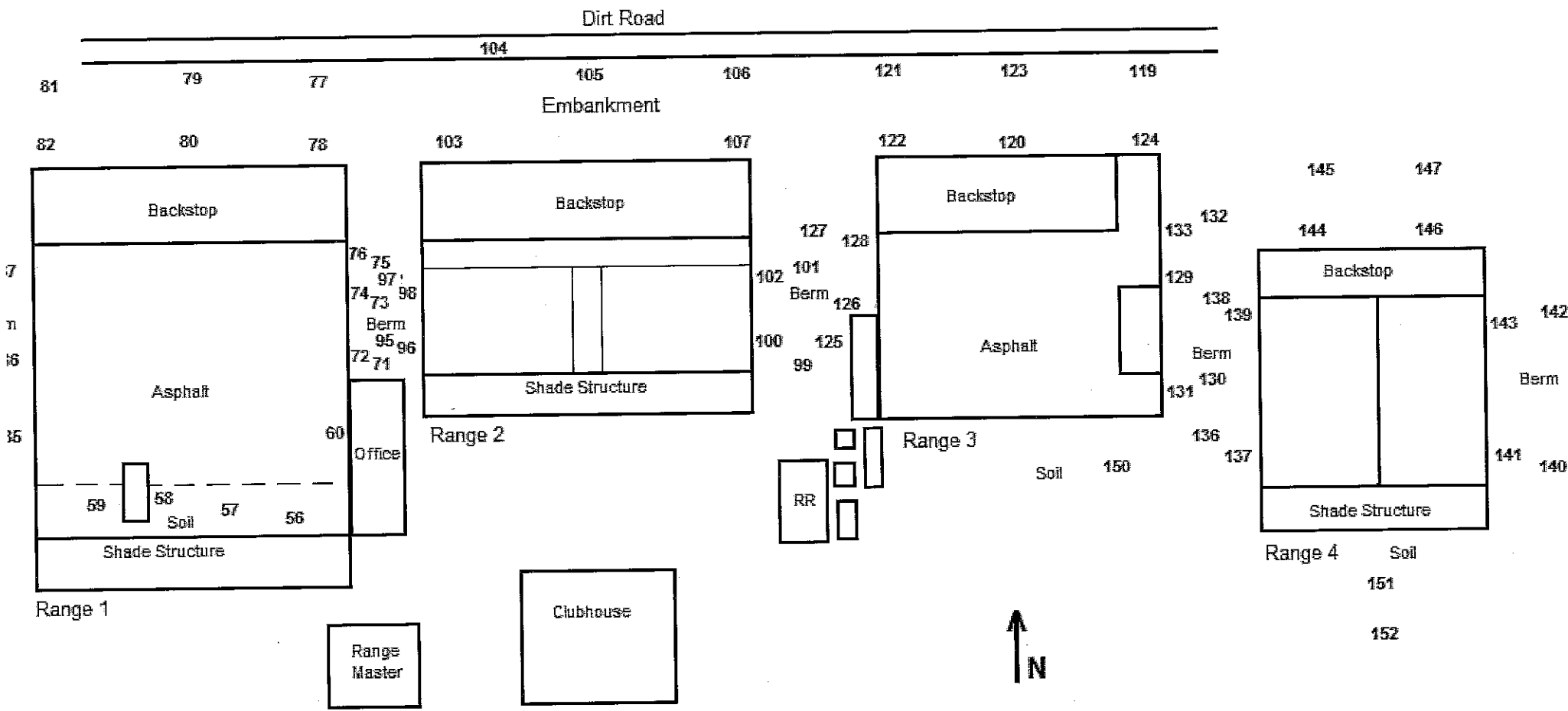
Dirt Road

Embankment



- Asphalt wipe samples: 62-70, 110-118
- Concrete floor wipe samples: 50, 52, 54, 163, 166, 167
- Wood bench wipe samples: 53, 164,
- Wood table wipe samples: 51, 55, 162, 165
- Concrete trough sample locations: 88, 168
- Concrete sidewalk sample location: 90
- Tunnel concrete floor sample location: 91

Police Firing Range Lead Dust Wipe Sample Locations



Police Firing Range Soil Sample Locations

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HAZARDOUS MATERIALS ABATEMENT FOR SITE PREPARATION - SECTION 02050

PART 1 - GENERAL

1.1 LEAD DEMOLITION SCOPE OF WORK FOR SITE PREPARATION

In preparation for the refurbishment activities at the Police Range Refurbishment Project, Phase II, the ABATEMENT CONTRACTOR shall remove and relocate all hazardous soils to an area at the site as identified in this specification by the project manager and covered for later use at the site. Some of the wastes generated during this project may be hazardous or contain hazardous components. The ABATEMENT CONTRACTOR must exercise caution during their work activities to ensure no hazardous substances remain on any equipment, portion of a structure, item or area to be demolished, recycled, or disposed of to a solid waste or recycling facility. **This includes live ammunition that may be found on the embankments that is to be collected and returned to the Range Master on duty.**

These "hazardous wastes" as defined by all Federal, State, and Local regulations shall be properly managed as specified in Part 2 of this section. Proper management of hazardous wastes includes, but is not limited to, sampling, testing, packaging, labeling, storage, containment, and disposal. The ABATEMENT CONTRACTOR will be responsible for the removal, storage, and disposal in accordance with this specification for:

1. All lead contaminated soils in bunkers and berms.
2. All lead embedded wood from the shooting bunker structures.
3. Wood impregnated with creosote.

The ABATEMENT CONTRACTOR will be responsible for the identification, management and disposal of all hazardous wastes generated from their equipment maintenance activities and spilled materials in accordance with this specification.

1.2 RELATED SECTIONS

- A. The WORK of the following Sections ALSO applies to the WORK of this Section. Other Sections of the Specifications, not referenced below, shall also apply to the extent required for proper performance of this WORK.
1. Section 02081 - Asbestos Abatement
 2. Section 02090 - Lead Abatement

1.3 STANDARD SPECIFICATIONS

- A. Except as otherwise indicated in this Section of the Specification, the ABATEMENT CONTRACTOR shall comply with the Standard Specifications for Public Works Construction (SSPWC).

1.4 APPLICABLE REGULATIONS

- A. 49 Code of Federal Regulations (49 CFR)
- B. 40 Code of Federal Regulations (40 CFR)
- C. California Code of Regulations, Title 22 (22 CCR) and Title 19 Sections 2701-2705
- D. California Health and Safety Code, Chapter 6.5 (HSC)
- E. Uniform Fire Code (UFC)

1.5 DEFINITIONS

- A. Closed Container - a container is closed when the lid, ring, gaskets, and bung are latched, screwed, and tightened in such a way that the contents, including vapors, are confined within the space of the container.
- B. Hazardous Material - a material which may cause harm to humans, animals, or the environment. Hazardous Materials include but are not limited to products labeled: Danger, Warning, Caution, Corrosive, Flammable, Toxic, Poison. Hazardous Substance - a hazardous material, hazardous waste, or any chemical product which a manufacturer or producer is required to prepare an SDS.
- C. Hazardous Waste - A hazardous material that can no longer be used for its intended purpose or as defined in HSC 25115, HSC 25117, and HSC 25316.
- D. Hazardous Waste Determination - the process which shall be used to determine if a waste is hazardous or non-hazardous as required in 22 CCR 66262.11.
- E. Hazardous Waste Manifest - the shipping document DHS 8022A, or the equivalent document required by the state to which the waste will be shipped, which is originated and signed by the generator of the waste in accordance with 22 CCR and 49 CFR.
- F. SDS - Safety Data Sheet
- G. Chemical Release - any spilling, leaking, pumping, pouring, emitting, emptying, discharging, dumping, or disposing into the environment as defined in 40 CFR, 22 CCR, 19 CCR, and HSC.
- H. Bill of Lading - an approved DOT document which is signed by the transporter and generator (shipper) and denotes the amount and type of recyclable hazardous substance being transporter off-site to a recycling location.
- I. Universal Wastes - A subcategory of hazardous waste that includes consumer batteries, mercury thermostats, lighting wastes including fluorescent lights, cathode ray tube devices to include computer monitors and televisions, and mercury containing items to include thermometers, and switches. See Title 22, Chapter 23, Standards for Universal Waste Management, for detailed definitions and regulations.

1.6 SUBMITTALS

A. Before Start of Work: Submit the following to the PROJECT MONITOR for review. Do not start work until these submittals are returned with the PROJECT MONITOR's written approval indicating that the submittal is complete and acceptable. Refer to Part 2, Section 2.11 of this document for a checklist of all required submittals. Additional submittals may be required for hazardous wastes not listed in the Scope of Work that are encountered during the project.

1. Plan of Action/Work Plan outlining the procedures used for the dust control, storm water protection, soil removal, soil storage, worker decontamination, testing (if applicable), identification, packaging, labeling, storage, containment, and disposal for each hazardous waste listed in Section 02000.
2. Procedures which have been determined to contain insufficient detail, as determined by the PROJECT MONITOR shall be returned to the ABATEMENT CONTRACTOR for revision. Work shall not commence until all procedures have been reviewed and approved by the PROJECT MONITOR.
3. Name, address, phone number, company representative name, EPA Generator Identification number, and copy of a valid insurance policy certificate for environmental pollution liability insurance for each company that shall be managing the transportation, treatment, storage, recycling and/or disposal of the hazardous waste generated from this project.
4. Identify the disposal method which shall be utilized for each type of waste generated. The City's preference for disposal is in the following order:
 - a. Recycle
 - b. Treatment/Fuel Blending
 - c. Incinerate
 - d. Landfill

The City will require specific disposal methods for specific wastes as listed in Description of Work

5. Optional Submittal, if Necessary - Name, address, phone number, company representative name, and certification number for all State certified hazardous waste testing laboratories used to perform analytical testing. Include a list of the tests the laboratory is certified to perform under the laboratory's State hazardous waste testing certification.
6. Spill Contingency Plan - Prepare a spill contingency plan for the release of hazardous materials or hazardous waste to the ground,

trash, sewer, storm drain, air, surface waters or other water source. A release is defined as any spilling, leaking, pumping, pouring, emitting, emptying, discharging, dumping, or disposing into the environment. There is no de minimis release level recognized as non-reportable for a hazardous substance or waste which is released to the trash, storm water, sewer, surface water, other water source has migrated off the work site, causes property damage, employee exposure or injury, or public exposure or injury. The contingency plan shall include the following:

- a. Listing of agencies that will be notified immediately of a chemical release.
 - b. Contacts (City and construction staff) which shall be notified when any release occurs including a specified time by which the notification shall be given to the PROJECT MONITOR.
 - c. Procedures for the identification of any unknown substances released.
 - d. Procedures for the containment, clean-up, storage, and disposal of the released material.
7. Health and Safety Plan - Provide a Health and Safety Plan for all demolition/deconstruction activities where hazardous materials or hazardous wastes may be encountered or generated by the ABATEMENT CONTRACTOR. The ABATEMENT CONTRACTOR is responsible for the removal and storage of various materials which contain hazardous substances as noted in 1.1 Scope of Work in accordance with specification Section 02050. The Health and Safety Plan must contain a minimum of the following components:
- a. Scope of Work - A brief description of the activities covered by the Health and Safety Plan.
 - b. Hazard Identification - Identify the chemical and physical hazards that are posed by each type of hazardous material or hazardous waste that is anticipated to be encountered during the process of demolition/deconstruction including anticipated exposure levels for affected workers.
 - c. Worker Protection - Provide a description of the types of administrative controls, engineering controls or personal protective equipment used to minimize worker exposure to known or anticipated hazards as listed in the Hazard Identification section of the Health and Safety Plan.
 - d. Site Control - Describe the steps that will be taken to monitor the access and egress for work areas where chemical or physical hazards may be present. Include actions that will be taken to prevent hazard exposure to non-contractor personnel working in or around the building.
 - e. Emergency Action Plan - Provide a list of emergency contacts for various emergencies (fire, spill, chemical exposure, etc.), evacuation procedures, staging area(s), and basic on-site

emergency response equipment. Include the location(s) of nearby emergency rooms capable of treating chemical exposures.

- f. Key Personnel - List the names and titles of ABATEMENT CONTRACTOR staff responsible for:
 - 1) Daily activities
 - 2) Project management
 - 3) Site safety and training
 - 4) Emergency response coordination and notifications
 - 5) Hazardous waste identification, management and disposal
- g. Training Program - Identify the type and level of training for contracted workers entering zones where hazardous materials or hazardous wastes exist. Copies of training records must be provided to the PROJECT MONITOR within 24 hours of request.

B. Weekly Submittals:

Hazardous/Universal Waste Storage Log - Complete a Hazardous Universal Waste Storage Log to track all hazardous and universal wastes generated on-site. The Hazardous/Universal Waste Log shall be maintained on a weekly basis and a copy of the log must be submitted to the PROJECT MONITOR on a weekly basis. A copy of the week's log shall be provided to the PROJECT MONITOR no later than the second working day of the following week. The weekly Hazardous/Universal Waste Storage Log shall contain the following:

- 1. The number used to identify each container of hazardous waste or universal waste as specified in Part 2, Section 2.5(C) of this document.
- 2. The contents of each container.
- 3. The accumulation start date for each container of hazardous waste or universal waste.
- 4. The intended recycling or disposal method for each container of hazardous waste or universal waste.

C. Prior to Transporting Hazardous/Universal Waste Off-Site:

- 1. A date for the pick-up and transportation of hazardous or universal waste off-site shall not be scheduled until the following documents have been submitted and approved by the PROJECT MONITOR.
- 2. A draft copy of the hazardous waste manifest or bill of lading which shall be used to ship each hazardous substance from the project site to the disposal location.

3. A copy of the waste profile (if required), as approved by the treatment, storage and disposal facility for each hazardous or universal waste.
4. The PROJECT MONITOR shall return the draft hazardous waste manifest or bill of lading and waste profile (if required) with any required changes to the ABATEMENT CONTRACTOR within three working days of receipt.
5. Inadequate or incorrect hazardous waste manifests or bills of lading or waste profiles will be returned to the ABATEMENT CONTRACTOR as often as necessary for revision until the documents are approved by the PROJECT MONITOR.
6. The date for pick-up and transportation of hazardous waste off-site shall be approved by the PROJECT MONITOR.

D. The Day the Waste is Transported Off-Site:

1. Any changes to the hazardous waste manifest after it has been approved shall be cleared through the PROJECT MONITOR. The PROJECT MONITOR or other designated City representative shall sign the hazardous waste manifest or bill of lading as representing the generator at the time the hazardous waste is being removed from the site. Pre-signed hazardous waste manifests or bills of lading are not acceptable.
2. The yellow Generator's copy of the hazardous waste manifest or a copy of the bill of lading shall be provided to the PROJECT MONITOR prior to the transporter leaving the site.

PART 2 - HAZARDOUS WASTE MANAGEMENT

2.1 EMPLOYEE TRAINING

- A. Any employee who manages hazardous waste shall be trained to ensure compliance with the regulations, and all contracted staff working at the job site shall be able to respond effectively to emergency situations including chemical spills (22 CCR 66265.16).

2.2 WASTE CHARACTERIZATION

- A. A hazardous waste determination shall be performed on all potential hazardous waste generated on-site within 10 days of generation to determine if it meets hazardous waste criteria as specified in 22 CCR Division 4.5 or any other pertinent law or regulation. The results of all waste determinations shall be submitted to the PROJECT MONITOR prior to disposal of the waste as municipal waste.
- B. Incomplete or inconclusive hazardous waste determinations, as determined by the PROJECT MONITOR, will be returned to the ABATEMENT

CONTRACTOR for additional information or testing. The final determination as to whether a waste is hazardous or non-hazardous shall be made by the PROJECT MONITOR.

- C. Substances requiring analytical testing shall be sampled and tested in accordance with Part 2, Section 2.3 of this document. Specific hazardous wastes that may be generated, as determined in a pre-demolition inspection, are identified in the Description of Work. Additional wastes may be encountered during demolition/deconstruction activities. Identification and management of all hazardous and recyclable wastes generated during the process of demolition/deconstruction must be done in accordance with specification, Section 02050 and the sole responsibility of the ABATEMENT CONTRACTOR and must be done in accordance with this document and all applicable Federal, State, and Local regulations.

2.3 SAMPLING AND ANALYTICAL TESTING REQUIREMENTS

- A. A suspect item that may be hazardous or contain a hazardous component must be separated from other demolition waste for the PROJECT MONITORS determination if a Waste Characterization is needed or the ABATEMENT CONTRACTOR may follow B - F of this section.
- B. Each testing method shall be approved by the PROJECT MONITOR as appropriate for the sample being tested prior to having a certified laboratory conduct the test.
- C. Representative samples shall be obtained for each waste to be tested with the sampling procedure pre-approved by the PROJECT MONITOR.
- D. The PROJECT MONITOR shall be contacted prior to sampling, and if possible, be present to observe the sampling. Items sampled without the presence or approval of the PROJECT MONITOR may require the item to be re-sampled.
- E. All containers (jars, bags, etc.) used for sampling shall be certified as "pre-cleaned."
- F. A copy of all analytical test results and the sampling chain-of-custody form received by the ABATEMENT CONTRACTOR shall be provided to the PROJECT MONITOR within one (1) working day of receipt from the certified testing laboratory.
- G. All hazardous substances shall immediately upon generation be placed in an approved container as specified in Part 2, Section 2.5 of this document. No interim containers including, but not limited to, bags, transfer containers, buckets, or pails shall be acceptable.
- H. Hazardous substances, wastes, universal wastes, or items and equipment containing hazardous substances or wastes shall be removed and handled in such a way as to minimize the possibility of a release.

2.4 PRE-TRANSPORTATION REQUIREMENTS

- A. Any packaging used to store and or transport hazardous waste or universal waste off-site such as a container, roll-off bin, pallet, tank or other device,

shall comply with 49 CFR Parts 173, 178, 179 and be labeled and prepared for transportation in accordance with 22 CCR Article 3.

- B. A hazardous waste label shall be affixed to all hazardous waste containers and filled out when the first amount of hazardous waste is placed in the container. The label shall include the contents of the container, physical state and hazardous properties of the waste, generator information, and the initial accumulation date. Section 2000 contains a sample hazardous waste label. All hazardous wastes will be properly identified by a labeling system to include the initial collection date that materials were placed into the container. An example is presented in Appendix A of this section.
- C. The ABATEMENT CONTRACTOR shall use a numbering system to identify each hazardous and universal waste container. Each hazardous and universal waste container shall be marked with an identification number specific to that individual container. All markings shall be made in indelible ink no larger than 3 inches in height on the top of the container.
- D. All additional pre-transportation labeling and marking, or placarding shall be conducted prior to transporting hazardous or universal waste off-site and in accordance with 22 CCR Chapter 12, Article 3.
- E. All containers used to package hazardous and universal waste shall be compatible with the waste (22 CCR 66265.172), maintained in good condition (22 CCR 66265.171), and kept closed unless adding or removing waste (22 CCR 66265.173).
- F. Different waste types shall be stored in separate containers and incompatible wastes shall never be combined. All containers and tanks of hazardous and universal waste shall be managed in a way which minimizes the threat of fire, explosion, or any unplanned sudden or non-sudden release of hazardous waste to the air, soil, or surface water which could threaten human health or the environment (22 CCR 66265.31). Management techniques include containment areas capable of holding the contents of the largest container within the containment area.
- G. The ABATEMENT CONTRACTOR shall perform weekly inspections of their hazardous material, hazardous waste, and universal waste storage areas to ensure compliance with the regulations. Any spills, leaks, damaged or unlabeled containers shall be immediately corrected once identified. All inspections must be documented and copies provided to the PROJECT MONITOR upon request.
- H. Secondary containment shall be provided for all storage areas containing 55 gallons or more of hazardous material or a hazardous waste. The secondary containment area must be capable of containing the contents of the largest container plus ten percent of that volume.
- I. Secondary containment areas must be maintained so any releases will be confined within the secondary containment area. Any rips, tears, cracks, breaks, etc. that compromise the integrity of the secondary containment shall be immediately repaired.
- J. Any material used in or around the secondary containment area which has been contaminated with a hazardous material or hazardous waste shall not be disposed until a hazardous waste determination has been performed as

specified in Part 2, Section 2.2 of this document. Contaminated materials include, but are not limited to, plastic sheeting, absorbent, dirt, sand, and kitty litter. Any contaminated materials found in or around containment areas shall be immediately cleaned-up.

2.5 ACCUMULATION TIME

- A. Each container of hazardous waste and universal waste shall be shipped off-site for disposal by a registered hazardous waste transporter within **90 days** of the date of initial generation or by the end of the project, whichever comes first.

2.6 TRANSPORTATION REQUIREMENTS

- A. The PROJECT MONITOR shall provide the ABATEMENT CONTRACTOR with the EPA Generator Identification number for the work site. This number is site specific and shall only be used on hazardous waste disposal documentation for the appropriate site where the waste was generated.
- B. A hazardous waste manifest shall be completed in accordance with 22 CCR Chapter 12, Article 2 for any shipment of hazardous waste leaving the work site.
- C. The submission of each hazardous waste manifest to the PROJECT MONITOR shall be done as specified in Part 1, Section 1.4(C) of this document. Only a PROJECT MONITOR pre-approved, licensed hazardous waste transporter with a valid insurance certificate shall transport hazardous waste off-site to a pre-approved treatment, storage, and disposal facility (TSDF) in accordance with 22 CCR Chapter 13. Any ABATEMENT CONTRACTOR who allows the transportation or disposal of hazardous waste from a City site by an unauthorized vendor, upon conviction, shall be punished up to 3 years in prison and fined up to \$100,000 per day (HSC 25163, 25189.5).
- D. Hazardous Materials Containers
 - 1. All empty hazardous material containers shall be managed as specified in 22 CCR 66261.7 and outlined as follows:
 - a. Empty the entire contents of a hazardous material container.
 - 1) If a liquid, pour or drain the contents from the container so that no hazardous material remains in the container when it is held in any orientation (e.g. inverted, tilted, etc.). If not a liquid, remove the hazardous material by a physical method so that no more than a thin uniform film remains in the container.
 - b. The hazardous material that is removed from the container is used as a material or disposed of as a hazardous waste.
 - c. Mark each container with the date it was emptied. Manage the container within one year by one of the following methods:
 - 1) Reclaim the scrap value of the container.

- 2) Send the container off-site for reconditioning or remanufacturing.
 - 3) Send the container back to the manufacturer.
- d. For containers five (5) gallons capacity or less, once the container is empty, it may be disposed of to the regular trash.
 - e. Aerosol spray containers may be disposed of in the regular trash if the contents and propellant have been emptied to the maximum extent practical under normal use (i.e., the spray mechanism was not defective and thus allowed complete discharge of the contents and propellant). Aerosol spray containers cannot be punctured, crushed or altered to remove or release any remaining contents or propellant for the purpose of emptying the container for disposal to the trash.
 - f. A compressed gas cylinder is empty when the pressure in the container approaches atmospheric pressure.

APPENDIX A-SECTION 02050

SAMPLE HAZARDOUS WASTE LABEL

HAZARDOUS WASTE
STATE AND FEDERAL LAW PROHIBITS IMPROPER DISPOSAL
IF FOUND, CONTACT THE NEAREST POLICE, PUBLIC SAFETY AUTHORITY, OR THE U.S. ENVIRONMENTAL PROTECTION AGENCY

PROPER D.O.T. SHIPPING NAME _____

CONTENTS, COMPOSITION **CONTAMINATED GASOLINE**

PHYSICAL STATE: HAZARDOUS PROPERTIES: FLAMMABLE TOXIC
 SOLID LIQUID CORROSIVE REACTIVITY OTHER _____

GENERATOR INFORMATION: TELEPHONE **434-1567**
NAME **ACME INDUSTRIES**
ADDRESS **120 MAIN STREET**
CITY **SAN DIEGO** STATE **CA** ZIP **92123**

ACCUMULATION START DATE **5/1/98** MANIFEST DOCUMENT NO. _____

EPA WASTE NO(S) _____ EPA ID NO. _____
CA WASTE NO. _____

COMPLETE FOR STORAGE **HANDLE WITH CARE** COMPLETE FOR TRANSPORT

CITY OF SAN DIEGO
PROJECT NO. 7141
PROJECT NAME: Police Range Refurbishment Project, Phase II

Hazardous Soils, Asbestos, and Lead Paint
02050-22
DATE: March 22, 2019

SECTION 02081 - ASBESTOS ABATEMENT

Part 1 — GENERAL

1.1 SCOPE OF WORK

- A. The ABATEMENT CONTRACTOR shall provide all labor, equipment, tools and materials for the mitigation, removal and disposal of all asbestos-containing materials to facilitate the scope of work at the Police Range Refurbishment Project, Phase II identified in Section 02000 and the survey.
- B. ABATEMENT CONTRACTOR Responsibility: The ABATEMENT CONTRACTOR shall assume full responsibility and liability for the compliance with all applicable Federal, State, and local regulations pertaining to work practices, transportation, disposal, and protection of workers, visitors to the site, and person occupying areas adjacent to the site. The ABATEMENT CONTRACTOR shall hold the OWNER and the PROJECT MONITOR harmless for failure to comply with any applicable work, transportation, disposal, safety, health or other regulation on the part of himself, his employees, or his subcontractors. Any fines imposed on the OWNER, or PROJECT MONITOR by any regulatory agency as a result of the ABATEMENT CONTRACTOR's noncompliance with environmental regulations shall be paid or reimbursed by the ABATEMENT CONTRACTOR.
- C. The disturbance or dislocation of asbestos-containing materials may cause asbestos fibers to be released into the building's atmosphere, thereby creating a potential health hazard to workmen and building occupants. Apprise all workers, supervisory personnel, subcontractors and consultants who will be at the job site of the seriousness of the hazard and of proper work procedures which must be followed.
- D. Where in the performance of the work, workers, supervisory personnel, subcontractors, or consultants may encounter, disturb, or otherwise function in the immediate vicinity of any identified asbestos-containing materials, take appropriate continuous measures as necessary to protect all building occupants from the potential hazard of exposure to airborne asbestos. Such measures shall include the procedures and methods described herein, and compliance with regulations of applicable federal, state and local agencies.
- E. Before the beginning of the work related to asbestos abatement, ABATEMENT CONTRACTOR shall hold a safety construction meeting with all asbestos related supervisors, workers, and other contractors on-site that provides an overview of the accepted asbestos work plan, decontamination procedures specific to this project (decontamination procedures shall be on paper with copies for all present), and disposal plan for this project. Meeting shall include the PROJECT MONITOR and any other designated City representative. Meeting time shall be provided for the PROJECT MONITOR to introduce themselves and identify their role in this project.
- F. The ABATEMENT CONTRACTOR shall inform himself of the conditions for the project, and is responsible for verifying the quantities and location of all

work to be performed as outlined in this section. Failure to do so shall not relieve the ABATEMENT CONTRACTOR of his obligation to furnish all materials and labor necessary to carry out the provisions of the Contract.

- G. An asbestos-containing materials survey has been performed. The purpose of the survey was to identify asbestos containing materials that will be impacted during this project. The survey was limited to readily accessible suspect materials. Section 2000 provides summary of the survey and sample results. It shall be the ABATEMENT CONTRACTOR's responsibility to visit this project site before starting the Work, and to assess the exact amounts and types of asbestos containing materials, as well as the physical difficulty involved in its complete removal.

1.2 DEFINITIONS

- A. Accredited or Accreditation (when referring to a person or laboratory): A person or laboratory accredited in accordance with section 206 of Title II of the Toxic Substances Control Act (TSCA).
- B. Aerosol: A system consisting of particles, solid or liquid, suspended in air.
- C. Air Cell: Insulation normally used on pipes and duct work that is comprised of corrugated cardboard which is frequently comprised of asbestos combined with cellulose or refractory binders.
- D. Air Monitoring: The process of measuring the fiber content of a specific volume of air.
- E. Amended Water: Water to which a surfactant has been added to decrease the surface tension to 35 dynes or less.
- F. Asbestos: The asbestiform varieties of serpentinite (chrysotile), riebeckite (crocidolite), cummingtonite-grunerite, anthophyllite, and actinolite-tremolite. For purposes of determining respiratory and worker protection both the asbestiform and non-asbestiform varieties of the above minerals and any of these materials that have been chemically treated and/or altered shall be considered as asbestos.
- G. Asbestos-Containing Material (ACM): Any material containing more than 1% by weight of asbestos of any type or mixture of types.
- H. Asbestos-Containing Building Material (ACBM): Surfacing ACM, thermal system insulation ACM, or miscellaneous ACM that is found in or on interior structural members or other parts of a building.
- I. Asbestos-Containing Waste Material: Any material which is or is suspected of being or any material contaminated with an asbestos-containing material which is to be removed from a work area for disposal.
- J. Asbestos debris: Pieces of ACBM that can be identified by color, texture, or composition, or means dust, if the dust is determined by an accredited inspector to be ACM.
- K. Authorized Visitor: The Owner, the Owner's representative, testing lab personnel, the Architect/Engineer, emergency personnel or a representative of any federal, state and local regulatory or other agency having authority over the project.

- L. Barrier: Any surface that seals off the work area to inhibit the movement of fibers.
- M. Breathing Zone: A hemisphere forward of the shoulders with a radius of approximately 6 to 9 inches.
- N. California Code of Regulations (CCR): The CCR is a codification of the regulations of the various State Agencies.
- O. Ceiling Concentration: The concentration of an airborne substance that shall not be exceeded.
- P. Certified Industrial Hygienist (C.I.H.): An industrial hygienist certified in Comprehensive Practice by the American Board of Industrial Hygiene.
- Q. Class 1 or Class II Landfill: A disposal facility or part of a facility where hazardous waste is placed in or on land and which is not a land treatment facility, a surface impoundment, or an injection well.
- R. Code of Federal Regulations (CFR): The basic component of the Federal Register publication system. The CFR is a codification of the regulations of the various Federal Agencies.
- S. Competent Person: An agent of the ABATEMENT CONTRACTOR who is a Competent Person as defined in 8 CCR 1529. This person must be capable of identifying existing and predictable asbestos hazards in the surroundings or working conditions and who has authorization by the ABATEMENT CONTRACTOR to take prompt corrective measures to eliminate them.
- T. Curtained Doorway: Device to allow ingress and egress from one room to another while permitting minimal air movement between the rooms.
- U. Demolition: The wrecking or taking out of any building component, system, finish or assembly of a facility together with any related handling operations.
- V. Disposal Bag: A properly labeled 6-mil thick leak-tight plastic bags used for transporting asbestos waste from work and to disposal site.
- W. Equipment Decontamination Enclosure System: Series of areas used for decontamination materials and equipment, typically consisting of a designated area of the Work Area (wash down station), washroom, holding room, container room, and an uncontaminated area.
 1. Wash Down Station: A designated section of the Work Area adjacent to the Equipment Decontamination Enclosure System. At this station there shall be a gross contamination removal shower with a filtration capability of 0.5 microns or less.
 2. Washroom: A room between the Work Area and the holding area in the equipment decontamination enclosure system. The washroom comprises an airlock.
 3. Holding Room: A chamber between the washroom and an uncontaminated area in the equipment decontamination enclosure system. The holding area comprises an airlock.

4. Container Room: A chamber between the holding room and an uncontaminated area in the equipment decontamination enclosure system. The container room comprises an airlock.
- X. Encapsulant: A material that surrounds or embeds asbestos fibers in an adhesive matrix, to prevent release of fibers.
1. Bridging encapsulant: an encapsulant that forms a discrete layer on the surface of an in situ asbestos matrix.
 2. Penetrating encapsulant: an encapsulant that is absorbed by the in situ asbestos matrix without leaving a discrete surface layer.
 3. Removal encapsulant: a penetrating encapsulant specifically designed to minimize fiber release during removal of asbestos-containing materials rather than for in situ encapsulation.
- Y. Encapsulation: Treatment of asbestos-containing materials, with an encapsulant.
- Z. Enclosure: The construction of an air-tight, impermeable, permanent barrier around asbestos-containing material to control the release of asbestos fibers into the air.
- AA. Filter: A media component used in respirators to remove solid or liquid particles from the inspired air.
- BB. Friable Asbestos Material: Material that contains more than 1.0% asbestos by weight and that can be crumbled, pulverized, or reduced to powder by hand pressure when dry. Mechanical means may also render a material friable.
- CC. Glovebag: A sack (typically constructed of 6-mil transparent polyethylene or polyvinylchloride plastic) with inward projecting long-sleeved gloves, which are designed to enclose an object from which an asbestos-containing material is to be removed.
- DD. Hazardous Waste (includes the definition identified in California Title 22): As defined in RCRA the term "hazardous waste" means a solid waste, or combination of solid wastes, which because of its quantity, concentration, or physical, chemical, or infectious characteristics may:
1. Cause, or significantly contribute to an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness; or
 2. Pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed.
 3. As defined in the regulations, a solid waste is hazardous if it meets one of four conditions:
 - a. Exhibits a characteristic of a hazardous waste (40 CFR Sections

- 261.20 through 262.24).
- b. Has been listed as hazardous (40 CFR Section 261.31 through 261.33).
 - c. Is a mixture containing a listed hazardous waste and a non-hazardous solid waste (unless the mixture is specifically excluded or no longer exhibits any of the characteristics of hazardous waste).
 - d. Is not excluded from regulation as a hazardous waste.
- EE. HEPA Filter: A High Efficiency Particulate Air (HEPA) filter capable of trapping and retaining 99.97% of asbestos fibers greater than 0.3 microns in diameter.
- FF. HEPA Filter Vacuum Collection Equipment (or vacuum cleaner): High efficiency particulate air filtered vacuum collection equipment with a filter system capable of collecting and retaining asbestos fibers. Filters should be of 99.97% efficiency for retaining fibers of 0.3 microns or larger.
- GG. Negative Pressure Respirator: A respirator in which the air pressure inside the respiratory-inlet covering is positive during exhalation in relation to the air pressure of the outside atmosphere and negative during inhalation in relation to the air pressure of the outside atmosphere.
- HH. Negative Pressure Ventilation System: A pressure differential and ventilation system.
- II. Permissible Exposure Limit (PEL): employee exposure to asbestos at concentration no greater than 0.1 fibers/cc of air averaged over an 8-hour period TWA.
- JJ. PROJECT MONITOR: The PROJECT MONITOR is a full-time representative of the OWNER at the job site during the asbestos related work. The PROJECT MONITOR has the authority to stop the work upon verbal order if requirement of the Contract Documents or regulations are not met, or if in the sole judgment of the PROJECT MONITOR, the interests of the OWNER, safety of any person or the Owner's property are jeopardized by the work.
- KK. Personal Monitoring: Sampling of the asbestos fiber concentrations within the breathing zone of an employee.
- LL. Pressure Differential and Ventilation System: A local exhaust system, utilizing HEPA filtration capable of maintaining a pressure differential with the inside of the Work Area at a lower pressure than any adjacent area, and which cleans recirculated air or generates a constant air flow from adjacent areas into the Work Area.
- MM. PROJECT MONITOR: The PROJECT MONITOR is a full-time representative of the OWNER at the job site during the asbestos related work. The PROJECT MONITOR has the authority to stop the work upon verbal order if requirement of the Contract Documents or regulations are not met, or if in the sole judgment of the PROJECT MONITOR or the interests of the OWNER, safety of any person or the Owner's property are jeopardized by the work.
- NN. Protection Factor: The ratio of the ambient concentration of an airborne

substance to the concentration of the substance inside the respirator at the breathing zone of the wearer. The protection factor is a measure of the degree of protection provided by a respirator to the wearer.

- OO. Repair: Returning damaged ACBM to an undamaged condition or to an intact state to prevent fiber release.
- PP. Respirator: A device designed to protect the wearer from the inhalation of harmful atmospheres.
- QQ. Substantial Competition: The work of this contract is substantially complete when clearance criteria set forth in the Contract Documents are met and the Work Area may be re-occupied by the OWNER.
- RR. Surfactant: A chemical wetting agent added to water to improve penetration, thus reducing the quantity of water required for a given operation or area.
- SS. Time Weighted Average (TWA): The average concentration of a contaminant in air during a specific time period.
- TT. TSDF: A hazardous waste transfer, treatment, storage, or disposal facility which has received a permit, a grant of interim status, or a variance or is otherwise authorized by law to receive specific hazardous wastes
- UU. Visible Emissions: Any emissions containing particulate asbestos material that are visually detectable without the aid of instruments. This does not include condensed uncombined water vapor.
- VV. Wet Cleaning: The process of eliminating asbestos contamination from building surfaces and objects by using cloths, mops, or other cleaning utensils which have been dampened with amended water or diluted removal encapsulant and afterwards thoroughly decontaminated or disposed of as asbestos-contaminated waste.
- WW. Work Area: The area where asbestos-related work or removal operations are performed which is defined and/or isolated to prevent the spread of asbestos dust, fibers or debris, and entry by unauthorized personnel. Work area is a Regulated Area as defined by 8 CCR 1529.

1.3 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

- A. Applicability of Standards: Except where the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.
- B. Publication Dates: Comply with the standards in effect as of the date of the Contract Documents.
- C. Conflicting Requirements: Where compliance with two or more standards is specified and where the standards may establish different or conflicting requirements for minimum quantities or quality levels, refer requirements that are different but apparently equal and uncertainties to the PROJECT MONITOR for a decision before proceeding.

1. **Minimum Quantity or Quality Levels:** The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of the requirements. Refer uncertainties to the PROJECT MONITOR for a decision before proceeding.
- D. **Copies of Standards:** Each entity engaged in construction on the Project is required to be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.
1. Where copies of standards are needed to perform a required construction activity, the ABATEMENT CONTRACTOR shall obtain copies directly from the publication source.
- E. **Abbreviations and Names:** Trade association names and titles of general standards are frequently abbreviated. Where such acronyms or abbreviations are used in the Specifications or other Contract Documents, they mean the recognized name of the trade association, standards-generating organization, authority having jurisdiction, or other entity applicable to the context of the text provision. Refer to the "Encyclopedia of Associations," published by Gale Research Co., available in most libraries.
- F. **Abbreviations and Names:** Trade association names and titles of general standards are frequently abbreviated. The following acronyms or abbreviations, as referenced in Contract Documents, are defined to mean the associated names. Names and addresses are subject to change and are believed, but not assured, to be accurate and up-to-date as of date of the Contract Documents.

AIHA	American Industrial Hygiene Association 475 Wolf Ledges Parkway Akron, OH 44311	216/762-7294
AIA	American Institute of Architects 1735 New York Ave. NW Washington, DC 20006	202/626-7474
ANSI	American National Standards Institute 11 West 42nd St., 13th Floor New York, NY 10036	(212) 642-4900
ASHRAE	American Society for Heating, Refrigerating, and Air Conditioning Engineers 1791 Tullie Circle NE Atlanta, GA 30329	404/636-8400
ASME	American Society of Mechanical Engineers	

	345 East 47th Street New York, NY 10017	212/705-7722
ASPE	American Society of Plumbing Engineers 3716 Thousand Oaks Boulevard, Suite 210 Westlake, CA 91362	805/495-7120
ASTM	American Society for Testing and Materials 1916 Race St. Philadelphia, PA 19103	215/299-5400
AWCI	Association of the Wall and Ceiling Industries-International 25 K Street, NW Washington, DC 20002	202/783-2924
CGA	Compressed Gas Association 1235 Jefferson Davis Highway Arlington, VA 22202	703/979-0900
CS	Commercial Standard of NBS (U.S. Dept. of Commerce) Government Printing Office Washington, DC 20402	202/377-2000
FS	Federal Specification (General Services Admin.) Obtain from your Regional GSA Office, or purchase from GSA Specifications Unit (WFSIS) 7th and D Streets, S.W. Washington, DC 20406	202/472-2205 or 2140
GA	Gypsum Association 1603 Orrington Ave. Evanston; IL 60201	312/491-1744
IESNA	Illuminating Engineering Society of North America 345 E. 47th St. New York, NY 10017	(212) 705-7926
NBS	National Bureau of Standards (U.S. Dept. of Commerce) Gaithersburg, MD 20234	301/921-1000
NEC	National Electrical Code (by NFPA)	
NFPA	National Fire Protection Assoc. One Batterymarch Park P.O. Box 9101 (800) 344-3555 Quincy, MA 02269-9101	(617) 770-3000
NRCA	National Roofing Contractors Association 6250 River Road	

	Rosemont, IL 60018	312/318-6722
PS	Product Standard of NBS (U.S. Dept. of Commerce) Government Printing Office Washington, DC 20402	202/783-3238
RFCI	Resilient Floor Coverings Institute 966 Hungerford Drive, Suite 12-B Rockville, MD 20805	301/340-8580
UL	Underwriters Laboratories 333 Pfingsten Rd. Northbrook, IL 60062	(708) 272-8800
G.	Federal Government Agencies: Names and titles of federal government standard- or Specification-producing agencies are often abbreviated. The following acronyms or abbreviations referenced in the Contract Documents indicate names of standard- or Specification-producing agencies of the federal government. Names and addresses are subject to change and are believed, but are not assured, to be accurate and up-to-date as of the date of the Contract Documents.	
	CFR Code of Federal Regulations (Available from the Government Printing Office) N. Capitol St. between G and H St. NW Washington, DC 20402 (202) 783-3238 (Material is usually first published in the "Federal Register")	
	CCR California Code of Regulations (Available from Barclays Law Publishers) 400 Oyster Point Blvd P.O. Box 3066 South San Francisco, CA 94080 (415) 244-6611	
CPSC	Consumer Product Safety Commission 5401 Westbard Ave. Bethesda, MD 20207	(800) 638-2772
DTSC	Department of Toxic Substances Council Region 4 245 W. Broadway, Suite 350 Long Beach, CA 90802	(310) 590-4868
	EPA Environmental Protection Agency 401 M St., SW Washington, DC 20460 (202) 382-2090	
HUD	Department of Housing and Urban Development Office of Lead-Based Paint Abatement and Poisoning Prevention Room B-133	

	451 7th St. SW, Washington, DC 20410	(202) 755-1805
MSHA	Mine Safety and Health Administration (U.S. Department of Commerce) 4015 Wilson Blvd Arlington, VA 22203	(703) 235-1565
NIOSH	National Institute of Occupational Safety and Health U.S. Dept. of Labor, Room N-3718 200 Constitution Ave, N.W. Washington, D.C. 20210	(800) 35-NIOSH
NIST	National Institute of Standards and Technology (U.S. Department of Commerce) Gaithersburg, MD 20899	(301) 975-2000
OSHA	Occupational Safety and Health Administration (U.S. Department of Labor) 200 Constitution Ave., NW Washington, DC 20210	(202) 219-6091

H. Federal Requirements: which govern asbestos abatement work or hauling and disposal of hazardous waste include but are not limited to the following:

1. OSHA: U.S. Department of Labor, Occupational Safety and Health Administration, (OSHA), including but not limited to:
 - 29 CFR 1910.134 - Respiratory Protection
 - 29 CFR 1926.20 - General safety and health provisions;
 - 29 CFR 1926.21 - Safety training and education;
 - 29 CFR 1926.23 - First Aid
 - 29 CFR 1926.24 - Fire Protection
 - 29 CFR 1926.25 - Housekeeping;
 - 29 CFR 1926.28 - Personal protective equipment;
 - 29 CFR 1926.51(f) - Washing facilities;
 - 29 CFR 1926.55 - Gases, vapors, fumes, dusts, and mists;
 - 29 CFR 1926.56 - Illumination
 - 29 CFR 1926.57 - Ventilation;
 - 29 CFR 1926.59 - Hazard Communication Standard;

- 29 CFR 1926.58 - Asbestos Construction Standard
- 29 CFR 1926.103 - Respiratory protection;
- 29 CFR 1926.353 - Ventilation: Welding, cutting or heating of metals of toxic significance.
- 29 CFR 1926.300, 301, 302 - Hand and power tools.
- 29 CFR 1926.451 - Scaffolding
- 29 CFR 1926.500, 502, 503 - Fall Protection
- 2. DOT: U. S. Department of Transportation, including but not limited to:
 - 49 CFR 171 through 179 - Hazardous Substances
- 3. EPA: U. S. Environmental Protection Agency (EPA), including but not limited to:
 - 40 CFR 260, 261, 262, 263 and 264 - Resource Conservation and Recovery Act (RCRA)
 - 40 CFR 763 - Asbestos Abatement Projects
- 4. California State Requirements: which govern asbestos abatement work or hauling and disposal of hazardous waste include but are not limited to the following:
 - 8 CCR 5144 - Respiratory Protection
 - 8 CCR 1509 - General safety and health provisions;
 - 8 CCR 1510 - Safety training and education;
 - 8 CCR 1512 - First Aid
 - 8 CCR 1513 - Housekeeping;
 - 8 CCR 1514 - Personal protective equipment;
 - 8 CCR 1527 - Washing facilities;
 - 8 CCR 1528 - Gases, vapors, fumes, dusts, and mists;
 - 8 CCR 1523 - Illumination
 - 8 CCR 1530 - Ventilation;
 - 8 CCR 5194 - Hazard Communication Standard;

- 8 CCR 1529 - Asbestos Construction Standard
- 8 CCR 1531 - Respiratory protection;
- 8 CCR 1530 - Ventilation: Welding, cutting or heating of metals of toxic significance.
- 8 CCR 1707 - Hand and power tools.
- 8 CCR 1637 - Scaffolding & Fall Protection
- 8 CCR 5156, 5157 and 5158 - Confined Spaces
- 22 CCR Div 4.5 - Management of Hazardous Waste
- Health & Safety Code, Div 20, Chapter 6.5 - Hazardous Waste Control Law

- I. Local Requirements: Abide by all local requirements which govern asbestos abatement work or hauling and disposal of hazardous waste materials.
- J. Building Codes: Comply with applicable provision of state and/or local building and construction codes that govern any part of the work.
- K. Model Codes: In the absence of an applicable adopted state or local building code which governs work involved in the asbestos abatement project, comply with the applicable provisions of the BOCA National Codes/1993 published by International Conference for Building Officials or the SBCCI Standard Codes published by Southern Building Code Congress International.

1.4 SUBMITTALS

- A. ABATEMENT CONTRACTOR shall submit complete copies of all asbestos submittals in accordance with this section. Submittals shall be bound and organized by tabs labeled with matching paragraph numbers listed in 1.4.
- B. No work shall begin until a complete set of submittals listed below are returned with the PROJECT MONITOR's stamp indicating that the submittals have been accepted. Acceptance by the PROJECT MONITOR shall not be construed to imply approval of any particular method or sequence for addressing health, safety, and environmental concerns or to relieve ABATEMENT CONTRACTOR of the responsibility to adequately protect the environment as well as the health and safety of all workers involved in this project, all OWNER's employees, agents and other contractors in adjacent areas. ABATEMENT CONTRACTOR is solely responsible for all Work performed.
- C. Prior to commencement of work, examine areas in which work will be performed with the PROJECT MONITOR. Prepare a listing of damage to structure, surfaces, equipment or of surrounding properties which could be

misconstrued as damage resulting from the work. Photograph or videotape existing conditions as necessary to document conditions. Submit to PROJECT MONITOR prior to starting work.

D. Prior to the start of work, submit all the following to the PROJECT MONITOR:

1. Asbestos Abatement Work Plan: In addition to information required in this section, Work Plan shall contain all information required under 8 CCR 1529. Submit a detailed job-specific plan that includes:
 - a. The procedures proposed for use in complying with the requirements of this specification and all applicable regulations.
 - b. Detailed drawings that identify the location, size, layout and details of the Work Areas, any equipment, disposal storage, restrooms, and worker decontamination facilities.
 - c. The sequencing of abatement work and the interface of trades involved in the performance of work. Provide a time line that details each major phase of work activity and anticipated time it will occur.
 - d. The methods to be used to assure the safety of adjoining floors and visitors to the site.
 - e. Detailed description of the methods to be employed to ensure asbestos is not released above pre-background air levels.
 - f. The method of removal to reduce asbestos dust generation in the Work Area.
2. Work site coordination submittals including:
 - a. Contingency and Spill Plan: Prepare a contingency plan for emergencies including fire, accident, power failure, or any other event that may require modification or abridgement of decontamination or Work Area isolation procedures. Include in plan specific procedures for decontamination or Work Area isolation. Plan should be specific for all types of hazardous materials or situations specific to this work site. Note that nothing in this specification should impede safe exiting or providing of adequate medical attention in the event of an emergency.
 - b. Telephone numbers and locations of emergency services including but not limited to fire, ambulance, doctor, hospital, police, power company, telephone company.
 - c. Notifications:
 - 1) Notify emergency service agencies including fire, ambulance, police or other agency that may service the abatement work site in case of an emergency. Notification is to include methods of entering Work Area, emergency entry and exit locations, modifications to fire notification or fire-fighting equipment, and other

information needed by agencies providing emergency services.

- 2) Notifications of Emergency: Any individual at the job site may notify emergency service agencies if necessary without effect on this contract or the Contract Sum.
- 3) Provide submittal identifying person responsible for responding to project site emergencies twenty-four hours a day, seven days a week.

3. ABATEMENT CONTRACTOR qualifications and personnel information submittals that include but are not limited to:

- a. Provide all staff names, certifications, and experience. Identify their duties and responsibilities on this project. ABATEMENT CONTRACTOR shall have the following minimum levels of qualified supervision on the project site:
 - 1) General Superintendent: Provide a full-time General Superintendent who is experienced in administration and supervision of asbestos abatement projects including work practices, protective measures for building and personnel, disposal procedures, etc. This person is the ABATEMENT CONTRACTOR's representative responsible for compliance with all applicable federal, state and local regulations and guidelines, particularly those relating to asbestos abatement and hazardous waste. Should, in the opinion of the OWNER, any language barrier existing between the on-site superintendent and the OWNER or PROJECT MONITOR, the ABATEMENT CONTRACTOR shall employ a qualified full-time interpreter or provide a new on-site superintendent at no additional cost to the OWNER. Shall be AHERA certified as asbestos supervisor.
 - 2) Foreman: Provide a Foreman to directly supervise and direct no more than 10 abatement workers. Each Foreman will act as the Competent Person as required by 8 CCR 1529 for the workers the foreman is directing. The Foreman has oversight authority over the workers and reports to the General Superintendent. If there are 10 or fewer abatement workers on the project the General Superintendent may fill the Foreman's position. Shall be AHERA certified as asbestos supervisor.
 - 3) Experience and Training: The General Superintendent and foreman shall meet all the requirements as a Competent Person as required by OSHA 8 CCR 1529. They shall have completed training in EPA Asbestos Supervisor Training. They shall have experience with projects of similar type and size.
 - 4) Workers: All asbestos abatement workers shall have current EPA asbestos abatement training.

- 5) Certificate of Worker's Acknowledgment: Submit an original signed copy of the Certificate of Worker's Acknowledgment found in Appendix B, for each worker and supervisor who is to be at the job site or enter the Work Area.
4. Provide submittals related to respiratory protection as follows:
 - a. Copy of ABATEMENT CONTRACTOR's respiratory protection program.
 - b. Submit level of respiratory protection intended for each operation required by the project. This should include a narrative specific to what criteria was used to select the respirators to be used on this project, including historical data. Historical data should consist of the following:
 - 1) Date of measurements
 - 2) Operation monitored
 - 3) Sampling and analytical methods used and evidence of their accuracy
 - 4) Number, duration, and results of samples taken
 - 5) Workers name, social security number and job classification
 - 6) Type of respirator worn by workers
 - 7) Type of material including laboratory results identifying the asbestos concentration.
 - 8) Control Methods
 - 9) Work Practices
 - 10) Training and experience level of workers and supervisors
 - a. Copies of each worker's medical okay to wear a respirator
 - b. Copies of each worker's current fit test for each type of respirator used on this project.
 5. Medical submittals include but are not limited to the following:
 - a. Provide full medical examinations for all workers performing asbestos abatement and at first use of negative pressure respirators.
 - b. Medical evaluation to include:
 - 1) A detailed work and medical history.
 - 2) A thorough physical examination.
 - 3) Evaluation of pulmonary status.
 - 4) A blood pressure measurement.
 - 5) Any other laboratory or other test which is recommended

by the examining physician.

- c. The medical evaluation must be provided prior to the start of the asbestos project and/or assignment requiring the use of negative pressure respirators.
6. Hazardous waste management submittals shall include but not be limited to the following:
- a. Identification of hazardous wastes as associated with the scope of work and that will be generated by the means and methods used by ABATEMENT CONTRACTOR.
 - b. Provide estimates for the quantities of waste to be generated and disposed of. Include a description of what type of container will be used for each type of waste.
 - c. Name, address, phone number, company representative name, EPA Generator Identification number, insurance certificate for minimum \$1,000,000 pollution liability, and certifications/licenses/permits, for each company that will be managing the transportation, treatment, storage and/or disposal of the waste generated from this project.
 - d. Provide name, address, phone number, company representative name, and all related State Hazardous waste accreditation paperwork for all laboratories that will be used in performing waste characterization.
 - e. Identify the disposal method which shall be utilized for each type of waste generated. Specific disposal methods for some wastes are required and noted in this specification. The City's preference is in the following order:
 - 1) Recycle
 - 2) Incinerate
 - 3) Landfill
 - f. Prior to Transporting Waste Off Site (allow a 72-hour review period):
 - 1) Submit to the PROJECT MONITOR a draft hazardous waste manifest which will be used to ship each hazardous waste from the site to the disposal location.
 - 2) Submit a copy of the waste profile, as approved by the TSDf for each hazardous waste.
 - 3) The PROJECT MONITOR will return a draft hazardous waste manifest and waste profile with required changes (if needed) to the ABATEMENT CONTRACTOR within three working days of receipt.
 - 4) Inadequate or incorrect hazardous waste manifests or waste profiles will be returned to the ABATEMENT CONTRACTOR as often as necessary for the revision until

the documents are approved by PROJECT MONITOR. A date for pickup and transportation of hazardous waste off-site shall not be scheduled until hazardous waste documents have been approved by PROJECT MONITOR.

- a. The Day the Waste is Transported Off Site:
 - 1) The PROJECT MONITOR is the only authorized person to sign manifest as OWNER representative unless an additional person has been designated by the PROJECT MONITOR.
 - 2) Any changes to the manifest after it has been approved must be cleared through the PROJECT MONITOR.
 - 3) Two copies of the original manifest shall be provided to PROJECT MONITOR prior to the transporter leaving the site.

7. ABATEMENT CONTRACTOR shall provide copies of notification given to all rental equipment companies that will be supplying this project that their equipment will be used on an asbestos abatement project.

8. Provide complete product information and intended use for all equipment that will be used in the performance of work on this project. Including but not limited to the following:
 - a. All equipment that will be used to perform abatement work. Include description of removal methods to be used for each substrate condition including manufacturers' operating instructions and recommendations for equipment usage.
 - b. Scaffolding: submit list of rolling and fixed scaffolding intended for use on the project. Submit sufficient detail to indicate compliance with applicable worker safety regulations or other requirements. Scaffolding over twenty feet shall be signed off by professional engineer. OSHA scaffold permit shall be submitted if required.
 - c. Hot water heater: Submit manufacturers name, model number, size in gallons, heating capacity, power requirements.
 - d. Decontamination Unit Sub-panel: Submit product data.
 - e. Ground Fault Circuit Interrupters (GFCI): Submit product data.
 - f. Lamps and Light Fixtures: Submit product data.
 - g. Self-Contained Toilet Units: Provide product data and name of sub-contractor used for servicing self-contained toilets. Submit method to be used for servicing.
 - h. First Aid Supplies: Provide list of contents of first aid kit. Submit in form of check list.
 - i. Fire Extinguishers: Provide product data. Submit schedule indicating location at job site.

9. Provide complete product information and manufactures instructions on all equipment used as engineering pollution controls including but not limited to negative air machines and HEPA vacuums. Include maintenance records for all equipment that uses any type of filtration device that clearly shows filter changes and number of hours on current filters. All machinery and filters shall be clean prior to bringing to work site. PROJECT MONITOR shall inspect all equipment brought to site prior to its operation.
 - a. Submit design of pressure differential system to the PROJECT MONITOR for review. Do not begin work until submittal is returned with the PROJECT MONITOR's action stamp indicating that the submittal is returned for unrestricted use. Include in the submittal at a minimum:
 - 1) Number of HEPA filtered fan units required and the calculations necessary to determine the number of machines
 - 2) Description of projected air flow within Work Area and methods required to provide adequate air flow in all portions of the work area
 - 3) Anticipated pressure differential across Work Area enclosures
 - 4) Description of methods of testing for correct air flow and pressure differentials
 - 5) Manufacturer's product data on the HEPA filtered fan units to be used
 - 6) Location of the machines in the Work Area
 - 7) Method of supplying adequate power to the machines and designation of electrical panel(s) which will be supplying the power
 - 8) Description of work practices to ensure that airborne dust travels away from workers
 - 9) Manufacturer's product data on equipment used to monitor pressure differential between inside and outside of Work Area
 - 10) Manufacturer's product data on auxiliary generator to be used
 - 11) Manufacturer's product data on auxiliary power switch to be used
 - 12) Schematic diagram of power and auxiliary power supply to HEPA filtered fan units
10. On a weekly basis: Submit printout from pressure differential monitoring equipment. Mark printout with date and start of time for each day. Use printout paper that indicates elapsed time in intervals no greater than hours. Indicate on each day's record times

of starting and stopping abatement work, type of work in progress, breaks for lunch or other purposes, periods of stop work, and filter changes. If printout paper type is a strip, cut into segments by day, attach to 8 1/2" by 11" paper. Label with project name, ABATEMENT CONTRACTOR's name and date.

11. Provide copies of all MSDS, manufactures instructions for use, and how ABATEMENT CONTRACTOR will use, for all products used on this project.
12. Daily Construction reports: Prepare a daily construction report, recording the following information concerning events at the site and provide one copy of this log to PROJECT MONITOR on a daily basis:
 - a. Meetings; purpose, attendees, brief discussion and significant decisions.
 - b. Visitations; authorized and unauthorized
 - c. Log of those entering and leaving Work Area including personnel, by name.
 - d. Accidents
 - e. Special or unusual events, i.e. Barrier breaching, Equipment failures, accidents
 - f. Documentation of ABATEMENT CONTRACTOR's completion of the following:
 - 1) Inspection of Work Area preparation prior to start of removal and daily thereafter.
 - 2) Removal of any sheet plastic barriers
 - 3) ABATEMENT CONTRACTOR's inspections prior to encapsulating, enclosure or any other operation that will conceal the condition of the substrate from which such materials have been removed.
 - 4) Removal of waste materials from Work Area
 - 5) Decontamination of equipment (list items)
 - g. List of subcontractors at the site.
 - h. Approximate count of personnel at the site.
 - i. High and low temperatures, general weather conditions.
 - j. Stoppages, delays, shortages, losses.
 - k. Meter readings and similar recordings.
 - l. Emergency procedures.
 - m. Orders and requests of governing authorities.
 - n. Change Orders received, implemented.
 - o. Services connected, disconnected.

- p. Equipment or system tests and start-ups.
 - q. Partial Completions.
 - r. Substantial Completions authorized.
 - s. ABATEMENT CONTRACTOR's final inspection.
 - t. Log of waste as accumulated - shall include:
 - 1) Date
 - 2) Barrel/container number (ABATEMENT CONTRACTOR shall use permanent barrel or container marking system).
 - 3) Waste description
 - 4) Accumulation start date
13. Except as otherwise indicated, submit special reports directly to the PROJECT MONITOR within one day of occurrence requiring special report and to others affected by occurrence.
14. Reporting Unusual Events: When an event of unusual and significant nature occurs at site, within 24 hours prepare and submit a written special report to the PROJECT MONITOR listing chain of events, persons participating, response by ABATEMENT CONTRACTOR's personnel, evaluation of results or effects, and similar pertinent information. When such events are known or predictable in advance, advise the City in advance at earliest possible date.
15. Reporting Accidents: Prepare and submit written reports of significant accidents, at site and anywhere else work is in progress. Reports must be submitted to the PROJECT MONITOR within 24 hours after the accident occurs. Record and document data and actions; comply with industry standards. For this purpose, a significant accident is defined to include events where personal injury is sustained, or property loss of substance is sustained, where the event posed a significant threat of loss or personal injury, or where an OSHA 200 Log is required. A copy of an OSHA 200 Log may be submitted for this purpose.
16. Report Discovered Conditions: When an unusual condition is discovered during the work (e.g. leaks, corrosion) prepare and submit a written special report to the PROJECT MONITOR indicating condition discovered.
- E. Submit the following at the conclusion of the project:
- 1. Provide a bound closeout package that includes all information generated from this project.

1.5 AIR MONITORING, STOP WORK LEVELS, & CLEARANCE SAMPLING

- A. Not in Contract Sum: This Section describes work being performed by the City's PROJECT MONITOR. This work is not in the Contract Sum except for OSHA personnel compliance sampling that is the responsibility of the ABATEMENT CONTRACTOR.
- B. The PROJECT MONITOR will use air monitoring to verify that the area beyond the Work Area and outside environment remain uncontaminated. This Section also sets forth baseline levels that the ABATEMENT CONTRACTOR must comply with and describes the action required if the levels are exceeded. This section also identifies the clearance sampling levels.
- C. Corrective Work triggered by this Section is part of the contract sum and is to be performed by the ABATEMENT CONTRACTOR at no additional cost to the City.
- D. Establish baseline asbestos concentration:
 - 1. Before start of work the City will secure air samples to establish a baseline level.
 - 2. ABATEMENT CONTRACTOR is encouraged to take their own baseline samples.
- E. Personnel monitoring: The PROJECT MONITOR will not be performing air monitoring to meet ABATEMENT CONTRACTOR's OSHA requirements for personnel sampling. ABATEMENT CONTRACTOR shall provide sample results to the PROJECT MONITOR. Personnel samples shall be provided on a same day turn around basis for the first three days of work. Same day turn around shall be provided if the work activity changes and no personnel air monitoring has been performed for the same activity on this project. OSHA exposure monitoring shall be performed daily during abatement on personnel with the highest potential exposure. All other results shall be submitted to the PROJECT MONITOR within 24 hours of when sample was taken.
- F. Work Area Isolation: The purpose of the City's air monitoring is to detect faults in the work area isolation such as:
 - 1. Contamination of the building outside of the work area with airborne asbestos fibers.
 - 2. Failure of filtration or rupture in the differential pressure system.
 - 3. Contamination of air outside the building envelop with airborne asbestos fibers.
 - 4. Should any of the above occur immediately cease asbestos abatement activities until the fault is corrected. Do not recommence work until authorized by the City's PROJECT MONITOR.
- G. Work Area Airborne Fiber Count: The City's PROJECT MONITOR may monitor airborne fiber counts in the Work Area. The purpose of this air

monitoring will be to detect airborne asbestos concentrations which may challenge the ability of the Work Area isolation procedures to protect the balance of the building or outside of the building from contamination by airborne fibers.

H. Stop action levels

1. Inside Work Area

- a. Maintain an average airborne count in the Work Area of less than 0.5 fibers per cubic centimeter. If the fiber counts rise above this figure for any sample taken, revise work procedures to lower fiber counts.
- b. If the Time Weighted Average (TWA) fiber count for any work shift or 8-hour period exceeds 0.5 fibers per cubic centimeter, stop all work, leave Pressure Differential System in operation and notify City's PROJECT MONITOR. After correcting cause of high fiber levels, do not recommence work for 24 hours unless otherwise authorized, in writing, by City's PROJECT MONITOR.
- c. If airborne fiber counts exceed 1.0 fibers per cubic centimeter for any period of time, cease all work except corrective action until fiber counts fall below 0.5 fibers per cubic centimeter and notify City's PROJECT MONITOR. After correcting cause of high fiber levels, do not recommence work for 24 hours unless otherwise authorized, in writing, by City's PROJECT MONITOR.

2. Outside Work Area

- a. If any air sample taken outside of the Work Area exceeds the base line, immediately and automatically stop all work except corrective action. The ABATEMENT CONTRACTOR and PROJECT MONITOR will determine the source of the high reading.
- b. If the high reading was the result of a failure of Work Area isolation measures initiate the following actions:
 - 1) Immediately erect new critical barriers as set forth in this specification to isolate the affected area from the balance of the building. Erect Critical Barriers at the next existing structural isolation of the involved space (e.g. wall, ceiling, floor).
 - 2) Decontaminate the affected area in accordance with this specification.
 - 3) Require that respiratory protection as set forth in this specification be worn in affected area until area is cleared for re-occupancy in accordance with this section.
 - 4) Leave Critical Barriers in place until completion of work and insure that the operation of the pressure differential system in the Work Area results in a flow of air from the balance of the building into the affected area.
 - 5) If the exit from the clean room of the personnel

decontamination unit enters the affected area, establish a decontamination facility consisting of a Shower Room and Changing Room as set forth in this specification at entry point to affected area.

- 6) After Certification of Visual Inspection in the Work Area has been signed, final clearance will be taken within the entire area as set forth in this specification.
 - a. If the high reading was the result of other causes initiate corrective action as determined by the City's PROJECT MONITOR.
 - b. Complete corrective work with no change in the Contract Sum if high airborne fiber counts were caused by ABATEMENT CONTRACTOR's activities. The Contract Sum and schedule will be adjusted for additional work caused by high airborne fiber counts beyond the ABATEMENT CONTRACTOR's control.

I. Fibers Counted

1. The following procedure will be used to resolve any disputes regarding fiber types when a project has been stopped due to excessive airborne fiber counts.
 - a. Large Fibers: "Airborne Fibers" referred to above include all fibers regardless of composition as counted by phase contrast microscopy (PCM), unless additional analysis by transmission or scanning electron microscopy demonstrates to the satisfaction of the City's PROJECT MONITOR that non-asbestos fibers are being counted. "Airborne Fibers" counted in samples analyzed by scanning or transmission electron microscopy shall be asbestos fibers, greater than 5 microns in length and greater than 0.25 microns in diameter. For purposes of stop action levels, subsequent to analysis by electron microscopy, the number of "Airborne Fibers" shall be determined by multiplying the number of fibers, regardless of composition, counted by PCM by a number equal to asbestos fibers counted divided by all fibers counted in the electron microscopy analysis.
 - b. Small Structures: "Airborne Fibers" referred to above include asbestos structures (fibers, bundles, clusters or matrices) of any diameter and any length greater than 0.5 microns.

J. Analytical methods

1. The following methods will be used by the City's PROJECT MONITOR in analyzing filters used to collect air samples. Sampling rates may be varied from printed standards to allow for high volume sampling.
2. Phase Contrast Microscopy (PCM) will be performed using the NIOSH 7400 method using the "A" counting rules.

3. Transmission Electron Microscopy will be performed using the analysis method set forth in the AHERA regulation 40 CFR Part 763 Appendix A.

K. Sampling methodology

1. Samples will be collected on 25 mm cassettes as follows:
 - a. PCM: 0.8 micrometer mixed cellulose ester.
 - b. TEM: 0.45 micrometer mixed cellulose ester.
2. Sample volumes collected will vary depending upon the analytical method used.

L. Clearance Sampling:

1. Clearance sampling will not begin until the visual inspection described in Section 1.6 has been completed and certified by the PROJECT MONITOR.
2. Clearance criteria:
 - a. Decontamination is complete when every sample is at or below the following levels. If clearance levels are not satisfactory, the decontamination is incomplete and recleaning per Section 1.6. Project Decontamination is required at no additional cost to the City. Additional clearance testing required because of non-satisfactory clearance levels shall be charged to the ABATEMENT CONTRACTOR.
 - 1) All clearance sampling: Acceptable levels are 0.01 fibers/cc by TEM. The laboratory under contract with City for TEM analysis should be able to provide results by the next day, late afternoon, but is not guaranteed.

1.6 PROJECT DECONTAMINATION

- A. Work of This Section includes the decontamination of air in the Work Area which has been, or may have been, contaminated by the elevated airborne asbestos fiber levels generated during abatement activities, or which may previously have had elevated fiber levels due to friable asbestos-containing materials in the space.
- B. Work of This Section includes the cleaning, decontamination, and removal of temporary facilities installed prior to abatement work, including:
 1. Secondary, Primary and Critical Barriers erected by work of Section 1.1 and 3.1
 2. Decontamination Unit erected by work of Section 1.8
 3. Pressure Differential System installed by work of Section 3.2.

- C. For decontamination and clearance for asbestos roofing material abatement:
- D. Release of the ABATEMENT CONTRACTOR from the asbestos-containing material removal phase of the contract will be accomplished by a visual inspection by the PROJECT MONITOR.
- E. Decontamination of full containments used to remove asbestos.
 - 1. Previous Work: During completion of the asbestos abatement work specified in other sections, any gross debris generated by the asbestos abatement work will have been removed from area.
 - 2. Start of Work: Work of this section begins with the cleaning of all secondary containment barriers. At start of work the following will be in place:
 - a. Primary Barrier: The first layer of plastic sheeting on the floor and walls.
 - b. Secondary Barrier: The first layer of plastic sheeting on the floor and walls.
 - c. Critical Barrier: An airtight barrier between the Work Area and other portions of the building or the outside. This includes plastic sheeting placed over lighting fixtures, clocks, ventilation openings, doorways, convectors, speakers and other openings.
 - d. Decontamination Units: For personnel and equipment in operating condition.
 - e. Pressure Differential System: In operation.
 - 3. First cleaning
 - a. First Cleaning: Carry out a first cleaning of all surfaces of the secondary containment including items of remaining sheeting, tools, ladders, scaffolding and/or staging by use of damp-cleaning and mopping, and/or a High Efficiency Particulate Air (HEPA) filtered vacuum. (Note: A HEPA vacuum may fail if used with wet material.) Do not perform dry dusting or dry sweeping. Use each surface of a cleaning cloth one time only and then dispose of as contaminated waste. Continue this cleaning until there is no visible debris from removed materials or residue on plastic sheeting or other surfaces.
 - b. Remove all pre-filters in negative air machines and dispose of as asbestos-containing waste in accordance with requirements of Section 3.3.
 - c. A complete visual inspection of the entire Work Area will be performed by Owner's PROJECT MONITOR including: ceiling, walls, floor, plastic sheeting, seals over ventilation openings, doorways, windows, and other openings. After passing visual inspection, the secondary containment can be removed.
 - d. Temporary lighting: Provide a minimum of 100-foot candles of

lighting on all surfaces in the areas to be subjected to visual inspection. Provide hand-held lights providing 150-foot candles at 4 feet capable of reaching all locations in work area.

- e. Lifts: Provide ladders, scaffolding, and lifts as required to provide access to all surfaces in the area to be subjected to visual inspection. Access is to allow touching of all surfaces.
- f. Repeat steps a-e above for each work area.

4. Final Cleaning

- a. Following removal of all secondary barriers, a visual inspection for any asbestos debris behind the secondary containment will be performed by the ABATEMENT CONTRACTOR and the PROJECT MONITOR. Any debris found must be cleaned up in a safe manner using HEPA vacuums and wet methods.
- b. After passing visual inspection, ABATEMENT CONTRACTOR shall perform encapsulation of all primary barrier substrate.

5. Wait approximately 12 - 24 hours after encapsulation to allow HEPA filtered fan units to clean air of airborne asbestos fibers. Use oscillating fans as necessary to assure circulation of air in all parts of work area.

6. After the encapsulant has been allowed to dry, air samples will be taken and analyzed in accordance with the procedure for Phase Contrast Microscopy and Transmission Electron Microscopy as set forth in Section 1.5.

- a. If release criteria are not met, repeat final cleaning and continue decontamination procedure from that point.
- b. If release criteria are met, remove remaining plastic, equipment, and engineering controls in accordance with this specification.

F. Removal of work area isolation

1. After all requirements of Section 1.5 have been met:

- a. Remove the Pressure Differential System. Seal HEPA filtered fan units, HEPA vacuums and similar equipment with 6 mil plastic sheet and duct tape to form a tight seal at intake end before being moved from Work Area.
- b. Remove Personnel Decontamination Unit.
- c. Remove the Critical Barriers separating the Work Area from the rest of the building. Remove any small quantities of residual material found upon removal of the plastic sheeting with wet wiping, HEPA filtered vacuum cleaners and local area protection. If significant quantities, as determined by the Owner's PROJECT MONITOR, are found then the entire area affected shall be decontaminated as specified in Section 1.6.

- d. Remove all equipment, materials, debris from the work site.
- e. Dispose of all asbestos-containing waste material as specified in Section 3.3

G. Substantial completion of abatement work:

1. Abatement Work is Substantially Complete upon meeting the requirements of this Section, and Section 1.5, including submission of:
 - a. Certificate of Visual Inspection found in Appendix C. This certification is to be completed by the ABATEMENT CONTRACTOR and submitted to the PROJECT MONITOR when ready for visual inspection. PROJECT MONITOR will then perform visual inspection with ABATEMENT CONTRACTOR's representative that completed "Certificate of Visual Inspection" and when visual criteria are met, PROJECT MONITOR will sign the form.
 2. Receipts Documenting proper disposal as required by Section 3.3 Disposal of Hazardous Waste.
 3. Punch list detailing repairs to be made and incomplete items.

1.7 CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS:

A. General: Provide temporary connection to existing utilities or provide temporary facilities as required herein or as necessary to carry out the work. Use qualified tradesmen for installation of temporary services and facilities. Locate temporary services and facilities where they will serve the entire project adequately and result in minimum interference with the performance of the Work.

1. Require that tradesmen accomplishing this work be licensed as required by local authority for the work performed.

B. Water Service

1. Temporary Water Service Connection: All connections to the City's water system shall be done at the ABATEMENT CONTRACTOR's expense using a temporary construction meter and shall include backflow protection. Valves shall be temperature and pressure rated for operation of the temperatures and pressures encountered. After completion of use, connections and fittings shall be removed without damage or alteration to existing water piping and equipment. Leaking or dripping valves shall be piped to the nearest drain or located over an existing sink or grade where water will not damage existing finishes or equipment.
2. Water Hoses: Employ heavy-duty abrasion-resistant hoses with a pressure rating greater than the maximum pressure of the water

distribution system to provide water into each Work Area and to each Decontamination Unit. Provide fittings as required to allow for connection to existing wall hydrants or spouts, as well as temporary water heating equipment, branch piping, showers, shut-off nozzles and equipment.

3. **Water Heater:** Provide UL rated 40 gallon electric water heater to supply hot water for the Decontamination Unit shower. Activate from 30 amp circuit breaker located within the Decontamination Unit subpanel. Provide with relief valve compatible with water heater operation; pipe relief valve down to drip pan on floor with type L copper. Drip pans shall consist of a 12" X 12" X 6" (30 cm x 30 cm x 15 cm) deep pan, made of 19 gauge galvanized steel, with handles. A 3-quart (3 L) kitchen saucepan may be substituted for this purpose. Drip pan shall be securely fastened to the water heater with bailing wire or similar material. Wiring of the water heater shall be in compliance with NEMA, NECA, and UL standards.
4. **General:** Water connection (without charge) to City's existing potable water system is limited to one 3/4" pipe-size connection, and a maximum flow of 10 g.p.m. each to hot and cold water supply. Install using vacuum breakers or other backflow preventer as required by the City.
5. **Maintain hose connections and outlet valves in leak-proof condition.** Where finish work below an outlet might be damaged by spillage or leakage, provide a drip pan of suitable size to minimize the possibility of water damage. Drain water promptly from pans as it accumulates.

C. **Electrical service & equipment:**

1. **General:** Comply with applicable NEMA, NECA and UL standards and governing regulations for materials and layout of temporary electric service. Provide equipment which is compatible with existing electrical characteristics and available power. If existing power is either incompatible or inadequate for performance of the Work, provide auxiliary generators(s) located outside of the work area.
2. **Temporary Power:** Provide service to Decontamination Unit subpanel with minimum 60 amp, 2 pole circuit breaker or fused disconnect connected to the main distribution panel. Subpanel and disconnect shall be sized and equipped to accommodate all electrical equipment required for completion of the work.
3. **Voltage Differences:** Provide identification warning signs at power outlets which are other than 110-120 volt power. Provide polarized outlets for plug-in type outlets, to prevent insertion of 110-120 volt plugs into higher voltage outlets. Dry type transformers shall be provided where required to provide voltages necessary for work

operations.

4. **Ground Fault Protection:** Equip all circuits for any purpose entering Work Area with ground fault circuit interrupters (GFCI). Locate GFCI's exterior to Work Area so that all circuits are protected prior to entry to Work Area. Provide circuit breaker type ground fault circuit interrupters (GFCI) equipped with test button and reset switch for all circuits to be used for any purpose in Work Area, decontamination units, exterior, or as otherwise required by national electrical code, OSHA or other authority. Locate in panel exterior to Work Area.
5. **Electrical Power Cords:** Use only grounded extension cords; use "hard-service" cords where exposed to abrasion and traffic. Use single lengths or use waterproof connectors to connect separate lengths of electric cords, if single lengths will not reach areas of work.
6. **Lamps and Light Fixtures:** Provide sealed quartz halogen construction lights, general service incandescent lamps or fluorescent lamps of wattage indicated or required for adequate illumination as required by the work or this Section. Protect lamps with guard cages where fixtures are exposed to breakage by construction operations. Provide lighting with a secure base to ensure that they will not be knocked over. Keep lights away from combustible materials.
7. **Circuit Protection:** Protect each tool or extension cord with a ground fault circuit interrupter (GFCI) of proper size. GFCI can be type that plugs into existing duplex outlets. Insure that outlet is properly grounded before installation of GFCI.
8. **General:** Provide a weatherproof, grounded temporary electric power service and distribution system of sufficient size, capacity, and power characteristics to accommodate performance of work during the construction period. Install temporary lighting adequate to provide sufficient illumination for safe work and traffic conditions in every area of work.
9. **Lockout:** Lockout all existing power to or through the Work Area as described below. Unless specifically noted otherwise existing power and lighting circuits to the Work Area are not to be used. All power and lighting to the Work Area is to be provided from temporary electrical panel described below.
 - a. Lockout power to Work Area by switching off all breakers serving power or lighting circuits in Work Area. Label breakers with tape over breaker with notation "DANGER circuit being worked on". Lock panel and have all keys under control of ABATEMENT CONTRACTOR's superintendent or PROJECT MONITOR.

- b. Lockout power to circuits running through Work Area wherever possible by switching off all breakers serving these circuits. Label breakers with tape over breaker with notation "DANGER circuit being worked on". Sign and date danger tag. Lock panel and supply keys to ABATEMENT CONTRACTOR, City and PROJECT MONITOR. If circuits cannot be shut down for any reason, label at 4'-0" on center with tags reading, "DANGER live electric circuit. Electrocutation hazard."
10. Power Distribution System: Provide circuits of adequate size and proper characteristics for each use. In general run wiring overhead, and rise vertically where wiring will be least exposed to damage from construction operations.
11. Circuit Protection: Protect each circuit with a ground fault circuit interrupter (GFCI) of proper size located in the temporary panel. Do not use outlet type GFCI devices.
12. Temporary Wiring: in the Work Area shall be type UF non-metallic sheathed cable located overhead and exposed for surveillance. Do not wire temporary lighting with plain, exposed (insulated) electrical conductors. Provide liquid tight enclosures or boxes for wiring devices.
13. Number of Branch Circuits: Provide sufficient branch circuits as required by the work. All branch circuits are to originate at temporary electrical panel. At minimum provide the following:
14. For power tools and task lighting, provide one temporary 4-gang outlet in the following locations. Provide a separate 110-120 Volt, 20 Amp circuit for each 4-gang outlet (4 outlets per circuit). One outlet in the Work Area for each 2500 square feet of Work Area
 - a. One outlet at each decontamination unit, located in equipment room.
15. 110-120 volt 20 amp branch circuits with 4-gang outlet for City's exclusive use while conducting air sampling during the work as follows:
 - a. One in each Work Area
 - b. One at clean side of each Decontamination Unit.
16. Temporary lighting - regulated areas: Provide sufficient temporary lighting to ensure proper workmanship everywhere; by combined use of daylight, general lighting, and portable plug-in task lighting. Circuit Protection: Protect each light with a ground fault circuit interrupter (GFCI) of proper size. GFCI can be type that plugs into existing duplex outlets. Insure that outlet is properly grounded before installation of GFCI.
17. ABATEMENT CONTRACTOR shall provide power and sufficient

power chords for all monitoring and sampling requirements of the City's PROJECT MONITOR.

D. Fire extinguishers:

1. Provide type "ABC" dry chemical extinguishers, or a combination of several extinguishers of NFPA recommended types for the exposures in each case. Comply with the applicable recommendations of NFPA Standard 10 "Standard for Portable Fire Extinguishers". Locate the appropriate class of fire extinguishers where they are most convenient and effective for their intended purpose.

E. Storage facilities:

1. Storage: On-site lay-down areas will be provided in the parking lot on the north side of the building.

1.8 WORKER PROTECTION

A. Provide worker protection as required by the most stringent OSHA and/or EPA standards applicable to the work. The following procedures are minimums to be adhered to regardless of asbestos concentration in the Work Area.

B. Competent person: Provide on-site, full time competent person (or persons) to ensure that the worker protection program is effective. Competent person shall be certified as a Asbestos Supervisor under the AHERA guidelines.

C. All workers are to be accredited as Abatement Workers as required by the AHERA regulation 40 CFR 763 Appendix C to Subpart E, April 30, 1987.

D. State and Local License: All workers are to be trained, certified and accredited as required by state or local code or regulation.

E. Exposure assessment:

1. Prior to the completion of an exposure assessment of the tasks being conducted, the employer should follow the regulations as if the employee was exposed above the PEL. The employee(s) must be notified in writing within 5 days of receipt of the results representing their exposure. Where exposure is above the PEL, employees must be informed of this fact and advised of corrective action to be taken. Monitoring and analysis must have an accuracy (to a confidence level of 95%) of not less than plus or minus 25% for airborne asbestos levels equal to or greater than 0.1 fibers/cc.
2. Personal protective equipment for all asbestos related work is to include protective work clothing and equipment, change areas, washing facilities, and training. The only difference in protective equipment for the different types of tasks is respiratory protection which is to be provided in accordance with Section 1.9.

F. Decontamination facilities:

1. Provide a Personnel Decontamination Unit consisting of a serial arrangement of connected rooms or spaces, Changing Room, Drying Room, Shower Room, Equipment Room. Require all persons without exception to pass through this Decontamination Unit for entry into and exiting from the Work Area for any purpose. Do not allow parallel routes for entry or exit. Do not remove equipment or materials through Personnel Decontamination Unit. Provide temporary lighting within Decontamination Units as necessary to reach a lighting level of 100 foot candle power.
2. Changing Room (clean room): Provide a room that is physically and visually separated from the rest of the building for the purpose of changing into protective clothing.
 - a. Construct using plastic sheeting, at least 6-mil in thickness, to provide an airtight seal between the Changing Room and the rest of the building.
 - b. Locate so that access to Work Area from Changing Room is through Shower Room.
 - c. Separate Changing Room from the building by a sheet plastic flapped doorway.
 - d. Require workers to remove all street clothes in this room, dress in clean, disposable coveralls, and don respiratory protection equipment. Do not allow asbestos-contaminated items to enter this room. Require Workers to enter this room either from outside the structure dressed in street clothes, or naked from the showers.
 - e. An existing room may be utilized as the Changing Room if it is suitably located and of a configuration whereby workers may enter the Changing Room directly from the Shower Room. Protect all surfaces of room with sheet plastic as set forth in this specification.
 - f. Maintain floor of changing room dry and clean at all time. Do not allow overflow water from shower to wet floor in changing room.
 - g. Damp wipe all surfaces twice after each shift change with a disinfectant solution.
 - h. Provide posted information for all emergency phone numbers and procedures.
 - i. Provide 1 storage locker per employee and 2 additional lockers for City PROJECT MONITORS.
3. Airlock: Provide an airlock between Drying Room and Changing Room. This is a transit area for workers.
 - a. Separate this room from Drying Room and Changing Room by

- sheet plastic flapped doorways.
 - b. Separate this room from the rest of the building with airtight walls fabricated of 6 mil plastic sheeting.
 - c. Separate this room from the Drying and Changing Rooms with airtight walls fabricated of 6 mil plastic sheeting.
4. Drying Room: Provide a drying room as an airlock and a place for workers to dry after showering.
- a. Construct room by providing a pan continuous with or draining to Shower Room pan. Install a freely draining wooden or non-skid metal floor in pan at elevation of top of pan.
 - b. Separate this room from the rest of the building with airtight walls fabricated of 6 mil plastic sheeting.
 - c. Separate this room from the Changing Room and Shower Room with airtight walls fabricated of 6-mil plastic sheeting.
 - d. Separate from Changing Room by a sheet plastic flapped doorway.
 - e. Provide a continuously adequate supply of disposable bath towels.
5. Shower Room: Provide a completely watertight operational shower to be used for transit by cleanly dressed workers heading for the Work Area from the Changing Room, or for showering by workers headed out of the Work Area after undressing in the Equipment Room.
- a. Construct room by providing a shower pan and 2 shower walls in a configuration that will cause water running down walls to drip into pan. Install a freely draining wooden floor in shower pan at elevation of top of pan.
 - b. Separate this room from the rest of the building with airtight walls fabricated of 6-mil plastic sheeting.
 - c. Separate this room from the Drying Room and Airlock with airtight walls fabricated of 6-mil plastic sheeting.
 - d. Provide splash proof entrances to Drying Room and Airlock with doors.
 - e. Provide shower head and controls.
 - f. Provide temporary extensions of existing hot and cold water and drainage, as necessary for a complete and operable shower.
 - g. Provide a soap dish and a continuously adequate supply of soap and maintain in sanitary condition.
 - h. Arrange so that water from showering does not splash into the Changing or Equipment Rooms.
 - i. Arrange water shut off and drain pump operation controls so that a single individual can shower without assistance from

- either inside or outside of the Work Area.
- j. Provide flexible hose shower head.
 - k. Pump waste water to drain or to storage for use in amended water. If pumped to drain, provide 20 micron and 5 micron waste water filters in line to drain or waste water storage. Change filters daily or more often if necessary.
 - l. Provide hose bib.
6. **Airlock:** Provide an airlock between Shower Room and Equipment Room. This is a transit area for workers. Separate this room from Equipment Room by a sheet plastic flap doorway.
- a. Separate this room from the rest of the building with airtight walls fabricated of 6 mil plastic sheeting.
 - b. Separate this room from the Equipment Room and Shower Room with airtight walls fabricated of 6 mil plastic sheeting.
 - c. Separate from Equipment Room by a sheet plastic flapped doorway.
7. **Equipment Room (contaminated area):** Require work equipment, footwear and additional contaminated work clothing to be left here. This is a change and transit area for workers.
- a. Separate this room from the Work Area by a 6-mil plastic sheeting flapped doorway.
 - b. Separate this room from the rest of the building with airtight walls fabricated of 6-mil plastic sheeting.
 - c. Separate this room from the Shower Room and Work Area with airtight walls fabricated of 6-mil plastic sheeting.
 - d. Provide a drop cloth layer of sheet plastic on floor in the Equipment Room for every shift change expected. Roll drop cloth layer of plastic from Equipment Room into Work Area after each shift change. Replace before next shift change. Provide a minimum of two (2) layers of plastic at all times. Use only clear plastic to cover floors.
8. **Airlock:** Provide an airlock between Equipment Room and Work Area. This is a transit area for workers.
- a. Separate this room from Equipment Room and Work Area with sheet plastic flapped doorways.
 - b. Separate this room from the rest of the building with airtight walls fabricated of 6-mil plastic sheeting.
 - c. Separate this room from the Equipment Room and Work Area with airtight walls fabricated of 6-mil plastic sheeting.
9. **Work Area:** Separate Work Area from the Equipment Room by plastic sheeting barriers. If the airborne asbestos level in the Work

Area is expected to be high, as in dry removal, add an intermediate cleaning space between the Equipment Room and the Work Area. Damp wipe clean all surfaces after each shift change. Provide one additional floor layer of 6-mil plastic sheeting per shift change and remove contaminated layer after each shift.

10. Decontamination Sequence: Require that all workers adhere to the following sequence when entering or leaving the Work Area.
 - a. Entering Work Area: Each time Work Area is entered remove street clothes and put on new disposable coverall or (re-use previous coverall if not overly contaminated or torn), new head cover, and a clean respirator with cartridges appropriate for the abatement work to be performed. Reinforce coverall seams and secure gloves to coveralls with duct tape. Proceed through Change Room, don foot covers, hood, gloves, etc., and enter Work Area.
 - 1) Any additional clothing and equipment left in Equipment Room needed by the worker are put on in the Equipment Room.
 - 2) Worker proceeds to Work Area.
 - b. Exiting Work Area:
 - 1) Before leaving the Work Area, require the worker to remove all gross contamination and debris from overalls and feet.
 - 2) The worker then proceeds to the Equipment Room and removes all clothing except respiratory protection equipment.
 - 3) Extra work clothing such as boots, hard hats, goggles, gloves are to be stored in contaminated end of the Equipment Room.
 - 4) Disposable coveralls are placed in a bag for disposal with other material.
 - 5) Require that Decontamination procedures found in this specification be followed by all individuals leaving the Work Area.
 - 6) After showering, the worker moves to the Changing Room and dresses in either new coveralls for another entry or street clothes if leaving.

G. Equipment decontamination unit

1. Provide an Equipment Decontamination Unit consisting of a serial arrangement of rooms, Clean Room, Holding Room, Wash Room for removal of equipment and material from Work Area. Do not allow personnel to enter or exit Work Area through Equipment Decontamination Unit.

2. Wash Down Station: Provide an enclosed Shower Unit located in Work Area just outside Wash Room as an equipment, bag and container cleaning station.
 - a. Fabricate waterproof floor extending 6' - 0" beyond Wash Down station in all directions. Install seamless waterproof membrane over area and extend over curbs on all four sides. Form curbs from 2" x 4" lumber laid on the flat.
 - b. Waterproof membrane is to be fabricated from elastomeric membrane or 10 mil plastic sheeting.
 - c. Do not allow water to collect on waterproof membrane. Remove continuously with a wet vacuum or mops.
3. Wash Room: provide wash room for cleaning of bagged or containerized asbestos-containing waste materials passed from the Work Area.
 - a. Construct wash room of nominal 2" x wood framing and plastic sheeting, at least 6-mil in thickness and located so that packaged materials, after being wiped clean, can be passed to the Holding Room.
 - b. Separate this room from the Work Area by a single flapped door of 6 mil plastic sheeting.
 - 1) Provide a drop cloth layer of plastic on floor in the Wash Room for every load-out operation. Roll this drop cloth layer of plastic from Wash Room into Work Area after each load-out. Provide a minimum of two (2) layers of plastic at all times. Use only clear plastic to cover floors.
4. Holding Room: Provide Holding Room as a drop location for bagged asbestos-containing materials passed from the Wash Room. Construct Holding Room of nominal 2" x wood framing and plastic sheeting, at least 6-mil in thickness and located so that bagged materials cannot be passed from the Wash Room through the Holding Room to the Clean Room.
 - a. Separate this room from the adjacent rooms by flap doors fabricated from 6-mil sheet plastic.
5. Clean Room: provide Clean Room to isolate the Holding Room from the building exterior. If possible locate to provide direct access to the Holding Room from the building exterior.
 - a. Erect Critical and Primary Barriers as described in this specification in an existing space. If no space exists construct Clean Room of 2X wood framing and plastic sheeting, at least 6-mil in thickness.
 - b. Separate this room from the exterior by a single flap door of 6 mil plastic sheeting.
6. Load-out Area: The load-out area is the transfer area from the

building to a truck or dumpster. It may be the Clean Room of the Equipment Decontamination unit or a separate room or loading dock area. Erect Critical and Primary barriers as described in this specification in load-out area.

- a. During transfer of material from load-out area erect primary barriers as described in this specification as necessary to seal path from load-out area to truck or dumpster.

7. Decontamination Sequence: Take all equipment or material from the Work Area through the Equipment Decontamination Unit according to the following procedure:

- a. At wash down station, thoroughly wet clean contaminated equipment or sealed plastic bags and pass into Wash Room.
- b. When passing equipment or containers into the Wash Room, close all doorways of the Equipment Decontamination Unit, other than the doorway between the Wash Station and the Wash Room. Keep all outside personnel clear of the Equipment Decontamination Unit.
- c. Once inside the washroom, wet clean the bags and/or equipment.
- d. When cleaning is complete pass items into Holding Room. Close all doorways except the doorway between the Holding room and the Clean Room.
- e. Workers from the building exterior enter Holding Area and remove decontaminated equipment and/or containers for disposal.
- f. Require these workers to wear full protective clothing and appropriate respiratory protection.
- g. At no time is a worker from an uncontaminated area to enter the enclosure when a removal worker is inside.

H. Construction of the decontamination units

1. Walls and Ceiling: Construct airtight walls and ceiling using plastic sheeting, at least 6-mil in thickness. Attach to existing building components or a temporary framework.
2. Floors: Use 2 layers (minimum) of 6-mil plastic sheeting to cover floors in all areas of the Decontamination Units. Use only clear plastic to cover floors.
3. Doors: Fabricated from three (3) overlapping sheets with openings a minimum of three feet (3') wide. Configure so that sheeting overlaps adjacent surfaces. Weigh sheets at bottoms as required so that they quickly close after being released. Put arrows on sheets to indicate direction of overlap and/or travel. Provide a minimum of six feet (6') between entrance and exit of any room. Provide a

minimum of three feet (3') between doors to airlocks.

4. If the Decontamination area is located within an area containing friable asbestos on overhead ceilings, ducts, piping, etc., provide the area with a minimum 1/4 inch hardboard or 1/2 inch plywood "ceiling" with plastic sheeting, at least 6 mil in thickness covering the top of the "ceiling".
5. Visual Barrier: Where the Decontamination area is immediately adjacent to and within view of occupied areas, provide a visual barrier of black plastic sheeting at least 6-mil in thickness so that worker privacy is maintained and work procedures are not visible to building occupants. Where the area adjacent to the Decontamination area is accessible to the public, construct a solid barrier on the public side of the sheeting to protect the sheeting. Construct barrier with wood or metal studs covered with minimum 1/4 inch thick hardboard or 1/2 inch plywood. Where the solid barrier is provided, sheeting need not be opaque.
6. Alternate methods of providing Decontamination facilities may be submitted to the Owner's PROJECT MONITOR for approval. Do not proceed with any such method(s) without written authorization of the Owner's PROJECT MONITOR.
7. Electrical: Provide subpanel at Changing Room to accommodate all removal equipment. Power subpanel directly from a building electrical panel. Connect all electrical branch circuits in Decontamination unit and particularly any pumps in shower room to a ground-fault circuit protection device.

I. Cleaning of decontamination units

1. Clean debris and residue from inside of Decontamination Units on a daily basis or as otherwise indicated on Contract Drawings. Damp wipe or hose down all surfaces after each shift change. Clean debris from shower pans on a daily basis.
2. If the Changing Room of the Personnel Decontamination Unit becomes contaminated with asbestos-containing debris, abandon the entire Decontamination Unit and erect a new Decontamination Unit. Use the former Changing Room as an inner section of the new Equipment Room.

J. Signs

1. Post an approximately 20 inch by 14 inch manufactured caution sign at each entrance to the Work Area displaying the following legend with letter sizes and styles of a visibility required by 8 CCR 1529:
 - a. Provide signs in both English and Spanish.

LEGEND

DANGER

ASBESTOS

CANCER AND LUNG DISEASE HAZARD
AUTHORIZED PERSONNEL ONLY
RESPIRATORS AND PROTECTIVE CLOTHING
ARE REQUIRED IN THIS AREA

K. Certificate of worker's acknowledgment:

1. In Appendix B is a Certificate of Worker Training. After each worker has been included in the ABATEMENT CONTRACTOR's Respiratory Protection Program, completed the training program and medical examination, secure a fully executed copy of this form.

1.9 RESPIRATORY PROTECTION

A. Description of work

1. Instruct and train each worker involved in asbestos abatement in proper respiratory use and require that each worker wear a respiratory, properly fitted on the face in the Work Area from the start of any operation which may expose the worker above the permissible exposure limit (PEL) until the Work Area is completely decontaminated. Use respiratory protection appropriate for the asbestos levels encountered in the work place or as required for other toxic or oxygen-deficient situations encountered.

B. General:

1. Respiratory Protection Program: Comply with ANSI Z88.2 - 1992 "Practices for Respiratory Protection" and OSHA 8 CCR 1544, 1529.
2. Require that respiratory protection be used at all time that there is any possibility of airborne asbestos levels exceeding the permissible exposure level required in OSHA 8 CCR 1529.
3. Require that a respirator be worn by anyone in a Work Area at all time, regardless of activity, during a period that starts with any operation which could cause disturbance of asbestos, until the area has met the requirements of Section 1.5 or Section 1.6.
4. Regardless of Airborne Asbestos Levels: Require that the minimum level of respiratory protection used be a half-face air-purifying respirators with high efficiency filters.
5. Do not allow the use of single-use, disposable, or quarter-face respirators for any purpose.

C. Fit testing:

1. Initial Fitting: Fit types of respirator to be worn by each individual. Require that an individual use only those respirators for which training and fit testing has been provided. Require that fit testing be repeated annually, and at any time a respirator is replaced.
2. On a Monthly Basis, check the fit of each worker's respirator by having irritant smoke blown onto the respirator from a smoke tube.
3. Upon Each Wearing: Require that each time an air-purifying respirator is put on it be checked for fit with a positive and negative pressure fit check.
4. Fit testing of tight-fitting atmosphere-supplying respirators and tight-fitting powered air-purifying respirators shall be accomplished by performing quantitative or qualitative fit testing in the negative pressure mode, regardless of the mode of operation (negative or positive pressure) that is used for respiratory protection.

D. Permissible exposure limit (PEL):

1. Permissible Exposure Limit (PEL-TWA) - 0.1 fiber/cc
2. Action Level (TWA) - 0.1 fiber/cc

E. Air purifying respirators: Appropriate type of respiratory shall be determined by ABATEMENT CONTRACTOR. The minimum worker protection during all gross removal phases is Powered Air Purifying Respirators (PAPR).

1. Negative pressure: Half or full-face mask: Supply a sufficient quantity of respirator HEPA filters approved for asbestos, so that workers can change filters as necessary. Require that respirators be wet-rinsed, and filters discarded or covered with duct tape, each time a worker leaves the Work Area. Store respirators and filters at the job site in the changing room and protect totally from exposure to asbestos prior to their use. Respirator cartridges must be replaced whenever a worker experiences increased breathing resistance.
2. Powered air purifying: Half or full-face mask: Supply a sufficient quantity of high efficiency respirator filters approved for asbestos so that workers can change filters at any time that flow through the face piece decreases to the level at which the manufacturer recommends filter replacement. Require that regardless of flow, filter cartridges be replaced after 40 hours of use. Require that HEPA elements in filter cartridges be protected from wetting during personal decontamination. Require entire exterior housing of respirator, including blower unit, filter cartridges, hoses, battery

pack, face mask, belt, and cords, be washed each time a worker leaves the Work Area. Caution should be used to avoid shorting battery pack during washing. Provide an extra battery pack for each respirator so that one can be charging while one is in use.

3. ABATEMENT CONTRACTOR shall provide necessary respirators, HEPA cartridges, and other clean and sanitary personal protective equipment listed in this specification for two City representatives on a daily basis.

Part 2 — PRODUCTS

2.1 MISCELLANEOUS PRODUCTS

- A. Plastic Sheeting: Provide flame resistant polyethylene film that conforms to requirements set forth by the National Fire Protection Association Standard 701, Small Scale Fire Test for Flame-resistant Textiles and Films. Provide largest size possible to minimize seams, 4.0, 6.0 millimeter thick or higher as indicated, frosted or black as indicated.
- B. Reinforced Polyethylene Sheet: Where plastic sheet is the only separation between the Work Area and building exterior, provide translucent, nylon reinforced, laminated, flame resistant, polyethylene film that conforms to requirements set forth by the National Fire Protection Association Standard 701, Small Scale Fire Test for Flame-resistant Textiles and Films. Provide largest size possible to minimize seams, 4.0 or 6.0 mil thick as indicated, frosted or black as indicated.
- C. Tape: Provide duct tape in 2" or 3" widths as indicated, with an adhesive which is formulated to stick aggressively to sheet plastic.
- D. Spray Adhesive: Provide spray adhesive in aerosol cans which is specifically formulated to stick tenaciously to sheet plastic.
- E. Shower Pan: Provide a one-piece waterproof shower pan 4' x 8' by 6" deep. Fabricate from seamless fiberglass minimum 1/16" thick reinforced with wood, 18 ga. stainless or galvanized steel with welded seams, copper or lead with soldered seams, or a seamless liner of minimum 60 mil thick elastomeric membrane.
- F. Shower Walls: Provide 8' long by approximately 7' high walls fabricated from rigid, impervious, waterproof material, either corrugated fiberglass roofing or equivalent. Structurally support as necessary for stability.
- G. Shower Heads & Controls: Provide a factory-made shower head producing a spray of water which can be adjusted for spray size and intensity. Feed shower with water mixed from hot and cold supply lines. Arrange so that control of water temperature, flow rate, and shut off is from inside shower without outside aid.
- H. Filters: Provide cascaded filter units on drain lines from showers or any other water source carrying asbestos-contaminated water from the Work Area. Provide units with disposable filter elements as indicated below. Connect so that discharged water passes primary filter and output passes

through final filter.

1. Primary Filter - Passes particles 100 microns and smaller
 2. Final Filter - Passes particles .5 microns and smaller
- I. For Wash Down Station provide leak tight shower enclosure with integrated drain pan fabricated from fiberglass or other durable waterproof material, approximately 3' x 3' square with minimum 6' high sides and back. Structurally support as necessary for stability. Equip with hose bib, as specified in this section, mounted at approximately 4'-0" above drain pan. Connect drain to a reservoir, pump water from reservoir through filters to a drain or store and use for amended water. Mount filters inside shower stall on back wall beneath hose bib.
 - J. Sump Pump: Provide totally submersible waterproof sump pump with integral float switch. Provide unit sized to pump 2 times the flow capacity of all showers or hoses supplying water to the sump, through the filters specified herein when they are loaded to the extent that replacement is required. Provide unit capable of pumping debris, sand, plaster or other materials washed off during decontamination procedures without damage to mechanism of pump. Adjust float switch so that a minimum of 3" remains between top of liquid and top of sump pan.
 - K. Surfactant: Submit product data, use instructions and recommendations from manufacturer of surfactant intended for use. Include data substantiating that material complies with requirements.
 - L. Removal Encapsulant: Submit material safety data sheet, product data, use instructions and recommendations from manufacturer of removal encapsulant intended for use. Include data substantiating that material complies with requirements.

2.2 PROTECTIVE CLOTHING:

- A. Disposable Coveralls: Provide disposable full-body coveralls and disposable head covers, and require that they be worn by all workers in the Work Area. Provide a sufficient number for all required changes, for all workers in the Work Area. Dispose of coveralls as clothing waste at the end of each day.
- B. Coveralls: Provide cloth full-body coveralls and hats, require that they be worn by all workers in the Work Area. Require that workers change out of coverall in the Equipment Section of the Change Room. Dispose of coverall as clothing waste at completion of all work.
- C. Shoe Covers: Provide disposable shoe covers and require that they be worn by all workers in the Work Area. Shoe covers must be replaced each time a worker leaves the Work Area. Shoe covers are disposed as clothing waste in the Equipment Section of the Change Room.
- D. Boots: Provide work boots with non-skid soles, and where required by OSHA, foot protection, for all workers. Provide boots at no cost to workers. Do not allow boots to be removed from the Work Area for any reason, after being contaminated with asbestos. Dispose of boots with clothing waste at

the end of the work, or bag and take to next project. Boots that are non-porous may be decontaminated and removed from Work Area.

- E. **Hard Hats:** Provide head protection (hard hats) as required by OSHA for all workers, and provide 4 spares for use by the PROJECT MONITOR and City. Require hard hats to be worn at all time that work is in progress that may potentially cause head injury. Provide hard hats of type with plastic strap type suspension. Require hats to remain in the Work Area throughout the work. Thoroughly clean and decontaminate hats before removing them from Work Area at the end of the project.
- F. **Goggles and Face Shields:** Provide eye and face protection (goggles or face shields) as required by OSHA for all workers involved in scraping, spraying, stripping or any other activity which may potentially cause eye or face injury. Thoroughly clean and decontaminate goggles or face shields before removing them from Work Area at the end of the project.
- G. **Gloves:** Provide work gloves to all workers and require that they be worn at all times in the Work Area. Chemical resistant gloves must be provided when using chemical strippers to remove asbestos. Gloves must be secured to the coveralls using duct tape to protect arms and hands from the chemical strippers. Do not remove gloves from Work Area. Dispose of as clothing waste at the end of the work.

2.3 RESPIRATORY

- A. Respirators, and respirator filters, disposable coveralls, head covers, and footwear covers shall be provided by the ABATEMENT CONTRACTOR for the City PROJECT MONITOR, and other authorized representatives who may inspect the job site as needed.
- B. **Respirator Product Data:** Submit manufacturer's product information for each component used, including NIOSH Certifications for each component in an assembly and/or for entire assembly.

2.4 HEPA FILTERED FAN UNITS

- A. **General:** Supply the required number of HEPA filtered fan units to the site in accordance with these specifications. Use units that meet the following requirements.
- B. **Cabinet:** Constructed of durable materials able to withstand damage from rough handling and transportation. Provide units whose cabinets are:
 - 1. Factory-sealed to prevent asbestos from being released during use, transport, or maintenance
 - 2. Arranged to provide access to and replacement of all air filters from intake end
 - 3. Mounted on casters or wheels
- C. **Fans:** Rate capacity of fan according to usable air-moving capacity under

actual operating conditions.

- D. HEPA Filters: Provide units whose final filter is the HEPA type with the filter media (folded into closely pleated panels) completely sealed on all edges with a structurally rigid frame.
1. Provide units with a continuous rubber gasket located between the filter and the filter housing to form a tight seal.
 2. Provide HEPA filters that are individually tested and certified by the manufacturer to have an efficiency of not less than 99.97 percent when challenged with 0.3 um dioctylphthalate (DOP) particles when tested in accordance with Military Standard Number 282 and Army Instruction Manual 136-300-175A. Provide filters that bear a UL586 label to indicate ability to perform under specified conditions.
 3. Provide filters that are marked with: the name of the manufacturer, serial number, air flow rating, efficiency and resistance, and the direction of test air flow.
- E. Pre-filters, which protect the final filter by removing the larger particles, are required to prolong the operating life of the HEPA filter. Two stages of prefiltration are required. Provide units with the following pre-filters:
1. First-stage pre-filter: low-efficiency type (e.g., for particles 100 um and larger)
 2. Second-stage (or intermediate) filter: medium efficiency (e.g., effective for particles down to 5 um)
- F. Provide units with pre-filters and intermediate filters installed either on or in the intake grid of the unit and held in place with special housings or clamps.
- G. Instrumentation: Provide units equipped with:
1. Manometer to measure the pressure drop across filters and indicate when filters have become loaded and need to be changed.
 2. A table indicating the usable air-handling capacity for various static pressure readings on the manometer affixed near the gauge for reference, or the manometer reading indicating at what point the filters should be changed, noting Cubic Feet per Minute (CFM) air delivery at that point
 3. Elapsed time meter to show the total accumulated hours of operation
- H. Safety and Warning Devices: Provide units with the following safety and warning devices:
1. Electrical (or mechanical) lockout to prevent fan from operating

without a HEPA filter.

2. Automatic shutdown system to stop fan in the event of a rupture in the HEPA filter or blocked air discharge.
 3. Warning lights to indicate normal operation (green), too high a pressure drop across the filters (i.e., filter overloading) (yellow), and too low of a pressure drop (i.e., rupture in HEPA filter or obstructed discharge) (red)
 4. Audible alarm if unit shuts down due to operation of safety systems
- I. Electrical components: Provide units with electrical components approved by the National Electrical Manufacturers Association (NEMA) and Underwriter's Laboratories (UL). Each unit is to be equipped with overload protection sized for the equipment. The motor, fan, fan housing, and cabinet are to be grounded.
 - J. Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:
 - A. Manufacturer: Subject to compliance with requirements, provide products of the following:

Part 3 — EXECUTION

3.1 CONTAINMENT SYSTEM

- A. Securing work area:
 1. Secure Work Area from access by public, staff or users of the area. Accomplish this where possible, by locking doors, gates, or other means of access to the area.
- B. Work Area is the location where asbestos-abatement work occurs. It is a variable of the extent of work of the Contract. It may be a portion of a room, a single room, or a complex of rooms. A "Work Area" is considered contaminated during the work, and must be isolated from the balance of the building, and decontaminated at the completion of the asbestos-control work.
- C. Completely isolate the Work Area from other parts of the building so as to prevent asbestos-containing dust or debris from passing beyond the isolated area. Should the area beyond the Work Area(s) become contaminated with asbestos-containing dust or debris as a consequence of the work, clean those areas in accordance with the procedures indicated in this specification. Perform all such required cleaning or decontamination at no additional cost to owner.
- D. Place all tools, scaffolding, staging, etc. necessary for the work in the area to be isolated prior to completion of Work Area isolation.

- E. Remove uncontaminated equipment, and/or supplies from the Work Area before commencing work, or completely cover with two (2) layers of plastic sheeting, at least 6-mil in thickness, securely taped in place with duct tape. Such equipment shall be considered outside the work area unless covering plastic or seal is breached.
- F. Disable ventilating systems or any other system bringing air into or out of the Work Area. Disable system by disconnecting wires, removing circuit breakers, by lockable switch or other positive means that will prevent accidental premature restarting of equipment.
- G. Lockout power to Work Area by switching off all breakers serving power or lighting circuits in work area. Label breakers with tape over breaker with notation "DANGER circuit being worked on". Lock panel and have all keys under control of ABATEMENT CONTRACTOR's Superintendent and the City's PROJECT MONITOR.
- H. Lockout power to circuits running through work area wherever possible by switching off all breakers or removing fuses serving these circuits. Label breakers with tape over breaker with notation "DANGER circuit being worked on". Lock panel and have all keys under control of ABATEMENT CONTRACTOR's superintendent or owner's designated representative. If circuits cannot be shut down for any reason, label at intervals 4'-0" on center with tags reading, "DANGER live electric circuit. Electrocution hazard." Label circuits in hidden locations but which may be affected by the work in a similar manner.
- I. Emergency exits
 - 1. Provide emergency exits and emergency lighting as set forth below:
 - a. Emergency Exits: At each existing exit door from the Work Area provide the following means for emergency exiting:
 - b. Arrange exit door so that it is secure from outside the Work area but permits exiting from the Work Area.
 - c. Mark outline of door on Primary and Critical Barriers with luminescent paint at least 1" wide. Hang a razor knife on a string beside outline. Arrange Critical and Primary barriers so that they can be easily cut with one pass of razor knife. Paint words "EMERGENCY EXIT" inside outline with luminescent paint in letters at least one foot high and 2" thick.
- J. Control Access
 - 1. Isolate the Work Area to prevent entry by building occupants into Work Area or surrounding controlled areas. Accomplish isolation by the following:
 - 2. Submit to City's PROJECT MONITOR a list of doors and other openings that must be secured to isolate Work Area. Include on list notation if door or opening is in an indicated exit route.
 - 3. After receiving written authorization from the City's PROJECT

MONITOR, lock all doors into Work Area, or, if doors cannot be locked, chain shut. Cover any signs that direct emergency exiting, either outside or inside of Work Area, to locked doors. Do not obstruct doors required for emergency exits from Work Area or from building.

4. Locked Access: Arrange Work Area so that the only access into Work Area is through lockable doors to personnel and equipment decontamination units.
5. Provide keys for each door to the City's PROJECT MONITOR and maintain one key in clean room of decontamination unit.
6. Provide Warning Signs at each locked door leading to Work Area reading as follows:
7. Print text in both English and Spanish:

<u>Legend</u>	<u>Notation</u>
KEEP OUT	3" Sans Serif Gothic or Block
BEYOND THIS POINT	1" Sans Serif Gothic or Block
ASBESTOS ABATEMENT WORK	1" Sans Serif Gothic or Block
IN PROGRESS	1" Sans Serif Gothic or Block
BREATHING ASBESTOS DUST MAY BE HAZARDOUS TO YOUR HEALTH	14 Point Gothic

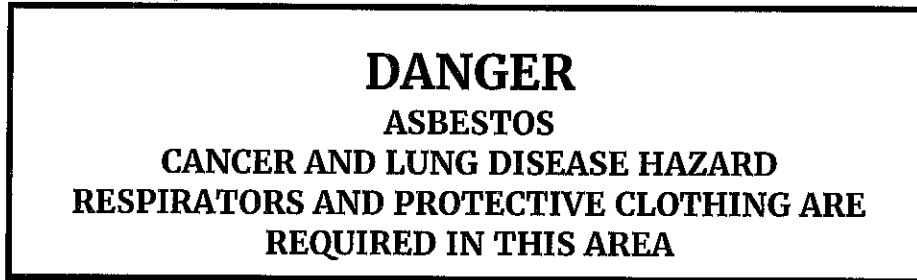
8. Provide Warning Signs at each locked door leading to Work Area reading as follows:

<u>Legend</u>	<u>Notation</u>
KEEP OUT	3" Sans Serif Gothic or Block
CONSTRUCTION	1" Sans Serif Gothic or Block
WORK AREA	1" Sans Serif Gothic or Block
PROTECTIVE CLOTHING REQUIRED BEYOND THIS POINT	14 Point Gothic

9. Immediately inside door and outside critical barriers post an approximately 20 inch by 14 inch manufactured caution sign

displaying the following legend with letter sizes and styles of a visibility required by 29 CFR 1926:

LEGEND



Provide spacing between respective lines at least equal to the height of the respective upper line.

K. Alternative methods of enclosure

1. This contract price should be based for all methods of containing the Work Area as listed in this specification. If the ABATEMENT CONTRACTOR has a method that will meet all safety criteria established by the City's PROJECT MONITOR and will save money or time, they may submit it as an alternative work plan. This alternative method's submittal will be in addition to the required work plan that meets the requirements of this specification. All cost savings will be equally shared between the ABATEMENT CONTRACTOR and the City. Do not proceed with any such alternative method(s) without prior written approval of the City's PROJECT MONITOR.

L. Critical Barriers

1. Completely Separate the Work Area from other portions of the building, and the outside by closing all openings with sheet plastic barriers at least 6-mil in thickness, or by sealing cracks leading out of Work Area with duct tape.
2. Individually seal all ventilation openings (supply and exhaust), doorways, windows, and other openings into the Work Area with duct tape alone or with plastic sheeting at least 6-mil in thickness, taped securely in place with duct tape. ABATEMENT CONTRACTOR is responsible for providing any materials necessary to establish an effective seal if duct tape and plastic sheeting is determined to be not effective by the City's PROJECT MONITOR. Maintain seal until all work including Project Decontamination is completed.
3. Provide Sheet Plastic barriers at least 6-mil in thickness as required to seal openings completely from the Work Area into adjacent areas. Seal the perimeter of all sheet plastic barriers with duct tape or spray adhesive or any additional materials necessary.

4. Provide Pressure Differential System per Section 3.2
5. View windows must be installed where feasible for friable asbestos work.

M. Prepare Area

1. Scaffolding: If fixed scaffolding is to be used to provide access HEPA vacuum and wet clean area prior to scaffolding installation.
2. Remove all electrical and mechanical items, such as lighting fixtures, clocks, diffusers, registers, escutcheon plates, etc. which cover any part of the surface to be worked on with the work as long as the removal does not disturb contaminated areas.
3. Remove all general construction items such as cabinets, casework, door and window trim, moldings, ceilings, trim, etc., which cover the surface of the work as required to prevent interference with the work.
4. Clean All Surfaces in Work Area with a HEPA filtered vacuum or by wet wiping prior to the installation of primary barrier.

N. Primary Barrier

1. Protect building and other surfaces in the Work Area from damage from water and high humidity or from contamination from asbestos-containing debris, slurry or high airborne fiber levels by covering with a primary barrier as described below.
2. Sheet Plastic: Protect surfaces in the Work Area with two (2) layers of plastic sheeting on floor and walls, or as otherwise directed on the Contract Drawings or in writing by the City's PROJECT MONITOR. Perform work in the following sequence.
 - a. Cover Floor of Work Area with 2 individual layers of clear plastic sheeting, each at least 6-mil in thickness, turned up walls at least 12 inches. Form a sharp right angle bend at junction of floor and wall so that there is no radius which could be stepped on causing the wall attachment to be pulled loose. Both spray-glue and duct tape all seams in floor covering. Locate seams in top layer six feet from, or at right angles to, seams in bottom layer. Install sheeting so that top layer can be removed independently of bottom layer.
 - b. Cover all walls in Work Area including "Critical Barrier" sheet plastic barriers with one layer of plastic sheeting, at least 6-mil in thickness, mechanically supported and sealed with duct tape or spray-glue in the same manner as "Critical Barrier" sheet plastic barriers. Tape all joints including the joining with the floor covering with duct tape or as otherwise indicated on the Contract Documents or in writing by the City's PROJECT

MONITOR.

- c. Repair of Damaged Plastic Sheeting: Remove and replace plastic sheeting which has been damaged by removal operations or where seal has failed allowing water to seep between layers. Remove affected sheeting and wipe down entire area. Install new sheet plastic only when area is completely dry.
- d. Install an additional layer of plastic as a drop cloth to protect the secondary layer from debris generated by the asbestos abatement work. Additional protection for primary and secondary floor barriers may be necessary during the demolition of ceiling system. Care should be taken by ABATEMENT CONTRACTOR to protect the floor sheeting. If City's PROJECT MONITOR determines that the demolition has damaged the floor sheeting he/she shall request the ABATEMENT CONTRACTOR to replace damaged floor sheeting as a part of this contract.

O. Isolation Area

1. Maintain isolation areas between the Work Area and adjacent building area:
 - a. In locations shown on the plans.
 - b. In unoccupied rooms located between Work Area and adjacent occupied portions of the building.
 - c. In locations where separation between Work Area and occupied portions of building is formed by sheet plastic and/or temporary barriers.
2. Form isolation area by controlling access to the space in the same manner as a Work Area. Physically isolate the space from the Work Area and adjacent areas. Accomplish physical isolation by:
 - a. Installing critical barriers in unoccupied space.
 - b. Erecting a second Critical Barrier a minimum of 3'0" away from Work Area.

P. Stop Work

1. If the Critical or Primary barrier falls or is breached in any manner stop work immediately. Do not start work until authorized in writing by the City's PROJECT MONITOR.

Q. Extension of Work Area: If the Critical Barrier is breached in any manner that could allow the passage of asbestos debris or airborne fibers, then add affected area to the Work Area, enclose it as required by this Section of the specification and decontaminate it as described in this specification.

R. Drop Cloth Barrier

1. Use a secondary layer of plastic as a drop cloth to protect the primary layer from debris generated by the asbestos abatement work is specified in the appropriate work sections.

3.2 NEGATIVE PRESSURE ENCLOSURE

A. Monitoring

1. Continuously monitor and record the pressure differential between the Work Area and outside of the Work Area with a monitoring device incorporating a continuous recorder such as a strip chart or other graphic recorder.

B. Quality assurance:

1. **Relative Pressure in Work Area:** Continuously maintain the work area at an air pressure that is lower than that in any surrounding space, or at any location in the immediate proximity outside of the envelope. This pressure differential when measured across any physical or critical barrier must equal or exceed a static pressure of: 0.03 inches of water.

C. Air circulation in the work area:

1. **Air Circulation:** For purposes of this section air circulation refers to either the introduction of outside air to the Work Area or the circulation and cleaning of air within the Work Area.
2. Air circulation in the Work Area is a minimum requirement intended to help maintain airborne dust levels that do not significantly challenge the work area isolation measures. The ABATEMENT CONTRACTOR may also use this air circulation as part of the engineering controls in his worker protection program.
3. **Determining the air circulation requirements:** Provide a fully operational air circulation system supplying a minimum of the following air circulation rate:
 - a. 6 air changes per hour
4. **Determine number of units needed to achieve required air circulation according to the following procedure:**
 - a. Determine the volume of the work area in cubic feet by multiplying floor area by ceiling height. Determine total air circulation requirement in cubic feet per minute (CFM) for the work area by multiplying this volume by the air change rate and dividing by 60.
 - b. Calculate air circulation required in cubic feet of air per minute (CFM) by the following formula:

CFM required =

Volume of work area (cu. ft.) X $\frac{\text{Number of air changes per hour}}{60 \text{ (minutes per hour)}}$

- c. Divide the air circulation requirement (CFM) above by 75% of capacity of HEPA filtered fan unit(s) used. Capacity of a unit for purposes of this section is 75% of the capacity in cubic feet per minute with fully loaded filters (pressure differential which causes loaded filter warning light to come on) in the machine's labeled operating characteristics.

Number of Units Needed = $\frac{\text{air circulation requirement(CFM)}}{\text{Capacity of Unit with Loaded Filters}}$

- d. Add one (1) additional unit as a backup in case of equipment failure or machine shutdown for filter changing.

D. Exhaust system:

1. Pressure differential isolation and air circulation in the Work Area are to be accomplished by an exhaust system as described below.
 - a. Exhaust all units from the Work Area to meet air circulation requirement of this section.
 - b. Location of HEPA Filtered Fan Units: Locate fan unit(s) so that makeup air enters work area primarily through decontamination facilities and traverses Work Area as much as possible. This may be accomplished by positioning the HEPA filtered fan unit(s) at a maximum distance from the worker access opening or other makeup air sources.
 - c. Place end of unit, its intake duct or its exhaust duct through an opening in the plastic barrier or wall covering. Seal plastic around the unit or duct with tape and other means necessary to ensure exhaust ducting does not become unfastened.
 - d. Vent all negative air machines to the outside of building. Exhaust duct shall be secured to window via a manifold supplied by ABATEMENT CONTRACTOR.
 - e. Mount units to exhaust directly or through disposable ductwork.
 - f. Use only new ductwork except for sheet metal connections and elbows.
 - g. Use ductwork and fittings of same diameter or larger than discharge connection on fan unit.
 - h. Use inflatable, disposable plastic ductwork in lengths not greater than 100 feet.
 - i. Use spiral wire-reinforced flex duct in lengths not greater than 50 feet.

- j. Arrange exhaust as required to inflate duct to a rigidity sufficient to prevent flapping.
 - k. If direction of discharge from fan unit is not aligned with duct use sheet metal elbow to change direction. Use six feet of spiral wire reinforced flex duct at each direction change.
- 2. If unable to vent to the exterior of the building and this is agreed upon by the PROJECT MONITOR, vent each HEPA filtered fan unit to inlet of second unit. Vent second unit to a controlled area in building as agreed upon with the PROJECT MONITOR. Insure that controlled area is isolated by critical barriers at all times that units are in operation.
- 3. Decontamination Units: Arrange Work Area and decontamination units so that the majority of make-up air comes through the Decontamination Units. Use only personnel or equipment Decontamination Unit at any time and seal the other so that make up air passes through unit in use.
- 4. Supplemental Makeup Air Inlets: Provide where required for proper air flow through the Work Area in location approved by the PROJECT MONITOR by making openings in the plastic sheeting that allow air from outside the Work Area into the Work Area. Locate auxiliary makeup air inlets as far as possible from the fan unit(s) (e.g., on an opposite wall), off the floor (preferably near the ceiling), and away from barriers that separate the Work Area from occupied clean areas. Cover with flaps to reseal automatically if the pressure differential system should shut down for any reason. Spray flap and around opening with spray adhesive so that if flap closes meeting surfaces are both covered with adhesive. Use adhesive that forms contact bond when dry.

E. Recirculation system:

- 1. Pressure differential isolation and air circulation in the Work Area are to be accomplished by a recirculation system as described below.
- 2. Recirculate air in the Work Area through HEPA filtered fan units to accomplish air circulation requirements of this section.
- 3. Location of Fan Units: Locate HEPA filtered fan units so that air is circulated through all parts of the Work Area, and so that required pressure is maintained at all parts of Work Area geometry. Move units as necessary so that in any location where asbestos is being disturbed, the discharge from one HEPA filtered fan unit is blowing contamination away from workers. Direct air flow in these locations so that it is predominantly toward workers' backs at the breathing zone elevation.

F. Air circulation in decontamination units:

1. Pressure Differential Isolation: Continuously maintain the pressure differential required for the work area in the:
 - a. Personnel Decontamination Unit: Across the Shower Room with the Equipment Room at a lower pressure than the Clean room.
 - b. Equipment Decontamination Unit: Across the Holding Room with the Wash Room at a lower pressure than the Clean Room.
 2. Air Circulation: Continuously maintain air circulation in Decontamination Units at same level as required for Work Area.
 3. Air Movement: Arrange air circulation through the Personnel Decontamination Unit so that it produces a movement of air from the Clean Room through the Shower Room into the Equipment Room. Maintain continuous minimum velocities of Sixty (60) feet per minute (0.305 m/s) in the breathing zone area of the shower and thirty (30) feet per minute (0.15 m/s) in all other locations of the shower.
- G. Use of the pressure differential and air circulation system:
1. General: Each unit shall be serviced by a dedicated minimum 115V-20A circuit with ground fault circuit interrupter (GFCI) supplied from temporary power installed under requirements of this specification. Do not use existing branch circuits to power fan units.
 2. Testing the System: Test pressure differential system before any asbestos is disturbed. After the Work Area has been prepared, the decontamination facility set up, and the fan unit(s) installed, start the unit(s) (one at a time). Demonstrate operation and testing of pressure differential system to PROJECT MONITOR.
 3. Demonstrate condition of equipment for each HEPA filtered fan unit and pressure differential monitoring equipment including proper operation of the following:
 - a. Squareness of HEPA Filter;
 - b. Condition of seals;
 - c. Proper operation of all lights;
 - d. Proper operation of automatic shut down if exhaust is blocked;
 - e. Proper operation of alarms;
 - f. Proper operation of manometer;
 - g. Proper operation and calibration of pressure monitoring equipment.
 4. Demonstrate Operation of the pressure differential system to the PROJECT MONITOR. This demonstration is to include, but is not be limited to, the following:

- a. Plastic barriers and sheeting move lightly in toward Work Area;
- b. Curtain of decontamination units move lightly in toward Work Area;
- c. There is a noticeable movement of air through the Decontamination Unit;
- d. Use smoke tube to demonstrate air movement from Clean Room through Shower Room to Equipment Room;
- e. Use smoke tubes to demonstrate a definite motion of air across all areas in which work is to be performed;
- f. Use a differential pressure meter or manometer to demonstrate the required pressure differential at every barrier separating the Work Area from the balance of the equipment, ductwork or outside;
- g. Modify the Pressure Differential System as necessary to demonstrate successfully the above.

5. Use of System During Abatement Operations:

- a. After abatement work has begun, run units continuously to maintain a constant pressure differential and air circulation until decontamination of the work area is complete. Do not turn off units at the end of the work shift or when abatement operations temporarily stop.
- b. Do not shut down air pressure differential system during encapsulating procedures, unless authorized by the PROJECT MONITOR in writing. Supply sufficient pre-filters to allow frequent changes.
- c. Start abatement work at a location farthest from the fan units and proceed toward them. If an electric power failure occurs, immediately stop all abatement work and do not resume until power is restored and fan units are operating again.
- d. At completion of abatement work, allow fan units to run as specified in this specification, to remove airborne dust that may have been generated during abatement work and cleanup and to purge the Work Area with clean makeup air. The units may be required to run for a longer time after decontamination, if very finely divided asbestos was generated by the work.

6. Dismantling the System:

When a final inspection and the results of final air tests indicate that the area has been decontaminated, fan units may be removed from the Work Area. Before removal from the Work Area, remove and properly dispose of pre-filter, decontaminate exterior of machine and seal intake to the machine with 6 mil plastic sheeting to prevent environmental contamination from the filters. Wrap entire machine including unit housing, caster wheels, instrument face, etc. in 6-mil plastic.

3.3 DISPOSAL OF HAZARDOUS WASTE:

- A. This Section describes the disposal of hazardous waste generated while performing work for this project and includes packaging, labeling, storage, containment, and disposal of hazardous wastes. Disposal of the asbestos containing waste shall be landfill. Disposal methods for a particular hazardous waste other than asbestos will be approved on a case by case basis and shall be properly disposed in accordance with specification and all applicable regulations.
- B. Employee training: Any contracted employee who handles hazardous waste must be trained to ensure compliance with the regulations. All contracted staff working at the job site must be able to respond effectively to emergency situations including chemical spills (22 CCR 66265.16).
- C. Waste minimization:
 - 1. The ABATEMENT CONTRACTOR is required to make all reasonable efforts to minimize the amount of hazardous waste generated from this project.
- D. Waste characterization:
 - 1. All waste generated on site must be tested within 10 days of generation to determine if it meets hazardous waste criteria as specified in 22 CCR Division 4.5 or any other pertinent law or regulation. ABATEMENT CONTRACTOR shall also provide:
 - a. Planned hazardous waste disposal method, all transporters, and disposal facilities to be utilized.
 - b. All hazardous waste containers shall have a permanent paint marking system and hazardous waste labeled completed and attached once waste has started to accumulate.
 - c. ABATEMENT CONTRACTOR shall separate all waste as generated.
 - 2. Representative samples of all solid or liquid waste other than asbestos shall be analyzed and the results compared to the Total Threshold Limit Concentration (TTLC) for all metals listed.
 - a. If any of the results exceed the TTLC criteria, the waste must be managed as hazardous waste.
 - b. If all the results are less than the TTLC and less than ten times the Soluble Threshold Limit Concentration (STLC), the waste can be managed as non-hazardous waste.
If all results are less than the TTLC, but, some of the results are greater than ten times the STLC, the sample shall be further analyzed for those specific metals using the Waste Extraction Test (WET). If the results from the WET are less than the STLC, the waste can be managed as non-hazardous waste.
 - 3. Additional testing for other constituents besides TTLC may be

required by the PROJECT MONITOR or the disposal company to accurately identify the waste or to adequately determine the waste is non-hazardous, non-regulated, or type of waste requiring special handling.

4. In addition to the State required testing, if the waste is to be disposed of at a treatment, storage, and disposal facility outside of California or if proof is required to show it is not a federally regulated waste, the federal Toxicity Characteristic Leachate Procedure may also be required.
5. Any other potential hazardous waste generated shall be tested in accordance with 22 CCR Division 4.5 within ten (10) days to determine if hazardous waste and the required disposal.

E. Pre-transportation requirements:

1. Any packaging used to ship hazardous waste off site such as a container, roll-off bin, tank or other device, must comply with 49 CFR Parts 173, 178, 179 and be labeled and prepared for transportation in accordance with 22 CCR Article 3.
2. The hazardous waste label must be affixed and filled out when the first amount of hazardous waste is placed in the container. The label must include the initial accumulation date.
3. All additional pre-transportation labeling, marking or placarding must be conducted prior to transporting off site and in accordance with 22 CCR Chapter 12, Article 3.
4. All containers used to package the hazardous waste must be compatible with the waste (22 CCR 66265.172), maintained in good condition (22 CCR 66265.171) and kept closed unless adding or removing waste (22 CCR 66265.173).
5. All containers and tanks of hazardous waste must be managed in a way which minimizes the threat of fire, explosion, or any unplanned sudden or non-sudden release of hazardous waste to the air, soil or surface water which could threaten human health or the environment. Management techniques include containment areas capable of holding the contents of largest container within the containment area. Properly store and secure waste at all times. Do not leave hazardous waste in uncovered or unlocked trucks or dumpsters.
6. The ABATEMENT CONTRACTOR will perform inspections of their hazardous waste management areas at least weekly to ensure compliance with the regulations (22 CCR 66265.174).

F. Transportation and disposal requirements:

1. The PROJECT MONITOR will supply the ABATEMENT CONTRACTOR with the EPA Generator Identification number for each work site. These numbers are site specific and will only be used on hazardous waste disposal documentation for the appropriate site where the waste was generated.
2. A hazardous waste manifest will be completed in accordance with 22 CCR Chapter 12, Article 2 for each shipment of hazardous waste leaving the work site.
3. The submission of each manifest to the PROJECT MONITOR will be done as specified in Part 1, Section 1.3 of this document. A Certificate of Destruction or Recycling is required for each manifest where that method of disposal was used.
4. Only a PROJECT MONITOR pre-approved, licensed hazardous waste transportation company shall transport hazardous waste off site to a disposal location in accordance with 22 CCR Chapter 13. When the amount of hazardous waste generated at the site is 220 pounds or 25 gallons, the ABATEMENT CONTRACTOR shall arrange for disposal within 90 days or the end of the project, whichever comes first.

G. Management of specified wastes:

1. Non-Hazardous Solid Waste (As Determined by Testing)
 - a. Properly store and secure waste at all time. Do not leave debris in the yard or in uncovered or unlocked trucks or dumpsters. Do not contaminate the debris with asbestos or any other hazardous waste. Transport waste in covered or enclosed trucks or dumpsters.
2. NON-HAZARDOUS LIQUID WASTE: (As Determined by Testing)
 - a. Dispose of liquid waste by pouring into sanitary sewage system may occur if permission is received from the Industrial Waste Program at (858) 527-7600. Do not dispose of liquid waste by pouring onto ground or into storm drain.
3. Hazardous Materials Containers
 - a. All empty hazardous material containers must be managed as specified in 22 CCR 66261.7 and outlined as follows:
 - 1) A container is empty if the entire contents of a hazardous material has been used and if:
 - b. No liquid can pour or drain from the container when it is held in any orientation (e.g. inverted, tilted, etc.)
 - c. If not a liquid, all solid hazardous material has been removed by a physical method so that no more than a thin uniform film

remains in the container.

- 1) The hazardous material that is removed from the container is used as a material or disposed of as a hazardous waste.
- 2) Mark each container with the date it was emptied. Manage the container within one year by one of the following methods:
 - d. Reclaim the scrap value of the container.
 - e. Send the container off for reconditioning or re-manufacturing.
 - f. Send the container back to the manufacturer.
 - 1) For containers 5 gallons capacity or less, once the container is empty, it may be disposed of to the regular trash.
 - 2) Aerosol spray containers may be disposed of in the regular trash if the contents and propellant have been emptied to the maximum extent practical under normal use (i.e., the spray mechanism was not defective and thus allowed discharge of the contents and propellant.)
 - 3) A compressed gas cylinder is empty when the pressure in the container approaches atmospheric.

3.4 REMOVAL OF ASBESTOS-CONTAINING MATERIALS

A. Installation of Critical and Primary Barriers, and Work Area Isolation Procedures are set forth in this specification shall be in place and have been reviewed by the City's PROJECT MONITOR prior to any removal taking place.

B. Wet Removal

1. Thoroughly wet to satisfaction of City of San Diego's PROJECT MONITOR Asbestos-Containing Materials to be removed prior to stripping and/or tooling to reduce fiber dispersal into the air. Accomplish wetting by a fine spray (mist) of amended water or removal encapsulant. Saturate material sufficiently to wet to the substrate without causing excess dripping. Allow time for amended water or removal encapsulant to penetrate material thoroughly. If amended water is used, spray material repeatedly during the work process to maintain a continuously wet condition. If a removal encapsulant is used, apply in strict accordance with manufacturer's written instructions. Where necessary, carefully strip away while simultaneously spraying amended water or removal encapsulant on the installation to minimize dispersal of asbestos fibers into the air.
2. Mist work area continuously with amended water whenever necessary to reduce airborne fiber levels.
3. Remove saturated Asbestos-Containing Material in small sections

from all areas. Do not allow material to dry out. As it is removed, simultaneously pack material **while still wet** into disposal bags. Evacuate air from disposal bags with a HEPA filtered vacuum cleaner before sealing. Twist neck of bags, bend over and seal with minimum three wraps of duct tape. Clean outside of bags and move to Wash Down Station adjacent to Material Decontamination Unit. No asbestos-containing material shall remain on the floor overnight.

4. ASBESTOS SPRAYED-ON FIREPROOFING shall be removed under full negative pressure containment in accordance with this specification.
5. THERMAL SYSTEM INSULATION (TSI) shall be removed under full containment in accordance with this specification. Glove bags can only be used in individual rooms where three (3) or less glove bags are necessary to perform the required removal.
 - a. Glove bags may be used to remove a portion of pipe insulation when the pipe will be cut and removed with insulation intact. For this work practice, where all the insulation is not being removed, it shall be wrapped in six (6) millimeter plastic prior to performing the glovebag operation or cutting the pipe.
6. FLOOR TILE MASTIC agitated with “mechanical means” shall be removed within a full negative pressure containment in accordance with this specification.

APPENDIX A

ASBESTOS SUBMITTAL CHECKLIST

All submittal information is required as identified in Section 1.4. This check list is a guide to assist the ABATEMENT CONTRACTOR in completing their submittals and may not be all inclusive of submittals required by specification.

With bid documents, ABATEMENT CONTRACTOR shall submit:

- Two projects within the past five (5) years that are similar to scope of this project
 - Project name
 - Address
 - Contact person name and phone #
 - Scope of work
 - Dates of projects
 - Name of monitoring company, contact, and phone #
- Signed & notarized statement disclosing all OSHA and EPA citations, violations and/or criminal or civil convictions in the past (3) years

Within 10 business days of Notice to Proceed date:

- Permits, Licenses, Certifications, etc.

Prior to the project beginning:

- Work plan
 - Procedures that will be used
 - Drawings
 - Sequence of work
 - Methods to assure site and adjoining property safety
 - Method to ensure compliance with background levels
 - Method to reduce level of asbestos in work area
- Work site coordination
 - Contingency plan
 - Telephone and locations of emergency services
 - Notifications
 - ABATEMENT CONTRACTOR 24 hour emergency contact list with phone/pager #s
- ABATEMENT CONTRACTOR qualifications and personnel information
 - Staff names, certifications, and experience. Identify their duties on this project.
 - Certificates of worker's acknowledgment (form found in Appendix C)
- Respiratory Protection
 - Copy of respiratory protection program
 - Identification of respirators to be used on this project, related justification, dates of measurements and historical data
 - Work practices

- Medical related submittals as defined in Section 1.4
 - Medical history for all employees entering performing or entering the work area
 - Physical examination verification
 - Medical proof that employee can wear assigned respirator
- Hazardous waste management
 - Identification of wastes associated with the scope of work
 - Estimates of quantities of wastes to be generated along with type of container
 - Name, address, phone #, company representative name for each company managing the transpiration, treatment, storage, recycle and/or disposal
 - Name, address, phone #, company representative name, and related accreditation for all laboratories
 - Identify disposal location
- Rental equipment notifications
- Equipment and product information
- MSDSs for all products used on this project

During the project:

- Draft hazardous waste manifest 10 days prior to transport
- Daily construction reports as identified in Section 1.4
- Discovered conditions and unusual events
- Daily personnel laboratory results
- Weekly printout of differential monitoring equipment
- Visual inspection certification

At conclusion of project:

- Bound close out package

APPENDIX B

CERTIFICATE OF WORKER'S ACKNOWLEDGMENT

PROJECT NAME _____ DATE _____

PROJECT ADDRESS _____

CONTRACTOR'S NAME _____

Working with asbestos can be dangerous. Inhaling asbestos fibers has been linked with various types of cancer. If you smoke and inhale asbestos fibers the chance that you will develop lung cancer is greater than that of the non-smoking public.

Your employer's contract with the City for the above project requires that: You be supplied with the proper respirator and be trained in its use. You be trained in safe work practices and in the use of the equipment found on the job. You receive a medical examination. These things are to have been done at no cost to you.

RESPIRATORY PROTECTION: You must have been trained in the proper use of respirators, and informed of the type respirator to be used on the above referenced project. You must be given a copy of the written respiratory protection manual issued by your employer. You must be equipped at no cost with the respirator to be used on the above project.

TRAINING COURSE: You must have been trained in the dangers inherent in handling asbestos and breathing asbestos dust and in proper work procedures and personal and area protective measures. The topics covered in the course must have included the following:

- Physical characteristics of asbestos
- Health hazards associated with asbestos
- Respiratory protection
- Use of protective equipment
- Pressure Differential Systems
- Work practices including hands on or on-job training
- Personal decontamination procedures
- Air monitoring, personal and area

MEDICAL EXAMINATION: You must have had a medical examination within the past 12 months at no cost to you. This examination must have included: health history, pulmonary function tests and may have included an evaluation of a chest x-ray.

By signing this document you are acknowledging only that the City has advised you of your rights to training and protection relative to your employer, the ABATEMENT CONTRACTOR.

Signature _____ Social Security No. _____

Printed Name _____ Witness _____

APPENDIX C

CERTIFICATION OF VISUAL INSPECTION

In accordance with Section 1.6 "Project Decontamination" the ABATEMENT CONTRACTOR hereby certifies that he has visually inspected the Work Area (all surfaces including pipes, counters, ledges, walls, ceiling and floor, behind critical barriers, sheet plastic, etc.) and has found no asbestos, dust, debris or residue.

by: (Signature) _____ Date _____

(Print Name) _____

(Company Name)

(Print Title)

PROJECT MONITOR CERTIFICATION

The PROJECT MONITOR hereby certifies that he has accompanied the ABATEMENT CONTRACTOR on his visual inspection and verifies that this inspection has been thorough and to the best of his knowledge and belief, the ABATEMENT CONTRACTOR's certification above is a true and honest one.

by: (Signature) _____

Date _____

(Print Name)

(Company Name)

(Print
Title)

WORK AREA

Location: _____ Room: _____

This is the 1st __, 2nd __, 3rd __, other _____ inspection by the Contractor and Owner's PROJECT MONITOR of the above noted project and area.

SECTION 02090 – LEAD-CONTAINING COATINGS

Part 1 — GENERAL

1.1 WORK OF THIS SECTION

- A. The ABATEMENT CONTRACTOR shall provide all labor, equipment, tools and materials for the stabilization or removal of components with lead-based paint as identified.
- B. ABATEMENT CONTRACTOR Responsibility: The ABATEMENT CONTRACTOR shall assume full responsibility and liability for the compliance with all applicable Federal, State, and local regulations pertaining to work practices, transportation, disposal, and protection of workers, visitors to the site, and person occupying areas adjacent to the site. The ABATEMENT CONTRACTOR shall hold the OWNER and PROJECT MONITOR harmless for failure to comply with any applicable work, transportation, disposal, safety, health or other regulation on the part of himself, his employees, or his subcontractors.
- C. Uncontained disturbance or dislocation of lead containing materials may cause lead dust to be released into the atmosphere, thereby creating a potential health hazard to workers and area occupants. Apprise all workers, supervisory personnel, subcontractors and consultants who will be at the job site of the hazard and of proper work procedures which must be followed.
- D. Where in the performance of the work, workers, supervisory personnel, subcontractors, or consultants may encounter, disturb, or otherwise function in the immediate vicinity of any identified lead containing coating, take appropriate continuous measures as necessary to protect all adjoining property owners and project personnel from the potential hazard of exposure to lead dust. Such measures shall include the procedures and methods described herein, and compliance with regulations and guidelines of applicable federal, state and local agencies.
- E. A lead-containing coating survey has been performed. The purpose of the survey was to identify lead containing coating on materials scheduled for demolition. The survey was limited to readily accessible suspect coatings. Section 2000 provides summary of the survey and sample results. It shall be the ABATEMENT CONTRACTOR's responsibility to visit this project site before starting the Work, and to assess the exact amounts and types of lead containing coatings, as well as the physical difficulty involved in its complete removal.
- F. ABATEMENT CONTRACTOR shall follow all lead regulations, provide for worker protection, and employee environmental controls as defined in this specification.
- G. Storage, transportation, and disposal shall be done in accordance with this specification and applicable regulations.

1.2 DEFINITIONS

- A. Accreditation: A formal recognition that an organization (e.g. laboratory) is competent to carry out specific tasks or type of tests.
- B. Accredited laboratory: A laboratory that has been evaluated and given approval to perform a specified measurement or task (such as the National Lead Laboratory Accreditation Program), usually for a specific property or analyze for a specified period of time. The laboratory shall also be a state certified laboratory.
- C. Accredited Training Provider: means a training provider that meets the standards established by EPA to train risk assessors, inspectors, supervisors, and workers.
- D. Action Level: employee exposure, without regard to the use of respirators, to an airborne concentration of lead of 30 µg/m³ or air calculated as an 8-hour time-weighted average (TWA).
- E. Adhesion: the ability of dry coating or other coating to attach to or remain fixed on a surface without blistering, flaking, cracking, or being removed by tape.
- F. Blank: A non-exposed sample of the medium used for testing, such as a wipe or filter, which is analyzed like other samples to determine whether (1) samples are contaminated with lead before samples are collected (e.g., at the testing site), (2) the samples are contaminated after sample collection (e.g., during transportation to the laboratory or in the laboratory).
- G. Breathing Zone: A hemisphere forward of the shoulders with a radius of approximately 6 to 9 inches around the nose and mouth of the face.
- H. California Code of Regulations (CCR): The CCR is a codification of the regulations of the various State Agencies.
- I. Ceiling Concentration: The concentration of an airborne substance that shall not be exceeded.
- J. Certified Industrial Hygienist (CIH): An industrial hygienist certified by the American Board of Industrial Hygiene.
- K. Code of Federal Regulations (CFR): The basic component of the Federal Register publication system. The CFR is a codification of the regulations of the various Federal Agencies.
- L. Class 1 or Class II Landfill: A disposal facility or part of a facility where hazardous waste is place in or on land and which is not a land treatment facility, a surface impoundment, or an injection well.
- M. Competent Person: An agent of the ABATEMENT CONTRACTOR who is a Competent Person as defined in 8 CCR 1532.1. This person must be capable of identifying existing and predictable lead hazards in the surroundings or working conditions and who has authorization by the ABATEMENT CONTRACTOR to take prompt corrective measures to eliminate them.
- N. Detection Limit: The minimum of a component that a method can reliably measure.
- O. Exposure Monitoring: The personal air monitoring of an employee's breathing zone to determine the amount of contaminant (e.g. lead) to

which he/she is exposed.

- P. Federal Register: A document published daily by the Federal government that contains either proposed or final regulations.
- Q. Hazardous Waste (includes the definition identified in California Title 22): As defined in RCRA the term "hazardous waste" means a solid waste, or combination of solid wastes, which because of its quantity, concentration, or physical, chemical, or infectious characteristics may:
1. Cause, or significantly contribute to an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness; or
 2. Pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed.
 3. As defined in the regulations, a solid waste is hazardous if it meets one of four conditions:
 - a. Exhibits a characteristic of a hazardous waste (40 CFR Sections 261.20 through 262.24).
 - b. Has been listed as hazardous (40 CFR Section 261.31 through 261.33).
 - c. Is a mixture containing a listed hazardous waste and a non-hazardous solid waste (unless the mixture is specifically excluded or no longer exhibits any of the characteristics of hazardous waste).
 - d. Is not excluded from regulation as a hazardous waste.
- R. High Efficiency Particulate Air (HEPA): A filter capable of filtering out particles of 0.3 microns or greater from a body of air at 99.97% efficiency or greater.
- S. Micrograms (μg): The prefix "micro-" means "1/1,000,000 of" (one millionth of). A microgram is 1/1,000,000 of a gram and 1/1,000 of a milligram. A microgram is equal to about 35/1,000,000,000 (thirty-five billionths) of an ounce. 28,400,000 μg are equal to 1 ounce.
- T. Negative Pressure Respirator: A respirator in which the air pressure inside the respiratory-inlet covering is positive during exhalation in relation to the air pressure of the outside atmosphere and negative during inhalation in relation to the air pressure of the outside atmosphere.
- U. Permissible Exposure Limit (PEL): employee exposure to lead at concentration no greater than 50 $\mu\text{g}/\text{m}^3$ of air averaged over an 8-hour period TWA.
- V. Personal Monitoring: Sampling of the lead dust concentrations within the breathing zone of an employee.
- W. Personal Samples (for sampling lead dust): Air samples collected from within the breathing zone of a worker, but outside the respirator. The

samples are collected with a personal sampling pump, pulling 1 to 4 liters/minute of air.

- X. **PROJECT MONITOR:** The PROJECT MONITOR is a full-time representative of the OWNER at the job site during the lead related work. The PROJECT MONITOR has the authority to stop the work upon verbal order if requirement of the Contract Documents or regulations are not met, or if in the sole judgment of the PROJECT MONITOR or the interests of the OWNER, safety of any person or the Owner's property are jeopardized by the work.
- Y. **Protection Factor:** The ratio of the ambient concentration of an airborne substance to the concentration of the substance inside the respirator at the breathing zone of the wearer. The protection factor is a measure of the degree of protection provided by a respirator to the wearer.
- Z. **Respirator:** A device designed to protect the wearer from the inhalation of harmful atmospheres.
- AA. **Solid Waste:** As defined in RCRA the term "solid waste" means any garbage, refuse, sludge from a waste treatment plant, water supply treatment plant, or air pollution control facility and other discarded material, including solid, liquid, semisolid, or contained gaseous material resulting from industrial, commercial, mining, and agricultural operations, and from community activities, but does not include solid or dissolved material in domestic sewage, or solid or dissolved materials in irrigation return flows or industrial discharges which are point sources subject to permits under the Clean Water Act, or special nuclear or byproduct material as defined by the Atomic Energy Act of 1954.
- BB. **Soluble Threshold Limit Concentration (STLC):** A test which measures total soluble amount of 22 CCR listed heavy metals.
- CC. **Substantial Competition:** The work of this contract is substantially complete when clearance criteria set forth in the Contract Documents are met and the Work Area may be re-occupied by the OWNER.
- DD. **Time Weighted Average (TWA):** The average concentration of a contaminant in air during a specific time period.
- EE. **Toxicity Characteristic Leaching Procedure (TCLP):** A test, called the extraction procedure, that is designed to identify RCRA wastes likely to leach hazardous concentrations of particular toxic constituents into the ground water as a result of improper management. It is a characteristic of hazardous waste.
- FF. **Total Threshold Limit Concentration (TTLC):** A test which identifies the total amount of a specifically listed 22 CCR heavy metal.
- GG. **TSDF:** A hazardous waste transfer, treatment, storage, or disposal facility which has received a permit, a grant of interim status, or a variance or is otherwise authorized by law to receive specific hazardous wastes
- HH. **Waste Minimization:** The process or action which reduces, avoids, or eliminates the generation of hazardous waste. Minimization can also include substitution of a less hazardous product.
- II. **Wet Cleaning:** The process of eliminating lead dust contamination from

building surfaces and objects by using cloths, mops, or other cleaning utensils which have been dampened with a solution of an appropriate cleaner and afterwards thoroughly decontaminated or disposed of as lead contaminated waste.

- JJ. Work Area: The area where lead coating abatement or related work is performed which is defined and/or isolated to prevent the spread of lead dust, or debris, and entry by unauthorized personnel.
- KK. Work Practice: A procedure followed by workers that is intended to minimize exposure to the worker and the environment.

1.3 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

- A. Applicability of Standards: Except where the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.
- B. Publication Dates: Comply with the standards in effect as of the date of the Contract Documents.
- C. Conflicting Requirements: Where compliance with 2 or more standards is specified and where the standards may establish different or conflicting requirements for minimum quantities or quality levels, refer requirements that are different but apparently equal and uncertainties to the PROJECT MONITOR for a decision before proceeding.
 - 1. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of the requirements. Refer uncertainties to the PROJECT MONITOR for a decision before proceeding.
- D. Copies of Standards: Each entity engaged in construction on the Project is required to be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.
 - 1. Where copies of standards are needed to perform a required construction activity, the ABATEMENT CONTRACTOR shall obtain copies directly from the publication source.
- E. Abbreviations and Names: Trade association names and titles of general standards are frequently abbreviated. Where such acronyms or abbreviations are used in the Specifications or other Contract Documents, they mean the recognized name of the trade association, standards-generating organization, authority having jurisdiction, or other entity applicable to the context of the text provision. Refer to the

"Encyclopedia of Associations," published by Gale Research Co., available in most libraries.

F. Federal Requirements: which govern lead-containing coating abatement work or hauling and disposal of hazardous waste include but are not limited to the following:

1. OSHA: U.S. Department of Labor, Occupational Safety and Health Administration, (OSHA), including but not limited to:

- 29 CFR 1910.134 -Respiratory Protection
- 29 CFR 1926.20 -General safety and health provisions;
- 29 CFR 1926.21 -Safety training and education;
- 29 CFR 1926.23 -First Aid
- 29 CFR 1926.24 -Fire Protection
- 29 CFR 1926.25 -Housekeeping;
- 29 CFR 1926.28 -Personal protective equipment;
- 29 CFR 1926.51(f) -Washing facilities;
- 29 CFR 1926.55 -Gases, vapors, fumes, dusts, and mists;
- 29 CFR 1926.56 -Illumination
- 29 CFR 1926.57 -Ventilation;
- 29 CFR 1926.59 -Hazard Communication Standard;
- 29 CFR 1926.62 -Lead Construction Standard
- 29 CFR 1926.103 -Respiratory protection;
- 29 CFR 1926.353 -Ventilation: Welding, cutting or heating of metals of toxic significance.
- 29 CFR 1926.300, 301, 302 -Hand and power tools.
- 29 CFR 1926.451 -Scaffolding
- 29 CFR 1926.500, 502, 503 -Fall Protection

2. DOT: U. S. Department of Transportation, including but not limited to:

- 49 CFR 171 through 179 -Hazardous Substances

3. EPA: U. S. Environmental Protection Agency (EPA), including but not limited to:

40 CFR 260, 261,
262, 263 and 264

-Resource Conservation and Recovery Act
(RCRA)

40 CFR 745

-Lead Based Paint Activities: Training,
Certification, and Work Practice Requirements

G. California State Requirements: which govern lead coating abatement work or hauling and disposal of hazardous waste include but are not limited to the following:

8 CCR 5144

-Respiratory Protection

8 CCR 1509

-General safety and health provisions;

8 CCR 1510

-Safety training and education;

8 CCR 1512

-First Aid

8 CCR 1513

-Housekeeping;

8 CCR 1514

-Personal protective equipment;

8 CCR 1527

-Washing facilities;

8 CCR 1528

-Gases, vapors, fumes, dusts, and mists;

8 CCR 1523

-Illumination

8 CCR 1530

-Ventilation;

8 CCR 5194

-Hazard Communication Standard;

8 CCR 1532.1

-Lead Construction Standard

8 CCR 1531

-Respiratory protection;

8 CCR 1530

-Ventilation: Welding, cutting or heating
of metals of toxic significance.

8 CCR 1707

-Hand and power tools.

8 CCR 1637

-Scaffolding & Fall Protection

8 CCR 5156, 5157
and 5158

-Confined Spaces

22 CCR Div 4.5

-Management of Hazardous Waste

Health & Safety Code,
Div 20, Chapter 6.5

-Hazardous Waste Control Law

- H. Local Requirements: Abide by all local requirements which govern lead abatement work or hauling and disposal of hazardous waste materials.
- I. Building Codes: Comply with applicable provision of state and/or local building and construction codes that govern any part of the work.
- J. Model Codes: In the absence of an applicable adopted state or local building code which governs work involved in the lead abatement project, comply with the applicable provisions of the BOCA National Codes/1993 published by International Conference for Building Officials or the SBCCI Standard Codes published by Southern Building Code Congress International.

1.4 SUBMITTALS

- A. ABATEMENT CONTRACTOR shall submit complete copies of all lead paint coating submittals in accordance with this specification. Submittals shall be bound and organized by tabs labeled with matching paragraph numbers listed in 1.4.
- B. No work shall begin until a complete set of submittals listed below are returned with the PROJECT MONITOR's signature of approval indicating that the submittals have been accepted. Acceptance by the PROJECT MONITOR shall not be construed to imply approval of any particular method or sequence for addressing health, safety, and environmental concerns or to relieve ABATEMENT CONTRACTOR of the responsibility to adequately protect the environment as well as the health and safety of all workers involved in this project, all OWNER's employees, agents and other contractors in adjacent areas. ABATEMENT CONTRACTOR is solely responsible for all Work performed.
- C. Prior to commencement of work, examine areas in which work will be performed with the PROJECT MONITOR. Prepare a listing of damage to structure, surfaces, equipment or of surrounding properties which could be misconstrued as damage resulting from the work. Photograph or videotape existing conditions as necessary to document conditions. Submit to PROJECT MONITOR prior to starting work.
- D. Prior to the start of work, submit all the following to the PROJECT MONITOR:
 - 1. Lead-containing coating Work Plan: In addition to information required in this section, Work Plan shall contain all information required under 8 CCR 1532.1, Lead Compliance Program. Submit a detailed job-specific plan that includes:
 - a. The procedures proposed for use in complying with the requirements of this specification and all applicable regulations.
 - b. The sequencing of the work, the interface of trades involved in

the performance of work.

- c. The methods to be used to assure the safety of adjoining property owners and visitors to the site.
- d. The method of removal to reduce lead dust generation in the Work Area,

2. Work site coordination submittals including:

- a. Contingency Plan: Prepare a contingency plan for emergencies including fire, accident, power failure, or any other event that may require modification or abridgement of decontamination or Work Area isolation procedures. Note that nothing in this specification should impede safe exiting or providing of adequate medical attention in the event of an emergency.
- b. Telephone numbers and locations of emergency services including but not limited to fire, ambulance, doctor, hospital, police, power company, telephone company.
- c. Notifications:
 - 1) Notify emergency service agencies including fire, ambulance, police or other agency that may service the abatement work site in case of an emergency. Notification is to include methods of entering Work Area, emergency entry and exit locations, modifications to fire notification or fire-fighting equipment, and other information needed by agencies providing emergency services.
 - 2) Notifications of Emergency: Any individual at the job site may notify emergency service agencies if necessary without effect on this contract or the Contract Sum.
 - 3) Provide submittal identifying person responsible for responding to project site emergencies twenty-four a day, seven days a week.

3. ABATEMENT CONTRACTOR qualifications and personnel information submittals that include but are not limited to:

- a. Provide all staff names, certifications, and experience. Identify their duties and responsibilities on this project. ABATEMENT CONTRACTOR shall have the following minimum levels of qualified supervision on the project site:
 - 1) General Superintendent: Provide a full-time General Superintendent who is experienced in administration and supervision of lead coating wall demolition projects including work practices, protective measures for building and personnel, disposal procedures, etc. This person is the ABATEMENT CONTRACTOR's representative responsible for compliance with all applicable federal, state and local regulations and

guidelines.

- 2) **Foreman:** Provide a Foreman to directly supervise and direct no more than 10 abatement workers. Each Foreman will act as the Competent Person as required by 8 CCR 1532.1 for the workers the foreman is directing. The Foreman has oversight authority over the workers and reports to the General Superintendent. If there are 10 or fewer abatement workers on the project the General Superintendent may fill the Foreman's position.
 - 3) **Experience and Training:** The General Superintendent and foreman shall meet all the requirements as a Competent Person as required by OSHA 8 CCR 1532.1. They shall have completed training in Lead Paint Abatement Health and Safety for Supervisors and have obtained certification from the State Department of Health Services as a "lead supervisor". They shall have experience with projects of similar type and size.
 - 4) **Workers:** All lead abatement workers shall have current lead certifications from a State of California certified lead trainer as defined under 17 CCR.
 - 5) **Certificate of Worker's Acknowledgment:** Submit an original signed copy of the Certificate of Worker's Acknowledgment found in Appendix B, for each worker and supervisor who is to be at the job site or enter the Work Area.
4. Provide submittals related to respiratory protection as follows:
- a. Copy of ABATEMENT CONTRACTOR's respiratory protection program.
 - b. Submit level of respiratory protection intended for each operation required by the project. Copies of each worker's medical okay to wear a respirator.
 - c. Copies of each worker's current fit test for each type of respirator used on this project.
5. Medical submittals include but are not limited to the following:
- a. Provide full medical examinations for all workers performing lead related work and at first use of negative pressure respirators. Provide blood lead levels for all employees taken within two weeks of the start of this project. Provide medical examination for any employee who has signs and symptoms of lead poisoning or when a worker becomes pregnant.
 - b. Medical evaluation to include:
 - 1) A detailed work and medical history.
 - 2) A thorough physical examination.

- 3) Evaluation of pulmonary status.
 - 4) A blood pressure measurement.
 - 5) A blood sample and analysis that determines blood lead levels, hemoglobin and hematocrit, red cell indices, peripheral smear morphology, blood urea nitrogen, serum creatinine and zinc protoporphyrin.
 - 6) A routine urinalysis.
 - 7) Any other laboratory or other test which is recommended by the examining physician.
- c. The medical evaluation must be provided prior to the start of the lead hazard reduction project and/or assignment requiring the use of negative pressure respirators.
- d. Blood testing (blood lead and zinc protoporphyrin) shall be performed within 2 weeks prior to the start of the project. An additional blood test shall be performed within 5 days of completion of lead portion of project, the person being reassigned from this project, and/or upon termination of employment. The ABATEMENT CONTRACTOR must make available the following:
- 1) When an employee's blood lead level is at or above 20 µg/dl and/or increases more than 10 µg/dl at any time, biological monitoring at least every two weeks until two consecutive blood lead level results are below 20 µg/dl.
 - 2) When an employee's blood lead level meets the criterion for medical removal (at or above 25 µg/dl), follow-up blood testing within two weeks.
6. Hazardous waste management submittals shall include but not be limited to the following:
- a. Identification of hazardous wastes as associated with the scope of work and that will be generated by the means and methods used by ABATEMENT CONTRACTOR.
 - b. Provide estimates for the quantities of waste to be generated and disposed of. Include a description of what type of container will be used for each type of waste.
 - c. Name, address, phone number, company representative name, EPA Generator Identification number, insurance certificate for minimum \$1,000,000 pollution liability, and certifications/licenses/permits, for each company that will be managing the transportation, treatment, storage and/or disposal of the waste generated from this project.
 - d. Provide name, address, phone number, company representative name, all related accreditation paperwork for all laboratories that will be used in performing waste characterization.
 - e. Identify the disposal method which shall be utilized for each

type of waste generated. Specific disposal methods for some wastes are required and noted in this specification. The City's preference is in the following order:

- 1) Recycle
 - 2) Incinerate
 - 3) Landfill
- f. Prior to Transporting Waste Off Site (allow 72-hour review period):
- 1) Submit to the PROJECT MONITOR a draft hazardous waste manifest which will be used to ship each hazardous waste from the site to the disposal location.
 - 2) Submit a copy of the waste profile, as approved by the TSDf for each hazardous waste.
 - 3) The PROJECT MONITOR will return a draft hazardous waste manifest and waste profile with required changes (if needed) to the ABATEMENT CONTRACTOR within three working days of receipt.
 - 4) Inadequate or incorrect hazardous waste manifests or waste profiles will be returned to the ABATEMENT CONTRACTOR as often as necessary for the revision until the documents are approved by PROJECT MONITOR. A date for pickup and transportation of hazardous waste off-site shall not be scheduled until hazardous waste documents have been approved by PROJECT MONITOR.
- g. The Day the Waste is Transported Off Site:
- 1) The PROJECT MONITOR is the only authorized person to sign manifest as owner representative unless an additional person has been designated by PROJECT MONITOR.
 - 2) Any changes to the manifest after it has been approved must be cleared through the PROJECT MONITOR.
 - 3) Two copies of the original manifest shall be provided to PROJECT MONITOR prior to the transporter leaving the site.
7. Provide complete product information and intended use for all equipment that will be used in the performance of lead related work on this project. Including but not limited to the following:
- a. All equipment that will be used to perform lead related work.
 - b. Provide complete product information and manufactures instructions on all equipment used as engineering controls including but not limited to negative air machines and HEPA vacuums. Include maintenance records for all equipment that uses any type of filtration device that clearly shows filter

changes and number of hours on current filters. All machinery shall be clean prior to bringing to work site. PROJECT MONITOR shall inspect all equipment brought to site prior to its operation.

- c. Scaffolding: submit list of rolling and fixed scaffolding intended for use on the project. Submit sufficient detail to indicate compliance with applicable worker safety regulations or other requirements. Scaffolding over twenty feet shall be signed off by professional engineer. OSHA scaffold permit shall be submitted if required.
 - d. Decontamination Unit Sub-panel: Submit product data.
 - e. Ground Fault Circuit Interrupters (GFCI): Submit product data.
 - f. Lamps and Light Fixtures: Submit product data.
 - g. Self-Contained Toilet Units: Provide product data and name of sub-contractor used for servicing self-contained toilets. Submit method to be used for servicing.
 - h. First Aid Supplies: Provide list of contents of first aid kit. Submit in form of check list.
 - i. Fire Extinguishers: Provide product data. Submit schedule indicating location at job site.
8. Provide copies of all MSDS, manufactures instructions for use, and how ABATEMENT CONTRACTOR will use, for all products used on this project.
9. Daily Construction reports: Prepare a daily construction report, recording the following information concerning events at the site and provide one copy of this log to PROJECT MONITOR on a daily basis. Submit duplicate copies to the PROJECT MONITOR at weekly intervals:
- a. Meetings; purpose, attendees, brief discussion and significant decisions.
 - b. Visitations; authorized and unauthorized
 - c. Log of those entering and leaving Work Area including personnel, by name.
 - d. Accidents
 - e. Special or unusual events, i.e. Barrier breaching, Equipment failures, accidents
 - f. Documentation of ABATEMENT CONTRACTOR's completion of the following:
 - 1) Inspection of Work Area preparation prior to start of removal and daily thereafter.
 - 2) Removal of any sheet plastic barriers
 - 3) Removal of waste materials from Work Area

- 4) Decontamination of equipment (list items)
 - g. List of subcontractors at the site.
 - h. Approximate count of personnel at the site.
 - i. Stoppages, delays, shortages, losses.
 - j. Meter readings and similar recordings.
 - k. Emergency procedures.
 - l. Orders and requests of governing authorities.
 - m. Change Orders received, implemented.
 - n. Services connected, disconnected.
 - o. Equipment or system tests and start-ups.
 - p. Partial Completions.
 - q. Substantial Completions authorized.
 - r. ABATEMENT CONTRACTOR's final inspection.
 - s. Log of waste as accumulated - shall include:
 - 1) Date
 - 2) Barrel/container number (ABATEMENT CONTRACTOR shall use permanent barrel or container marking system).
 - 3) Waste description
 - 4) Accumulation start date
- 10. Except as otherwise indicated, submit special reports directly to PROJECT MONITOR within one day of occurrence requiring special report and to others affected by occurrence.
- 11. Reporting Unusual Events: When an event of unusual and significant nature occurs at site, within 24 hours prepare and submit a written special report to the PROJECT MONITOR listing chain of events, persons participating, response by ABATEMENT CONTRACTOR's personnel, evaluation of results or effects, and similar pertinent information. When such events are known or predictable in advance, advise the City in advance at earliest possible date.
- 12. Reporting Accidents: Prepare and submit written reports of significant accidents, at site and anywhere else work is in progress. Reports must be submitted to the PROJECT MONITOR within 24 hours after the accident occurs. Record and document data and actions; comply with industry standards. For this purpose, a significant accident is defined to include events where personal injury is sustained, or property loss of substance is sustained, where the event posed a significant threat of loss or personal injury, or where an OSHA 200 Log is required. A copy of an OSHA 200 Log

may be submitted for this purpose.

13. Report Discovered Conditions: When an unusual condition is discovered during the work (e.g. leaks, corrosion) prepare and submit a written special report to the PROJECT MONITOR indicating condition discovered.

E. Submit the following at the conclusion of the project:

1. Provide a bound closeout package that includes all information generated from this project.

1.5 TEST LABORATORY SERVICES

- A. Not in Contract Sum: This Section describes work being performed by the City's PROJECT MONITOR. This work is not in the Contract Sum.
- B. This Section describes air monitoring and surface lead dust wipe sampling carried out by the PROJECT MONITOR to verify that the area beyond the Work Area and outside environment remain uncontaminated. This Section also sets forth baseline levels that the ABATEMENT CONTRACTOR must comply with, and describes the action required if the levels are exceeded.
- C. Corrective Work triggered by this Section is part of the contract sum and is to be performed by the ABATEMENT CONTRACTOR at no additional cost to the City.
- D. Additional air monitoring required by OSHA and Section 1.9 AND 1.10 is work of the ABATEMENT CONTRACTOR and is not covered in this Section.
- E. Establish baseline lead concentration:
 1. Baseline air and surface wipe samples may be collected by the PROJECT MONITOR inside and outside the work area.
- F. Air and surface lead dust monitoring: The purpose of the City's air and surface lead dust monitoring will be to detect faults in the Work Area isolation which may cause contamination in and around the Work Area. Should any of the above occur, cease Hazard Reduction activities. Correct fault in Work Area isolation or work procedures at no cost to the City.
- G. Airborne lead concentrations during work: The City may monitor airborne lead concentrations inside and outside the Work Area.
 1. Inside Work Area: Maintain lead concentrations at lowest possible levels. Levels should not to exceed 30 µg/m³. If concentrations rise above this figure revise work procedures to lower lead levels.
 2. Outside Work Area: Maintain lead concentrations at lowest possible levels, not to exceed 5 % of baseline levels. If concentrations rise above 5 % of baseline levels, stop hazard reduction work and institute corrective actions. There should be no visible emissions outside of the Work Area. ABATEMENT CONTRACTOR shall submit

in writing the cause of lead concentration exceeding baseline and what corrective actions they will perform. Work will not continue until the PROJECT MONITOR has reviewed and approved the submittal.

- H. Personnel monitoring: The PROJECT MONITOR will not be performing air monitoring to meet ABATEMENT CONTRACTOR's OSHA requirements for personnel sampling. ABATEMENT CONTRACTOR shall provide sample results to the PROJECT MONITOR. Personnel samples shall be provided on a same day turn around basis for the first three days of work. Same day turn around shall be provided if the work activity changes and no personnel air monitoring has been performed for the same activity on this project. OSHA exposure monitoring shall be performed daily during abatement on personnel with the highest potential exposure. All other results shall be submitted to the PROJECT MONITOR within 24 hours of when sample was taken.

1.6 PROJECT CLEARANCE

- A. Not in Contract Sum: This Section describes work being performed by the City's PROJECT MONITOR. This work is not in the Contract Sum.
- B. This Section sets forth required surface lead dust concentration in the Work Area and describes testing procedures the City will use to measure these levels.
- C. Analytical methods: Atomic Absorption will be used for analysis of:
1. Surface lead dust wipe samples
 2. Air Samples
- D. Visual inspection:
1. Work of this Section 1.6 will not begin until the visual inspection described in Section 1.7 has been completed and certified by the PROJECT MONITOR.
 2. Clearance criteria:
 - a. Component Demolition: Clearance will be conducted on surfaces within the Work Area as identified by PROJECT MONITOR and regulated by the ABATEMENT CONTRACTOR.
 - b. Wipe Sampling Clearance: Decontamination is complete when every sample is at or below the following levels. If clearance levels are not satisfactory, the decontamination is incomplete and recleaning per Section 1.7. Project Decontamination is required at no additional cost to the City. Additional clearance testing required because of non-satisfactory clearance levels shall be charged to the ABATEMENT CONTRACTOR.

- 1) Interior Surface Areas: 250 micrograms per square foot.
- 2) Exterior Surface Areas: 1,000 micrograms per square foot or lowest achievable level due to lead levels not associated with dust.

1.7 PROJECT DECONTAMINATION

- A. Work Area Clearance: Wipe sample testing and other requirements which must be met before release of ABATEMENT CONTRACTOR and re-occupancy of the Work Area as specified in Section 1.6 Project Clearance.
- B. Work of This Section: includes the decontamination of surfaces and all equipment in the Work Area which have been, or may have been, contaminated by lead dust generated by the demolition activities.
- C. Preliminary First Cleaning:
 1. Preliminary Cleaning: Clean tools, ladders and equipment by HEPA vacuuming. Follow HEPA vacuuming with wet cleaning of all tools and equipment.
 2. Immediately following preliminary cleaning, mist and remove poly sheeting. Fold sheeting inward to trap any leaded dust or residue. Place sheeting in appropriate containers and dispose if in accordance with Section 3.2.
- D. Final Cleaning:
 1. HEPA Vacuum: All surfaces in Work Area.
 2. After Final Cleaning Perform a Complete Visual Inspection of the entire Work Area including: all surfaces and surfaces previously covered with barrier sheeting, look for debris from any source, residue on surfaces, dust or other matter. If any debris, residue, dust or other matter is found repeat final cleaning and continue decontamination procedure from that point. When the area is visually clean, complete the certification at the end of this Section. Visual inspection is not complete until confirmed in writing, on the certification, by PROJECT MONITOR.
- E. Perform final clearance sampling in accordance with Section 1.6 final clearance sampling.

1.8 CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS:

- A. General: Provide temporary connection to existing utilities or provide temporary facilities as required herein or as necessary to carry out the work. Use qualified tradesmen for installation of temporary services and facilities. Locate temporary services and facilities where they will serve the entire project adequately and result in minimum interference with the performance of the Work.

3. Require that tradesmen accomplishing this work be licensed as required by local authority for the work performed.

B. Water Service

1. Temporary Water Service Connection: All connections to the City's water system shall be done at the ABATEMENT CONTRACTOR's expense using a temporary construction meter and shall include backflow protection. Valves shall be temperature and pressure rated for operation of the temperatures and pressures encountered. After completion of use, connections and fittings shall be removed without damage or alteration to existing water piping and equipment. Leaking or dripping valves shall be piped to the nearest drain or located over an existing sink or grade where water will not damage existing finishes or equipment.
2. Water Hoses: Employ heavy-duty abrasion-resistant hoses with a pressure rating greater than the maximum pressure of the water distribution system to provide water into each Work Area and to each Decontamination Unit. Provide fittings as required to allow for connection to existing wall hydrants or spouts, as well as temporary water heating equipment, branch piping, showers, shut-off nozzles and equipment.
3. General: Water connection (without charge) to City's existing potable water system is limited to one 3/4" pipe-size connection, and a maximum flow of 10 gpm each to the hot and cold water supply lines. Install using vacuum breakers or other backflow preventer as required by the City.
4. Maintain hose connections and outlet valves in leak-proof condition. Where finish work below an outlet might be damaged by spillage or leakage, provide a drip pan of suitable size to minimize the possibility of water damage. Drain water promptly from pans as it accumulates.

C. Electrical service & equipment:

1. General: Comply with applicable NEMA, NECA and UL standards and governing regulations for materials and layout of temporary electric service. Provide equipment which is compatible with existing electrical characteristics and available power. If existing power is either incompatible or inadequate for performance of the Work, provide auxiliary generators(s) located outside of the building.
2. Temporary Power: Provide service to Decontamination Unit subpanel with minimum 60 amp, 2 pole circuit breaker or fused disconnect connected to the buildings main distribution panel. Subpanel and disconnect shall be sized and equipped to accommodate all electrical equipment required for completion of the

work.

3. **Voltage Differences:** Provide identification warning signs at power outlets which are other than 110-120 volt power. Provide polarized outlets for plug-in type outlets, to prevent insertion of 110-120 volt plugs into higher voltage outlets. Dry type transformers shall be provided where required to provide voltages necessary for work operations.
4. **Ground Fault Protection:** Equip all circuits for any purpose entering Work Area with ground fault circuit interrupters (GFCI). Locate GFCI's exterior to Work Area so that all circuits are protected prior to entry to Work Area. Provide circuit breaker type ground fault circuit interrupters (GFCI) equipped with test button and reset switch for all circuits to be used for any purpose in Work Area, decontamination units, exterior, or as otherwise required by national electrical code, OSHA or other authority. Locate in panel exterior to Work Area.
5. **Electrical Power Cords:** Use only grounded extension cords; use "hard-service" cords where exposed to abrasion and traffic. Use single lengths or use waterproof connectors to connect separate lengths of electric cords, if single lengths will not reach areas of work.
6. **Lamps and Light Fixtures:** Provide sealed quartz halogen construction lights, general service incandescent lamps or fluorescent lamps of wattage indicated or required for adequate illumination as required by the work or this Section. Protect lamps with guard cages where fixtures are exposed to breakage by construction operations. Provide lighting with a secure base to ensure that they will not be knocked over. Keep lights away from combustible materials.
7. **Circuit Protection:** Protect each tool or extension cord with a ground fault circuit interrupter (GFCI) of proper size. GFCI can be type that plugs into existing duplex outlets. Insure that outlet is properly grounded before installation of GFCI.
8. **General:** Provide a weatherproof, grounded temporary electric power service and distribution system of sufficient size, capacity, and power characteristics to accommodate performance of work during the construction period. Install temporary lighting adequate to provide sufficient illumination for safe work and traffic conditions in every area of work.
9. **Lockout:** Lockout all existing power to or through the Work Area as described below. Unless specifically noted otherwise existing power and lighting circuits to the Work Area are not to be used. All power and lighting to the Work Area is to be provided from temporary

electrical panel described below.

- a. Lockout power to Work Area by switching off all breakers serving power or lighting circuits in Work Area. Label breakers with tape over breaker with notation "DANGER circuit being worked on". Lock panel and have all keys under control of ABATEMENT CONTRACTOR's superintendent or PROJECT MONITOR.
 - b. Lockout power to circuits running through Work Area wherever possible by switching off all breakers serving these circuits. Label breakers with tape over breaker with notation "DANGER circuit being worked on". Sign and date danger tag. Lock panel and supply keys to ABATEMENT CONTRACTOR, City and PROJECT MONITOR. If circuits cannot be shut down for any reason, label at 4'-0" on center with tags reading, "DANGER live electric circuit. Electrocutation hazard."
10. Temporary Electrical Panel: Provide temporary electrical panel at ABATEMENT CONTRACTOR's expense, sized and equipped to accommodate all electrical equipment and lighting required by the work. Connect temporary panel to existing building electrical. Protect with circuit breaker or fused disconnect. Locate temporary panel as directed by City or PROJECT MONITOR.
 11. Power Distribution System: Provide circuits of adequate size and proper characteristics for each use. In general run wiring overhead, and rise vertically where wiring will be least exposed to damage from construction operations.
 12. Circuit Protection: Protect each circuit with a ground fault circuit interrupter (GFCI) of proper size located in the temporary panel. Do not use outlet type GFCI devices.
 13. Temporary Wiring: in the Work Area shall be type UF non-metallic sheathed cable located overhead and exposed for surveillance. Do not wire temporary lighting with plain, exposed (insulated) electrical conductors. Provide liquid tight enclosures or boxes for wiring devices.
 14. Number of Branch Circuits: Provide sufficient branch circuits as required by the work. All branch circuits are to originate at temporary electrical panel. At minimum provide the following:
 15. For power tools and task lighting, provide one temporary 4-gang outlet in the following locations. Provide a separate 110-120 Volt, 20 Amp circuit for each 4-gang outlet (4 outlets per circuit).
 16. One outlet in the Work Area for each 2500 square feet of Work Area
 - a. One outlet at each decontamination unit, located in equipment room

17. 110-120 volt 20 amp branch circuits with 4-gang outlet for City's exclusive use while conducting air sampling during the work as follows:
 - a. One in each Work Area
 - b. One at clean side of each Decontamination Unit.
18. Temporary lighting - regulated areas: Provide sufficient temporary lighting to ensure proper workmanship everywhere; by combined use of daylight, general lighting, and portable plug-in task lighting. Circuit Protection: Protect each light with a ground fault circuit interrupter (GFCI) of proper size. GFCI can be type that plugs into existing duplex outlets. Insure that outlet is properly grounded before installation of GFCI.
19. ABATEMENT CONTRACTOR shall provide power and sufficient power chords for all monitoring and sampling requirements of the City's PROJECT MONITOR.

D. Fire extinguishers:

1. Provide type "ABC" dry chemical extinguishers, or a combination of several extinguishers of NFPA recommended types for the exposures in each case. Comply with the applicable recommendations of NFPA Standard 10 "Standard for Portable Fire Extinguishers". Locate the appropriate class of fire extinguishers where they are most convenient and effective for their intended purpose.

E. Storage facilities:

1. Storage: The ABATEMENT CONTRACTOR shall provide a temporary construction trailer as a storage area for tools, equipment and supplies. Waste generated during abatement shall be stored in a secured area in addition to above. Security of all equipment and hazardous waste is responsibility of ABATEMENT CONTRACTOR.

1.9 WORKER PROTECTION

- A. Competent person: Provide on-site, full time competent person (or persons) to ensure that the worker protection program is effective. Competent person shall be certified by the California Department of Health Services as a Lead Supervisor.
- B. Lead worker training: All workers and supervisors are to be certified by the California Department of Health Services in their respective discipline.
- C. Medical removal:
 1. Employers must remove employees with lead exposure at or above 30 micrograms/cubic meter of air each time:
 - a. A periodic and follow-up blood sampling test indicates a blood

lead level at or above 25 µg/dl; and

- b. A final medical determination indicates a detectable medical condition that increases health risks from lead exposure.

D. Compliance program:

1. The CAL-OSHA Lead in Construction Standard requires the employer to establish and implement a written compliance program prior to the commencement of a job. All employees covered under this standard must implement engineering and work practice controls to reduce and maintain employee exposures to lead at or below the Permissible Exposure Limit (PEL). This program must include:
 - a. Description of activities that produce lead exposures.
 - b. Description of the specific means that will be employed to reduce exposure, and where engineering controls are used, the plans and studies used to determine the methods selected.
 - c. A detailed schedule for implementing the compliance program.
 - d. A report of the technology considered in meeting the PEL.
 - e. Air monitoring data that documents the source of the lead exposure.
 - f. Specific work practice procedures which will be employed on the project.
 - g. A schedule of administrative controls if these are to be utilized.
 - h. A description of all arrangements made on multi-employer work sites to inform affected employers about the lead project.

E. Exposure assessment:

1. The CAL-OSHA Lead in Construction Standard requires employers to implement protective measures before exposure assessment has been completed if they are conducting any one of a number of "lead related tasks". These tasks are divided into three different classes. The employer must assume that the worker is exposed to airborne concentrations at least to a certain level of lead (depending on the class) until exposure assessment shows otherwise. When the employer has objective data demonstrating that the process, operation or activity does not result in employee exposure to lead at or above the action level, the employer may rely upon such data for the initial exposure assessment.
2. Class 1 Tasks - Employer must assume exposure of at least 50 µg/m³ - 500 µg/m³ until exposure assessment proves otherwise. Examples include:
 - a. Manual demolition of structures;
 - b. Manual scraping;

- c. Manual sanding;
 - d. Using a heat gun;
 - e. Power tool coating removal with dust collection systems;
 - f. Spray painting with lead-based paint.
3. Class 2 Tasks - Employers must assume exposure of at least 500 $\mu\text{g}/\text{m}^3$ - 2500 $\mu\text{g}/\text{m}^3$ until exposure assessment proves otherwise. Examples include:
- a. Using lead containing mortar;
 - b. Burning lead;
 - c. Rivet busting on lead-containing coating;
 - d. Power tool coating removal without dust collection systems;
 - e. Clean up activities where dry expendable abrasives are used;
 - f. Abrasive blasting enclosures movement and removal.
4. Class 3 Tasks - Employer must assume exposure of at least 2,500 $\mu\text{g}/\text{m}^3$ until exposure assessment proves otherwise. Examples include:
- a. Abrasive blasting;
 - b. Cutting;
 - c. Welding;
 - d. Torch burning.
5. Prior to the completion of an exposure assessment of the tasks being conducted, the employer should follow the regulations as if the employee was exposed above the PEL. The employee(s) must be notified in writing within 5 days of receipt of the results representing their exposure. Where exposure is above the PEL, employees must be informed of this fact and advised of corrective action to be taken. Monitoring and analysis must have an accuracy (to a confidence level of 95%) of not less than plus or minus 25% for airborne lead levels equal to or greater than 30 $\mu\text{g}/\text{m}^3$.
6. Personal protective equipment for each of the tasks above is to include protective work clothing and equipment, change areas, washing facilities, and training. The only difference in protective equipment for the different classes of tasks is respiratory protection which is to be provided in accordance with Section 1.10.

F. Shower facilities:

- 1. Provide shower facilities to be used by all workers when lead air concentrations are expected to exceed 20 $\mu\text{g}/\text{m}^3$ or exterior surface lead dust concentrations exceed 1,000 $\mu\text{g}/\text{ft}^2$.

2. Provide pre-fabricated or site-built shower facilities. Supply hot and cold water to shower head which can be controlled from inside shower. Filter all shower water or dispose of in accordance with Section 3.2.
3. Supply a sufficient quantity of soap and disposable towels for the workers and authorized visitors.

G. Washing facilities:

1. Provide washing facilities to be used by all workers when exiting the Work Area.
2. Provide temporary sink with adjustable hot and cold water supply. Filter all water, collect in holding tank and dispose of in accordance with Section 3.2.
3. Supply a sufficient quantity of soap and disposable towels for the workers and authorized visitors.
4. Provide a wash basin for cleaning foot wear used in the Work Area.

H. Where the eyes of employees may be exposed to injurious corrosive materials, suitable facilities for flushing of the eyes shall be provided within the Work Area for immediate emergency use.

I. General:

1. Provide worker protection as required by the most stringent OSHA and/or EPA standards applicable to the work. The following procedures are minimums to be adhered to regardless of lead concentration in the Work Area.
2. Each time Work Area is entered remove street clothes and put on new disposable coverall or (re-use previous coverall if not overly contaminated or torn), new head cover, and a clean respirator with cartridges appropriate for the abatement work to be performed. Reinforce coverall seams and secure gloves to coveralls with duct tape. Proceed through Change Room, don foot covers, hood, gloves, etc., and enter Work Area.

J. Decontamination procedures:

1. Require all workers to adhere to the following personal decontamination procedures whenever they leave the Work Area:
2. Air Purifying-Negative Pressure Respirators: Require that all workers use the following decontamination procedure as a minimum requirement whenever leaving the Work Area with a half or full-face cartridge type respirator:
 - a. Still wearing respirators, comply with the following procedure.

Care must be taken to follow reasonable procedures in removing the respirator and filters to avoid disturbing lead dust. The following procedure is required as a minimum:

- 1) HEPA vacuum heavily contaminated protective work clothing.
 - 2) When exiting Work Area, remove foot covers in Work Area. Remove disposable coveralls and disposable head covers in the Change Room. Remove protective coveralls by carefully rolling down the garment to minimize exposure to lead dust.
 - a. Remove respirator and set aside.
 - b. Thoroughly wash hands and face with soap and water. If shower facilities are available, proceed to shower and shower completely with soap and water.
 - c. Remove respirator cartridges from face piece and either seal with duct tape or discard.
 - d. Carefully wash face piece of respirator inside and out.
 - e. Thoroughly wash hands with soap and water.
3. Powered Air Purifying Respirators: Require that all workers use the following decontamination procedure as a minimum requirement whenever leaving the Work Area with a PAPR:
- a. Still wearing respirators, comply with the following procedure. Care must be taken to follow reasonable procedures in removing the respirator and filters to avoid disturbing lead dust. The following procedure is required as a minimum:
 - 1) HEPA vacuum heavily contaminated protective work clothing.
 - 2) When exiting Work Area, remove foot covers in Work Area. Remove disposable coveralls and disposable head covers in the Change Room. Remove protective coveralls by carefully rolling down the garment to minimize exposure to lead dust.
 - a. Remove respirator, cap filter cartridges, shut blower unit off and set aside. Thoroughly wash hands and face with soap and water. If shower facilities are available, proceed to shower and shower completely with soap and water.
 - b. Carefully wash face piece of respirator inside and out. Wet wipe blower unit, hose and battery pack. Do not allow battery pack terminals to get wet. Do not remove respiratory cartridges unless wet. If wet, remove respirator cartridges from blower unit and discard.
 - c. Thoroughly wash hands with soap and water.
4. Within Work Area:

- a. Require that workers NOT eat, drink, smoke, chew tobacco or gum, or apply cosmetics in the Work Area. To eat, chew, drink or smoke, workers shall follow the procedure described above before entering the Non-Work Areas of the building or exterior.

K. Certificate of worker's acknowledgment:

1. In Appendix B is a Certificate of Worker Training. After each worker has been included in the ABATEMENT CONTRACTOR's Respiratory Protection Program, completed the training program and medical examination, secure a fully executed copy of this form.

1.10 RESPIRATORY PROTECTION

A. Description of work

1. Instruct and train each worker involved in lead-related work in proper respiratory use and require that each worker wear a respiratory, properly fitted on the face in the Work Area from the start of any operation which may expose the worker above the permissible exposure limit (PEL) until the Work Area is completely decontaminated. Use respiratory protection appropriate for the lead levels encountered in the work place or as required for other toxic or oxygen-deficient situations encountered.

B. General:

1. Respiratory Protection Program: Comply with ANSI Z88.2 - 1992 "Practices for Respiratory Protection" and OSHA 8 CCR 1544.
2. Require that respiratory protection be used at all time that there is any possibility of airborne lead levels exceeding the permissible exposure level required in OSHA 8 CCR 1532.1
3. Require that a respirator be worn by anyone in a Work Area at all time, regardless of activity, during a period that starts with any operation which could cause disturbance of lead coating or dust, until the area has met the requirements of Section 1.6 or Section 1.7.
4. Regardless of Airborne Lead Levels or Surface Dust Contamination: Require that the minimum level of respiratory protection used will be a half-face air-purifying respirator with high efficiency filters.
5. Do not allow the use of single-use, disposable, or quarter-face respirators for any purpose.

C. Fit testing:

1. Initial Fitting: Fit the type of respirator to be worn by each individual. Require that an individual use only those respirators for which training and fit testing has been provided. Require that fit

- testing be repeated annually, and at any time a respirator is replaced.
2. Yearly: Check the fit of each worker's respirator by having irritant smoke blown onto the respirator from a smoke tube.
 3. Upon Each Wearing: Require that each time an air-purifying respirator is put on it be checked for fit with a positive and negative pressure fit check.
- D. Permissible exposure limit (PEL):
1. Permissible Exposure Limit (PEL-TWA) - 50 micrograms/cubic meter
 2. Action Level (TWA) - 30 micrograms/cubic meter
- E. Air purifying respirators: Appropriate type of respiratory shall be determined by ABATEMENT CONTRACTOR.
1. Negative pressure: Half or full-face mask: Supply a sufficient quantity of respirator HEPA filters approved for lead, so that workers can change filters as necessary. Require that respirators be wet-rinsed, and filters discarded or covered with duct tape, each time a worker leaves the Work Area. Store respirators and filters at the job site in the changing room and protect totally from exposure to lead prior to their use. Respirator cartridges must be replaced whenever a worker experiences increased breathing resistance.
 2. Powered air purifying: Half or full-face mask: Supply a sufficient quantity of high efficiency respirator filters approved for lead so that workers can change filters at any time that flow through the face piece decreases to the level at which the manufacturer recommends filter replacement. Require that regardless of flow, filter cartridges be replaced after 40 hours of use. Require that HEPA elements in filter cartridges be protected from wetting during personal decontamination. Require entire exterior housing of respirator, including blower unit, filter cartridges, hoses, battery pack, face mask, belt, and cords, be washed each time a worker leaves the Work Area. Caution should be used to avoid shorting battery pack during washing. Provide an extra battery pack for each respirator so that one can be charging while one is in use.

1.11 GENERAL PROVISIONS

- A. **Stop Work:** If the PROJECT MONITOR presents a written or verbal stop work order, or if stop work levels as set forth in the Contract Documents are exceeded, immediately and automatically stop all work. Do not recommence work until authorized in writing by the PROJECT MONITOR.
- B. Before the beginning of the lead-related work, ABATEMENT CONTRACTOR

shall hold a safety construction meeting with all lead related supervisors, workers, and other contractors on-site that provides an overview of the accepted lead work plan, decontamination procedures specific to this project (decontamination procedures shall be on paper with copies for all present), and disposal plan for this project. Meeting shall include the PROJECT MONITOR, CONSTRUCTION MONITOR, and any other designated City representative. Meeting time shall be provided for the PROJECT MONITOR to introduce themselves and identify their role in this project.

Part 2 — PRODUCTS

2.1 MISCELLANEOUS PRODUCTS

- A. Duct Tape: Provide 2" (51mm) width tape with an adhesive which is formulated to aggressively stick to sheet polyethylene.
- B. Wet Cleaning Solution: Provide appropriate cleaning agent formulated to be effective in removing lead dust. Follow dilution ratio recommended by the manufacturer's instructions.
- C. Plastic Sheet: A single polyethylene film in the largest sheet size possible to minimize seams, 4.0 or 6.0 mils thick.

2.2 PROTECTIVE CLOTHING:

- A. Disposable Coveralls: Provide disposable full-body coveralls and disposable head covers, and require that they be worn by all workers in the Work Area. Provide a sufficient number for all required changes, for all workers in the Work Area. Dispose of coveralls as clothing waste at the end of each day.
- B. Coveralls: Provide cloth full-body coveralls and hats, require that they be worn by all workers in the Work Area. Require that workers change out of coverall in the Equipment Section of the Change Room. Dispose of coverall as clothing waste at completion of all work.
- C. Shoe Covers: Provide disposable shoe covers and require that they be worn by all workers in the Work Area. Shoe covers must be replaced each time a worker leaves the Work Area. Shoe covers are disposed as clothing waste in the Equipment Section of the Change Room.
- D. Boots: Provide work boots with non-skid soles, and where required by OSHA, foot protection, for all workers. Provide boots at no cost to workers. Do not allow boots to be removed from the Work Area for any reason, after being contaminated with lead dust. Dispose of boots with clothing waste at the end of the work, or bag and take to next project. Boots that are non-porous may be decontaminated and removed from Work Area.
- E. Hard Hats: Provide head protection (hard hats) as required by OSHA for all workers, and provide 4 spares for use by PROJECT MONITOR and City. Require hard hats to be worn at all time that work is in progress that may potentially cause head injury. Provide hard hats of type with plastic strap type suspension. Require hats to remain in the Work Area throughout the work. Thoroughly clean and decontaminate hats before removing them from Work Area at the end of the project.

- F. Goggles and Face Shields: Provide eye and face protection (goggles or face shields) as required by OSHA for all workers involved in scraping, spraying, stripping or any other activity which may potentially cause eye or face injury. Thoroughly clean and decontaminate goggles or face shields before removing them from Work Area at the end of the project.
- G. Gloves: Provide work gloves to all workers and require that they be worn at all time in the Work Area. Chemical resistant gloves must be provided when using chemical strippers to remove lead coating. Gloves must be secured to the coveralls using duct tape to protect arms and hands from the chemical strippers. Do not remove gloves from Work Area. Dispose of as clothing waste at the end of the work.
- H. Disposable coveralls, head covers, gloves, and footwear covers shall be provided by the ABATEMENT CONTRACTOR for the City, PROJECT MONITOR, and other authorized representatives who may inspect the job site as needed

2.3 RESPIRATORY

- A. Respirators, and respirator filters, disposable coveralls, head covers, and footwear covers shall be provided by the ABATEMENT CONTRACTOR for the City, PROJECT MONITOR, and other authorized representatives who may inspect the job site as needed
- B. Respirator Product Data: Submit manufacturer's product information for each component used, including NIOSH Certifications for each component in an assembly and/or for entire assembly.

Part 3 — EXECUTION

3.1 INTERIOR REGULATED AREA

- A. Securing work area:
 1. Secure Work Area from access by public, staff or users of the area. Accomplish this where possible, by locking doors, gates, or other means of access to the area.
 2. One layer of 6-mil thick plastic shall be used to protect the floor and other non-movable objects that remain in the work area. All overlaps and seams shall be taped. The contractor is responsible for ensuring the removal of all existing movable, i. e. trash, furniture and fixtures, etc.
 3. Wood pony walls in the MAST area require a hard encasement type of protection to prevent any damage to the walls. These walls will be identified to the ABATEMENT CONTRACTOR by the City PROJECT MONITOR prior to start of work
 4. Shut down and isolate (by means of one layer of 6 mil plastic sheeting) heating, cooling and ventilating air systems to prevent

contamination and lead dust dispersal to other areas of the structure. During the work, vents or openings within the work area shall be sealed with tape and plastic sheeting.

5. Seal off all openings, including but not limited to corridors, doorways, skylights, ducts, grilles, or diffuser openings and any other penetrations of the work areas, with two layers of 6 mil plastic sheeting sealed with tape. Doorways and corridors that will not be used for passage during work must be sealed with 6-mil plastic barriers.
6. Build airlocks at entrances to and exits from the work area. Airlocks should be built in a manner that allows for in-flow air. Make-up air shall be admitted through specially constructed vents which prevent contaminated air from leaving the work area.
7. Establish a HEPA filter ventilation system with Negative Air Machines to produce 4 air changes per hour in the work area.

B. Interior procedures for wall demolition:

1. The following precautions and procedures have application to the work of this Section. Workers must exercise caution to avoid the release of lead dust into the air and to contain lead dust and debris on drop sheet.
2. Before start of work comply with requirement for worker protection in Section 1.9 and respiratory protection in Section 1.10.
3. Do not allow eating, drinking, smoking, chewing tobacco or gum, or applying cosmetics in the regulated area.
4. Asbestos is present on the ceiling tile and grid. Any disturbance of the ceiling tile or grid must be performed under full negative pressure containment with all the provisions specified in the Asbestos Abatement section of this Specification.
5. Lead containing surfaces must be kept wet during the demolition.
6. Perform frequent clean-up of waste generated by the demolition. A thorough clean-up must be performed at the end of each day.
7. On a periodic basis throughout the day, collect dust and debris by HEPA vacuuming and/or by wet sweeping the surfaces.
8. On a periodic basis throughout the day inspect all containment barriers for rips/tears and delaminating tape. Make repairs immediately.
9. Daily, and during final cleanup, visually examine the immediate area to ensure that no lead debris has escaped containment. Wet sweep

or HEPA vacuum up any debris found and place in appropriate hazardous waste labeled container. Securely store with other waste.

3.2 DISPOSAL OF HAZARDOUS WASTE

- A. This Section describes the disposal of hazardous waste generated while performing work for this project and includes packaging, labeling, storage, containment, and disposal of hazardous wastes. Disposal of the lead containing waste shall be by incineration.
- B. Employee training: Any contracted employee who manages hazardous waste must be trained to ensure compliance with the regulations. All contracted staff working at the job site must be able to respond effectively to emergency situations including chemical spills (22 CCR 66265.16).
- C. Waste minimization:
 - 1. The ABATEMENT CONTRACTOR is required to make all reasonable efforts to minimize the amount of hazardous waste generated from this project.
 - 2. Lead coated construction debris with intact coating may be disposed of as non-hazardous waste if testing shows it is below hazardous waste thresholds.
- D. Waste characterization:
 - 1. Lead debris and lead contaminated items generated on site must be assumed to be hazardous or tested within 10 days of generation to determine if it meets hazardous waste criteria as specified in 22 CCR Division 4.5 or any other pertinent law or regulation. These include but are not limited to the following:
 - 2. Paint chip debris and dust.
 - 3. Disposable suits and respirator filters used inside work area.
 - 4. Plastic sheeting from within work area that has not been thoroughly cleaned by HEPA-vacuuming and/or wet-wiping.
 - 5. Rags, sponges, etc. used to clean lead dust off surfaces and equipment.
- E. Pre-transportation requirements:
 - 1. Any packaging used to ship hazardous waste off site must comply with 49 CFR Parts 173, 178, 179 and be labeled and prepared for transportation in accordance with 22 CCR Article 3.
 - 2. The hazardous waste label must be affixed and filled out when the first amount of hazardous waste is placed in the container. The label must include the initial accumulation date.

3. All additional pre-transportation labeling, marking or placarding must be conducted prior to transporting off site and in accordance with 22 CCR Chapter 12, Article 3.
4. All containers used to package the hazardous waste must be compatible with the waste (22 CCR 66265.172), maintained in good condition (22 CCR 66265.171) and kept closed unless adding or removing waste (22 CCR 66265.173).
5. All containers of hazardous waste must be managed in a way which minimizes the threat any unplanned sudden or non-sudden release of hazardous waste to the air, soil or surface water which could threaten human health or the environment. Management techniques include containment areas capable of holding the contents of largest container within the containment area. Properly store and secure waste at all time. Do not leave hazardous waste in uncovered or unlocked trucks or dumpsters.
6. The ABATEMENT CONTRACTOR will perform inspections of their hazardous waste management areas at least weekly to ensure compliance with the regulations (22 CCR 66265.174).

F. Transportation and disposal requirements:

1. The PROJECT MONITOR will supply the ABATEMENT CONTRACTOR with the EPA Generator Identification number for each work site. These numbers are site specific and will only be used on hazardous waste disposal documentation for the appropriate site where the waste was generated.
2. A hazardous waste manifest will be completed in accordance with 22 CCR Chapter 12, Article 2 for each shipment of hazardous waste leaving the work site.
3. The submission of each manifest to the PROJECT MONITOR will be done as specified in Part 1, Section 1.3 of this document. A Certificate of Destruction or Recycling is required for each manifest where that method of disposal was used.
4. Only a PROJECT MONITOR pre-approved, licensed hazardous waste transportation company shall transport hazardous waste off site to a disposal location in accordance with 22 CCR Chapter 13.

G. Management of specified wastes:

1. Non-Hazardous Solid Waste
 - a. Properly store and secure waste at all time. Do not leave debris in the yard or in uncovered or unlocked trucks or dumpsters. Do not contaminate the debris with lead contaminated materials/wastes or any other hazardous waste. Transport waste in covered or enclosed trucks or dumpsters. Do not

permit recycling of building components coated with lead-containing coating. Non-hazardous solid waste includes:

- 1) Plastic sheeting and duct tape used during abatement.
- 2) Construction debris where the coating is adhered to the surface.

2. NON-HAZARDOUS LIQUID WASTE: (As Determined by Testing)

- a. Dispose of liquid waste by pouring into sanitary sewage system may occur if permission is received from the Industrial Waste Program at (858) 527-7600. Do not dispose of liquid waste by pouring onto ground or into storm drain. Remove Stripper Sludge: Place lead containing stripper sludge in corrosion-proof containers and place in a secure waste storage area. The surface from which lead-containing coating has been removed shall be thoroughly scrubbed, while still damp from the stripper, in accordance with the manufacturer's recommendation. Monitor pH of the neutralizing solution to ensure it has not become neutralized in the process. If the pH exceeds 6.5, or the solution becomes overly soiled, change solution. Solution may be classified as hazardous waste. Place in 55-gallon drums and test in accordance with Section 3.2 - Disposal of Hazardous Waste. The surface shall be tested to determine that the pH is in the range of 6 - 10. If not, ABATEMENT CONTRACTOR shall use appropriate methods as identified in their work plan to neutralize.

H. Complete Project Decontamination Requirements of Section 1.7 - Project Decontamination.

LEAD APPENDIX A

SUBMITTAL CHECKLIST FOR THE ABATEMENT CONTRACTOR

All submittal information is required as identified in Section 1.4. This check list is a guide to assist the ABATEMENT CONTRACTOR in completing their submittals and may not be all inclusive of submittals required by specification.

With bid documents, ABATEMENT CONTRACTOR shall submit:

- Two projects within the past five (5) years that are similar to scope of this project
 - Project name
 - Address
 - Contact person name and phone #
 - Scope of work
 - Dates of projects
 - Name of monitoring company, contact, and phone #
- Signed & notarized statement disclosing all OSHA and EPA citations

Within 10 business days of Notice to Proceed date:

- Permits, Licenses, Certifications, etc.

Prior to the project beginning:

- Work plan
 - Procedures that will be used
 - Drawings
 - Sequence of work
 - Methods to assure site and adjoining property safety
 - Method to ensure compliance with background levels
 - Method to reduce level of lead dust in work area
 - Compliance plan as required by 8 CCR 1532.1
- Work site coordination
 - Contingency plan
 - Telephone and locations of emergency services
 - Notifications
- ABATEMENT CONTRACTOR qualifications and personnel information
 - Staff names, certifications, and experience. Identify their duties on this project.
 - Certificates of worker's acknowledgment (form found in Appendix C)
- Respiratory Protection
 - Copy of respiratory protection program
 - Identification of respirators to be used on this project, related justification and historical data
- Medical related submittals as defined in Section 1.4
 - Blood lead tests taken 14 days prior to project beginning

- Hazardous waste management
 - Identification of wastes associated with the scope of work
 - Estimates of quantities of wastes to be generated along with type of container
 - Name, address, phone #, company representative name for each company managing the transpiration, treatment, storage, and/or disposal
 - Name, address, phone #, company representative name, and related accreditation for all laboratories
- Rental equipment notifications
- Equipment and product information
- MSDSs for all products used on this project

During the project:

- Draft hazardous waste manifest 10 days prior to transport
- Daily construction reports as identified in Section 1.4
- Daily personnel laboratory results
- Visual inspection certification

At conclusion of project:

- Blood leads of all workers and supervisors that performed work on project
- Close out package

LEAD APPENDIX B

CERTIFICATE OF ABATEMENT WORKER'S ACKNOWLEDGMENT

PROJECT NAME _____ DATE _____

PROJECT ADDRESS _____

CONTRACTOR'S NAME _____

Working with lead can be dangerous. Inhaling and ingesting lead dust can cause an increase in blood lead levels which can lead to adverse health effects such as kidney damage, elevated blood pressure or infertility.

Your employer's contract with the City for the above project requires that: You be supplied with the proper respirator and be trained in its use. You be trained in safe work practices and in the use of the equipment found on the job. You receive a medical examination. These items are to have been done at no cost to you.

RESPIRATORY PROTECTION: You must have been trained in the proper use of respirators, and informed of the type respirator to be used on the above referenced project. You must be given a copy of the written respiratory protection manual issued by your employer. You must be equipped at no cost with the respirator to be used on the above project.

TRAINING COURSE: You must have been trained in the dangers inherent in handling lead and breathing and ingesting lead dust and in proper work procedures and personal and area protective measures. The topics covered in the course must have included the following:

- Possible routes of exposure to lead
- Health hazards associated with lead
- Respiratory protection
- Use of protective equipment
- Work practices including hands on or on-the-job training
- Personal decontamination procedures
- Health and safety considerations

MEDICAL EXAMINATION: You must have had a medical examination within the past 12 months at no cost to you. This examination must have included: health history, physical examination, a blood pressure measurement, pulmonary function test and blood sample and analysis for lead.

By signing this document, you are acknowledging only that the City has advised you of your rights to training and protection relative to your employer.

Signature _____ SSN last four digits _____

Printed Name _____ Witness _____

LEAD APPENDIX C

CERTIFICATE OF WORKER'S ACKNOWLEDGMENT FOR SUB-CONTRACTORS

PROJECT NAME _____ DATE _____

PROJECT ADDRESS _____

CONTRACTOR'S NAME _____

Working with lead can be dangerous. Inhaling and ingesting lead dust can cause an increase in blood lead levels which can lead to adverse health effects such as kidney damage, elevated blood pressure or infertility.

Your employer's contract with the City for the above project requires that: You will be entering areas with known lead contamination in the soil.

Food and drinks will not be allowed into the work areas and will be kept at a clean break area.

All sub-contractors will be required to use a foot wear decontamination facility and be required to use the hand washing facility when exiting the work site.

By signing this document, you are acknowledging only that the City has advised you of the hazardous soil conditions at this site.

Signature _____ SSN last four digits _____

Printed Name _____ Witness _____

LEAD APPENDIX D

CERTIFICATION OF VISUAL INSPECTION

In accordance with Section 1.7 "Project Decontamination" the ABATEMENT CONTRACTOR hereby certifies that he has visually inspected the Work Area (all surfaces including pipes, counters, ledges, walls, ceiling and floor, behind critical barriers, sheet plastic, etc.) and has found no loose or flaky lead-containing coatings, dust, debris or residue.

by: (Signature) _____ Date _____

(Print Name) _____

(Company Name) _____

(Print Title) _____

PROJECT MONITOR CERTIFICATION

The PROJECT MONITOR hereby certifies that he has accompanied the ABATEMENT CONTRACTOR on his visual inspection and verifies that this inspection has been thorough and to the best of his knowledge and belief, the ABATEMENT CONTRACTOR's certification above is a true and honest one.

by: (Signature) _____
Date _____

(Print Name) _____

(Company Name) _____

(Print
Title) _____

WORK AREA

Location: _____

Room: _____

Hazard Reduction Performed: _____

APPENDIX J
LED SPORTS LIGHTING
(DRAWINGS, CALCULATIONS, ILLUMINATION SUMMARY)

GENERAL NOTES:

GENERAL

ALL CONSTRUCTION AND WORKMANSHIP SHALL CONFORM TO THE CALIFORNIA BUILDING CODE, 2016 EDITION.

WIND- ASCE 7-10, VULT= 110 MPH (EXPOSURE C); VASD= 85 MPH (EXPOSURE C); RISK CATEGORY= II.
SEISMIC - I_{pe}=1.0; S_{ps}=1.049; S_{ps}=0.400; S_{ps}=0.756; S_{ps}=0.427; RISK CATEGORY=II; I=1.0; SITE CLASS=D;
R=1.5; SEISMIC DESIGN CATEGORY=D; SEISMIC-FORCE-RESISTING SYSTEM=NON-BUILDING STRUCTURE, NOT SIMILAR TO BUILDINGS; ANALYSIS PROCEDURE=EQUIVALENT LATERAL FORCE PROCEDURE.

REFERENCE POLE LOCATION DRAWING FOR ACTUAL POLE PLACEMENT AND SITE LOCATION.

THE CONTRACTOR IS SOLELY RESPONSIBLE FOR ALL CONSTRUCTION PROCEDURES AND SAFETY CONDITIONS AT THE JOB SITE.

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.

NOTICE TO THE CONTRACTOR/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.

SPECIAL INSPECTION NOTES:

1. THE SPECIAL INSPECTOR MUST BE CERTIFIED BY THE CITY OF SAN DIEGO, DEVELOPMENT SERVICES, IN THE CATEGORY OF WORK REQUIRED TO HAVE SPECIAL INSPECTION.
2. THE CONSTRUCTION MATERIALS TESTING LABORATORY MUST BE APPROVED BY THE CITY OF SAN DIEGO, DEVELOPMENT SERVICES, FOR TESTING OF MATERIALS, SYSTEMS, COMPONENTS AND, EQUIPMENTS.
3. THE SPECIAL INSPECTIONS IDENTIFIED ON PLANS ARE, IN ADDITION TO, AND NOT A SUBSTITUTE FOR, THOSE INSPECTIONS REQUIRED TO BE PERFORMED BY A CITY'S BUILDING INSPECTOR.
4. FABRICATOR MUST BE APPROVED BY THE CITY OF SAN DIEGO, DEVELOPMENT SERVICES FOR THE FABRICATION OF MEMBERS AND ASSEMBLIES ON THE PREMISES OF THE FABRICATOR'S SHOP.
5. FABRICATOR SHALL SUBMIT AN 'APPLICATION TO PERFORM OFF-SITE FABRICATION' TO THE INSPECTION SERVICES DIVISION FOR APPROVAL PRIOR TO COMMENCEMENT OF FABRICATION.
6. FABRICATOR SHALL SUBMIT A 'CERTIFICATE OF COMPLIANCE FOR OFF-SITE FABRICATION' TO THE INSPECTION SERVICES DIVISION PRIOR TO ERECTION OF FABRICATED ITEMS AND ASSEMBLIES.

MISCELLANEOUS

FIXTURES MUST BE LOCATED TO MAINTAIN 10'-0" MINIMUM HORIZONTAL CLEARANCE FROM ANY OBSTRUCTION.

POLES, FIXTURES, PRECAST BASES, ELECTRICAL ITEMS, PLATFORMS, SPECIFICATIONS, AND INSTALLATION PER MUSCO LIGHTING, INC.

LED 1150 FIXTURE: EPA = 2.9 MAX SQ FT; WEIGHT = 80.0 LBS (PER MUSCO LIGHTING, INC.)

SOIL DESIGN PARAMETERS

REFERENCE CHAPTER 18, SECTIONS 1806, 1807, AND 1810 OF THE 2016 EDITION OF THE CALIFORNIA BUILDING CODE. ASSUME CLASS 5 SOILS.

ASSUMED ALLOWABLE END BEARING SOIL PRESSURE: 1,500 PSF (TABLE 1806.2) OR 250 PSF SKIN FRICTION (SECTION 1810.3.3.1.4)

ASSUMED ALLOWABLE LATERAL PASSIVE SOIL BEARING PRESSURE: 200 PSF/FT FOR ISOLATED POLES NOT ADVERSELY AFFECTED BY A 0.5 INCH MOTION AT THE GROUND SURFACE (SECTION 1806.3.4).

ASSUMED DESIGN SOIL PARAMETERS ARE AS NOTED. ACTUAL ALLOWABLE SOIL DESIGN PARAMETERS AT LEVEL OR SLOPING CONDITIONS (IF ANY) MUST BE VERIFIED BY A GEOTECHNICAL ENGINEER.

ENCOUNTERING SOIL FORMATIONS THAT WILL REQUIRE SPECIAL DESIGN CONSIDERATIONS OR EXCAVATION PROCEDURES MAY EXIST. POLE FOUNDATIONS MAY NEED TO BE REANALYZED ACCORDING TO THE SOIL CONDITIONS THAT EXIST.

IF ANY DISCREPANCIES OR INCONSISTENCIES ARISE, NOTIFY THE ENGINEER OF SUCH DISCREPANCIES. FOUNDATIONS WILL THEN BE REVISED ACCORDINGLY.

ALL PRECAST BASES AND CONCRETE BACKFILL MUST BEAR ON AND AGAINST FIRM, UNDISTURBED SOIL OR AS APPROVED BY A GEOTECHNICAL ENGINEER.

ALL EXCAVATIONS MUST BE FREE OF LOOSE SOIL AND DEBRIS PRIOR TO FOUNDATION INSTALLATION AND PLACEMENT OF CONCRETE BACKFILL. CASING MAY BE REQUIRED IF CAVING OCCURS. IN SUCH A CASE, APPROVAL BY A GEOTECHNICAL ENGINEER IS REQUIRED.

ALL EXCAVATIONS MUST BE FREE OF WATER OR CONCRETE SHALL BE PLACED WITH A TREMIE PIPE IN ACCORDANCE WITH ACI STANDARD 336. CONCRETE PLACED BY THE TREMIE METHOD SHALL HAVE A MINIMUM ULTIMATE STRENGTH OF 1,000 PSI GREATER THAN REQUIRED UNDER 'CONCRETE BACKFILL' BELOW.

CONCRETE BACKFILL

CONCRETE BACKFILL WITHOUT STEEL REINFORCEMENT SHALL ATTAIN A MINIMUM ULTIMATE COMPRESSIVE STRENGTH AT 28 DAY TEST OF 3,000 PSI (2,500PSI USED FOR STRUCTURAL DESIGN). BATCH PLANT INSPECTION NOT REQUIRED.

ALL CONCRETE SHALL ATTAIN A MINIMUM STRENGTH OF 2,500 PSI PRIOR TO STEEL POLE ERECTION.

USE TYPE II/V PORTLAND CEMENT OR AS DIRECTED BY THE GEOTECHNICAL ENGINEER.

PORTLAND CEMENT ASTM C-150.

AGGREGATE ASTM C-33, 1" MAXIMUM AGGREGATE SIZE. 3/8" MAX AGG. SIZE ACCEPTABLE WHERE PUMP MIXES ARE USED AT UNREINFORCED CONCRETE BACKFILL.

MIX IN CONFORMANCE WITH ASTM C-94, ACI 318 SECTIONS 19.2 AND 26.4.

PLACE CONCRETE IMMEDIATELY AFTER COMPLETION OF EXCAVATION. NO EXCAVATIONS SHALL BE LEFT UNPROTECTED OR OPEN OVERNIGHT.

CONCRETE SHALL BE PLACED IN ONE CONTINUOUS OPERATION (NO CONSTRUCTION JOINT) TO GRADE, WITH SPECIAL EQUIPMENT, WITH A MAXIMUM FREEFALL OF 5 FT AND TO PREVENT CONCRETE FROM STRIKING THE SIDES OF THE EXCAVATION. VIBRATE TOP 5 FT.

STEEL POLE

STEEL POLE SECTIONS CONFORM TO THE 2016 CBC CHAPTER 22.

ALL STEEL CONFORMS TO REFERENCED ASTM SPECIFICATIONS. (SEE POLE DATA TABLE FOR EACH POLE TYPE).

ALL WELDMENT CONFORMS WITH AWS D1.1 SPECIFICATION FOR GMAW FILLET UTILIZING E70S-X FILLER METAL OR SAW FILLET UTILIZING F7XX-EXXX OR F8XX-EXXX FILLER METAL. GMAW PROCEDURE CONFORMS TO AWS A5.18. SAW PROCEDURE CONFORMS TO AWS A5.23.

LONGITUDINAL SEAM WELDS FOR POLE SECTIONS SHALL HAVE 60% MINIMUM PENETRATION; EXCEPT LONGITUDINAL SEAM WELDS ON THE FEMALE SECTION OF TELESCOPIC FIELD SPLICES SHALL BE FULL PENETRATION GROOVE WELDS FOR A LENGTH EQUAL TO THE MINIMUM SPLICE LENGTH PLUS 6 INCHES. SEE DRAWING NUMBER MD1 FOR SEAM WELD DETAILS.

STEEL POLE SECTIONS SHALL BE ASSEMBLED IN THE FIELD BY ATTACHING TWO 1.5 TON "COME ALONGS" TO JACKING EARS, USING FULL EFFORT ON EACH SIMULTANEOUSLY, TO ENSURE MINIMUM OVERLAPS AS INDICATED ON THE "MS" SHEET(S) AND DETAIL G/MD1.

POLE SECTIONS HOT DIPPED GALVANIZED TO ASTM A123 LATEST STANDARDS.

ALL MISCELLANEOUS STRUCTURAL STEEL ITEMS CONFORM TO AISC 360-10.

PRECAST BASE

THE PRECAST CONCRETE BASE CONFORMS TO 2016 CBC, CHAPTER 19 AND TO BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE, ACI 318-14.

PRECAST BASES ARE AS FABRICATED BY CRETEX CONCRETE PRODUCTS, 1340 6TH STREET ELK RIVER, MN. CRETEX CONCRETE PRODUCTS IS A CERTIFIED PLANT UNDER THE PCI PLANT CERTIFICATION PROGRAM.

TESTING AND INSPECTION

TESTING AND INSPECTION IN ACCORDANCE WITH 2016 CBC, CHAPTER 17. THESE ITEMS INCLUDE CONCRETE, STEEL, PRESTRESSED CONCRETE, & EXCAVATIONS.

NOTE: SPECIAL INSPECTIONS AS REQUIRED BY SECTION 1704.2.5 SHALL NOT BE REQUIRED WHERE FABRICATOR IS APPROVED IN ACCORDANCE WITH SECTION 1704.2.5.2.

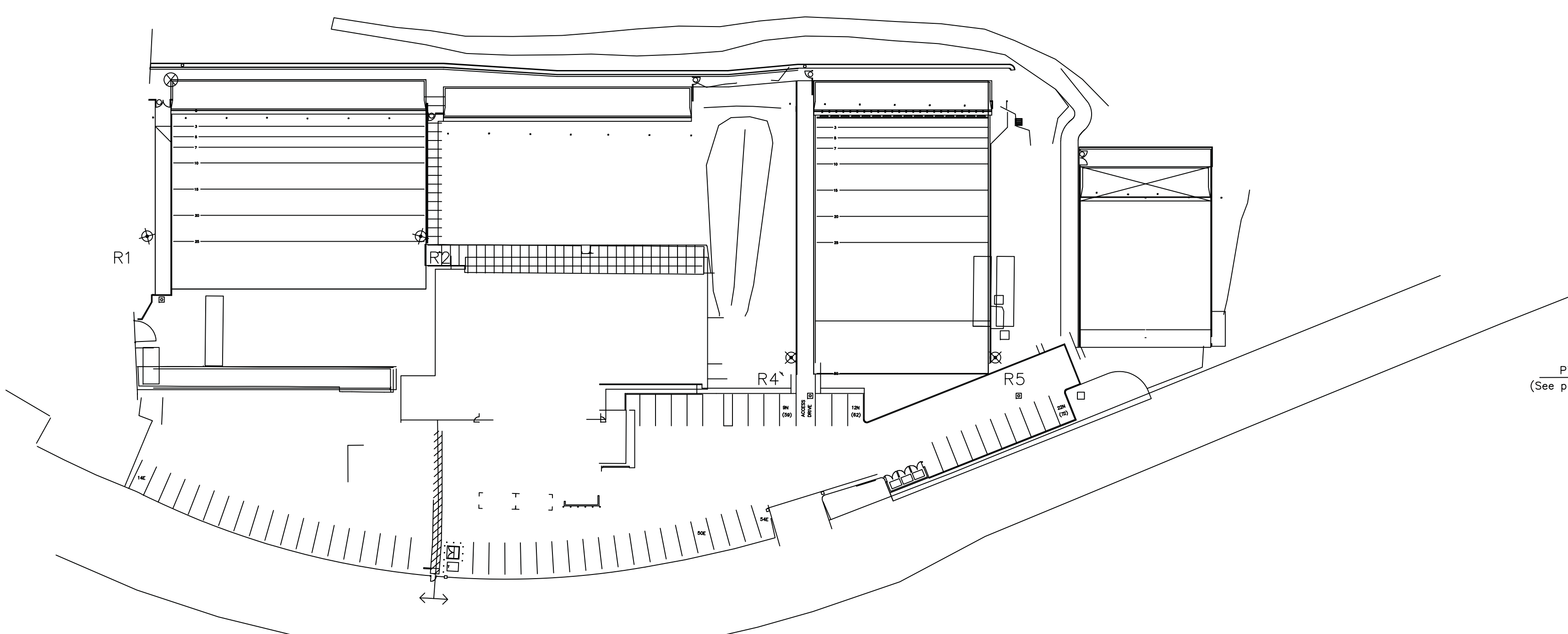
INDEX OF SHEETS

MT1	NOTES, FOUNDATION DETAIL
MS1	50AB POLE DETAILS
MS2	60B POLE DETAILS
MD1	ATTACHMENT DETAILS
MD2	ATTACHMENT DETAILS
MD3	ATTACHMENT DETAILS

STATEMENT OF SPECIAL INSPECTIONS*

ITEM	CONTINUOUS/ PERIODIC	SCOPE
1. PIER FOUNDATIONS	CONTINUOUS	INSPECT INSTALLATION OF DRILLED PIER FOUNDATIONS. VERIFY DIAMETER, EMBEDMENT DEPTHS AS SCHEDULED, DEPTHS OR FILL, AND BEARING STRATA.
2. CONCRETE PLACEMENT	CONTINUOUS	INSPECT PLACEMENT OF CONCRETE FOR PROPER APPLICATION TECHNIQUES. VERIFY THAT CONCRETE CONVEYANCE AND DEPOSITING AVOIDS SEGREGATION OR CONTAMINATION. VERIFY THAT CONCRETE IS PROPERLY CONSOLIDATED.
3. CRETEX PRECAST/ PRESTRESSED CONCRETE BASES.	PCI CERTIFIED	FABRICATOR EXEMPT** REFERENCE ICC ESR-3765.
6. STRUCTURAL STEEL	GOVERNING JURISDICTION APPROVED	FABRICATOR EXEMPT.** REVIEW CERTIFIED MILL TEST REPORTS AND IDENTIFICATION MARKINGS.

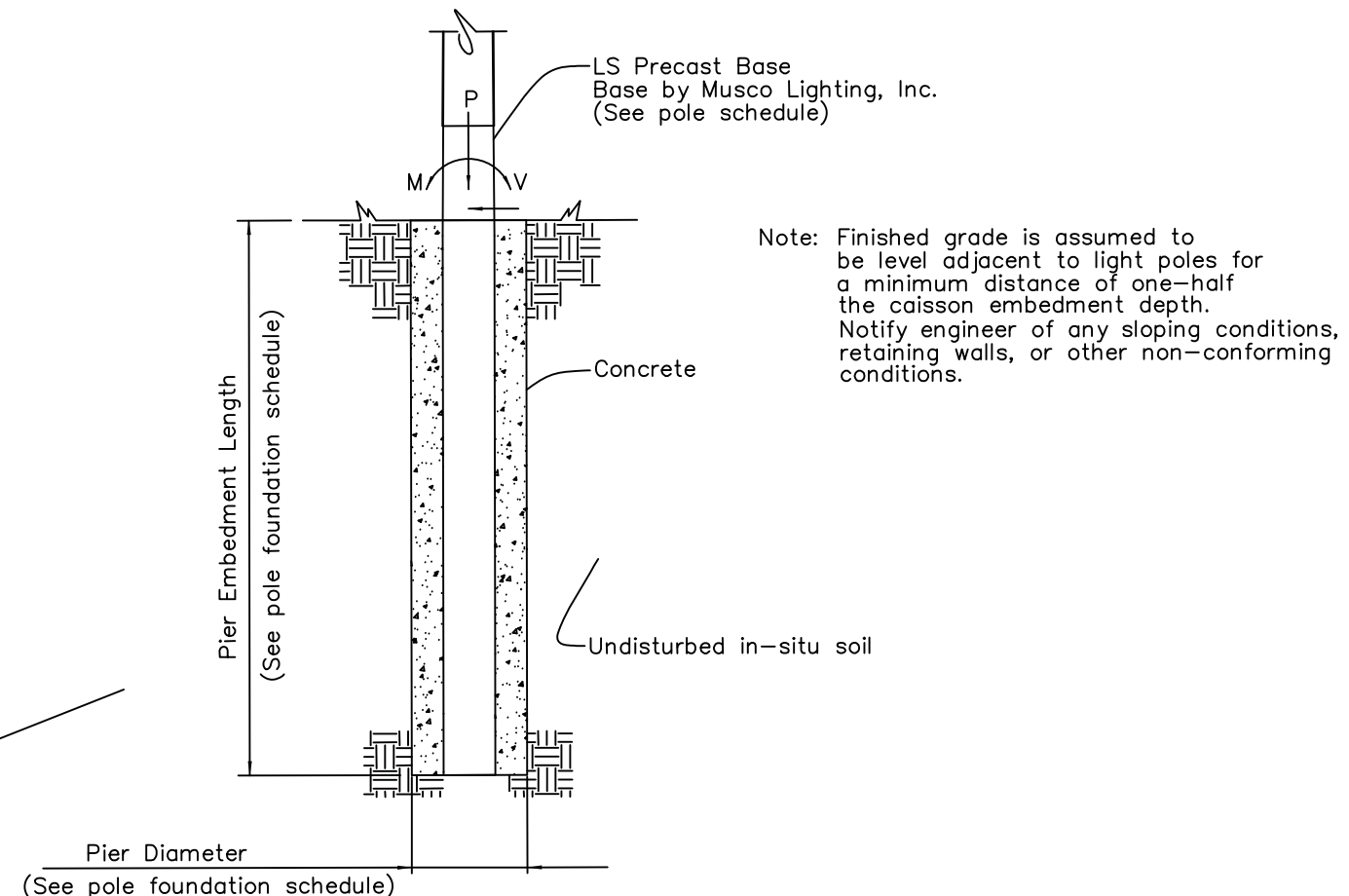
* THE SPECIAL INSPECTOR SHALL BE A QUALIFIED PERSON WHO SHALL DEMONSTRATE COMPETENCE, TO THE SATISFACTION OF THE BUILDING OFFICIAL, FOR INSPECTION OF THE PARTICULAR TYPE OF CONSTRUCTION OR OPERATION REQUIRING SPECIAL INSPECTION.
** SPECIAL INSPECTIONS SHALL NOT BE REQUIRED WHEN THE WORK IS DONE ON THE PREMISES OF A FABRICATOR REGISTERED AND APPROVED BY THE GOVERNING JURISDICTION TO PERFORM SUCH WORK WITHOUT SPECIAL INSPECTION.



POLE ORIENTATION PLAN

N.T.S.

NOTE: THIS PLAN IS A PICTORIAL REPRESENTATION OF THE SITE LAYOUT. REFERENCE APPROPRIATE ARCHITECTURAL SITE PLAN FOR ALL NECESSARY INFORMATION.



FOUNDATION DETAIL

N.T.S.

POLE FOUNDATION SCHEDULE

POLE TYPE-# OF FIXTURES (MAX) (LSS=LIGHT STRUCTURE)	MARK (SEE POLE ORIENTATION PLAN)	ASD LEVEL FORCES (MAX)			C.I.P. DEEP FOUNDATION		PRECAST BASE EMBEDMENT LENGTH
		MOMENT (M) FT-LBS	SHEAR (V) LBS	VERTICAL (P) LBS*	DIAMETER INCHES	EMBEDMENT FEET	
LSS50AB-4	R1, R2	33,110	1,068	1,081	30"	10'-0"	10'-0"
LSS60B-4	R4, R5	46,460	1,271	1,516	30"	12'-0"	12'-0"

*Vertical (P) load does not include weight of precast base above groundline. Vertical (P) load for is the dressed pole weight for erection purposes. See Detail "A" on MS Sheet(s) for precast base weight.

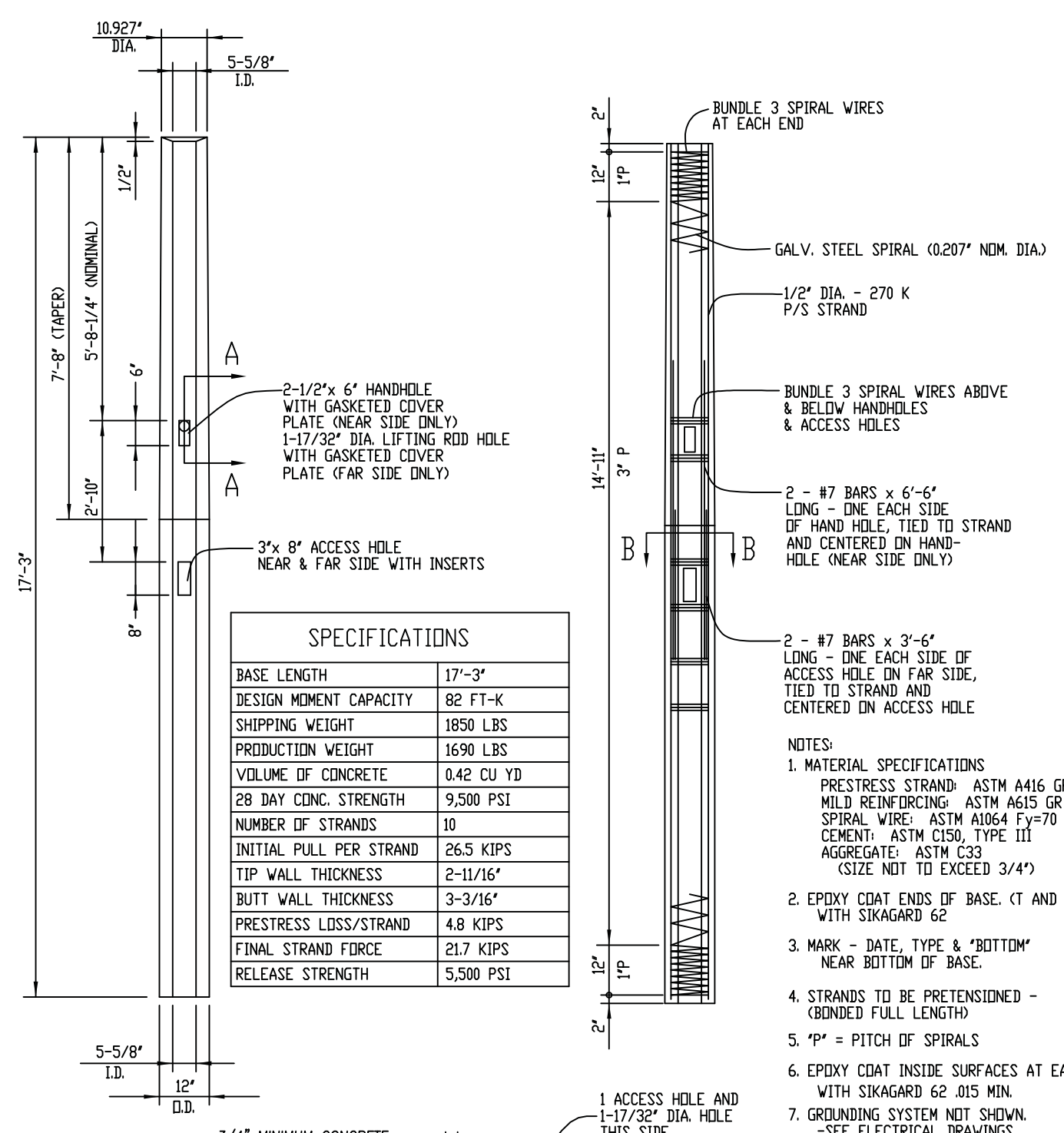
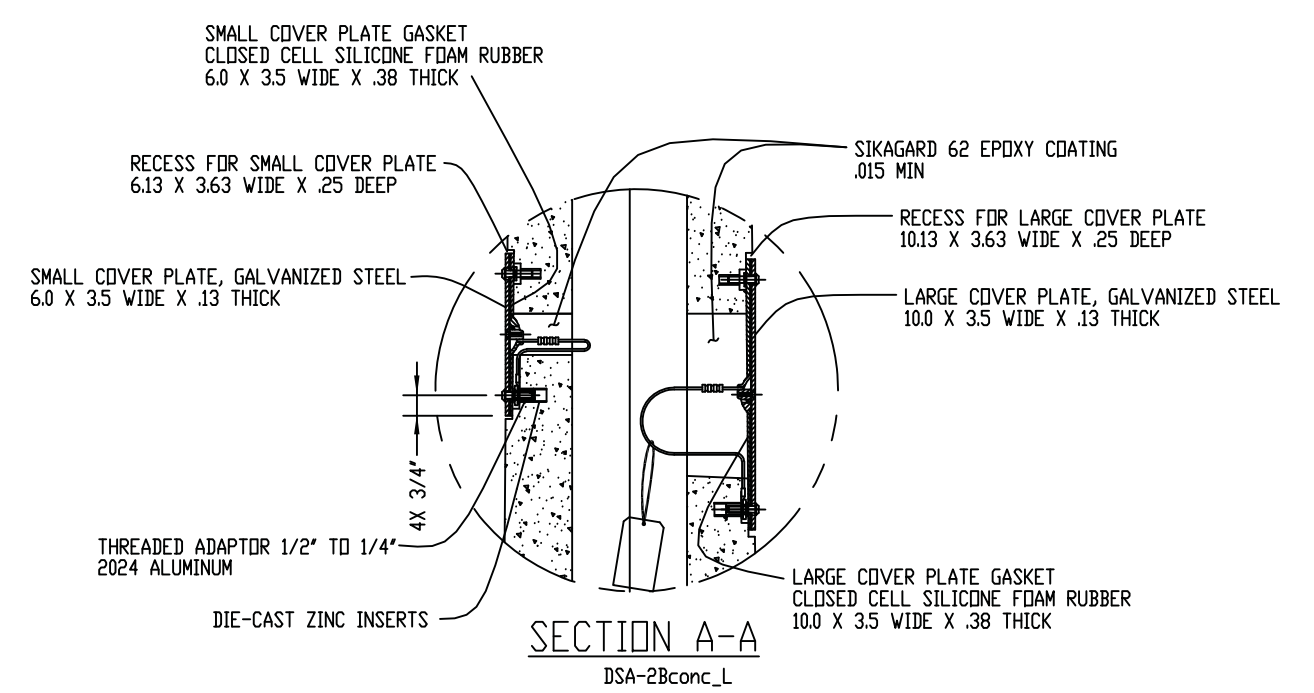
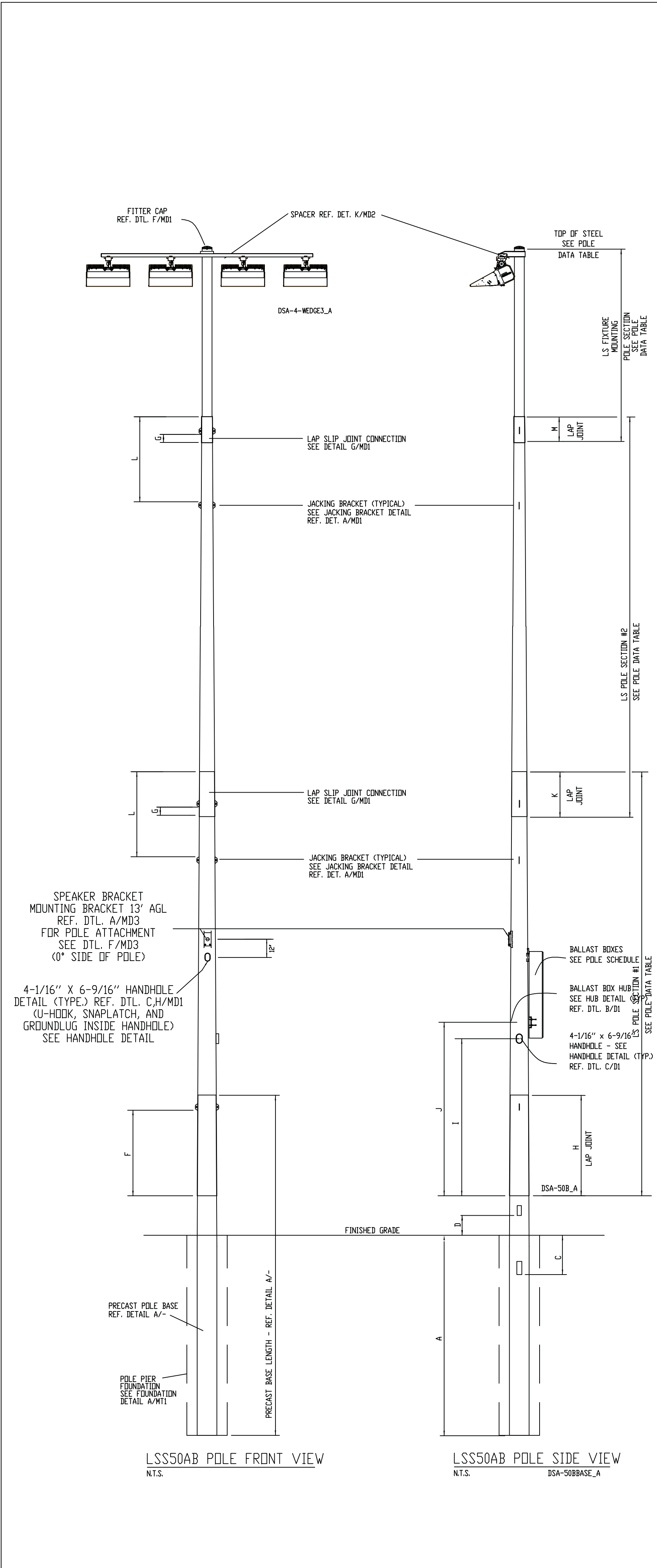
SECTION 265668
BASIS OF DESIGN

MT1

PLANS FOR THE CONSTRUCTION OF
SAN DIEGO PD FIRING RANGE
NOTES AND FOUNDATION
DETAIL

CONSULTANT		SPEC. NO.	CITY OF SAN DIEGO, CALIFORNIA PUBLIC WORKS DEPARTMENT SHEET OF SHEETS	WBS _____
	CORPORATE OFFICE: P.O. Box 808 100 1st Avenue West Oskaloosa, Iowa 52577 800/825-6020		APPROVED FOR CITY ENGINEER _____ DATE _____ PRINT DCE NAME _____ RCES# _____ ORIGINAL BY KNA APPROVED DATE 02/11/2019 FILMED _____	SUBMITTED BY _____ PROJECT MANAGER _____ CHECKED BY _____ PROJECT ENGINEER _____ CCS27 COORDINATE _____ CCS83 COORDINATE _____
			CONTRACTOR INSPECTOR _____ DATE STARTED _____ DATE COMPLETED _____	-D

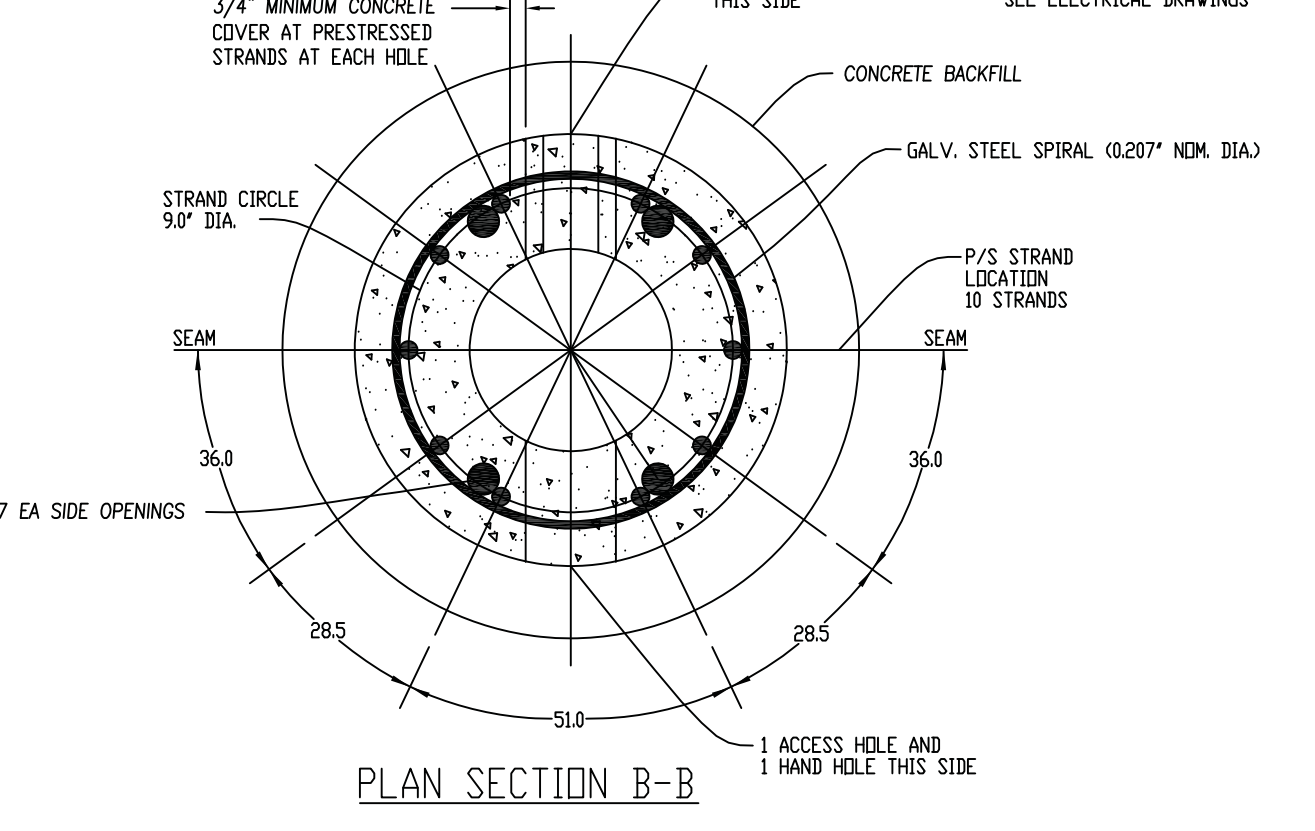
SAN DIEGO PD FIRING RANGE



SPECIFICATIONS

BASE LENGTH	17'-3"
DESIGN MOMENT CAPACITY	82 FT-K
SHIPPING WEIGHT	1850 LBS
PRODUCTION WEIGHT	1690 LBS
VOLUME OF CONCRETE	0.42 CU YD
28 DAY CONG. STRENGTH	9,500 PSI
NUMBER OF STRANDS	10
INITIAL PULL PER STRAND	26.5 KIPS
TIP WALL THICKNESS	2-1/16"
BUTT WALL THICKNESS	3-3/16"
PRESTRESS LOSS/STRAND	4.8 KIPS
FINAL STRAND FORCE	21.7 KIPS
RELEASE STRENGTH	5,500 PSI

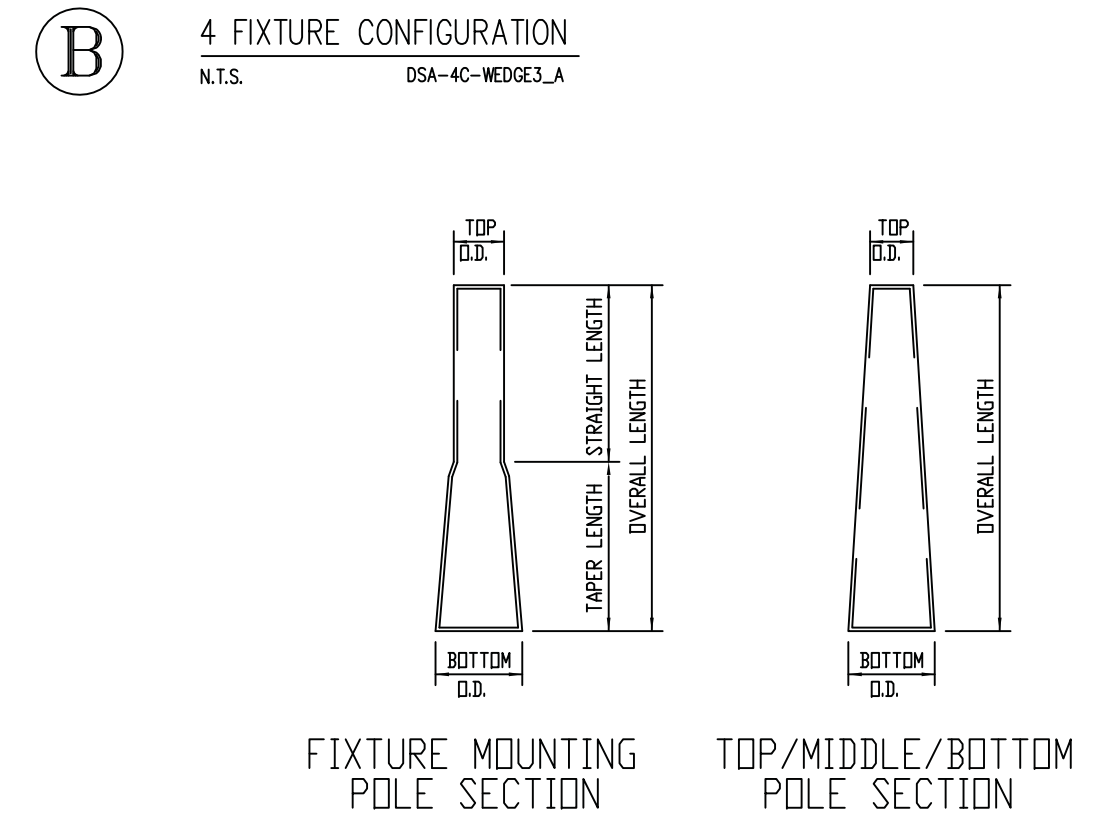
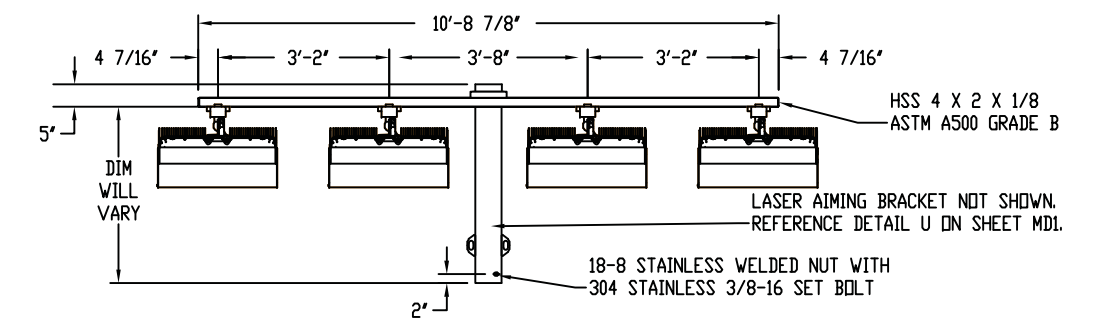
- NOTES:**
- MATERIAL SPECIFICATIONS:
PRESTRESS STRAND: ASTM A416 GR 270 (LOW RELAXATION)
MILD REINFORCING: ASTM A615 GR 60
SPIRAL WIRE: ASTM A564 Fy=70 KSI
CEMENT: ASTM C150, TYPE III
AGGREGATE: ASTM C33 (SIZE NOT TO EXCEED 3/4")
 - EPDXY COAT ENDS OF BASE (T AND B) WITH SIKAGARD 62
 - MARK - DATE, TYPE & "BOTTOM" NEAR BOTTOM OF BASE.
 - STRANDS TO BE PRETENSIONED - (GONDED FULL LENGTH)
 - 9" = PITCH OF SPIRALS
 - EPDXY COAT INSIDE SURFACES AT EACH HOLE WITH SIKAGARD 62 .015 MIN.
 - GROUNDING SYSTEM NOT SHOWN - SEE ELECTRICAL DRAWINGS



(A) TYPE 2B PRECAST BASE DETAIL
N.T.S. DSA-28conc_L

NOTATION

NOTATION	DIMENSION
A	10'-0"
C	2'-0" NOM.
D	1'-0" NOM.
F	4'-4" NOM.
G	1'-6"
H	5'-1 1/4" NOM. 4'-8" MIN.
I	7'-7 1/2" NOM.
J	8'-9 1/2" NOM.
K	2'-3" NOM. 1'-1 3/8" MIN.
L	4'-7" NOM.
M	1'-6 1/8" NOM. 9 1/8" MIN.



1. CONTAINS COMBINED EPA OF LIGHT FIXTURES, CROSS ARM AND MISCELLANEOUS FIXTURE MOUNTING APPARATUS. FIXTURE WEIGHT 928 LBS. THIS INCLUDES THE WEIGHT OF FIXTURE, CROSS ARM & MISC. MOUNTING APPARATUS. ELECTRICAL BALLAST BOX WEIGHT 20 LBS PER FIXTURE SERVICED.

POLE SCHEDULE

SITE LOCATION	POLE MARK	REFERENCE LOCATION	POLE TYPE	FIXTURE CONFIGURATION	TOTAL EPA	BALLAST BOX REQUIREMENTS
SEE SITE PLAN (BY OTHERS)	R1, R2	SEE POLE ORIENTATION PLAN	LSS50AB	4 - SEE DETAIL B/MS1	1394	SEE DETAIL P/MDI

DSA-POLESCH_C

POLE DATA TABLE

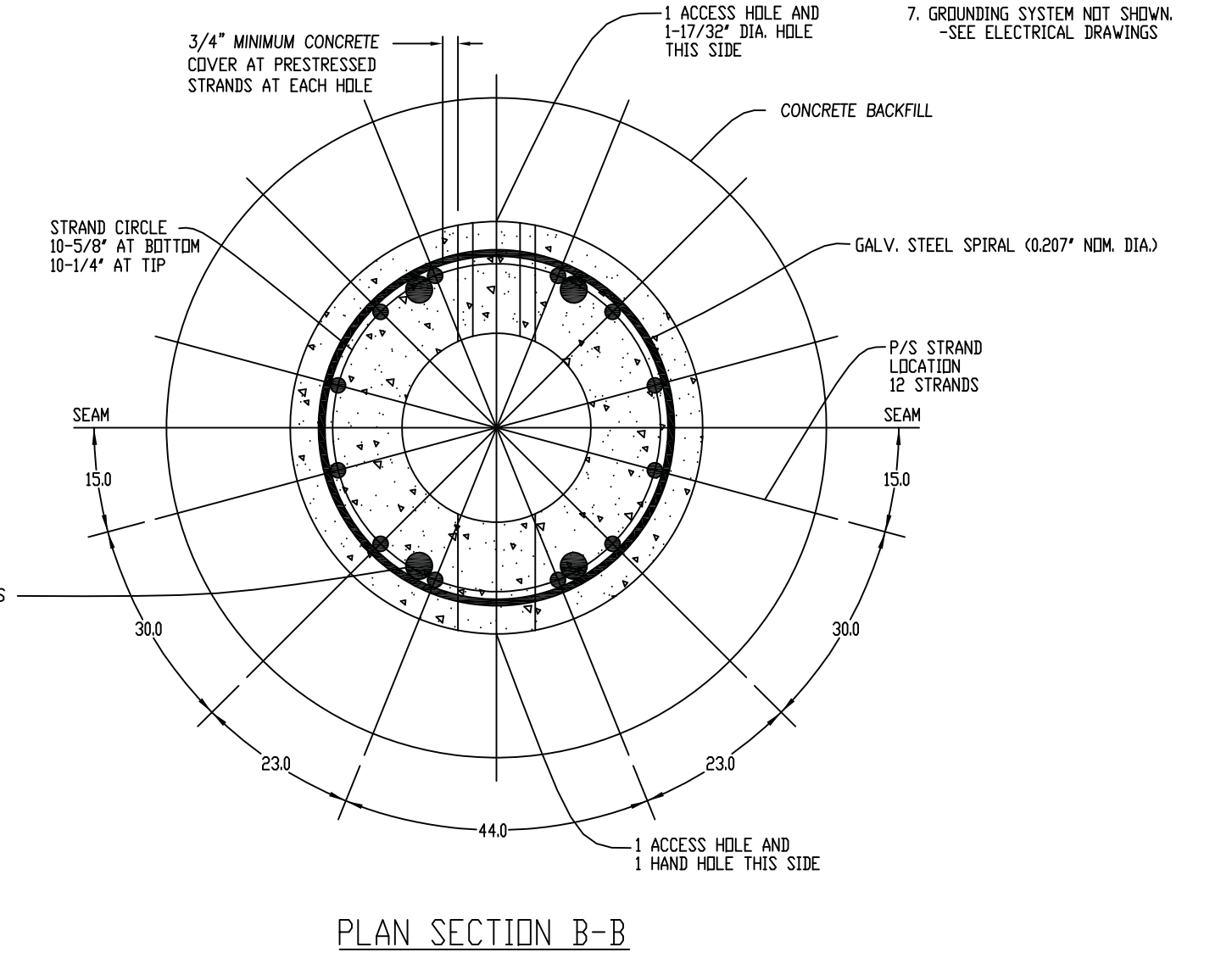
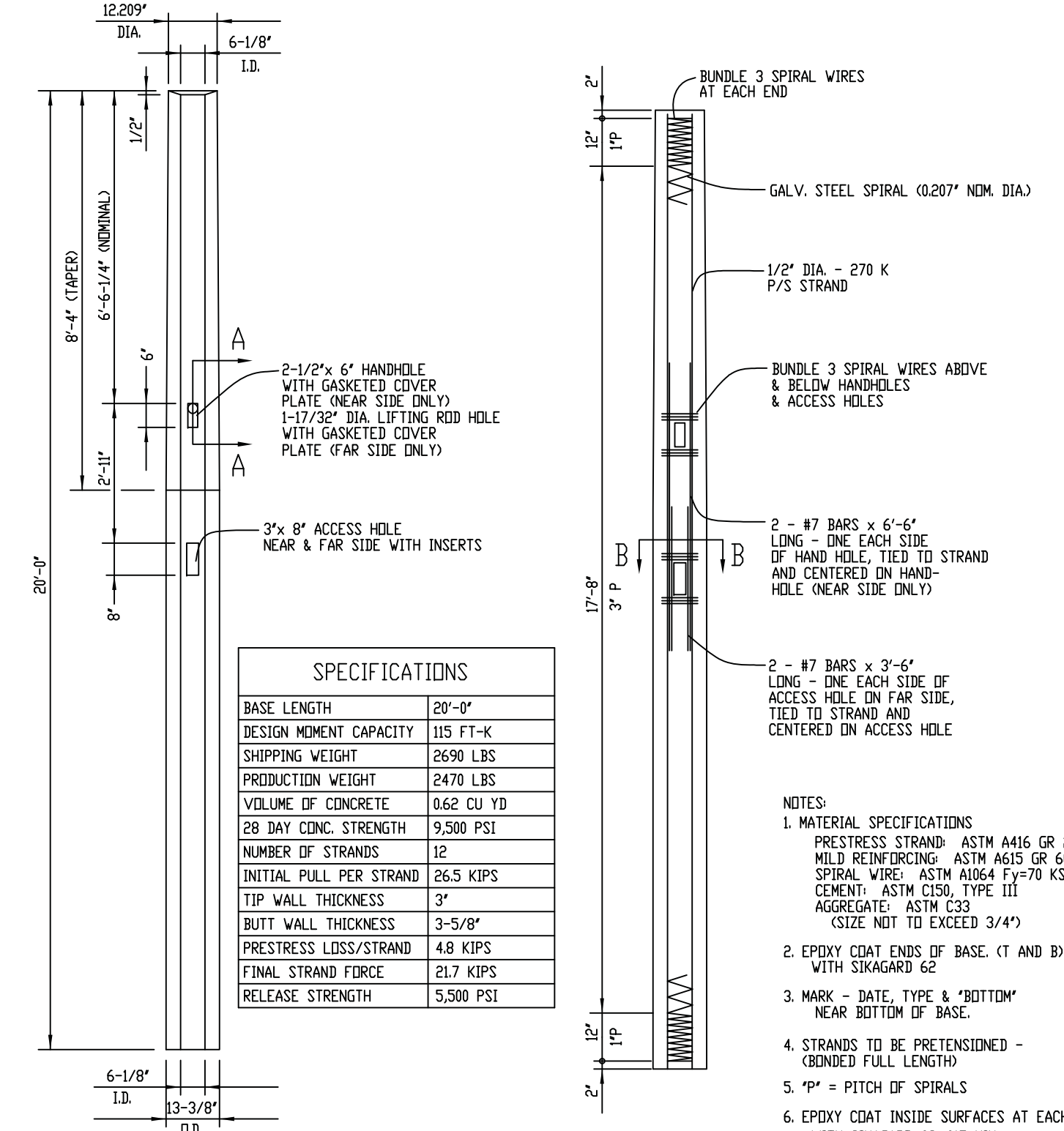
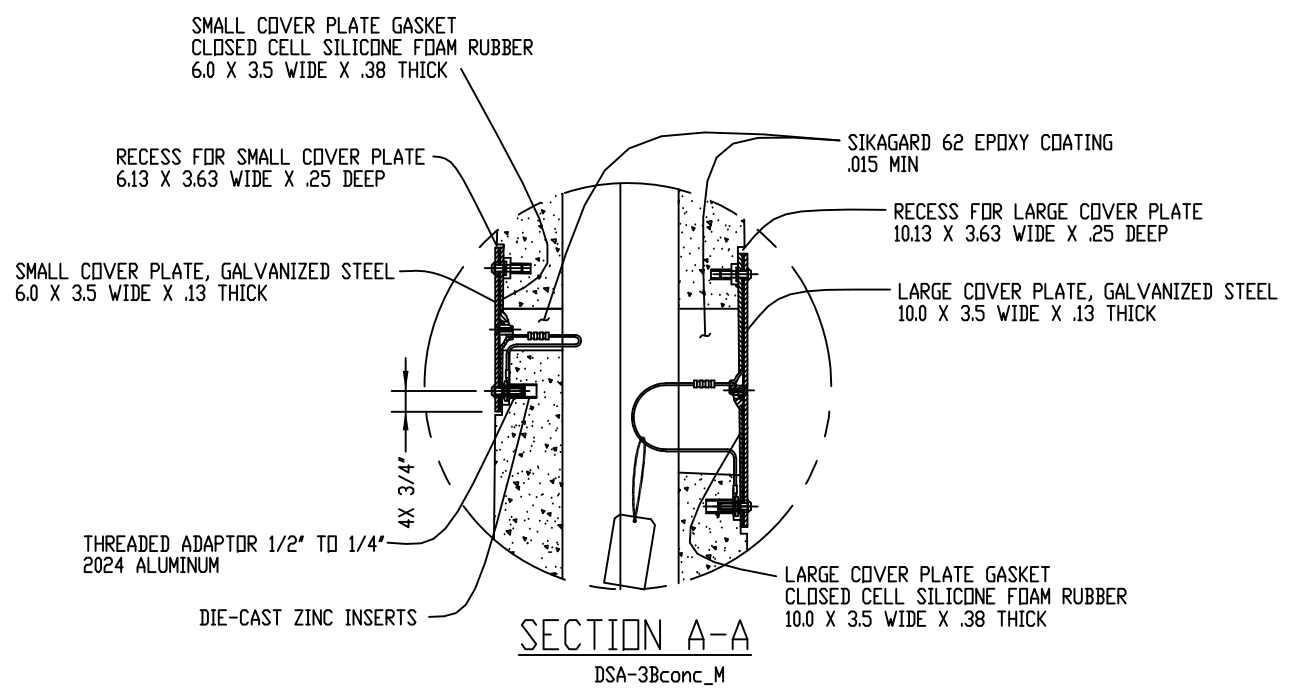
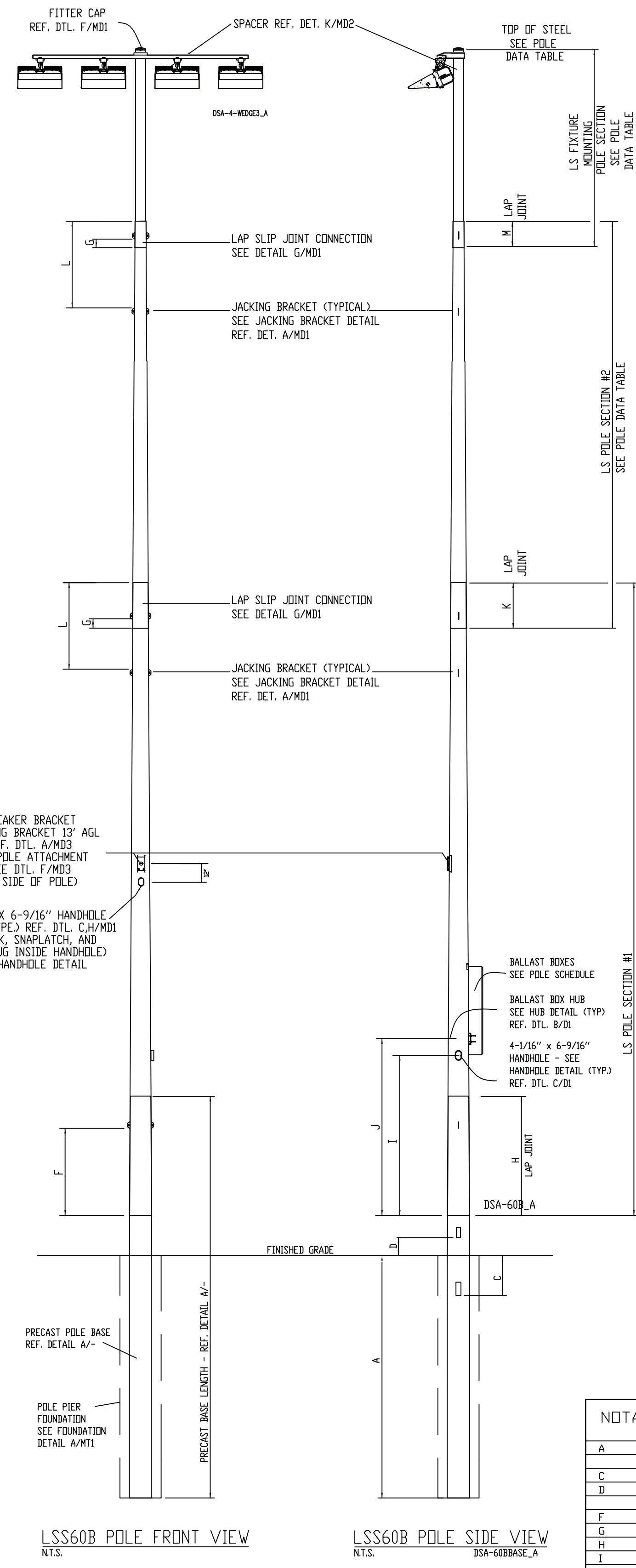
POLE TYPE	PIECE MARK	MAX NUMBER OF X-ARMS	POLE SECTION	TOP O.D. (INCHES)	BTM O.D. (INCHES)	OVERALL LENGTH	STRAIGHT LENGTH	TAPER LENGTH	THICKNESS (INCHES)	TOP OF STEEL NOMINAL	ASTM REFERENCE
LSS50AB	LS-2009	1	FIXTURE MOUNTING	6.000"	6.505"	5'-3"	3'-5"	1'-10"	.120	50'-0 7/8"	A513 (Fy=38ksi)
	MP-1T-2		#2	6.054"	9.440"	24'-2 1/4"	-----	24'-2 1/4"	.120	-----	A595A (Fy=55 ksi) or A572, Gr. 55 or 65
	MP-1BTA		#1	8.886"	11.880"	22'-2 7/8"	-----	21'-4 3/5"	.179	-----	A595A (Fy=55 ksi) or A572, Gr. 55 or 65
	MP-2B			PRECAST BASE							

FOR PRECAST MEMBER PROPERTIES SEE PRECAST BASE DETAIL A/- STAN090T_C

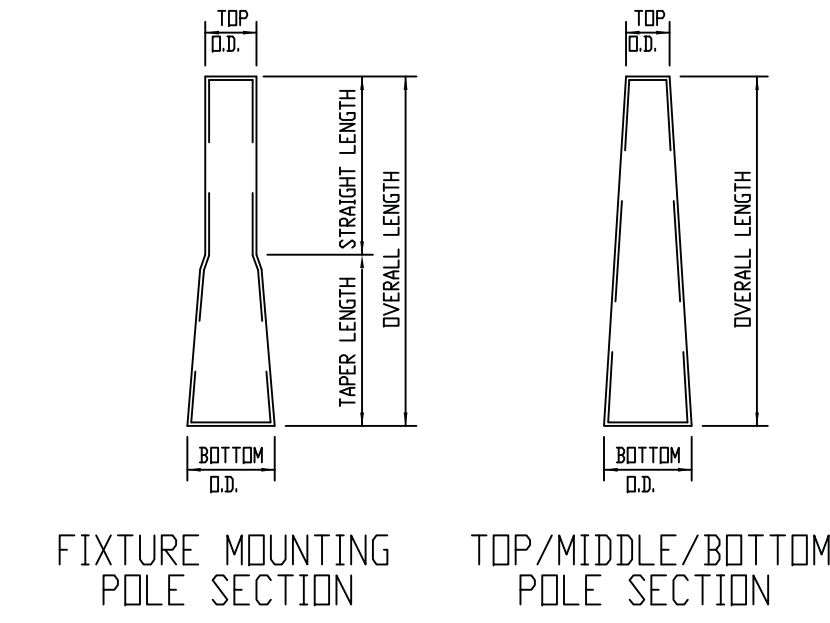
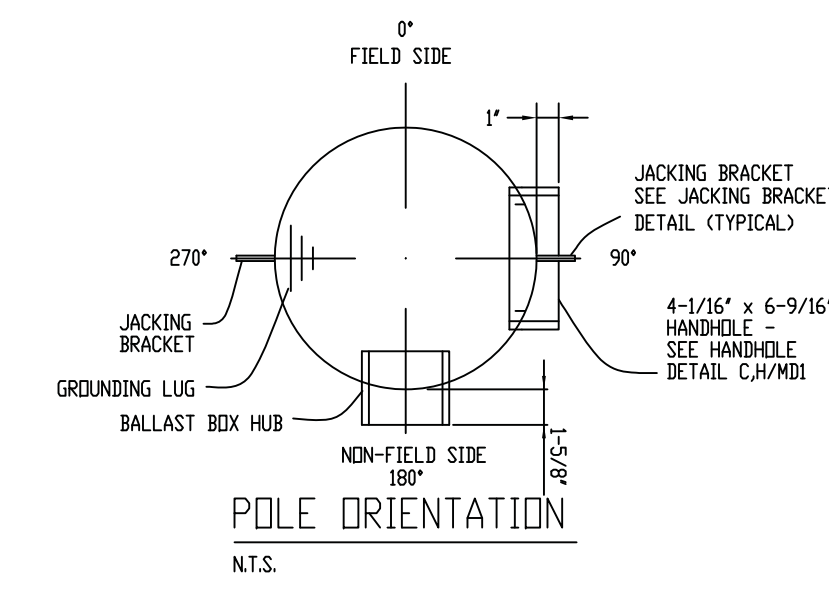
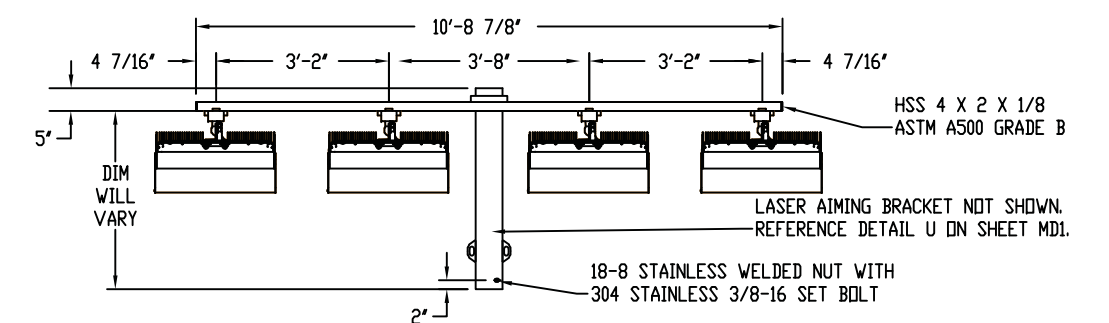
SECTION 265668
BASIS OF DESIGN

PLANS FOR THE CONSTRUCTION OF
SAN DIEGO PD FIRING RANGE
POLE DETAIL

<p>CONSULTANT</p> <p>CORPORATE OFFICE: P.O. Box 808 100 1st Avenue West Oskaloosa, Iowa 52577 800/825-6020</p> <p>PROJECT NO.: 161133</p>	<p>KNA STRUCTURAL ENGINEERS</p> <p>9931 Muirlands Boulevard, Irvine, CA 92618 Tel (949) 462-3200 • Fax (949) 462-3201 www.KNAstructural.com</p> <p>KNA JOB NO.: 363.444</p>	<p>REG. PROFESSIONAL ENGINEER No. 4508 Exp. 6-30-19 STATE OF CALIFORNIA</p>	<p>CITY OF SAN DIEGO, CALIFORNIA PUBLIC WORKS DEPARTMENT SHEET OF SHEETS</p>		<p>WBS _____</p>
			<p>APPROVED FOR CITY ENGINEER _____ DATE _____</p> <p>PRINT DCE NAME _____ RCES# _____</p>		<p>PROJECT MANAGER _____</p> <p>CHECKED BY _____</p> <p>PROJECT ENGINEER _____</p> <p>CC827 COORDINATE _____</p> <p>CC883 COORDINATE _____</p>
<p>CONTRACTOR INSPECTOR _____</p>		<p>DATE STARTED _____</p> <p>DATE COMPLETED _____</p>	<p>-D</p>		



NOTATION	DIMENSION
A	12'-0"
C	2'-0" NOM.
D	1'-0" NOM.
F	4'-4" NOM.
G	1'-6"
H	5'-11 3/8" NOM. 4'-8" MIN.
I	7'-7 1/2" NOM.
J	8'-9 1/2" NOM.
K	2'-3" NOM. 1'-1 3/8" MIN.
L	4'-7" NOM.
M	1'-6 1/8" NOM. 9 1/8" MIN.



1. CONTAINS COMBINED EPA OF LIGHT FIXTURES, CROSS ARM AND MISCELLANEOUS FIXTURE MOUNTING APPARATUS. FIXTURE WEIGHT 928 LBS. THIS INCLUDES THE WEIGHT OF FIXTURE, CROSS ARM & MISC. MOUNTING APPARATUS. ELECTRICAL BALLAST BOX WEIGHT 20 LBS PER FIXTURE, SERVICED.

POLE SCHEDULE						
SITE LOCATION	POLE MARK	REFERENCE LOCATION	POLE TYPE	FIXTURE CONFIGURATION	TOTAL EPA ¹	BALLAST BOX REQUIREMENTS
SEE SITE PLAN (BY OTHERS)	R4, R5	SEE POLE ORIENTATION PLAN	LSS60B	4 - SEE DETAIL B/MS2	1394	SEE DETAIL F/MD1

DSA-POLESCH_E

POLE DATA TABLE											
POLE TYPE	PIECE MARK	MAX NUMBER OF X-ARMS	POLE SECTION	TOP O.D. (INCHES)	BTM. O.D. (INCHES)	OVERALL LENGTH	STRAIGHT LENGTH	TAPER LENGTH	THICKNESS (INCHES)	TOP OF STEEL NOMINAL	ASTM REFERENCE
LSS60B	LS-2009	1	FIXTURE MOUNTING	6.000"	6.505"	5'-3"	3'-5"	1'-10"	.120	59'-11 3/4"	A513 (Fy=38ksi)
	NP-1TT-2		#2	6.054"	9.440"	24'-2 1/4"	-----	24'-2 1/4"	.120	-----	A595A (Fy=55 ksi) or A572, Gr 55 or 65
	NP-3BT		#1	8.886"	13.400"	32'-2 7/8"	-----	32'-2 7/8"	.179	-----	A595A (Fy=55 ksi) or A572, Gr 55 or 65
	NP-3B		PRECAST BASE								FOR PRECAST MEMBER PROPERTIES SEE PRECAST BASE DETAIL A/-

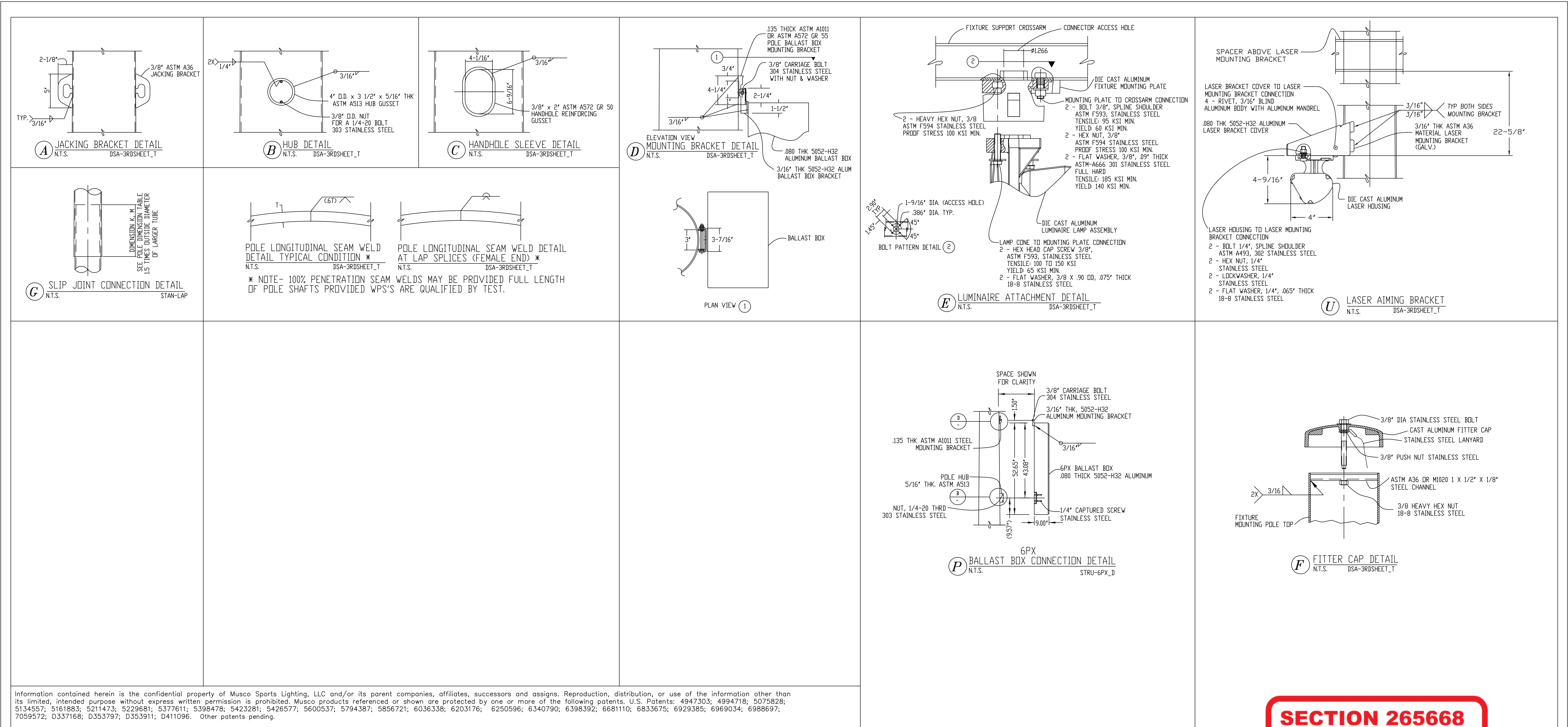
STANG08DT_E

SECTION 26568
BASIS OF DESIGN

MS2

**PLANS FOR THE CONSTRUCTION OF
SAN DIEGO PD FIRING RANGE
POLE DETAIL**

<p>CONSULTANT</p> <p>CORPORATE OFFICE: P.O. Box 808 100 1st Avenue West Oskaloosa, Iowa 52577 800/825-6020</p> <p>PROJECT NO.: 161133</p>	<p>9931 Muirlands Boulevard, Irvine, CA 92618 Tel (949) 462-3200 • Fax (949) 462-3201 www.KNAstructural.com</p> <p>KNA JOB NO.: 363.444</p>	<p>REG. NO. 4508 Exp. 6-30-19</p> <p>REGISTERED PROFESSIONAL ENGINEER STRUCTURAL STATE OF CALIFORNIA</p>	<p>CITY OF SAN DIEGO, CALIFORNIA PUBLIC WORKS DEPARTMENT SHEET OF SHEETS</p> <p>APPROVED: _____ DATE _____ FOR CITY ENGINEER</p> <p>PRINT DCE NAME _____ RCED# _____ ORIGINAL BY KNA APPROVED DATE FILMED 02/11/2019</p> <p>CONTRACTOR INSPECTOR _____ DATE STARTED _____ DATE COMPLETED _____</p>	<p>WBS _____</p> <p>PROJECT MANAGER _____ CHECKED BY _____ PROJECT ENGINEER _____ COORDINATOR _____ COORDINATOR _____</p> <p style="text-align: right;">-D</p>
--	---	--	--	--



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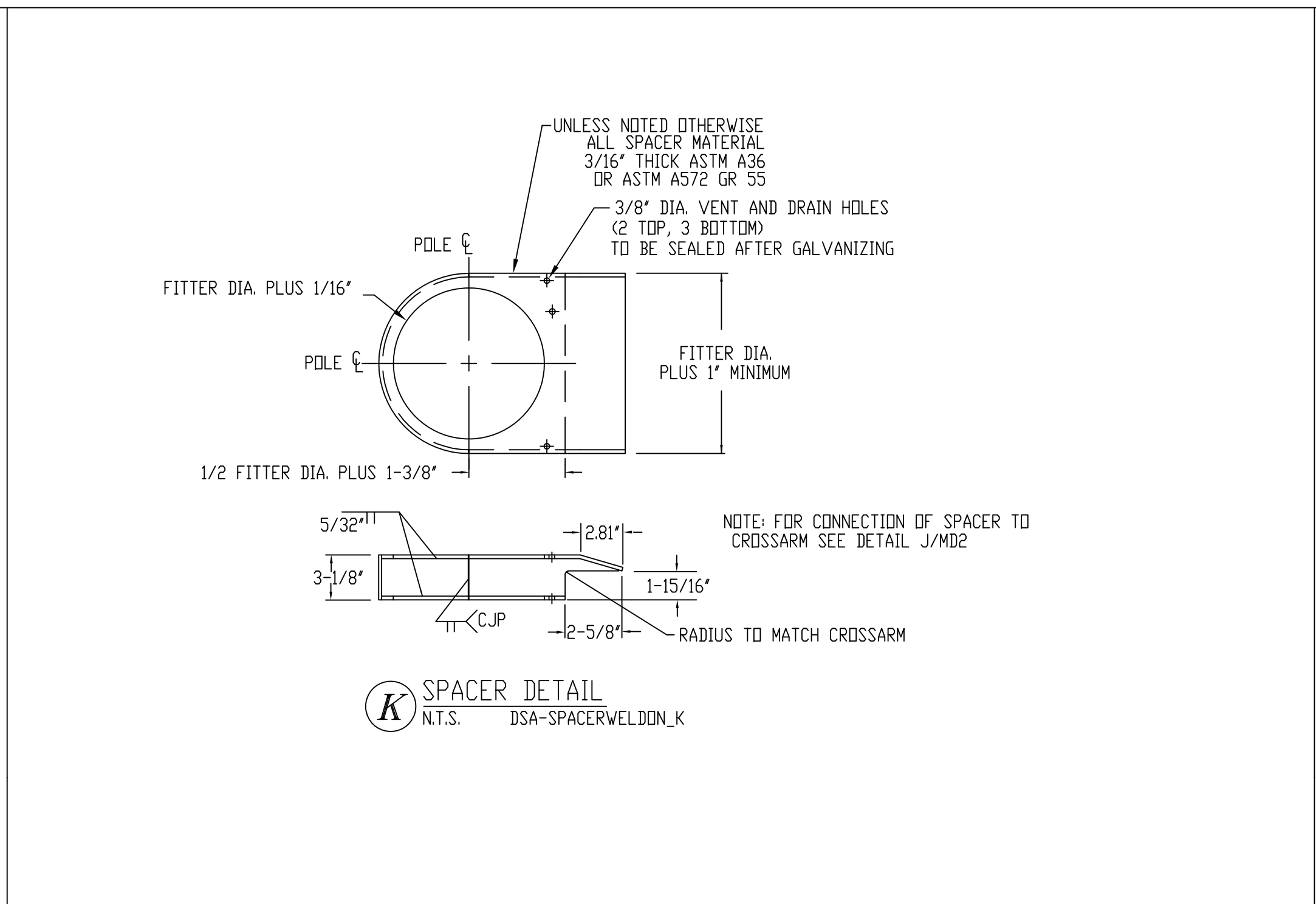
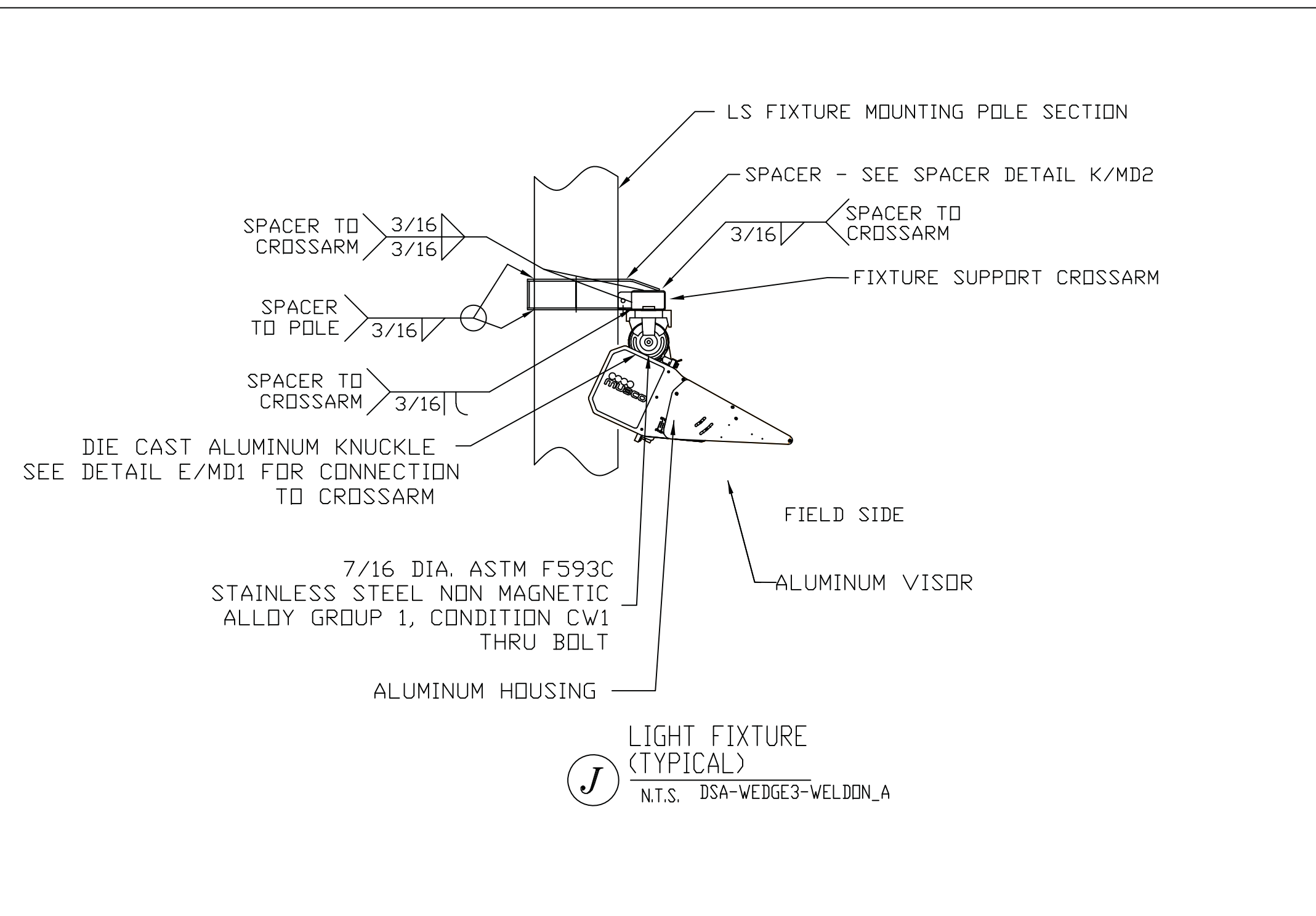
SECTION 265668
BASIS OF DESIGN

MD1

**PLANS FOR THE CONSTRUCTION OF
SAN DIEGO PD FIRING RANGE
ATTACHMENT DETAILS**

CITY OF SAN DIEGO, CALIFORNIA PUBLIC WORKS DEPARTMENT		WBS _____	
SHEET OF SHEETS			
APPROVED FOR CITY ENGINEER _____ DATE _____		SUBMITTED BY _____	
PRINT DCE NAME _____ RCE# _____		PROJECT MANAGER _____	
DESCRIPTION	BY	APPROVED	DATE FILMED
ORIGINAL	KNA		02/11/2019
CONTRACTOR INSPECTOR _____		DATE STARTED _____	
		DATE COMPLETED _____	
		-D	

CONSULTANT	SPEC. NO. _____
<p>MUSCO Lighting</p> <p>CORPORATE OFFICE: P.O. Box 808 100 1st Avenue West Oskaloosa, Iowa 52577 800/825-6020</p> <p>PROJECT NO.: 161133</p>	<p>KNA STRUCTURAL ENGINEERS</p> <p>9931 Muirlands Boulevard, Irvine, CA 92618 Tel (949) 462-3200 • Fax (949) 462-3201 www.KNAstructural.com</p> <p>KNA JOB NO.: 363.444</p>
<p>REGISTERED PROFESSIONAL ENGINEER No. 4508 Exp. 6-30-19 STATE OF CALIFORNIA</p>	<p>REGISTERED PROFESSIONAL ENGINEER No. 4508 Exp. 6-30-19 STATE OF CALIFORNIA</p>



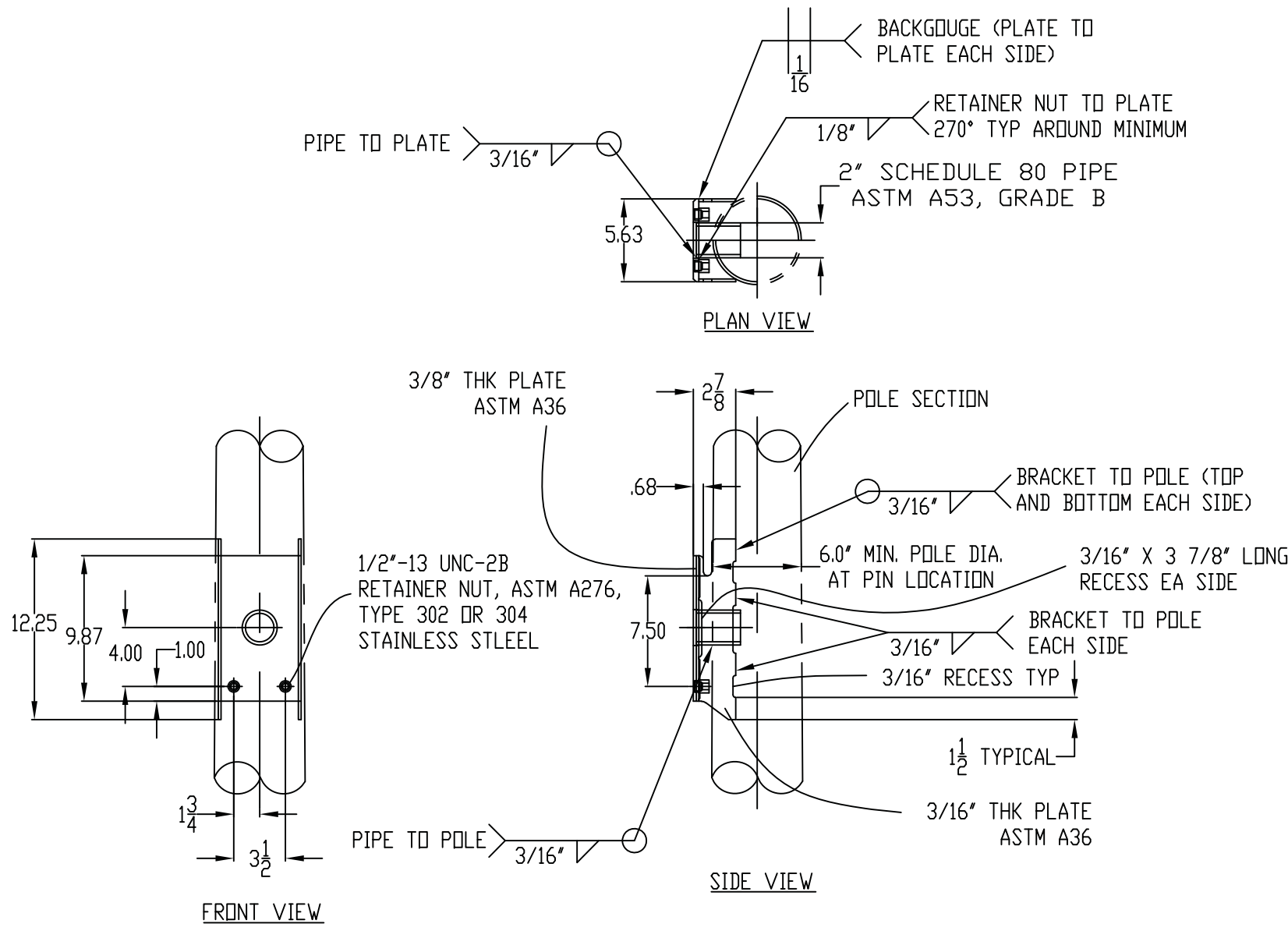
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**SECTION 265668
BASIS OF DESIGN**

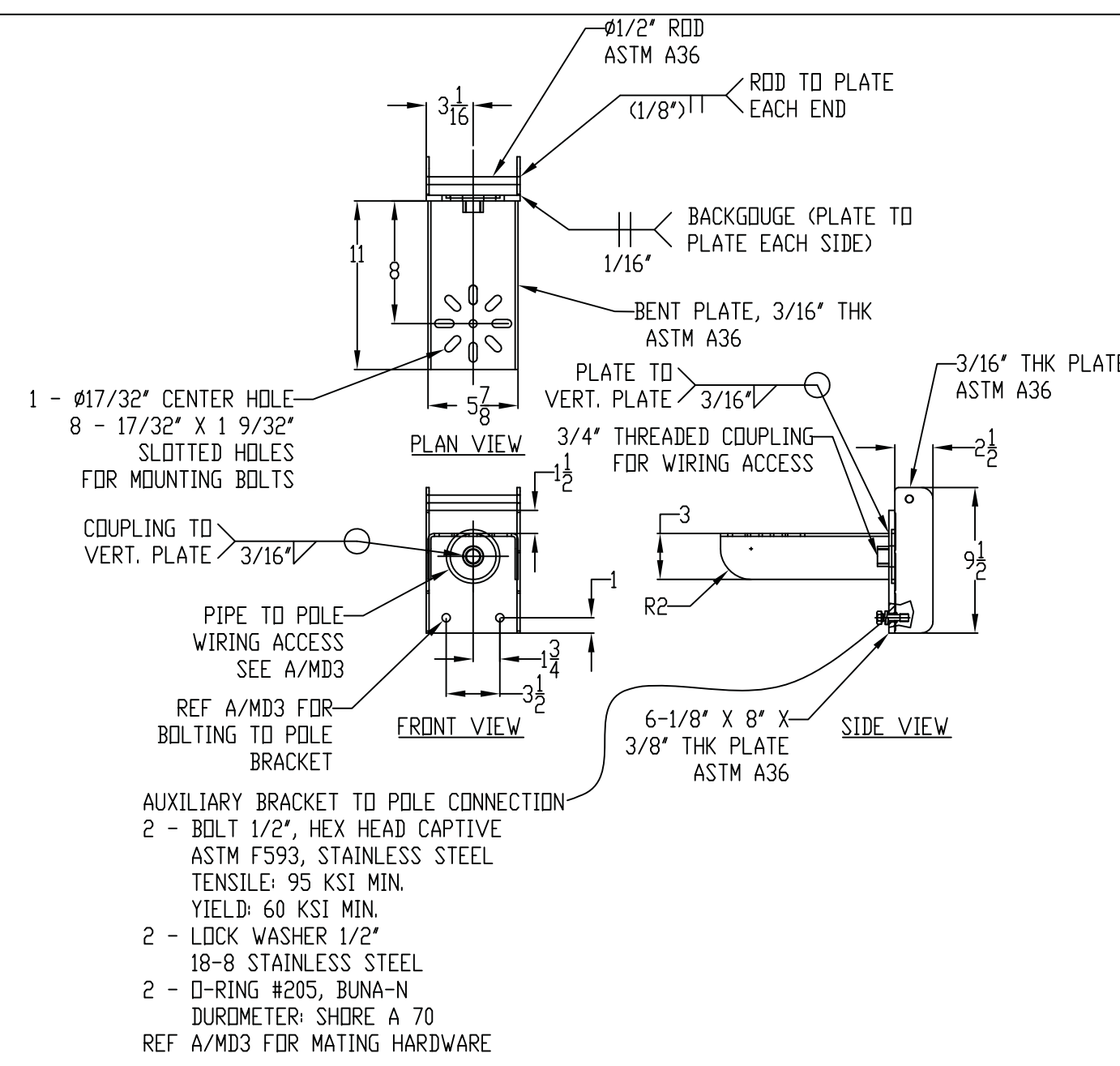
MD2

**PLANS FOR THE CONSTRUCTION OF
SAN DIEGO PD FIRING RANGE
ATTACHMENT DETAILS**

CONSULTANT		SPEC. NO.	CITY OF SAN DIEGO, CALIFORNIA PUBLIC WORKS DEPARTMENT SHEET OF SHEETS		WBS _____
 CORPORATE OFFICE: P.O. Box 808 100 1st Avenue West Oskaloosa, Iowa 52577 800/825-6020 PROJECT NO.: 161133	 KNA STRUCTURAL ENGINEERS 9931 Muirlands Boulevard, Irvine, CA 92618 Tel (949) 462-3200 • Fax (949) 462-3201 www.KNAstructural.com KNA JOB NO.: 363.444		APPROVED: FOR CITY ENGINEER _____ DATE _____ PRINT DCE NAME _____ RCES# _____ DESCRIPTION BY APPROVED DATE FILMED ORIGINAL KNA _____ 02/11/2019 _____ _____ _____		SUBMITTED BY: _____ PROJECT MANAGER _____ CHECKED BY: _____ PROJECT ENGINEER _____ CCS27 COORDINATE _____ CCS83 COORDINATE _____
			CONTRACTOR INSPECTOR _____ DATE STARTED _____ DATE COMPLETED _____		-D



A BRACKET DETAIL
N.T.S. DSA-Brk-Dtl-L_A



F 1P TRUNNION MOUNT
N.T.S. DSA-1P TRUNNION_E

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**SECTION 26568
BASIS OF DESIGN**

MD3

PLANS FOR THE CONSTRUCTION OF
SAN DIEGO PD FIRING RANGE
ATTACHMENT DETAILS

CONSULTANT		SPEC. NO.	CITY OF SAN DIEGO, CALIFORNIA PUBLIC WORKS DEPARTMENT SHEET OF SHEETS		WBS _____														
<p>CORPORATE OFFICE: P.O. Box 808 100 1st Avenue West Oskaloosa, Iowa 52577 800/825-6020</p>		<p>9931 Muirlands Boulevard, Irvine, CA 92618 Tel (949) 462-3200 • Fax (949) 462-3201 www.KNAstructural.com</p>																	
PROJECT NO.: 161133		KNA JOB NO.: 363.444		<table border="1"> <tr> <th>DESCRIPTION</th> <th>BY</th> <th>APPROVED</th> <th>DATE</th> <th>FILMED</th> </tr> <tr> <td>ORIGINAL</td> <td>KNA</td> <td></td> <td>02/11/2019</td> <td></td> </tr> </table>		DESCRIPTION	BY	APPROVED	DATE	FILMED	ORIGINAL	KNA		02/11/2019					
DESCRIPTION	BY	APPROVED	DATE	FILMED															
ORIGINAL	KNA		02/11/2019																
CONTRACTOR INSPECTOR _____		DATE STARTED _____ DATE COMPLETED _____		<table border="1"> <tr> <td>APPROVED FOR CITY ENGINEER _____</td> <td>DATE _____</td> </tr> <tr> <td>PRINT DCE NAME _____</td> <td>RCE# _____</td> </tr> <tr> <td colspan="2">PROJECT ENGINEER _____</td> </tr> <tr> <td colspan="2">CHECKED BY _____</td> </tr> <tr> <td colspan="2">PROJECT MANAGER _____</td> </tr> <tr> <td colspan="2">CS827 COORDINATE _____</td> </tr> <tr> <td colspan="2">CS883 COORDINATE _____</td> </tr> </table>		APPROVED FOR CITY ENGINEER _____	DATE _____	PRINT DCE NAME _____	RCE# _____	PROJECT ENGINEER _____		CHECKED BY _____		PROJECT MANAGER _____		CS827 COORDINATE _____		CS883 COORDINATE _____	
APPROVED FOR CITY ENGINEER _____	DATE _____																		
PRINT DCE NAME _____	RCE# _____																		
PROJECT ENGINEER _____																			
CHECKED BY _____																			
PROJECT MANAGER _____																			
CS827 COORDINATE _____																			
CS883 COORDINATE _____																			

MUSCO LIGHTING, INC.
Light Structure Pole and Foundation Standard

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**ITEM : Structural Calculations
Pole Foundation Standard**

**PROJECT : San Diego Police Department
Firing Range
San Diego, CA**

**PROJECT NO : 161133
363.444**

DATE : 2/11/2019



ENGINEER :  **KNA
STRUCTURAL
ENGINEERS**
**JOSH RANDALL, SE No. 4506
9931 Muirlands Blvd
Irvine, Ca 92618**

MUSCO LIGHTING, INC.
Light Structure Pole and Foundation Standard

Calculation Index

CONTENTS:

<u>Page</u>	<u>Item</u>	
1-2	LSS50-AB (w/ 4 Fixtures)	-Wind Analysis
3-4	LSS50-AB (w/ 4 Fixtures)	-Seismic Analysis
5	Precast base by CRETEX	
6-8	LSS60-B (w/ 4 Fixtures)	-Wind Analysis
9-10	LSS60-B (w/ 4 Fixtures)	-Seismic Analysis
11	Precast base by CRETEX	
12	Foundation Check	
Appendix A	ATC Seismic Design Values	

CODE REFERENCE:

2016 CBC

ACI 318-14

Building Code Requirements for Structural Concrete

AISC 360-10

Specifications for Structural Steel Buildings

Distance From top of Pole FT	Outside Diameter of Pole, D IN	Pole thick, t IN	D/t	Kz	gz PSF	Cf Pole	Kl/r equiv.	E3-4 Fe	E3-2 or E3-3 Design comp strength, KIPS	Acting Manufactured, KIPS	F8.1-F8.4 Design flex'd strength, K-FT	F8.1-F8.4 Design flex'd strength, K-FT	Pr/Pc	H1-1b for Pr/Pc < 0.2	H1-1a for Pr/Pc ≥ 0.2	2nd Order /1st Order Moment FT-K	Req'd shea strength, KIPS	1st Order Delta IN	C2.2a P-Delta Moment FT-K	Total 2nd Order Moment FT-K	E7-19 Q	ACTING MOM DUE TO DL	M/I	DEFL DUE TO DL IN	
0	6.00	0.120	50.0	1.094	32.19	0.7	300	3.18	5.57	0.000	12.02	0.0	0.000	0.000	N.A.	1.000	Y	0.000	43.2	0.0	0.0	1.2467	0.00	0.0002	26.74
1	6.00	0.120	50.0	1.089	32.05	0.7	300	3.18	5.57	0.379	12.02	0.3	0.082	0.070	N.A.	1.196	Y	0.581	41.7	0.1	0.3	1.2467	0.00	0.0203	25.82
2	6.00	0.120	50.0	1.084	31.91	0.7	300	3.18	5.57	0.386	12.02	0.9	0.083	0.124	N.A.	1.130	Y	0.595	40.2	0.1	1.0	1.2467	0.39	0.0606	24.90
3	6.00	0.120	50.0	1.080	31.77	0.7	300	3.18	5.57	0.394	12.02	1.5	0.085	0.180	N.A.	1.117	Y	0.609	38.7	0.2	1.7	1.2467	0.78	0.1017	23.97
4	6.00	0.120	50.0	1.075	31.63	0.7	300	3.18	5.57	0.401	12.02	2.1	0.087	0.237	N.A.	1.111	Y	0.623	37.2	0.2	2.3	1.2467	1.17	0.135	23.06
5	6.22	0.120	51.8	1.070	31.48	0.7	300	3.18	5.77	0.409	12.84	2.7	0.085	0.278	N.A.	1.107	Y	0.637	35.7	0.3	3.0	1.2262	1.58	0.1603	22.15
6	6.37	0.120	53.1	1.065	31.33	0.7	300	3.18	5.92	0.418	18.01	3.4	0.085	0.249	N.A.	1.105	Y	0.652	34.3	0.4	3.7	1.0441	1.99	0.1847	21.25
7	6.51	0.120	54.3	1.060	31.18	0.7	300	3.18	6.05	0.426	18.77	4.0	0.085	0.279	N.A.	1.103	Y	0.667	32.9	0.4	4.4	1.036	2.41	0.2065	20.36
8	6.65	0.120	55.4	1.054	31.03	0.7	300	3.18	6.18	0.435	19.54	4.7	0.084	0.307	N.A.	1.101	Y	0.682	31.4	0.5	5.2	1.0282	2.84	0.2257	19.48
9	6.79	0.120	56.6	1.049	30.87	0.7	300	3.18	6.31	0.443	20.32	5.4	0.084	0.334	N.A.	1.100	Y	0.697	30.0	0.5	5.9	1.0208	3.28	0.2427	18.61
10	6.93	0.120	57.8	1.044	30.71	0.7	300	3.18	6.45	0.452	21.12	6.1	0.084	0.359	N.A.	1.099	Y	0.713	28.7	0.6	6.7	1.0136	3.73	0.2576	17.76
11	7.07	0.120	58.9	1.038	30.55	0.7	300	3.18	6.58	0.461	21.94	6.8	0.084	0.383	N.A.	1.097	Y	0.729	27.3	0.7	7.5	1.0067	4.19	0.2708	16.92
12	7.21	0.120	60.1	1.032	30.38	0.7	300	3.18	6.71	0.471	22.77	7.6	0.084	0.406	N.A.	1.096	Y	0.745	26.0	0.7	8.3	1.0001	4.65	0.2824	16.10
13	7.35	0.120	61.3	1.027	30.21	0.7	300	3.18	6.84	0.480	23.61	8.3	0.084	0.427	N.A.	1.095	Y	0.761	24.7	0.8	9.1	0.9938	5.13	0.2927	15.29
14	7.49	0.120	62.4	1.021	30.04	0.7	300	3.18	6.98	0.490	24.47	9.1	0.084	0.448	N.A.	1.094	Y	0.777	23.4	0.9	9.9	0.9877	5.61	0.3017	14.51
15	7.63	0.120	63.6	1.015	29.86	0.7	300	3.18	7.11	0.500	25.35	9.9	0.084	0.467	N.A.	1.092	Y	0.794	22.2	0.9	10.8	0.9818	6.11	0.3096	13.74
16	7.77	0.120	64.8	1.008	29.68	0.7	300	3.18	7.24	0.510	26.24	10.7	0.084	0.486	N.A.	1.091	Y	0.811	21.0	1.0	11.6	0.9761	6.61	0.3166	12.98
17	7.91	0.120	65.9	1.002	29.49	0.7	300	3.18	7.37	0.520	27.14	11.5	0.085	0.504	N.A.	1.090	Y	0.828	19.8	1.0	12.5	0.9706	7.13	0.3227	12.25
18	8.05	0.120	67.1	0.996	29.30	0.7	300	3.18	7.51	0.530	28.06	12.3	0.085	0.521	N.A.	1.089	Y	0.845	18.6	1.1	13.4	0.9653	7.65	0.328	11.54
19	8.19	0.120	68.3	0.989	29.11	0.7	300	3.18	7.64	0.541	29.00	13.2	0.085	0.537	N.A.	1.088	Y	0.863	17.5	1.2	14.3	0.9602	8.19	0.3327	10.84
20	8.33	0.120	69.4	0.982	28.90	0.7	300	3.18	7.77	0.551	29.95	14.0	0.085	0.552	N.A.	1.087	Y	0.880	16.4	1.2	15.3	0.9553	8.73	0.3367	10.17
21	8.47	0.120	70.6	0.975	28.70	0.7	300	3.18	7.90	0.562	30.92	14.9	0.085	0.567	N.A.	1.085	Y	0.898	15.4	1.3	16.2	0.9505	9.29	0.3401	9.51
22	8.61	0.120	71.8	0.968	28.49	0.7	300	3.18	8.04	0.573	31.90	15.8	0.086	0.581	N.A.	1.084	Y	0.916	14.3	1.3	17.2	0.9459	9.86	0.3431	8.88
23	8.75	0.120	72.9	0.961	28.27	0.7	300	3.18	8.17	0.584	32.90	16.8	0.086	0.595	N.A.	1.083	Y	0.934	13.4	1.4	18.2	0.9415	10.44	0.3457	8.26
24	8.89	0.120	74.1	0.953	28.05	0.7	300	3.18	8.30	0.596	33.91	17.7	0.086	0.608	N.A.	1.082	Y	0.952	12.4	1.4	19.2	0.9371	11.03	0.3478	7.67
25	9.03	0.120	75.3	0.945	27.82	0.7	300	3.18	8.43	0.608	34.94	18.7	0.086	0.621	N.A.	1.081	Y	0.971	11.5	1.5	20.2	0.9329	11.63	0.3496	7.09
26	9.17	0.120	76.4	0.937	27.58	0.7	300	3.18	8.57	0.619	35.98	19.7	0.087	0.633	N.A.	1.079	Y	0.989	10.6	1.6	21.2	0.9289	12.24	0.3511	6.54
27	9.31	0.120	77.6	0.929	27.33	0.7	300	3.18	8.70	0.631	37.04	20.7	0.087	0.645	N.A.	1.078	Y	1.008	9.7	1.6	22.3	0.9249	12.87	0.3666	6.01
28	9.21	0.120	76.8	0.920	27.08	0.7	300	3.18	8.61	0.643	36.29	21.7	0.090	0.688	N.A.	1.077	Y	1.027	8.9	1.7	23.3	0.9277	13.50	0.3816	5.50
29	9.35	0.120	77.9	0.911	26.81	0.7	300	3.18	8.74	0.655	37.35	22.7	0.090	0.699	N.A.	1.076	Y	1.045	8.1	1.7	24.4	0.9238	14.15	0.3819	5.01
30	9.49	0.120	79.1	0.902	26.54	0.7	300	3.18	8.87	0.667	38.43	23.8	0.090	0.710	N.A.	1.074	Y	1.063	7.4	1.8	25.5	0.92	14.81	0.382	4.54
31	9.63	0.120	80.3	0.892	26.25	0.7	300	3.18	9.00	0.679	39.52	24.8	0.091	0.720	N.A.	1.073	Y	1.082	6.6	1.8	26.7	0.9163	15.49	0.3819	4.10
32	9.77	0.120	81.4	0.882	25.96	0.7	300	3.18	9.14	0.692	40.63	25.9	0.091	0.729	N.A.	1.072	Y	1.101	6.0	1.9	27.8	0.9128	16.17	0.3816	3.68
33	9.91	0.120	82.6	0.872	25.65	0.7	300	3.18	9.27	0.705	41.75	27.0	0.091	0.739	N.A.	1.071	Y	1.119	5.3	1.9	28.9	0.9093	16.87	0.3812	3.28
34	10.05	0.120	83.8	0.860	25.32	0.7	300	3.18	9.40	0.718	42.89	28.2	0.092	0.748	N.A.	1.069	Y	1.138	4.7	2.0	30.1	0.9059	17.58	0.3807	2.91
35	10.19	0.120	84.9	0.849	24.98	0.7	300	3.18	9.53	0.731	44.05	29.3	0.092	0.757	N.A.	1.068	Y	1.156	4.2	2.0	31.3	0.9026	18.30	0.38	2.56
36	10.33	0.120	86.1	0.849	24.98	0.7	300	3.18	9.67	0.744	45.21	30.5	0.092	0.765	N.A.	1.067	Y	1.175	3.6	2.0	32.5	0.8994	19.04	0.3792	2.23
37	10.47	0.120	87.3	0.849	24.98	0.7	300	3.18	9.80	0.809	46.40	31.7	0.099	0.778	N.A.	1.065	Y	1.343	3.1	2.1	33.8	0.8963	19.79	0.3788	1.92
38	10.61	0.120	88.4	0.849	24.98	0.7	300	3.18	9.93	0.823	47.60	33.1	0.099	0.789	N.A.	1.064	Y	1.363	2.7	2.1	35.2	0.8933	20.61	0.3788	1.64
39	10.75	0.120	89.6	0.849	24.98	0.7	300	3.18	10.06	0.917	48.81	34.5	0.109	0.806	N.A.	1.062	Y	1.547	2.2	2.2	36.7	0.8903	21.44	0.3793	1.38
40	10.89	0.120	90.8	0.849	24.98	0.7	300	3.18	10.20	0.931	50.05	36.1	0.110	0.820	N.A.	1.061	Y	1.567	1.9	2.2	38.3	0.8875	22.36	0.3803	1.14
41	11.03	0.120	91.9	0.849	24.98	0.7	300	3.18	10.33	0.945	51.29	37.7	0.110	0.833	N.A.	1.059	Y	1.587	1.5	2.2	39.9	0.8847	23.30	0.381	0.92
42	11.17	0.120	93.1	0.849	24.98	0.7	300	3.18	10.46	0.959	52.55	39.3	0.110	0.845	N.A.	1.057	Y	1.608	1.2	2.3	41.5	0.8819	24.25	0.3816	0.73
43	11.31	0.120	94.3	0.849	24.98	0.7	300	3.18	10.59	0.974	53.83	40.9	0.110	0.857	N.A.	1.056	Y	1.628	0.9	2.3	43.2	0.8793	25.22	0.3821	0.56
44	11.45	0.120	95.4	0.849	24.98	0.7	300	3.18	10.73	0.988	55.12	42.5	0.111	0.869	N.A.	1.054	Y	1.649	0.7	2.3	44.8	0.8767	26.20	0.3823	0.41
45	11.59	0.120	96.6	0.849	24.98	0.7	300	3.18	10.86	1.003	56.43	44.2	0.111	0.880	N.A.	1.053	Y	1.671	0.5	2.3	46.5	0.8741	27.19	0.3824	0.28
46	11.73	0.120	97.8	0.849	24.98	0.7	300	3.18	10.99	1.018	57.75	45.9	0.111	0.890	N.A.	1.051	Y	1.692	0.3	2.3	48.2	0.8716	28.21	0.3824	0.18
47	11.87	0.120	98.9	0.849	24.98	0.7	300	3.18	11.12	1.034	59.09	47.6	0.112	0.901	N.A.	1.049	Y	1.714	0.2	2.4	49.9	0.8692	29.23	0.3822	0.10
48	12.01	0.120	100.1	0.849	24.98	0.7	300	3.18	11.26	1.049	60.44	49.3	0.112	0.911	N.A.	1.048	Y	1.736	0.1	2.4	51.7	0.8669	30.27	0.382	0.05
49	12.15	0.120	101.3	0.849	24.98	0.7	300	3.18	11.39	1.065	61.81</														

Reference: 2016 CBC, ASCE 7-10

INPUT:

Job Location:	San Diego, CA	
Site Class	D	
0.2 Sec MCE, S_s	1.049 g	ATC Hazards by location
1.0 Sec MCE, S_1	0.4 g	ATC Hazards by location
Site Coeff., F_a	1.080	ATC Hazards by location
Site Coeff., F_v	1.600	ATC Hazards by location
$S_{MS} = F_a S_s$	1.133 g	ATC Hazards by location
$S_{M1} = F_v S_1$	0.640 g	ATC Hazards by location
$S_{DS} = 2/3 S_{MS}$	0.756 g	ATC Hazards by location
$S_{D1} = 2/3 S_{M1}$	0.427 g	ATC Hazards by location
$T_s = S_{D1}/S_{DS}$	0.564 sec	
Long Period transition period, T_L	8.0 sec	ASCE 7-10 -Figure 22-12
Risk Category	II	Table 1604.5
Seismic Design Category	D	2016 CBC Section 1613.3.5

OUTPUT:

Light Pole Class	LS50-AB	
Fundamental Period, T	1.65 sec	See structural calculations, pg 1
Seismic coeff., R	1.5	ASCE 7-10 Table 15.4-2
Overstrength Factor, Ω	1.5	ASCE 7-10 Table 15.4-2
Importance Factor, I	1.00	ASCE 7-10 Section 15.4.1.1 & Table 1.5-2
Redundancy factor, ρ	1.0	ASCE 7-10 Section 15.6
DESIGN SEISMIC FORCE		
$V = C_s W$		ASCE 7-10 Eqn. 12.8-1
$C_s = S_{DS}/(R/I)$ for $T \leq T_s$	0.504 g	ASCE 7-10 Eqn. 12.8-2
C_s max. for $T \leq T_L$, $C_s = S_{D1}/T(R/I)$	0.172 g	ASCE 7-10 Eqn. 12.8-3
C_s min = $0.044 S_{DS} \geq 0.03$	0.03 g	ASCE 7-10 Eqn. 15.4-1
if $S_1 \geq 0.6g$, C_s min = $0.8 S_1/(R/I)$	N.A. g	ASCE 7-10 Eqn. 15.4-2
Load Combination, 1.2D+ 1.0E		ASCE 7-10 Section 2.3.2 Load Comb 5
where $E = E_h + E_v$		ASCE 7-10 Eqn. 12.4-1
and $E_h = pQ_E$	0.172 W	ASCE 7-10 Eqn. 12.4-3
and $E_v = 0.2S_{DS}D$	0.151 D	ASCE 7-10 Eqn. 12.4-4
Load Combination, 1.2D + (pQ _E + 0.2S _{DS} D)		
Load Combination, 1.2D + (pQ _E + 0.2S _{DS} D) 1.351 D + 0.172 W		

Total Seismic Weight, W = 1.647 kips See following page

SEISMIC SHEAR, V = 0.350 kips	<	1.781 kips WIND SHEAR	WIND CONTROLS
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Vertical Distribution of Seismic Force, $F_x = C_{vx}V$ ASCE7-10 Eqn. 12.8-11 & Section 12.8.5
 $k = 1.577$

Item	w	h_x	$w_x h_x^k$	$w_x h_x^k / \sum w_x h_x^k$	$C_{vx} * V$	OTM
Fixtures	0.371	49.5	174	0.568	0.161	7.97
	0	48.5	0	0.000	0.000	0.00
	0	46	0	0.000	0.000	0.00
	0	43.5	0	0.000	0.000	0.00
Top Pole Section	0.043	48.2	19	0.063	0.018	0.86
2nd Pole Section	0.269	34.3	71	0.231	0.065	2.25
1st Pole Section	0.446	12.75	25	0.080	0.023	0.29
	0	0	0	0.000	0.000	0.00
	0	0.00	0	0.000	0.000	0.00
	0	0.00	0	0.000	0.000	0.00
	0	0.00	0	0.000	0.000	0.00
Speaker	0.052	13.00	3	0.010	0.003	0.04
ECE	0.08	15.00	6	0.019	0.005	0.08
1/2 Precast base above grade	0.387	7.25	9	0.029	0.008	0.06
Sum	1.64725		307	1.000	0.283	11.54
Total Dead Load at grade	2.034					
SEISMIC OTM = 11.54 kip-ft < 55.19 kip-ft Wind OTM WIND CONTROLS						

SCOPE: Analysis of an annular prestressed concrete pole member based on compatible strain procedure per ACI-318-11 with an ultimate concrete strain of 0.003.
PROJECT: Musco Standard Pole Base
DATE: May-14-2014 9:49 AM
POLE TYPE = 2B

PROGRAM VERSION 2.3 Standard

USER DEFINED INPUTS

CROSS-SECTION OUTER DIAMTER = D_o =	11.92 INCHES
HOLLOW CORE INSIDE DIAMETER = D_i =	5.625 INCHES
TENDON CIRCLE DIAMETER = D_t =	9 INCHES
NUMBER OF TENDONS = N (56 or less and even)	10
TENDON DIAMETER = d_t =	0.5 INCHES
NOMINAL TENDON AREA = A_{ps} =	0.1531 IN ²
ULTIMATE TENDON STRENGTH = f_{pu} =	270 KSI
TENDON YIELD STRENGTH = f_{py} =	230 KSI
CONCRETE COMPRESSIVE STRENGTH = F'_c =	9500 PSI
MODULUS OF ELASTICITY - STEEL = E_s =	29000 KSI
INITIAL PRESTRESS FACTOR = IPF =	0.64
PRESTRESS LOSS FACTOR = PLF =	0.82
*PHI FACTOR USED =	0.9

OUTPUT

PHI FACTOR = ϕ =	0.90	
PRESTRESSING STRAIN IN TENDON = ϵ_{se} =	0.0049	
CONCRETE SERVICE STRESS DUE TO PRESTRESS =	2501 PSI	
CROSS SECTIONAL AREA =	87 IN ²	
GROSS MOMENT OF INERTIA =	942 IN ⁴	
DISTANCE TO NEUTRAL AXIS FROM COMP. SIDE = c =	5.67 INCHES	
CONCRETE COMPRESSIVE FORCE =	224 KIPS	
AREA OF BONDED REINFORCEMENT =	1.53 IN ²	
MINIMUM BONDED REINFORCEMENT AREA =	0.17 IN ²	SATISFIED
REINFORCEMENT RATIO = ρ_p =	0.0197	
REINFORCEMENT INDEX = ω =	0.3673	
MAXIMUM REINFORCEMENT INDEX =	0.2340	EXCEEDED
STRAND DEVELOPMENT LENGTH = L_d =	60 INCHES	

RESULTS

NOMINAL MOMENT CAPACITY = M_n =	92 FT-KIPS	
DESIGN MOMENT CAPACITY = ϕM_n =	82 FT-KIPS	
CRACKING LOAD MOMENT =	43 FT-KIPS	SATISFIED

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POLE DESIGNATION: LSS60-B W/ 4 FIXTURES
MANUFACTURER: MUSCO
PROJECT NO: 161133

JOB NO: 363.444
PROJECT: San Diego Police Department
LOCATION: San Diego, CA

ASCE 7-10
WIND CRITERIA 110 MPH, EXP C
LOAD COMB 1.2 DEAD + 1.0 WIND

POLE ID: R4, R5

LED 1150
EPA/FIXTURE*, Af = 3.5 ft2
D.L./FIXTURE** = 92.8 lbs
D.L. ECE/FIXTURE*** = 20.0 lbs
EPA = EFFECTIVE PROJECTED AREA OF LIGHT FIXTURE
INCLUDING CROSSARM, PER MUSCO
**D.L. = DEAD LOAD OF FIXTURE, & CROSSARM, PER MUSCO
***D.L. = DEAD LOAD OF ECE, PER MUSCO

| P = SUPERIMPOSED WT + POLE WT
v
^ ||| a
| |v| <-- <-- FIXTURES, F/Af= qz*Gf*Cf = 42.28 PSF MAX (29.5-1)
| | | <-- <-- where qz=.00256*Kz*Kzt*Kd(V)^2 = 33.63 PSF MAX (29.3-1)
| | | <-- <--
| |v| <--
| | | <--
| | | <--
| |v| <--
| | | <--
1 | | <--
| |v| <--
| | | <--
| | | <--
| |v| <--
| | | <--
| | | <--
| |v| <--
| | | <--
| | | <--
| |v| <--
| | | <--
v | | b <--

ATTACHMENT TYPE	NUMBER	DIST. FROM TOP POLE, FT	PA SQ FT	Cf	EPA SQ FT	Kz	qz PSF	WIND, F LBS	WEIGHT, P LBS
LED1150	4.0	0.5		1.0	3.49	1.141	33.57	588	371
	0.0	3.0		1.3	3.49	1.131	33.28	0	0
	0.0	5.5		1.3	3.49	1.120	32.97	0	0
	0.0	8.0		1.3	3.49	1.110	32.66	0	0
	0.0	10.5		1.3	3.49	1.099	32.33	0	0
	0.0	13.0		1.3	3.49	1.087	31.99	0	0
	0.0	15.5		1.3	3.49	1.075	31.64	0	0
	0.0	18.0		1.3	3.49	1.062	31.27	0	0
	0.0	20.5		1.3	3.49	1.049	30.88	0	0
Speaker	1.0	48.6	3.62	1.3	4.70	0.849	24.98	148	52
ECE	4.0	49.9	4.00	1.3	5.20	0.849	24.98	163	80
TOTALS =								899	503

POLE, F/Af= qz*Gf*Cf = 29.60 PSF MAX (29.5-1)
where qz=.00256*Kz*Kzt*Kd(V)^2 = 33.63 PSF MAX (29.3-1)

LOADING DIAGRAM

INPUT

-> l = 61.56 ft. (ht. from adj. grade)
-> l = 61.56 ft. (ht. from grade) 60.90 ft.(nom. ht from grade)
-> tA = 0.120 in. (pole thk. @ top)
-> dA = 6.00 in. (pole diam. @ top)
-> dB = 13.40 in. (pole diam. @ btm)
-> tB = 0.179 in. (pole thk. @ btm)
-> Fy = 38.0 ksi (fixt mount sect. = 5.25 ft)
-> Fy = 55.0 ksi (other pole sect.)
-> E = 29,000 ksi
-> Kzt = 1 (Figure 26.8-1)
-> Kd = 0.95 (Table 26.6-1)
-> Kz = 1.143 MAX-EXP C @ 61.6 FT. (Table 29.3-1)
-> Cf = 1.00 LIGHT FIXTURE (INCLUDED IN EPA)
-> Cf = 0.700 MAX (VARIES 0.5-1.2 FOR RND POLE) (Figure 29.5-1)
POLE DAMPING, beta= 0.025 Per Musco test

OUTPUT

-> POLE NATURAL FREQUENCY = 0.549 Hz 1/(2PI*(DELTA/386)^0.5) where DELTA is due to self weight
-> Gf = 1.26 (Section 26.9.5) (Reference Vibration Problems in Engineering by Timoshenko, 4th ED. pg.34)
Pole Properties:
Ia = 9.58 in4 taper = 0.140 in/ft
Ib = 162 in4 db/da = 2.233
ra = 2.079 in rb = 4.675 in.
Aa = 2.217 in2 Ab = 7.43 in2
Sa = 3.19 in3 Sb = 24.25 in3
From Critical Buckling Loads of Tapered Columns, ASCE 2/62:
n = Log (Ib/Ia)/Log (dB/dA) = 3.52
P* = (Ib/Ia)/(Ib/Ia)^.333 = 6.6
kl/req* (1/(P*)^.5)[kl/ra] = 290 (where k= 2.1)
AISC 360-05 Specification Table B4.1, Case 15
for Fy = 55.0 KSI 38 KSI
D/t < .45E/Fy = 237 343 (MAX)
D/t < .31E/Fy = 163 237 Noncompact
D/t < .07E/Fy = 37 53 Compact
D/t < .11E/Fy = 58 84 Slender element Section for Uniform Compr

Section 26.9.5 Gust-Effect Factor		
constant epsilon,e =	0.2	LZ = 511.4
constant l =	500	N1 = 2.633
Vz =	106.70	Rn = 0.076
4.6n1h/Vz =	1.458	
4.6n1B/Vz =	0.019	R = 1.165
15.4n1L/Vz =	0.064	9R = 4.044
Rh =	0.463	c = 0.200
RB =	0.987	lz = 0.196
RL =	0.959	Q = 0.926
		G = 0.888
Gf = 1.257		

SHEAR,F= 1.271 KIPS MOMENT, M= 46.46 K-FT e=M/F = 36.56 FT AXIAL,P = 1.516 KIPS ASD Forces at groundline (for foundation design)
SHEAR,F= 2.118 KIPS MOMENT, M= 77.44 K-FT e=M/F = 36.56 FT AXIAL,P = 1.819 KIPS Nominal Forces at groundline
M < Phi Mn = 115 K-FT Precast Base O.K.
Pole Stress Check = 0.75 Max. < 1 Pole O.K.
Max. Deflection = 52.5 Inch < 0.15H= 111 Inch AASHTO 10.4.2

51	12.28	0.179	68.6	0.849	24.98	0.7	290	3.39	18.23	1.244	97.21	53.3	0.082	0.619	N.A.	1.055	Y	1.866	1.5	3.0	56.2	0.9587	33.55	0.2091	0.98
52	12.42	0.179	69.4	0.849	24.98	0.7	290	3.39	18.44	1.268	99.33	55.1	0.083	0.626	N.A.	1.054	Y	1.889	1.3	3.0	58.1	0.9554	34.81	0.27018	0.81
53	12.56	0.179	70.2	0.849	24.98	0.7	290	3.39	18.65	1.292	101.48	57.0	0.083	0.633	N.A.	1.053	Y	1.912	1.0	3.0	60.1	0.9522	36.09	0.27069	0.66
54	12.70	0.179	70.9	0.849	24.98	0.7	290	3.39	18.86	1.316	103.64	59.0	0.084	0.640	N.A.	1.052	Y	1.935	0.8	3.0	62.0	0.9491	37.39	0.27114	0.52
55	12.84	0.179	71.7	0.849	24.98	0.7	290	3.39	19.07	1.340	105.84	60.9	0.084	0.647	N.A.	1.050	Y	1.958	0.6	3.1	64.0	0.946	38.72	0.27153	0.40
56	12.98	0.179	72.5	0.849	24.98	0.7	290	3.39	19.28	1.365	108.05	62.9	0.085	0.653	N.A.	1.049	Y	1.982	0.5	3.1	66.0	0.943	40.07	0.27187	0.29
57	13.12	0.179	73.3	0.849	24.98	0.7	290	3.39	19.49	1.390	110.29	64.9	0.086	0.659	N.A.	1.048	Y	2.006	0.3	3.1	68.0	0.94	41.45	0.27217	0.20
58	13.26	0.179	74.1	0.849	24.98	0.7	290	3.39	19.70	1.415	112.54	66.9	0.086	0.665	N.A.	1.047	Y	2.030	0.2	3.1	70.0	0.9371	42.85	0.27242	0.13
59	13.40	0.179	74.9	0.849	24.98	0.7	290	3.39	19.92	1.441	114.83	68.9	0.087	0.671	N.A.	1.046	Y	2.054	0.1	3.1	72.1	0.9343	44.28	0.27263	0.07
60	13.54	0.179	75.6	0.849	24.98	0.7	290	3.39	20.13	1.467	117.13	71.0	0.087	0.677	N.A.	1.044	NA	2.079	0.1	3.2	74.2	0.9315	45.73	0.27281	0.03
61	13.68	0.179	76.4	0.849	24.98	0.7	290	3.39	20.34	1.493	119.46	73.1	0.088	0.682	N.A.	1.043	NA	2.104	0.0	3.2	76.2	0.9288	47.21	0.27295	0.01
62	13.82	0.179	77.2	0.849	24.98	0.7	290	3.39	20.55	1.534	121.81	75.2	0.090	0.688	N.A.	1.042	NA	2.129	0.0	3.2	78.4	0.9262	48.72	0	0.00

Reference: 2016 CBC, ASCE 7-10

INPUT:

Job Location:	San Diego, CA		
Site Class	D		
0.2 Sec MCE, S_s	1.049	g	ATC Hazards by location
1.0 Sec MCE, S_1	0.4	g	ATC Hazards by location
Site Coeff., F_a	1.080		ATC Hazards by location
Site Coeff., F_v	1.600		ATC Hazards by location
$S_{MS} = F_a S_s$	1.133	g	ATC Hazards by location
$S_{M1} = F_v S_1$	0.640	g	ATC Hazards by location
$S_{DS} = 2/3 S_{MS}$	0.756	g	ATC Hazards by location
$S_{D1} = 2/3 S_{M1}$	0.427	g	ATC Hazards by location
$T_s = S_{D1}/S_{DS}$	0.564	sec	
Long Period transition period, T_L	8.0	sec	ASCE 7-10 -Figure 22-12
Risk Category	II		Table 1604.5
Seismic Design Category	D		2016 CBC Section 1613.3.5

OUTPUT:

Light Pole Class	LS60B		
Fundamental Period, T	1.82	sec	See structural calculations, pg 6
Seismic coeff., R	1.5		ASCE 7-10 Table 15.4-2
Overstrength Factor, Ω	1.5		ASCE 7-10 Table 15.4-2
Importance Factor, I	1.00		ASCE 7-10 Section 15.4.1.1 & Table 1.5-2
Redundancy factor, ρ	1.0		ASCE 7-10 Section 15.6
DESIGN SEISMIC FORCE			
$V = C_s W$			ASCE 7-10 Eqn. 12.8-1
$C_s = S_{DS}/(R/I)$ for $T \leq T_s$	0.504	g	ASCE 7-10 Eqn. 12.8-2
C_s max. for $T \leq T_L$, $C_s = S_{D1}/T(R/I)$	0.156	g	ASCE 7-10 Eqn. 12.8-3
C_s min = $0.044 S_{DS} \geq 0.03$	0.03	g	ASCE 7-10 Eqn. 15.4-1
if $S_1 \geq 0.6g$, C_s min = $0.8 S_1/(R/I)$	N.A.	g	ASCE 7-10 Eqn. 15.4-2
Load Combination, 1.2D+ 1.0E			ASCE 7-10 Section 2.3.2 Load Comb 5
where $E = E_h + E_v$			ASCE 7-10 Eqn. 12.4-1
and $E_h = P Q_e$	0.156	W	ASCE 7-10 Eqn. 12.4-3
and $E_v = 0.2 S_{DS} D$	0.151	D	ASCE 7-10 Eqn. 12.4-4
Load Combination, 1.2D + ($p Q_e + 0.2 S_{DS} D$)			
Load Combination, 1.2D + ($p Q_e + 0.2 S_{DS} D$)	1.351	D	+ 0.156 W

Total Seismic Weight, W = 2.066 kips See following page

SEISMIC SHEAR, V = 0.406 kips	<	2.118 kips WIND SHEAR	WIND CONTROLS
-------------------------------	---	-----------------------	---------------

Vertical Distribution of Seismic Force, $F_x = C_{vx}V$ CE7-10 Eqn. 12.8-11 & Section 12.8.5
 $k = 1.660$

Item	w	h_x	$w_x h_x^k$	$w_x h_x^k / \sum w_x h_x^k$	$C_{vx} * V$	OTM
LED 1150	0.371	60.9	340	0.527	0.170	10.36
	0	58.4	0	0.000	0.000	0.00
Top Pole Section	0.043	58.75	37	0.058	0.019	1.09
2nd Pole Section	0.275	44.84	152	0.235	0.076	3.40
1st Pole Section	0.711	18.68	92	0.142	0.046	0.86
	0	45	0	0.000	0.000	0.00
	0	30.00	0	0.000	0.000	0.00
	0	25.00	0	0.000	0.000	0.00
	0	22.00	0	0.000	0.000	0.00
	0	15.00	0	0.000	0.000	0.00
			0	0.000	0.000	0.00
Speaker	0.052	13.00	4	0.006	0.002	0.02
ECE	0.08	11.69	5	0.007	0.002	0.03
1/2 Precast base above grade	0.534	8.00	17	0.026	0.008	0.07
	Sum	2.066	646	1.000	0.323	15.82
Total Dead Load at grade	2.600					

SEISMIC OTM = 15.82 kip-ft < 77.44 kip-ft Wind OTM

WIND CONTROLS

SCOPE: Analysis of an annular prestressed concrete pole member based on compatible strain procedure per ACI-318-11 with an ultimate concrete strain of 0.003.
PROJECT: Musco Standard Pole Base
DATE: May-14-2014 9:49 AM
POLE TYPE = 3B

PROGRAM VERSION 2.3 Standard

USER DEFINED INPUTS

CROSS-SECTION OUTER DIAMTER = $D_o =$	13.32 INCHES
HOLLOW CORE INSIDE DIAMETER = $D_i =$	6.125 INCHES
TENDON CIRCLE DIAMETER = $D_t =$	10.32 INCHES
NUMBER OF TENDONS = N (56 or less and even)	12
TENDON DIAMETER = $d_t =$	0.5 INCHES
NOMINAL TENDON AREA = $A_{ps} =$	0.1531 IN²
ULTIMATE TENDON STRENGTH = $f_{pu} =$	270 KSI
TENDON YIELD STRENGTH = $f_{py} =$	230 KSI
CONCRETE COMPRESSIVE STRENGTH = $F'_c =$	9500 PSI
MODULUS OF ELASTICITY - STEEL = $E_s =$	29000 KSI
INITIAL PRESTRESS FACTOR = IPF =	0.64
PRESTRESS LOSS FACTOR = PLF =	0.82
*PHI FACTOR USED =	0.9

OUTPUT

PHI FACTOR = $\phi =$	0.90	
PRESTRESSING STRAIN IN TENDON = $\epsilon_{se} =$	0.0049	
CONCRETE SERVICE STRESS DUE TO PRESTRESS =	2369 PSI	
CROSS SECTIONAL AREA =	110 IN ²	
GROSS MOMENT OF INERTIA =	1476 IN ⁴	
DISTANCE TO NEUTRAL AXIS FROM COMP. SIDE = $c =$	6.15 INCHES	
CONCRETE COMPRESSIVE FORCE =	274 KIPS	
AREA OF BONDED REINFORCEMENT =	1.84 IN ²	
MINIMUM BONDED REINFORCEMENT AREA =	0.22 IN ²	SATISFIED
REINFORCEMENT RATIO = $\rho_p =$	0.0207	
REINFORCEMENT INDEX = $\omega =$	0.3756	
MAXIMUM REINFORCEMENT INDEX =	0.2340	EXCEEDED
STRAND DEVELOPMENT LENGTH = $L_d =$	64 INCHES	

RESULTS

NOMINAL MOMENT CAPACITY = $M_n =$	128 FT-KIPS	
DESIGN MOMENT CAPACITY = $\phi M_n =$	115 FT-KIPS	
CRACKING LOAD MOMENT =	57 FT-KIPS	SATISFIED

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DESIGN OF EMBEDDED POLE FOOTING-
NONCONSTRAINED
2016 CBC Section 1807.3.2.1

KNA STRUCTURAL ENGINEERS

Mark/Type Grade	LS50-AB	LS60-B
<u>INPUT</u>		
Shear, P	lbs = 1,068	1,271
height of P above grade, h	ft = 32.0	37.6
allow lateral brg pressure, s	psf/ft = 200	200
max allow lateral brg pressure	psf/ft = 2400	2400
Pier Diameter, b	ft = 2.5	2.5
<u>OUTPUT</u>		
Moment at grade, M	ft-lbs = 34,182	47,732
acting lateral brg pressure, S ₁	psf = 578	644
allow lateral brg pressure, S ₂	psf = 578	644
A=2.34P/(S ₁ b)	= 1.73	1.85
Min req'd embedment, d	ft = 8.68	9.67
=A/2{1+(1+4.36h/A) ^{1/2} }		
Add Depth to Ignore	1.00	1.00
Total Embed Required	9.68	10.67
USE 30 IN DIAMETER --->	10'-0	
USE 30 IN DIAMETER --->		12'-0

⚠ This is a beta release of the new ATC Hazards by Location website. Please contact us with feedback.

ATC Hazards by Location

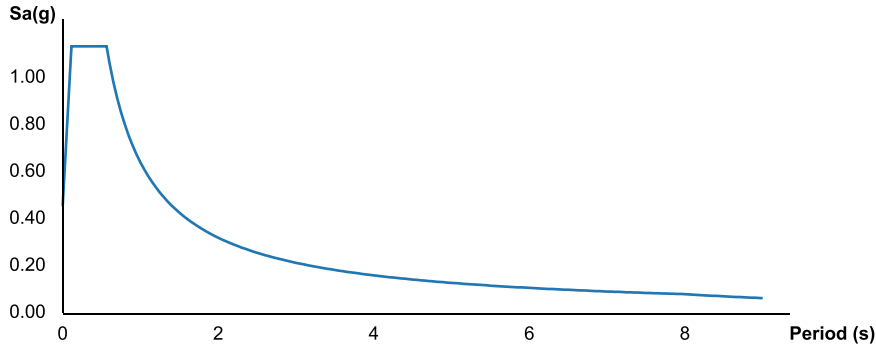
Search Information

Address: 4008 Federal Blvd, San Diego, CA 92102, USA
Coordinates: 32.71906870000001, -117.1082571
Timestamp: 2019-02-06T23:57:36.029Z
Hazard Type: Seismic
Reference Document: ASCE7-10
Risk Category: II
Site Class: D
Report Title: Not specified

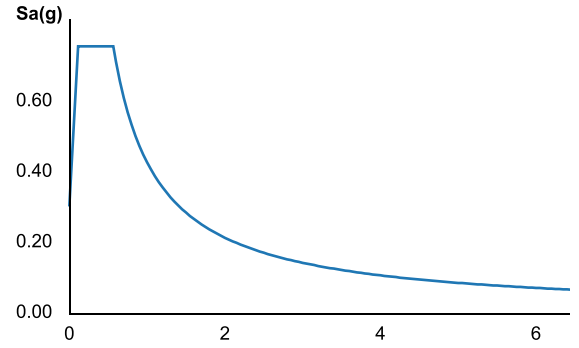
Map Results



MCER Horizontal Response Spectrum



Design Horizontal Response Spectrum



Text Results

Basic Parameters

Name	Value	Description
S _S	1.05	MCE _R ground motion (period=0.2s)
S ₁	0.4	MCE _R ground motion (period=1.0s)
S _{MS}	1.134	Site-modified spectral acceleration value
S _{M1}	0.64	Site-modified spectral acceleration value
S _{DS}	0.756	Numeric seismic design value at 0.2s SA
S _{D1}	0.427	Numeric seismic design value at 1.0s SA

Additional Information

Name	Value	Description
------	-------	-------------

SDC	D	Seismic design category
F _a	1.08	Site amplification factor at 0.2s
F _v	1.6	Site amplification factor at 1.0s
PGA	0.447	MCE _G peak ground acceleration
F _{PGA}	1.053	Site amplification factor at PGA
PGA _M	0.471	Site modified peak ground acceleration
T _L	8	Long-period transition period (s)
SsRT	1.05	Probabilistic risk-targeted ground motion (0.2s)
SsUH	1.186	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	1.784	Factored deterministic acceleration value (0.2s)
S1RT	0.4	Probabilistic risk-targeted ground motion (1.0s)
S1UH	0.427	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	0.741	Factored deterministic acceleration value (1.0s)
PGAd	0.69	Factored deterministic acceleration value (PGA)

The results indicated here DO NOT reflect any state or local amendments to the values or any delineation lines made during the building code adoption process. Users should confirm any output obtained from this tool with the local Authority Having Jurisdiction before proceeding with design.

Disclaimer

Hazard loads are provided by the United States Geological Survey [Seismic Design Web Services](#).

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San Diego Police Department Firing Range

San Diego, CA

Lighting System

Pole / Fixture Summary						
Pole ID	Pole Height	Mtg Height	Fixture Qty	Luminaire Type	Load	Circuit
R1-R2	50'	50'	4	TLC-LED-1150	4.60 kW	A
R4-R5	60'	60'	4	TLC-LED-1150	4.60 kW	B
4			16		18.40 kW	

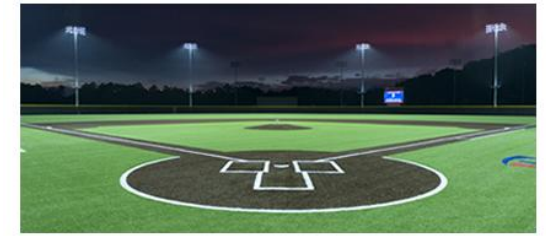
Circuit Summary			
Circuit	Description	Load	Fixture Qty
A	West Range	9.2 kW	8
B	East Range	9.2 kW	8

Fixture Type Summary							
Type	Source	Wattage	Lumens	L90	L80	L70	Quantity
TLC-LED-1150	LED 5700K - 75 CRI	1150W	121,000	>81,000	>81,000	>81,000	16

Light Level Summary

Calculation Grid Summary								
Grid Name	Calculation Metric	Illumination					Circuits	Fixture Qty
		Ave	Min	Max	Max/Min	Ave/Min		
East Range Target Area - Front	Perpendicular	56.3	40	68	1.69	1.41	B	8
East Range	Horizontal Illuminance	39.7	21	57	2.68	1.89	B	8
Property Spill	Horizontal	0	0	0	0.00		A,B	16
Property Spill	Max Candela (by Fixture)	0	0	0	0.00		A,B	16
Property Spill	Max Vertical Illuminance Metric	0	0	0	0.00		A,B	16
West Range Targets - Front	Perpendicular	55.8	43	78	1.81	1.30	A	8
West Range	Horizontal Illuminance	36	22	55	2.52	1.64	A	8

From Hometown to Professional



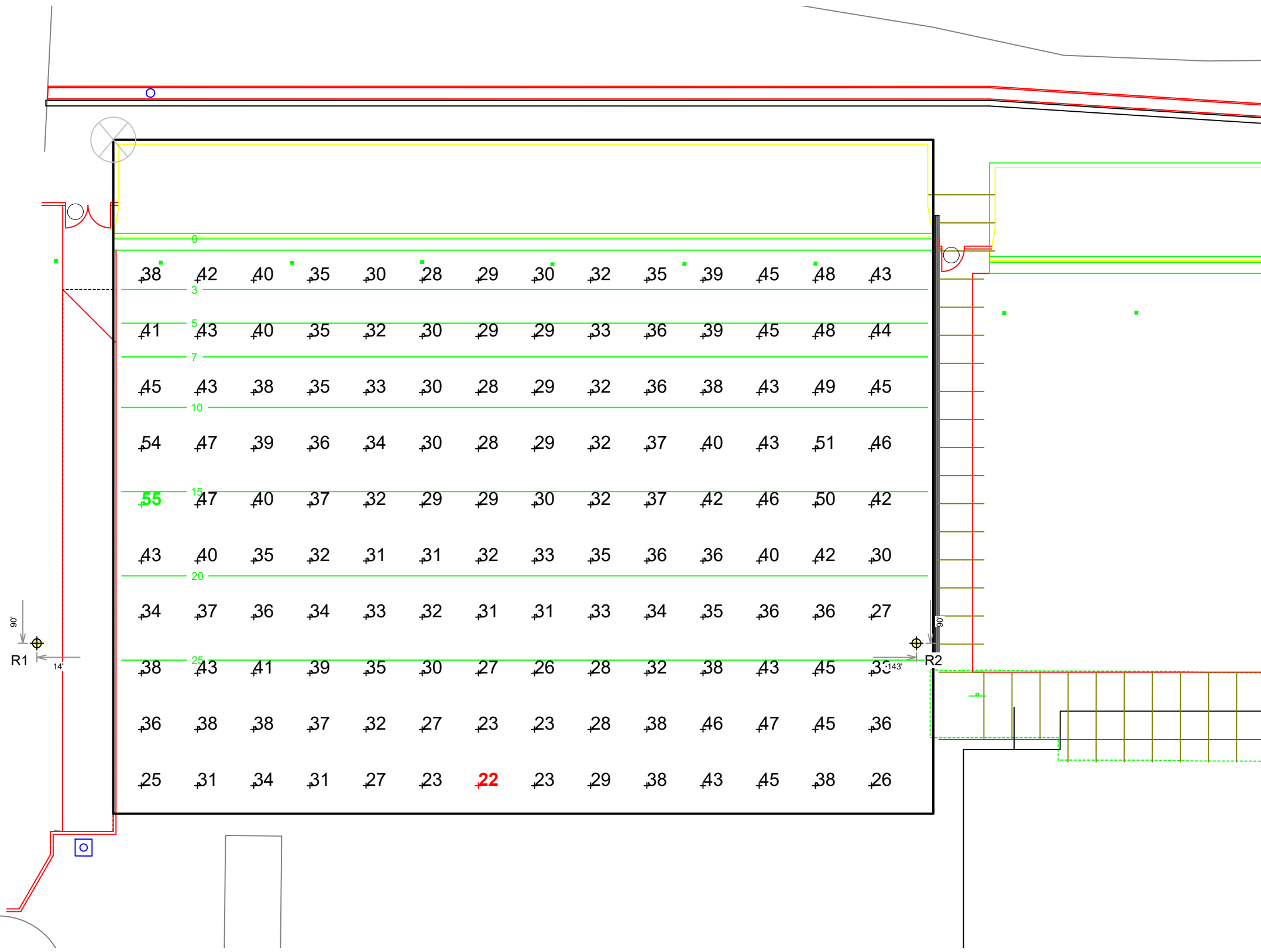
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EQUIPMENT LIST FOR AREAS SHOWN								
Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	THIS GRID	
2	R1-R2	50'	-	50'	TLC-LED-1150	4	4	
2	TOTALS							8

GRID SUMMARY	
Name:	West Range
Size:	146' x 120'
Spacing:	10.0' x 10.0'
Height:	3.0' above grade

ILLUMINATION SUMMARY			
MAINTAINED HORIZONTAL FOOTCANDLES			
Entire Grid			
Scan Average:	36.04		
Maximum:	55		
Minimum:	22		
Avg / Min:	1.65		
Max / Min:	2.52		
UG (adjacent pts):	1.51		
CU:	0.54		
No. of Points:	140		
LUMINAIRE INFORMATION			
Color / CRI:	5700K - 75 CRI / 1500W MZ		
Luminaire Output:	121,000 lumens		
No. of Luminaires:	8		
Total Load:	9.2 kW		
Lumen Maintenance			
Luminaire Type	L90 hrs	L80 hrs	L70 hrs
TLC-LED-1150	>81,000	>81,000	>81,000
Green Generation	--	--	--
Reported per TM-21-11. See luminaire datasheet for details.			

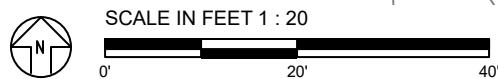


Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document and includes a 0.95 dirt depreciation factor.

Field Measurements: Individual field measurements may vary from computer-calculated predictions and should be taken in accordance with IESNA RP-6-15.

Electrical System Requirements: Refer to Amperage Draw Chart and/or the "Musco Control System Summary" for electrical sizing.

Installation Requirements: Results assume ± 3% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.



Pole location(s) ⊕ dimensions are relative to 0,0 reference point(s) ⊗



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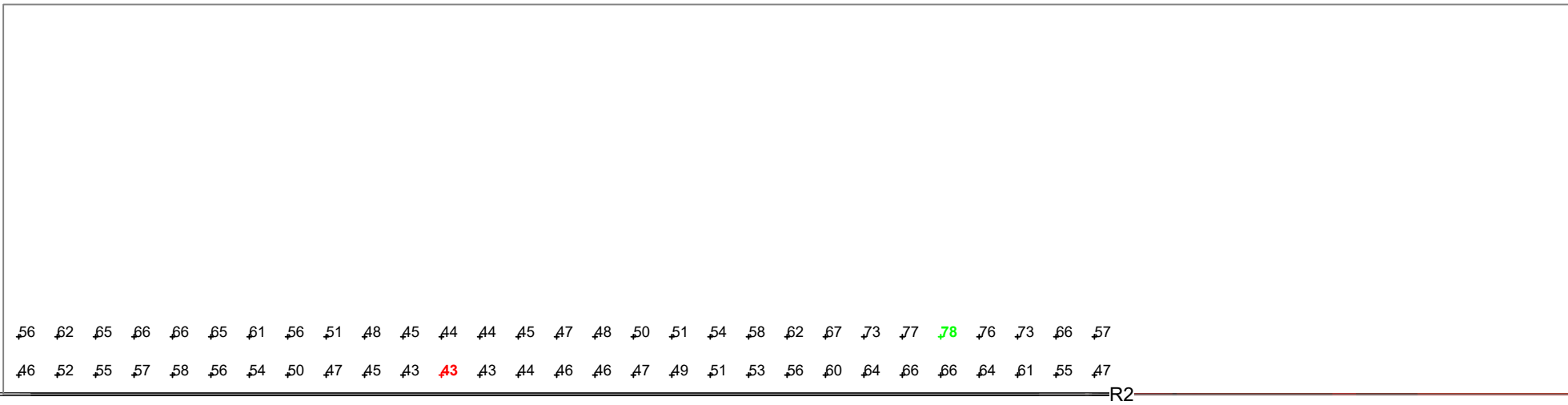
ILLUMINATION SUMMARY

EQUIPMENT LIST FOR AREAS SHOWN								
Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
2	R1-R2	50'	-	50'	TLC-LED-1150	4	4	0
2	TOTALS					8	8	0

San Diego Police Department Firing Range
San Diego, CA

GRID SUMMARY	
Name:	West Range Targets - Front
Size:	146' x 120'
Spacing:	5.0' x 5.0'

ILLUMINATION SUMMARY			
MAINTAINED VERTICAL FOOTCANDLES: 0° Tilt			
Entire Grid			
Scan Average:	55.83		
Maximum:	78		
Minimum:	43		
Avg / Min:	1.30		
Max / Min:	1.81		
UG (adjacent pts):	1.22		
CU:	0.09		
No. of Points:	58		
LUMINAIRE INFORMATION			
Color / CRI:	5700K - 75 CRI / 1500W MZ		
Luminaire Output:	121,000 lumens		
No. of Luminaires:	8		
Total Load:	9.2 kW		
Lumen Maintenance			
Luminaire Type	L90 hrs	L80 hrs	L70 hrs
TLC-LED-1150	>81,000	>81,000	>81,000
Green Generation	--	--	--
Reported per TM-21-11. See luminaire datasheet for details.			

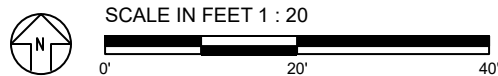


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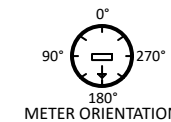
Field Measurements: Individual field measurements may vary from computer-calculated predictions and should be taken in accordance with IESNA RP-6-15.

Electrical System Requirements: Refer to Amperage Draw Chart and/or the "Musco Control System Summary" for electrical sizing.

Installation Requirements: Results assume ± 3% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.



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Pole location(s) dimensions are relative to 0,0 reference point(s)



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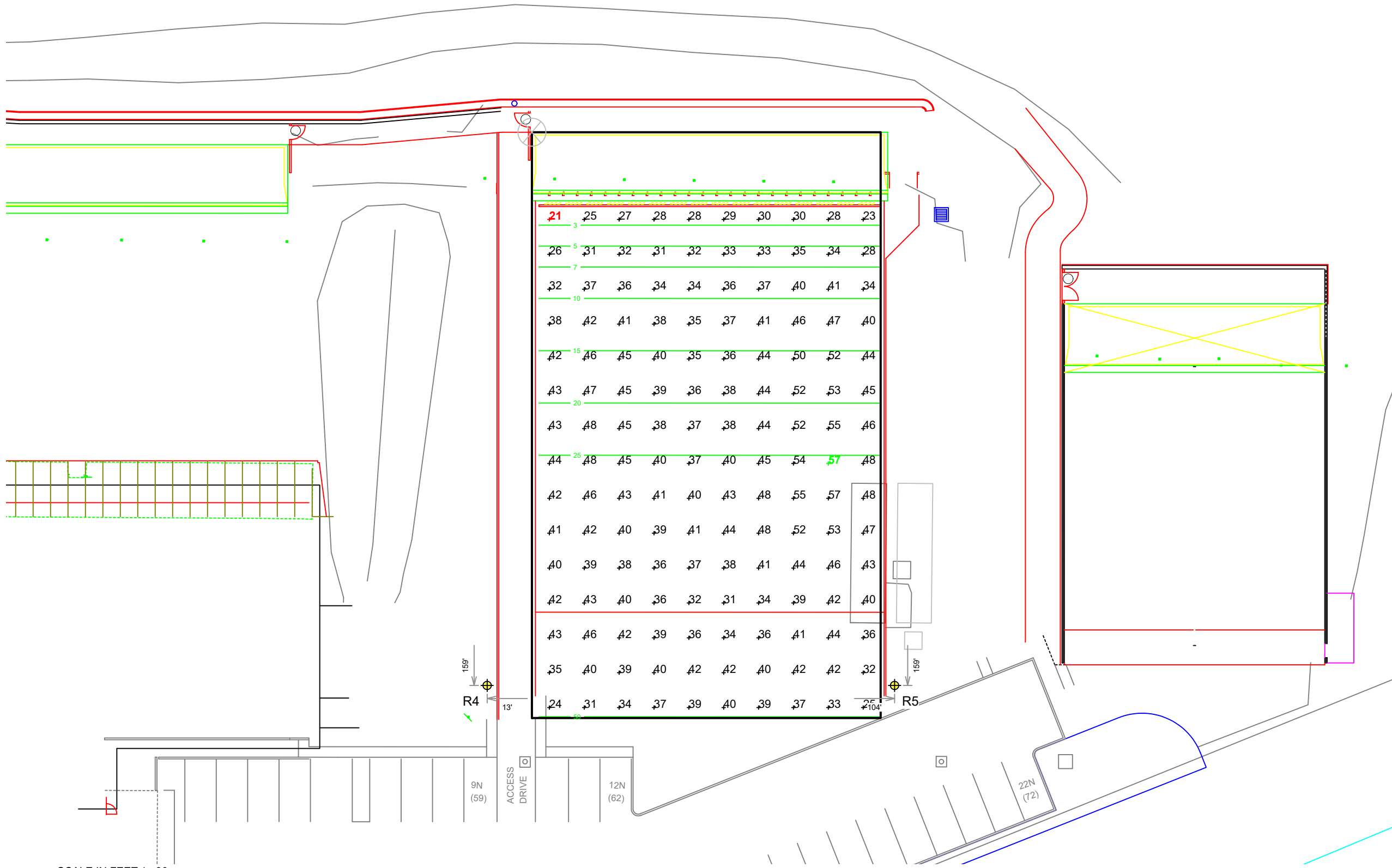
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ILLUMINATION SUMMARY

EQUIPMENT LIST FOR AREAS SHOWN									
Pole				Luminaires					
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS	
2	R4-R5	60'	-	60'	TLC-LED-1150	4	4	0	
2	TOTALS								
						8	8	0	

GRID SUMMARY	
Name:	East Range
Size:	100' x 168'
Spacing:	10.0' x 10.0'
Height:	3.0' above grade

ILLUMINATION SUMMARY			
MAINTAINED HORIZONTAL FOOTCANDLES			
Entire Grid			
Scan Average:	39.69		
Maximum:	57		
Minimum:	21		
Avg / Min:	1.86		
Max / Min:	2.68		
UG (adjacent pts):	1.48		
CU:	0.61		
No. of Points:	150		
LUMINAIRE INFORMATION			
Color / CRI:	5700K - 75 CRI / 1500W MZ		
Luminaire Output:	121,000 lumens		
No. of Luminaires:	8		
Total Load:	9.2 kW		
Lumen Maintenance			
Luminaire Type	L90 hrs	L80 hrs	L70 hrs
TLC-LED-1150	>81,000	>81,000	>81,000
Green Generation	--	--	--
Reported per TM-21-11. See luminaire datasheet for details.			

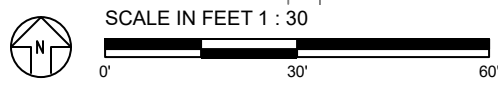


Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document and includes a 0.95 dirt depreciation factor.

Field Measurements: Individual field measurements may vary from computer-calculated predictions and should be taken in accordance with IESNA RP-6-15.

Electrical System Requirements: Refer to Amperage Draw Chart and/or the "Musco Control System Summary" for electrical sizing.

Installation Requirements: Results assume ± 3% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.



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Pole location(s) ⊕ dimensions are relative to 0,0 reference point(s) ⊗



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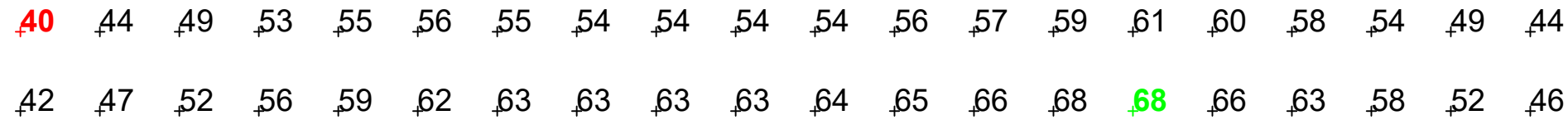
ILLUMINATION SUMMARY

EQUIPMENT LIST FOR AREAS SHOWN								
Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
2	R4-R5	60'	-	60'	TLC-LED-1150	4	4	0
2	TOTALS					8	8	0

San Diego Police Department Firing Range
San Diego, CA

GRID SUMMARY	
Name:	East Range Target Area - Front
Size:	100' x 168'
Spacing:	5.0' x 5.0'

ILLUMINATION SUMMARY			
MAINTAINED VERTICAL FOOTCANDLES: 0° Tilt			
Entire Grid			
Scan Average:	56.30		
Maximum:	68		
Minimum:	40		
Avg / Min:	1.40		
Max / Min:	1.69		
UG (adjacent pts):	1.17		
CU:	0.06		
No. of Points:	40		
LUMINAIRE INFORMATION			
Color / CRI:	5700K - 75 CRI / 1500W MZ		
Luminaire Output:	121,000 lumens		
No. of Luminaires:	8		
Total Load:	9.2 kW		
Lumen Maintenance			
Luminaire Type	L90 hrs	L80 hrs	L70 hrs
TLC-LED-1150	>81,000	>81,000	>81,000
Green Generation	--	--	--
Reported per TM-21-11. See luminaire datasheet for details.			



Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document and includes a 0.95 dirt depreciation factor.

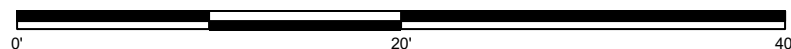
Field Measurements: Individual field measurements may vary from computer-calculated predictions and should be taken in accordance with IESNA RP-6-15.

Electrical System Requirements: Refer to Amperage Draw Chart and/or the "Musco Control System Summary" for electrical sizing.

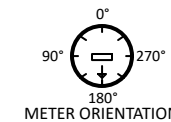
Installation Requirements: Results assume ± 3% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.



SCALE IN FEET 1 : 10



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Pole location(s) ⚓ dimensions are relative to 0,0 reference point(s) ⊗



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ILLUMINATION SUMMARY

EQUIPMENT LIST FOR AREAS SHOWN								
Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
2	R1-R2	50'	-	50'	TLC-LED-1150	4	4	0
2	R4-R5	60'	-	60'	TLC-LED-1150	4	4	0
4	TOTALS					16	16	0

GRID SUMMARY	
Name:	Property Spill
Spacing:	30.0'
Height:	53.0' above grade

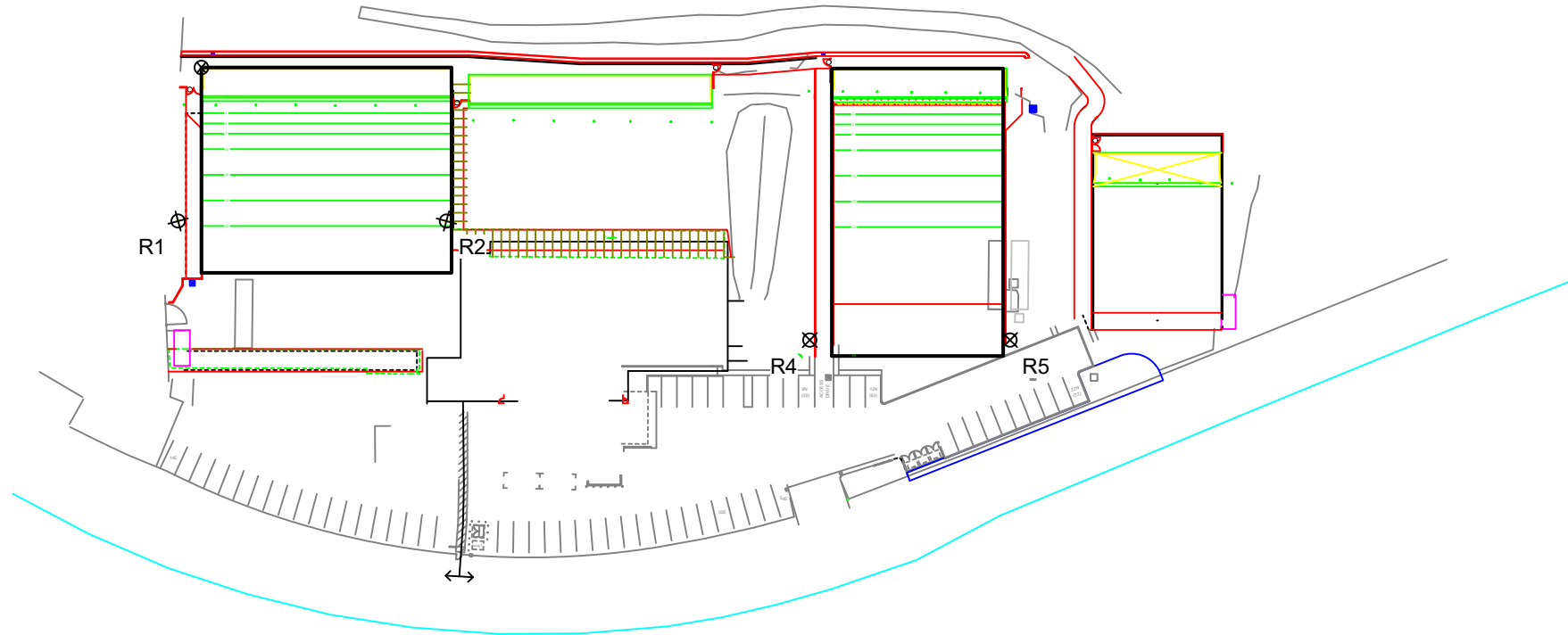
ILLUMINATION SUMMARY	
MAINTAINED HORIZONTAL FOOTCANDLES	
Entire Grid	
Scan Average:	0.0000
Maximum:	0.00
Minimum:	0.00
No. of Points:	16

LUMINAIRE INFORMATION	
Color / CRI:	5700K - 75 CRI / 1500W MZ
Luminaire Output:	121,000 lumens
No. of Luminaires:	16
Total Load:	18.4 kW

Luminaire Type	Lumen Maintenance		
	L90 hrs	L80 hrs	L70 hrs
TLC-LED-1150	>81,000	>81,000	>81,000
Green Generation	--	--	--

Reported per TM-21-11. See luminaire datasheet for details.

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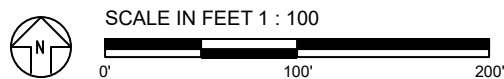
Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document and includes a 0.95 dirt depreciation factor.

Field Measurements: Individual field measurements may vary from computer-calculated predictions and should be taken in accordance with IESNA RP-6-15.

Electrical System Requirements: Refer to Amperage Draw Chart and/or the "Musco Control System Summary" for electrical sizing.

Installation Requirements: Results assume ± 3% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.

NOTES: Property spill at approximate elevation



ENGINEERED DESIGN By: Daniel Lohman • File #161133G • 11-Dec-18

Pole location(s) Ⓢ dimensions are relative to 0,0 reference point(s) ⊗



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ILLUMINATION SUMMARY

EQUIPMENT LIST FOR AREAS SHOWN								
Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
2	R1-R2	50'	-	50'	TLC-LED-1150	4	4	0
2	R4-R5	60'	-	60'	TLC-LED-1150	4	4	0
4	TOTALS					16	16	0

GRID SUMMARY	
Name:	Property Spill
Spacing:	30.0'
Height:	53.0' above grade

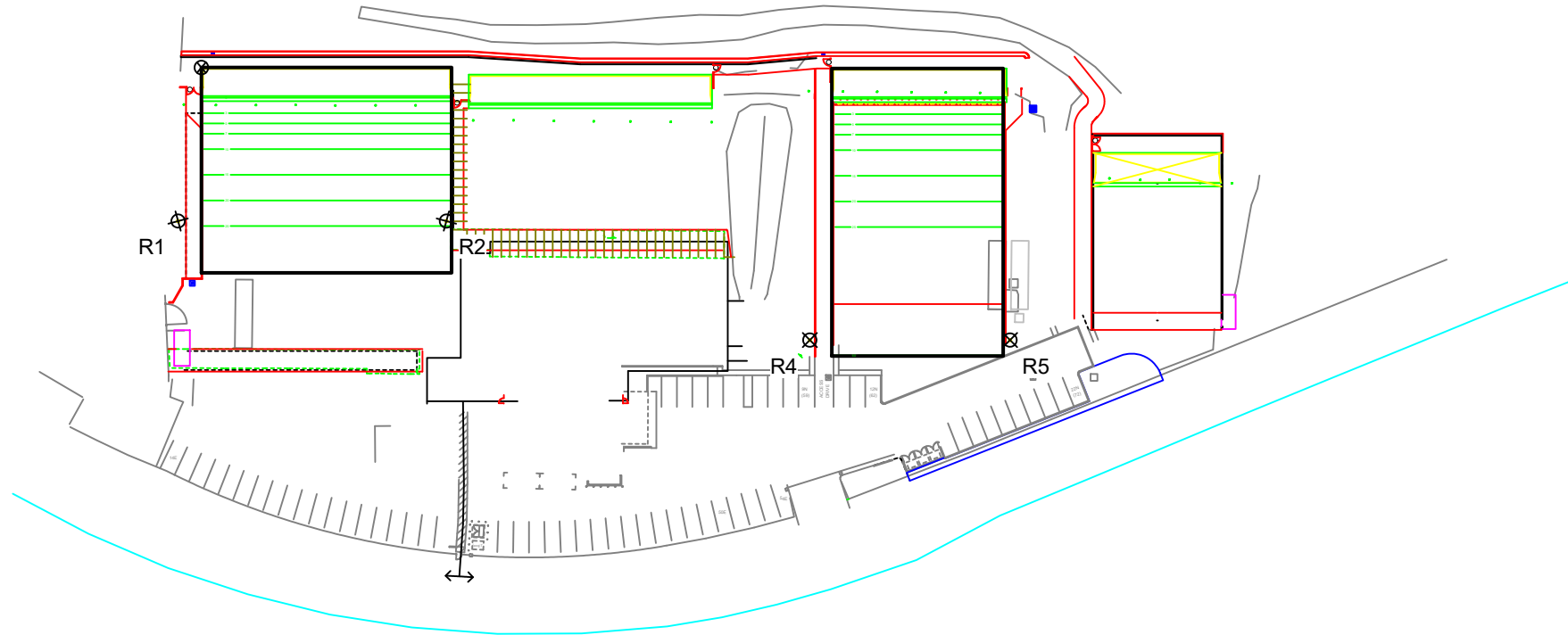
ILLUMINATION SUMMARY	
MAINTAINED MAX VERTICAL FOOTCANDLES	
Entire Grid	
Scan Average:	0.0000
Maximum:	0.00
Minimum:	0.00
No. of Points:	16

LUMINAIRE INFORMATION	
Color / CRI:	5700K - 75 CRI / 1500W MZ
Luminaire Output:	121,000 lumens
No. of Luminaires:	16
Total Load:	18.4 kW

Luminaire Type	Lumen Maintenance		
	L90 hrs	L80 hrs	L70 hrs
TLC-LED-1150	>81,000	>81,000	>81,000
Green Generation	--	--	--

Reported per TM-21-11. See luminaire datasheet for details.

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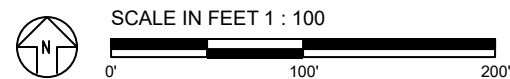
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Electrical System Requirements: Refer to Amperage Draw Chart and/or the "Musco Control System Summary" for electrical sizing.

Installation Requirements: Results assume ± 3% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.

NOTES: Property spill at approximate elevation



ENGINEERED DESIGN By: Daniel Lohman • File #161133G • 11-Dec-18

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ILLUMINATION SUMMARY

EQUIPMENT LIST FOR AREAS SHOWN								
Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
2	R1-R2	50'	-	50'	TLC-LED-1150	4	4	0
2	R4-R5	60'	-	60'	TLC-LED-1150	4	4	0
4	TOTALS					16	16	0

GRID SUMMARY	
Name:	Property Spill
Spacing:	30.0'
Height:	53.0' above grade

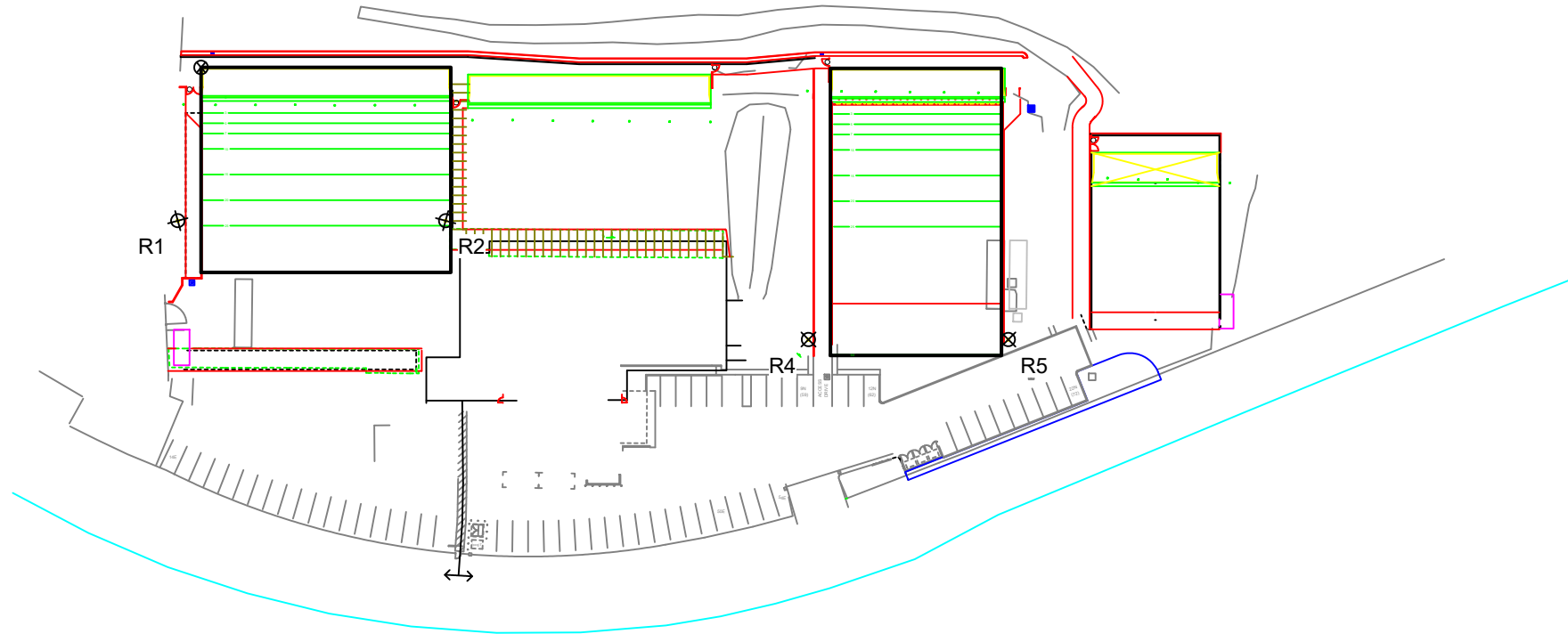
ILLUMINATION SUMMARY	
MAINTAINED CANDELA (PER FIXTURE)	
Entire Grid	
Scan Average:	0.0000
Maximum:	0.00
Minimum:	0.00
No. of Points:	16

LUMINAIRE INFORMATION	
Color / CRI:	5700K - 75 CRI / 1500W MZ
Luminaire Output:	121,000 lumens
No. of Luminaires:	16
Total Load:	18.4 kW

Luminaire Type	Lumen Maintenance		
	L90 hrs	L80 hrs	L70 hrs
TLC-LED-1150	>81,000	>81,000	>81,000
Green Generation	--	--	--

Reported per TM-21-11. See luminaire datasheet for details.

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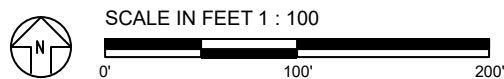
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ILLUMINATION SUMMARY

EQUIPMENT LAYOUT

INCLUDES:

- East Range
- West Range

Electrical System Requirements: Refer to Amperage Draw Chart and/or the "Musco Control System Summary" for electrical sizing.

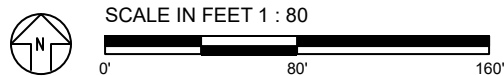
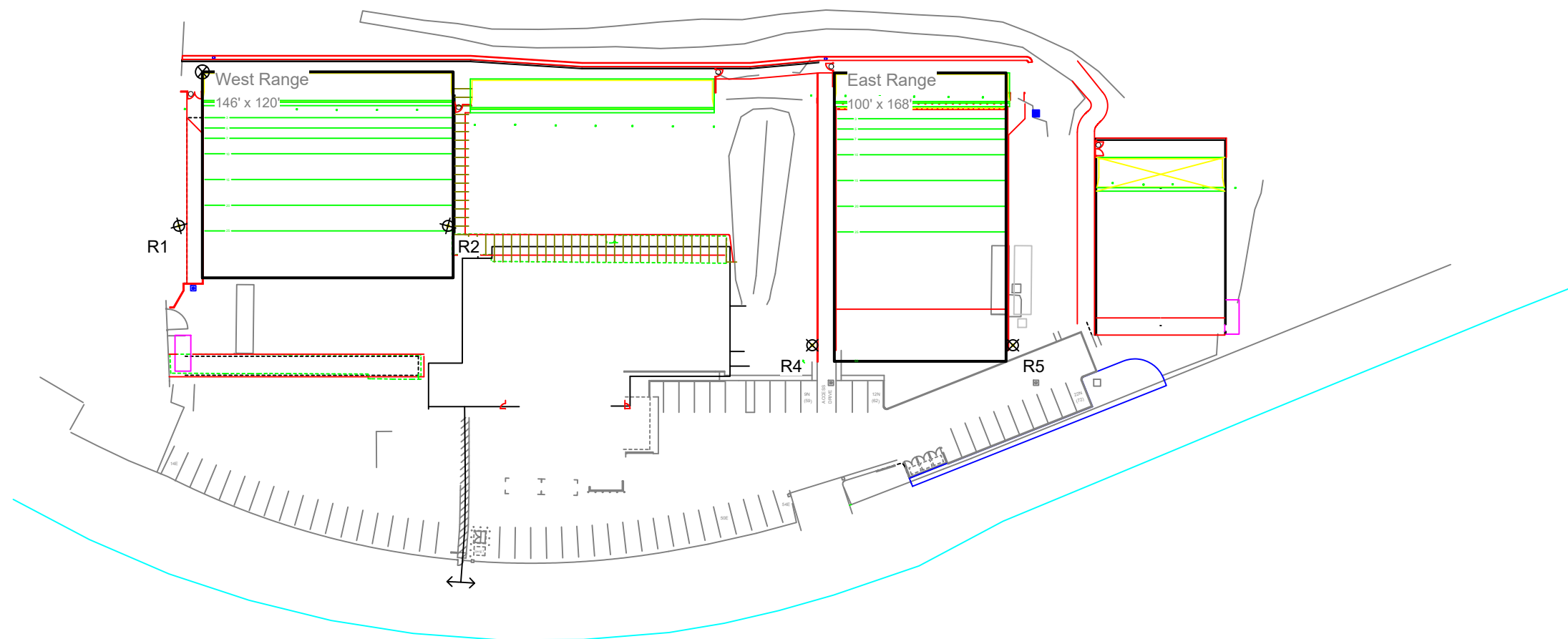
Installation Requirements: Results assume ± 3% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.

EQUIPMENT LIST FOR AREAS SHOWN

QTY	Pole			Luminaires		QTY / POLE
	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	
2	R1-R2	50'	-	50'	TLC-LED-1150	4
2	R4-R5	60'	-	60'	TLC-LED-1150	4
4	TOTALS					16

SINGLE LUMINAIRE AMPERAGE DRAW CHART

Ballast Specifications (.90 min power factor)	Line Amperage Per Luminaire (max draw)						
	208 (60)	220 (60)	240 (60)	277 (60)	347 (60)	380 (60)	480 (60)
Single Phase Voltage							
TLC-LED-1150	6.8	6.5	5.9	5.1	4.1	3.7	3.0



ENGINEERED DESIGN By: Daniel Lohman • File #161133G • 11-Dec-18

Pole location(s) ⊕ dimensions are relative to 0,0 reference point(s) ⊗



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GLARE IMPACT

Summary

Map indicates the maximum candela an observer would see when facing the brightest light source from any direction.

A well-designed lighting system controls light to provide maximum useful on-field illumination with minimal destructive off-site glare.

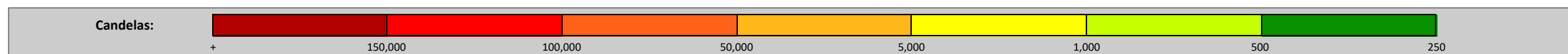
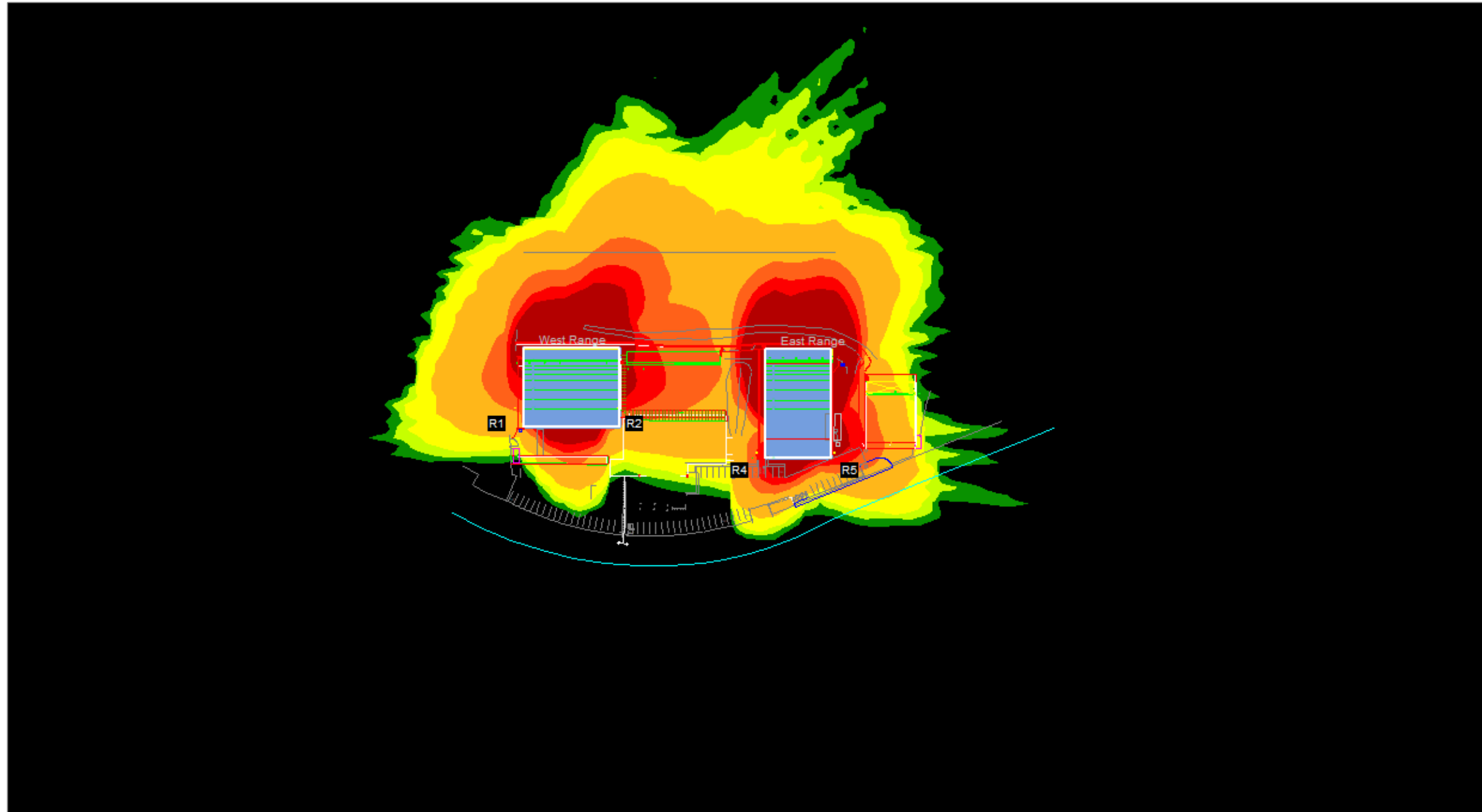
GLARE

Candela Levels

High Glare: 150,000 or more candela
Should only occur on or very near the lit area where the light source is in direct view. Care must be taken to minimize high glare zones.

Significant Glare: 25,000 to 75,000 candela
Equivalent to high beam headlights of a car.

Minimal to No Glare: 500 or less candela
Equivalent to 100W incandescent light bulb.



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APPENDIX K
BULLET TRAPS DRAWING

SAN DIEGO PD



CUSTOMER APPROVAL:

Signature: _____

Printed Name: _____

Date: _____



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PROJECT STATUS

**SECTION 116723
BASIS OF DESIGN**

PROJECT NAME

SAN DIEGO PD

Project Manager:	----
Territory Manager:	CHRIS HART
Project Engineer:	FELIX GUZMAN
Drawn By:	PEDRO CORREA
Approved By:	FELIX GUZMAN
Origination Date:	3/1/19

No	BY	REVISION	DATE
1	FG	CUSTOMER MARKUPS	5/8/19

DESIGN CRITERIA:

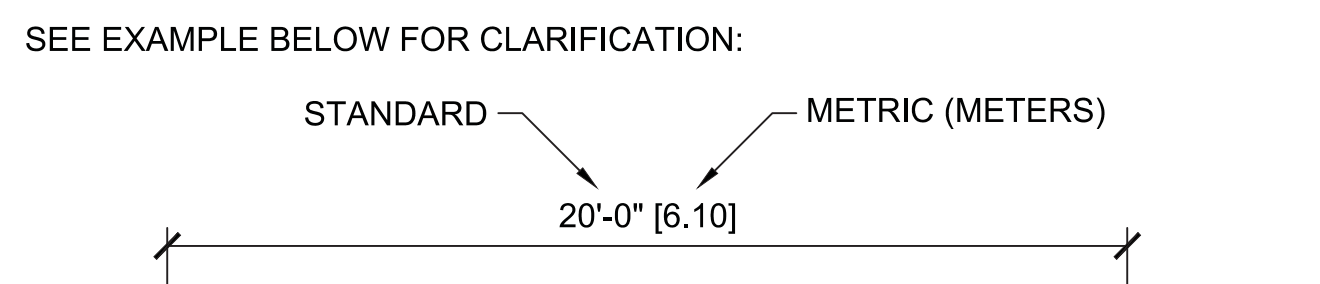
- FIXED POSITION FIRING RANGE:**
 - TRAJECTORIES START AT 1' ABOVE FINISHED FLOOR, AT FIRING LINE SECONDARY TRAJECTORIES DESIGNED TO CONTAIN 6° PROJECTILE DEFLECTION.
 - BAFFLE LAYOUT PROVIDES STEEL COVERAGE OF TRAJECTORY + 2" ON BAFFLE/TRAP.
 - COVERAGE EXTENDS 36" BEHIND FIRING LINE, PROVIDING A 90° CONTAINMENT AREA AT FIRING LINE.
 - BAFFLE ANGLE DESIGNED TO NOT EXCEED 30°.
 - TARGETRY HEIGHT DESIGNED TO PLACE THE TOP OF HEAD AT 5'-10" AFF.
- TACTICAL FIRING RANGE:**
 - TRAJECTORIES START AT 1' ABOVE FINISHED FLOOR, AT FURTHEST FIRING POSITION TO 10 METERS TRAJECTORIES AT 3 METER TO 10 METER LOCATIONS START AT 4' ABOVE FINISHED FLOOR SECONDARY TRAJECTORIES DESIGNED TO CONTAIN 6° PROJECTILE DEFLECTION.
 - BAFFLE LAYOUT PROVIDES STEEL COVERAGE OF TRAJECTORY + 2" ON BAFFLE/TRAP.
 - COVERAGE EXTENDS 36" BEHIND FIRING LINE TACTICAL LAYOUT PROVIDES A 90° CONTAINMENT AREA FROM THE 3 METER LINE TO THE FURTHEST FIRING POSITION.
 - BAFFLE ANGLE DESIGNED TO NOT EXCEED 30°. TARGETRY HEIGHT DESIGNED TO PLACE THE TOP OF HEAD AT 5'-10" AFF.
- M.A.T.C.H. (MODULAR ARMORED TACTICAL COMBAT HOUSE):**
 - DESIGNED TO CONTAIN ROUNDS FIRED BETWEEN 0" AFF AND 84" AFF. WALLS DESIGNED TO BE A NOMINAL 8' TALL, WITH 84" AFF AND ABOVE DESIGNATED NO SHOOT ZONE.
 - WALL SYSTEM AND GRID REFERENCES DESIGNED ON A 4'-0" x 4'-0" GRID.
 - PAINT SCHEME:
 - RED PAINT - NO SHOOT ZONE
 - WHITE PAINT - SHOOT ZONE
 - WHEN CONFIGURING TRAINING SCENARIO'S BE AWARE OF THE TRAJECTORY OF THE ROUND AFTER IT PENETRATES THE INTENDED TARGET.
 - TAN PAINT - CAUTION ZONE
 - ROUNDS HAVE POTENTIAL TO PENETRATE THIS ZONE.
- BUILDING / EQUIPMENT ACCESS:**
 - SCREW CONVEYOR SYSTEM / DUST COLLECTION SYSTEM:
 - SUGGESTED ACCESS AREA AROUND EQUIPMENT FOR THE DISPOSE OF COLLECTED MATERIALS IS:
 - 4'-6" - FOR A FORKLIFT
 - 3'-0" - FOR A PALLET JACK
 - SPACE NEEDED FOR MATERIALS INSTALLATION AND INSTALLATION EQUIPMENT:
 - SUGGESTED ACCESS AREA TO RANGE AREA: (FOR ENTIRE DURATION OF INSTALLATION)
 - MIN (1) 4'-6" WIDE BY 7'-6" TALL ACCESS PER RANGE/BAY
- CONCRETE SPECS:**
 - ALL CONCRETE MUST HAVE A FLATNESS TOLERANCE OF 1/8" OVER 20' (3MM OVER 6M) FOR ANY CONCRETE WORK WHERE ACTION TARGET EQUIPMENT WILL BE INSTALLED AND/OR ATTACHED (WALLS AND FLOOR). CONCRETE SURFACES MUST NOT BE CROWNED OR SLOPED UNLESS SPECIFICALLY NOTED ON ACTION TARGET DRAWINGS.

DISCLAIMERS:

- ELECTRICAL:** WHERE ELECTRICAL CONTRACTOR IS REQUIRED ALL ACTION TARGET INC. ELECTRICAL DRAWINGS WILL BE USED ONLY AS REFERENCE MATERIAL FOR THE ELECTRICAL CONTRACTOR TO UTILIZE IN THEIR DESIGN OF THE COMPLETE BUILDING / RANGE SYSTEM (UNLESS NOTED OTHERWISE.) FINAL LOCATION OF ELECTRICAL EQUIPMENT CONTAINED IN THE ACTION TARGET INC. ELECTRICAL LAYOUTS TO BE VERIFIED WITH ACTION TARGET INC., ELECTRICAL CONTRACTOR, AND CUSTOMER BEFORE INSTALLATION.
- ARCHITECTURAL:** ALL BUILDING MEASUREMENTS ARE TO BE CONSIDERED ACTION TARGET INC. SUGGESTIONS, UNLESS PROPER DIMENSIONAL PLANS / INFORMATION HAS BEEN PROVIDED. ACTION TARGET INC. IS NOT LIABLE FOR ANY CONFLICTS BETWEEN ITS EQUIPMENT AND ANY VARIATIONS FROM THE BUILDING DESIGN (AS PORTRAYED FROM CUSTOMER TO ACTION TARGET INC. EITHER BY PROVIDED PLANS OR OTHER FORM OF COMMUNICATION) AND THE COMPLETED BUILDINGS DIMENSIONS AND LAYOUT. ADDITIONAL MATERIAL AND PRODUCT REDESIGN MAY BE REQUIRED IF THE STRUCTURE VARIES FROM INDICATED SIZE AND LAYOUT.
- STRUCTURAL:** WHERE ENGINEER IS REQUIRED ALL ITEMS PERTAINING TO ACTION TARGET INC. MATERIALS AND EQUIPMENT, AND IT'S CONNECTION TO / SUPPORT FROM THE STRUCTURE IS TO BE VERIFY AND APPROVED BY THE ENGINEER OF RECORD. ALL ACTION TARGET INC. PLANS INDICATING ANCHOR SIZES AND CONNECTION METHOD, CONCRETE DEPTH, REBAR LAYOUTS, AND ANY OTHER ITEMS PERTAINING TO THE CONNECTION AND SUPPORT OF ACTION TARGET INC. EQUIPMENT TO BE UTILIZED BY ENGINEER AS ACTION TARGET INC.'S PREFERRED METHOD.
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- SHEETS Z5XX.X** STANDARD DETAIL SHOWN FOR REFERENCE ONLY ACTUAL INSTALLATION MAY VARY

DIMENSIONS CLARIFICATION:

- ALL DIMENSION LINES SHOW DEFAULT OF U.S. STANDARD UNITS, WITH METRIC UNITS AS SECONDARY INDICATED BY THERE LOCATION BETWEEN THE FOLLOWING SYMBOLS []



GENERAL ELECTRICAL NEEDS:

- RANGE WILL HAVE 120/240 VAC AND MULTIPLE 20 AMP CIRCUITS PROVIDED BY OTHERS IF ANY OF THE FOLLOWING CONDITIONS ARE PRESENT IN ATTACHED RANGE DESIGN:
 - TARGETRY IS PRESENT.
 - TARGETRY CONTROL EQUIPMENT IS PRESENT.
 - STALL (AND/OR) RANGE LIGHTING IS PRESENT.
 - COMMUNICATION SYSTEMS ARE PRESENT.
 - A DUST COLLECTION UNIT IS PRESENT.
 - AN AIR COMPRESSOR IS PRESENT
- RANGE WILL HAVE MULTIPLE 3 PHASE 208/240/480 VAC DISCONNECTS PROVIDED BY OTHERS IF ANY OF THE FOLLOWING CONDITIONS ARE PRESENT IN ATTACHED RANGE DESIGN:
 - A SCREW CONVEYOR SYSTEM IS PRESENT. (TYPICALLY UTILIZES 2 OR MORE 3HP 3 PHASE MOTORS)
 - A DUST COLLECTION UNIT IS PRESENT.
- CUSTOMER TO PROVIDE ACCESS TO INTERNET FOR ACTION TARGET EQUIPMENT.
- THE DENOTES HOME RUN OF CAT5e OR GREATER FROM DATA JACK LOCATION TO GENESIS RANGE SERVER PATCH PANEL.
- THE (XX) DENOTES PORT ID# AND CORRESPONDING PATCH PANEL WIRING LOCATION.

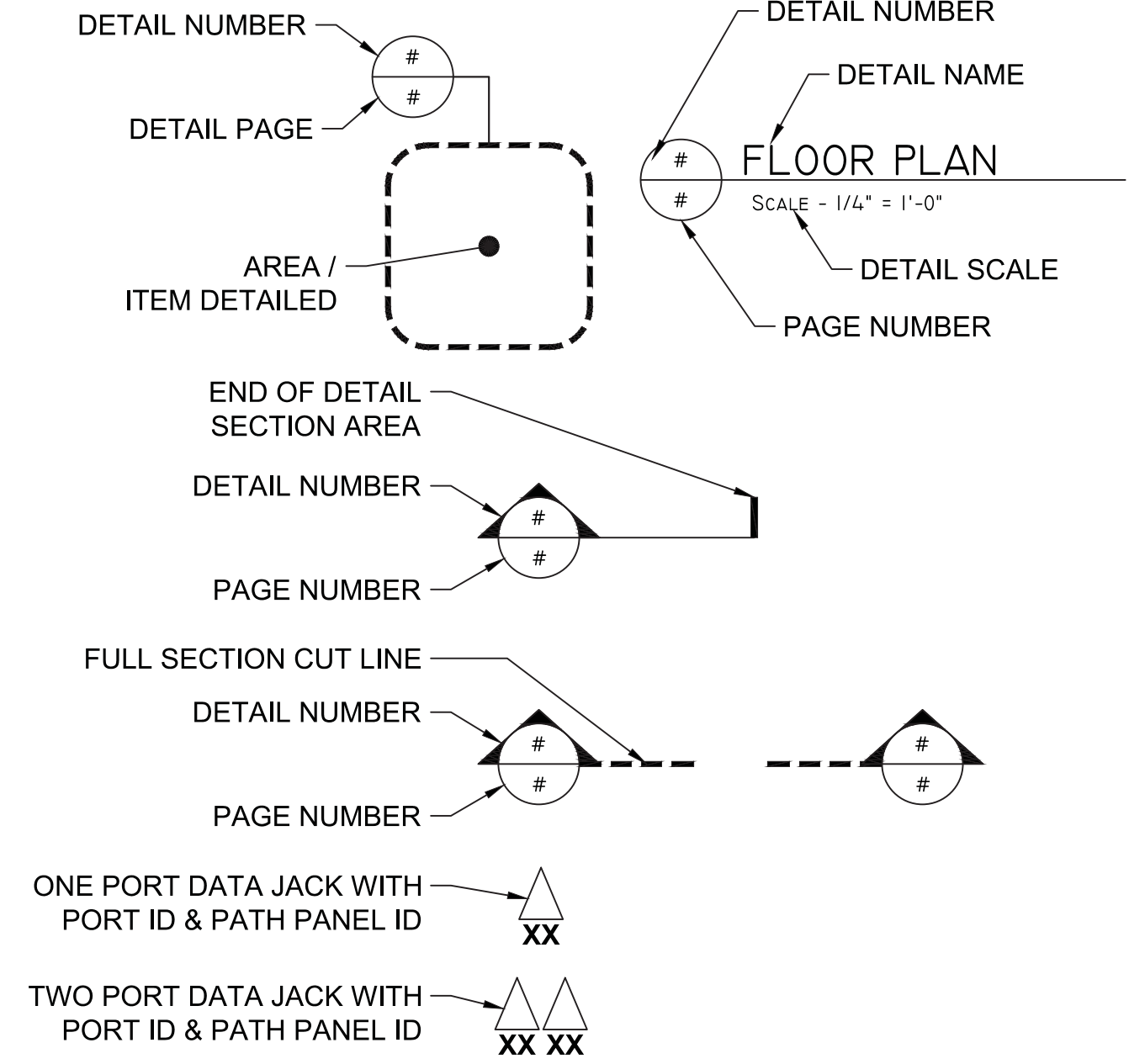
ABBREVIATIONS:

ABBREVIATED	UN-ABBREVIATED
AFF	ABOVE FINISHED FLOOR
APRX	APPROXIMATE / APPROXIMATELY
APROX	APPROXIMATE / APPROXIMATELY
ATI	ACTION TARGET INC.
AWG	AMERICAN WIRE GAUGE
BOS	BOTTOM OF STEEL
BOT	BOTTOM
CL	CENTER LINE
CFM	CUBIC FEET PER MINUTE
DCU	DUST COLLECTION UNIT
EMT	ELECTRICAL METALLIC TUBING
EQ	EQUAL / EQUALS
EQ APROX	EQUAL APPROXIMATE
HVAC	HEATING, VENTILATION, AND AIR CONDITIONING
LBS	POUNDS
MDU	MOTOR DRIVE UNIT
NTS	NOT TO SCALE
PSI	POUNDS PER SQUARE INCH
RBT	RUBBER BERM TRAP
SCS	SCREW CONVEYOR SYSTEM
SPKR	SPEAKER
TCT	TOTAL CONTAINMENT TRAP
TCT 2	TOTAL CONTAINMENT TRAP VERSION 2
TCT 4	TOTAL CONTAINMENT TRAP VERSION 4
TCT 4D	TOTAL CONTAINMENT TRAP VERSION 4D
TYP	TYPICAL
UNO	UNLESS NOTED OTHERWISE
UON	UNLESS OTHERWISE NOTED
GSR	GENESIS SERVER RACK
SRAS	SMART RANGE AXIS SCREEN

SHEET INDEX:

Z001	TITLE PAGE
Z101.1	PRACTICE RANGE PLAN
Z101.2	PUBLIC/REVOLVER RANGE PLAN
Z101.3	QUALIFICATION RANGE PLAN
Z101.4	RAPID FIRE RANGE PLAN
Z104.1	PRACTICE TRAP FOOTPRINT
Z104.2	PUBLIC/REVOLVER TRAP FOOTPRINT
Z104.3	QUALIFICATION TRAPFOOTPRINT
Z104.4	RAPID FIRE FOOTPRINT
Z301.1	PRACTICE RANGE SECTION
Z301.2	PUBLIC/REVOLVER SECTION
Z301.3	QUALIFICATION SECTION
Z301.4	RAPID FIRE SECTION
Z521.2	TOTAL CONTAINMENT TRAP VORTEX DETAILS
Z533.8	DRM PRO GROUND MOUNTED DETAILS
Z535.5	POWER 90 DETAILS

SYMBOLS & CALLOUTS



SHEET NAME

INDEX PAGE

DRAWING NUMBER

SHEET NUMBER

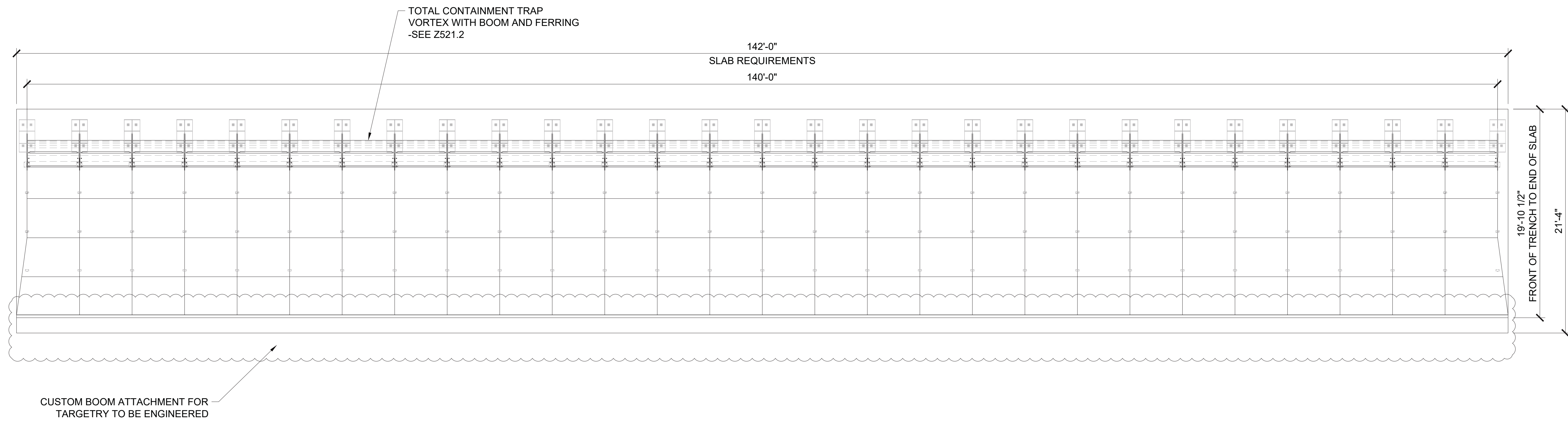
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PROJECT STATUS

SECTION 116723
BASIS OF DESIGN

PROJECT NAME

SAN DIEGO PD

Project Manager:	----
Territory Manager:	CHRIS HART
Project Engineer:	FELIX GUZMAN
Drawn By:	PEDRO CORREA
Approved By:	FELIX GUZMAN
Origination Date:	3/1/19

No	BY	REVISION	DATE
1	FG	CUSTOMER MARKUPS	5/8/19

SHEET NAME


PUBLIC/REV
RANGE PLAN

DRAWING NUMBER

SHEET NUMBER

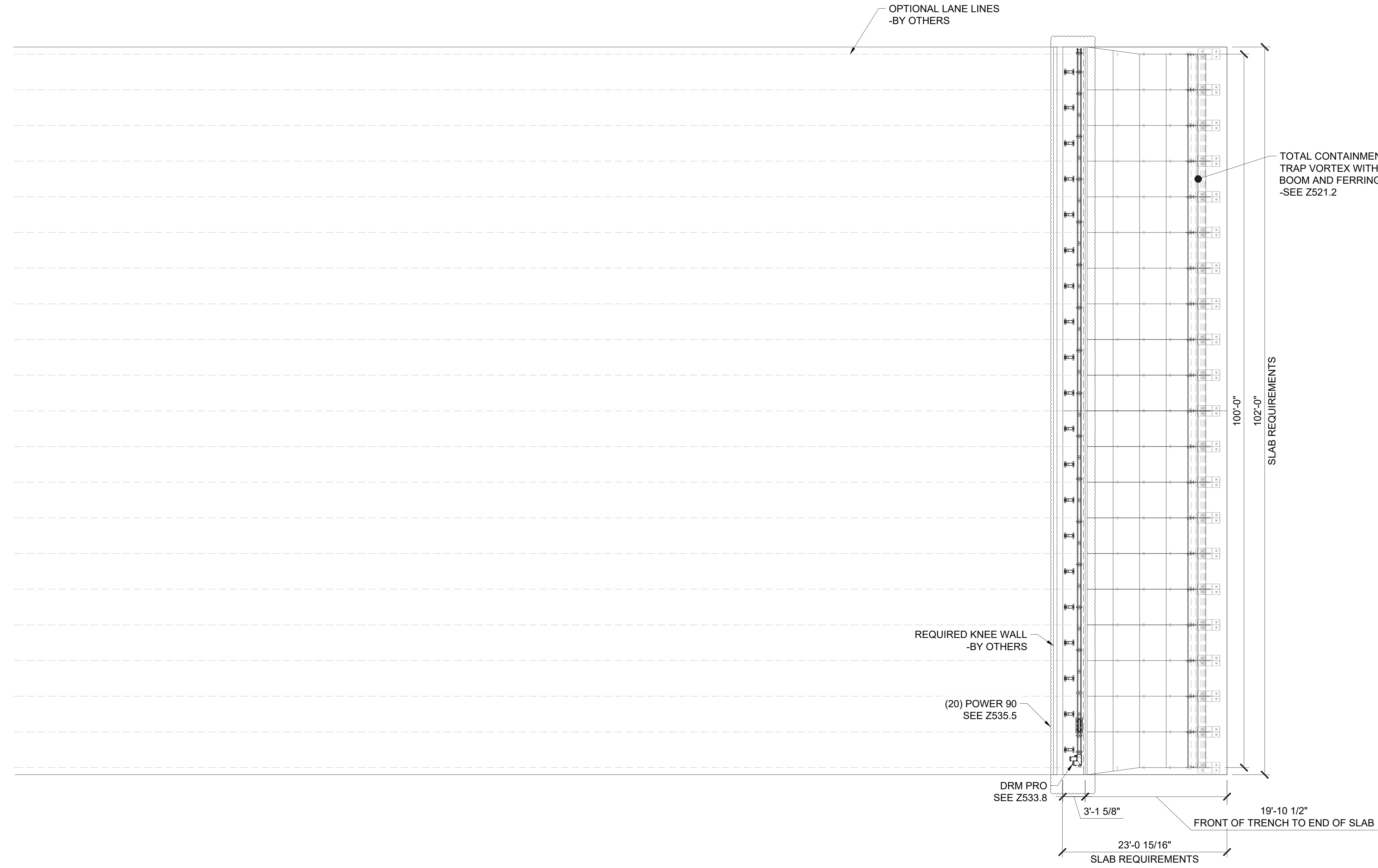
Z101.2

SCALED FOR ORIGINAL DRAWING AT 22" X 34"

 RANGE PLAN
SCALE - 3/16" = 1'-0"

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Z101.3 RANGE PLAN
SCALE - 3/16" = 1'-0"



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PROJECT STATUS
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PROJECT NAME
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Territory Manager: CHRIS HART
Project Engineer: FELIX GUZMAN
Drawn By: PEDRO CORREA
Approved By: FELIX GUZMAN
Origination Date: 3/1/19

No	BY	REVISION	DATE
1	FG	CUSTOMER MARKUPS	5/8/19

SHEET NAME
QUALIFICATION RANGE PLAN

DRAWING NUMBER

SHEET NUMBER
Z101.3

SCALED FOR ORIGINAL DRAWING AT 22" X 34"

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**SECTION 116723
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PROJECT NAME

SAN DIEGO PD

Project Manager: ----
Territory Manager: CHRIS HART
Project Engineer: FELIX GUZMAN
Drawn By: PEDRO CORREA
Approved By: FELIX GUZMAN
Origination Date: 3/1/19

No	BY	REVISION	DATE
1	FG	CUSTOMER MARKUPS	5/8/19

SHEET NAME

RAPID FIRE
RANGE PLAN

DRAWING NUMBER

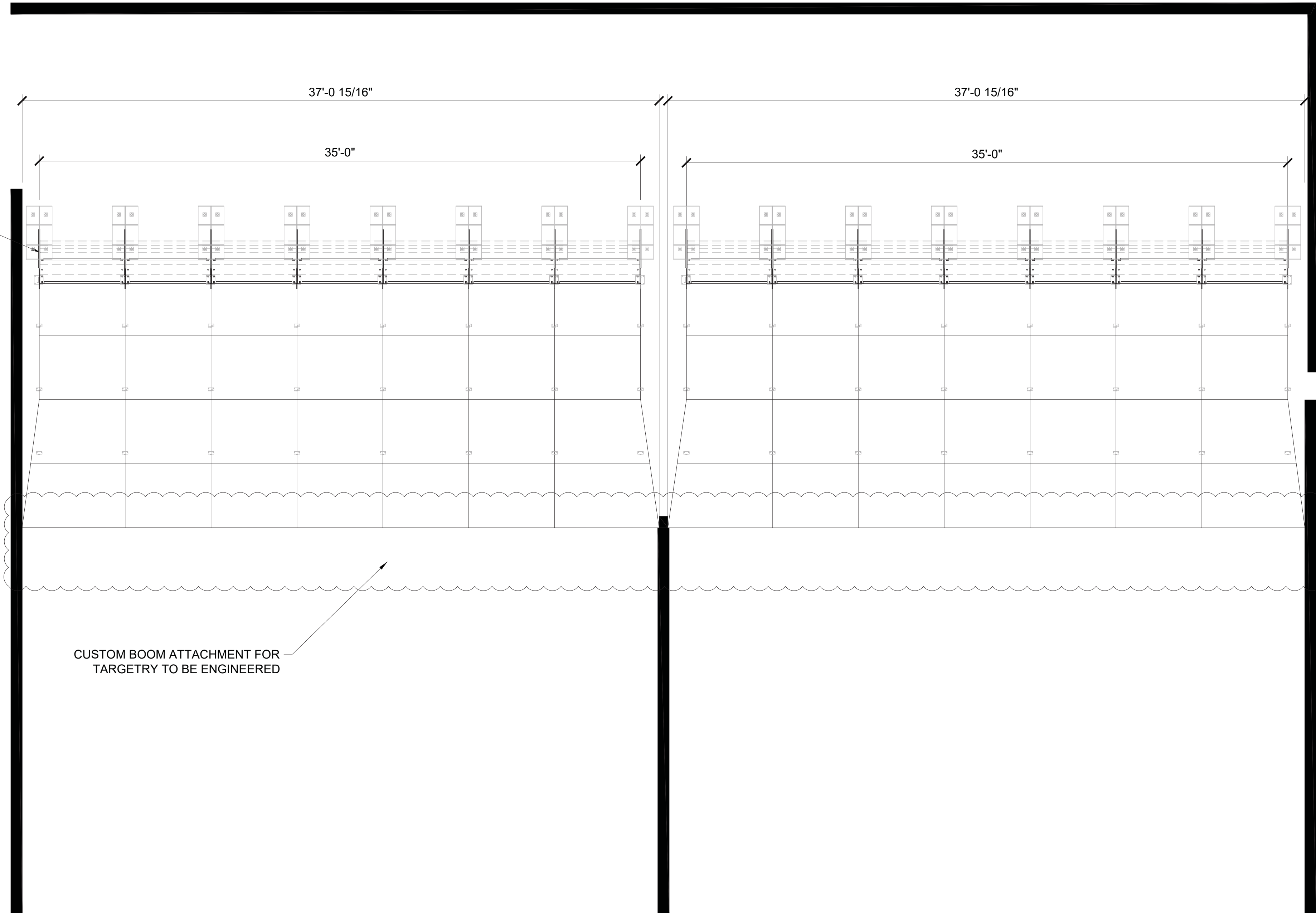
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Z101.4

SCALED FOR ORIGINAL DRAWING AT 22" X 34"

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TOTAL CONTAINMENT TRAP
VORTEX WITH BOOM AND FERRING
-SEE Z521.2

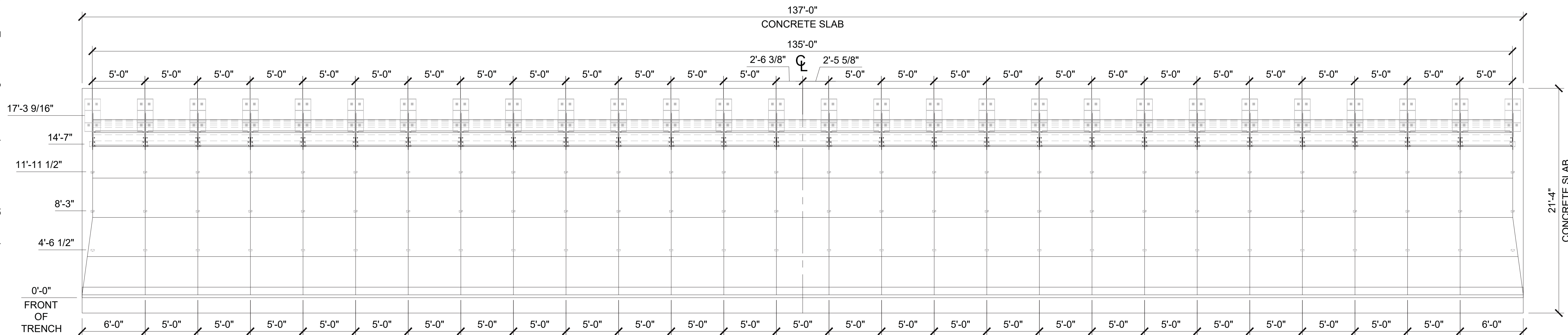


CUSTOM BOOM ATTACHMENT FOR
TARGETRY TO BE ENGINEERED

RANGE PLAN
SCALE - 3/16" = 1'-0"

NOT FOR CONSTRUCTION

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1
Z104.1

TRAP FOOTPRINT
SCALE - 1/2" = 1'-0"



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1	FG	CUSTOMER MARKUPS	5/8/19

SHEET NAME

PRACTICE
TRAP FOOTPRINT

DRAWING NUMBER

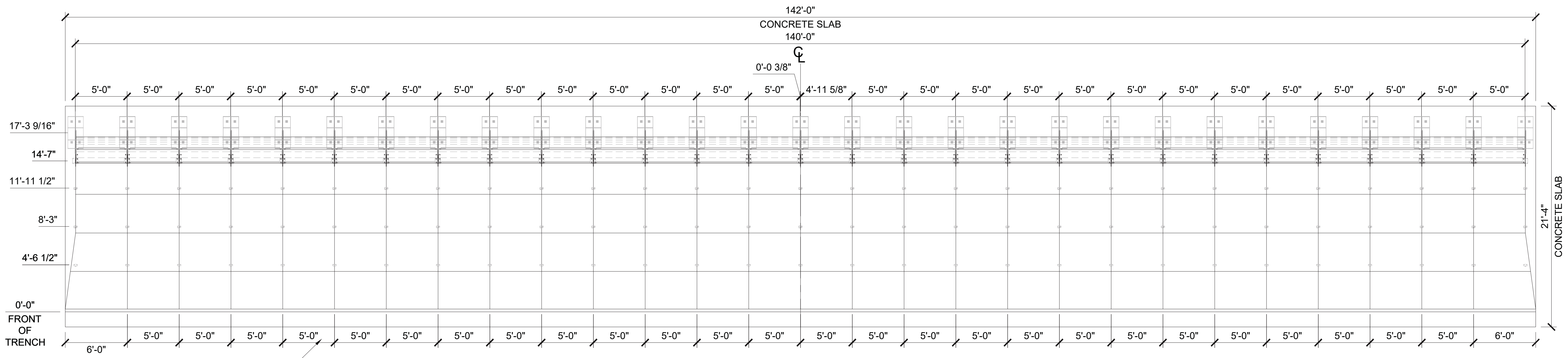
SHEET NUMBER

Z104.1

SCALED FOR ORIGINAL DRAWING AT 22" X 34"

NOT FOR CONSTRUCTION

SAVED: 2019-05-08 15:55:11 BY: FGUZMAN AT: S:\PDT(drafting)\PROJECTS\OpenSan Diego PD\CAD_Working\SAN DIEGO PD 40 Rev 1.dwg



1 TRAP FOOTPRINT
Z104.2
SCALE - 1/2" = 1'-0"



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PROJECT STATUS

SECTION 116723
BASIS OF DESIGN

PROJECT NAME

SAN DIEGO PD

Project Manager:	----
Territory Manager:	CHRIS HART
Project Engineer:	FELIX GUZMAN
Drawn By:	PEDRO CORREA
Approved By:	FELIX GUZMAN
Origination Date:	3/1/19

No	BY	REVISION	DATE
1	FG	CUSTOMER MARKUPS	5/8/19

SHEET NAME

PUBLIC / REV.
TRAP FOOTPRINT

DRAWING NUMBER

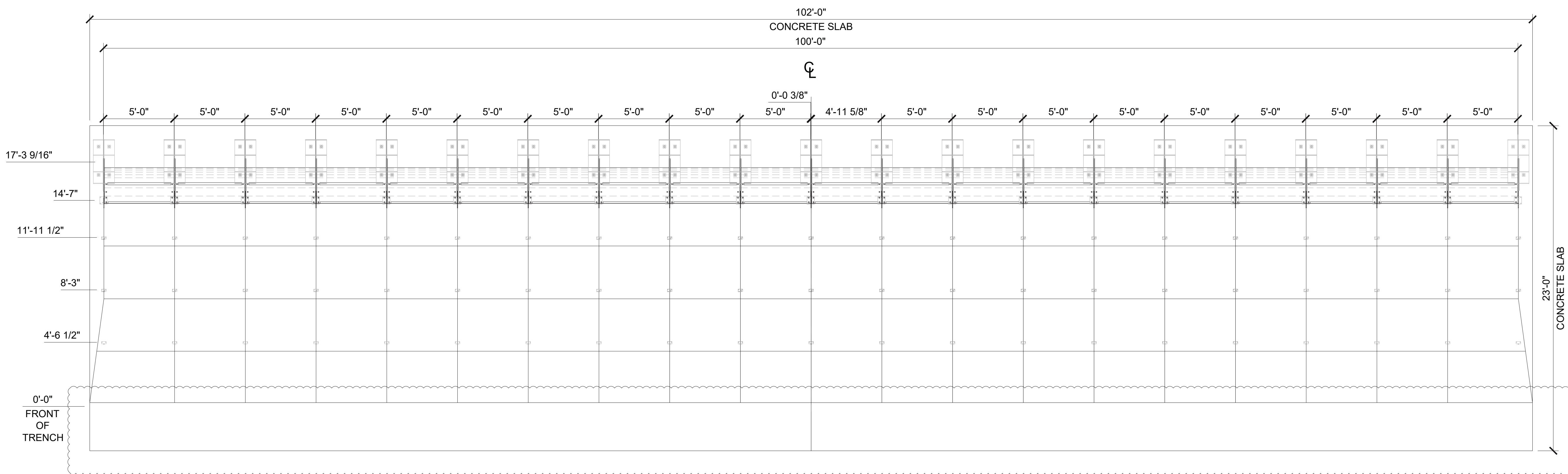
SHEET NUMBER

Z104.2

SCALED FOR ORIGINAL DRAWING AT 22" X 34"

NOT FOR CONSTRUCTION

SAVED: 2019-05-08 15:55:11 BY: FGUZMAN AT: S:\PDT(drafting)\PROJECTS\OpenSan Diego PD\CAD_Working\San Diego PD 40 Rev 1.dwg



1 TRAP FOOTPRINT
Z104.3 SCALE - 1/2" = 1'-0"



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PROJECT STATUS
**SECTION 116723
BASIS OF DESIGN**

PROJECT NAME
SAN DIEGO PD

Project Manager: ----
Territory Manager: CHRIS HART
Project Engineer: FELIX GUZMAN
Drawn By: PEDRO CORREA
Approved By: FELIX GUZMAN
Origination Date: 3/1/19

No	BY	REVISION	DATE
1	FG	CUSTOMER MARKUPS	5/8/19

SHEET NAME
**QUALIFICATION (E)
TRAP FOOTPRINT**

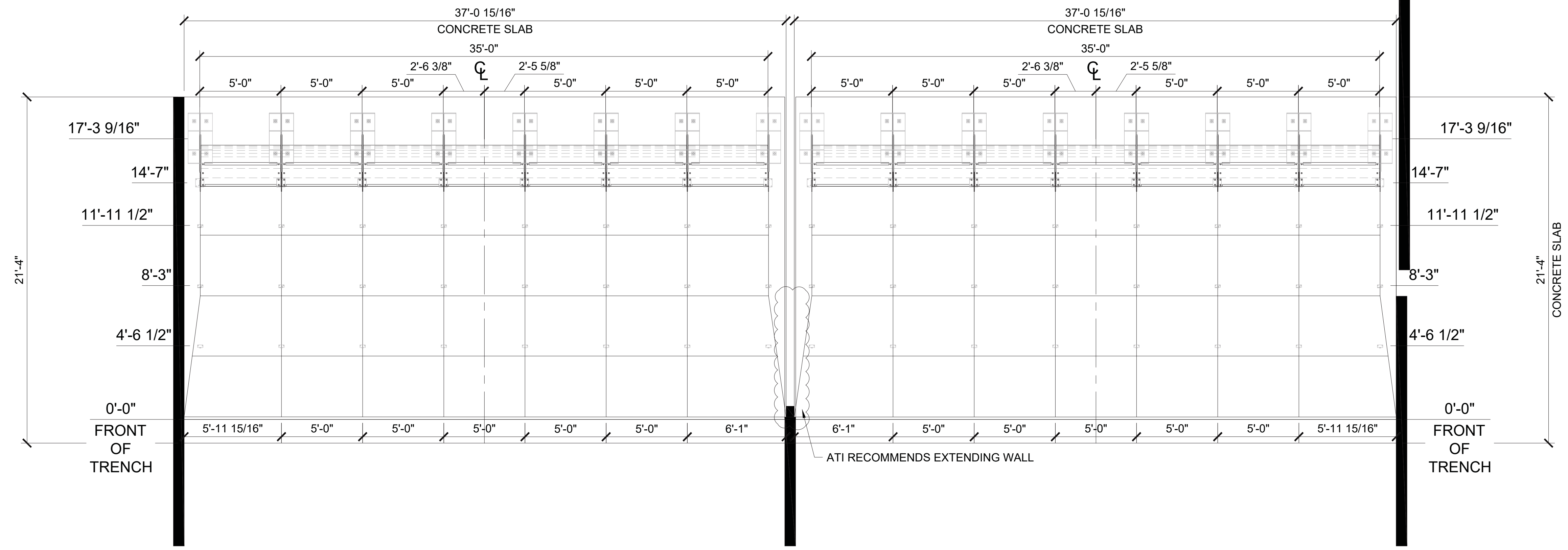
DRAWING NUMBER

SHEET NUMBER
Z104.3

SCALED FOR ORIGINAL DRAWING AT 22" X 34"

NOT FOR CONSTRUCTION

SAVED: 2019-05-08 15:55:11 BY: FGUZMAN AT: S:\PDT(drafting)\PROJECTS\OpenSan Diego PD\CAD_Working\SAN DIEGO PD 40 Rev 1.dwg



1 TRAP FOOTPRINT
 Z104.4 SCALE - 1/2" = 1'-0"



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PROJECT STATUS
SECTION 116723
BASIS OF DESIGN

PROJECT NAME
 SAN DIEGO PD

Project Manager:	----
Territory Manager:	CHRIS HART
Project Engineer:	FELIX GUZMAN
Drawn By:	PEDRO CORREA
Approved By:	FELIX GUZMAN
Origination Date:	3/1/19

No	BY	REVISION	DATE
1	FG	CUSTOMER MARKUPS	5/8/19

SHEET NAME
RAPID FIRE
TRAP FOOTPRINT

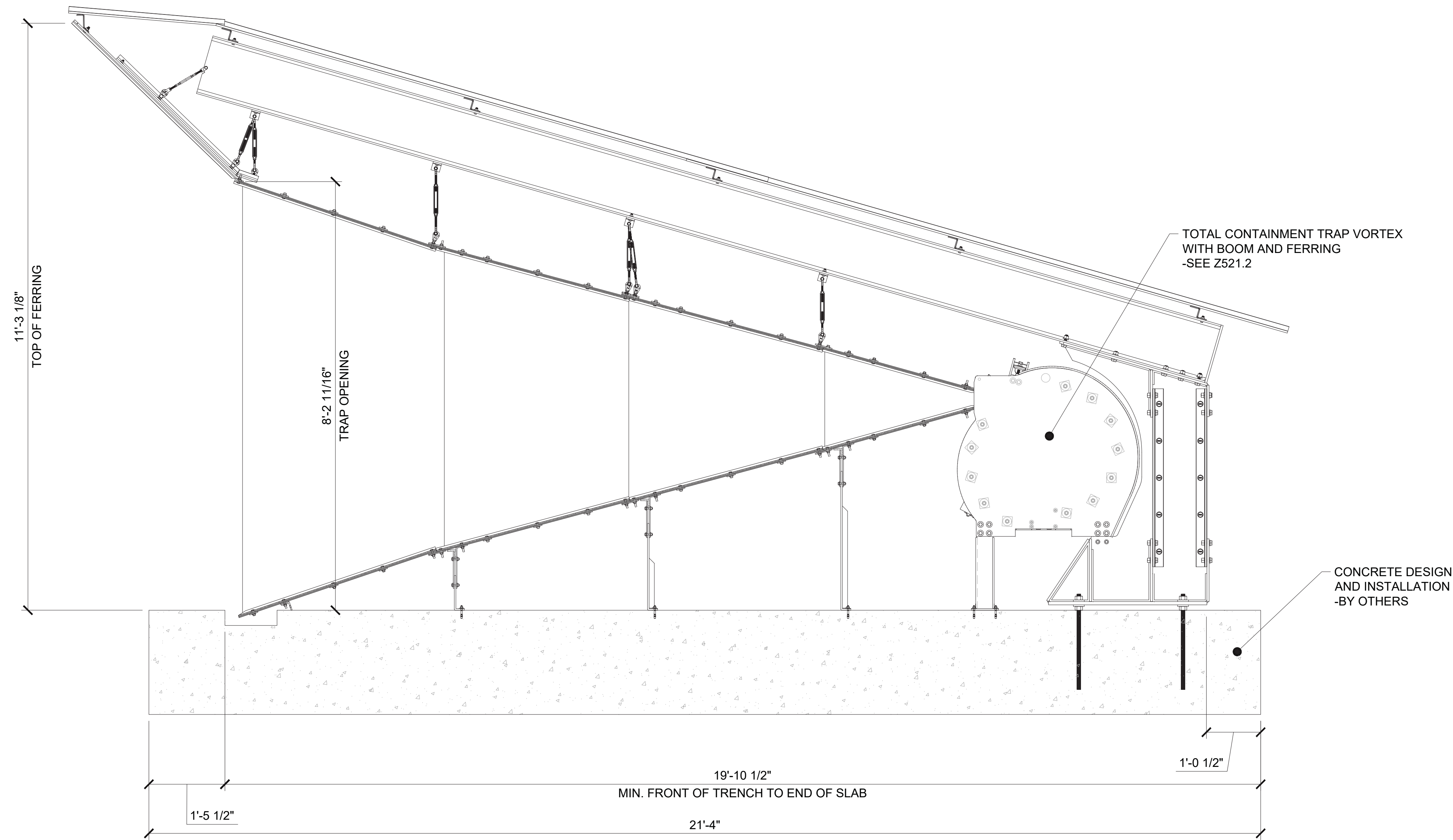
DRAWING NUMBER

SHEET NUMBER
Z104.4

SCALED FOR ORIGINAL DRAWING AT 22" X 34"

NOT FOR CONSTRUCTION

NOTE:
ACTION TARGET RECOMMENDS USE OF STEEL BAFFLES OVER WOOD FOR PROPER BALLISTIC PROTECTION.



RANGE SECTION
SCALE - 1/2" = 1'-0"



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PROJECT STATUS

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BASIS OF DESIGN**

PROJECT NAME

SAN DIEGO PD

Project Manager:	----
Territory Manager:	CHRIS HART
Project Engineer:	FELIX GUZMAN
Drawn By:	PEDRO CORREA
Approved By:	FELIX GUZMAN
Origination Date:	3/1/19

No	BY	REVISION	DATE
1	FG	CUSTOMER MARKUPS	5/8/19

SHEET NAME

**PUBLIC / REV.
SECTION VIEW**

DRAWING NUMBER

SHEET NUMBER

Z301.2

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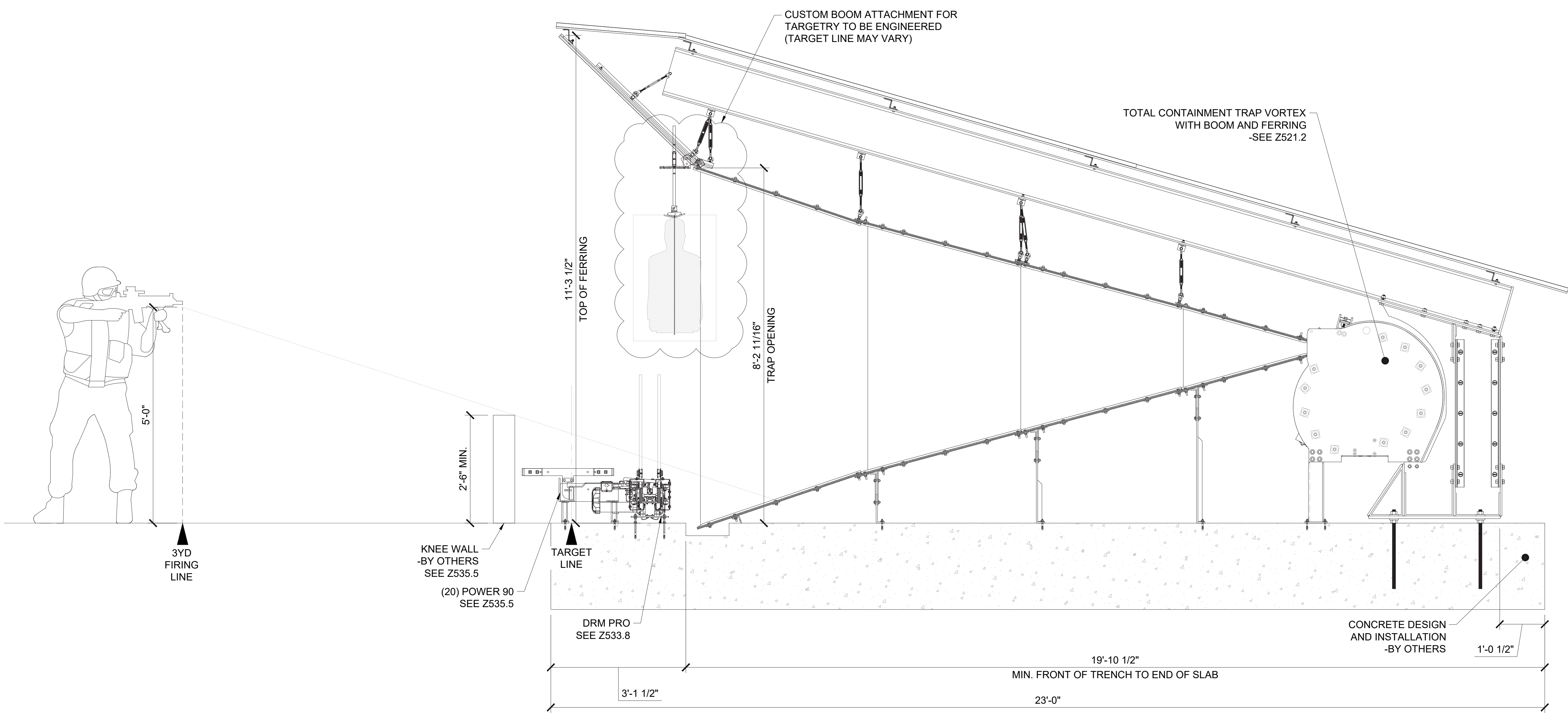
NOT FOR CONSTRUCTION

NOTE:
ACTION TARGET RECOMMENDS USE OF
STEEL BAFFLES OVER WOOD FOR PROPER
BALLISTIC PROTECTION.



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RANGE SECTION
SCALE - 1/2" = 1'-0"

PROJECT STATUS

SECTION 116723
BASIS OF DESIGN

PROJECT NAME

SAN DIEGO PD

Project Manager:	----
Territory Manager:	CHRIS HART
Project Engineer:	FELIX GUZMAN
Drawn By:	PEDRO CORREA
Approved By:	FELIX GUZMAN
Origination Date:	3/1/19

No	BY	REVISION	DATE
1	FG	CUSTOMER MARKUPS	5/8/19

SHEET NAME

QUALIFICATION SECTION VIEW

DRAWING NUMBER

SHEET NUMBER

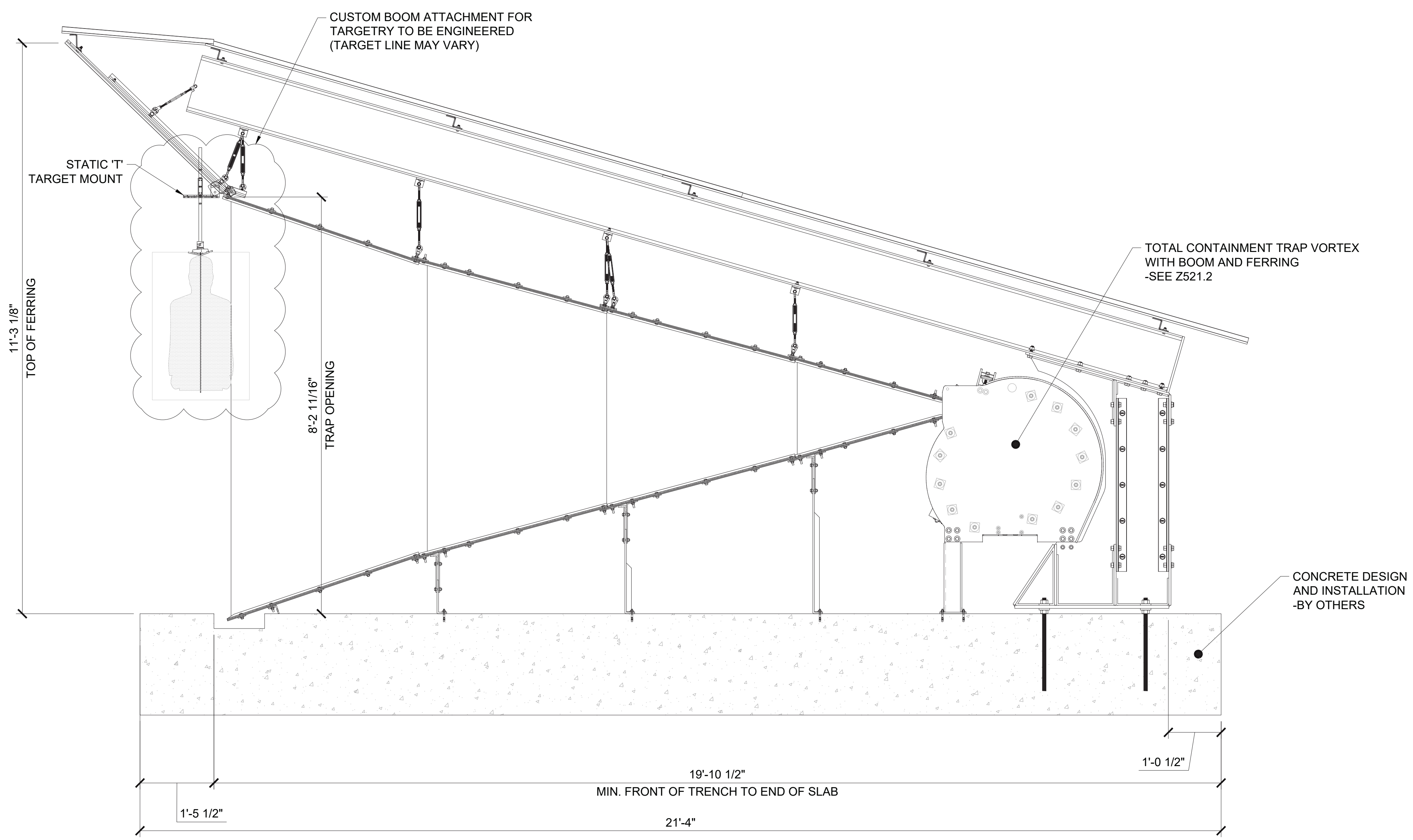
Z301.3

SCALED FOR ORIGINAL DRAWING AT 22" X 34"

NOT FOR CONSTRUCTION

NOTE:
ACTION TARGET RECOMMENDS USE OF STEEL BAFFLES OVER WOOD FOR PROPER BALLISTIC PROTECTION.

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SECTION 116723
BASIS OF DESIGN

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SAN DIEGO PD

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 Territory Manager: CHRIS HART
 Project Engineer: FELIX GUZMAN
 Drawn By: PEDRO CORREA
 Approved By: FELIX GUZMAN
 Origination Date: 3/1/19

No	BY	REVISION	DATE
1	FG	CUSTOMER MARKUPS	5/8/19

SHEET NAME
RAPID FIRE SECTION VIEW

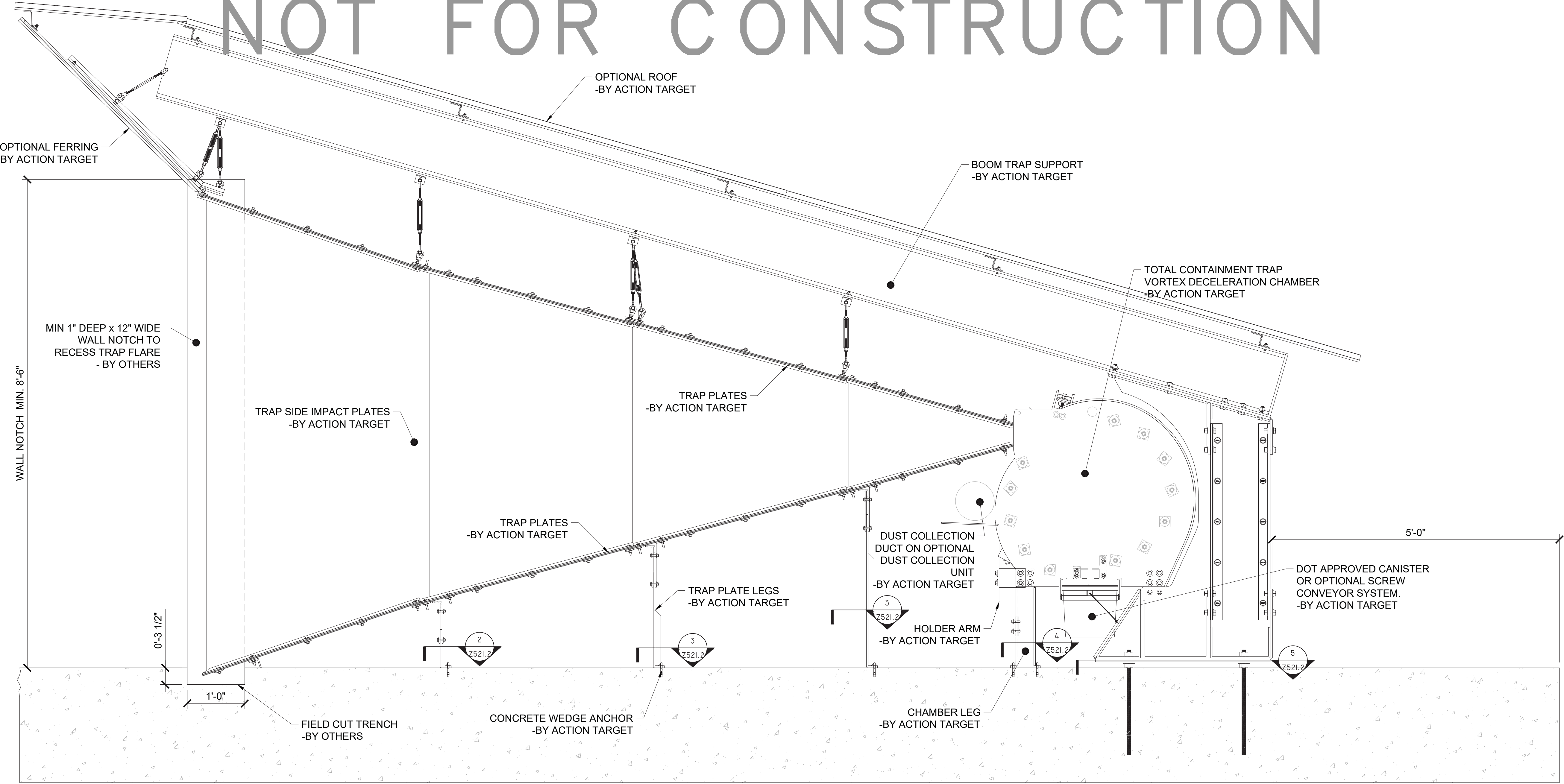
DRAWING NUMBER

SHEET NUMBER
Z301.4

Z301.4
 RANGE SECTION
 SCALE - 1/2" = 1'-0"

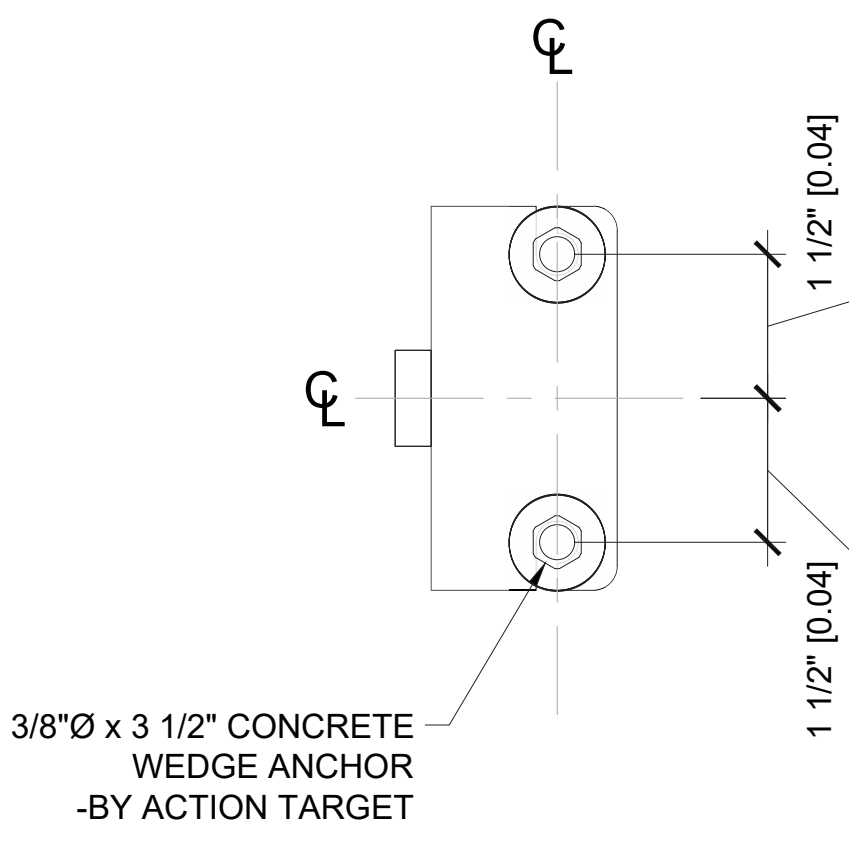
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NOT FOR CONSTRUCTION

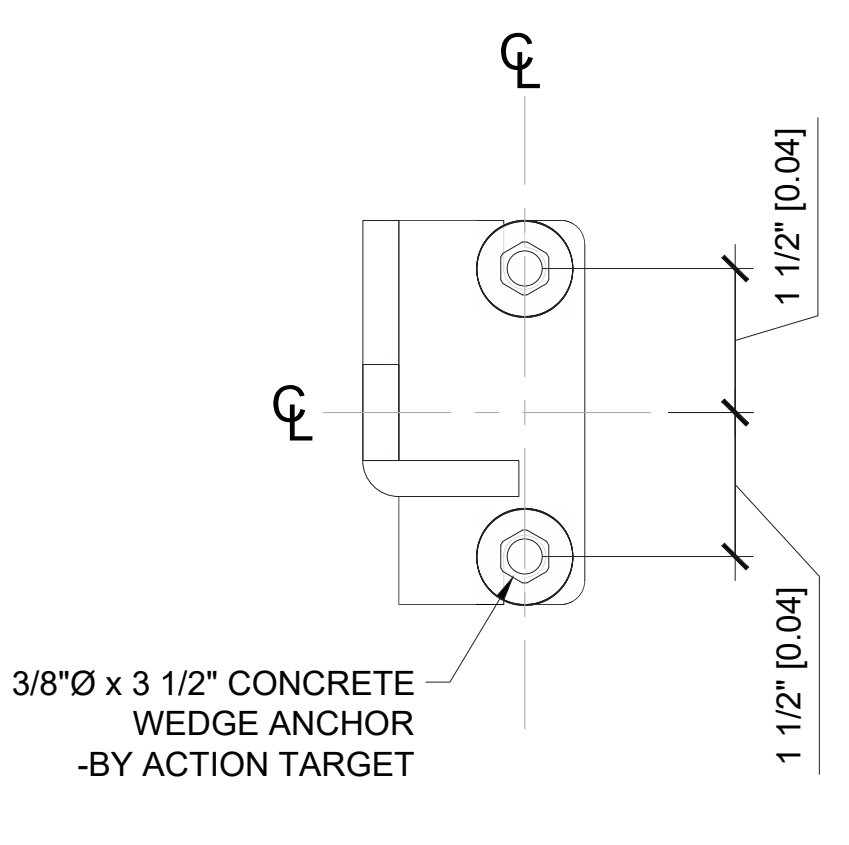


NOTE:
CHAMBER FOOT CENTER TO BE OFFSET (RANGE LEFT TO RIGHT) FROM CHAMBER RIB CENTER / TRAP FOOT CENTER, BY 3/8".

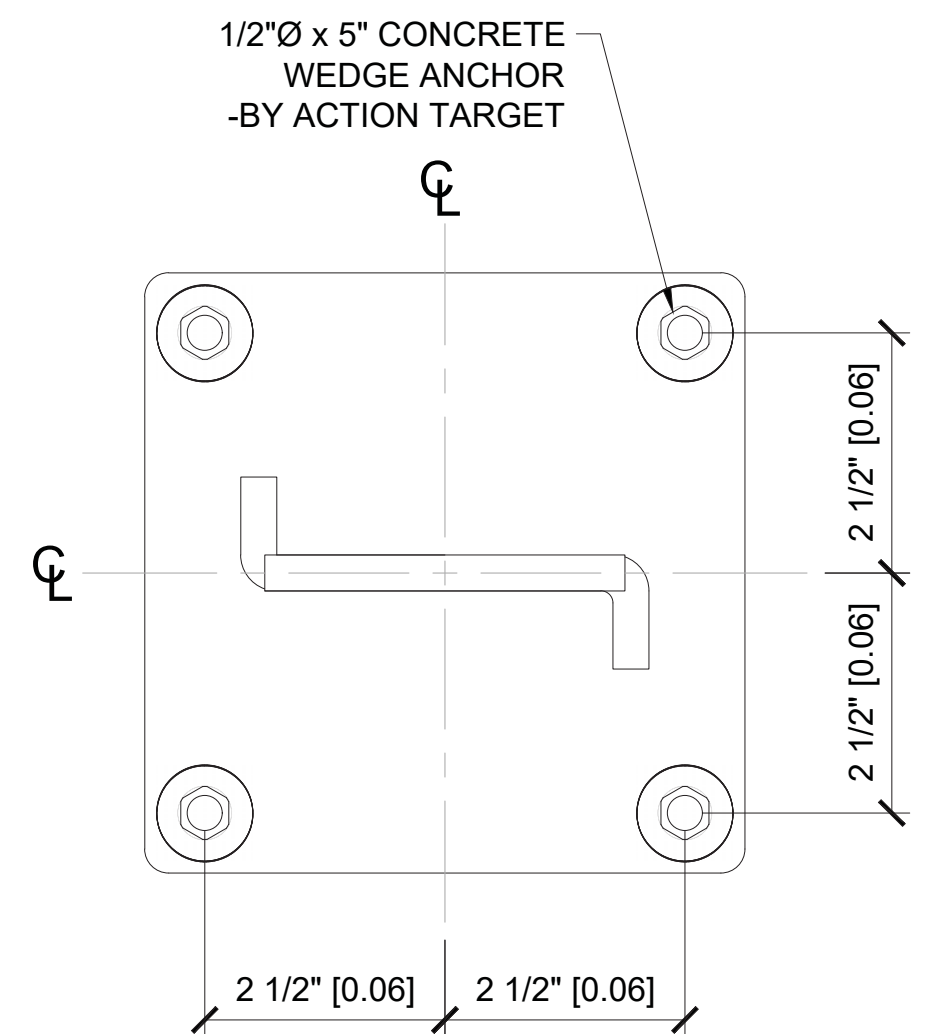
1 TOTAL CONTAINMENT TRAP (4 UP 4 DOWN CONFIGURATION)
SCALE - 1" = 1'-0"



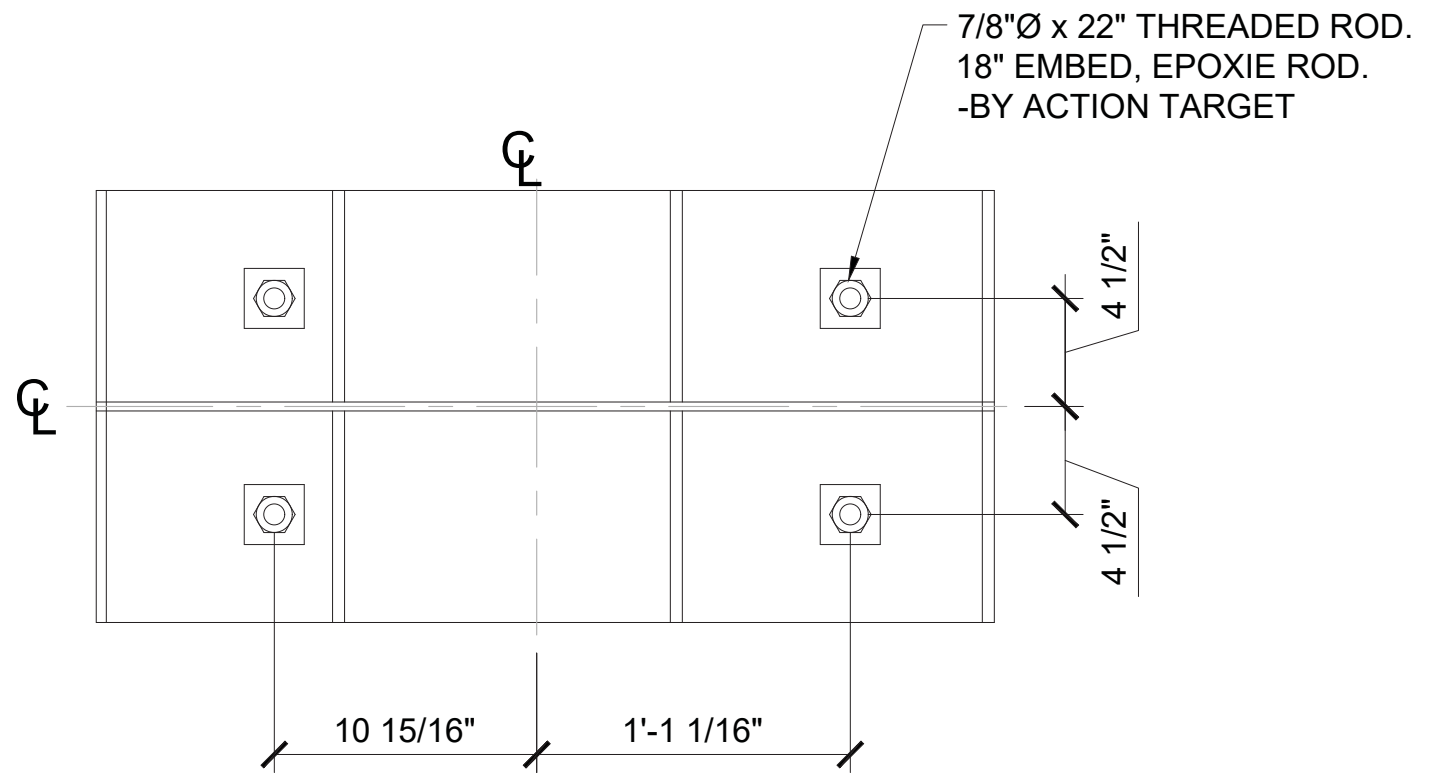
2 TRAP FRONT FOOT
SCALE - 6" = 1'-0"



3 TRAP MIDDLE FOOT
SCALE - 6" = 1'-0"



4 CHAMBER FRONT FOOT
SCALE - 6" = 1'-0"



5 CHAMBER REAR FOOT
SCALE - 3" = 1'-0"

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No	BY	REVISION	DATE
1	FG	CUSTOMER MARKUPS	5/8/19

SHEET NAME

TOTAL CONTAINMENT TRAP VORTEX DETAILS

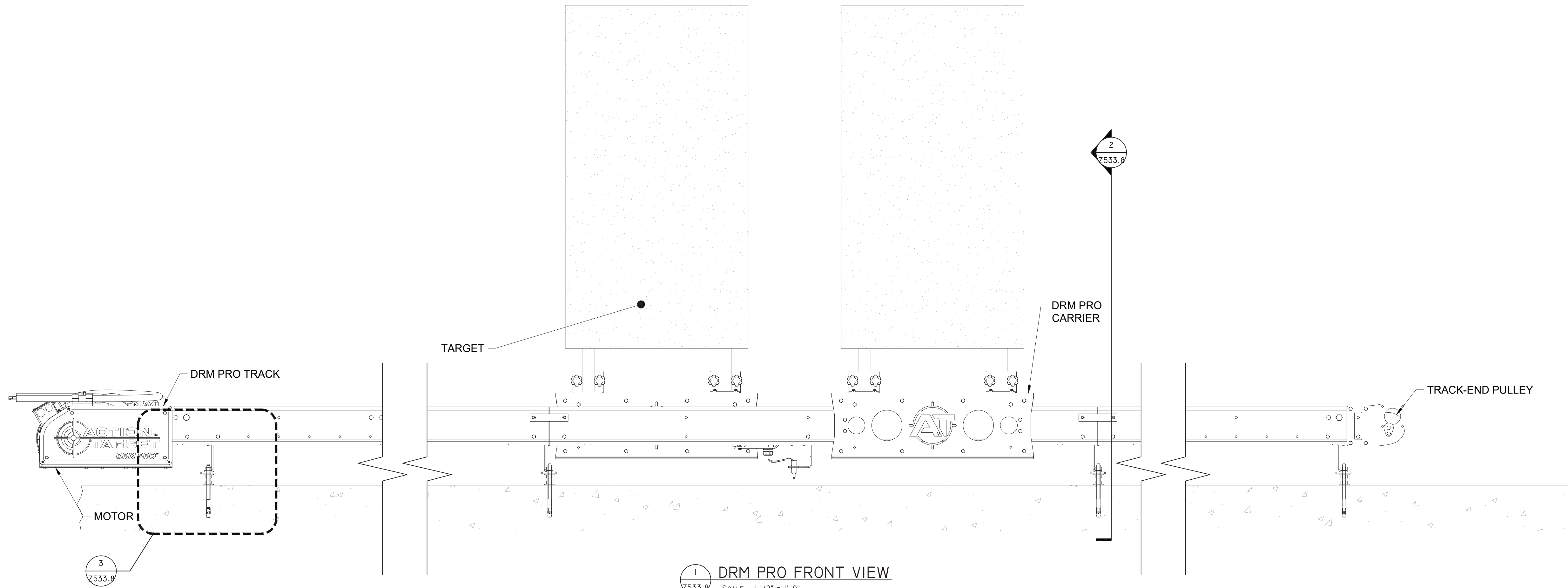
DRAWING NUMBER

SHEET NUMBER

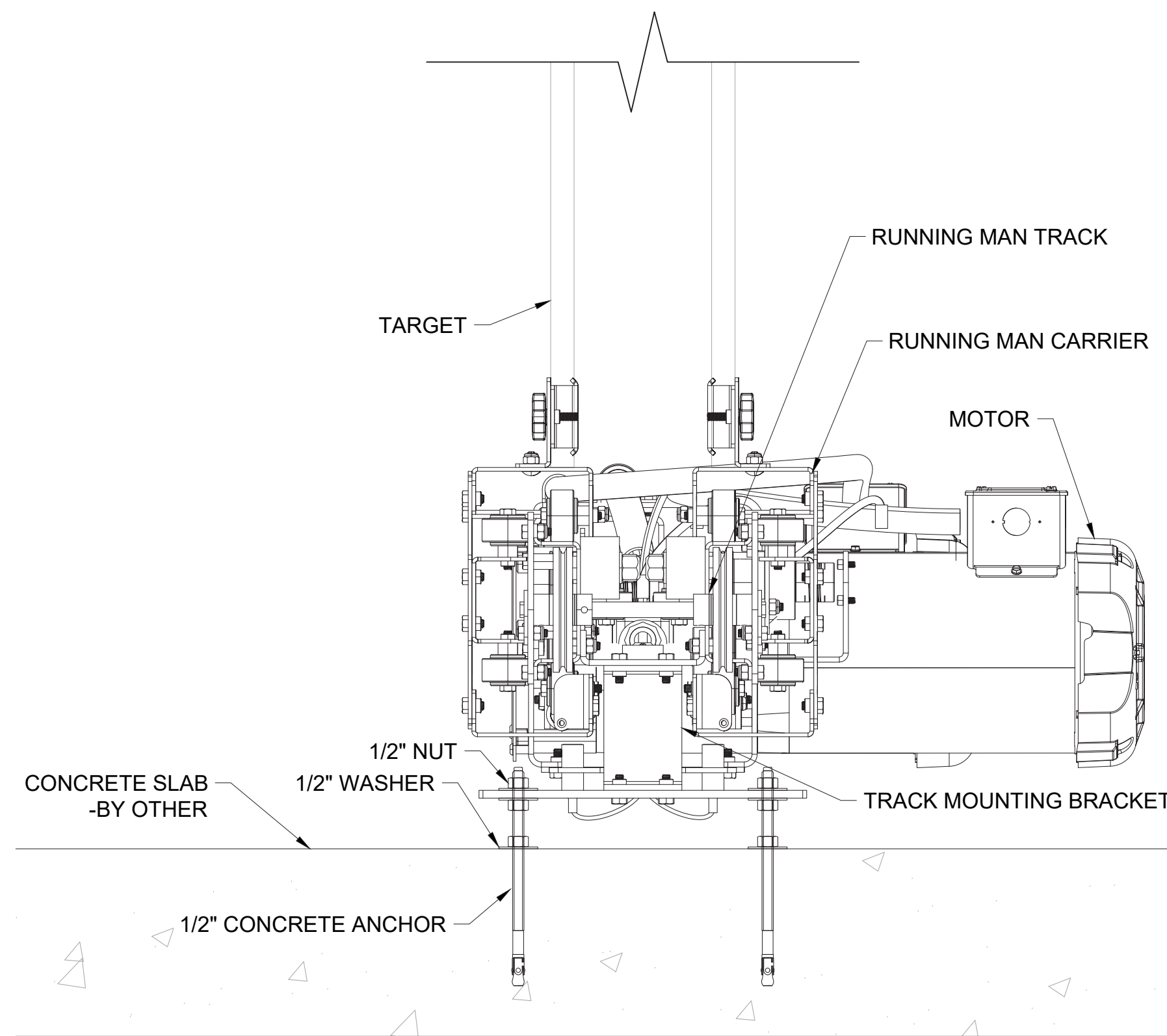
Z521.2

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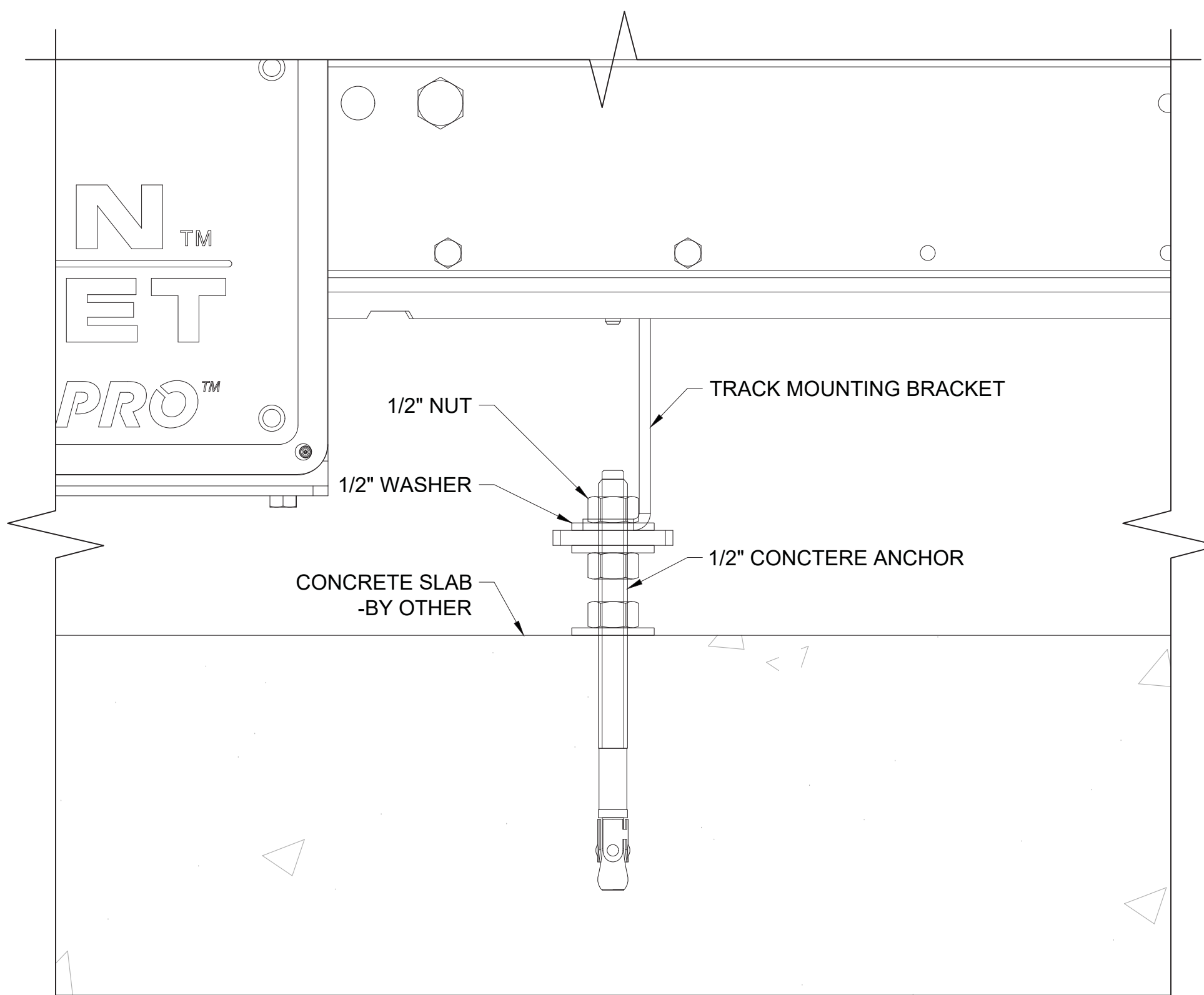
NOT FOR CONSTRUCTION



1 DRM PRO FRONT VIEW
SCALE - 1/2" = 1'-0"



2 SIDE VIEW DETAIL
SCALE - 3" = 1'-0"



3 CONCRETE MOUNTING DETAIL
SCALE - 6" = 1'-0"



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Origination Date: 3/1/19

No	BY	REVISION	DATE
1	FG	CUSTOMER MARKUPS	5/8/19

SHEET NAME

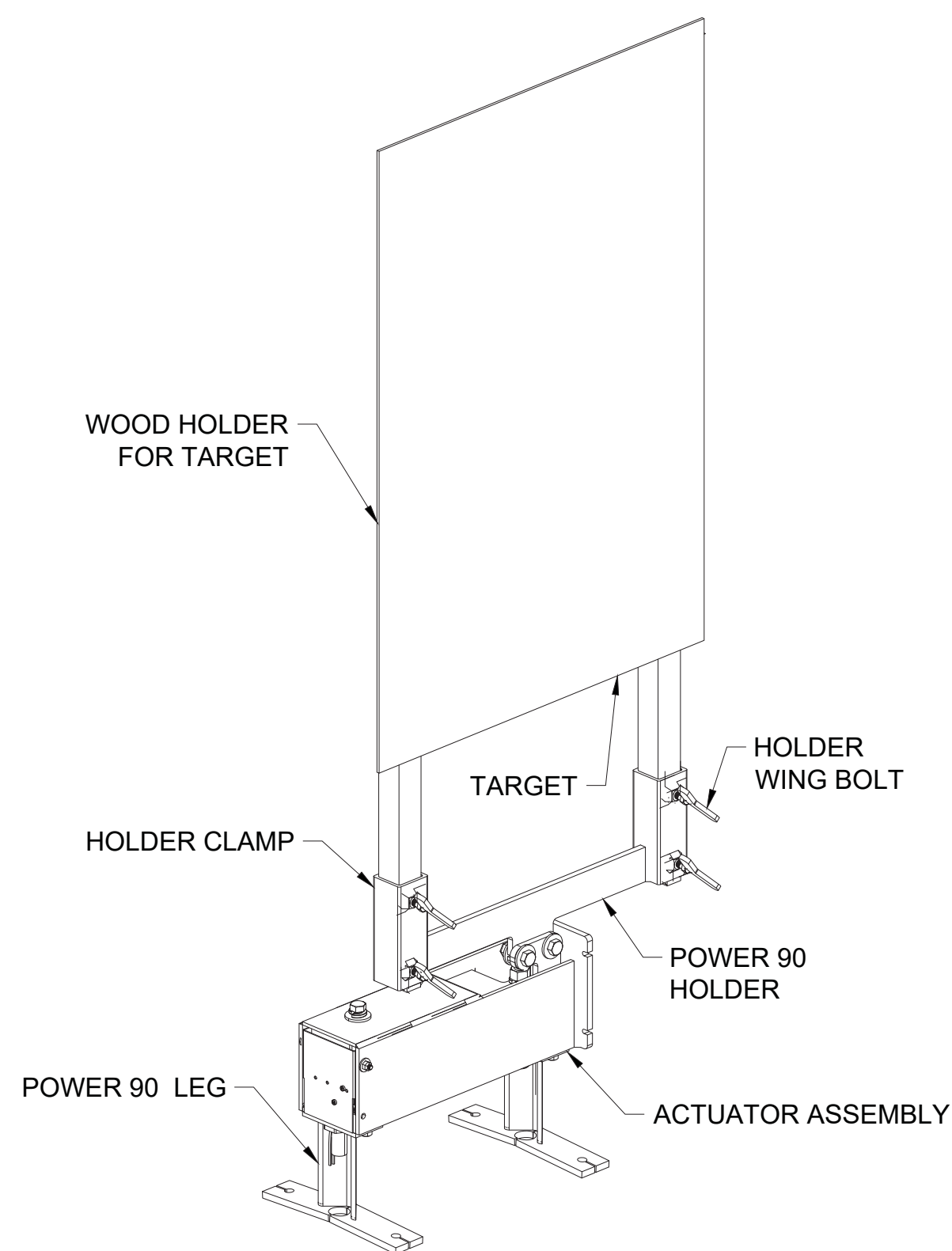
**DRM PRO
GROUND MOUNTED
DETAILS**

DRAWING NUMBER

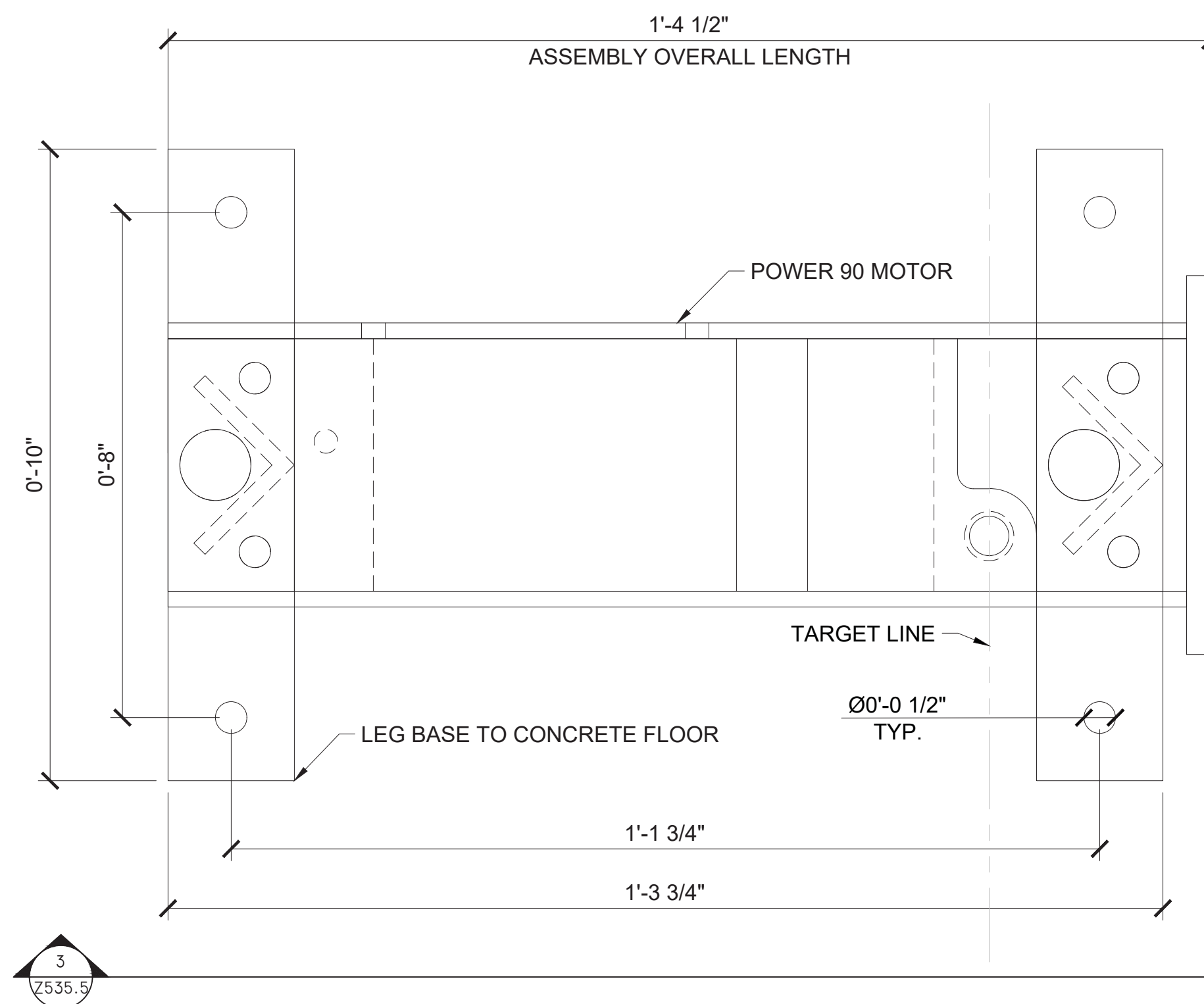
SHEET NUMBER

Z533.8

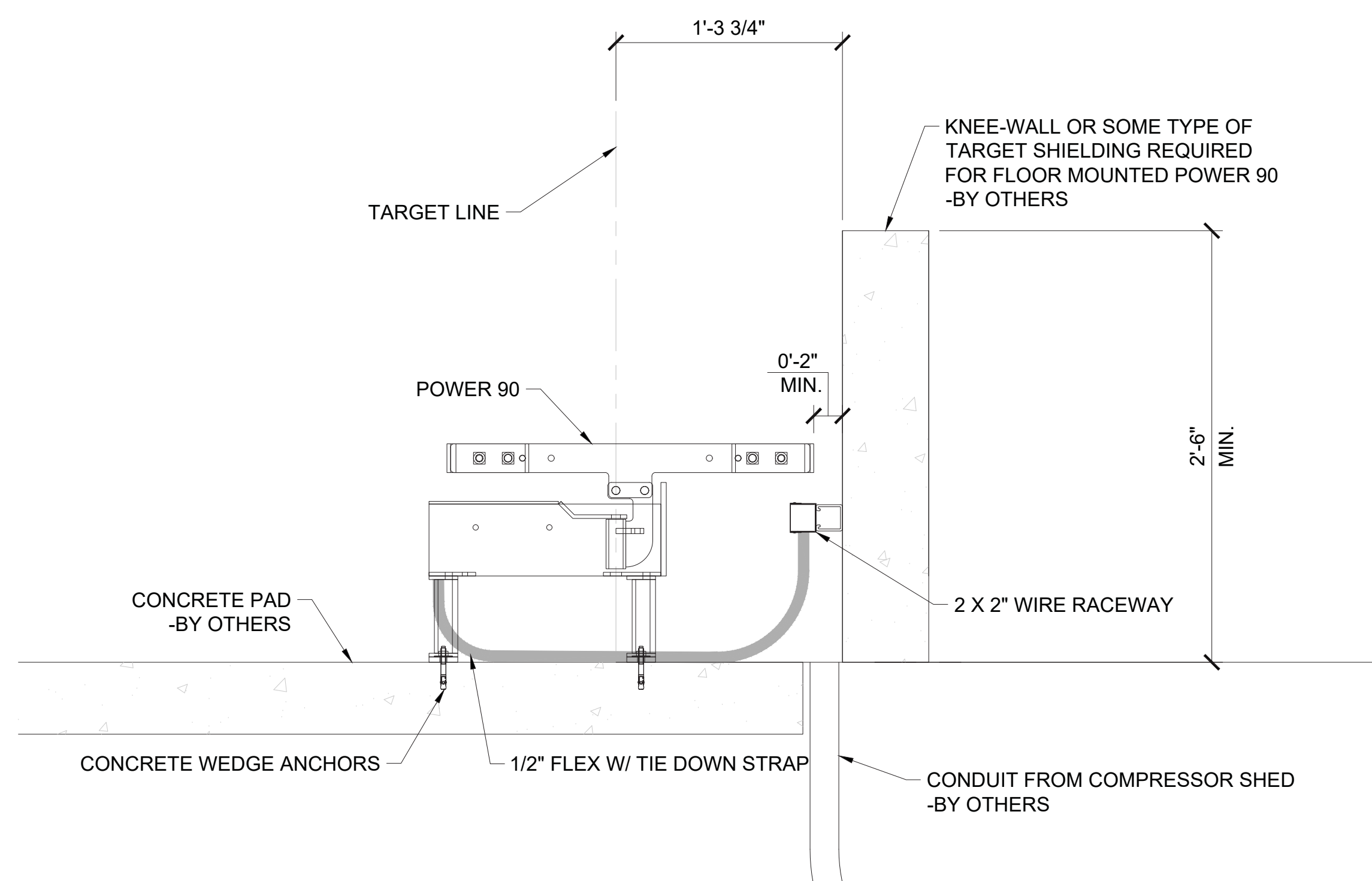
NOT FOR CONSTRUCTION



1 POWER 90 TARGET DETAILS
SCALE - 1 - 1/2" = 1'-0"



2 POWER 90 TOP VIEW
SCALE - 6" = 1'-0"



3 POWER 90 FLOOR MOUNTED
SCALE - 1 - 1/2" = 1'-0"



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**SECTION 116723
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Territory Manager: CHRIS HART
Project Engineer: FELIX GUZMAN
Drawn By: PEDRO CORREA
Approved By: FELIX GUZMAN
Origination Date: 3/1/19

No	BY	REVISION	DATE
1	FG	CUSTOMER MARKUPS	5/8/19

SHEET NAME

POWER 90 DETAILS

DRAWING NUMBER

SHEET NUMBER

Z535.5

APPENDIX L
LIGHT FIXTURE CATALOG CUT



T U R P I N & R A T T A N
ENGINEERING, INC.

CONSULTING ENGINEERS

4719 PALM AVENUE
LA MESA, CA 91941-5221

619 / 466 / 6224
FAX / 466 / 6233



PROPOSED LIGHT FIXTURE CATALOG CUT SHEETS

**POLICE RANGE
REFURBISHMENT PROJECT
PHASE II
4110 FEDERAL BOULEVARD, SAN DIEGO, CA**

FEBRUARY 2019

PROVIDING CLIENT SATISFACTION THROUGH INNOVATIVE ENGINEERING SOLUTIONS
COUPLED WITH TEAM WORK, INTEGRITY, QUALITY, AND VISION



WALL / CEILING/
PENDANT MOUNT
LED

Fixture Type	Date
Job Name	Approved By
Catalog Number - - - - -	

SPECIFICATIONS

ADA Compliant

Description The Vision 8 series features an all aluminum, ligature resistant construction and optional wet location listing which allows it to be used in nearly any environmental condition. Designed in conjunction with an ophthalmologist, the polycarbonate lens provides complete control of glare and LED image while maintaining the high efficiency of clear optical material. The Vision 8 series can be row mounted to any length. Natatorium finish is standard for all versions of this fixture.



Housing Marine grade heat treated extruded aluminum. Chemically primed and finished with robotically applied polyester powder coat.

Lens Extruded UV stabilized opal polycarbonate with integral prisms. Maximum wall thickness 0.160". Secured to housing with die cast aluminum clamps and stainless steel TORX® head screws.

End Caps Die-cast marine grade aluminum with conduit knockouts that are visible from interior of end cap.

Drivers Constant current driver at 700mA, 120-277V, 347V optional.

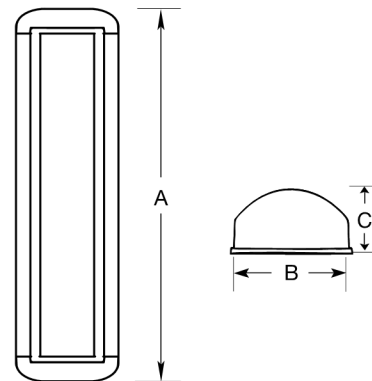
LED Samsung LM561B+ series @ 2700K, 3000K, 3500K, 4000K, or 5000K and 82 CRI wired in parallel-series. L₇₀ projected life of over 130,000 hours at 50°C. Ten year warranty on LED boards against operational defects. Tested in accordance with LM-80.

Listings U.L., C.U.L., Damp Standard, Wet optional.

Lifetime Warranty Luminaire LED Incorporated will repair or replace any fixture damaged due to vandalism for the lifetime of the installation.

DIMENSIONAL DATA

	A	B	C
VPF82	27.64	8.75	3.96
VPF83	37.87	8.75	3.96
VPF84	49.68	8.75	3.96



www.luminaireled.net

5 Sutton Place
P.O. Box 2162
Edison, NJ 08818

P. 732.549.0056
F. 732.549.9737



Luminaire LED Incorporated products are manufactured in the USA with components purchased from USA suppliers, and meet the Buy American requirements under the ARRA. Content of specification sheets is subject to change; please consult our website for current product information.

ORDERING INFORMATION

SERIES	LED	CCT	DRIVER	VOLTS	LENS	COLOR	OPTIONS		TX/SD
VPF 82	15W	2700K	CC	120-277	CP	BLK	<input type="checkbox"/> DIM	<input type="checkbox"/> OCCFA	
	25W	3000K	DIM	347	OP	WHT	<input type="checkbox"/> PC	<input type="checkbox"/> OCC50	
	50W	3500K	PRD			A1 BRZ	<input type="checkbox"/> GLR	<input type="checkbox"/> EMB310	
VPF 83	20W	4000K				GRY	<input type="checkbox"/> WET A	<input type="checkbox"/> EMB310ST	
	40W	5000K				SIL	<input type="checkbox"/> NSF	<input type="checkbox"/> EMB722	
VPF 84	A1 25W					CUST	<input type="checkbox"/> COR	<input type="checkbox"/> EMB722C	
	A 50W						<input type="checkbox"/> JB	<input type="checkbox"/> EMB125R	
	70W						<input type="checkbox"/> LEDNL	<input type="checkbox"/> EMB250R	
	100W						<input type="checkbox"/> 2B	<input type="checkbox"/> PNDKT	
							<input type="checkbox"/> OCC	<input type="checkbox"/> ST/SC	

CC = Constant Current (Standard)
 DIM = 0-10V Dimming, 10% at lowest level
 PRD = Programmable driver. Specify Lumens or Watts. Consult factory.

OPTIONS

LENS	CP = Clear Prismatic Standard	A1	OP = Opal Optional	A (RAL #7009)
COLORS	BLK = Black WHT = White	BRZ = Bronze	GRY = Gray SIL = Silver	CUST = Custom Color (Consult Factory)
DIM	0-10V dimming driver, 10% at lowest level.			
PC	Photoelectric switch.			
GLR	Fuse and fuse holder.			
WET	Silicone and neoprene gasketing for wet location. Surface mount only.			
NSF	National Sanitation Foundation rated. White finish only.			
COR	Corner mounted back box. Constructed from 16 gauge cold rolled zinc coated steel. Finished with white powder coat. Damp only.			
JB	Die cast joiner band for continuous row mount. Consult factory for row information.			
LEDNL	LED Night Light.			
2B	(2) LED drivers for independent LED board operation.			
OCC	Microwave occupancy sensor mounted behind the lens. All LED boards sensed on/off. Consult factory for availability in select models.			
OCC50	Microwave occupancy sensor mounted behind the lens. 50% of LED's constantly on and 50% sensed. 2 ft. and 4 ft. fixtures only.			
OCCFA	Microwave occupancy sensor mounted behind the lens. All LED board sensed to dim to 50%, 30%, 20%, or 10%, field selectable low levels. Factory standard preset of 50% dimming level and 20 minute time out.			
EMB310	1200 lumen self-contained 90 minute emergency battery pack for 15W minimum operation. 0°C (32°F) to 55°C (131°F). Not available in 347V. Meets CA Title 20 Standards.			
EMB310ST	1000 lumen self-testing, self-contained, 90 minute emergency battery pack. Not available for 24". 0°C (32°F) to 55°C (131°F). Not available in 347V. Meets CA Title 20 Standards.			
EMB722	2600 lumen self contained 90 minute emergency battery pack for 25W minimum operation. 0°C (32°F) to 60°C (140°F). Not available in 347V.			
EMB722C	Cold weather, 2600 lumen self contained 90 minute emergency battery pack for 25W minimum operation. -20°C (-4°F) to 60°C (140°F). Not available in 347V.			
EMB125R	Remote mounted inverter that will operate a 125W maximum load for 90 minutes. 20°C (68°F) to 30°C (86°F). Not available in 347V.			
EMB250R	Stand-alone inverter that will operate a 250W maximum load for 90 minutes. 20°C (68°F) to 30°C (86°F). Not available in 347V.			
PNDKT	Rigid stem pendant kit. Specify length. Consult factory for availability.			
ST/SC	Phillips head screws instead of TORX® head.			
TX/SD	TORX® head bit.			



PHOTOMETRIC DATA

Model	Watts	Input Watts	Delivered Lumens		Delivered Lumens		Delivered Lumens		Delivered Lumens		Delivered Lumens	
			Clear	Opal	Clear	Opal	Clear	Opal	Clear	Opal	Clear	Opal
			2700K		3000K		3500K		4000K		5000K	
VPF82	15W	13.0W	1325	1227	1339	1240	1367	1266	1410	1306	1452	1345
VPF82	25W	26.6W	2879	2668	2910	2697	2971	2754	3063	2839	3155	2924
VPF82	50W	56.0W	5059	4689	5115	4742	5220	4839	5382	4989	5543	5138
VPF83	20W	19.5W	1988	1842	2010	1864	2052	1901	2115	1960	2178	2018
VPF83	40W	38.9W	3967	3677	4012	3718	4094	3795	4221	3912	4348	4030
A1 VPF84	25W	26.6W	2879	2668	2910	2697	2971	2754	3063	2839	3155	2924
A VPF84	50W	53.3W	5560	5154	5621	5211	5736	5317	5915	5483	6092	5647
VPF84	70W	74.0W	7783	7214	7869	7295	8030	7444	8280	7675	8528	7905
VPF84	100W	114.6W	10357	9601	10473	9709	10687	9906	11019	10214	11349	10520
VPF8x	PRD		Programmable Driver. Specify Wattage or Delivered Lumens in Ordering Information.									



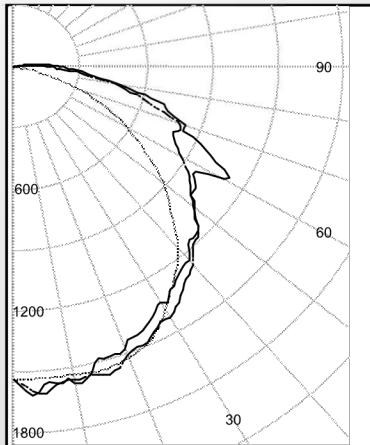
PHOTOMETRIC DATA

MODEL VPF84-50W-4000K CP

Delivered Lumens: 5,477 Lumens

Total Power: 54.0W

Testing was performed in accordance with IES LM-79-08



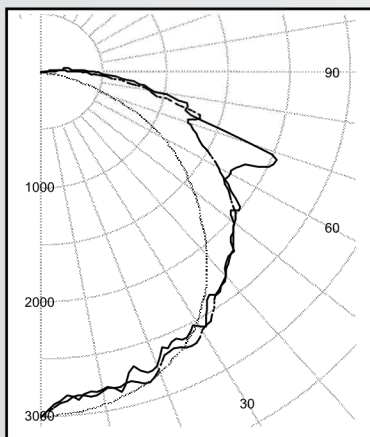
Zone	Lumens	% Lamps
0 - 30	1256	22.9
0 - 40	2072	37.8
0 - 60	3781	69.0
60 - 90	1557	28.4
0 - 90	5339	97.5
90 - 180	138	2.5
0 - 180	5477	100.0

MODEL VPF84-100W-4000K CP

Delivered Lumens: 10,203 Lumens

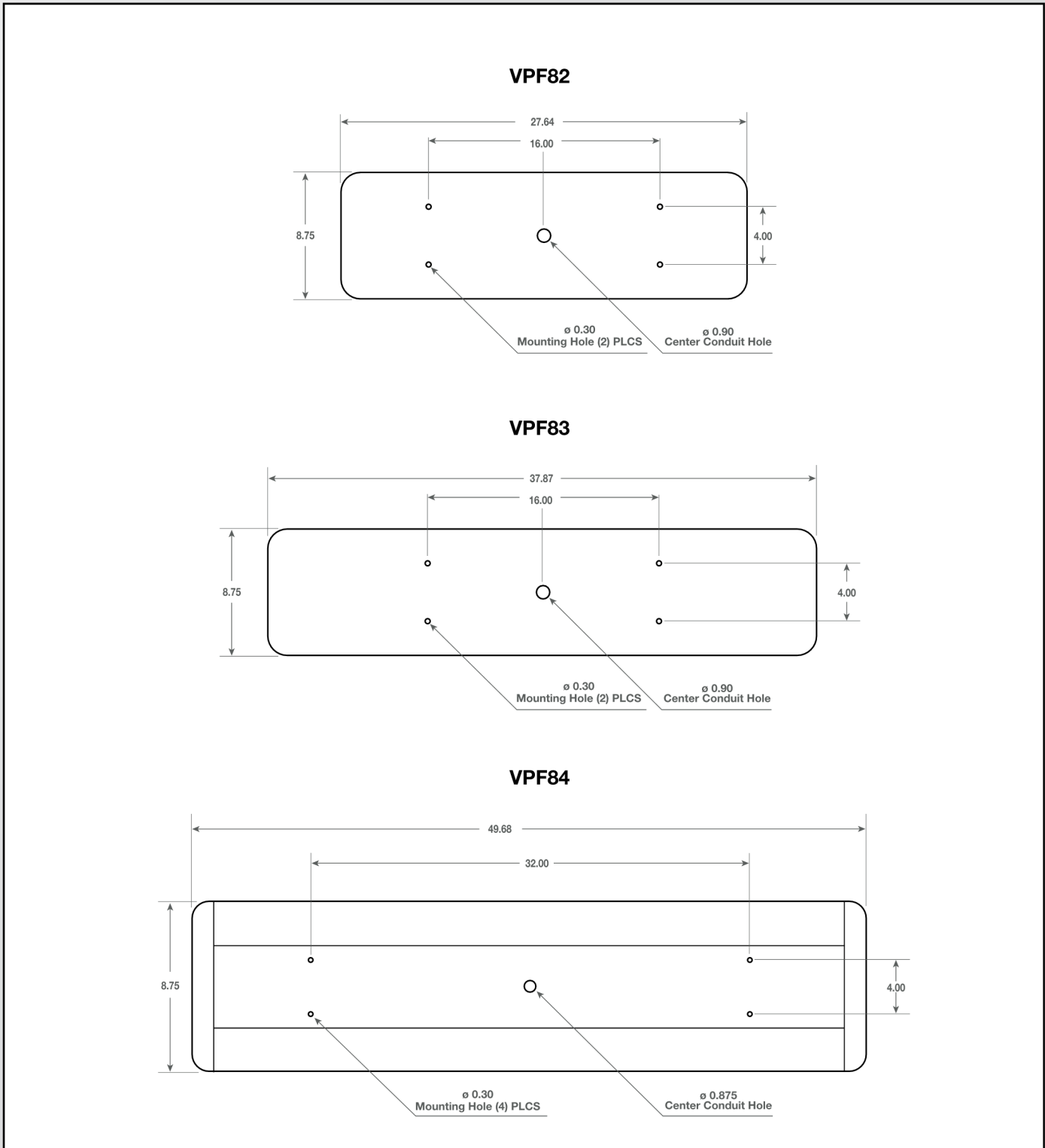
Total Power: 114.6W

Testing was performed in accordance with IES LM-79-08



Zone	Lumens	% Lamps
0 - 30	2290	22.4
0 - 40	3796	37.2
0 - 60	6958	68.2
60 - 90	2963	29.0
0 - 90	9922	97.2
90 - 180	281	2.8
0 - 180	10203	100.0

MOUNTING PLATE DETAILS



Specification Sheet

lumenbeam

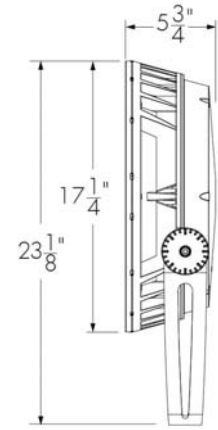
LBX
WHITE & STATIC COLORS

Project Name _____ Qty _____

Type _____ Catalog / Part Number _____



Front view



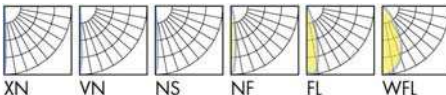
Side view

Photometric Summary

4000K, HO	Delivered output (lm)	Intensity (peak cd)
XN	14,193	1,169,800
VN	10,447	656,461
NS	10,251*	353,555*
NF	10,592*	63,959*
FL	10,689*	27,663*
WFL	9,997*	9,456*

Photometric performance is measured in compliance with IESNA LM-79-08.
*Estimated. Consult website for the latest IES and IDT files.

Optics



Control

ON/OFF 0-10V DALI



Rating



Description

The Lumenbeam LBX is a high-performance, 140W or 205W luminaire for lighting multi-story facades and tall structures. Noted for its slim form factor and long L70 lifetime, the luminaire can be configured with numerous options including two outputs RO (140W) and HO (205W); optics for flood or accent lighting; a choice of color temperatures and colors; various mounting options, accessories, spread lenses and controls.

Features

Color and Color Temperature	2200K, 2700K, 3000K, 3500K, 4000K, 5700K, Red, Green, Blue
Optics (nominal distribution)	4°, 6°, 10°, 20°, 40°, 60°
Optical Option	Linear spread lens horizontal distribution, Linear spread lens vertical distribution
Options	Short Yoke, 3G ANSI C136.31 Vibration Rating for bridge applications, Corrosion-resistant coating for hostile environments
Power Consumption	140 W (RO version), 205 W (HO version)
Warranty	5-year limited warranty

Performance

Delivered Output	10,361 lm (4000K, XN optic, RO version), 14,193 lm (4000K, XN optic, HO version)
Delivered Intensity	853,954 cd at nadir (4000K, XN optic, RO version), 1,169,800 cd at nadir (4000K, XN optic, HO version)
Illuminance at Distance	Minimum 1 fc at 924 ft distance (4000K, XN optic, RO version), Minimum 1 fc at 1082 ft distance (4000K, XN optic, HO version)
Color Consistency	2 SDCM
Color Rendering	CRI 80+
Lumen Maintenance	L70 120,000 hrs (Ta 25 °C)

Physical

Housing Material	Low copper content high pressure die-cast aluminum
Yoke Material	Steel (standard yoke included)
Lens Material	Clear tempered glass
Hardware Material	Stainless steel
Gasket Material	Silicone
Surface Finish	Electrostatically applied polyester powder coat
Weight	38 lbs
EPA	Front = 2.75 sq ft, Side = 1.17 sq ft

Electrical and control

Voltage	100 to 277 volts
Fixture Cable	Power and data in 1 cable, 3 ft cord standard (#16-5), other lengths available
Resolution (DMX/RDM)	Per fixture, 8-bit or 16-bit
Control	On/Off control, Lumentalk, 0-10V dimming, DALI dimming, Lutron® EcoSystem® Enabled dimming, DMX/RDM enabled

Environmental

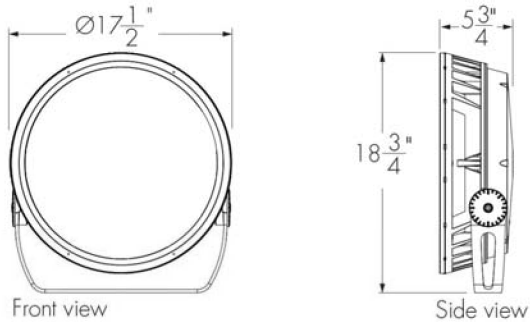
Operating Temperature	-13 °F to 122 °F
IP Rating	IP66
IK Rating	IK09

Accessories (order separately)

Control Boxes	Power and control box - daisy chain configuration, Power and control box - star configuration
Control Systems	Lumentouch 2.0™, Lumencue, Lumentone
Diagnostic and Addressing Tools	LumenID, LumentalkID

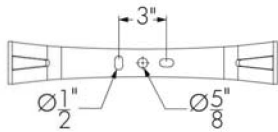
Mounting options

SY - Short yoke

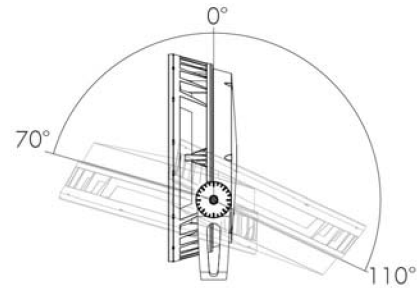
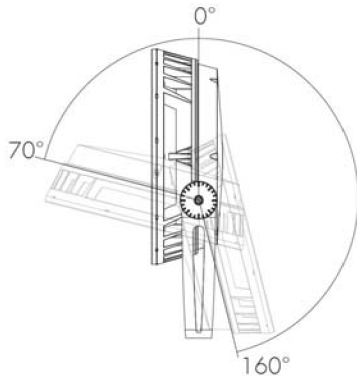


Mounting details

Mounting hole pattern - standard and short yoke



Adjustable pivot limits (adjustable in 6 degree increments)



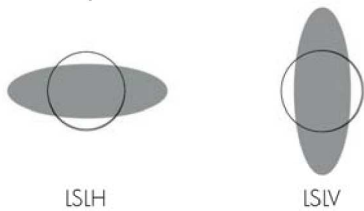
Standard yoke

Short yoke

Optical options

LSLH - Linear spread lens horizontal distribution

LSLV - Linear spread lens vertical distribution



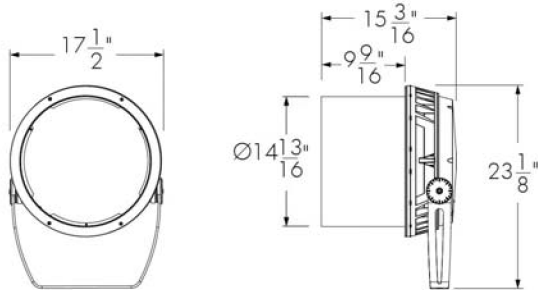
	Beam angle with LSLH/LSLV
XN	5° x 57°
VN	8° x 60°
NS	9° x 60°
NF	18° x 65°
FL	32° x 72°

Factory installed, not adjustable on site. Not available for WFL optic.
See 'Optical Accessories' section for field adjustable spread lens (LSLA).

Optical accessories (order separately)

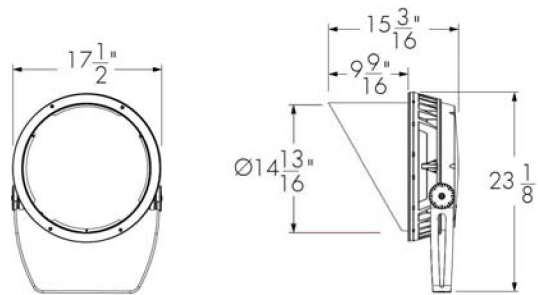
Installed optical accessories will affect the maximum pivot limits for each mounting option, consult factory for details.

SN - Snoot



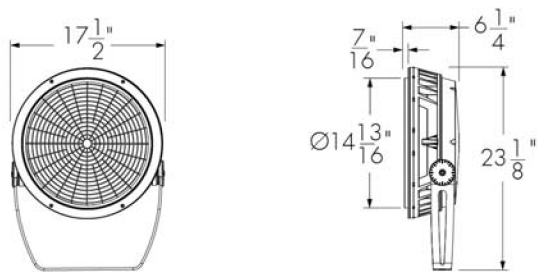
LBXSN-FINISH-BK
Interior surface painted black. Please specify desired exterior FINISH from list of available finishes.

VS - Visor



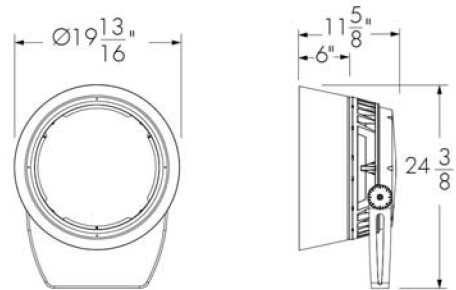
LBXVS-FINISH-BK
Interior surface painted black. Please specify desired exterior FINISH from list of available finishes.

WG - Wire guard



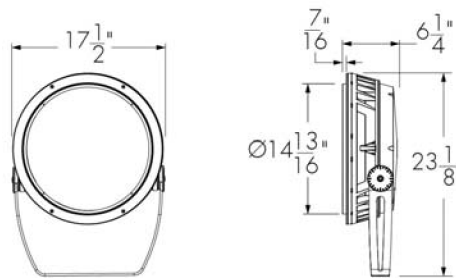
LBXWG-FINISH
Please specify desired exterior FINISH from list of available finishes.

SNW - Snoot wide



LBXSNW-FINISH-BK
Interior surface painted black. Please specify desired exterior FINISH from list of available finishes.

LSLA - Linear spread lens adjustable



LBXLSLA-FINISH
Please specify desired exterior FINISH from list of available finishes.

Accessory combinations

	+	Snoot	Snoot wide	Visor
Linear spread lens adjustable		YES	NO*	YES
Wire guard		YES	NO	YES

Accessory combinations must be ordered together on a single line
Ex: A snoot + wire guard combination order code is LBXSNWG-BK-BK.
*Consult factory for a linear spread lens adjustable + snoot wide combination.

Available exterior finishes for optical accessories

- BK** - Black Sandtex®
- BRZ** - Bronze Sandtex®
- SI** - Silver Sandtex®
- WH** - Smooth white
- BKTX** - Textured black
- BRZTX** - Textured bronze, non-metallic
- GRATX** - Textured medium gray
- GRNTX** - Textured green
- WHTX** - Textured white
- CC** - Custom color and finish (please specify RAL color)*

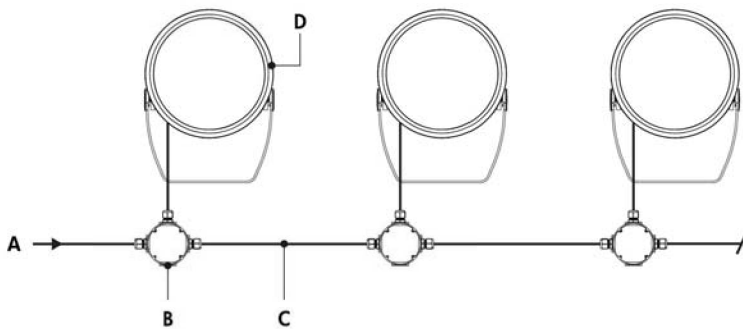
*Lumenpulse offers a wide selection of RAL CLASSIC (K7) colors with a smooth texture and high-gloss finish. Please consult factory for a list of available K7 colors, other RAL textures and glosses, or to match alternate color charts. Final color matching results may vary.

Typical wiring diagrams

Wiring color code

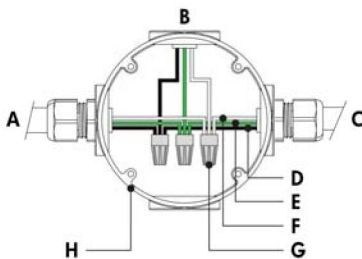
UL Color Code	USE
Green	Ground
Black	Live 100-277V
White	Neutral
Red/Purple	0-10V / Data +
Orange	0-10V / Data -

On/Off control (NO)



- A** - Power input (100-277V)
- B** - Junction box (by others)
- C** - Power wiring (by others)
- D** - Lumenbeam LBX

On/Off control (NO) - wiring detail



- A** - Power input or from previous fixture
- B** - To fixture
- C** - To next fixture
- D** - Live
- E** - Ground
- F** - Neutral
- G** - Wire-nuts (by others)
- H** - Junction box (by others)

- Consult factory for specific applications and maximum fixture count/cable length recommendations.
- Regular Output version: 140 watts per fixture, High Output version: 205 watts per fixture.

How to order

1	2	3	4	5	6	7	8
9	10	11	12				

1 . Housing

LBX RO	Lumenbeam™ XLarge, Regular Output, 140W
LBX HO	Lumenbeam™ XLarge, High Output, 205W

2 . Voltage

100	100 volts
120	120 volts
208	208 volts
220	220 volts
240	240 volts
277	277 volts

3 . Color and Color Temperature ⁽¹⁾

22K	2200K
27K	2700K
30K	3000K
35K	3500K
40K	4000K
57K	5700K
RD	Red
GR	Green
BL	Blue

4 . Optic1

XN	Extra Narrow 4°
VN B	Very Narrow 6°
B2 NS	Narrow Spot 10°
NF B1	Narrow Flood 20°
B3 FL	Flood 40°
WFL	Wide Flood 60° ⁽²⁾

5 . Optic2

XN	Extra Narrow 4°
VN	Very Narrow 6°
NS	Narrow Spot 10°
NF	Narrow Flood 20°
FL	Flood 40°
WFL	Wide Flood 60° ⁽²⁾

6 . Optic3

XN	Extra Narrow 4°
VN	Very Narrow 6°
NS	Narrow Spot 10°
NF	Narrow Flood 20°
FL	Flood 40°
WFL	Wide Flood 60° ⁽²⁾

7 . Optical Option

LSLH	Linear spread lens horizontal distribution ⁽³⁾
LSLV	Linear spread lens vertical distribution ⁽³⁾

8 . Finish

BK	Black Sandtex®
BRZ	Bronze Sandtex®
SI	Silver Sandtex®
WH	Smooth white
BKTX	Textured black
BRZTX	Textured bronze non-metallic
GRATX	Textured medium gray
GRNTX	Textured green
WHTX	Textured white
CC	Custom color and finish (please specify RAL color) ⁽⁴⁾

11 . Certification

UL	UL compliant
CE	CE compliant

9 . Control

NO	On/Off control
LT	Lumentalk ⁽⁵⁾
DIM	0-10V dimming
DALI	DALI dimming
ES	Lutron® EcoSystem® Enabled dimming
DMX/RDM	DMX/RDM enabled

10 . Options

SY	Short Yoke
3GV	3G ANSI C136.31 Vibration Rating for bridge applications
CRC	Corrosion-resistant coating for hostile environments ⁽⁶⁾

12 . Cable Length⁽⁷⁾

3FT	3 ft ⁽⁷⁾ ⁽⁸⁾
10FT	10 ft
20FT	20 ft
30FT	30 ft
50FT	50 ft
70FT	70 ft
100FT	100 ft

Notes:

- ⁽¹⁾ Consult factory for availability of static Royal Blue, 6500K and 90+ CRI.
- ⁽²⁾ Cannot be combined with other optics.
- ⁽³⁾ Factory installed, not available for 60° optic. Field adjustable spread lens optical accessory available, order separately.
- ⁽⁴⁾ Lumenpulse offers a wide selection of RAL CLASSIC [K7] colors with a smooth texture and high-gloss finish. Please consult factory for a list of available K7 colors, other RAL textures and glosses, or to match alternate color charts. Final color matching results may vary.
- ⁽⁵⁾ A Lumentranslator and LumentalkID (LIDL) must be specified for Lumentalk applications. Consult Lumentranslator and Lumentalk pages and specification sheets for details.
- ⁽⁶⁾ Use only when exposed to salt spray and harsh chemicals. This option is not required for normal outdoor exposure.
- ⁽⁷⁾ 3 ft cable length is standard unless otherwise specified.
- ⁽⁸⁾ Maximum of 3 ft cable length for daisy chain DMX applications with CBX-DS.



**WALL /CEILING
LED**

Fixture Type	Date
Job Name	Approved By
Catalog Number - 20W - - 120 - 277 - - -	

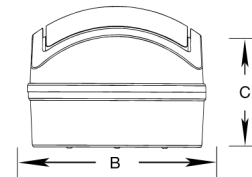
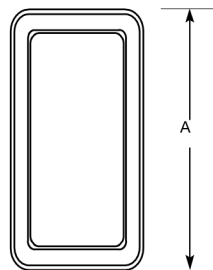
SPECIFICATIONS



- Description** The Swoop 610 series features a durable, color-impregnated, polycarbonate housing supported by a marine grade, die cast aluminum base plate to provide a lighting fixture that will survive in many challenging environments. Natatorium finish is standard for all versions of this fixture.
- Bezel** One piece injection molded UV stabilized polycarbonate mechanically interlocked to lens. Minimum wall thickness shall be 0.140". Color is molded through entire part for scratch resistant finish.
- Lens** One piece injection molded UV stabilized prismatic polycarbonate with minimum 0.140" wall thickness. Available in Clear or Opal and secured to base plate with (4) concealed captive stainless steel screws. YWP models come with a chemically etched, scratch resistant surface painted lens.
- Reflector** Die formed, shaped for maximum efficiency and finished with high gloss electrostatically applied white polyester powder coat.
- Driver** Constant current driver at 350mA, 120-277V only.
- LED** Samsung LM561B+ series @ 3000K, 3500K, 4000K, or 5000K and 82 CRI wired in parallel-series. L₇₀ projected life of over 130,000 hours at 50°C. Ten year warranty on LED boards against operational defects.
- Base Plate** Pressure die cast marine grade aluminum. Chemically primed and finished with electrostatically applied polyester powder coat.
- Gasket** Closed cell die cut, self-adhesive neoprene gasket provided between fixture base plate and mounting surface. High temperature silicone O-ring between lens and base plate.
- UL Listing** U.L., C.U.L., Wet standard, 1598a Marine Listed.
- Lifetime Warranty** Luminaire LED Incorporated will repair or replace any fixture damaged due to vandalism for the lifetime of the installation.

DIMENSIONAL DATA

	A	B	C
SWP610HO	10.84	6.74	5.79
YWP610HO	10.84	6.74	5.79
YWPH610HO	6.74	10.84	5.79



www.luminaireled.net

5 Sutton Place
P.O. Box 2162
Edison, NJ 08818

P. 732.549.0056
F. 732.549.9737



Luminaire LED Incorporated products are manufactured in the USA with components purchased from USA suppliers, and meet the Buy American requirements under the ARRA. Content of specification sheets is subject to change; please consult our website for current product information.

ORDERING INFORMATION

SERIES	LED	CCT	VOLTS	LENS	COLOR	OPTIONS		TX/SD
	20W		120 - 277					
SWP610HO	20W	3000K	120-277	CP	BLK	<input type="checkbox"/> DIM	<input type="checkbox"/> EMB20R	
YWP610HO		3500K		OP	WHT	<input type="checkbox"/> PC	<input type="checkbox"/> EMB125R	
YWPH610HO		4000K			BRZ	<input type="checkbox"/> GLR	<input type="checkbox"/> EMB375R	
		5000K			GRY	<input type="checkbox"/> KO		
					CUST			

OPTIONS

LENS	CP = Clear Prismatic Standard	OP = Opal	Optional		
COLORS	BLK = Black	WHT = White	BRZ = Bronze	GRY = Gray	CUST = Custom Color (Consult Factory)
DIM	0-10V dimming driver. 10% at lowest level.				
PC	Photoelectric switch.				
GLR	Fuse and fuse holder.				
KO	Add (3) 1/2" i.p.t. holes for conduit entry in housing.				
EMB20R	Remote mounted micro inverter that will operate a 25W maximum load for 90 minutes. 0°C (32°F) to 50°C (122°F).				
EMB125R	Stand-alone inverter that will operate a 125W maximum load for 90 minutes. 20°C (68°F) to 30°C (86°F).				
EMB 375R	Stand-alone inverter that will operate a 375W maximum load for 90 minutes. 20°C (68°F) to 30°C (86°F).				
TX/SD	TORX® head bit.				

TRIM OPTIONS

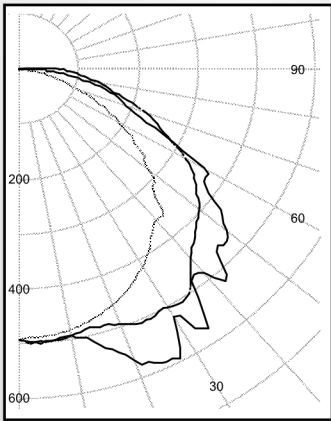


PHOTOMETRIC DATA

Model	Watts	Input Watts	Delivered Lumens		Delivered Lumens		Delivered Lumens		Delivered Lumens	
			Clear	Opal	Clear	Opal	Clear	Opal	Clear	Opal
			3000K		3500K		4000K		5000K	
SWP610HO	20W	19.6	1958	1491	1998	1522	2060	1569	2121	1616

MODEL SWP610HO-20W-4000K-CP

Delivered Lumens: 1,801 Lumens



IES FILE: SWP610HO-20W-4000K-CP

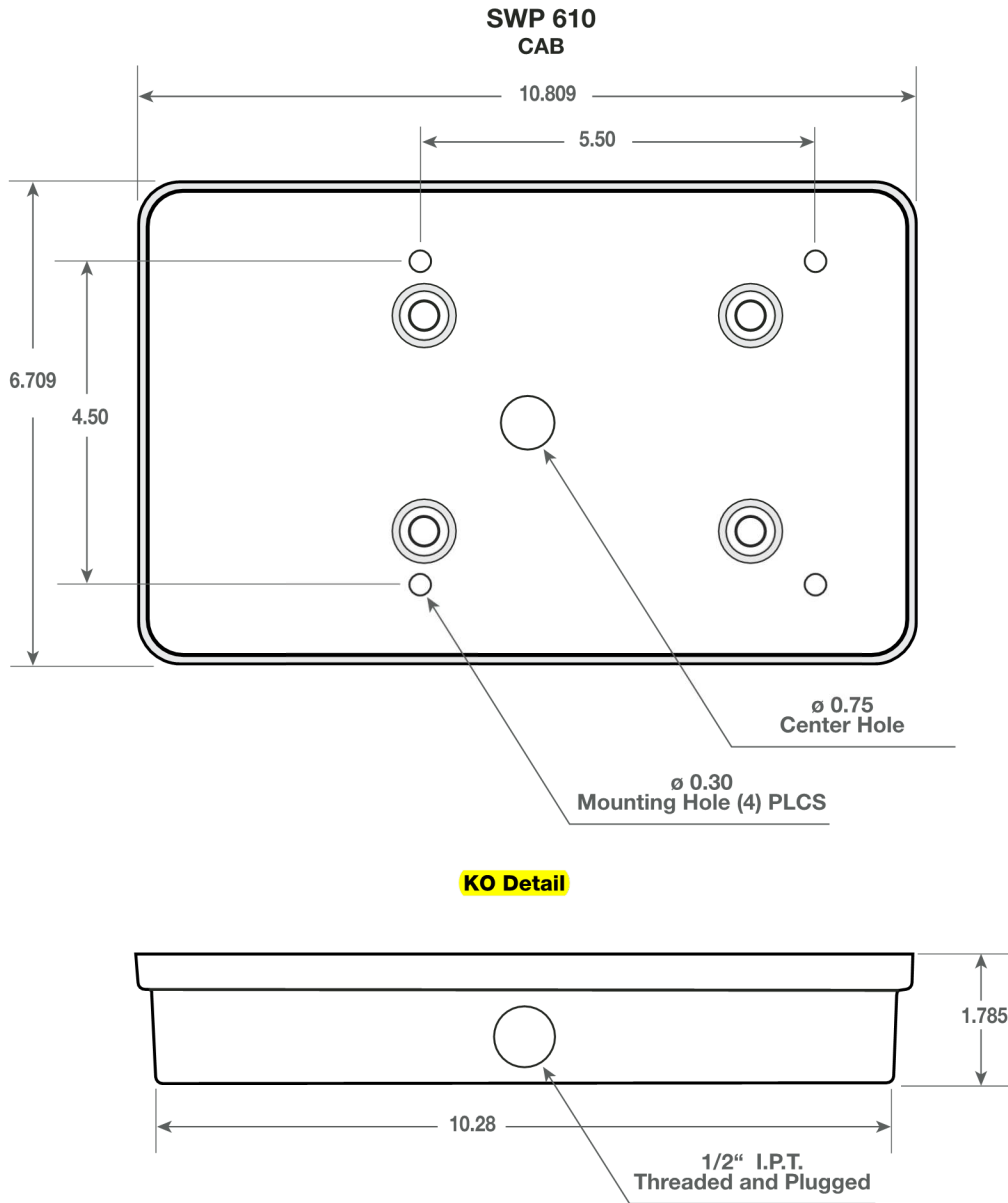
Total Power: 19.6W

Zone	Lumens	% Lamps
0 - 30	421	23.4
0 - 40	714	39.6
0 - 60	1330	73.8
60 - 90	442	24.5
0 - 90	1771	98.3
90 - 180	30	1.7
0 - 180	1801	100.0

Testing was performed in accordance with IES LM-79-08



MOUNTING PLATE DETAILS



Specification Sheet

lumenbeam

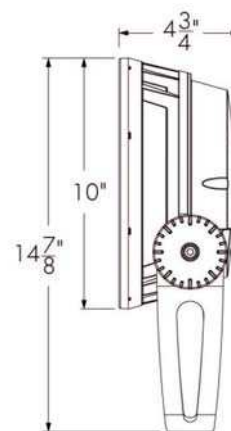
Large
WHITE AND STATIC COLORS

Project Name _____ Qty _____

Type _____ Catalog / Part Number _____



Front view



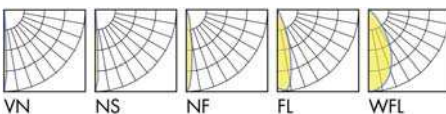
Side view

Photometric Summary

4000K	Delivered output (lm)	Intensity (peak cd)
VN	3,271	144,794
NS	2,896	98,556
NF	2,673	19,635
FL	2,692	7,448
WFL	2,623	2,480

Photometric performance is measured in compliance with IESNA LM-79-08.

Optics



Control

ON/OFF 0-10V DALI



Rating



Description

The Lumenbeam Large is a high-performance, 50W luminaire for solving complex lighting challenges such as multi-story building exteriors. It offers a wide array of options including a choice of optics for floodlighting or accent lighting; a number of color temperatures and colors; various mounting options, accessories, spread lenses and controls.

Features

Color and Color Temperature 2200K, 2700K, 3000K, 3500K, 4000K, 5700K, Red, Green, Blue

Optics (nominal distribution) 6°, 10°, 20°, 40°, 60°

Optical Option Linear spread lens horizontal distribution, Linear spread lens vertical distribution

Options Short Yoke, 3G ANSI C136.31 Vibration Rating for bridge applications, Corrosion-resistant coating for hostile environments

Power Consumption 50 W

Warranty 5-year limited warranty

Performance

Delivered Output 3,271 lm (4000K, VN optic)

Delivered Intensity 144,794 cd at nadir (4000K, VN optic)

Illuminance at Distance Minimum 1 fc at 381 ft distance (4000K, VN optic)

Color Consistency 2 SDCM

Color Rendering CRI 80+

Lumen Maintenance L70 120,000 hrs (T_a 25 °C)

Physical

Housing Material	Low copper content high pressure die-cast aluminum
Yoke Material	Heavy aluminum (standard yoke included)
Lens Material	Clear tempered glass
Hardware Material	Stainless steel
Gasket Material	Silicone
Surface Finish	Electrostatically applied polyester powder coat
Weight	12 lbs
EPA	Front = 0.94 sq ft, Side = 0.56 sq ft

Electrical and control

Voltage	100 to 277 volts
Fixture Cable	Power and data in 1 cable, 3 ft cord standard (#16-5), other lengths available
Resolution (DMX/RDM)	Per fixture, 8-bit or 16-bit
Control	On/Off control, Lumentalk, 0-10V dimming, DALI dimming, Lutron® EcoSystem® Enabled dimming, DMX/RDM enabled

Environmental

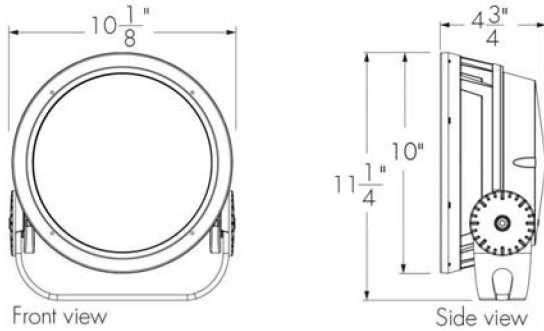
Operating Temperature	-13 °F to 122 °F
IP Rating	IP66
IK Rating	IK10

Accessories (order separately)

Control Boxes	Power and control box - daisy chain configuration, Power and control box - star configuration
Control Systems	Lumentouch 2.0™, Lumencue, Lumentone
Diagnostic and Addressing Tools	LumenID, LumentalkID

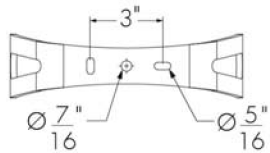
Mounting options

SY - Short yoke

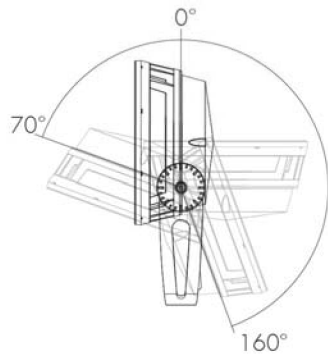


Mounting details

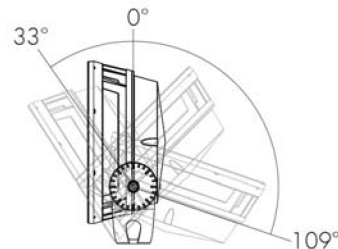
Mounting hole pattern - standard and short yoke



Adjustable pivot limits



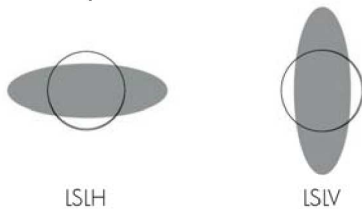
Standard yoke



Short yoke

Optical options

LSLH - Linear spread lens horizontal distribution
LSLV - Linear spread lens vertical distribution



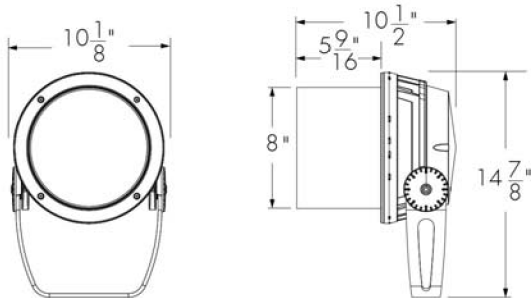
	Beam angle with LSLH/LSLV
VN	8° x 60°
NS	9° x 60°
NF	18° x 65°
FL	32° x 72°

Factory installed, not adjustable on site. Not available for WFL optic.
See 'Optical Accessories' section for field adjustable spread lens (LSLA).

Optical accessories (order separately)

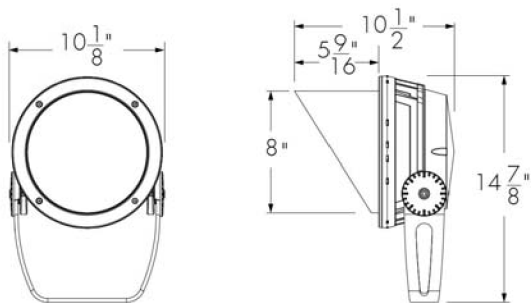
Installed optical accessories will affect the maximum pivot limits for each mounting option, consult factory for details.

SN - Snoot



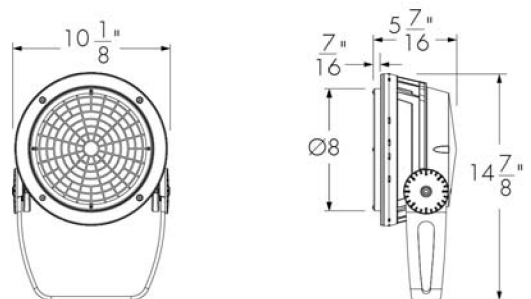
LBSN-FINISH-BK
Interior surface painted black. Please specify desired exterior FINISH from list of available finishes.

VS - Visor



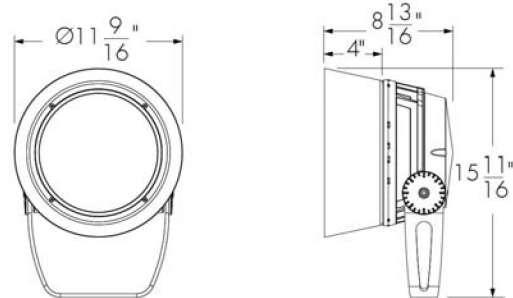
LBLVS-FINISH-BK
Interior surface painted black. Please specify desired exterior FINISH from list of available finishes.

WG - Wire guard



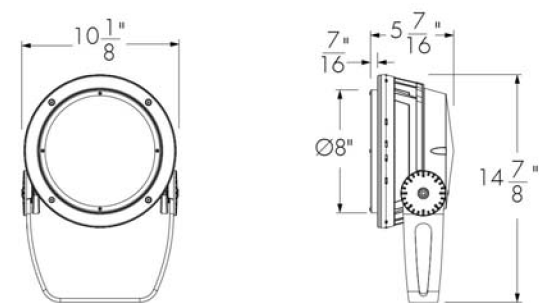
LBLWG-FINISH
Please specify desired exterior FINISH from list of available finishes.

SNW - Snoot wide



LBSNW-FINISH-BK
Interior surface painted black. Please specify desired exterior FINISH from list of available finishes.

LSLA - Linear spread lens adjustable



LBLSLA-FINISH
Please specify desired exterior FINISH from list of available finishes.

Accessory combinations

	+	Snoot	Snoot wide	Visor
Linear spread lens adjustable		YES	NO*	YES
Wire guard		YES	NO	YES

Accessory combinations must be ordered together on a single line
Ex: A snoot + wire guard combination order code is LBSLNWG-BK-BK.
*Consult factory for a linear spread lens adjustable + snoot wide combination.

Available exterior finishes for optical accessories

- BK** - Black Sandtex®
- BRZ** - Bronze Sandtex®
- SI** - Silver Sandtex®
- WH** - Smooth white
- BKTX** - Textured black
- BRZTX** - Textured bronze, non-metallic
- GRATX** - Textured medium gray
- GRNTX** - Textured green
- WHTX** - Textured white
- CC** - Custom color and finish (please specify RAL color)*

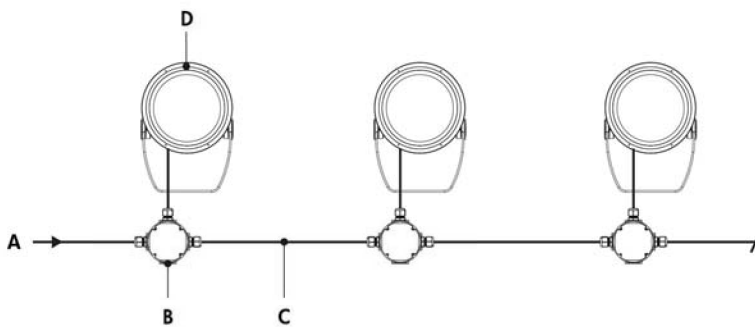
*Lumenpulse offers a wide selection of RAL CLASSIC (K7) colors with a smooth texture and high-gloss finish. Please consult factory for a list of available K7 colors, other RAL textures and glosses, or to match alternate color charts. Final color matching results may vary.

Typical wiring diagrams

Wiring color code

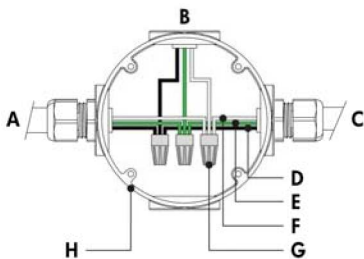
UL Color Code	USE
Green	Ground
Black	Live 100-277V
White	Neutral
Red/Purple	0-10V / Data +
Orange	0-10V / Data -

On/Off control (NO)



- A** - Power input (100-277V)
- B** - Junction box (by others)
- C** - Power wiring (by others)
- D** - Lumenbeam Large

On/Off control (NO) - wiring detail



- A** - Power input or from previous fixture
- B** - To fixture
- C** - To next fixture
- D** - Live
- E** - Ground
- F** - Neutral
- G** - Wire-nuts (by others)
- H** - Junction box (by others)

- Consult factory for specific applications and maximum fixture count/cable length recommendations.
- 50 watts per fixture.

How to order

1	2	3	4	5	6	7	8
LBL							
9	10						

1 . Housing

LBL Lumenbeam™ Large

2 . Voltage

100 100 volts
120 **120 volts**
 208 208 volts
 220 220 volts
 240 240 volts
 277 277 volts

3 . Color and Color Temperature ⁽¹⁾

22K 2200K
 27K 2700K
 30K 3000K
 35K 3500K
40K **4000K**
 57K 5700K
 RD Red
 GR Green
 BL Blue

4 . Optics

VN Very Narrow 6°
NS **Narrow Spot 10°**
 NF Narrow Flood 20°
 FL Flood 40°
 WFL Wide Flood 60°

5 . Optical Option

LSLH Linear spread lens horizontal distribution ⁽²⁾
 LSLV Linear spread lens vertical distribution ⁽²⁾

6 . Finish

BK Black Sandtex®
 BRZ Bronze Sandtex®
 SI Silver Sandtex®
 WH Smooth white
 BKTX Textured black
 BRZTX Textured bronze non-metallic
 GRATX Textured medium gray
 GRNTX Textured green
 WHTX Textured white
CC **Custom color and finish (please specify RAL color) ⁽³⁾**

7 . Control

NO **On/Off control**
 IT Lumentalk ⁽⁴⁾
 DIM 0-10V dimming
 DALI DALI dimming
 ES Lutron® EcoSystem® Enabled dimming
 DMX/RDM DMX/RDM enabled

8 . Options

SY Short Yoke
 3GV 3G ANSI C136.31 Vibration Rating for bridge applications
CRC **Corrosion-resistant coating for hostile environments ⁽⁵⁾**

9 . Certification

UL	UL compliant
CE	CE compliant

10 . Cable Length ⁽⁶⁾

3FT	3 ft ^{(6) (7)}
10FT	10 ft
20FT	20 ft
30FT	30 ft
50FT	50 ft
70FT	70 ft
100FT	100 ft

Notes:

- ⁽¹⁾ Consult factory for availability of static Royal Blue, 6500K and 90+ CRI.
- ⁽²⁾ Factory installed, not available for 60° optic. Field adjustable spread lens optical accessory available, order separately.
- ⁽³⁾ Lumenpulse offers a wide selection of RAL CLASSIC (K7) colors with a smooth texture and high-gloss finish. Please consult factory for a list of available K7 colors, other RAL textures and glosses, or to match alternate color charts. Final color matching results may vary.
- ⁽⁴⁾ A Lumentranslator and LumentalkID (LIDLIT) must be specified for Lumentalk applications. Consult Lumentranslator and Lumentalk pages and specification sheets for details.
- ⁽⁵⁾ Use only when exposed to salt spray and harsh chemicals. This option is not required for normal outdoor exposure.
- ⁽⁶⁾ 3 ft cable length is standard unless otherwise specified.
- ⁽⁷⁾ Maximum of 3 ft cable length for daisy chain DMX applications with CBX-DS.



880

**Thin Line Aluminum Frame
Self-Luminous Exit**
Features

- Architecturally pleasing, thin profile designed for applications when aesthetics are an important factor.
- Requires no electricity or external light source.
- Tamper-proof design
- Maintenance free – no lamps or batteries to replace.
- Easy to install – no wiring required.
- Ideal for damp, wet, explosion proof, and extreme temperature applications.
- Service life – 10 or 20 year options available.

Construction

- Extruded aluminum frame.
- Painted extruded aluminum stencil.

Letters

- 6" high; 0.75" stroke

Arrows

- Universal chevrons

Viewing Distance

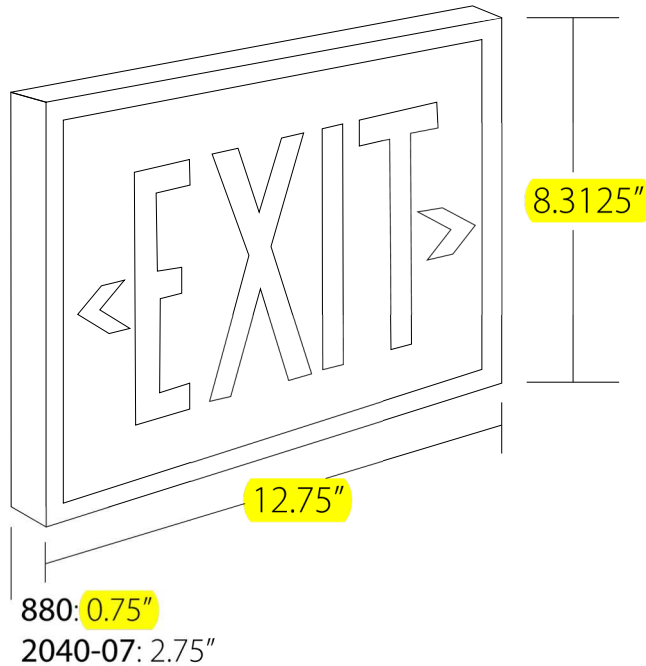
- 100 foot visibility rating

Technology

- Isolite Self-Luminous signs are illuminated with a light source that consists of glass tubes which are internally coated with phosphor and filled with tritium gas-a natural hydrogen isotope.



Ordering Information



Series

- 880 = Single
- 2040-07 = Double

Service Life

- 10 = 10 Years
- 20 = 20 Years

Face Color

- R = Red
- G = Green
- BK = Black
- BZ = Bronze

Frame Color

- WH = White
- BK = Black
- BA = Brushed Aluminum
- BZ = Bronze

Mounting

- UN = Universal Canopy
- PA = 12" Swivel Pendant
- PB = 24" Swivel Pendant
- PC = 36" Swivel Pendant
- PD = 48" Swivel Pendant

Weight

- **Single Face:** 3.5 lb
- **Double Face:** 8 lb

Temperature Rating

- From -67°F to 176°F

Approvals

- **UL Listed to standard UL924** & CAN/ULC-S572
- **NFPA 101 Life Safety Code**
- NEC Article 500, Class 1, 11, and 111 conditions

Warranty

- Our self-luminous products are warranted against any defects in material or workmanship for the rated life of the product. For further details, refer to General Warranty and Obligations in the Isolite manual or on our website.

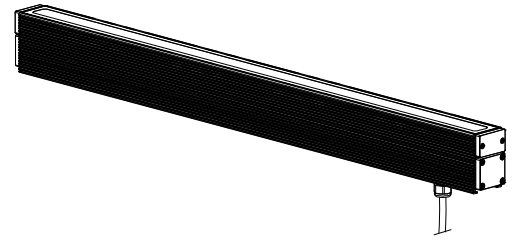
Client _____ Project name _____

Order# _____ Type _____ Qty _____

FEATURES AND BENEFITS

Physical :

- Low copper content extruded aluminum housing
- Available in 1', 2', 3' or 4' sections
- Electro-statically applied polyester powder coat finish
- Machined aluminum end caps and silicone gaskets
- Stainless steel hardware
- Standard straight leader cable output, bottom feed
- Clear tempered glass lens
- Asymmetric wallwash, 8° x 8°, 10° x 10°, 10° x 30°, 10° x 60°, 10° x 90°, 15° x 25°, 30° x 30°, 30° x 60°, 35° x 35°, 50° x 80°, 60° x 60°, 80° x 80°, or 90° x 90° optics
- IP66
- IK07 rated (asymmetric wallwash lens is IK06 rated)
- Meets 3G ANSI C136.31 Vibration standard for bridge applications
- Corrosion-resistant coating for hostile environments²



Performance :

- 2200K, 2700K, 3000K, 3500K, 4000K, Red, Green, Blue static colors available
- CRI value: 80+
- Minimum 1fc (10.7 lux) @ 140ft (43m) distance (HO 4000K, 4' unit, 10° x 60° optic)
- Lumen maintenance: 120,000 hrs [L70 @ 25°C]
- Lumen measurements comply with LM - 79 - 08 standard
- Resolution per foot or per fixture (configured with LumenID V3 software & DMX/RDM)
- Operating temperatures: -25° C to 50° C [-13F to 122F]

Photometric Summary

4ft HO, 4000K	Delivered Output [lm]	Intensity [peak cd]
WW	3,592	5,159
8°x8°	4,045	77,896
10°x10°	3,768*	38,346*
10°x30°	3,830	30,056
10°x60°	3,692	19,654
10°x90°	3,576	7,897
30°x30°	3,765	14,726
30°x60°	3,862*	5,119*
60°x60°	3,447*	3,015*
90°x90°	3,592	1,886

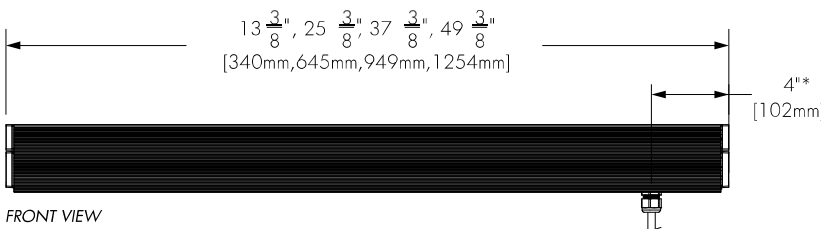
Photometric performance is measured in compliance with IESNA LM-79-08.
*Estimated. Consult lumenpulse website for the latest IES and LDT files.

Electrical :

- Line voltage luminaire for 100 to 277V
- Power & Data in 1 cable (#16-5), standard 10ft /3m black cable, other lengths available
- 5W/ft version meets ASHRAE standards for linear lighting on building facades³
- 8.5W/ft Regular Output version³
- 15.25W/ft High Output version³
- Dimming options: Lumentalk, 0-10 volt, DALI, Lutron® EcoSystem® or DMX/RDM enabled

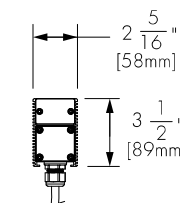


TOP VIEW



FRONT VIEW

* 6 ¹¹/₁₆" [169mm] on 1ft configuration



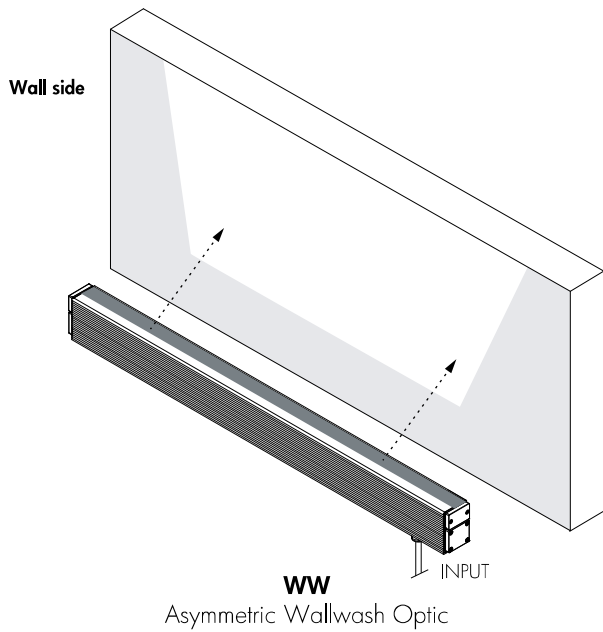
SIDE VIEW

¹ Asymmetric wallwash lens is IK06 rated.

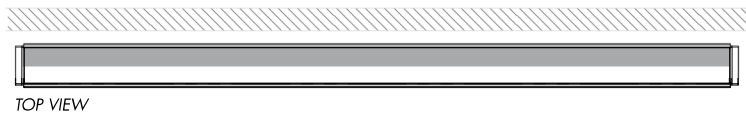
² Use only when exposed to salt spray and harsh chemicals. This option is not required for normal outdoor exposure!

³ ASHRAE version not available for 1' fixture lengths. Power consumption is typically 20% higher for 1' fixture lengths.

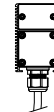
ASYMMETRIC WALLWASH OPTIC INSTALLATION DETAIL



Always position frosted side toward the wall



FRONT VIEW



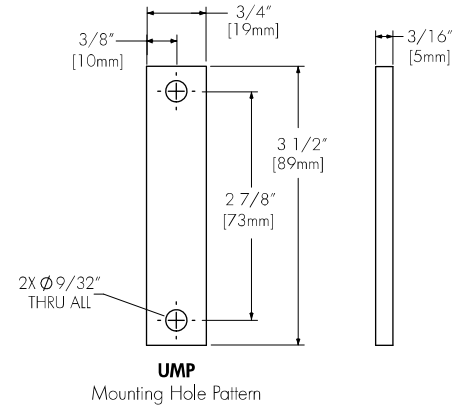
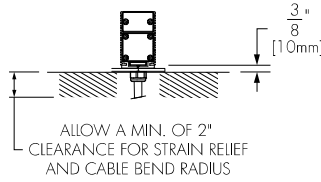
RIGHT SIDE VIEW
(Fixture pointing upwards)

Recommended setback from wall is 1/10 of the wall height.
Example: 2ft [0.6m] setback for a 20ft [6m] wall.

MOUNTING OPTIONS

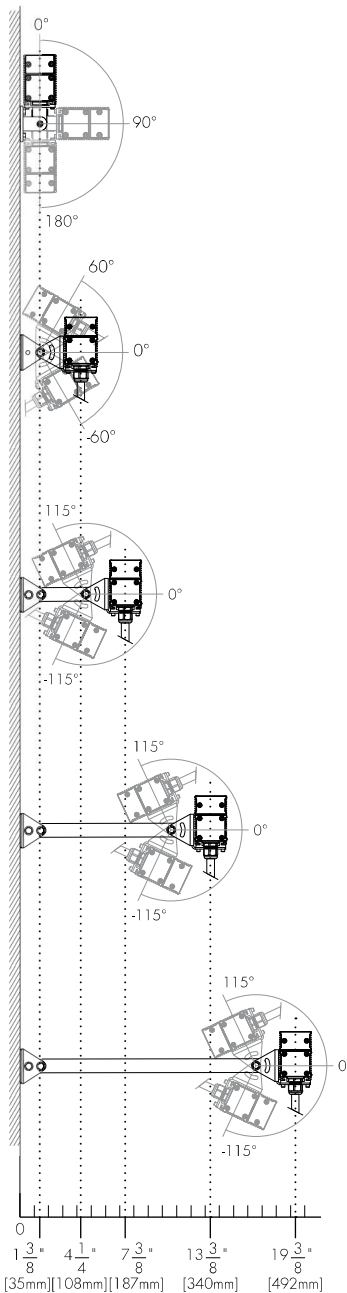
Surface Mount

UMP
Fixed Mounting

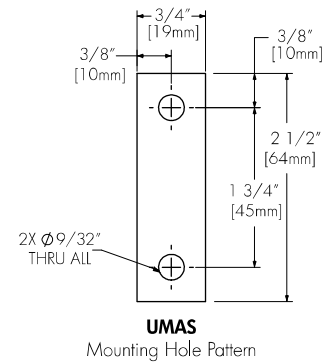


Wall Mount

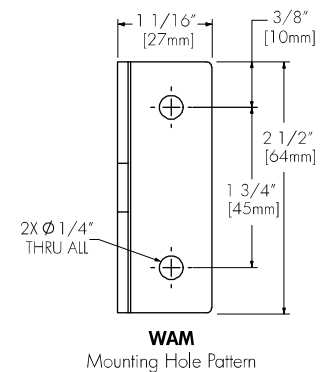
UMAS
Universal Adjustable Mounting



WAM2
Adjustable Wall Mounting 2"



WAM6
Adjustable Extended Arm Mounting 6"

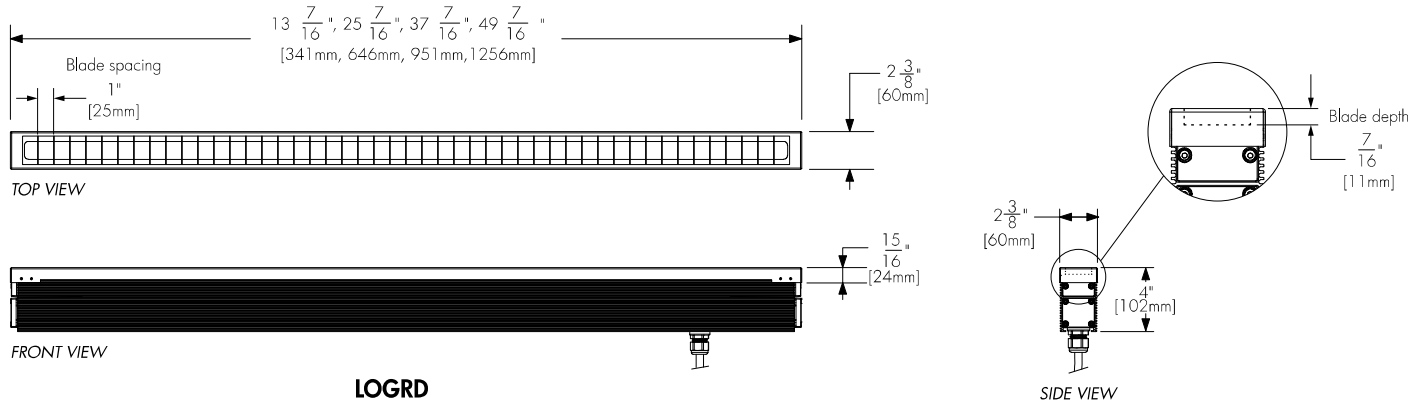


WAM12
Adjustable Extended Arm Mounting 12"

WAM18
Adjustable Extended Arm Mounting 18"

LOUVER ACCESSORY INSTALLATION DETAIL

Not suitable for asymmetric wallwash optic

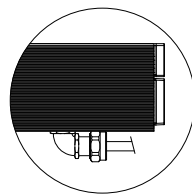


LOGRD

Radial Louver for Lumenfacade
(See page 5 for ordering code)

OPTION

**A - 90° angle cord output
bottom feed**



ACCESSORIES

Order separately

Control Systems:

- LTO2** Lumentouch is a wall mount DMX 512 controller keypad.
- LCU** Lumencue is a USB / mini SD DMX 512 controller.
- LID** LumenID is a diagnostic and addressing DMX 512 controller.
It must be specified for all DMX applications.
Refer to LID specification sheet for details.
- LID-LT** LumentalkID is a diagnostic and addressing controller.
It must be specified for all Lumentalk (LT) applications.
Refer to LID-LT specification sheet for details.
- LTN** Lumentone is a simple pre-programmed DMX 512 controller with a push button rotary dial and live feedback.

Control Boxes:

- CBX** DMX/RDM control box.
Up to six power and data outputs to fixtures or fixture runs.
Ethernet enabled option.
Refer to CBX specification sheet for details.
- LDB** Lumentalk Data Bridge, 0-10V or DMX output.
Refer to LDB specification sheet for details.

Radial Louver :

Not suitable for asymmetric wallwash optic

LOGRD - Radial louver for Lumenfacade Stand Alone Projector.



Louver blade depth: 7/16" [11mm]; louver blade spacing: 1" [25mm]

Please specify nominal length (1', 2', 3' or 4' [0.3m, 0.6m, 0.9m or 1.2m]) and finish (BK-Black Sandtex, BRZ-Bronze Sandtex, SI-Silver Sandtex, or WH-Smooth white. Custom color available on request, please specify as CC together with RAL color : _____).

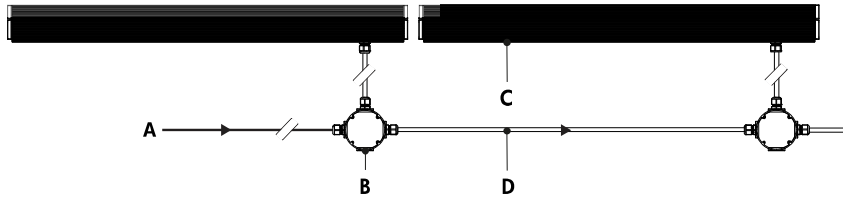
The addition of a louver will affect beam distribution, consult factory for application support.

TYPICAL WIRING DIAGRAMS

Wiring Color Code

American Color Code	CE Color Code	USE
Green	Yellow/Green	Ground
Black	Brown	Live 100-277V
White	Blue	Neutral
Red/Purple	Black	0-10V / Data +
Orange	Grey	0-10V / Data -

Non-Dimming (NO)

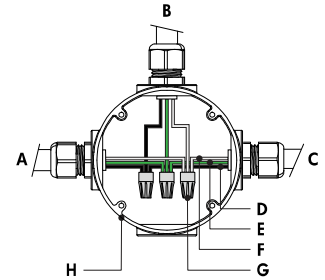


- A** - Power input (100-277V)
- B** - Junction box (by others)
- C** - Lumenfacade Stand Alone Projector (LOGP:NO)
- D** - Power wiring (by others)

Notes:

- Consult factory for specific applications and maximum fixture count/cable length recommendations.
- ASHRAE version: 5 watts per foot [0.3m], Regular Output version: 8.5 watts per foot [0.3m], High Output version: 15.25 watts per foot [0.3m].

Non-Dimming (NO) - Wiring detail



- A** - Power input or from previous fixture
- B** - To fixture
- C** - To next fixture
- D** - Line
- E** - Ground
- F** - Neutral
- G** - Wire-nuts (by others)
- H** - Junction box (by others)

Specification Sheet

HOW TO ORDER

lumenfacade™

STAND ALONE - PROJECTOR
WHITE & STATIC COLORS

LOGP Select:	Select:	Select:	Select:	Select:	Select:	Select:	Select:	Select:	Select:
1	2	3	4	5	6	7	8	9	10
1					6				

Housing:

- LOGP ASHRAE** - lumenfacade™ Stand Alone Projector, 5W/ft ASHRAE compliant¹
- LOGP RO** - lumenfacade™ Stand Alone Projector, Regular Output, 8.5W/ft
- LOGP HO** - lumenfacade™ Stand Alone Projector, High Output, 15.25W/ft

2

Cable Length:

UL Cables	CE Cables
10FT - 10ft	3M - 3m
20FT - 20ft	5M - 5m
30FT - 30ft	10M - 10m
50FT - 50ft	15M - 15m
70FT - 70ft	20M - 21m
100FT - 100ft	30M - 30m

Standard cable length is 10ft or 3m unless otherwise specified.

3

Voltage:

100 - 100 volts	220 - 220 volts
120 - 120 volts	240 - 240 volts
208 - 208 volts	277 - 277 volts

4

Length:

- 12** - 13 3/8 inches (340mm) (2 kg/4.5 lbs)
- 24** - 25 3/8 inches (645mm) (3.17 kg/7 lbs)
- 36** - 37 3/8 inches (949mm) (4.75 kg/10.5 lbs)
- 48** - 49 3/8 inches (1254mm) (6.35 kg/14 lbs)

5

Colors and Color temperatures:

22K - 2200K	RD - Red
27K - 2700K	GR - Green
30K - 3000K	BL - Blue
35K - 3500K	
40K - 4000K	

Consult factory for availability of static Royal Blue, 6500K and 90+ CRI.

Notes:

- Not available for 1' fixture lengths.
- For best results use with HO fixtures at a 6-inch (15cm) setback from surface. Contact factory for application support.
- Suitable to use when **3GV** option is specified.
- North American RAL colors specified with RAL number only are provided with a smooth/high-gloss finish. Please consult factory for other RAL textures and glosses, or to match alternate color charts. Final color matching results may vary.
- Lumentalk system is enabled with LDB accessory for 1' [0.3m] fixture lengths, see Typical Wiring Diagrams pages for details. 1% minimum dimming value.
- 10% minimum dimming value. Current Sink: 3mA/fixture, Current Source: 0.5mA/fixture.
- 1% minimum dimming value. 1 DALI address per fixture.
- 1% minimum dimming value. 1 EcoSystem® address per fixture length.
- 1% minimum dimming value. Fixtures set to by fixture resolution.
- 1 DMX address per fixture.
- Available with **UMP** and **UMAS** mounting options only.

Optics:

- Asymmetric**
- WW** - Asymmetric Wallwash optic

Symmetric

8x8 - 8° x 8°	60x60 - 60° x 60°
10x10 - 10° x 10°	80x80 - 80° x 80°
30x30 - 30° x 30°	90x90 - 90° x 90°
35x35 - 35° x 35°	

Bi-symmetric

10x30 - 10° x 30°	15x25 - 15° x 25°
10x60 - 10° x 60°	30x60 - 30° x 60°
10x90 - 10° x 90°	50x80 - 50° x 80°

7

Mounting Option:

- UMP** - Fixed Mounting³
- UMAS** - Universal Adjustable Mounting³
- WAM2** - Adjustable Wall Mounting 2"
- WAM6** - Adjustable Extended Arm Mounting 6"
- WAM12** - Adjustable Extended Arm Mounting 12"
- WAM18** - Adjustable Extended Arm Mounting 18"

8

Finish:

- BK** - Black Sandtex
- BRZ** - Bronze Sandtex
- SI** - Silver Sandtex
- WH** - Smooth white
- CC** - Custom color and finish (please specify RAL color)⁴

9

Control:

- NO** - No Dimming
- LT** - Lumentalk Dimming⁵
- DIM** - 0-10V Dimming option⁶
- DALI** - DALI Dimming option⁷
- ES** - Lutron® EcoSystem® Enabled Dimming⁸
- DMX/RDM** - DMX/RDM enabled⁹

10

Option:

- A** - 90° angle cord output, bottom feed
- CRC** - Corrosion-resistant coating for hostile environments
- 3GV** - 3G ANSI C136.31 Vibration Rating¹⁰
- CE** - CE (certification covers European Economic Area)

12/12

2017.04.06
EM - R39

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1.877.937.3003
P.514.937.3003
F.514.937.6289
info@lumenpulse.com
www.lumenpulsegroup.com

5-year limited warranty.

Consult www.lumenpulsegroup.com
for our complete Standard Terms
and Conditions of Sales.

lumenpulse™
GROUP

Lumenpulse reserves the right to make changes to this product at any time without prior notice and such modification shall be effective immediately.



WAREHOUSE DOME
DAMP LOCATION
 INTERIOR - CLASSICS

PROJECT: _____
 TYPE: _____



WD1812GV
EG - Evergreen



WD1812GV
OR - Orange



WD1812GV
GW - Gloss White



WD1812GV
TQ - Turquoise

SERIES	LUMENS ¹	CCT	DRIVER / DIMMING ²	ACCESSORIES ³	MOUNTING ⁵	INTERIOR ⁸	FINISH ⁸
WD1611GV	15L 1500 Lm	27K 2700K	EX Electronic Driver, 120V/277V	TF2 ³ 4" Frosted Dome	WALL MOUNT	MW ⁹ Matte White	MW ⁹ Matte White
WD1812GV	27L 2700 Lm	30K 3000K	DO10X 1%, 0-10V, 120V/277V DS2W1 ELV/MLV, 120V	TG2 4" Dome Wire Guard	CP6 Wall Mount Cover	CCI Custom Color	MB ⁹ Matte Black
WD2015GV	37L 3700 Lm	35K 3500K		MF2 4" Frosted Mini	PA ⁶ Mounting Arm Style	FCI Fixture Color Interior	PT ⁹ Platinum Silver
	55L 5500 Lm	40K 4000K		MG2 4" Short Wire Guard	CEILING MOUNT		CC Custom Color
				FJ2 4" Frosted Tall FG2 4" Tall Wire Guard	HM ⁷ Hang Straight AT ⁷ Hang Straight All Thread PM ⁷ Rigid Pendant Mount CD ⁷ Cord / Cable Mount CM ⁷ Cord Mount EMCR 10W Large Driver Canopy EM EMRM 7W Remote EM EMEN 7W Remote with Enclosure	See Page 5 for Full Range of Color Options	See Page 5 for Full Range of Color Options

EXAMPLE: WD1812GV15L30KEXFJ2/HM36MWICH

NOTES:
 1 Nominal Source Lumens at 35K 2 Contact Factory for Additional Options 3 See Enclosures & Guards Page for Wire Guards and Additional Options 4 Standard Enclosure
 5 See Mounting Page for Details on Components and Finishes 6 See Mounting Page for Available Arm Options 7 Specify Length in Inches: See Mounting Page for Available Lengths
 8 See Color Page for More Options/Consult Factory for Special Finishes 9 Standard Finishes



Dimensions and values shown are nominal. Spectrum Lighting continually works to improve products and reserves the right to make changes which may alter the performance or appearance of products.



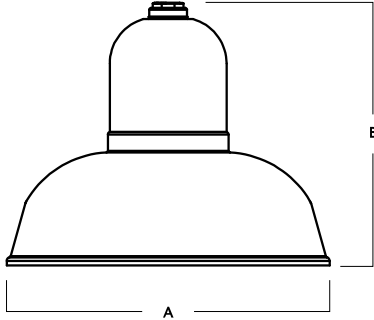


**WAREHOUSE DOME
DAMP LOCATION
INTERIOR - CLASSICS**

LUMENS / WATTAGE DATA				
PART NUMBER	SOURCE LUMENS ¹	DELIVERED LUMENS ²	SYSTEM WATTS	LPW
WD1611GV15L	1500	1091	10	109
WD1611GV27L	2700	1906	18	106
WD1611GV37L	3700	2800	26	108
WD1611GV55L	5500	4117	39	106

¹ Nominal Source Lumens at 35K ² Nominal Delivered Lumens at 35K

HOUSING DIMENSIONS



Dimensioned with **WD1812GV**

SERIES	A	B
WD1611GV	11.8	16.0
WD1812GV	14.6	17.8
WD2015GV	20.0	15.0

APPLICATION

The Warehouse Dome is designed for decorative general illumination. GV Series is designed for damp or dry locations.

FEATURES

Spectrum Lighting's RLM Classics are inspired by vintage lighting fixtures redesigned with modern LED light sources and materials. The wide range of options for illumination, mounting, enclosures, guards and finishes allows for creative fixture specification and design. LED driver is integral to fixture, special driver canopy is required. LED module and driver are serviceable for future replacement. Available in three sizes.

FINISH

Multi-stage polyester powder-coat process applied on our dedicated paint lines. Variety of standard and custom finishes are available. Matte White interior finish standard. Custom Color interior finish available.

ELECTRONICS

GV LED system features high brightness white Samsung LED's. 3-step MacAdam Ellipse binning. Standard CRI: 80+. Higher CRI, R9 and custom LED configurations are available; consult factory. Choice of electronic 120V/277V and dimming drivers.

CONSTRUCTION

Fixture shades are spun in our factory from 0,063 high purity aluminum. Wall mount canopies are die-cast aluminum with stainless steel hardware. Wall arms are formed 3/4 NPT aluminum pipe and may be field cut.

CODE COMPLIANCE

BAA compliant. ETL certified to meet US and Canadian standards. Suitable for dry or damp locations. Manufactured and tested to UL standards No. 1598/8750.

SERIES SIZES

WD1611GV



WD1812GV



WD2015GV



WALL MOUNT

(SEE MOUNTING PAGES FOR MORE OPTIONS & DIMENSIONS.)

PA_
MOUNTING ARM STYLE



WD1812GV SHOWN WITH PA23

CEILING MOUNT

(SEE MOUNTING PAGES FOR MORE OPTIONS & CANOPY DIMENSIONS.)

HM / AT / PM
HANG STRAIGHT / ALL THREAD / PENDANT



WD1812GV SHOWN WITH HM

CD
CORD / CABLE MOUNT



WD1812GV SHOWN WITH CD

CM
CORD MOUNT



WD1812GV SHOWN WITH CM



MOUNTING & ACCESSORIES

SOME OPTIONS NOT AVAILABLE ON ALL FIXTURES. CONSULT SPECIFICATION SHEETS. SEE INDIVIDUAL SPECIFICATION SHEETS OR CONSULT FACTORY FOR ADDITIONAL INFORMATION. NOTE: THIS IS TYPICAL OF RLM SPECIFICATION FOR MOUNTING. INDIVIDUAL FIXTURES OR PROJECTS MAY HAVE SPECIALIZED REQUIREMENTS.



ENCLOSURES UP TO 55L


TF2 4" FROSTED DOME 	MF2 4" FROSTED MINI 	FJ2 4" FROSTED TALL 
---	---	---

ENCLOSURE WIRE GUARDS UP TO 55L

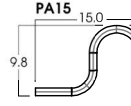
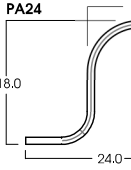
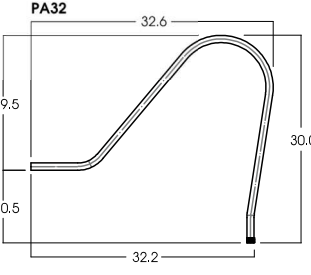
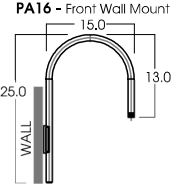
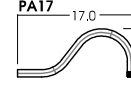
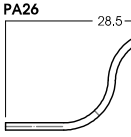
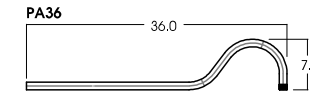
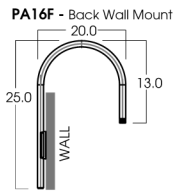
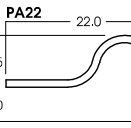

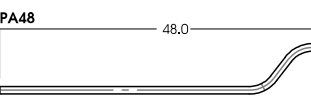
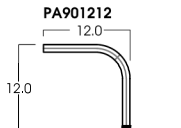
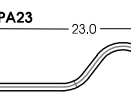
TG2 4" FROSTED DOME WIRE GUARD - FITS TF2 	MG2 4" FROSTED MINI WIRE GUARD - FITS MF2 	WG2 4" FROSTED TALL WIRE GUARD - FITS FJ2 
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WALL MOUNTING

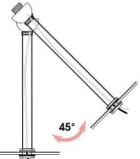
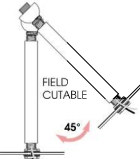
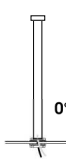
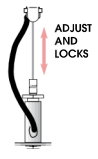


CP6/RMD - REMOTE MOUNT DRIVER
MOUNTS DIRECTLY TO WALL OR OCTAGON STYLE J-BOX



CUSTOM AND OTHER WALL ARMS AVAILABLE - CONTACT FACTORY. ARMS MAY BE FIELD CUT ON WALL SIDE - FIXTURE SIDE THREADED 3/4" NPT REQUIRES SEALANT FOR WET LOCATION.

PA15 	PA24 	PA32 	PA16 - Front Wall Mount 
PA17 	PA26 	PA36 	PA16F - Back Wall Mount 
PA22 	PA27 - Designed for Signlight 	PA48 	PA901212 
PA23 	SP(xx) 6", 12" & 24" Designed for Straight Arm Mounting SPECIFY LENGTH EXAMPLE: SP6 - STRAIGHT PIPE 6" LONG	SP90(xx) Designed for Straight Arm Mounting SPECIFY LENGTH EXAMPLE: SP9024 - STRAIGHT PIPE 24" LONG	PA90 (Wxx)(Dxx) SPECIFY LENGTH (Wxx) SPECIFY DROP (6.5 Minimum) (Dxx) EXAMPLE: PA90W20D07 - 90° PIPE 20 LONG 7" DEEP THREADED AT FIXTURE END

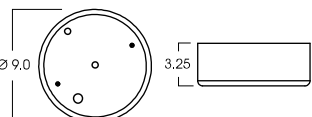
CEILING MOUNTING

HM* HANG STRAIGHT 45° SWIVEL 1/2" STEM - 3/8" NPT  <p>ORDER: HM (Length) SPECIFY LENGTH: HM3 - 3" HM24 - 24" HM6 - 6" HM36 - 36" HM12 - 12" HM48 - 48" HM18 - 18" HM72 - 72"</p> <p>HMLC(XX) Custom Length (Specify in Inches)</p>	AT** HANG STRAIGHT ALL THREAD 45° SWIVEL 1/2" STEM - 1/4" IP  <p>ORDER: AT (Length) SPECIFY LENGTH: AT12 - 12" AT24 - 24" AT36 - 36"</p> <p>ATLC(XX) Custom Length (Specify in Inches)</p>	PM* RIGID PENDANT MOUNT RIGID 1/2" STEM - 3/8" NPT  <p>ORDER: PM (Length) SPECIFY LENGTH: PM3 - 3" PM24 - 24" PM6 - 6" PM36 - 36" PM12 - 12" PM48 - 48" PM18 - 18" PM72 - 72"</p> <p>PMLC(XX) Custom Length (Specify in Inches)</p>	CD CORD / CABLE MOUNT SJ CORD WITH 1/16 SS CABLE  <p>ORDER: CD (Length) SPECIFY LENGTH: CD36 - 36" CD72 - 72" CD144 - 144"</p> <p>CDLC(XX) Custom Length (Specify in Inches)</p>	CM CORD MOUNT SJ CORD WITH STRAIN RELIEF  <p>ORDER: CM (Length) SPECIFY LENGTH: CM36 - 36" CM72 - 72" CM144 - 144"</p> <p>CMLC(XX) Custom Length (Specify in Inches)</p>	CHN CHAIN MOUNT SJ CORD / DECORATIVE CHAIN  <p>ORDER: CHN (Length) SPECIFY LENGTH: CHN36 - 36" CHN72 - 72" CHN144 - 144"</p> <p>CHNLC(XX) Custom Length (Specify in Inches)</p>
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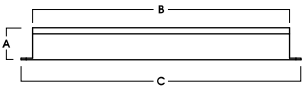
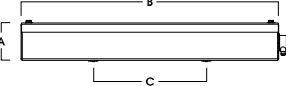
*MAXIMUM ONE PIECE STEM LENGTH IS 72". **MAXIMUM ONE PIECE STEM LENGTH IS 36". LONGER LENGTHS ARE POSSIBLE USING MULTIPLE STEMS AND COUPLERS.

EMERGENCY BATTERY OPTIONS

EMCR - LARGE DRIVER CANOPY FOR 10W EMERGENCY BATTERY
(FOR ROUND CEILING MOUNT TYPES)



REMOTE EMERGENCY BATTERY OPTIONS

EMRM* - 7W REMOTE EMERGENCY BATTERY (50" MAX)  <table border="1"> <tr> <th>A</th> <th>B</th> <th>C</th> </tr> <tr> <td>1.3</td> <td>12.6</td> <td>13.0</td> </tr> </table>	A	B	C	1.3	12.6	13.0	EMEN* - 7W REMOTE EMERGENCY BATTERY WITH ENCLOSURE (50" MAX)  <table border="1"> <tr> <th>A</th> <th>B</th> <th>C</th> </tr> <tr> <td>2.0</td> <td>17.0</td> <td>6.2</td> </tr> </table>	A	B	C	2.0	17.0	6.2
A	B	C											
1.3	12.6	13.0											
A	B	C											
2.0	17.0	6.2											

*OTHER EM BATTERY SIZES AVAILABLE. CONTACT FACTORY.

COLOR OPTIONS

SOME OPTIONS NOT AVAILABLE ON ALL FIXTURES, CONSULT SPECIFICATION SHEETS. SEE INDIVIDUAL SPECIFICATION SHEETS OR CONSULT FACTORY FOR ADDITIONAL INFORMATION. NOTE: THIS IS TYPICAL OF RLM SPECIFICATION FOR PENDANT MOUNTING. INDIVIDUAL FIXTURES OR PROJECTS MAY HAVE SPECIALIZED REQUIREMENTS.



MOUNTING FINISH

Standard Canopy / Stem or Cord mounting finish is matte white. Black fixtures receive matte black mounting finish, silver fixtures receive silver mounting finish. Custom colors for canopy and stem are available upon request.	FIXTURE COLOR	CANOPY / STEM / CORD COLOR
	Matte White, Textured White	Matte White
	Matte Black, Textured Black, Bronze, Oil Rubbed Bronze	Matte Black
	Platinum, Textured Silver, Silver	Silver
	All Others	Matte White
	Custom Color	Canopy / Stem Same Color as Fixture

POWDER COAT & METAL FINISHES

SOME OPTIONS NOT AVAILABLE ON ALL FIXTURES, CONSULT SPECIFICATION SHEETS. SEE INDIVIDUAL SPECIFICATION SHEETS OR CONSULT FACTORY FOR ADDITIONAL INFORMATION. NOTE: NO PRINTED IMAGE CAN EQUAL THE EXACT COLOR OF FINISH ON METAL.

GW Gloss White 	MW Matte White 	TW Textured White 	GB Glass Black 	MB Matte Black 	TB Textured Black 	PT Platinum 	MT Textured Silver 	BZ Bronze 	OB Oil Rubbed Bronze
SN Sun Gold 	CO Copper Metallic 	BR Brecchia 	GH Graphite 	CH Charcoal 	AL Almond 	AY Aero Yellow 	EG Evergreen 	SB Sky Blue 	BL Blue Streak
RD Red Baron 	OR Orange 	CM Camel 	PL Purple 	PG Pub Green 	TQ Turquoise 	LG Lime Green 	SF Sea Foam 	PK Pink 	BY Burgundy
VE Verde Green 	AK Anodic Black 	AM Anodic Malachite 	AZ Anodic Bronze 	AS Anodic Sapphire 	AN Anodic Natural 	AC Anodic Champagne 	GF Gold Flake 	GA Faux Galvanized 	BA Brushed Aluminum



Job Name:

Contact:

Ordering Code:

Fixture Type:



Z25 LED Track Spot

Description

Z25 is a performance spot fixture in a par30 cylinder form factor integrated with industry best LEDs up to 3200 lm. Z25 has many options for most applications and carries the first 5 Year NO COLOR SHIFT warranty.

Housing

Extruded aluminum housing with white, matte chrome or black finish

Mounting

Global Trac Systems, GEO track and ECO track, Halo® Power Trac track, and Zonyx track

Electrical / Led Driver

- 120Vac input, 50/60Hz
- Trailing Edge (ELV) 10% dimming
- Consult factory for other voltage options

Listings

- ETLus Listed to UL1598 (suitable for dry locations only)
- cETL Listed to CSA C22.2 #9.0
- Made in the USA - meets the requirements of the Buy American provision within the ARRA

S3 - bk



S1 - mc



S2 - wh



BD - mc

Ordering Codes

Follow the steps to specify your fixture, example: 350425 - XTM19 - 20LM - 35K - 83 - SA20 - S3 - 120 - ELV - mc - geosv

Part Number	LED	Delivered Lumen	CCT	CRI	Reflector	Snoot	Voltage
350425	XTM19	16LM 1360 lm	27K 2700K	83 ¹ 83 CRI 98 ² 98 CRI	DA20 diffuse, 20°	S1 flush / lens (standard) S2 flare / lens S3 extended / lens BD barndoors / lens CRO corona ring / lens	120 120V
		20LM ² 1700 lm	30K 3000K		DA40 diffuse, 40°		
		30LM 2550 lm	V30K 3000K Vibrant		DA60 diffuse, 60°		
		38LM ¹ 3230 lm	35K 3500K		SA20 specular, 20°		
			40K 4000K B27K ² 2700K Beauty		SA40 specular, 40° SA60 specular, 60°		

Dimming

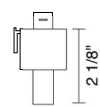
ELV 10% trailing edge dimming

Finish

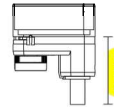
bk black
mc matte chrome
wh white

Mounting

ecobk ECO/HALO black
ecosv ECO/HALO matte chrome
ecowh ECO/HALO white
geobk GEO black
geosv GEO matte chrome
geowh GEO white
zonmc Zonyx matte chrome



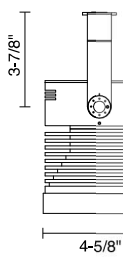
eco/halo



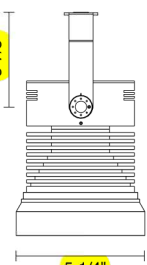
geo



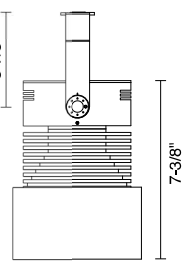
zon



S1



S2



S3

Notes

- 38LM available only in 83 CRI.
- B27K Beauty Series is only available for 20LM. Choose 98 CRI (Actual 95 CRI).

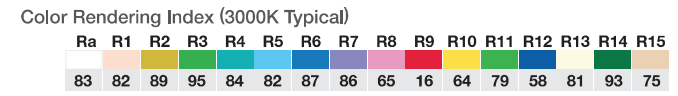
Job Name:	Contact:
Ordering Code:	Fixture Type:

Xicato Series LED Performance

SDCM 1 x 2 MacAdam Ellipse
DUV +/- 0.001
Life L80 50,000 hrs
Warranty 5 year "no color shift" warranty
 5 year fixture warranty

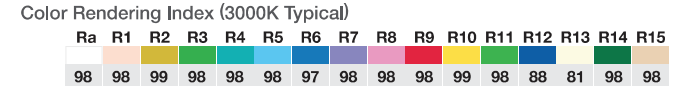
Standard Series

LED Patented Cold Remote Phosphor, Xicato® XTM19 Standard Series
CCT 2700k, 3000k, 3500k, 4000k
CRI Ra 83 typical
GAI_{BB} 97



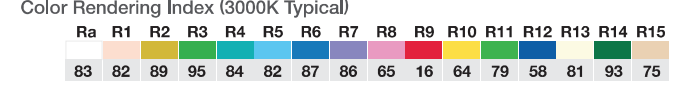
Artist Series

LED Patented Cold Remote Phosphor, Xicato® XTM19 Artist Series
CCT 2700k, 3000k, 3500k, 4000k
CRI Ra 98 typical
GAI_{BB} 109



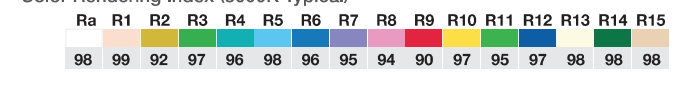
Vibrant Series (V80)

LED Patented Cold Remote Phosphor, Xicato® XTM19 Vibrant Series (V80)
CCT 3000k
CRI Ra 83 typical
GAI_{BB} 111



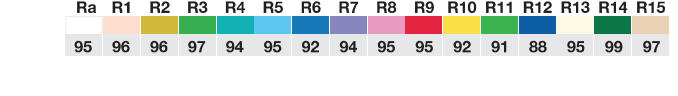
Vibrant Series (V95)

LED Patented Cold Remote Phosphor, Xicato® XTM19 Vibrant Series (V95)
CCT 3000k
CRI Ra 98 typical
GAI_{BB} 120



Beauty Series

LED Patented Cold Remote Phosphor, Xicato® XTM19 Beauty Series
CCT 2700k
CRI Ra 95 typical
GAI_{BB} 133



Notes

Values presented are average. Due to installation location and environment, end use performance may vary. Refer to IES file for specific values.

Delivered Lumen / Wattage Chart

Source Lumens	Delivered Lumens	Fixture Wattage
1600 lm	1360 lm	13.2 W
2000 lm	1700 lm	19.5 W
3000 lm	2550 lm	28.5 W
3800 lm	3230 lm	30.1 W

Source Lumens	Delivered Lumens	Fixture Wattage
1600 lm	1360 lm	15.6 W
2000 lm	1700 lm	17.5 W
3000 lm	2550 lm	22.3 W

Source Lumens	Delivered Lumens	Fixture Wattage
1600 lm	1360 lm	11.7 W
2000 lm	1700 lm	13.5 W
3000 lm	2550 lm	18.6 W
3800 lm	3230 lm	29.1 W

Source Lumens	Delivered Lumens	Fixture Wattage
1600 lm	1360 lm	15.6 W
2000 lm	1700 lm	17.5 W
3000 lm	2550 lm	23.3 W

Source Lumens	Delivered Lumens	Fixture Wattage
2000 lm	1700 lm	26.4 W

Job Name:

Contact:

Ordering Code:

Fixture Type:

Snoot



S1 flush



S2 flare



S3 extended



BD barndoors

Accessories

- 900331 Diffuser lens
- 900332 Frosted lens
- 900330 Linear lens



900331



900332



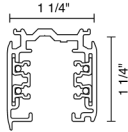
900330

Job Name:

Contact:

Ordering Code:

Fixture Type:



Geo Track

Description

GEO Track is a 2 circuit line voltage track that is surface mounted or recessed. GEO Track is lightweight, compact elegant design that is easy to install saving on overall project costs. The track is a 120v 2-phase system with 2 neutrals. The rail is made of extruded aluminum section. The phase and neutral conductors consist of copper. GEO Track can be surface mounted, on drop rods or wire pendent and recessed. Offered in White (RAL 9010), Matte Silver or Black. 9 ft minimum radius for factory curved track.

Technical Specs

- 2400VA maximum x 2
- 120VAC input
- Two 20-amp circuits
- #12-gauge copper conductors are co-extruded in PVC insulator.
- Two neutrals
- Suitable for dry location only
- made for Bruck and listed under the name Global Trac.

Follow the steps to specify your fixture, example: **380TEK - 412 - 1 - bk**

Base	Type	Shape	Finish
380TEK GEO Track	44 4 ft 48 8 ft 412 12 ft	1' straight factory bent	bk black sv matte silver wh white

9 ft minimum radius

Geo End Cap

Description

End Cap for Bruck's GEO track. Offered in white, matte silver or black.

Technical Specs

- made for Bruck and listed under the name Global Trac.

Follow the steps to specify your fixture, example: **380TEK - 41 - bk**

Base	Type	Finish
380TEK GEO	41 end cap	bk black sv matte silver wh white



Geo Conductor Tool

Description

Tool for Geo Track.

Technical Specs

- made for Bruck and listed under the name Global Trac.

Follow the steps to specify your fixture, example: **380XTSV - 12**

Base	Type
380XTSV GEO	12 conductor tool

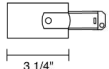


Job Name:

Contact:

Ordering Code:

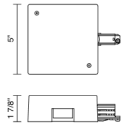
Fixture Type:



34



39,40



21

Geo Power Feeds

Description

Live power feed for Geo Track. Offered in White, Matte Silver, or Black. Power feeds with Circuit Breaker limit the allowable electrical load that can be put on the circuit.

Technical Specs

- 2400VA maximum x 2
- 120VAC input
- Two 20-amp circuits
- made for Bruck and listed under the name Global Trac.

Follow the steps to specify your fixture, example: **3GES - 41 - bk**

Base	Type	Finish	Circuit Breaker*
380TEK GEO	11 live end feed	bk black	010 1 amp circuit breaker
	12 live end feed, mirror	sv matte silver	020 2 amp circuit breaker
	14 live center feed	wh white	030 3 amp circuit breaker
	11cb* circuit breaker		050 5 amp circuit breaker
	12cb* circuit breaker, mirror		070 7 amp circuit breaker
			100 10 amp circuit breaker
			120 12 amp circuit breaker

* Specify Circuit Breaker on 11cb, 12cb only.

Geo Adapters

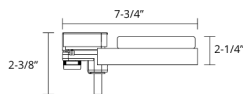
Description

Step down adapter for Bruck low-voltage fixtures.

Technical Specs

- made for Bruck and listed under the name Global Trac.

Follow the steps to specify your fixture, example: **380050 - bk**



Base	Finish
380050 GEO step down transformer	bk black
	wh white

Geo Outlet Box Cover

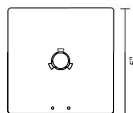
Description

GEO Outlet Box Cover.

Technical Specs

- made for Bruck and listed under the name Global Trac.

Follow the steps to specify your fixture, example: **380GES - 15 - bk**



Base	Type	Finish
380GES GEO	15 outlet box cover	bk black
		sv matte silver
		wh white

POLICE RANGE REFURBISHMENT PROJECT - PHASE II

DESCRIPTION

The RZL is a suspended and surface mount linear direct and semi-direct LED continuous row solution for new and retrofit construction. Designed for larger open ceiling environments, the RZL offers advanced LED technology and optical distributions that deliver high quality soft diffuse illumination while minimizing installation costs with the ability to mount continuously with 4, 8 and 12 foot modular sections. The wide variety of styles and lumen outputs available make it easy to use in a variety of building environments including aiseways, retail, educational facilities, open offices, and low bay applications.

Catalog #		Type	
Project		TYPE V, V1	
Comments		Date	
Prepared by			

SPECIFICATION FEATURES

Construction

Compact 3.5" x 6.4" profile with a die-formed 20 gauge cold rolled steel upper channel for strength and rigidity combined with a die-formed aluminum lower housing. Driver accessible from below by removing gear tray assembly.

optimal performance. Standard with 120-277V 0-10V dimming drivers (1% standard). 347V 0-10V drivers are available. Dimming wires come standard but can be capped in the field for standard switched operation. A single power feed drop supplied as standard.

cover plate (supplied) supports the fixture at the power mount and connects to a 4" octagonal junction box, by others. All other mounts interface to 1/4"-20 studs, by others, protruding from the ceiling. Mounting centers for the first fixture is the length of the fixture less 2-3/8"; all other mounting centers are 4', 8' or 12' on-center. Refer to installation instructions for more details. All sections are continuously wired with snap quick connects for fast installation. Fixtures can be joined via internal joining brackets for rigid, straight continuous runs.

End Caps & Joining Covers

End caps and joiner covers are injection molded polycarbonate, mechanically attached with no fasteners.

Controls
Options compatible with Eaton's Connected Lighting Systems:

- WaveLinx sensor
- LumaWatt Pro sensor
- Fifth Light DALI driver

Light Engine

LED's are available in 3000K, 3500K or 4000K with CRI options of either ≥80CRI or ≥90CRI. Lumen output will be affected - please refer to the lumen adjustment factor table.

Refer to the Connected Lighting options page and ordering information for more details.

Finish

Electrostatically applied polyester powder coat paint in white, silver, or black. RAL custom colors are available. Injection molded components are color matched.

Electrical

Long-Life LED system coupled with integral electronic drivers to deliver

Mounting

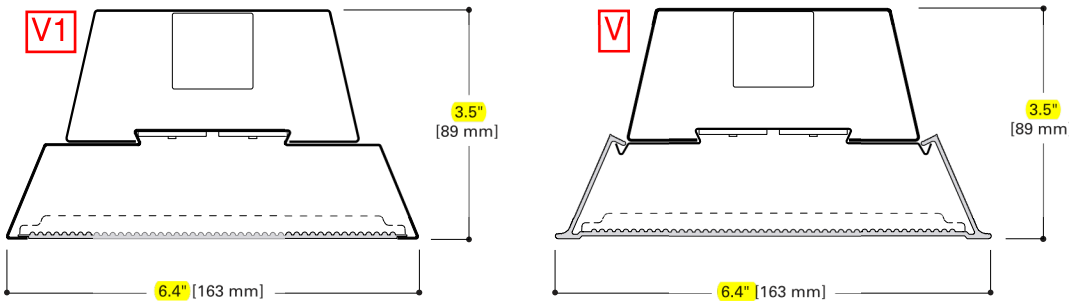
Surface mount - custom junction box



RZL
LED

Surface
Direct / Semi-Direct

cULus - 1598
Damp Location Listed
LM79/LM80 Compliant
ROHS Compliant
DesignLights Consortium® Qualified



ORDERING INFORMATION

Sample Number: RZL-NB-50L835-1D-UNV-STD-SWPD1-ILB12-W-SU-28

Series	Shielding/Optics	Lumen Package Nominal per 4' section	CRI / Color Temperature	Circuiting	Specialty Wiring	Input Voltage
RZL = RZL Linear LED	NL = Frosted Linear Prismatic Lens (100% Down) NB = Micro Baffles / Prismatic Lens (100% Down)	30L = 3,000 Lms (750 lms/ft) 40L = 4,000 Lms (1,000 lms/ft)	830 = LED 3000K, 80 CRI 835 = LED 3500K, 80 CRI 840 = LED 4000K, 80 CRI	1 = 1 Circuit	D = None E = Emergency Circuit S = Secondary Circuit N = Emergency + Secondary Circuit	UNV = Universal (120V-277V) 347 = 347V
OS-RZL = RZL Linear LED, Quick Ship	WL = Luminous Sides, Frosted Linear Prismatic Lens WB = Luminous Sides, Micro Baffles / Prismatic Lens WF = Metal Baffles with Perf Siderails / Smooth Frosted Lens	50L = 5,000 Lms (1,250 lms/ft) 65L = 6,500 Lms (1,625 lms/ft) 80L = 8,000 Lms (2,000 lms/ft)	930 = LED 3000K, 90 CRI 935 = LED 3500K, 90 CRI 940 = LED 4000K, 90 CRI	Refers to wiring in cross section.	Emergency and Secondary circuit section wiring are configured per 4ft section. Secondary circuit not available with integrated sensor options.	Integral 347V driver with STD 0-10V option only. Factory supplied 347V remote transformer for all other driver options.
Shaded options indicate valid quick ship selections.		Nominal lumen values baselined on WB version. Refer to performance table on Page 3 for more detail. Consult factory for custom lumen outputs.	Additional lead-time may apply for 930, 935 and 940 configurations.			

Driver/Dimming Options	Integrated Sensor	Integral Emergency	Finish	Mounting	Run Length
STD = Standard 0-10V (1%-100%) 5LT = Fifth Light DALI (5%-100%) LH = Lutron HiLume 1% EcoSystems L5 = Lutron 5-Series 5% EcoSystems	SWPD1 = WaveLinx Wireless Integrated Sensor LWIPD1 = LumaWatt Pro Wireless Integrated Sensor SVPD1 = 0-10V Stand-alone Integrated Sensor	ILB12 = 12-watt battery pack, 120V-277V, Iota ILB-SL-CP12	W = White S = Silver B = Black CC = Custom Color	SU = Ceiling Surface Mount, Junction Box	4 = 4 ft. 8 = 8 ft. 12 = 12 ft. XX = Specify Row Length
	Must be used with "STD" driver. Consult factory for emergency circuit option with integrated sensor option.			Refer to Mounting on Page 1 and installation instructions for more details.	Standard row configurations over 12' consist of 8' and 12' luminaires.

Lengths

Available in 4-ft, 8-ft, and 12-ft sections. All sections are modular eliminating the need for starter, joiner and end sections. Standard row configurations over 12-ft consist of 8-ft and 12-ft luminaires unless otherwise specified.

Shielding

NL: Solid aluminum sides with frosted linear prismatic lay-in flat acrylic lens, 0.125" thick. No uplight.

NB: Solid aluminum sides with high transmission 0.125" thick clear linear prismatic lay-in flat acrylic lens with white micro baffle inlay to minimize visual glare. No uplight.

WB: Snap-on three-sided high transmission 0.125" thick clear linear prismatic acrylic lens with white micro baffle inlay to minimize visual glare.

WL: Snap-on three-sided frosted linear prismatic acrylic lens, 0.125 inches thick.

WF: Die-formed aluminum baffle assembly (4" blade spacing). Perforated siderail sections are 23% open

with 0.0625" stagger hole spacing for side visual brightness. Smooth curved frosted acrylic center lens to eliminate direct view of the LEDs from below. Shielding assembly swings down for access to LEDs.

Lumen Maintenance

Projected lumen maintenance based on TM-21 standards is L85 > 60,000 hours at 25°C ambient conditions.

Emergency Options

Optional 120V-277V integral emergency battery pack is 12W maximum, 90 minute output, and powers a 4-foot section. Test switch/indicator button located on the endcap or joiner cover. For approximate delivered lumens multiply the lumens per watt of the desired fixture by the wattage of the emergency battery pack (100 lm/W x 12 = 1200 lumens). Emergency section wiring and UL 924 emergency/generator transfer options available – consult factory for details.

Integrated Sensing and Control Systems

Integrated options must be used in conjunction with

the associated system and may not be compatible with other options or accessories. Please consult WaveLinx and LumaWatt Pro system pages for additional details and compatibility. Consult Marketplace Options - Lutron system pages for additional details and compatibility. Requires field commissioning to operate or dim. Contact Lutron at www.lutron.com.

Weight

4.0 - 4.5 lbs per foot.

Compliance

Modules are UL recognized components and indoor luminaires are cULus listed for 25°C ambient environments, damp location listed, and RoHS compliant. LED modules comply with IESNA LM-79 and LM-80 standards. DesignLights Consortium® Qualified and classified for both DLC Standard and DLC Premium, refer to www.designlights.org for details.

Warranty

Five year warranty.

SHIELDING OPTIONS

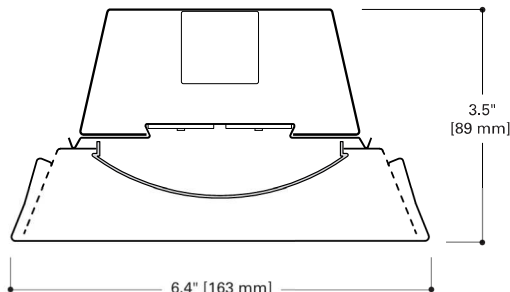


Fixture Lengths



OTHER VIEWS

RZL-WF Cross Section



SENSOR INTEGRATION

Integrated sensors are located in the joint of 8' and 12' units and in the endcap of 4' units for individual and continuous runs. Each unit can be individually controllable or grouped together with the integrated sensors.



JOINING

Fixtures are seamlessly connected together with an internal joining sleeve that provides rigidity and durability for long product runs. Simply attach the joining sleeve on one side, slide the next fixture over the joining sleeve and mechanical fasten with two screws on each side. Decorative cover plate snaps over joint to conceal all hardware.

ENERGY AND PERFORMANCE DATA

RZL LED Performance (3500K/80CRI)						
Series/ Distribution	Lumen Package	Delivered Lumens		Wattage		Efficacy LPW
		4FT	Per FT	4FT	Per FT	
RZL-NL	30L	3111	778	25	6.2	126
	40L	4123	1031	35	8.7	119
	50L	5219	1305	41	10.2	128
	65L	6807	1702	57	14.1	120
	80L	8359	2090	75	18.7	112
RZL-NB V1	30L	2871	718	25	6.2	116
	40L	3805	951	35	8.7	110
	50L	4816	1204	41	10.2	118
	65L	6282	1571	57	14.1	111
	80L	7714	1929	75	18.7	103
RZL-WL	30L	3286	822	25	6.2	133
	40L	4355	1089	35	8.7	125
	50L	5512	1378	41	10.2	135
	65L	7190	1798	57	14.1	127
	80L	8829	2207	75	18.7	118
RZL-WB V	30L	3007	752	25	6.2	121
	40L	3985	996	35	8.7	115
	50L	5043	1261	41	10.2	123
	65L	6579	1645	57	14.1	116
	80L	8078	2020	75	18.7	108
RZL-WF	30L	3045	761	25	6.2	123
	40L	4036	1009	35	8.7	116
	50L	5108	1277	41	10.2	125
	65L	6662	1666	57	14.1	118
	80L	8181	2045	75	18.7	109

LUMEN ADJUSTMENT FACTORS

CCT	80 CRI	90 CRI
3000K	0.967	0.830
3500K	1.000	0.861
4000K	1.024	0.883

Example Calculation:

RZL-NB / 40L / 3500K / 80 CRI

Lumen Output selected = 951 lms/ft

3500K / 90 CRI Desired

Lumen Adjustment Factor = 0.861

Adjusted Lumen Output = 951 lms/ft x 0.861 = 819 lms/ft

LUMEN MAINTENANCE

Ambient Temperature	TM-21 Lumen Maintenance (60,000 hours)	Theoretical L70 (Hours)
25°C	>85%	131,000

COLOR DATA (3500K)

		80CRI
TM-30-15	R _f	82.6
	R _g	94.9
CRI/CIE	R _a	83.6
	R ₉	25.0



WALL / CEILING/
PENDANT MOUNT
LED

Fixture Type	Date
Job Name	Approved By
Catalog Number - - - - -	

SPECIFICATIONS

ADA Compliant

Description The Vision 8 series features an all aluminum, ligature resistant construction and optional wet location listing which allows it to be used in nearly any environmental condition. Designed in conjunction with an ophthalmologist, the polycarbonate lens provides complete control of glare and LED image while maintaining the high efficiency of clear optical material. The Vision 8 series can be row mounted to any length. Natatorium finish is standard for all versions of this fixture.



Housing Marine grade heat treated extruded aluminum. Chemically primed and finished with robotically applied polyester powder coat.

Lens Extruded UV stabilized opal polycarbonate with integral prisms. Maximum wall thickness 0.160". Secured to housing with die cast aluminum clamps and stainless steel TORX® head screws.

End Caps Die-cast marine grade aluminum with conduit knockouts that are visible from interior of end cap.

Drivers Constant current driver at 700mA, 120-277V, 347V optional.

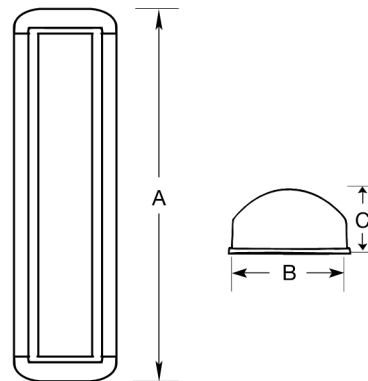
LED Samsung LM561B+ series @ 2700K, 3000K, 3500K, 4000K, or 5000K and 82 CRI wired in parallel-series. L₇₀ projected life of over 130,000 hours at 50°C. Ten year warranty on LED boards against operational defects. Tested in accordance with LM-80.

Listings U.L., C.U.L., Damp Standard, Wet optional.

Lifetime Warranty Luminaire LED Incorporated will repair or replace any fixture damaged due to vandalism for the lifetime of the installation.

DIMENSIONAL DATA

	A	B	C
VPF82	27.64	8.75	3.96
VPF83	37.87	8.75	3.96
VPF84	49.68	8.75	3.96



www.luminaireled.net

5 Sutton Place
P.O. Box 2162
Edison, NJ 08818

P. 732.549.0056
F. 732.549.9737



Luminaire LED Incorporated products are manufactured in the USA with components purchased from USA suppliers, and meet the Buy American requirements under the ARRA. Content of specification sheets is subject to change; please consult our website for current product information.

ORDERING INFORMATION

SERIES	LED	CCT	DRIVER	VOLTS	LENS	COLOR	OPTIONS		TX/SD
VPF 82	15W	2700K	CC	120-277	CP	BLK	<input type="checkbox"/> DIM	<input type="checkbox"/> OCCFA	
	25W	3000K	DIM	347	OP	WHT	<input type="checkbox"/> PC	<input type="checkbox"/> OCC50	
	50W	3500K	PRD			BRZ	<input type="checkbox"/> GLR	<input type="checkbox"/> EMB310	
VPF 83	20W	4000K				GRY	<input type="checkbox"/> WET	<input type="checkbox"/> EMB310ST	
	40W	5000K				SIL	<input type="checkbox"/> NSF	<input type="checkbox"/> EMB722	
VPF 84	25W					CUST	<input type="checkbox"/> COR	<input type="checkbox"/> EMB722C	
	50W						<input type="checkbox"/> JB	<input type="checkbox"/> EMB125R	
	70W						<input type="checkbox"/> LEDNL	<input type="checkbox"/> EMB250R	
	100W						<input type="checkbox"/> 2B	<input type="checkbox"/> PNDKT	
							<input type="checkbox"/> OCC	<input type="checkbox"/> ST/SC	

CC = Constant Current (Standard)
 DIM = 0-10V Dimming, 10% at lowest level
 PRD = Programmable driver. Specify Lumens or Watts. Consult factory.

OPTIONS

LENS	CP = Clear Prismatic Standard	OP = Opal Optional				
COLORS	BLK = Black	WHT = White	BRZ = Bronze	GRY = Gray	SIL = Silver	CUST = Custom Color (Consult Factory)
DIM	0-10V dimming driver, 10% at lowest level.					
PC	Photoelectric switch.					
GLR	Fuse and fuse holder.					
WET	Silicone and neoprene gasketing for wet location. Surface mount only.					
NSF	National Sanitation Foundation rated. White finish only.					
COR	Corner mounted back box. Constructed from 16 gauge cold rolled zinc coated steel. Finished with white powder coat. Damp only.					
JB	Die cast joiner band for continuous row mount. Consult factory for row information.					
LEDNL	LED Night Light.					
2B	(2) LED drivers for independent LED board operation.					
OCC	Microwave occupancy sensor mounted behind the lens. All LED boards sensed on/off. Consult factory for availability in select models.					
OCC50	Microwave occupancy sensor mounted behind the lens. 50% of LED's constantly on and 50% sensed. 2 ft. and 4 ft. fixtures only.					
OCCFA	Microwave occupancy sensor mounted behind the lens. All LED board sensed to dim to 50%, 30%, 20%, or 10%, field selectable low levels. Factory standard preset of 50% dimming level and 20 minute time out.					
EMB310	1200 lumen self-contained 90 minute emergency battery pack for 15W minimum operation. 0°C (32°F) to 55°C (131°F). Not available in 347V. Meets CA Title 20 Standards.					
EMB310ST	1000 lumen self-testing, self-contained, 90 minute emergency battery pack. Not available for 24". 0°C (32°F) to 55°C (131°F). Not available in 347V. Meets CA Title 20 Standards.					
EMB722	2600 lumen self contained 90 minute emergency battery pack for 25W minimum operation. 0°C (32°F) to 60°C (140°F). Not available in 347V.					
EMB722C	Cold weather, 2600 lumen self contained 90 minute emergency battery pack for 25W minimum operation. -20°C (-4°F) to 60°C (140°F). Not available in 347V.					
EMB125R	Remote mounted inverter that will operate a 125W maximum load for 90 minutes. 20°C (68°F) to 30°C (86°F). Not available in 347V.					
EMB250R	Stand-alone inverter that will operate a 250W maximum load for 90 minutes. 20°C (68°F) to 30°C (86°F). Not available in 347V.					
PNDKT	Rigid stem pendant kit. Specify length. Consult factory for availability.					
ST/SC	Phillips head screws instead of TORX® head.					
TX/SD	TORX® head bit.					



PHOTOMETRIC DATA

Model	Watts	Input Watts	Delivered Lumens		Delivered Lumens		Delivered Lumens		Delivered Lumens		Delivered Lumens	
			Clear	Opal	Clear	Opal	Clear	Opal	Clear	Opal	Clear	Opal
			2700K		3000K		3500K		4000K		5000K	
VPF82	15W	13.0W	1325	1227	1339	1240	1367	1266	1410	1306	1452	1345
VPF82	25W	26.6W	2879	2668	2910	2697	2971	2754	3063	2839	3155	2924
VPF82	50W	56.0W	5059	4689	5115	4742	5220	4839	5382	4989	5543	5138
VPF83	20W	19.5W	1988	1842	2010	1864	2052	1901	2115	1960	2178	2018
VPF83	40W	38.9W	3967	3677	4012	3718	4094	3795	4221	3912	4348	4030
VPF84	25W	26.6W	2879	2668	2910	2697	2971	2754	3063	2839	3155	2924
VPF84	50W	53.3W	5560	5154	5621	5211	5736	5317	5915	5483	6092	5647
VPF84	70W	74.0W	7783	7214	7869	7295	8030	7444	8280	7675	8528	7905
VPF84	100W	114.6W	10357	9601	10473	9709	10687	9906	11019	10214	11349	10520
VPF8x	PRD		Programmable Driver. Specify Wattage or Delivered Lumens in Ordering Information.									

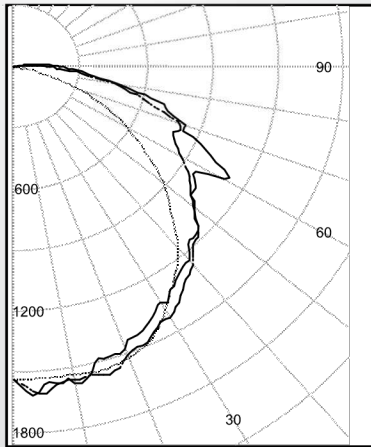
PHOTOMETRIC DATA

MODEL VPF84-50W-4000K CP

Delivered Lumens: 5,477 Lumens

Total Power: 54.0W

Testing was performed in accordance with IES LM-79-08



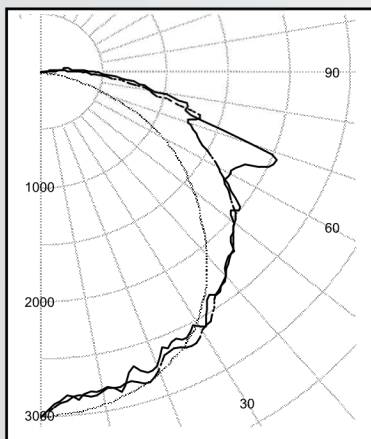
Zone	Lumens	% Lamps
0 - 30	1256	22.9
0 - 40	2072	37.8
0 - 60	3781	69.0
60 - 90	1557	28.4
0 - 90	5339	97.5
90 - 180	138	2.5
0 - 180	5477	100.0

MODEL VPF84-100W-4000K CP

Delivered Lumens: 10,203 Lumens

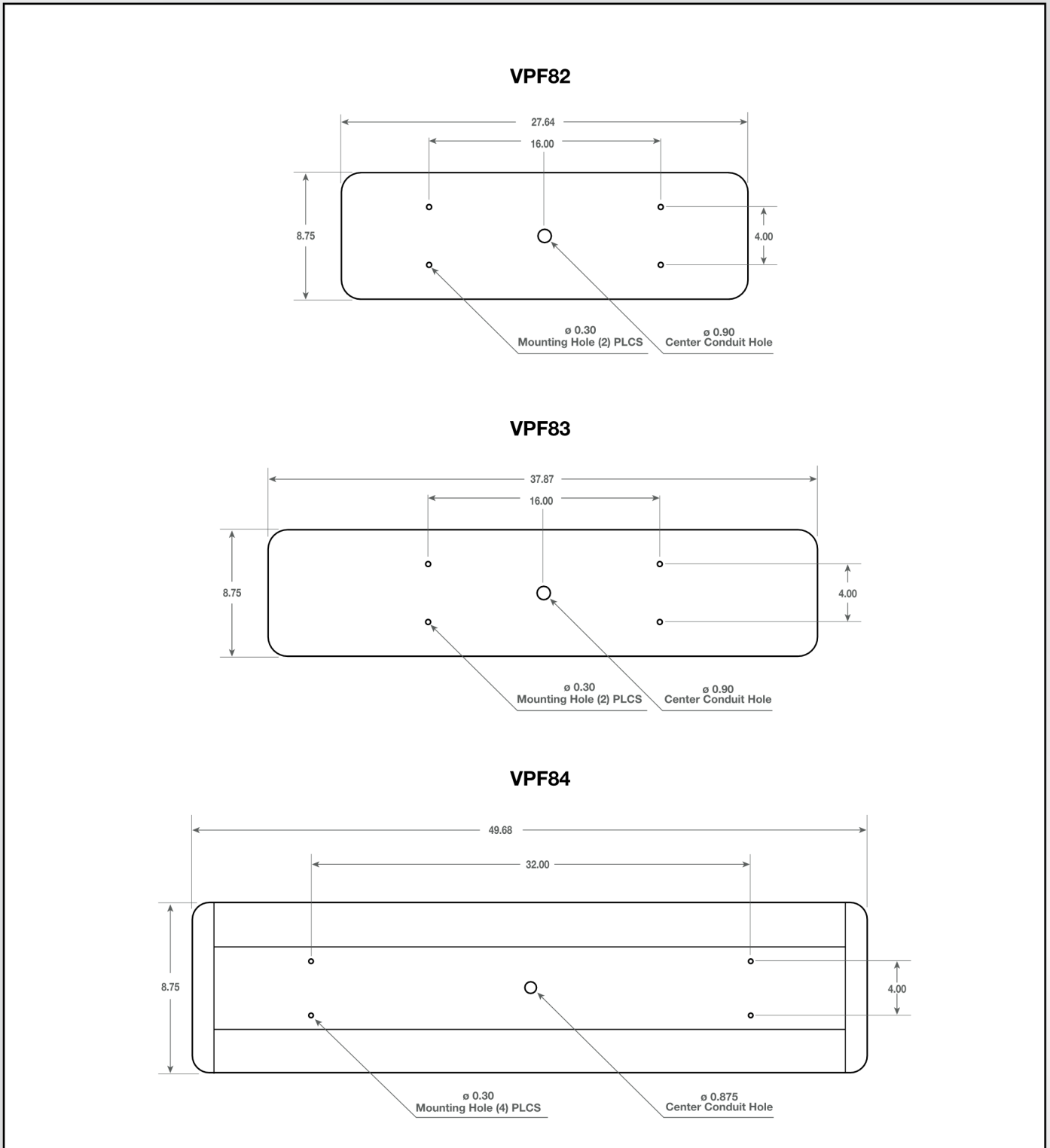
Total Power: 114.6W

Testing was performed in accordance with IES LM-79-08



Zone	Lumens	% Lamps
0 - 30	2290	22.4
0 - 40	3796	37.2
0 - 60	6958	68.2
60 - 90	2963	29.0
0 - 90	9922	97.2
90 - 180	281	2.8
0 - 180	10203	100.0

MOUNTING PLATE DETAILS



Job/Location:	POLICE RANGE REFURBISHMENT PROJECT - PHASE II		TYPE X
Specifier:	_____	Job Name:	_____
Prepared By:	_____	Date:	_____



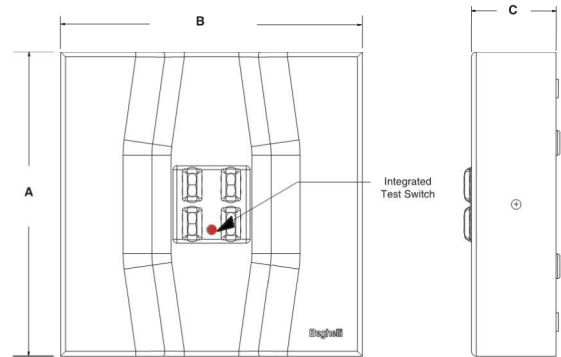
■ internal specifications

The **Pluraluce® INDOOR** unit is configured with a two-wire 120-277VAC 50/60 Hz input. Solid state microprocessor controlled circuitry also includes line latch, brownout protection, battery and charge circuit monitoring, LED failure detection and reverse polarity protection. Ni-MH batteries are standard.

■ external specifications

The compact design of the **Pluraluce® INDOOR** unit has a modern look that blends seamlessly in today's commercial environments. The aluminum cover comes **standard in a white powder coat** with optional painted or brushed finishes. The housing design acts as a large heat sink ensuring efficient thermal management and long operating life of the LEDs. **SE** and **SA** models feature an external test switch, allowing maintenance personnel the ability to quickly perform tests and determine the operational status by way of a multi-colored diagnostic LED.

■ dimensions (in,mm)



Series	A	B	C
PL	6 1/4"	6 1/4"	1 3/4"
	159mm	159mm	44mm

ORDERING LOGIC

Series	Operation	Voltage	Options
PL	HT (AC Only - Normally On)	UNV	AT (autotest)
	SE (Emergency - AC Fail only)		120SP (120 min. emergency)
	SA (Self powered - Always On/Emergency Backup)*		CC (custom color - specify)
			BA (brushed aluminum finish)
			B (black finish)
			TP (tamper proof screws)

NOTE: *Unit is always on and cannot be switched on and off.

EXAMPLE: PL-HT-UNV
 DESCRIPTION: Pluraluce® INDOOR SURFACE MOUNT, AC ONLY, 120-277V, WHITE FINISH

■ led technology

The **Pluraluce® INDOOR** unit is illuminated with four 2.5W Samsung LEDs laid in parallel on the LED module. This provides redundancy should one pair fail, the other will remain illuminated. A high-efficiency LED driver is used to maintain a constant output current to all LEDs. The **Pluraluce® INDOOR** unit delivers between 782lm - 845lm depending on configuration.

■ battery specifications

The **SE** and **SA** models come standard with a Ni-MH battery pack that provides a minimum of 90 minutes emergency duration. Optional 120 minute Ni-MH batteries are available. The maximum battery operating temperature is +104°F (+40°C) and the minimum is +50°F (+10°C).

■ charger specifications

The **Pluraluce® INDOOR** unit utilizes a high-efficiency two stage charger providing precise float voltage control with low voltage disconnect protection. Program controlled trickle charge current is provided by the charging unit in order to maintain the optimum performance of the Ni-MH battery. All components used in the circuitry are temperature compensated. The charger also has brownout and short circuit protection. Charger status is easily determined via a multi-colored diagnostic LED indicator which displays AC/ON and High Charge. An external push button test switch allows maintenance personnel to quickly activate any manual tests on the fixture.

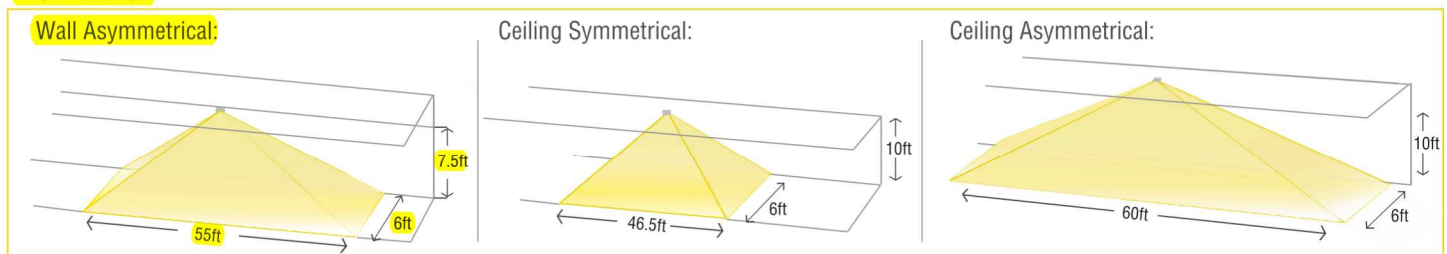
■ optics

The **Pluraluce® INDOOR** unit is supplied with three (3), optical grade polycarbonate lenses. The symmetrical ceiling distribution pattern is ideal for use in open areas with spacing of up to 46.5' on center. The asymmetrical ceiling distribution pattern is designed for use in corridors with spacing of up to 60' on center. The asymmetrical wall distribution pattern provides 55' on center with a 6' wide path of egress. HT and SA models come standard with frosted lenses.

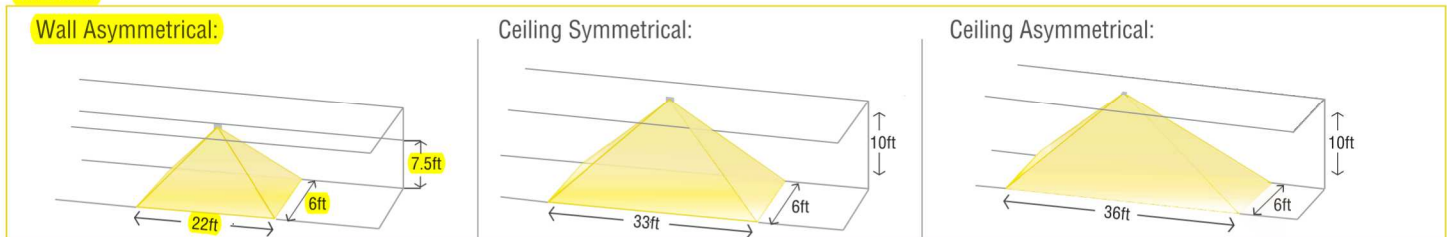
■ optical lens distribution patterns

1. Corridor dimensions: 150' long, ceiling height - 10', width - 6'.
2. Path of egress 3' wide.
3. Room reflectance: 80/50/20
4. For wall mounted option, fixture height will be at 7.5'.

1FC AVERAGE



1FC MIN



■ ac input rating

Operation	Voltage (VAC)	Wattage (W)	Rated Current (A)
HT	120/277	13.0/13.1	0.25/0.15
SE	120/277	4.5/5.0	0.15/0.10
SA	120/277	17.3/17.0	0.35/0.25

■ autotest

SE and **SA** models are available with the optional Beghelli autotest system that automatically performs one 5 minute discharge test monthly and every 6 months it performs two full discharge tests, 24 hours apart. This tests both full battery capacity and recharge capability. The information is communicated simply and intuitively to maintenance personnel via a single multi-color LED. A manual test feature is included when the autotest option is selected. The manual test will run a 30 second, 15 minute or 90 minute test by pressing the correct sequence of the test switch.

■ fcc

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

■ installation

The **Pluraluce® INDOOR** is suitable for indoor surface wall or ceiling mounting on a junction box or suspended by a pendant kit. Side knockouts for conduit entry.

■ warranty

The **Pluraluce® INDOOR** comes with a 3-year factory warranty. Deliberate damage, misuse, improper installation effectively cancel the warranty.

ATTACHMENT F

RESERVED

ATTACHMENT G
CONTRACT AGREEMENT

CONTRACT AGREEMENT

CONSTRUCTION CONTRACT

This Phase-Funded contract is made and entered into between THE CITY OF SAN DIEGO, a municipal corporation, herein called "City", and West Coast General, Corp., herein called "Contractor" for construction of Police Range Refurbishment Project – Phase II, Bid No. K-19-1847-DBB-3; in the total amount of Ten Million Nine Hundred Ninety-Eight Thousand Three Hundred Thirteen Dollars and Zero Cents (\$10,998,313.00), which is comprised of the Base Bid alone. Consisting of an amount not to exceed \$8,000,000.00 for Phase One, and \$2,998,313.00 for Phase Two.

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) Reference Standards listed in the Instruction to Bidders and the Supplementary Special Provisions (SSP).
 - (d) Phased Funding Schedule Agreement.
 - (e) That certain documents entitled **Police Range Refurbishment Project – Phase II**, , on file in the office of the Public Works Department as Document No. **S-18005**, as well as all matters referenced therein.
2. The 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 **Police Range Refurbishment Project – Phase II**, Bid Number **K-19-1847-DBB-3**, 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 the Contractor shall accept such payment in full satisfaction of all claims incident to such performances. See WB Section 7-3.10.
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 and is approved by the City Attorney in accordance with San Diego Charter Section 40.


CONTRACT AGREEMENT (continued)

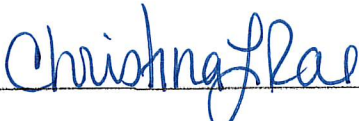
IN WITNESS WHEREOF, this Agreement is signed by the City of San Diego, acting by and through its Mayor or designee, pursuant to Municipal Code §22.3102 authorizing such execution.

THE CITY OF SAN DIEGO

APPROVED AS TO FORM

Mara W. Elliott, City Attorney

By  _____

By  _____

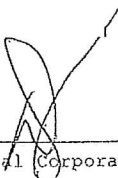
Print Name: James Naglevoort
Director
Public Works Department

Print Name: Christina L. Rae
Deputy City Attorney

Date: 11/20/19

Date: 11/21/19

CONTRACTOR

By  _____
West Coast General Corporation

Print Name: David E. Davey

Title: President

Date: 11/13/19

City of San Diego License No.: B1992002309

State Contractor's License No.: 479019

DEPARTMENT OF INDUSTRIAL RELATIONS (DIR) REGISTRATION NUMBER: 1000002666

CERTIFICATIONS AND FORMS

The Bidder, by submitting its electronic bid, agrees to and certifies under penalty of perjury under the laws of the State of California, that the certifications, forms and affidavits submitted as part of this bid are true and correct.

BIDDER'S GENERAL INFORMATION

To the City of San Diego:

Pursuant to "Notice Inviting 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.

**NON-COLLUSION AFFIDAVIT TO BE EXECUTED BY BIDDER AND SUBMITTED WITH BID UNDER 23
UNITED STATES CODE 112 AND PUBLIC CONTRACT CODE 7106**

State of California

County of San Diego

The bidder, being first duly sworn, deposes and says that he or she is authorized by 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.

CONTRACTOR CERTIFICATION

DRUG-FREE WORKPLACE

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 the WHITEBOOK, Section 5-1.3, "Drug-Free Workplace", of the project specifications, and that;

This company 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.

CONTRACTOR CERTIFICATION

AMERICAN WITH DISABILITIES ACT (ADA) COMPLIANCE CERTIFICATION

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 WHITEBOOK, Section 5-1.2, "American With Disabilities Act", of the project specifications, and that:

This company 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.

CONTRACTOR CERTIFICATION

CONTRACTOR STANDARDS – PLEDGE OF COMPLIANCE

I declare under penalty of perjury that I am authorized to make this certification on behalf of the company submitting this bid/proposal, that as Contractor, I am familiar with the requirements of City of San Diego Municipal Code § 22.3004 regarding Contractor Standards as outlined in the WHITEBOOK, Section 5-1.4, ("Contractor Standards"), of the project specifications, and that Contractor has complied with those requirements.

I further certify that each of the Contractor's subcontractors has completed a Pledge of Compliance attesting under penalty of perjury of having complied with City of San Diego Municipal Code § 22.3004.

CONTRACTOR CERTIFICATION

EQUAL BENEFITS ORDINANCE CERTIFICATION

I declare under penalty of perjury that I am familiar with the requirements of and in compliance with the City of San Diego Municipal Code § 22.4300 regarding Equal Benefits Ordinance.

CONTRACTOR CERTIFICATION

EQUAL PAY ORDINANCE CERTIFICATION

Contractor shall comply with the Equal Pay Ordinance (EPO) codified in the San Diego Municipal Code (SDMC) at section 22.4801 through 22.4809, unless compliance is not required based on an exception listed in SDMC section 22.4804.

Contractor shall require all of its subcontractors to certify compliance with the EPO in their written subcontracts.

Contractor must post a notice informing its employees of their rights under the EPO in the workplace or job site.

By signing this Contract with the City of San Diego, Contractor acknowledges the EPO requirements and pledges ongoing compliance with the requirements of SDMC Division 48, section 22.4801 et seq., throughout the duration of this Contract.

AFFIDAVIT OF DISPOSAL

(To be submitted upon completion of Construction pursuant to the contracts Certificate of Completion)

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

Police Range Refurbishment Project - Phase II

(Project Title)

as particularly described in said contract and identified as Bid No. **K-19-1847-DBB-3**; SAP No. (WBS/IO/CC) **S-18005**, and **WHEREAS**, the specification 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 _____, _____.

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

LIST OF SUBCONTRACTORS

***** PROVIDED FOR ILLUSTRATIVE PURPOSES ONLY *** TO BE SUBMITTED IN ELECTRONIC FORMAT ONLY *** SEE INSTRUCTIONS TO BIDDERS, FOR FURTHER INFORMATION**

In accordance with the requirements of the "Subletting and Subcontracting Fair Practices Act", Section 4100, of the California Public Contract Code (PCC), the Bidder is to list below the name, address and license number of each Subcontractor who will perform work, labor, render services or specially fabricate and install a portion [type] of the work or improvement, in an amount of or in excess of 0.5% of the Contractor's total Bid. Failure to comply with this requirement may result in the Bid being rejected as non-responsive. The Contractor is to list only one Subcontractor for each portion of the Work. The Bidder's attention is directed to the Special Provisions - Section 3-2, "SELF-PERFORMANCE", which stipulates the percentage of the Work to be performed with the Bidder's own forces. The Bidder is to also list all SLBE, ELBE, DBE, DVBE, MBE, WBE, OBE, SDB, WoSB, HUBZone, and SDVOSB Subcontractors for which the Bidders are seeking recognition towards achieving any mandatory, voluntary, or both subcontracting participation percentages.

NAME, ADDRESS AND TELEPHONE NUMBER OF SUBCONTRACTOR	CONSTRUCTOR OR DESIGNER	SUBCONTRACTOR LICENSE NUMBER	TYPE OF WORK	DOLLAR VALUE OF SUBCONTRACT	MBE, WBE, DBE, DVBE, OBE, ELBE, SLBE, SDB, WoSB, HUBZone, OR SDVOSB⓪	WHERE CERTIFIEDⓈ	CHECK IF JOINT VENTURE PARTNERSHIP
Name: _____ Address: _____ City: _____ State: _____ Zip: _____ Phone: _____ Email: _____							
Name: _____ Address: _____ City: _____ State: _____ Zip: _____ Phone: _____ Email: _____							

- Ⓢ 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 | | |
- Ⓢ 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 | | |
| 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.

NAMED EQUIPMENT/MATERIAL SUPPLIER LIST

***** PROVIDED FOR ILLUSTRATIVE PURPOSES ONLY *** TO BE SUBMITTED IN ELECTRONIC FORMAT ONLY *** SEE INSTRUCTIONS TO BIDDERS FOR FURTHER INFORMATION**

NAME, ADDRESS AND TELEPHONE NUMBER OF VENDOR/SUPPLIER	MATERIALS OR SUPPLIES	DOLLAR VALUE OF MATERIAL OR SUPPLIES	SUPPLIER (Yes/No)	MANUFACTURER (Yes/No)	MBE, WBE, DBE, DVBE, OBE, ELBE, SLBE, SDB, WoSB, HUBZone, OR SDVOSB ^①	WHERE CERTIFIED ^②
Name: _____ Address: _____ City: _____ State: _____ Zip: _____ Phone: _____ Email: _____						
Name: _____ Address: _____ City: _____ State: _____ Zip: _____ Phone: _____ Email: _____						

- ① As appropriate, Bidder shall identify Vendor/Supplier 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 Vendor/Supplier is certified by:
- | | | | |
|--|--------|--|----------|
| City of San Diego | CITY | State of California Department of Transportation | CALTRANS |
| California Public Utilities Commission | CPUC | | |
| 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.

ELECTRONICALLY SUBMITTED FORMS

THE FOLLOWING FORMS MUST BE SUBMITTED IN PDF FORMAT WITH BID SUBMISSION

The following forms are to be completed by the bidder and submitted (uploaded) electronically with the bid in PlanetBids.

- A. BID BOND – See Instructions to Bidders, Bidders Guarantee of Good Faith (Bid Security) for further instructions**
- B. CONTRACTOR’S CERTIFICATION OF PENDING ACTIONS**
- C. MANDATORY DISCLOSURE OF BUSINESS INTERESTS FORM**
- D. SUBCONTRACTOR LISTING (OTHER THAN FIRST TIER)**

Bids will not be accepted until ALL the above-named forms are submitted as part of the bid submittal

BID BOND

**See Instructions to Bidders, Bidder Guarantee of Good Faith
(Bid Security)**

KNOW ALL MEN BY THESE PRESENTS,

That West Coast General Corporation as Principal,
and Fidelity and Deposit Company of Maryland as Surety, are held
and firmly 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,
firmly 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

Police Range Refurbishment Project – Phase II

NOW THEREFORE, if said Principal is awarded a contract by said OWNER and, within the time and in
the manner required in the "Notice Inviting 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 27 day of June, 2019.

West Coast General Corporation (SEAL)
(Principal)

Fidelity and Deposit Company of Maryland (SEAL)
(Surety)

By: David E. Davey
(Signature) President

By: Aidan Smock
(Signature) Attorney-in-Fact

(SEAL AND NOTARIAL ACKNOWLEDGEMENT OF SURETY)

**ZURICH AMERICAN INSURANCE COMPANY
COLONIAL AMERICAN CASUALTY AND SURETY COMPANY
FIDELITY AND DEPOSIT COMPANY OF MARYLAND
POWER OF ATTORNEY**

KNOW ALL MEN BY THESE PRESENTS: That the ZURICH AMERICAN INSURANCE COMPANY, a corporation of the State of New York, the COLONIAL AMERICAN CASUALTY AND SURETY COMPANY, a corporation of the State of Illinois, and the FIDELITY AND DEPOSIT COMPANY OF MARYLAND a corporation of the State of Illinois (herein collectively called the "Companies"), by **Robert D. Murray, Vice President**, in pursuance of authority granted by Article V, Section 8, of the By-Laws of said Companies, which are set forth on the reverse side hereof and are hereby certified to be in full force and effect on the date hereof, do hereby nominate, constitute, and appoint **Richard HALLETT, Aidan SMOCK, Tim MCCLELLAN, Marta COLLETT, all of San Diego, California**, its true and lawful agent and Attorney-in-Fact, to make, execute, seal and deliver, for, and on its behalf as surety, and as its act and deed: **any and all bonds and undertakings**, and the execution of such bonds or undertakings in pursuance of these presents, shall be as binding upon said Companies, as fully and amply, to all intents and purposes, as if they had been duly executed and acknowledged by the regularly elected officers of the ZURICH AMERICAN INSURANCE COMPANY at its office in New York, New York., the regularly elected officers of the COLONIAL AMERICAN CASUALTY AND SURETY COMPANY at its office in Owings Mills, Maryland., and the regularly elected officers of the FIDELITY AND DEPOSIT COMPANY OF MARYLAND at its office in Owings Mills, Maryland., in their own proper persons.

The said Vice President does hereby certify that the extract set forth on the reverse side hereof is a true copy of Article V, Section 8, of the By-Laws of said Companies, and is now in force.

IN WITNESS WHEREOF, the said Vice-President has hereunto subscribed his/her names and affixed the Corporate Seals of the said **ZURICH AMERICAN INSURANCE COMPANY, COLONIAL AMERICAN CASUALTY AND SURETY COMPANY, and FIDELITY AND DEPOSIT COMPANY OF MARYLAND**, this 14th day of May, A.D. 2019.



**ATTEST:
ZURICH AMERICAN INSURANCE COMPANY
COLONIAL AMERICAN CASUALTY AND SURETY COMPANY
FIDELITY AND DEPOSIT COMPANY OF MARYLAND**

By: *Robert D. Murray*
Vice President

By: *Dawn E. Brown*
Secretary

**State of Maryland
County of Baltimore**

On this 14th day of May, A.D. 2019, before the subscriber, a Notary Public of the State of Maryland, duly commissioned and qualified, **Robert D. Murray, Vice President and Dawn E. Brown, Secretary** of the Companies, to me personally known to be the individuals and officers described in and who executed the preceding instrument, and acknowledged the execution of same, and being by me duly sworn, deposeth and saith, that he/she is the said officer of the Company aforesaid, and that the seals affixed to the preceding instrument are the Corporate Seals of said Companies, and that the said Corporate Seals and the signature as such officer were duly affixed and subscribed to the said instrument by the authority and direction of the said Corporations.

IN TESTIMONY WHEREOF, I have hereunto set my hand and affixed my Official Seal the day and year first above written.



Constance A. Dunn, Notary Public
My Commission Expires: July 9, 2019

EXTRACT FROM BY-LAWS OF THE COMPANIES

"Article V, Section 8, Attorneys-in-Fact. The Chief Executive Officer, the President, or any Executive Vice President or Vice President may, by written instrument under the attested corporate seal, appoint attorneys-in-fact with authority to execute bonds, policies, recognizances, stipulations, undertakings, or other like instruments on behalf of the Company, and may authorize any officer or any such attorney-in-fact to affix the corporate seal thereto; and may with or without cause modify or revoke any such appointment or authority at any time."

CERTIFICATE

I, the undersigned, Vice President of the ZURICH AMERICAN INSURANCE COMPANY, the COLONIAL AMERICAN CASUALTY AND SURETY COMPANY, and the FIDELITY AND DEPOSIT COMPANY OF MARYLAND, do hereby certify that the foregoing Power of Attorney is still in full force and effect on the date of this certificate; and I do further certify that Article V, Section 8, of the By-Laws of the Companies is still in force.

This Power of Attorney and Certificate may be signed by facsimile under and by authority of the following resolution of the Board of Directors of the ZURICH AMERICAN INSURANCE COMPANY at a meeting duly called and held on the 15th day of December 1998.

RESOLVED: "That the signature of the President or a Vice President and the attesting signature of a Secretary or an Assistant Secretary and the Seal of the Company may be affixed by facsimile on any Power of Attorney...Any such Power or any certificate thereof bearing such facsimile signature and seal shall be valid and binding on the Company."

This Power of Attorney and Certificate may be signed by facsimile under and by authority of the following resolution of the Board of Directors of the COLONIAL AMERICAN CASUALTY AND SURETY COMPANY at a meeting duly called and held on the 5th day of May, 1994, and the following resolution of the Board of Directors of the FIDELITY AND DEPOSIT COMPANY OF MARYLAND at a meeting duly called and held on the 10th day of May, 1990.

RESOLVED: "That the facsimile or mechanically reproduced seal of the company and facsimile or mechanically reproduced signature of any Vice-President, Secretary, or Assistant Secretary of the Company, whether made heretofore or hereafter, wherever appearing upon a certified copy of any power of attorney issued by the Company, shall be valid and binding upon the Company with the same force and effect as though manually affixed.

IN TESTIMONY WHEREOF, I have hereunto subscribed my name and affixed the corporate seals of the said Companies, this 27 day of June, 2019.



Brian M. Hodges, Vice President

TO REPORT A CLAIM WITH REGARD TO A SURETY BOND, PLEASE SUBMIT A COMPLETE DESCRIPTION OF THE CLAIM INCLUDING THE PRINCIPAL ON THE BOND, THE BOND NUMBER, AND YOUR CONTACT INFORMATION TO:

Zurich Surety Claims
1299 Zurich Way
Schaumburg, IL 60196-1056
www.reportsfclaims@zurichna.com
800-626-4577

CALIFORNIA ALL-PURPOSE ACKNOWLEDGMENT

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

STATE OF CALIFORNIA

County of San Diego

On JUN 27 2019 before me, M. Collett, Notary Public,
Date Insert Name of Notary exactly as it appears on the official seal

personally appeared Aidan Smock

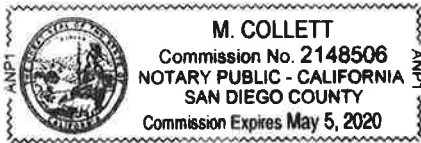
Name(s) of Signer(s)

who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

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

Witness my hand and official seal.

Signature M. Collett
Signature of Notary Public M. Collett



Place Notary Seal Above

OPTIONAL

Though the information below is not required by law, it may prove valuable to persons relying on the document and could prevent fraudulent removal and reattachment of the form to another document.

Description of Attached Document

Title or Type of Document: _____

Document Date: _____ Number of Pages: _____

Signer(s) Other Than Named Above: _____

Capacity(ies) Claimed by Signer(s)

Signer's Name: _____

- Individual
- Corporate Officer — Title(s): _____
- Partner Limited General
- Attorney in Fact
- Trustee
- Guardian or Conservator
- Other: _____

RIGHT THUMBPRINT
OF SIGNER

Top of thumb here

Signer is Representing: _____

Signer's Name: _____

- Individual
- Corporate Officer — Title(s): _____
- Partner Limited General
- Attorney in Fact
- Trustee
- Guardian or Conservator
- Other: _____

RIGHT THUMBPRINT
OF SIGNER

Top of thumb here

Signer is Representing: _____

CONTRACTOR'S 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 10 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 10 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:

DATE OF CLAIM	LOCATION	DESCRIPTION OF CLAIM	LITIGATION (Y/N)	STATUS	RESOLUTION/REMEDIAL ACTION TAKEN

Contractor Name: West Coast General Corporation

Certified By David E. Davey Title President
Name

Signature Date 7/1/19

USE ADDITIONAL FORMS AS NECESSARY

Mandatory Disclosure of Business Interests Form

BIDDER/PROPOSER INFORMATION

Legal Name West Coast General Corporation	DBA		
Street Address 13700 Stowe Drive, Suite 100	City Poway	State CA	Zip 92064
Contact Person, Title David E. Davey, President	Phone (619) 561-4200	Fax (619) 561-4205	

Provide the name, identity, and precise nature of the interest* of all persons who are directly or indirectly involved** in this proposed transaction (SDMC § 21.0103).

* The precise nature of the interest includes:

- the percentage ownership interest in a party to the transaction,
- the percentage ownership interest in any firm, corporation, or partnership that will receive funds from the transaction,
- the value of any financial interest in the transaction,
- any contingent interest in the transaction and the value of such interest should the contingency be satisfied, and
- any philanthropic, scientific, artistic, or property interest in the transaction.

** Directly or indirectly involved means pursuing the transaction by:

- communicating or negotiating with City officers or employees,
- submitting or preparing applications, bids, proposals or other documents for purposes of contracting with the City, or
- directing or supervising the actions of persons engaged in the above activity.

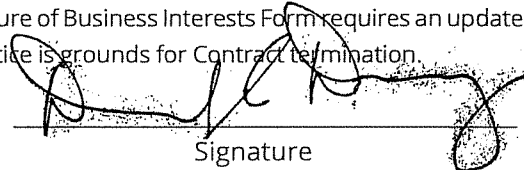
Name David E. Davey	Title/Position President
City and State of Residence Poway	Employer (if different than Bidder/Proposer) Same as noted above

Interest in the transaction
100% ownership of WCGC

Name Nicholas W. Walters	Title/Position Vice President/Secretary-Treasurer
City and State of Residence El Cajon, CA	Employer (if different than Bidder/Proposer) Same as noted above

Interest in the transaction
0% ownership of WCGC but was directly involved in pursuing the transaction and an officer of WCGC.
*** Use Additional Pages if Necessary ***

Under penalty of perjury under the laws of the State of California, I certify that I am responsible for the completeness and accuracy of the responses contained herein, and that all information provided is true, full and complete to the best of my knowledge and belief. I agree to provide written notice to the Mayor or Designee within five (5) business days if, at any time, I learn that any portion of this Mandatory Disclosure of Business Interests Form requires an updated response. Failure to timely provide the Mayor or Designee with written notice is grounds for Contract termination.

David E. Davey, President		11/6/2019
Print Name, Title	Signature	Date

Failure to sign and submit this form with the bid/proposal shall make the bid/proposal non-responsive. In the case of an informal solicitation, the contract will not be awarded unless a signed and completed Mandatory Disclosure of Business Interests Form is submitted.

SUBCONTRACTOR LISTING

(OTHER THAN FIRST TIER)

Pursuant to California Senate Bill 96 and in accordance with the requirements of Labor Code sections 1771.1 and 1725.5, by submitting a bid or proposal to the City, Contractor is certifying that he or she has verified that all subcontractors used on this public work project are registered with the California Department of Industrial Relations (DIR). **The Bidder is to list below the name, address, license number, DIR registration number of any (known tiered subcontractor) - who will perform work, labor, render services or specially fabricate and install a portion [type] of the work or improvement pursuant to the contract. If none are known at this time, mark the table below with non-applicable (N/A).**

NAME, ADDRESS AND TELEPHONE NUMBER OF SUBCONTRACTOR	CONSTRUCTOR OR DESIGNER	DIR REGISTRATION NUMBER	SUBCONTRACTOR LICENSE NUMBER	TYPE OF WORK
Name: _____ Address: _____ City: _____ State: _____ Zip: _____ Phone: _____ Email: _____	None			
Name: _____ Address: _____ City: _____ State: _____ Zip: _____ Phone: _____ Email: _____				
Name: _____ Address: _____ City: _____ State: _____ Zip: _____ Phone: _____ Email: _____				
Name: _____ Address: _____ City: _____ State: _____ Zip: _____ Phone: _____ Email: _____				

**** USE ADDITIONAL FORMS AS NECESSARY ****

City of San Diego

CITY CONTACT: Antoinette Sanfilippo, Contract Specialist, Email: ASanfilippo@sandiego.gov
Phone No. (619) 533-3439

ADDENDUM A



FOR

POLICE RANGE REFURBISHMENT PROJECT – PHASE II

BID NO.:	<u>K-19-1847-DBB-3</u>
SAP NO. (WBS/IO/CC):	<u>S-18005</u>
CLIENT DEPARTMENT:	<u>1914</u>
COUNCIL DISTRICT:	<u>9</u>
PROJECT TYPE:	<u>BT</u>

BID DUE DATE:

**2:00 PM
JULY 2, 2019**

CITY OF SAN DIEGO'S ELECTRONIC BIDDING SITE, PLANETBIDS

<http://www.sandiego.gov/cip/bidopps/index.shtml>

ENGINEER OF WORK

The engineering Specifications and Special Provisions contained herein have been prepared by or under the direction of the following Registered Architect:

Juan Manuel Oncina
1) Registered Architect

6/17/2019
Date

Seal:



Sami M
2) For City Engineer

6/17/19
Date

Seal: C 73 711

A. CHANGES TO CONTRACT DOCUMENTS

The following changes to the Contract Documents are hereby made effective as though originally issued with the bid package. Bidders are reminded that all previous requirements to this solicitation remain in full force and effect.

THE SUBMITTAL DATE FOR THIS PROJECT HAS BEEN **EXTENDED AS STATED ON THE COVER PAGE.**

B. BIDDER'S QUESTIONS

Q1. Can you confirm that Savage Range Systems, Inc. (SRS) is an approved supplier for the Shooting Range Equipment. SRS has been supplying range equipment for over 25 years. Our list of installations includes all branches of the military; local, state, and federal law enforcement; and numerous overseas installations. Notable California installations include US Navy – Coronado Island and Auburn Justice Center in Placer County.

A1. No proposed product information provided with the RFI question. Basis of Design is 15 degree deflection ramp. The project is hemmed in tight against a slope new retaining wall, and the firing line and shade structures cannot move further away from hillside. Trap must fit in the area allowed to provide required clearance to retaining wall, and maintain aperture height dimensioned per sheet A-9 (Drawing 41205-37-D). Additionally, the City requires a dry trap with no additional liquids or mechanical equipment to maintain.

Q2. Are Bullet Trap Manufacturers required to be Licensed Contractors?

A2. For Bullet Trap Manufacturers qualifications, refer to Section 116723 – Shooting Range Equipment, Item 1.6 Quality Assurance, B.

Q3. Can you please confirm the thickness of the concrete slab under the bullet trap? The drawings do not provide this information.

A3. Refer to Drawing 41205-87-D, Sheet S-23.

- Q4. Specification Section 116723, paragraph 2.2 K references AR500 and AR550 series for the abrasion resistant steel plates, however it also stipulates a Brinell Hardness range of 470 – 530 which is generally only the range for AR500. Can you please confirm the requirement
- A4. AR550 will remain as an expected material for components identified, for durability of the trap. The stated Brinell Hardness applies only to the AR500 series steel plates.
- Q5. Specification Section 116723, paragraph 2.5 E stipulates “Trap plates shall be hot dip galvanized.” AR500 plates should not be hot dipped galvanized. The process often causes hydrogen embrittlement which results in catastrophic failure of the plate. We would recommend that this requirement be removed.
- A5. No hardened steel, series AR500 or AR550, are expected to be galvanized. This requirement has been updated to apply to all structural steel supporting components.
- Q6. Specification Section 116723, paragraph 2.5 AA conflicts with paragraph 2.5 J. Can you please confirm which provision prevails?
- A6. Both requirements remain as-is. Paragraph 2.5 J refers to joints between the modular trap panels. Vertical supporting elements that would obstruct the open mouth of the deceleration chamber are addressed in Paragraph 2.5 L.
- Q7. Can you please confirm the maximum caliber that will be fired into the trap on a routine basis?
- A7. 308, with occasional 762 rifle rounds.
- Q8. Specification Section 116723, paragraph 2.7 is titled “Actuated Target Mount and Turning System” but describes the running man system. Paragraph 2.8 is titled “Running Man Target System” yet it describes the turning target requirements. Will an addendum be issued renaming the paragraphs?
- A8. Paragraph titles for 2.7 and 2.8 have been corrected per this addendum.

- Q9. Specification Section 116723, paragraph 2.8 O calls for target body to be hot dipped galvanized. Are powder coated enclosures acceptable?
- A9. For durability and low maintenance, hot-dip galvanizing of all structural steel components is preferred by the City for this environment.
- Q10. Who is supplying the ballistic knee wall in front of the target line in the Qualifications Range?
- A10. A descriptive specification for the knee wall has been provided as part of this addendum. Refer to new Paragraph 2.9 on the updated Section 116723, Shooting Range Equipment.
- Q11. What is the specification for the ballistic knee wall in the Qualifications Range?
- A11. A descriptive specification for the knee wall has been provided as part of this addendum. Refer to new Paragraph 2.9 on the updated Section 116723, Shooting Range Equipment.
- Q12. What is the specification for the "Static T" target and mount in the Public and Rapid Fire Ranges?
- A12. The "Static T" target mount is solid steel bar with an AR500 armored quick release jaw clamp for target retainment. Refer to new Paragraph 2.10 on the updated Section 116723, Shooting Range Equipment.
- Q13. Can you confirm that no targets are required in the Practice Range?
- A13. To clarify:
- No trap-mounted target mounts are required at the PUBLIC (or REVOLVER CLUB) range. Current system in access tunnel will remain.
- Static target mounts are required at the WEST (or PRACTICE) Range and RAPID FIRE RANGES.
- Pneumatically-operated target mounts are required at the EAST (or QUALIFICATION) Range.

Q14. Has the City of San Diego CA considered the inclusion of acoustics on the concrete range divider walls? The introduction of sidewalls will result in a loud echo and may exceed OSHA noise exposure limits.

The inclusion of high performance Portland Cement based acoustics is recommended for use on the sidewalls and under the canopy (if there is one). It is unclear as to any detail regarding the presence or lack of presence of a canopy.

A14. Maintenance, added wall profile, longevity are main concerns for SDPD (client department). Adding acoustic materials will be a maintenance issues.

Q15. Would the City of San Diego consider including acoustics on this range to meet the industry recognized standard of an RT60 of 1.5 seconds across all octaves from 125 Hz to 8000 Hz?

A15. Maintenance, added wall profile, longevity are main concerns for SDPD (client department). Adding acoustic materials will be a maintenance issues.

Q16. Please permit a two week bid opening extension to allow ELBE/SLBE contractors ample time to bid this project as well as Prime Contractors. By not allowing an extension the City of San Diego will receive bids that are inflated with contingency dollars due to the fact that ALL contractors have not received an adequate amount of time to review all contract documents and provide the most comprehensive bid for a contract of this magnitude. Furthermore, today is the final day to submit questions and the pre-bid meeting and site visit is scheduled for tomorrow June 13th at 10:00 a.m. Contractors have not been permitted to see the site and will not be allowed to submit questions pertaining directly to the existing conditions of the site. Again please allow for an extension to the bid opening date to provide the most accurate, comprehensive, and cost effective bid to the City of San Diego.

A16. The schedule is revised as shown in this Addendum.

- Q17. We see a major problem with possible safety consequences with the design of the Soil Nail wall for this project. The wall as designed makes no provision via a two layer shotcrete system to provide a “temporary” base layer to act as shoring for the soil back cut. Normally soil nail walls of any significant height (greater than 5 feet tall) are constructed in five foot “lifts” in a downward progression with a base layer of shotcrete with mild steel reinforcing and then a “permanent” structural layer with a more substantial reinforcing schedule. How is the soil to be supported with a cut of up to 20 feet plus tall without the benefit of what is normally applied as a base layer of shotcrete?
- A17. This question refers to a means and methods consideration. Means and methods, including temporary shoring and safety measures in reference to retaining the exposed soil back cut are the responsibility of the contractor. The design team does not take exception to additional reinforcing and a 2-layer wall system as the question describes so long as the finished face of wall occurs in the same location providing clearance as indicated to back of bullet traps.
- Q18. Differing finish options for shotcrete wall facing. The spec book (page 62) asks for sample shotcrete panels for both a rubbed smooth finish and a sculpted finish. These two types of finish have significant cost differences. Since the bid schedule does not have any alternates how can a sub bidder price the work with two options without the benefit of an alternate by which to price an option like this?
- A18. Provide smooth finish to 8'-0" above finish surface of walkway, sculptured surface above, to top of wall elevation, which varies. This information can be found on detail 1/A-22 (50-D) and view H/A-4 (however obscured by fence hatch).
- Q19. Would the City consider deleting or lowering the Self-Performance requirements from 30% to 10%?
- A19. The Self-Performance requirements remain as is.

C. CLARIFICATIONS

1. Attachment E, Supplementary Special Provisions, Appendix A - Mitigated Negative Declaration and Notice of Exemption, page 628, Historical Resources (Archeology), Section I, Prior to Permit Issuance or Bid Opening/Bid Award, (Subsection B – Letters of Qualifications have been submitted to ADD, items 2 and 3), the “applicant” refers to “Resident Engineer”.

D. SUPPLEMENTARY SPECIAL PROVISIONS

1. To Section 3, Control of Work, Subsection 3-9, Technical Studies and Subsurface Data, item 5, sub-item c, page 35, **DELETE** in its entirety and **SUBSTITUTE** with the following:
 - c) Priority Development Project, Storm Water Quality Management Plan dated May 29, 2019 by Nasland Engineering.
2. To Section 3, Control of Work, Subsection 3-9, Technical Studies and Subsurface Data, item 5, page 35, **ADD** the following:
 - d) Site Development Permit (SDP) - Amendment to SDP No. 8318.
 - e) Easement Acquisition, As Noted on Site Plan.

NAVFAC SW Contract No. N6247311RP00086, Dated July 9th, 2014.

Recorded at County of San Diego, Document No. 2014-0287250, Dated July 10th, 2014.
3. To Technicals, Section 080152.93, Historic Treatment of Wood Windows, Part 1 – General, Subsection 1.5, Quality Assurance, item A and sub-item 1, page 249, **DELETE** in its entirety and **SUBSTITUTE** with the following:
 - A. Historical Treatment Specialist Qualifications: A firm or individual with 1 successfully completed project involving historic preservation and/or rehabilitation per the Secretary of Interior Standards of windows and doors. The project shall be similar in material, design, and extent to than indicated for this Project,

whose work has resulted in construction with a record of successful in-service performance.

1. Historic Treatment Specialist Qualifications shall be provided at time of bidding incorporated with the bid package for City review identified in 1.5(A) of this section.
4. To Technicals, Section 090190.91, Painting Restoration, Part 1 – General, Subsection 1.5, Quality Assurance, item A and sub-item 1, page 311, **DELETE** in their entirety and **SUBSTITUTE** with the following:
- A. Painting Restoration Specialist Qualifications: A firm or individual with 1 successfully completed project involving historic preservation per the Secretary of Interior Standards for exterior paint. The project shall be similar in material, design, and extent to than indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
 1. Painting Restoration Specialist Qualifications shall be provided at time of bidding, included in bid package for City review identified in 1.5(A) of this section.
5. To Technicals, Section 116723, Shooting Range Equipment, Part 1 – General, pages 404 through 418, **DELETE** in their entirety and **SUBSTITUTE** with pages 11 through 26 of this Addendum.
6. To Technicals, Section 313236, Soil Nail Retaining Wall, Part 1 – General, Subsection 1.06 Contractor Qualifications, items A and B, page 596, **DELETE** in their entirety and **SUBSTITUTE** with the following:
- A. Contractor Qualifications shall be submitted at time of bidding, with bid package, for City review, identified in 1.06(B) of this section.
 - B. The soil nailing contractor shall have completed at least 1 permanent soil nail retaining wall project totaling at least 8,000 ft² (750 m²) of wall face area and at least 400 permanent soil nails.

7. To Appendix D – Sample City Invoice with Cash Flow Forecast, page 693, **DELETE** in its entirety and **SUBSTITUTE** with page 27 of this Addendum.

8. CERTIFICATIONS AND FORMS

1. To Electronically Submitted Forms, page 1008, **DELETE** in its entirety and **SUBSTITUTE** with page 28 of this Addendum.

9. PLANS

1. To Drawings numbered 41205-4-D (G-4), 41205-17-D (C-2), 41205-24-D (C-9), 41205-32-D (A-4), 41205-50-D (A-22), and 41205-61-D (A-33) **DELETE** in their entirety and **REPLACE** with pages 29 through 34 of this Addendum.

James Nagelvoort, Director
Public Works Department

Dated: *June 19, 2019*
San Diego, California

JN/MJN/mlw

SECTION 116723

SHOOTING RANGE EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract - Standard Specifications for Public Works Construction 'The GREENBOOK' and City Supplement 'The WHITEBOOK', latest editions, including Supplemental Supplementary Provisions (SSPs), apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Modular, self-supporting, self-contained shooting range bullet backstop and containment trap for use on heavy use outdoor ranges.
2. Actuated target mount and turning system.
3. "Running man" target system.
4. Protective Kneewall.

B. Related Requirements:

1. Section 030000 "Cast-in-Place Concrete" for concrete trap installation pad.

1.3 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written instructions to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of off-site fabrications that are anchored to or that receive other work. 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. Deliver such items to Project site in time for installation.
- C. Coordinate with existing range equipment and utilities, including power, data network, controls, and compressed air system.

1.4 ACTION SUBMITTALS

A. Product Data: For the following:

1. Prefabricated modular bullet traps.
2. Manufactured target systems.

3. Protective kneewall.
- B. Shop Drawings: Show fabrication and installation details. Include plans, elevations, sections, and details of fabrications and their connections. Show anchorage and accessory items. Provide Shop Drawings for the following:
1. Modular bullet backstop and containment traps.
 2. Modular bullet backstop and containment trap with actuated target mount and turning system.
 3. Installation of protective kneewall in relation to "running man" target system.
- C. Delegated-Design Submittal: For modular bullet backstop and containment traps (all ranges), and inverted actuated target mount and turning system suspended from top of trap (applies at East/Qualification Range only), including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For professional engineer's experience with providing delegated-design engineering services of the kind indicated, including documentation that engineer is licensed in the jurisdiction in which Project is located.
- B. Welding certificates.
- C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.
- D. Research Reports: For post-installed anchors.

1.6 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel in accordance with the following:
1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
 3. AWS D1.6/D1.6M, "Structural Welding Code - Stainless Steel."
- B. Manufacturer Qualifications
1. The manufacturer must have a minimum of one completed project of comparable size and complexity. Fabrication shall not be subcontracted out but must be done on-sight on manufacturer's property. Trap shall be installed by the manufacturer, with the installation supervisor also having one completed project of comparable size and complexity.
 2. Manufacturer shall provide a list of clients who have the same equipment of equal or greater size that is being bid (prior installations of the assembly, steel type and application meeting all specifications listed.)

3. Manufacturer shall stock all components for the Modular Bullet Trap and Containment System such that they shall be available for shipment within 24 hours of order.
4. Manufacturer must provide a toll-free telephone number and a dedicated toll-free customer service number with access to a customer service representative.

PART 2 - PRODUCTS

- A. Delegated Design: Engage a qualified professional engineer, registered as a professional engineering in the State of California, to design modular backstop and containment traps.
 1. All engineering and calculations necessary to satisfy the City of San Diego Development Services Department (DSD) for approval shall be included and performed by the manufacturer or manufacturer's engineer, including all features graphically illustrated on drawings and described in the following specification. Engineer shall be registered for practice in the state of California. See structural drawings for concrete slab and anchoring requirements only. See civil drawings for concrete slab finish surface elevation requirements.
 2. Contractor is responsible to obtain the deferred submittal approval through the City Development Services Department.
 3. Contractor shall submit to City DSD within 30 days of start of contract and allow adequate time in schedule for review and approval of the specified bullet trap system without causing delay to the Work.
 4. Prior to DSD Submittal, provide Engineer with a preliminary submittal for limited review of exposed items, major components and location on range.
 5. Once City approval is obtained, provide Engineer with record submittal, including drawings as issued by City Development Services Department.
- B. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.
 1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

2.2 METALS

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.
- B. Steel Plates, Shapes, and Bars: ASTM A36/A36M.
- C. Stainless Steel Sheet, Strip, and Plate: ASTM A240/A240M or ASTM A666, Type 304.
- D. Stainless Steel Bars and Shapes: ASTM A276/A276M, Type 304.
- E. Steel Tubing: ASTM A500/A500M, cold-formed steel tubing.

- F. Steel Pipe: ASTM A53/A53M, Standard Weight (Schedule 40) unless otherwise indicated.
- G. Slotted Channel Framing: Cold-formed metal box channels (struts) complying with MFMA-4.
 - 1. Size of Channels: As required by manufacturer.
 - 2. Material: Cold-rolled steel, ASTM A1008/A1008M, thickness as required by manufacturer; hot-dip galvanized after fabrication.
- H. Aluminum Plate and Sheet: ASTM B209 (ASTM B209M), Alloy 6061-T6.
- I. Aluminum Extrusions: ASTM B221 (ASTM B221M), Alloy 6063-T6.
- J. Aluminum Castings: ASTM B26/B26M, Alloy 443.0-F.
- K. Abrasion Resistant Steel Plates: AR500 and AR550 series. Quenched, tempered, through-hardened, abrasion-resistant grade of steel plate. Specialized plate designed for severe impact and abrasion applications. Typical Brinell Hardness range 470-530.

2.3 FASTENERS

- A. General: Unless otherwise indicated, provide Type 304 stainless steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.
 - 1. Provide stainless steel fasteners for fastening aluminum stainless steel or nickel silver.
 - 2. Provide bronze fasteners for fastening bronze.
- B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A307, Grade A (ASTM F568M, Property Class 4.6); with hex nuts, ASTM A563 (ASTM A563M); and, where indicated, flat washers.
- C. Stainless Steel Bolts and Nuts: Regular hexagon-head annealed stainless steel bolts, ASTM F593 (ASTM F738M); with hex nuts, ASTM F594 (ASTM F836M); and, where indicated, flat washers; Alloy Group 1 (A1).
- D. Anchor Bolts: ASTM F1554, Grade 36, of dimensions indicated; with nuts, ASTM A563 (ASTM A563M); and, where indicated, flat washers.
 - 1. Hot-dip galvanize or provide mechanically deposited, zinc coating where item being fastened is indicated to be galvanized.
- E. Anchors, General: 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 in accordance with ASTM E488/E488M, conducted by a qualified independent testing agency.

- F. Cast-in-Place Anchors in Concrete: Either threaded or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A47/A47M malleable iron or ASTM A27/A27M cast steel. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F2329/F2329M.
- G. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors.
 - 1. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 (A1) stainless steel bolts, ASTM F593 (ASTM F738M), and nuts, ASTM F594 (ASTM F836M).

2.4 FABRICATION, GENERAL

- A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm) unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- D. Form exposed work with accurate angles and surfaces and straight edges.
- E. Weld corners and seams continuously to comply with the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.
- G. Fabricate seams and other connections that are exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
- I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

- J. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 by 1-1/2 inches (3.2 by 38 mm), with a minimum 6-inch (150-mm) embedment and 2-inch (50-mm) hook, not less than 8 inches (200 mm) from ends and corners of units and 24 inches (600 mm) o.c., unless otherwise indicated.

2.5 MODULAR BULLET BACKSTOP AND CONTAINMENT TRAP

- A. Basis of Design Manufacturer:
1. Action Target; 3411 South Mountain Parkway, Provo, UT 84606; Tel: 801-705-9149; www.actiontarget.com ; Contact: Chris Hart, chrish@actiontarget.com .
 2. Product: Total Containment Trap (TCT).
 3. Or approved equal.
- B. The bullet trap and containment system shall be a self-supporting, self-contained bullet backstop and containment unit of steel plate construction for heavy use on outdoor high-volume ranges.
- C. The trap plate layout shall employ a sloping funnel design with 4 top and 4 bottom impact plates constructed of 3/8 or 1/2-inch thick steel with a mill certification of AR500.
- D. The bullet trap and containment system shall be fully modular such that it may be assembled on-site or disassembled and moved.
1. Assembly shall not require “permanent” connection means such as welding, riveting, etc.
 2. All modular components shall be completely prefabricated for simple assembly on site and shall not require cutting of materials or other sizing operations.
 3. All modular components shall be small enough to be carried through a standard 36”-wide doorway.
- E. Trap structural steel components shall be hot dip galvanized. No galvanizing is permitted on AR500 and AR550 series steel plates.
- F. No trap plates shall be subjected to flame cutting (oxygen fuel cutting, such as acetylene, propane or MAPP gas, etc.). All ballistic plate cutting must be done on computer-controlled plasma equipment.
- G. No welding shall be permitted on impact plates.
- H. No impact plate may be constructed of permeable or flammable materials such as rubber, wood, plastics, etc.
- I. All primary impact plates shall be arranged such that a bullet fired straight into the trap shall impact the plate at an angle of no greater than 16 degrees.
- J. Vertical joints that connect modular components shall not be located at or near the front edge of the trap and shall occupy no more than 6% of the total aperture height of the trap.

- K. All surfaces facing shooters shall be constructed of steel with a mill certification of AR500.
- L. Trap aperture shall not contain any intermediate vertical supports from which the bullets could ricochet when fired into the chamber from adjacent lanes (cross lane shooting).
- M. Joints shall have no exposed bolt heads.
- N. Trap shall require no prior construction or site preparation other than a flat concrete pad with a prepared trench.
- O. The trap shall be capable of being fully self-supported with an appropriate concrete pad.
- P. Deflectors shall be installed on all blunt or joined surfaces and facing the firing line in order to deflect the bullet into the trap and reduce the possibility of ricochet.
- Q. Trap design shall allow the leading edge of the trap side plates to be situated within a wall trench to reduce the possibility of ricochet.
 - 1. For ranges without a wall trench, a wall deflector with an additional, easy-to-replace consumable wall deflector shall be installed uprange of the side plates to protect them from damage.
- R. The trap shall include a rib crimp style steel roof situated no more than 4" above the trap support structure and covering the entire area occupied by the trap with at least 1 ft. on each side of the trap and 3 ft. on the rear of the trap.
 - 1. The roof shall be watertight, protecting the trap and service area from precipitation.
 - 2. Provide 2-coat 70% PVDF fluoropolymer coating on all sides of steel roofing panels.

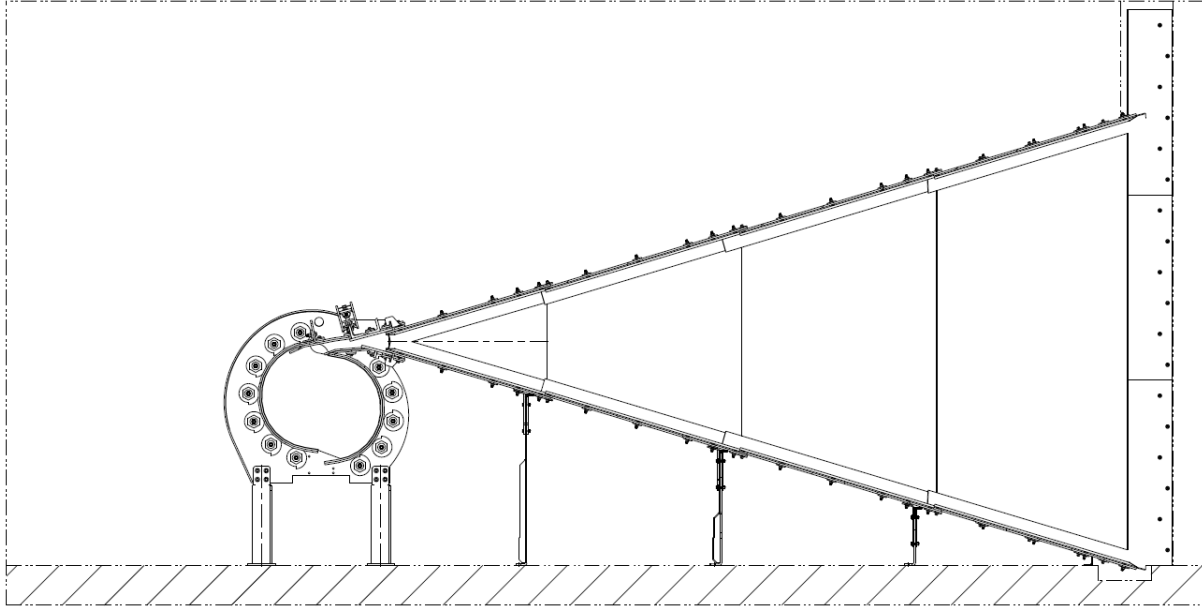


FIGURE 2: 4X4 TRAP PLATE LAYOUT

- S. The material of the chamber impact plates shall be mill certified AR500 steel with a minimum thickness of 3/8-inch.
- T. The material of the chamber's mouth shall be mill certified AR550 steel with a minimum thickness of 1/2".
- U. The material of the front chamber shell shall be mill certified AR500 steel.
- V. The material of the rear chamber shell shall be mill certified AR550 steel.
- W. The chamber shall be sealed with high-grade, closed-cell Neo/EPDM polymeric blend gaskets or high flexibility vulcanizing RTV adhesive gasket material in order to maintain negative pressure.
 - 1. No industrial grade, porous, or non-sealing materials (e.g. expanding spray foam) shall be used.
- X. Chambers may easily be disassembled for inspection and/or replacement of individual components to maintain range integrity.
- Y. Exterior chamber surfaces shall be galvanized and coated in paint that is resistant to high impact strikes.
 - 1. Paint shall sustain 60,000 rounds per chamber with no chipping.
 - 2. Chamber shall be blasted and prepared to be in compliance with painting specification SP 6.
- Z. Deceleration chamber shall consist of multiple bent or multiple individual surfaces at angles that decelerate and break down the bullet.
- AA. Deceleration chambers shall have an unobstructed open mouth design.

1. Deceleration chambers shall not contain any vertical impact surfaces from which the bullets could ricochet when fired into the chamber from adjacent lanes (cross lane shooting).

2.6 TRAP PERFORMANCE REQUIREMENTS

- A. Trap shall utilize steel impact plates to direct the bullet into an enclosed, sealed, and fully shielded chamber that safely captures the bullet and removes its velocity.
- B. Deceleration shall occur in free air and not in any other medium such as rubber, water, etc. Trap shall not require the use of or introduce any chemical media such as oils, anti-freezes, chlorine, etc.
 1. Trap shall not introduce any substance that is EPA regulated, e.g. ethylene glycol and antifreeze.
 2. Trap shall not introduce any substance that might act as a solvent for spent bullets or their by-products, e.g. water, which can be a solvent for some frangible materials.
- C. The inside of the chamber shall be readily accessible for inspection without requiring removal of any kind of internal deceleration medium such as rubber, sand, or water, etc.
- D. Bullet components that have lost their momentum shall be directed into a series of D.O.T. approved containers (BCS Basic 3 systems, or approved equal).
 1. Removal of contained lead shall not require any process such as scooping, pouring, shoveling, sifting, etc. that would disturb the settled state of the lead and lead particulates.
 2. Containers for BCS Basic 3 systems shall be located directly beneath the deceleration chambers.
 3. Containers for BCS Basic 3 systems shall be removable for recycling without requiring tools for this purpose
- E. Trap impact surfaces shall be UL 752 compliant and carry ATI Class 2 rating.
 1. Trap impact surfaces shall carry an ATI Class 2 rating when fired into at a point blank range from the front aperture. See Tables 1 and 2 below for included calibers in this rating*.
- F. Trap shall be able to capture a .50 BMG round when shot from 25 yards or farther from the mouth**.

TABLE 1: ATI CLASS 1 AND 2 BALLISTIC RATING PARAMETERS

Rating	Ammunition	Max Velocity	Max energy	Compliance
ATI Class 1	Pistol	1,485 fps	1,175 ft/lbs	Meets or exceeds UL 752 Level 3 standards
ATI Class 2	Rifle	3,388 fps	3,600 ft/lbs	Meets or exceeds UL 752 Level 5,7,8,9 &10 standards

TABLE 2: TYPICAL PISTOL AND RIFLE AMMUNITION

Typical Pistol Ammunition*			
Caliber	Cartridge Type	Max Velocity	Max energy
9mm	124gr FMJ	1,293 fps	460 ft/lbs
.357	158gr JSP	1,375 fps	663 ft/lbs
.40	180gr TMJ	1,000 fps	400 ft/lbs
.45	230gr TMJ	845 fps	365 ft/lbs
.44 mag	240gr SWC	1,485 fps	1,175 ft/lbs
Typical Rifle Ammunition*			
.22LR	40gr HP	1,260 fps	141 ft/lbs
5.56	55gr FMJ	3,388 fps	1,402ft/lbs
7.62	150gr FMJ	3,025 fps	3,048 ft/lbs
.308	150gr SPTZ	2,900 fps	2,800 ft/lbs
30:06	180gr SPTZ	2,900 fps	3,360 ft/lbs
300 Win.	190gr BTHP	2,900 fps	3,548 ft/lbs

* The above listed ammunitions are for demonstration purposes only. Certain ammunitions may fall outside stated safety ratings and should be used at user's risk.

** .50 BMG must be fired from at least 25 yards from the trap mouth. .50 BMG must not be fired from a fixed position. .50 BMG use will significantly decrease wear life of the trap. Damage due to .50 BMG use will not be covered under warranty.

2.7 "RUNNING MAN" TARGET SYSTEM

A. Basis of Design Manufacturer:

1. Action Target; 3411 South Mountain Parkway, Provo, UT 84606; Tel: 801-705-9149; www.actiontarget.com ; Contact: Chris Hart, chrish@actiontarget.com .
2. Or approved equal.

B. Basis of Design Product: "DRM Pro" by Action Target, or approved equal.

C. Runner system shall consist of two trolleys operating on parallel tracks.

1. Trolleys shall:
 - a. Accept wooden 1 in. x 2 in. target holders.
 - b. Be adjustable for target widths ranging from 12 in. to 24 in.

D. Speed of runner shall be controlled electronically.

1. Speed of runner shall not be adjusted manually with knobs or switches.

E. Runner shall use electronic braking to stop.

1. Runner shall not require mechanical braking.

F. Runner shall be able to operate without limit switches.

G. Trolley shall not make contact with the bumpers except during calibration runs.

H. Runner shall be able to operate in winds up to 30 mph.

I. Runner shall use a computerized control system.

1. The computerized control system shall be capable of:
 - a. Automatic track length detection.
 - b. Automatic trolley drift compensation.
 - c. Programmable trolley speeds up to 20 fps.
 - 1) 10 fps requires a minimum of 21 ft. of track.
 - 2) 15 fps requires a minimum of 30 ft. of track.
 - 3) 20 fps requires a minimum of 48 ft. of track.
 - d. Accelerating up to 0.5 g.
 - e. Accelerating the carrier to 10 fps within 5 ft. of track.
 - f. Changing trolley direction and speed while moving.
 - g. Position control within 6 in.
 - h. Intelligent error reporting.
 - 1) Cable slip detection.
 - 2) Drive errors.
 - 3) Proximity sensor errors.
 - 4) Wiring errors.
 - i. Status monitoring.
 - 1) Calibration.
 - 2) System ready.
 - 3) Trolley position.
 - j. Data logging.
 - k. In-field programming for feature add-ons and bug fixes.
 - l. Capturing odometer data for maintenance scheduling and general use.
 - m. Real-time speedometer for validation of speeds for consistent training.

- J. Runner system shall have a motor section.
 1. Motor section shall have:
 - a. 3 phase induction motors for reliable and powerful trolley movement.
 - b. High precision sealed encoders for accurate and reliable control.
 - c. Hardened tool-steel pulleys for long life and abrasion resistance.
 - d. Urethane bumpers for trolley calibration and protection of motors and sensors.

- K. Runner system shall have an idler section.
 1. Idler Section shall consist of:
 - a. Steel idler pulleys on bronze bushings for smooth operation.
 - b. Urethane bumpers for trolley calibration.

- L. Runner system shall have two parallel lengths of track separated by spacers.
 1. Track shall be:
 - a. Available in 3 ft. increments from 15 ft. to 201 ft.
 - b. Modular so that individual damaged sections may be replaced or repaired.
 - c. Fabricated from pre-galvanized material for corrosion resistance.
 2. Track spacers, brackets, supports, and cable guides shall be zinc plated for corrosion resistance.

- M. Runner system shall have two (2) trolleys to carry targets.
 1. Trolleys shall:
 - a. Consist of powder coated and zinc coated components for corrosion resistance.

- b. Utilize a ratcheting mechanism for quick cable adjustments and to take up slack as cable stretches.
 - c. Have tension indicators to allow for consistent and precise tensioning.
 - d. Be easily serviceable with the use of standard hand tools.

- N. Runner system shall have a downrange control panel.
 - 1. Downrange control panel shall:
 - a. Operate on a 208-240 volt single phase 20 amp service.
 - b. Be UL Listed.
 - c. Have pre-terminated connectors for quick installation and servicing.
 - d. Receive commands via Ethernet.

- O. Runner system shall use proximity sensors to reset trolley position and compensate for any drift.

- P. Runner system shall require no more than 2 ft. 2 in. in addition to the nominal track length for installation space.

- Q. Maximum trolley movement shall be the nominal length of the track minus the length of both buffers and an additional 3 ft. 2 in., i.e. Nominal track length - (buffer length + buffer length + 3 ft. 2 in.).
 - 1. 1 ft. buffer shall be required for nominal track lengths from 15 ft. to 29 ft.
 - 2. 2 ft. buffer shall be required for nominal track lengths from 30 ft. to 101 ft.
 - 3. 4 ft. buffer shall be required for nominal track lengths from 102 ft. to 201 ft.

- R. Runner system shall use 1/8 in. x 7 in. x 19 in. galvanized steel cable for trolley movement, which can be installed and tensioned using standard hand tools.

- S. All electronics shall be a minimum of IP54 rated for either indoor or outdoor use without modification.

- T. Wiring shall be protected by metal-lined wide-temperature flexible conduit.

- U. Mounting: Inverted mounting from channel strut.

- V. Provide the following Control Systems:
 - 1. Standalone Wireless Controls
 - a. Web-based graphical user interface for use with network-connected smartphones, tablets, and computers.
 - b. Independent trolley control.
 - c. 3 speed controls (reprogrammable).
 - d. Dynamic positioning (click and drag).
 - e. Real-time speed, position, and status feedback.
 - f. Delay function for standalone training.
 - g. Continuous mode function.
 - h. Status, settings, and configurations.
 - i. Error reports.
 - j. System reset function.
 - k. Built-in user manual.
 - 2. Master Control
 - a. Compatible with all Master Control functions and features.

- b. Requires server panel with Communications Bridge. Provide server panel as part of this contract.
 - c. Includes standalone wireless controls.
- 3. Smart Range
 - a. Compatible with all Smart Range functions and features.
 - b. Requires server panel with Communications Bridge. Provide server panel as part of this contract.
 - c. Includes standalone wireless controls.

2.8 ACTUATED TARGET MOUNT AND TURNING SYSTEM

- A. Basis of Design Manufacturer:
 - 1. Action Target; 3411 South Mountain Parkway, Provo, UT 84606; Tel: 801-705-9149; www.actiontarget.com ; Contact: Chris Hart, chrish@actiontarget.com .
 - 2. Or approved equal.
- B. Basis of Design Product: "Power 90" by Action Target, or approved equal.
- C. The actuator shall hold a cardboard target, or a plastic target, or a foam backer.
- D. Actuator shall have two positions: face and edge.
- E. Actuator shall be capable of turning a complete 90 degrees.
 - 1. Turning speeds in both directions shall be field adjustable with a screwdriver and wrench.
- F. Actuators shall be capable of independent or synchronized operation.
- G. The actuator shall be outdoor rated down to 0 degrees Fahrenheit (-17.8 degrees Celsius) and shall function in rain and wind.
- H. When actuating (e.g. turning target from face to edge), actuator airflow shall be no more than 4.9 cubic inches (80 milliliters) per actuation or .47 cubic feet (13.4 liters) per minute for typical usage.
- I. Air pressure shall be no more than 40 psi minimum and 80 psi maximum.
- J. Air supply shall be dry and filtered to ensure low temperature performance and long valve life.
- K. All air connections shall be flexible air tubing with quick-connect, push-in air fittings.
 - 1. Tools shall not be required to make air connections between actuators.
- L. Power requirements shall be 12V DC 200MA continuous per actuator.
- M. The actuator shall be totally field repairable such that a complete field rebuild operation may be accomplished using standard hand tools, such as a socket wrench, screwdriver, and span-ring pliers.
 - 1. The actuator shall not require the use of power tools such as impact wrenches (both air and electric) and electric drills.

- N. Actuators shall be controlled by a Smart Range computer or a Smart Range wireless tablet.
 - 1. The actuator shall connect to a computer to allow multiple units to operate in a pre-programmed scenario.
- O. Actuator body shall be constructed of solid steel plate with a “hot dip” galvanized coating for long-term exposure to harsh weather conditions.
- P. All inner parts (hoses, piston, valves and access ports) shall be covered by a removable “zinc-electroplated” steel housing to protect all components from harsh weather conditions.
- Q. The mechanism shall be protected from splatter at all angles and shall inherently protect tubing and control wires running inside. Actuator shall provide standard ¾” conduit interface from the bottom or rear of unit.
- R. Actuator shall not utilize ball bearings or any ferrous bearing surfaces in any part of its mechanism. Rather, any bearings shall employ permanently lubricated thrust surfaces able to accommodate reliable operation under a variety of loads and radial displacements.
- S. Pistons shall be linear for a low-cost, simple, and reliable operation.
- T. Valves shall be easily accessible for field maintenance and repair.
- U. Actuator shall be completely self-standing and self-contained.
- V. Mounting: Ground-mount behind a protective knee-wall.
- W. Operation shall include:
 - 1. A push-button controlled wireless interface with the ability to run pre-programmed scenarios.
 - 2. A mechanical toggle switch.

2.9 BALLISTIC KNEE WALL, or , COMPOSITE BALLISTIC CONTAINMENT PANEL

- A. Basis of Design Manufacturer:
 - 1. Action Target; 3411 South Mountain Parkway, Provo, UT 84606; Tel: 801-705-9149; www.actiontarget.com ; Contact: Chris Hart, chrish@actiontarget.com .
 - 2. Or approved equal.
- B. Assembly: Comprised of a self-supporting vertical Rear Panel of 3/8 inch (9.6MM) AR-500 panel with 3/4-inch pressure-treated plywood supported by vertical steel members (galvanized) with a void between the AR-500 steel rear panel and plywood covering to be 2-inch (50 mm) filled and compacted with crushed, sand free 3/4-inch (19MM) and under hard rock (Granite typical). The plywood shall be covered on range-facing side with a 2-inch (50 mm) thick rubber panel.
- C. The Ballistic Knee Wall shall be rated for all standard pistol rounds, 5.56 X 45 rounds, and 7.62 X 51 rounds without damage.

- D. The Ballistic Knee Wall rubber and plywood cover panels shall be easily replaceable, such that replacement can be accomplished using standard hand tools, such as a socket wrench, screw gun and screwdriver, and not require the use of power tools, such as impact wrenches, (both air or electric).
- E. The Ballistic Knee Wall shall be resistant to degradation by sunlight or indoor light.
- F. Color: Black.
 - 1. Allow for custom paint color – matching color 'P4' on Exterior Finish Schedule on Drawings, at the request of the City via submittal review and response.
- G. The Ballistic Knee Wall rubber and plywood panels shall be fastened to the underlying support structure with standard galvanized coated “grabber screws”.
- H. Paint lane numbers on face of Ballistic Knee Wall, centered vertically, using stencil for sharp outlines and no less than 12-inches in height with minimum 1-inch stroke.
 - 1. Color: White.

2.10 STATIC TARGET MOUNT

- A. Materials: Solid steel bar in suspended configuration from top of trap aperture, with “jaw-style” clamp to retain target.
 - 1. Jaw-style clamp: Corrosion resistant metal composition, hinged, protected with AR500 plate.



- 2. Example:

2.11 GENERAL FINISH REQUIREMENTS

- A. Finish metal fabrications after assembly.
- B. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

2.12 STEEL AND IRON FINISHES

- A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A153/A153M for steel and iron hardware and with ASTM A123/A123M for other steel and iron products.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Install each fabrication and assembly per manufacturer's written instructions.
- B. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete inserts and through bolts.
- C. Corrosion Protection: Coat concealed surfaces of aluminum that come into contact with grout, concrete, masonry, wood, or dissimilar metals with the following:
 - 1. Cast Aluminum: Heavy coat of bituminous paint.
 - 2. Extruded Aluminum: Two coats of clear lacquer.

3.2 INSTALLATION OF MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.
- B. Anchor steel supports on solid concrete. Secure supports with anchor bolts embedded in concrete.

3.3 REPAIRS

- A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A780/A780M.

END OF SECTION 116723

ELECTRONICALLY SUBMITTED FORMS

THE FOLLOWING FORMS MUST BE SUBMITTED IN PDF FORMAT WITH BID SUBMISSION

The following forms are to be completed by the bidder and submitted (uploaded) electronically with the bid in PlanetBids.

- A. BID BOND – See Instructions to Bidders, Bidders Guarantee of Good Faith (Bid Security) for further instructions**
- B. CONTRACTOR’S CERTIFICATION OF PENDING ACTIONS**
- C. MANDATORY DISCLOSURE OF BUSINESS INTERESTS FORM**
- D. SUBCONTRACTOR LISTING (OTHER THAN FIRST TIER)**
- E. ABATEMENT CONTRACTOR ASBESTOS SUBMITTAL – Refer to Supplementary Special Provisions, Appendix I, Section 1.4 Submittals.**
- F. HISTORIC TREATMENT SPECIALIST, SECTION 080152.93, HISTORIC TREATMENT OF WOOD WINDOWS, SUBSECTION 1.5 QUALITY ASSURANCE**
- G. PAINTING RESTORATION SPECIALIST, SECTION 090190.91, PAINTING RESTORATION, SUBSECTION 1.5 QUALITY ASSURANCE**
- H. SOIL NAIL RETAINING WALL CONTRACTOR, SECTION 313236, SOIL NAIL RETAINING WALL, SUBSECTION 1.06 CONTRACTOR QUALIFICATIONS**

Bids will not be accepted until ALL the above-named forms are submitted as part of the bid submittal

ARCHITECTURAL SYMBOLS

	GRID SYMBOLS		DOOR, PER SCHED
	DETAIL CALL OUT		WINDOW, PER SCHED
	SECTION CALL OUT		SIGNAGE, PER SCHED
	ELEVATION T.O.: TOP OF B.O.: BOTTOM OF F.F.: FINISH FLOOR		FIRE EXTINGUISHER
	ROOM NUMBER		R: RECESSED
	KEYNOTE CALL OUT		S: SURFACE MOUNTED
			SR: SEMI-RECESSED
			RESTROOM ACCESSORY (LETTER)
			FINISH CALLOUT
			SLOPE TO DRAIN
			HOSE BIB

ABBREVIATIONS

AB: Anchor Bolt	ID: Inside Diameter
A/C: Asphaltic Concrete	IN: Inch
ADA/ADAAG: Americans with Disabilities Act Accessibility Guidelines	INSUL: Insulation
ADJ: Adjacent	INT: Interior
AFF: Above Finished Floor	ISA: International Symbol of Accessibility
ALUM: Aluminum	LB: Pound (weight)
ANOD: Anodized	MAX: Maximum
APPROX: Approximate	MANUF: Manufacturer
ARCH: Architectural	MECH: Mechanical
ASTM: American Society for Testing and Materials	MIN: Minimum
	MTL: Metal
B.O.: Bottom Of	NIC: Not In Contract
BD: Board	NTS: Not To Scale
BLDG: Building	OC: On Center
BLK'G: Solid Blocking	OD: Outside Diameter
BW: Bottom of Wall	OFCl: Owner Furnished Contractor Installed
¢: Centerline	PCC: Portland Cement Concrete
CBC: California Building Code	P: Plate
COL: Column	PLAM/P-LAM: Plastic Laminate
CONC: Concrete	PLUMB: Plumbing
CONT: Continuous	POT/P.O.T.: Path of Travel
CT: Ceramic Tile	PT: Pressure Treated
CY: Cubic Yard	PTD: Painted
D: Deep	R: Radius
DF: Douglas Fir	RECOMMEND: Recommendation
DG: Decomposed Granite	REINF: Reinforcement
DIA: Diameter	REQ'D: Required
DIM: Dimension	RCP: Reflected Ceiling Plan
DN: Down	SCHED: Schedule
DS: Downspout	SF: Square Foot
(E): Existing	SHT/SHTS: Sheet/Sheets
ELECT: Electrical	SIM: Similar
EMBED: Embedment	SLR: Sealer
EQ: Equal	SPEC: Specification(s)
EXT: Exterior	SQ: Square
FAR: Floor Area Ratio	SS: Stainless Steel
FD: Floor drain	STL: Steel
FF: Finished Floor Elevation	STN: Stained
FG: Finished Grade Elevation	STRUCT: Structural
FS: Finished Surface Elevation	T&G: Tongue & Groove
FT: Foot, Feet	TEMP: Tempered
GA: Gauge	T.O.: Top of
GALV: Galvanized	TS: Tube Steel
GFCI: Ground Fault Circuit Interrupted	TW: Top of Wall
GFI: Ground Fault Interrupted	TYP: Typical
GL: Glass	UL: Underwriters' Laboratories
GSF: Gross Square Feet	UON: Unless Otherwise Noted
GYP BD: Gypsum Board	VERT: Vertical
HB: Hose Bib	VIF: Verify In the Field
HD: Hand Dryer	VTR: Vent Through Roof
HDWR: Hardware	WD: Wood
HORIZ: Horizontal	WH: Water Heater
HR: Hour	

SHEET INDEX

SHEET NO.	DISCIPLINE CODE	TITLE
GENERAL		
1	G-1	COVER SHEET
2	G-2	MITIGATION, MONITORING, AND REPORTING PROGRAM NOTES
3	G-3	OVERALL SITE DIAGRAM
4	G-4	LIST OF DRAWINGS, ABBREVIATIONS, SYMBOLS
5	G-5	GENERAL NOTES 1
6	G-6	GENERAL NOTES 2
7	G-7	CODE ANALYSIS - BUILDING '1'
8	G-8	CODE ANALYSIS - BUILDING '2'
9	G-9	CODE ANALYSIS - BUILDING '3'
DEMOLITION		
10	D-1	CIVIL SITE DEMOLITION PLAN
11	D-2	LANDSCAPE DEMOLITION PLAN
12	D-3	ARCHITECTURAL DEMOLITION PLAN
13	D-4	ELECTRICAL SITE DEMOLITION 1
14	D-5	ELECTRICAL SITE DEMOLITION 2
15	D-6	CLUBHOUSE AND STAFF BUILDING DEMOLITION PLANS
CIVIL		
16	C-1	GENERAL NOTES
17	C-2	CIVIL NOTES AND DETAILS
18	C-3	GRADING AND DRAINAGE PLAN 1
19	C-4	GRADING AND DRAINAGE PLAN 2
20	C-5	PRIVATE WATER & SEWER PLAN
21	C-6	RETAINING WALL PLAN AND PROFILE 1
22	C-7	RETAINING WALL PLAN AND PROFILE 2
23	C-8	RETAINING WALL CROSS SECTIONS
24	C-9	BMP PLAN
LANDSCAPE		
25	L-1	IRRIGATION PLAN
26	L-2	IRRIGATION SCHEDULE AND NOTES
27	L-3	PLANTING PLAN
28	L-4	LANDSCAPE SPECIFICATIONS AND NOTES
ARCHITECTURE		
29	A-1	ARCHITECTURAL SITE DIAGRAM 1
30	A-2	ARCHITECTURAL SITE DIAGRAM 2
31	A-3	SITE SECTIONS
32	A-4	SITE WALL ELEVATIONS
33	A-5	ENLARGED SITE PLAN 1
34	A-6	ENLARGED SITE PLAN 2
35	A-7	ENLARGED SITE PLAN 3
36	A-8	ENLARGED SITE PLAN 4
37	A-9	BULLET TRAP PLAN/SECTIONS
38	A-10	FIRING RANGE ELEVATIONS 1
39	A-11	FIRING RANGE ELEVATIONS 2
40	A-12	SHADE STRUCTURE PLANS 1
41	A-13	SHADE STRUCTURE PLANS 2
42	A-14	SHADE STRUCTURE PLANS 3
43	A-15	SHADE STRUCTURE SECTIONS

SHEET NO.	DISCIPLINE CODE	TITLE
44	A-16	SHADE STRUCTURE ELEVATIONS
45	A-17	STORAGE BUILDING 1
46	A-18	STORAGE BUILDING 2
47	A-19	CLUBHOUSE PLANS
48	A-20	CLUBHOUSE SECTIONS/ELEVATIONS
49	A-21	CLUBHOUSE ENLARGED PLANS
50	A-22	DETAILS
51	A-23	DETAILS
52	A-24	DETAILS
53	A-25	DETAILS
54	A-26	DETAILS
55	A-27	DETAILS
56	A-28	DETAILS
57	A-29	DETAILS
58	A-30	DETAILS
59	A-31	SCHEDULES
60	A-32	SIGNAGE SCHEDULE
61	A-33	SIGNAGE DETAILS
FINISH		
62	F-1	CLUBHOUSE FINISHES
63	F-2	STAFF OFFICE FINISHES
64	F-3	FINISH DETAILS
STRUCTURE		
65	S-1	STRUCTURAL NOTES
66	S-2	STRUCTURAL NOTES
67	S-3	STRUCTURAL NOTES
68	S-4	STRUCTURAL NOTES
69	S-5	STRUCTURAL NOTES
70	S-6	TYPICAL DETAILS
71	S-7	TYPICAL DETAILS
72	S-8	TYPICAL DETAILS
73	S-9	TYPICAL DETAILS
74	S-10	STRUCTURAL SITE PLAN
75	S-11	RETAINING WALL ELEVATION
76	S-12	RETAINING WALL ELEVATION
77	S-13	RETAINING WALL ELEVATION
78	S-14	RETAINING WALL SECTIONS
79	S-15	RETAINING WALL SECTIONS
80	S-16	SITE-CAST TILT-UP WALL ELEVATIONS
81	S-17	SITE-CAST TILT-UP WALL ELEVATIONS
82	S-18	SITE-CAST TILT-UP WALL ELEVATIONS
83	S-19	SITE-CAST TILT-UP WALL SECTIONS AND DETAILS
84	S-20	SITE-CAST TILT-UP WALL SECTIONS AND DETAILS
85	S-21	BULLET TRAP PLANS
86	S-22	BULLET TRAP PLANS
87	S-23	FOUNDATION DETAILS
88	S-24	SHADE STRUCTURE PLANS
89	S-25	SHADE STRUCTURE PLANS

SHEET NO.	DISCIPLINE CODE	TITLE
90	S-26	SHADE STRUCTURE PLANS
91	S-27	SHADE STRUCTURE SECTIONS AND DETAILS
92	S-28	FOUNDATION DETAILS
93	S-29	FRAMING DETAILS
94	S-30	FRAMING DETAILS
MECHANICAL		
95	M-1	LEGEND, ABBREVIATIONS AND NOTES
96	M-2	MECHANICAL SCHEDULES
97	M-3	MECHANICAL DEMOLITION PLAN - CLUBHOUSE
98	M-4	MECHANICAL DETAILS
PLUMBING		
99	P-1	LEGEND, ABBREVIATIONS AND NOTES
100	P-2	PLUMBING SCHEDULES
101	P-3	CLUBHOUSE PLUMBING PLANS
ELECTRICAL		
102	E-1	LEGEND, ABBREVIATIONS AND NOTES
103	E-2	LIGHTING FIXTURE SCHEDULE
104	E-3	LIGHTING FIXTURE SCHEDULE
105	E-4	ELECTRICAL SITE PLAN - WEST
106	E-5	ELECTRICAL SITE PLAN - EAST
107	E-6	SITE LIGHTING PHOTOMETRIC CALCULATION
108	E-7	SPORTS LIGHTING PHOTOMETRIC CALCULATION
109	E-8	ELECTRICAL PLAN - WEST RANGE
110	E-9	ELECTRICAL PLAN - PUBLIC RANGE
111	E-10	ELECTRICAL PLAN - EAST RANGE
112	E-11	ELECTRICAL PLAN - RAPID FIRE RANGE
113	E-12	CLUBHOUSE ELECTRICAL PLANS
114	E-13	STAFF BUILDING ELECTRICAL PLANS
115	E-14	SINGLE LINE DIAGRAM - DEMOLITION
116	E-15	SINGLE LINE DIAGRAM - NEW
117	E-16	PANEL AND LIGHTING CONTROL SCHEDULES
118	E-17	PANEL AND LIGHTING CONTROL SCHEDULES
119	E-18	PANEL SCHEDULES
120	E-19	ELECTRICAL DETAILS
121	E-20	LIGHT CONTROL DETAILS
122	E-21	SPORTS LIGHTING CONTROL DETAILS
123	E-22	OUTDOOR TITLE 24 DOCUMENTATION
124	E-23	OUTDOOR TITLE 24 DOCUMENTATION
125	E-24	INDOOR TITLE 24 DOCUMENTATION - SITE
126	E-25	INDOOR TITLE 24 DOCUMENTATION - SITE
127	E-26	INDOOR TITLE 24 DOCUMENTATION - CLUBHOUSE
128	E-27	INDOOR TITLE 24 DOCUMENTATION - CLUBHOUSE
129	E-28	INDOOR TITLE 24 DOCUMENTATION - CLUBHOUSE
130	E-29	INDOOR TITLE 24 DOCUMENTATION - STAFF OFFICE
131	E-30	INDOOR TITLE 24 DOCUMENTATION - STAFF OFFICE

DEFERRED SUBMITTAL ITEMS

- DOCUMENTS LISTED BELOW ARE DELEGATED DESIGN ITEMS THAT SHALL BE DESIGNED AND PREPARED BY THE CONTRACTOR, BASED ON GOVERNING CODES AND CRITERIA ESTABLISHED IN THE CONTRACT DOCUMENTS, THEN SUBMITTED TO THE ENGINEER FOR INITIAL REVIEW.
- THE ENGINEER WILL REVIEW - LIMITED TO GENERAL CONFORMANCE WITH PROJECT REQUIREMENTS AND CRITERIA, AND ACCEPTANCE OF EXPOSED EQUIPMENT AND LOCATIONS - AS PART OF TYPICAL SUBMITTAL REVIEW PROCESS, ONCE RETURNED MARKED EITHER 'NO EXCEPTIONS TAKEN' OR 'REVISE AS NOTED' CONTRACTOR MUST SUBMIT TO CITY DEVELOPMENT SERVICES FOR REVIEW AND APPROVAL PRIOR TO INSTALLATION.
- PLANS FOR DEFERRED SUBMITTAL ITEMS SHALL BE SUBMITTED IN A TIMELY MANNER BUT NOT LESS THAN 30 BUSINESS DAYS PRIOR TO INTENDED INSTALLATION DATE FOR CITY REVIEW AND APPROVAL.
- THE DEFERRED SUBMITTAL ITEMS SHALL NOT BE INSTALLED UNTIL THEIR DESIGN AND SUBMITTAL DOCUMENTS HAVE BEEN APPROVED BY THE BUILDING OFFICIAL. SDMC -129.0205
- DEFERRED SUBMITTAL PACKAGES SHALL BE DESIGNED BY AN ENGINEER REGISTERED IN THE STATE OF CALIFORNIA AND INCLUDE THEIR STAMP AND SIGNATURE ON ALL DRAWINGS AND CALCULATIONS.

PROVIDE DEFERRED SUBMITTAL AND APPROVAL FOR THE FOLLOWING PARTS OF WORK:

- MODULAR BULLET TRAPS
- SPORTS LIGHTING STRUCTURAL AND FOUNDATION DESIGN

DISCIPLINE CODES

- G GENERAL
- D DEMOLITION
- C CIVIL
- L LANDSCAPE
- A ARCHITECTURAL
- F FINISH
- S STRUCTURAL
- M MECHANICAL
- P PLUMBING
- E ELECTRICAL
- SD CITY STANDARD DRAWINGS

CONSULTANT		SPEC NO. 1847	CITY OF SAN DIEGO, CALIFORNIA DEVELOPMENT SERVICES DEPARTMENT SHEET 4 OF 131 SHEETS		W.B.S. S18005
 MANUEL ONCINA ARCHITECTS INC. ARCHITECTURE PLANNING INTERIORS 5711 La Jolla Blvd La Jolla, CA 92037 tel 858/459.1221 fax 858/459.1214 www.oncinaarc.com	 05/10/2019	APPROVED: <i>Samuel M. Garcia</i> FOR CITY ENGINEER DATE 05/10/2019		SUBMITTED BY: MICHELLE GARCIA-QUILICO PROJECT MANAGER	
		DESCRIPTION BY APPROVED DATE FILMED ORIGINAL MOA <i>Samuel M. Garcia</i> 05/10/19 ADDENDUM A MOA <i>Samuel M. Garcia</i> 06/17/19		CHECKED BY: DAVID SENAH PROJECT ENGINEER 202-1735 CCS27 COORDINATE 1842-6295 CCS83 COORDINATE	
CONTRACTOR: _____ DATE STARTED: _____ INSPECTOR: _____ DATE COMPLETED: _____		AS-BUILTS		41205 - 4 - D	

STORM WATER REQUIREMENTS APPLICABILITY CHECKLIST DS-560

City of San Diego Development Services Storm Water Requirements Applicability Checklist DS-560 FORM October 2016

Project Address: 4008 Federal Avenue, San Diego, CA Project Number (for City Use Only):

SECTION 1. Construction Storm Water BMP Requirements: All construction sites are required to implement construction BMPs in accordance with the performance standards in the Storm Water Standards Manual.

For all projects complete PART A: If project is required to submit a SWPPP or WPCP, continue to PART B.

PART A: Determine Construction Phase Storm Water Requirements.

1. Is the project subject to California's statewide General NPDES permit for Storm Water Discharges Associated with Construction Activities, also known as the State Construction General Permit (CGP)?

2. Does the project propose construction or demolition activity, including but not limited to, clearing, grading, grubbing, excavation, or any other activity resulting in ground disturbance and contact with storm water runoff?

3. Does the project propose routine maintenance to maintain original line and grade, hydraulic capacity, or original purpose of the facility? (Projects such as pipeline/utility replacement)

4. Does the project only include the following Permit types listed below?

5. Does the project only include the following Permit types listed below?

6. Does the project only include the following Permit types listed below?

7. Does the project only include the following Permit types listed below?

8. Does the project only include the following Permit types listed below?

9. Does the project only include the following Permit types listed below?

10. Does the project only include the following Permit types listed below?

11. Does the project only include the following Permit types listed below?

12. Does the project only include the following Permit types listed below?

13. Does the project only include the following Permit types listed below?

14. Does the project only include the following Permit types listed below?

15. Does the project only include the following Permit types listed below?

16. Does the project only include the following Permit types listed below?

17. Does the project only include the following Permit types listed below?

18. Does the project only include the following Permit types listed below?

19. Does the project only include the following Permit types listed below?

20. Does the project only include the following Permit types listed below?

Page 2 of 4 City of San Diego - Development Services - Storm Water Requirements Applicability Checklist

PART B: Determine Construction Site Priority

This prioritization must be completed within this form, noted on the plans, and included in the SWPPP or WPCP. The city reserves the right to adjust the priority of projects both before and after construction.

Complete PART B and continued to Section 2

1. ASBS a. Projects located in the ASBS watershed.

2. High Priority a. Projects 1 acre or more determined to be Risk Level 2 or Risk Level 3 per the Construction General Permit and not located in the ASBS watershed.

b. Projects 1 acre or more determined to be LUP Type 2 or LUP Type 3 per the Construction General Permit and not located in the ASBS watershed.

3. Medium Priority a. Projects 1 acre or more but not subject to an ASBS or high priority designation.

b. Projects determined to be Risk Level 1 or LUP Type 1 per the Construction General Permit and not located in the ASBS watershed.

4. Low Priority a. Projects requiring a Water Pollution Control Plan but not subject to ASBS, high, or medium priority designation.

SECTION 2. Permanent Storm Water BMP Requirements.

Additional information for determining the requirements is found in the Storm Water Standards Manual.

PART C: Determine if Not Subject to Permanent Storm Water Requirements.

Projects that are considered maintenance, or otherwise not categorized as "new development projects" or "redevelopment projects" according to the Storm Water Standards Manual are not subject to Permanent Storm Water BMPs.

If "yes" is checked for any number in Part C, proceed to Part F and check "Not Subject to Permanent Storm Water BMP Requirements".

If "no" is checked for all of the numbers in Part C continue to Part D.

1. Does the project only include interior remodels and/or is the project entirely within an existing enclosed structure and does not have the potential to contact storm water?

2. Does the project only include the construction of overhead or underground utilities without creating new impervious surfaces?

3. Does the project fall under routine maintenance? Examples include, but are not limited to: roof or exterior structure surface replacement, resurfacing or reconfiguring surface parking lots or existing roadways without expanding the impervious footprint, and routine replacement of damaged pavement (grinding, overlay, and pothole repair).

City of San Diego - Development Services - Storm Water Requirements Applicability Checklist Page 3 of 4

PART D: PDP Exempt Requirements.

PDP Exempt projects are required to implement site design and source control BMPs.

If "yes" was checked for any questions in Part D, continue to Part F and check the box labeled "PDP Exempt."

If "no" was checked for all questions in Part D, continue to Part E.

1. Does the project ONLY include new or retrofit sidewalks, bicycle lanes, or trails that:

• Are designed and constructed to direct storm water runoff to adjacent vegetated areas, or other non-erodible permeable areas? Or;

• Are designed and constructed to be hydraulically disconnected from paved streets and roads? Or;

• Are designed and constructed with permeable pavements or surfaces in accordance with the Green Streets guidance in the City's Storm Water Standards manual?

Yes; PDP exempt requirements apply No; next question

2. Does the project ONLY include retrofitting or redeveloping existing paved alleys, streets or roads designed and constructed in accordance with the Green Streets guidance in the City's Storm Water Standards Manual?

Yes; PDP exempt requirements apply No; project not exempt.

PART E: Determine if Project is a Priority Development Project (PDP).

Projects that match one of the definitions below are subject to additional requirements including preparation of a Storm Water Quality Management Plan (SWQMP).

If "yes" is checked for any number in Part E, continue to Part F and check the box labeled "Priority Development Project".

If "no" is checked for every number in Part E, continue to Part F and check the box labeled "Standard Development Project".

1. New Development that creates 10,000 square feet or more of impervious surfaces collectively over the project site.

2. Redevelopment project that creates and/or replaces 5,000 square feet or more of impervious surfaces on an existing site of 10,000 square feet or more of impervious surfaces.

3. New development or redevelopment of a restaurant. Facilities that sell prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (SIC 5812), and where the land development creates and/or replaces 5,000 square feet or more of impervious surface.

4. New development or redevelopment on a hillside. The project creates and/or replaces 5,000 square feet or more of impervious surface (collectively over the project site) and where the development will grade on any natural slope that is twenty-five percent or greater.

5. New development or redevelopment of a parking lot that creates and/or replaces 5,000 square feet or more of impervious surface (collectively over the project site).

6. New development or redevelopment of streets, roads, highways, freeways, and driveways. The project creates and/or replaces 5,000 square feet or more of impervious surface (collectively over the project site).

Page 4 of 4 City of San Diego - Development Services - Storm Water Requirements Applicability Checklist

7. New development or redevelopment discharging directly to an Environmentally Sensitive Area.

The project creates and/or replaces 2,500 square feet of impervious surface (collectively over project site), and discharges directly to an Environmentally Sensitive Area (ESA). "Discharging directly" includes flow that is conveyed overland a distance of 200 feet or less from the project to the ESA, or conveyed in a pipe or open channel any distance as an isolated flow from the project to the ESA (i.e. not commingled with flows from adjacent lands).

8. New development or redevelopment projects of a retail gasoline outlet (RGO) that creates and/or replaces 5,000 square feet of impervious surface.

9. New development or redevelopment projects of an automotive repair shops that creates and/or replaces 5,000 square feet or more of impervious surfaces.

10. Other Pollutant Generating Project. The project is not covered in the categories above, results in the disturbance of one or more acres of land and is expected to generate pollutants post construction, such as fertilizers and pesticides.

11. Does the project ONLY include new or retrofit sidewalks, bicycle lanes, or trails that:

• Are designed and constructed to direct storm water runoff to adjacent vegetated areas, or other non-erodible permeable areas? Or;

• Are designed and constructed to be hydraulically disconnected from paved streets and roads? Or;

• Are designed and constructed with permeable pavements or surfaces in accordance with the Green Streets guidance in the City's Storm Water Standards manual?

Yes; PDP exempt requirements apply No; next question

2. Does the project ONLY include retrofitting or redeveloping existing paved alleys, streets or roads designed and constructed in accordance with the Green Streets guidance in the City's Storm Water Standards Manual?

Yes; PDP exempt requirements apply No; project not exempt.

PART F: Select the appropriate category based on the outcomes of PART C through PART E.

1. The project is NOT SUBJECT TO PERMANENT STORM WATER REQUIREMENTS.

2. The project is a STANDARD DEVELOPMENT PROJECT. Site design and source control BMP requirements apply. See the Storm Water Standards Manual for guidance.

3. The project is PDP EXEMPT. Site design and source control BMP requirements apply. See the Storm Water Standards Manual for guidance.

4. The project is a PRIORITY DEVELOPMENT PROJECT. Site design, source control, and structural pollutant control BMP requirements apply. See the Storm Water Standards Manual for guidance on determining if project requires a hydromodification plan management.

Name of Owner or Agent (Please Print) Title

Signature Date

Signature Date

Signature Date

Signature Date

Signature Date

Signature Date

Signature Date

Signature Date

Signature Date

Signature Date

SPECIAL NOTES

THE FOLLOWING NOTES ARE PROVIDED TO GIVE DIRECTIONS TO THE CONTRACTOR BY THE ENGINEER OF WORK. THE CITY ENGINEER'S SIGNATURE ON THESE PLANS DOES NOT CONSTITUTE APPROVAL OF ANY OF THESE NOTES AND THE CITY WILL NOT BE RESPONSIBLE FOR THEIR ENFORCEMENT.

1. CONTRACTOR AGREES THAT HE SHALL ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR THE JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THIS PROJECT INCLUDING SAFETY OF ALL PERSONS AND PROPERTY; THAT THIS REQUIREMENT SHALL APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS, AND THAT THE CONTRACTORS SHALL DEFEND, INDEMNIFY, AND HOLD THE OWNER, ENGINEER AND GEOLOGIST HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN THE CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROPERTY, EXCEPTING FOR LIABILITY ARISING FROM SOLE NEGLIGENCE OF THE OWNER OR ENGINEER.

2. THE CONTRACTOR SHALL VERIFY THE LOCATION OF ALL EXISTING FACILITIES (ABOVEGROUND AND UNDERGROUND) WITHIN THE PROJECT SITE AND MAKE EXPLORATORY EXCAVATIONS SUFFICIENTLY AHEAD OF CONSTRUCTION TO PERMIT THE REVISION OF THE CONSTRUCTION PLANS IF IT IS FOUND THE ACTUAL LOCATIONS ARE IN CONFLICT WITH THE PROPOSED WORK.

3. DURING CONSTRUCTION: THE CONTRACTOR SHALL PROPERLY GRADE ALL EXCAVATED SURFACES TO PROVIDE POSITIVE DRAINAGE AND PREVENT PONDING OF WATER. HE SHALL CONTROL SURFACE WATER TO AVOID DAMAGE TO ADJOINING PROPERTIES OR TO FINISHED WORK ON THE SITE.

4. NASLAND ENGINEERING WILL NOT BE RESPONSIBLE FOR, OR LIABLE FOR UNAUTHORIZED CHANGES TO OR USES OF THESE PLANS. ALL PROPOSED CHANGES TO THE PLANS MUST BE IN WRITING AND MUST BE APPROVED BY NASLAND ENGINEERING.

5. WORK PERFORMED WITHOUT BENEFIT OF TESTING AND/OR INSPECTION SHALL BE SUBJECT TO REJECTION AND REMOVAL.

6. THE EXISTENCE AND LOCATION OF UTILITY STRUCTURES AND FACILITIES SHOWN ON THE CONSTRUCTION PLANS WERE OBTAINED BY A SEARCH OF THE AVAILABLE RECORDS. ATTENTION IS CALLED TO THE POSSIBLE EXISTENCE OF OTHER UTILITY FACILITIES OR STRUCTURES NOT KNOWN OR IN A LOCATION DIFFERENT FROM THAT SHOWN ON THE PLANS. THE CONTRACTOR IS REQUIRED TO TAKE DUE PRECAUTIONARY MEASURES TO PROTECT THE UTILITIES SHOWN ON THE PLANS AND ANY OTHER EXISTING FACILITIES OR STRUCTURES THAT MAY NOT BE SHOWN.

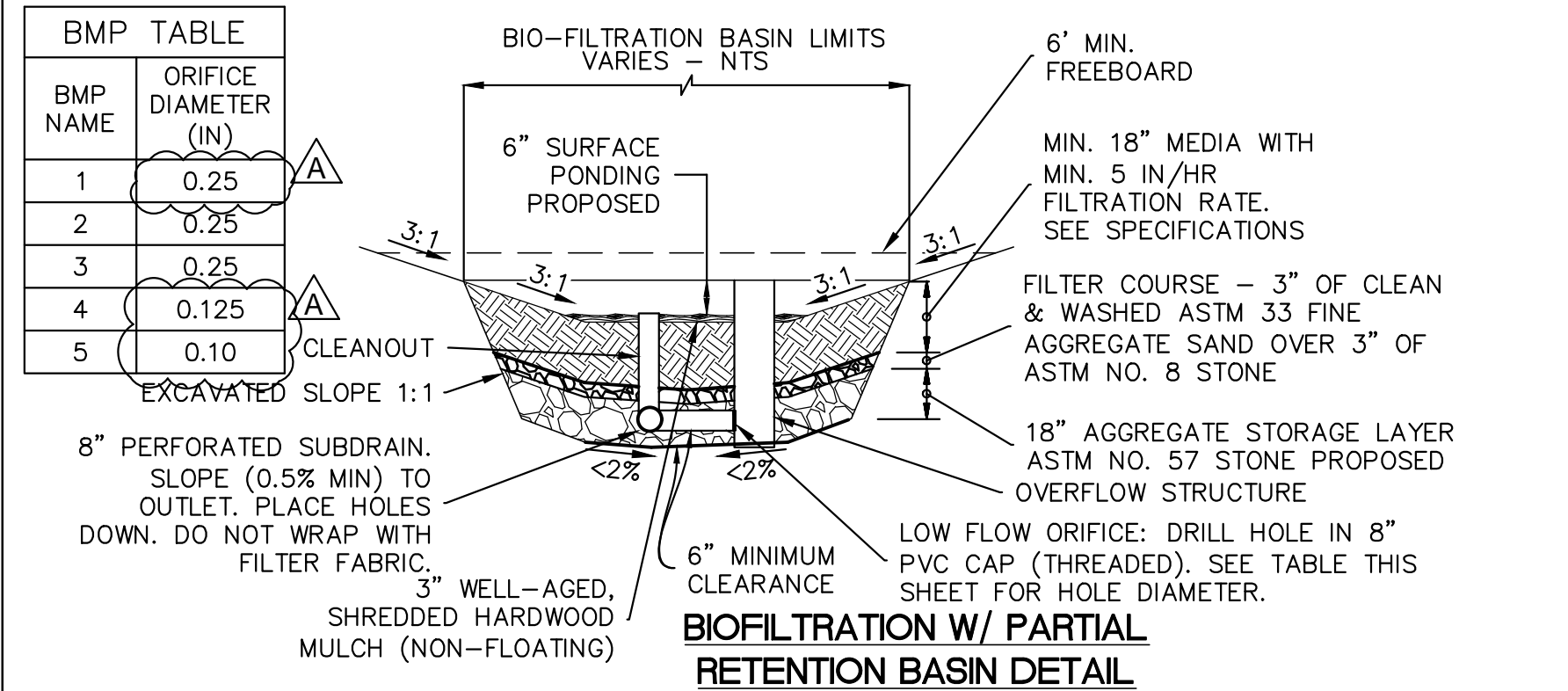
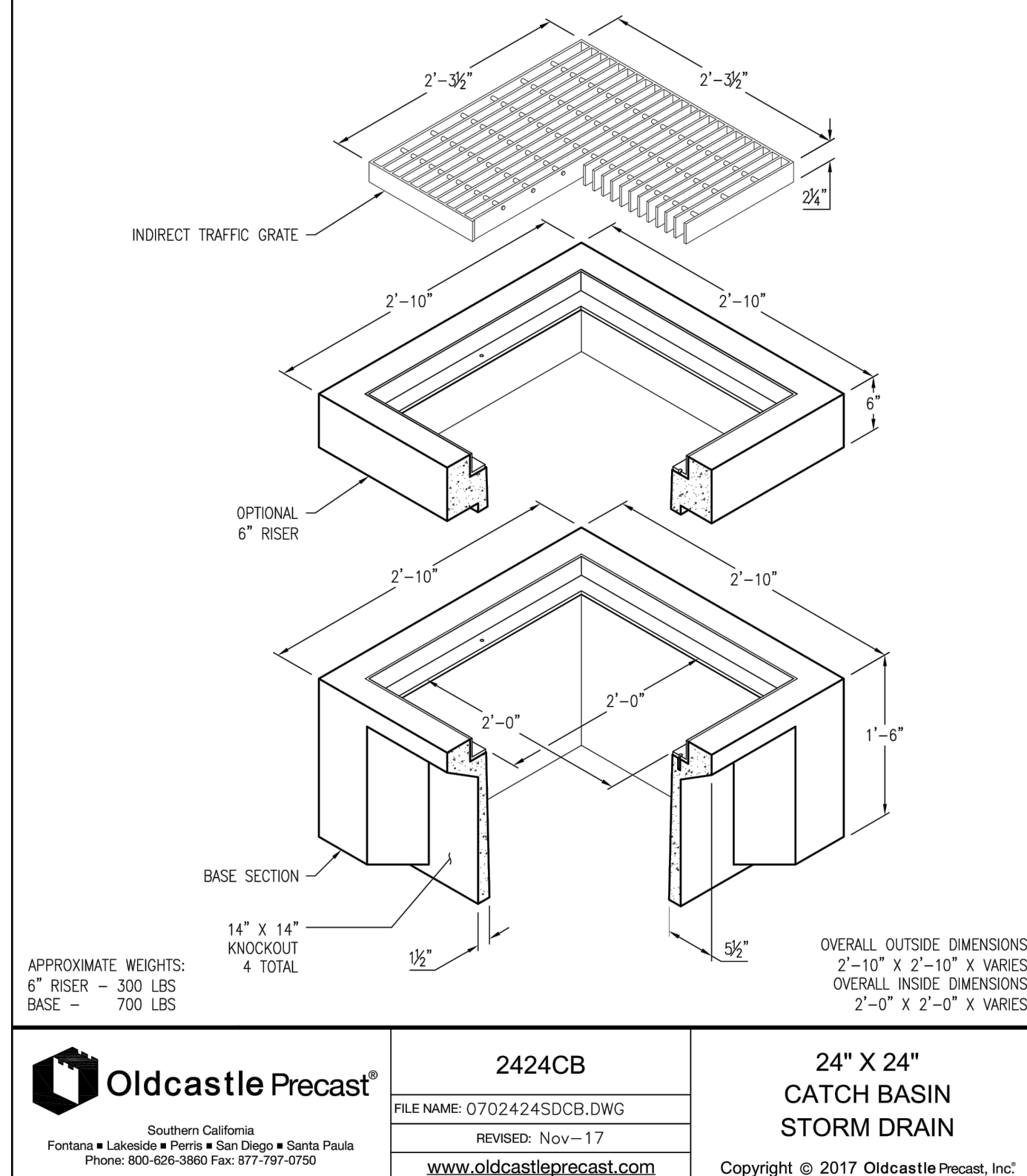
7. ALL GRADES SHOWN ON THIS PLAN WERE DESIGNED AT OR BELOW MAXIMUMS ALLOWED BY THE AMERICANS WITH DISABILITY ACT (A.D.A.) IT IS CONTRACTORS' RESPONSIBILITY TO FAMILIARIZE THEMSELVES WITH THE DISABILITY ACT GUIDELINES (A.D.A.G.) IN THE EVENT THAT A DESIGN QUESTION SHOULD ARISE, OR A FIELD CONDITION PRESENT ITSELF THAT IS DIFFERENT FROM THOSE SHOWN ON THESE PLANS, WORK SHALL CEASE AND THE ENGINEER SHALL BE NOTIFIED SO THAT AN ACCEPTABLE SOLUTION CAN BE DETERMINED.

8. THE CONTRACTOR IS ADVISED TO CAREFULLY CHECK ALL PHASES OF WORK RELATING TO A.D.A.G. ACCESS FOR THIS PROJECT. SINCE THE CODE DOES NOT ALLOW FOR CONSTRUCTION TOLERANCE, ANY CONSTRUCTION THAT EXCEEDS MAXIMUM OR MINIMUM DIMENSIONS AND SLOPES AS CALLED OUT BY A.D.A.G. ARE SUBJECT TO REJECTION AND MAY BE REQUIRED TO BE REMOVED AND REPLACED, AT THE CONTRACTORS' EXPENSE.

9. SINCE THE CIVIL ENGINEER OR SURVEYOR CANNOT CONTROL THE EXACT METHODS OR MEANS USED BY THE GENERAL CONTRACTOR OR THEIR SUBCONTRACTORS DURING GRADING AND CONSTRUCTION OF THE PROJECT, THE CIVIL ENGINEER OR SURVEYOR ASSUMES NO RESPONSIBILITY FOR THE FINAL ACCEPTANCE OF A.D.A.G. RELATED ITEMS BY THE CITY, ANY OTHER AUTHORITY, OR OTHER AFFECTED PARTIES.

ACCESSIBILITY NOTES

ALL GRADES SHOWN ON THESE PLANS WERE DESIGNED IN COMPLIANCE WITH THE 2016 CALIFORNIA BUILDING CODE (CBC) AND THE 2010 ADA STANDARDS FOR ACCESSIBLE DESIGN (ADA) TO ALLOW FOR CONSTRUCTION TOLERANCES. IT IS THE CONTRACTORS RESPONSIBILITY TO FAMILIARIZE THEMSELVES WITH THESE CODES. SHOULD A DESIGN QUESTION ARISE OR A FIELD CONDITION PRESENT ITSELF THAT IS DIFFERENT FROM THESE PLANS, WORK SHALL CEASE AND THE CIVIL ENGINEER BE NOTIFIED SO THAT AN ACCEPTABLE SOLUTION CAN BE DETERMINED.



NOTE: REFER TO APPENDIX E.26 IN THE CITY OF SAN DIEGO SOTRM WATER STANDARDS FOR PLANT LIST FOR BIORETENTION BMPs.

CONSULTANT: Nasland Civil Engineering Surveying Land Planning. SPEC NO. 1847. CITY OF SAN DIEGO, CALIFORNIA DEVELOPMENT SERVICES DEPARTMENT SHEET 17 OF 131 SHEETS. PROJECT: POLICE RANGE REFURBISHMENT PROJECT - PHASE II. SUBMITTED BY: MICHELLE GARCIA-QUILICO. PROJECT MANAGER. DATE: 05/10/2019. DATE: 05/29/19. DATE: 6/17/19.

PERMANENT POST-CONSTRUCTION BMP NOTES

1. PRIOR TO THE ISSUANCE OF ANY CONSTRUCTION PERMIT, THE "OWNER/PERMITTEE" SHALL ENTER INTO A MAINTENANCE AGREEMENT FOR THE ONGOING PERMANENT BMP MAINTENANCE.

2. PRIOR TO THE ISSUANCE OF ANY CONSTRUCTION PERMIT, THE "OWNER/PERMITTEE" SHALL INCORPORATE ANY CONSTRUCTION BEST MANAGEMENT PRACTICES NECESSARY TO COMPLY WITH CHAPTER 14, ARTICLE 2, DIVISION 1 (GRADING REGULATIONS) OF THE SAN DIEGO MUNICIPAL CODE, INTO THE CONSTRUCTION PLANS OR SPECIFICATIONS.

IMPORTANT NOTICE

SECTION 4215/4217 OF THE PERMIT/APPROVAL BY THE GOVERNMENT CODE REQUIRES THAT A DIG ALERT IDENTIFICATION NUMBER BE ISSUED BEFORE A "PERMIT TO EXCAVATE" WILL BE VALID. PER YOUR DIG ALERT I.D. NUMBER, CALL UNDERGROUND SERVICE ALERT.

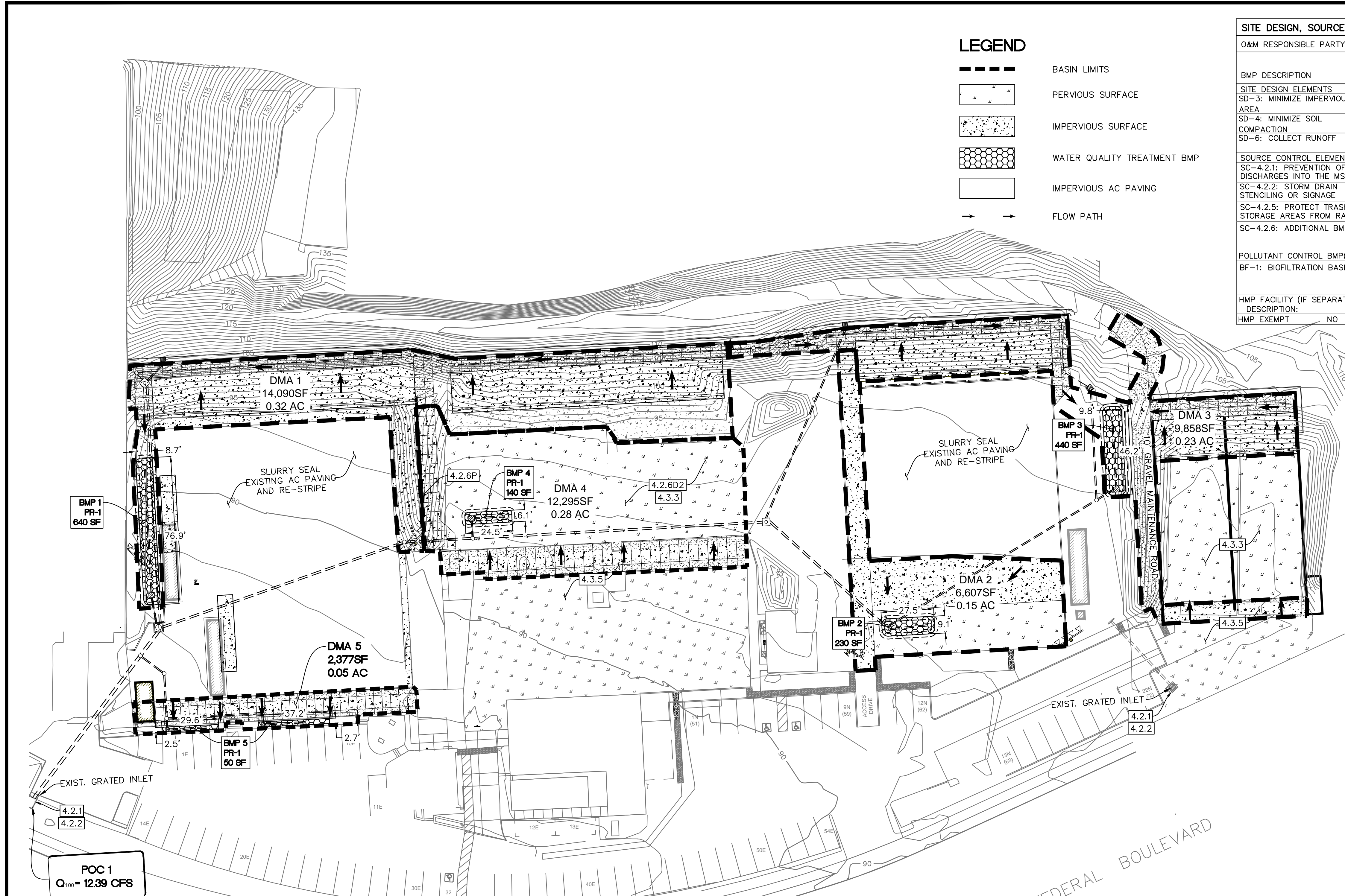
TOLL FREE 1-800-422-4133 TWO WORKING DAYS BEFORE YOU DIG.

PLANS FOR THE CONSTRUCTION OF: POLICE RANGE REFURBISHMENT PROJECT - PHASE II

NOTES / DETAILS

CITY OF SAN DIEGO, CALIFORNIA DEVELOPMENT SERVICES DEPARTMENT SHEET 17 OF 131 SHEETS. W.B.S. - S18005. PROJECT MANAGER: MICHELLE GARCIA-QUILICO. PROJECT ENGINEER: DAVID SENAH. DATE: 05/10/2019. DATE: 05/29/19. DATE: 6/17/19.

UPDATED ORIFICE DIAMETER, SIGNED DS-560 ADDENDUM A



LEGEND

- BASIN LIMITS
- PERVIOUS SURFACE
- IMPERVIOUS SURFACE
- WATER QUALITY TREATMENT BMP
- IMPERVIOUS AC PAVING
- FLOW PATH

SITE DESIGN, SOURCE CONTROL AND POLLUTANT CONTROL BMP OPERATION & MAINTENANCE PROCEDURE

BMP DESCRIPTION	INSPECTION FREQUENCY	MAINTENANCE FREQUENCY	MAINTENANCE METHOD	QUANTITY	INCLUDED IN O&M MANUAL		SHEET NUMBER(S)
					YES	NO	
SOURCE CONTROL ELEMENTS							
SD-3: MINIMIZE IMPERVIOUS AREA	N/A	N/A	N/A	ALL LANDSCAPE AREAS	<input checked="" type="checkbox"/>	<input type="checkbox"/>	C-9
SD-4: MINIMIZE SOIL COMPACTION	ANNUAL	AS NEEDED	REAPPLICATION REQUIREMENTS AS NEEDED		<input checked="" type="checkbox"/>	<input type="checkbox"/>	C-9
SD-6: COLLECT RUNOFF	QUARTERLY	AS NEEDED	REMOVE TRASH TO PREVENT CLOGGING.	1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	C-9
SOURCE CONTROL ELEMENTS							
SC-4.2.1: PREVENTION OF ILLICIT DISCHARGES INTO THE MS4	QUARTERLY	AS NEEDED	REPAIR IRRIGATION AS NEEDED	ALL LANDSCAPE AREAS	<input checked="" type="checkbox"/>	<input type="checkbox"/>	C-9
SC-4.2.2: STORM DRAIN STENCILING OR SIGNAGE	QUARTERLY	AS NEEDED	RE-STENCIL AS NEEDED		<input checked="" type="checkbox"/>	<input type="checkbox"/>	C-9
SC-4.2.5: PROTECT TRASH STORAGE AREAS FROM RAINFALL	MONTHLY	AS NEEDED	COVER STORAGE AREA AS NEEDED	TRASH STORAGE AREA	<input checked="" type="checkbox"/>	<input type="checkbox"/>	C-9
SC-4.2.6: ADDITIONAL BMPS	MONTHLY	AS NEEDED	REMOVE TRASH AND DEBRIS. SWEEP PLAZA AREAS AND SIDEWALKS	ALL PLAZA AND SIDEWALK AREAS	<input checked="" type="checkbox"/>	<input type="checkbox"/>	C-9
POLLUTANT CONTROL BMP(S)							
BF-1: BIOFILTRATION BASINS	QUARTERLY	AS NEEDED	REMOVE TRASH AND DEBRIS. INSPECT INLET, REPLACE FILTER MEDIA AS NEEDED.	6	<input checked="" type="checkbox"/>	<input type="checkbox"/>	C-2, C-3, C-4, C-9
HMP FACILITY (IF SEPARATE) DESCRIPTION:							
HMP EXEMPT	NO						

NOTES

- HYDROLOGIC SOIL TYPE D IS PRESENT (PER WEB SOIL SURVEY).
- AVERAGE DEPTH TO GROUNDWATER IS GREATER THAN 20 FEET BELOW THE GROUND SURFACE.
- NO NATURAL HYDROLOGIC FEATURES.
- NO CRITICAL COURSE SEDIMENT YIELD AREAS.
- MARK ALL INLETS WITH THE WORDS "NO DUMPING! FLOWS TO BAY" OR SIMILAR.

EXISTING CONDITIONS:

TOTAL PROJECT SITE AREA: 223,750 SF
 PERVIOUS AREA: 119,990 SF (54%)
 IMPERVIOUS AREA: 103,760 SF (53%)

PROPOSED CONDITIONS:

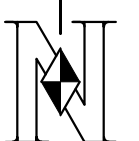
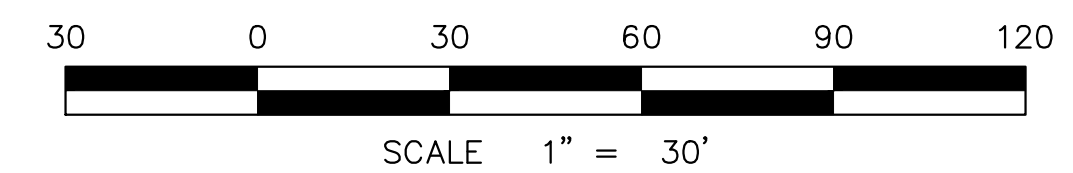
TOTAL PROJECT SITE AREA: 223,750 SF
 PERVIOUS AREA: 116,036 SF (52%)
 IMPERVIOUS AREA: 107,714 SF (48%)

SOURCE CONTROLS

- 4.2.1 PREVENTION OF ILLICIT DISCHARGES INTO THE MS4
- 4.2.2 STORM DRAIN STENCILING OR SIGNAGE
- 4.2.5 PROTECT TRASH STORAGE AREAS FROM RAINFALL, RUN-ON, RUNOFF, AND WIND DISPERSAL
- 4.2.6A ONSITE STORM DRAIN INLETS
- 4.2.6D2 LANDSCAPE/OUTDOOR PESTICIDE USE
- 4.2.6G REFUSE AREA
- 4.2.6P PLAZAS, SIDEWALKS, AND PARKING LOTS

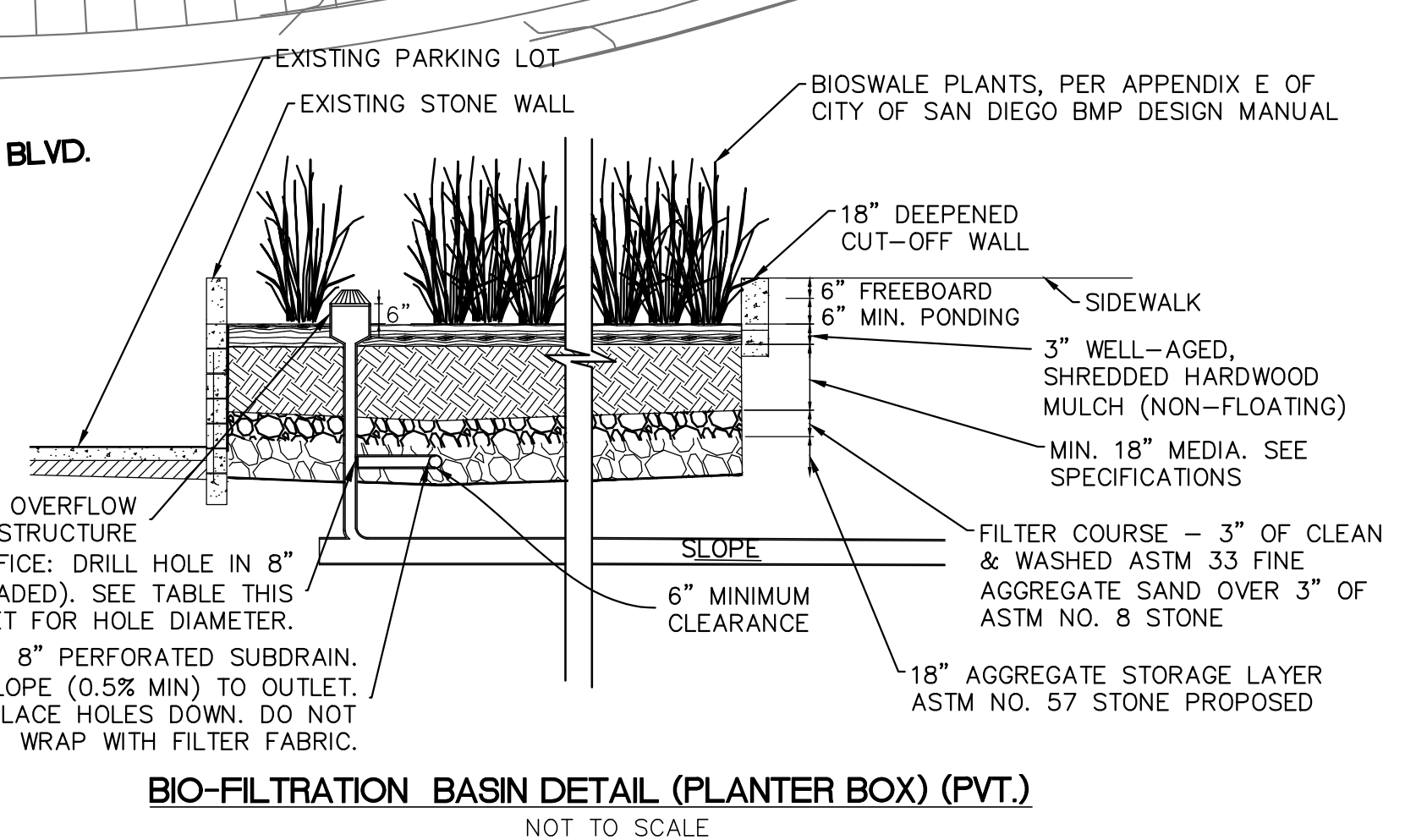
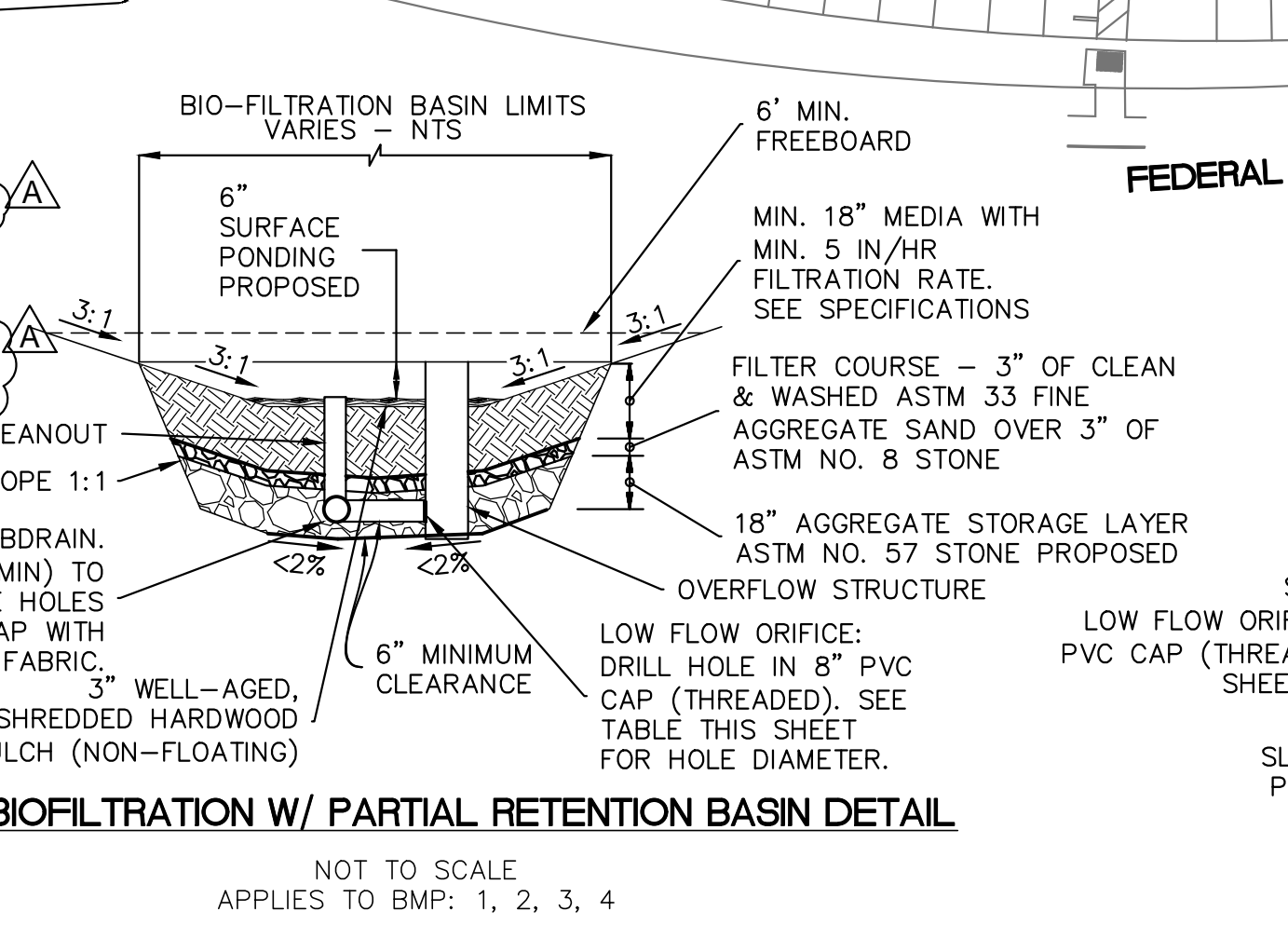
SITE DESIGN

- 4.3.3 MINIMIZE IMPERVIOUS AREA
- 4.3.4 MINIMIZE SOIL COMPACTION
- 4.3.5 IMPERVIOUS AREA DISPERSION



POC 1
 $Q_{100} = 12.39 \text{ CFS}$

BMP NAME	ORIFICE DIAMETER (IN)
1	0.25
2	0.25
3	0.25
4	0.125
5	0.10



FEDERAL BOULEVARD

C-9

PLANS FOR THE CONSTRUCTION OF:
POLICE RANGE REFURBISHMENT PROJECT - PHASE II
BMP MAP FOR PRIORITY DEVELOPMENT PROJECT

CONSULTANT

Nasland
 Civil Engineering
 Surveying
 Land Planning

T (858) 292-7770
 4740 Ruffner Street
 San Diego, CA 92111
 nasland.com

05/29/2019

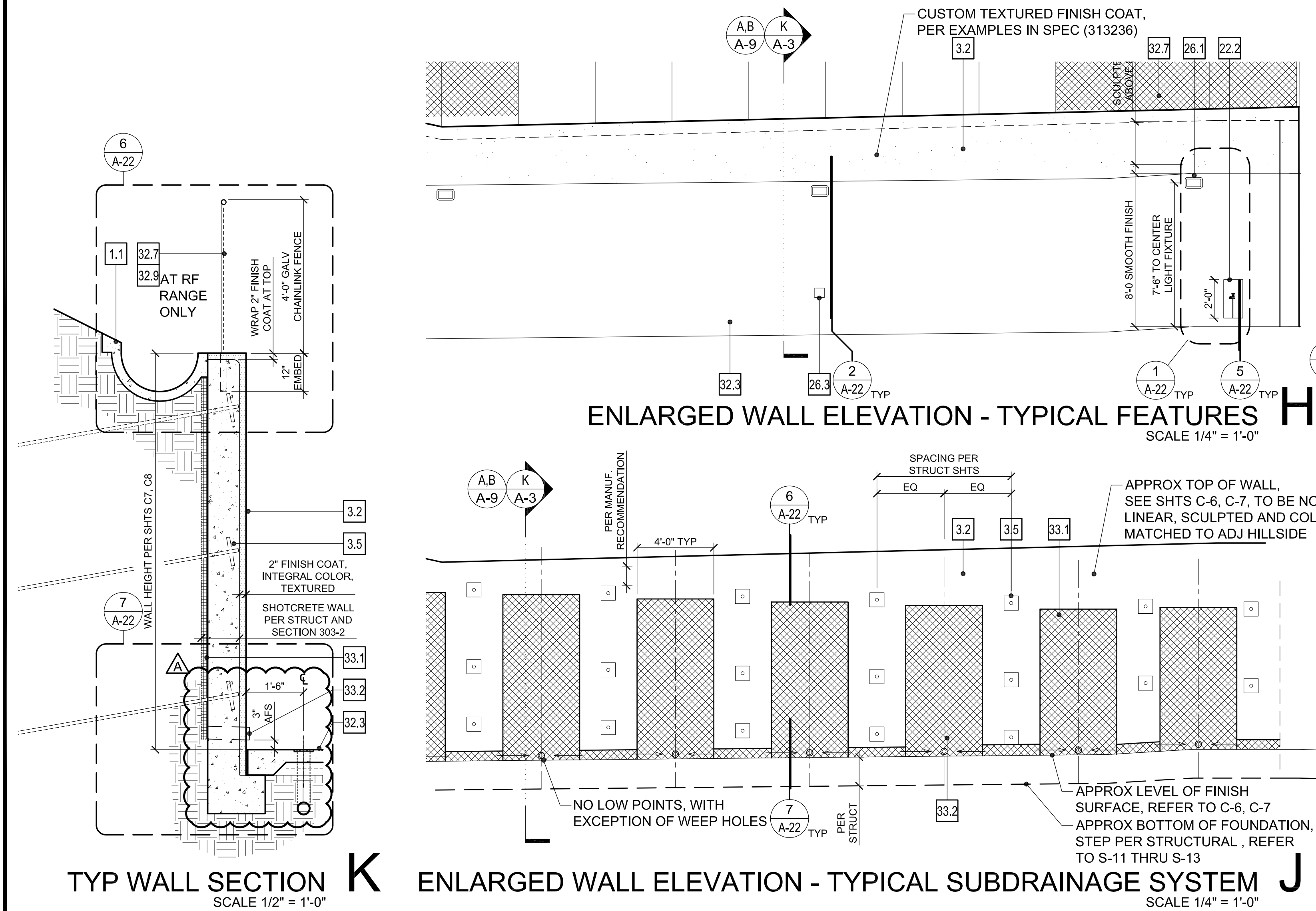
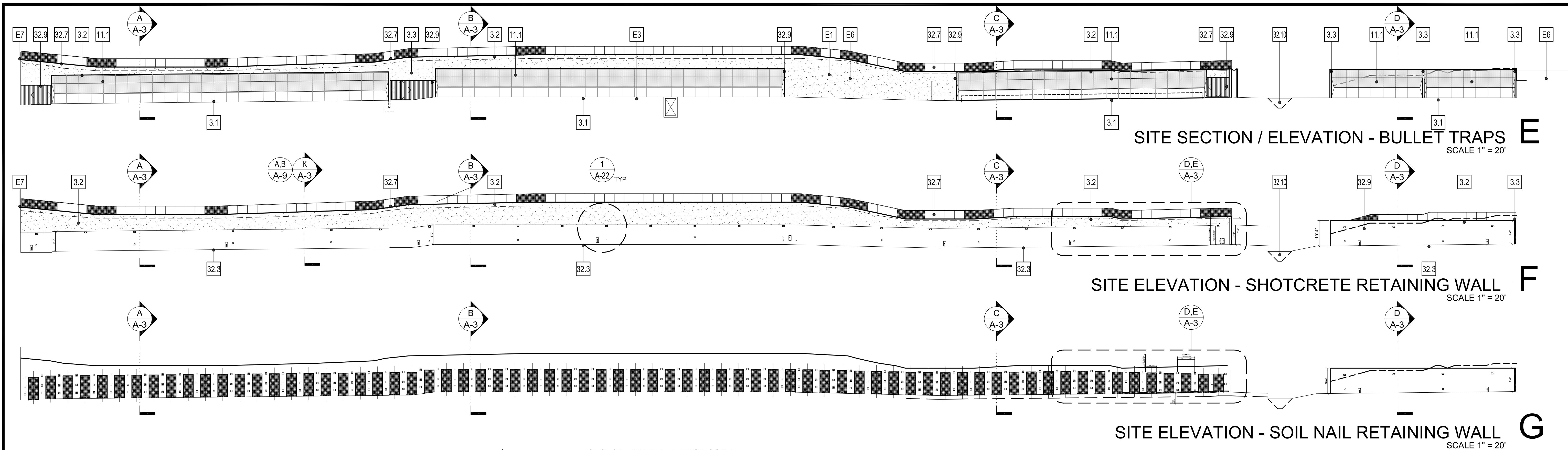
109-021.3

SPEC NO. 1847		CITY OF SAN DIEGO, CALIFORNIA DEVELOPMENT SERVICES DEPARTMENT SHEET 24 OF 131 SHEETS		W.B.S. S18005
APPROVED FOR CITY ENGINEER	DATE	05/10/2019	SUBMITTED BY MICHELLE GARCIA-QUILICO PROJECT MANAGER	
DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL	NE	Somus M	05/29/19	
ADDENDUM A	NE	Somus M	6/17/19	
AS-BUILTS				
CONTRACTOR		DATE STARTED		41205 - 24-D
INSPECTOR		DATE COMPLETED		

△ UPDATED ORIFICE DIAMETER

ADDENDUM A

POLICE RANGE REFURBISHMENT PROJECT - PHASE II



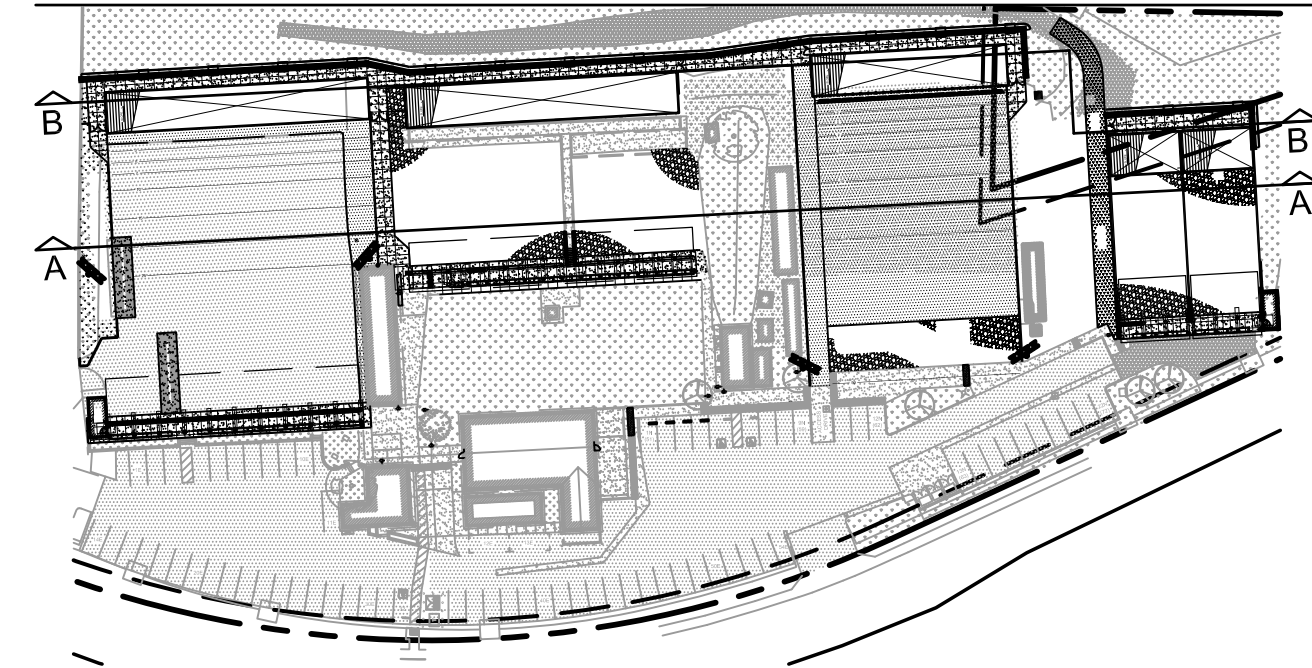
KEYNOTES (SPEC SECTION)

- E1 (E) BUILDING, TO REMAIN
- E3 (E) CONC TUNNEL AND TARGET LOADING PIT, PUBLIC RANGE ONLY, TO REMAIN
- E6 (E) SOIL BERM, TO REMAIN
- E7 (E) MASONRY WALL, TO REMAIN
- 3.1 CONC BULLET TRAP PAD (033000) REFER TO S-10
- 3.2 SHOTCRETE SOIL NAIL RETAINING WALL (303-2, 313236, 334616.16) WITH CONT BROW DITCH (SDD-106) ABOVE, REFER TO C-3, C-4, A-3, S-10
- 3.3 SITECAST CONC TILT-UP WALL, (034713), REFER TO C-4, S-26
- 3.5 SOIL NAIL TIEBACKS, REFER TO S-11 THRU S-15 (313236)
- 3.8 PCC BROW DITCH PER CIVIL
- 11.1 MODULAR BULLET BACKSTOP TRAP WITH LEAD CONTAINMENT SYSTEM (116723), REFER TO A-9
- 1.5 HOSE BIB AT RETAINING WALL, REFER TO C-5
- 2.2 LIGHT FIXTURE, (265100, 265600, 265668), REFER TO E-3
- 1.2 WEATHERPROOF RECEPTACLE, REFER TO E-8 THROUGH E-11
- 2 PCC PAVING (REFER TO S-24 THRU S-26 AT SHADE STRUCTURES; REFER TO C-3, C-4 ELSEWHERE)
- 5 CHAIN LINK FENCE (304-3)
- 5 COMPOSITE FENCES AND GATES (323132, 087100)
- 32.10 BIOFILTRATION WITH PARTIAL RETENTION BASIN, REFER TO C-2 THRU C-5, L-1
- J A-4 CRUSHPROOF SUBDRAINAGE PANEL, FILTER FABRIC BOTH SIDES, WEATHER LAP AT LIFT SEPARATIONS TIE INTO OUTLET PIPE WEEP HOLE (334600)
- J A-4 4" DIA SCHED 80 PVC DRAIN OUTLET PIPE WEEP HOLE, NON-CORROSIVE, RODENT-PROOF GRATE / SCREEN, INSTALL B.O. OUTLET 3" AFS, TYP (334600)

GENERAL NOTES

- INTEGRALLY COLORED CONCRETE AT SHOTCRETE SOIL NAIL RETAINING WALL AND SITE CAST TILT-UP WALLS TO MATCH: SOLOMON COLORS '238 THYME', OR APPROVED EQUAL. COLOR TO BE VERIFIED AND APPROVED THROUGH SUBMITTAL PROCESS AND MOCK-UP PANELS PRIOR TO INSTALLATION.
- EXTERIOR FINISH, PER SCHED

KEYPLAN



CONSULTANT

MANUEL ONCINA ARCHITECTS INC. ARCHITECTURE PLANNING INTERIORS
5711 La Jolla Blvd
La Jolla, CA 92037
tel 858/459.1221
fax 858/459.1214
www.oncinaarc.com

SPEC NO. 1847

APPROVED: *Michelle Garcia-Quilico*
C-13996
2-28-21
REB
05/10/2019

PLANS FOR THE CONSTRUCTION OF:
POLICE RANGE REFURBISHMENT PROJECT - PHASE II

SITE WALL ELEVATIONS/SECTIONS

CITY OF SAN DIEGO, CALIFORNIA
DEVELOPMENT SERVICES DEPARTMENT
SHEET 37 OF 131 SHEETS

W.B.S. S18005

APPROVED: *Samur M* 05/10/2019
FOR CITY ENGINEER DATE

DESCRIPTION	BY	DATE	FILED
ORIGINAL	MOA	05/10/19	
ADDENDUM A	MOA	6/17/19	
AS-BUILTS			

CHECKED BY: *David Senah*
PROJECT MANAGER
PROJECT ENGINEER

202-1735
CCS27 COORDINATE
1842-6295
CCS83 COORDINATE

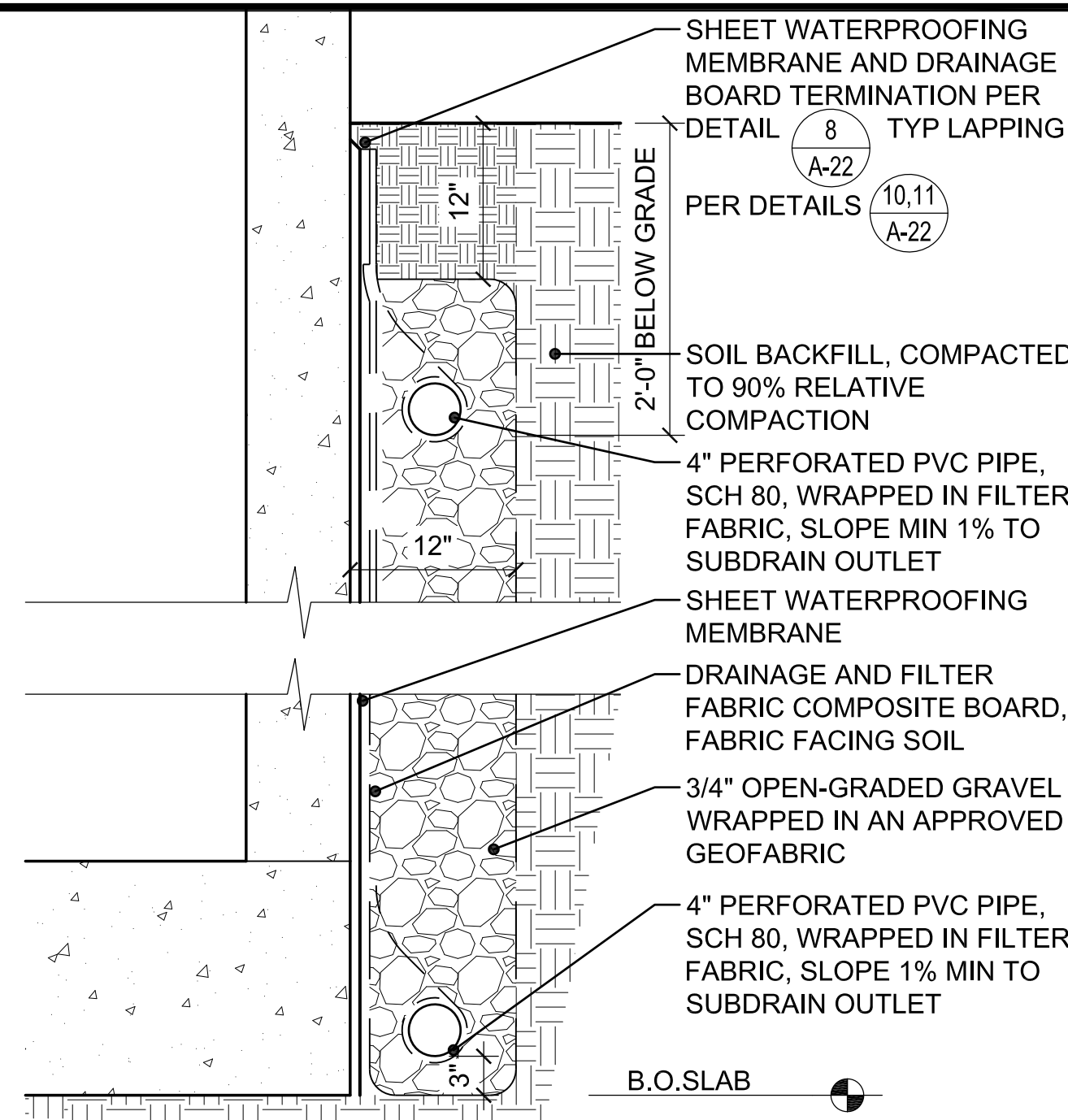
41205 - 32-D

CONTRACTOR DATE STARTED
INSPECTOR DATE COMPLETED

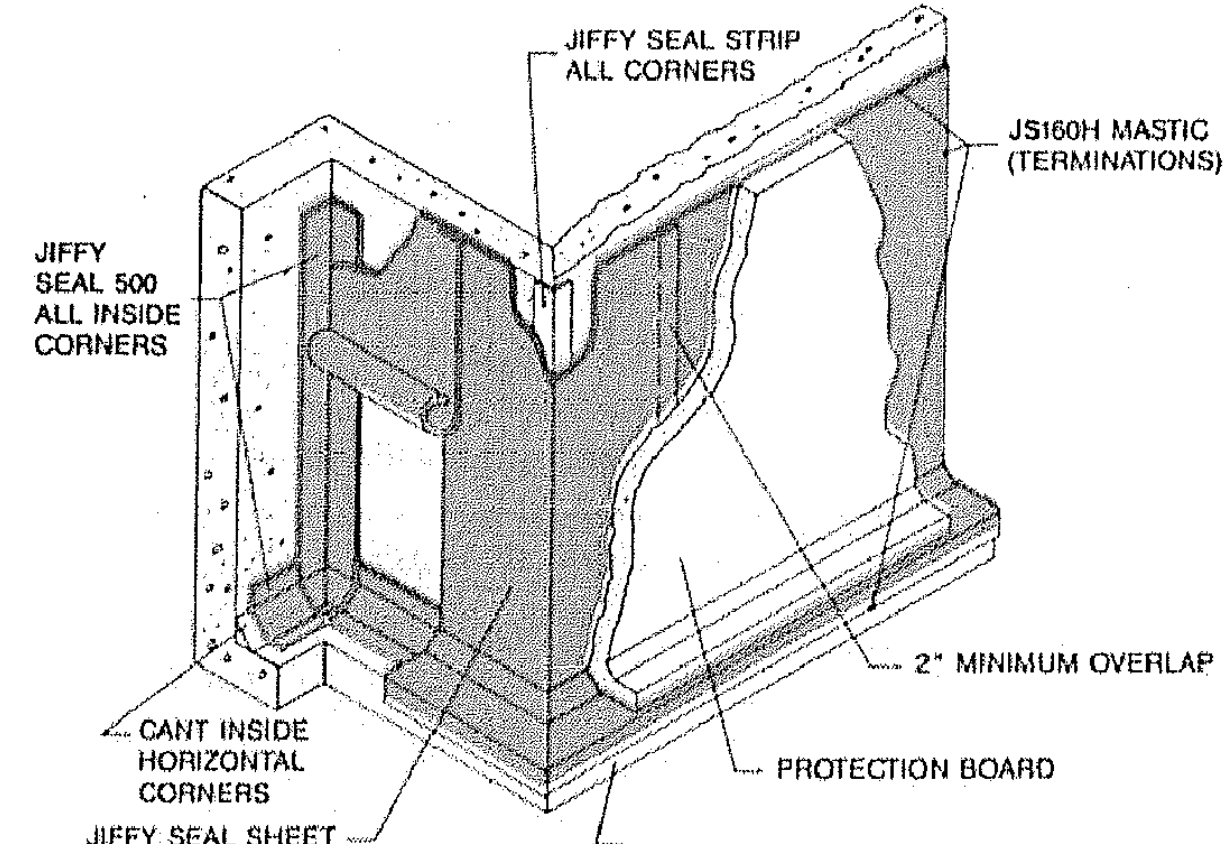
UPDATE VIEW K

ADDENDUM A

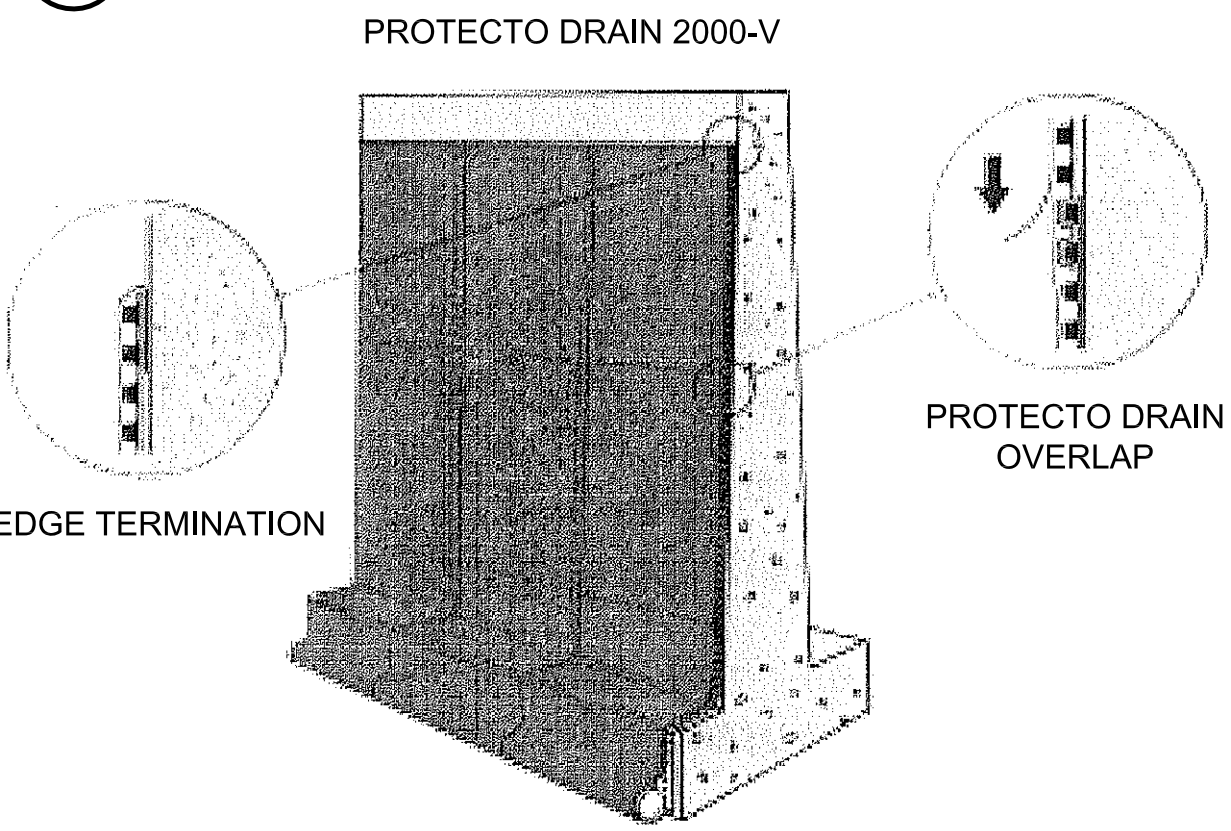
POLICE RANGE REFURBISHMENT PROJECT - PHASE II



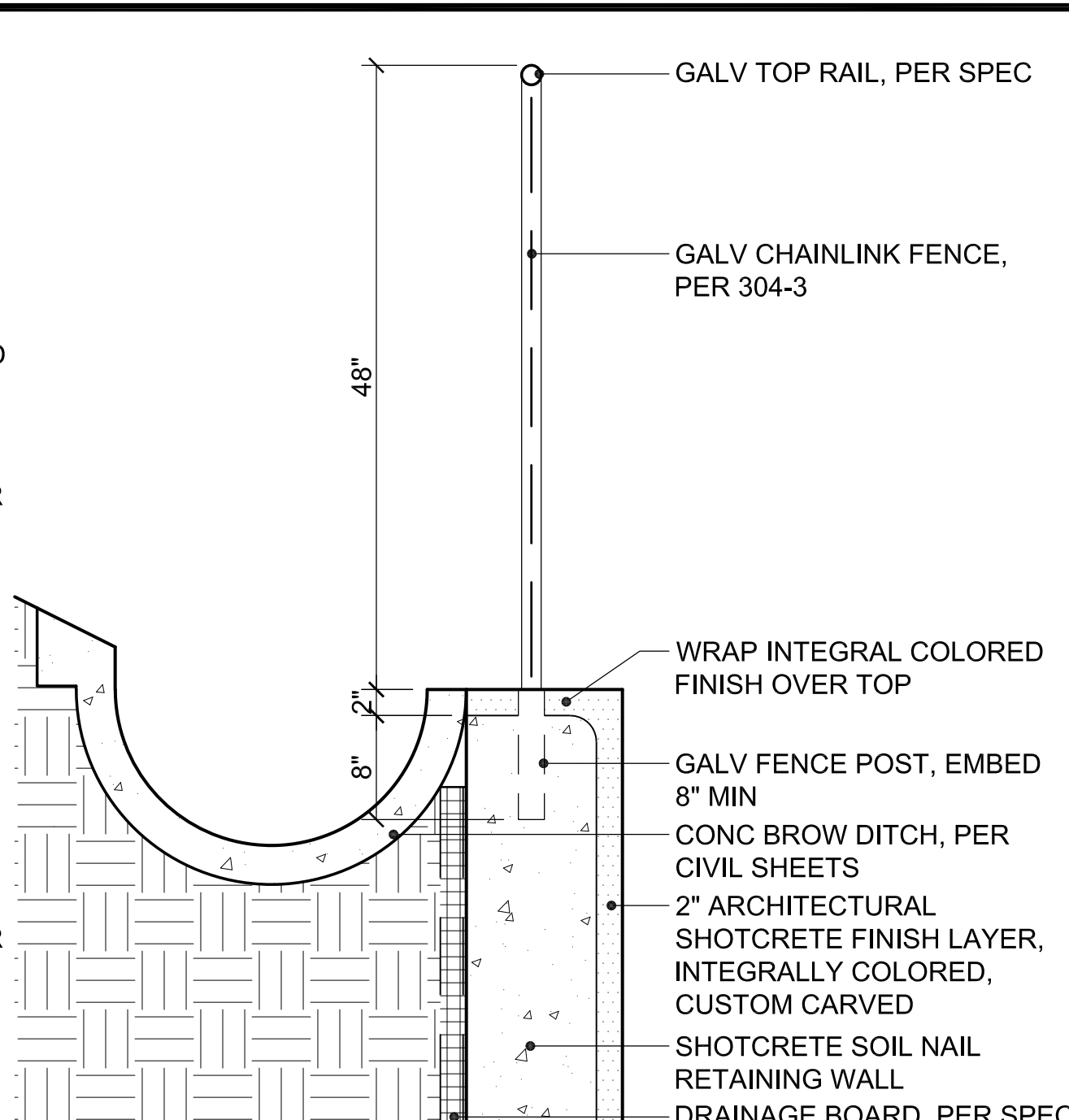
9 TYP WATERPROOFING AND SUBDRAIN
SCALE: 1"=1'-0"



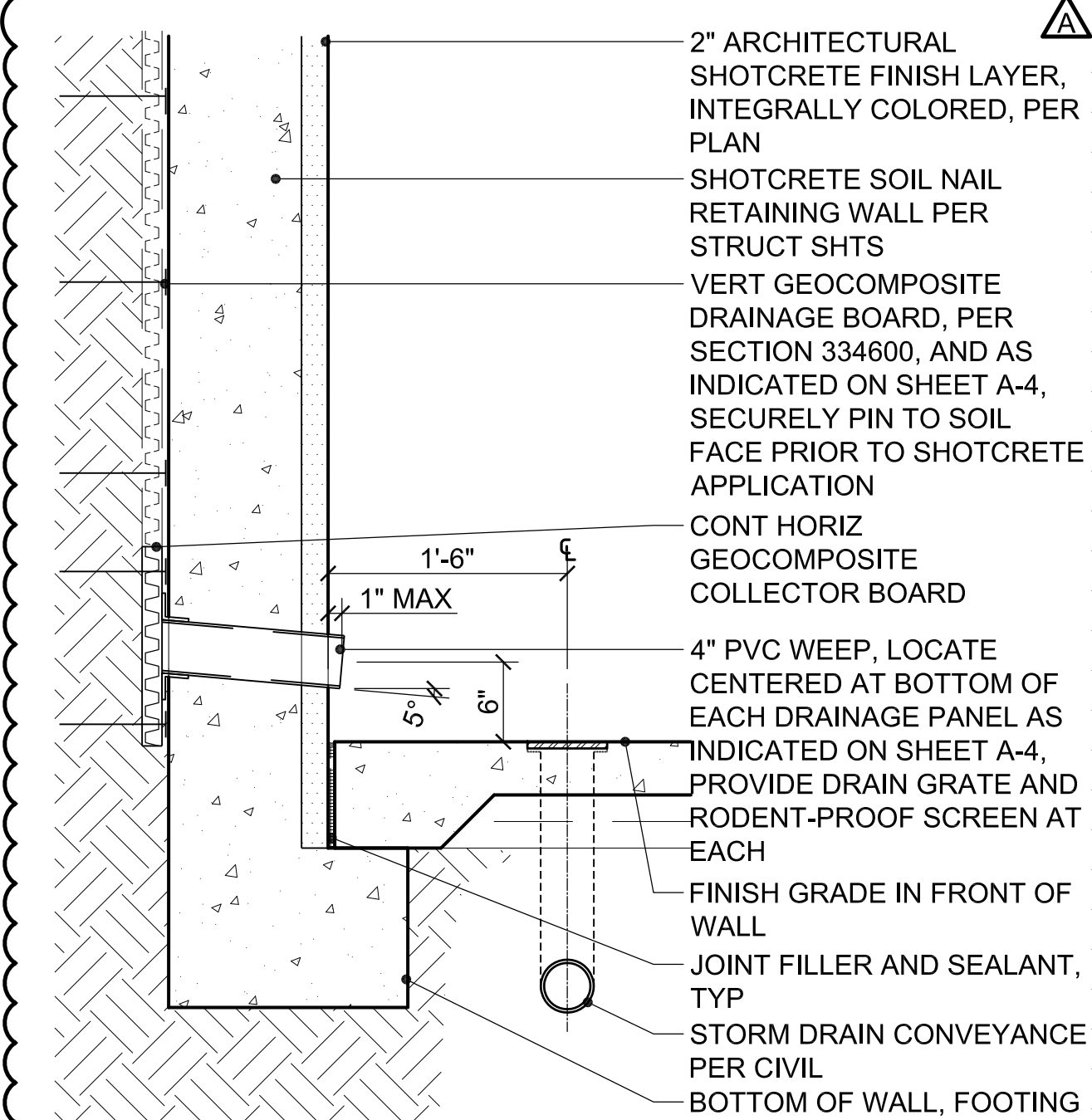
10 TYP SHEET WATERPROOFING APPLICATION*
SCALE: FULL



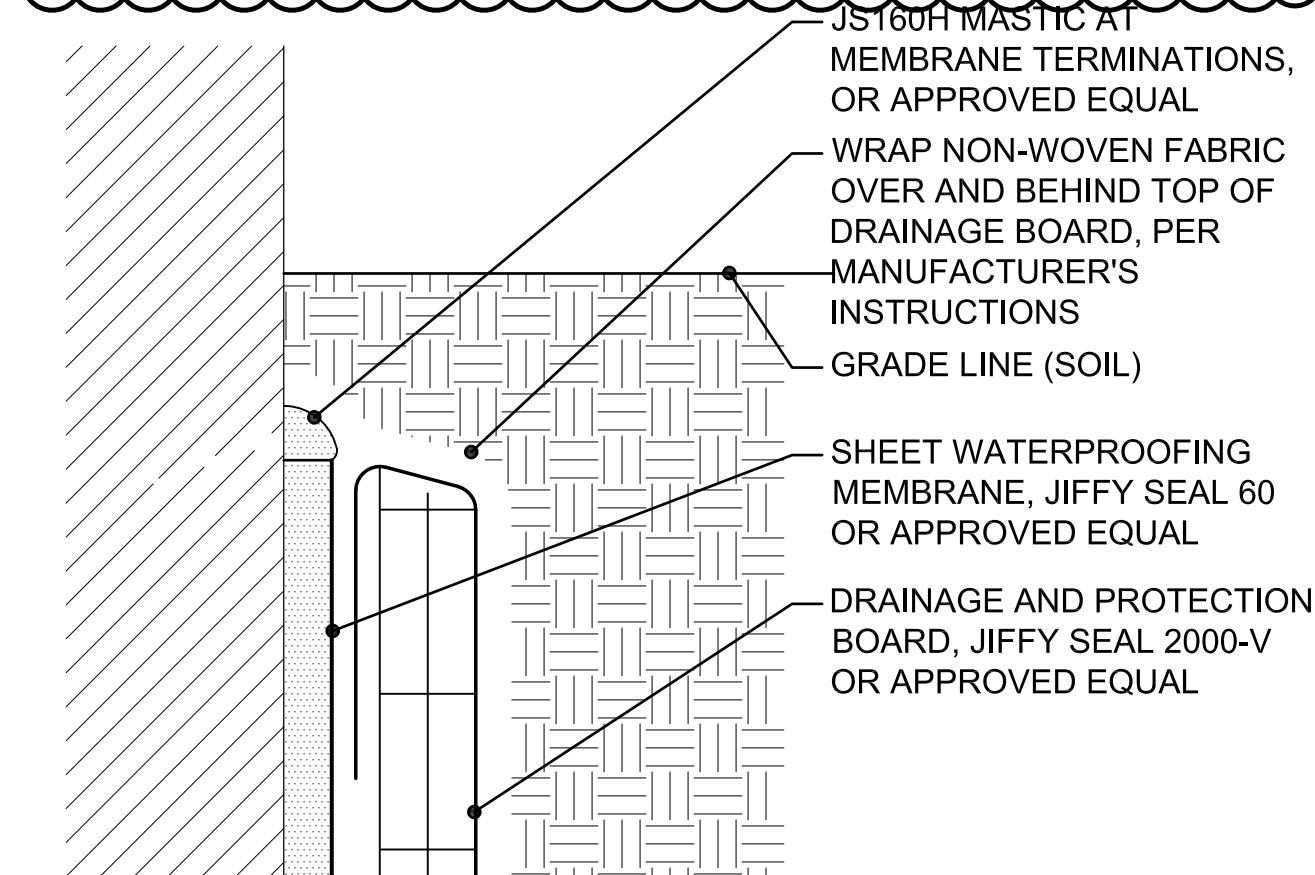
11 TYP DRAINAGE BOARD APPLICATION*
SCALE: FULL



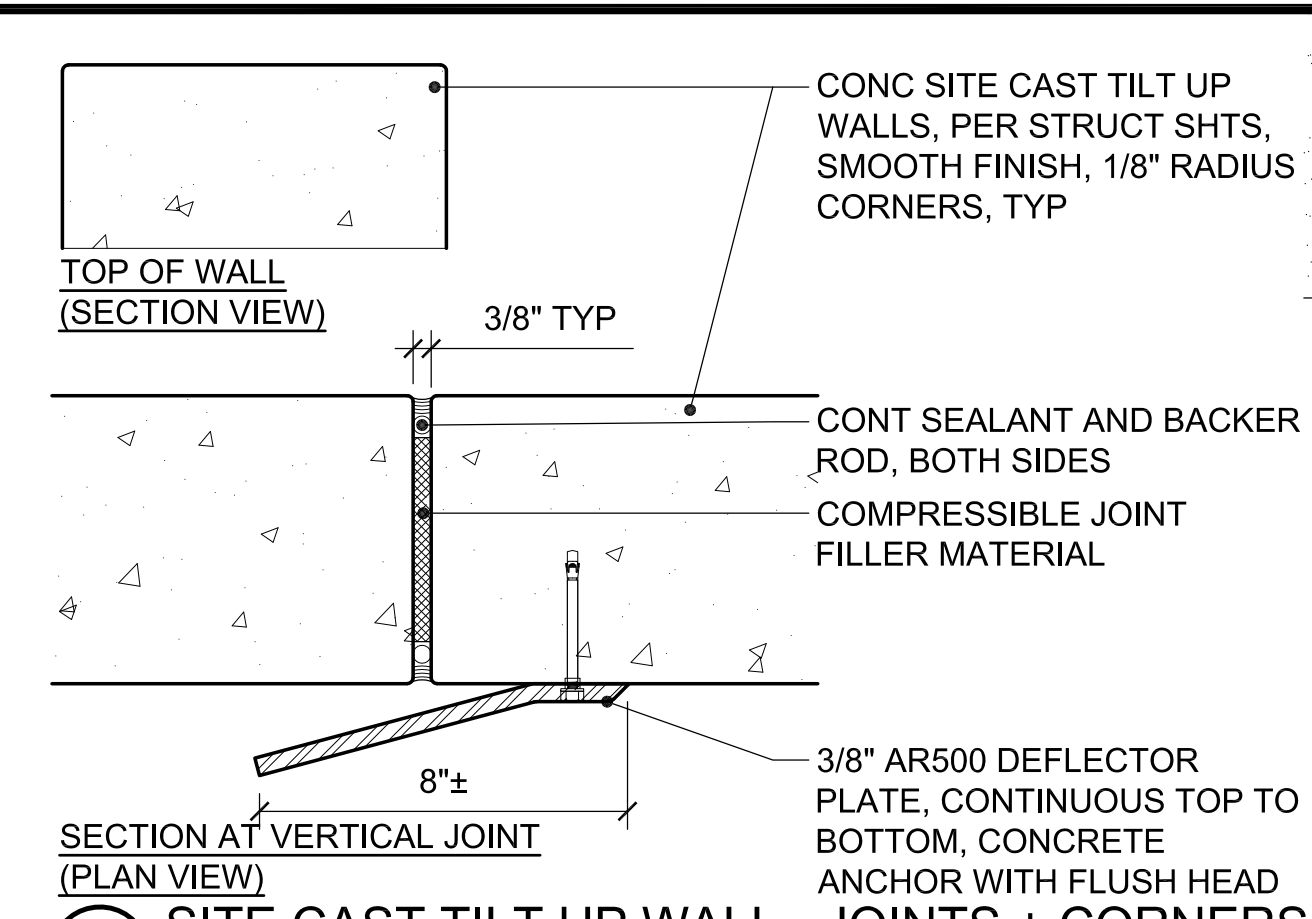
6 GUARD, FENCE AT TOP OF RETAINING WALL
SCALE: 1"=1'-0"



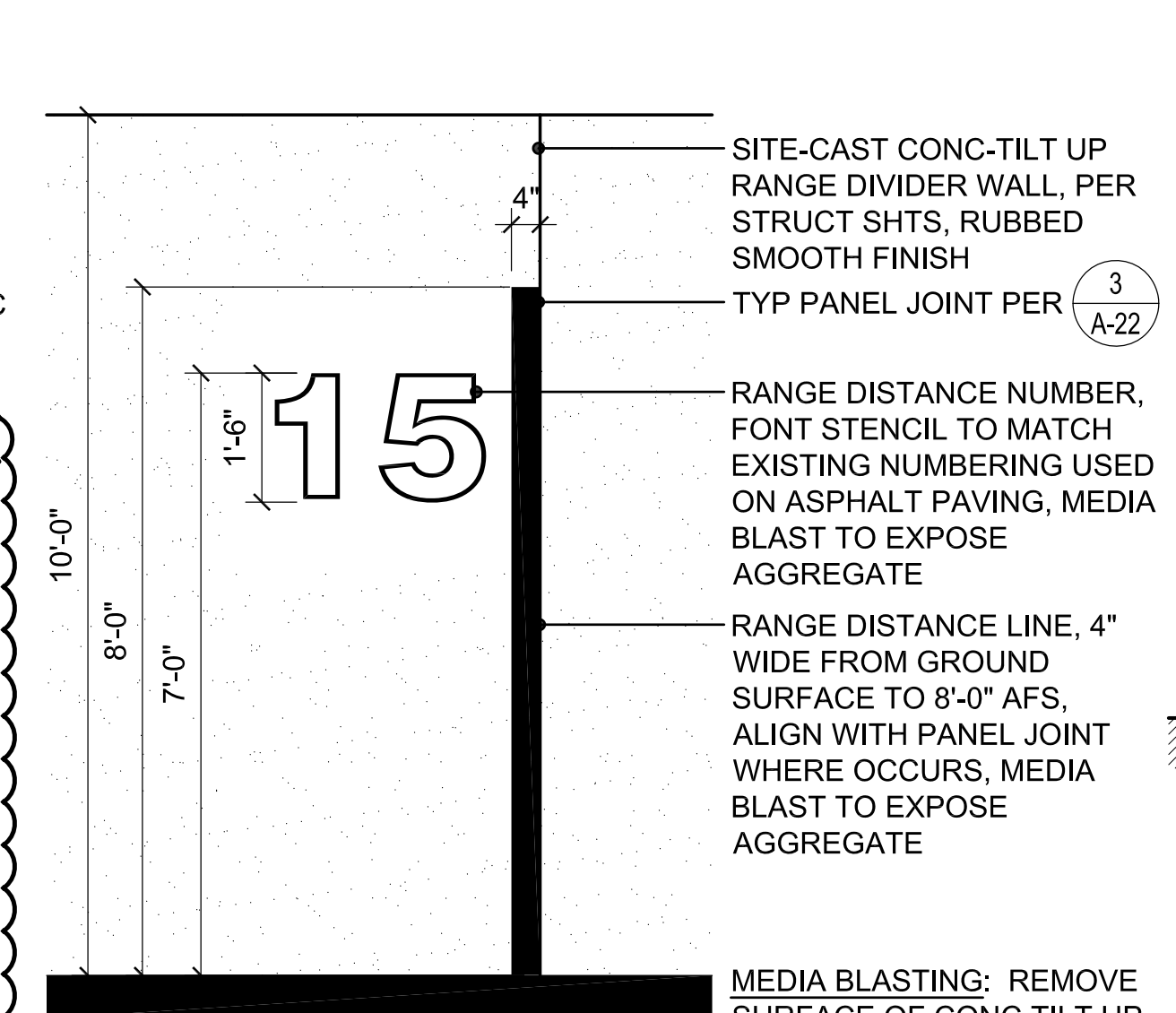
7 PVC DRAIN OUTLET PIPE WEEP HOLE
SCALE: 1"=1'-0"



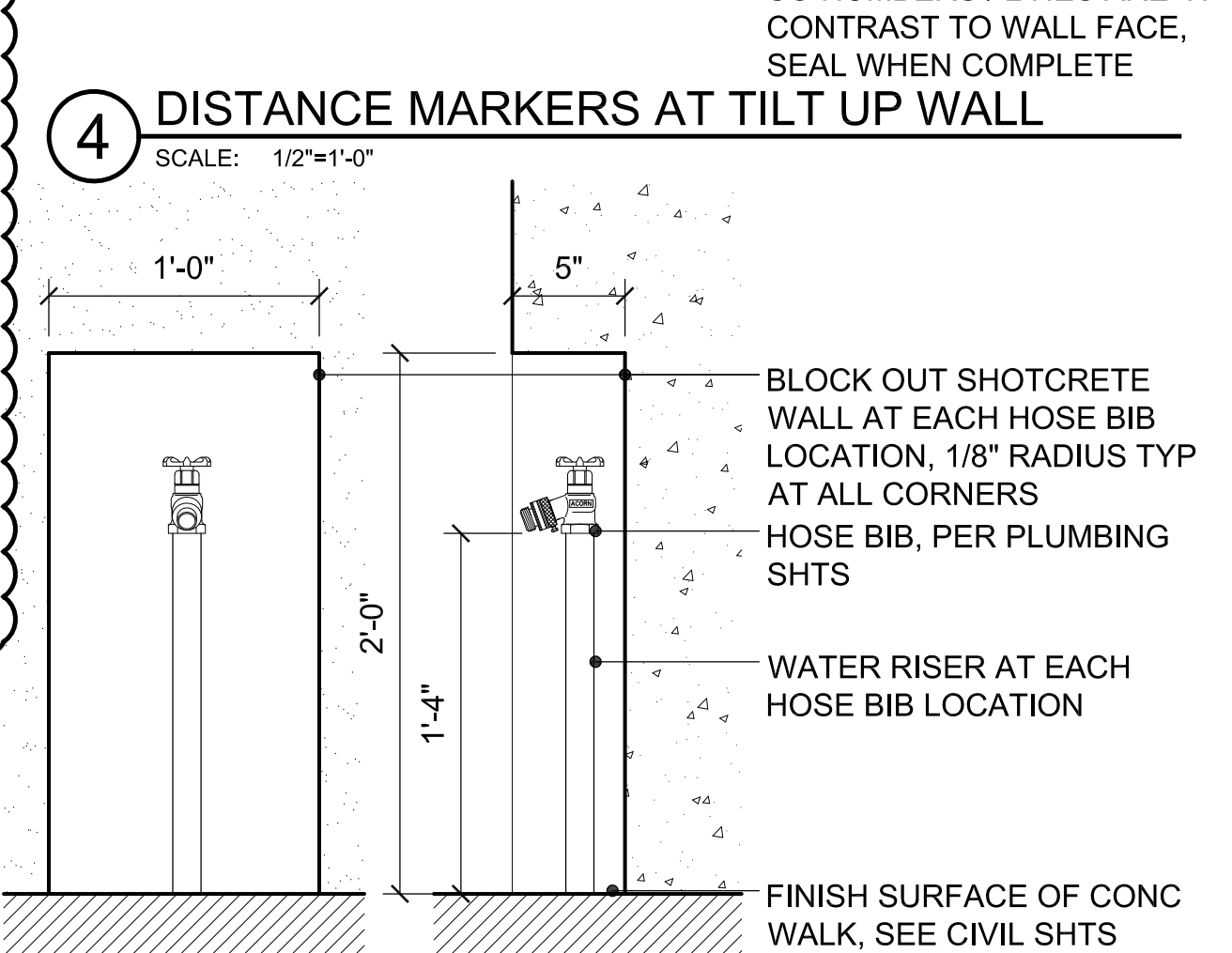
8 SHEET WATERPROOFING TERMINATION
SCALE: FULL



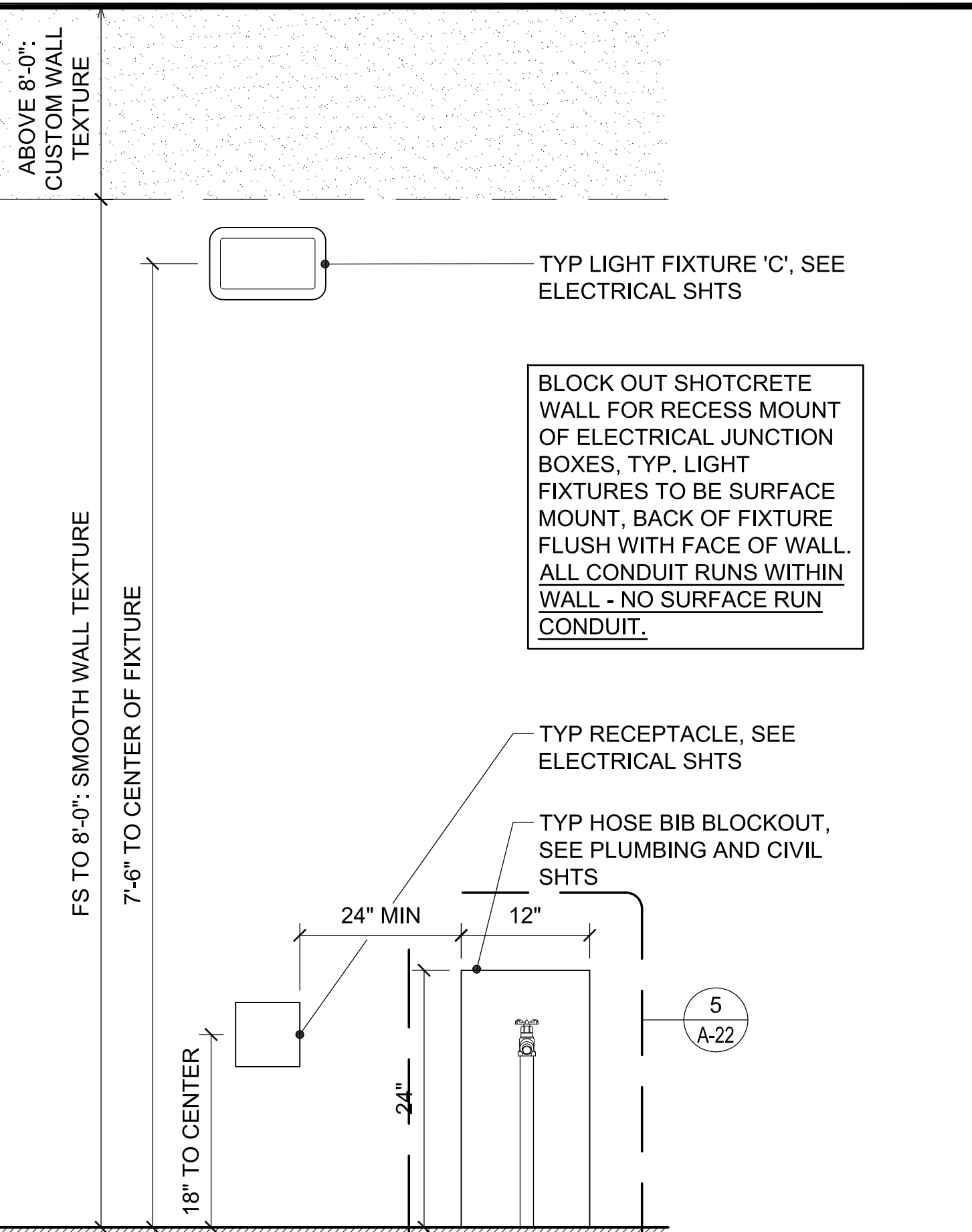
3 SITE CAST TILT UP WALL - JOINTS + CORNERS
SCALE: 3"=1'-0"



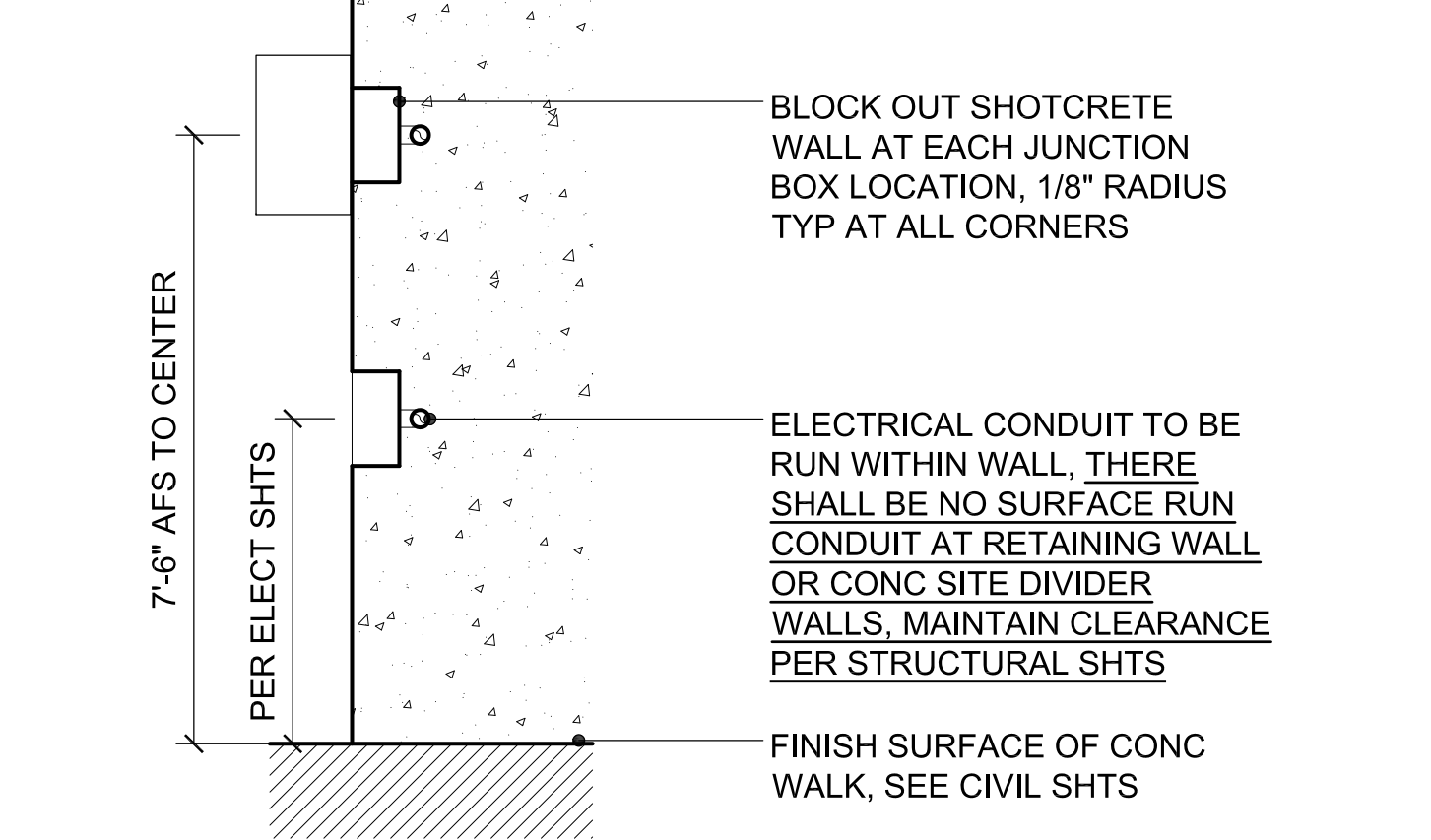
4 DISTANCE MARKERS AT TILT UP WALL
SCALE: 1/2"=1'-0"



5 TYP HOSE BIB BLOCK OUT
SCALE: 1-1/2"=1'-0"



1 TYP UTILITIES AT RETAINING WALL
SCALE: 1"=1'-0"



2 TYP ELECTRICAL AT RETAINING WALL
SCALE: 1-1/2"=1'-0"

A-22

PLANS FOR THE CONSTRUCTION OF:
POLICE RANGE REFURBISHMENT PROJECT - PHASE II

DETAILS

SPEC NO. 1847		CITY OF SAN DIEGO, CALIFORNIA DEVELOPMENT SERVICES DEPARTMENT SHEET 50 OF 131 SHEETS		W.B.S. S18005
<p>MANUEL ONCINA ARCHITECTS INC. ARCHITECTURE PLANNING INTERIORS 5711 La Jolla Blvd La Jolla, CA 92037 tel 858/459.1221 fax 858/459.1214 www.oncinaarc.com</p>		APPROVED	DATE	SUBMITTED BY
		FOR CITY ENGINEER	05/10/2019	MICHELLE GARCIA-QUILICO PROJECT MANAGER
DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL	MOA	Somur M	05/10/19	
ADDENDUM A	MOA	Somur M	6/17/19	
AS-BUILTS				
CONTRACTOR		DATE STARTED		41205 - 50-D
INSPECTOR		DATE COMPLETED		

UPDATE DETAIL 7

ADDENDUM A

POLICE RANGE REFURBISHMENT PROJECT - PHASE II

SIGNS AND IDENTIFICATION:

1. WHEN SIGNS IDENTIFY PERMANENT ROOM AND SPACES OF A BUILDING OR SITE, THEY SHALL COMPLY WITH THE FOLLOWING REQUIREMENTS AS WELL AS ANY OTHER REQUIREMENT SPECIFIED IN 2016 CBC.

2. **FINISH AND CONTRAST:** CHARACTERS, SYMBOLS AND THEIR BACKGROUND SHALL HAVE A NON-GLARE FINISH. CHARACTERS AND SYMBOLS SHALL CONTRAST WITH THEIR BACKGROUND.

3. **PROPORTIONS:** CHARACTERS ON SIGNS SHALL BE SELECTED FROM FONTS WHERE THE WIDTH OF AN UPPERCASE 'O' IS 60% MINIMUM AND 110% MAXIMUM OF THE HEIGHT OF THE UPPERCASE LETTER 'I'.

4. **CHARACTER HEIGHT:** CHARACTERS AND NUMBERS ON SIGNS REQUIRED TO BE ACCESSIBLE BY CBC SECTION 1117B.5.5 AND TABLE 11B-703.5.5. THE MINIMUM CHARACTER HEIGHT IS MEASURED USING AN UPPERCASE LETTER 'I'. VIEWING DISTANCE SHALL BE MEASURED AS THE HORIZONTAL DISTANCE BETWEEN THE CHARACTER AND AN OBSTRUCTION PREVENTING FURTHER APPROACH TOWARDS THE SIGN. **VISUAL CHARACTER HEIGHT**

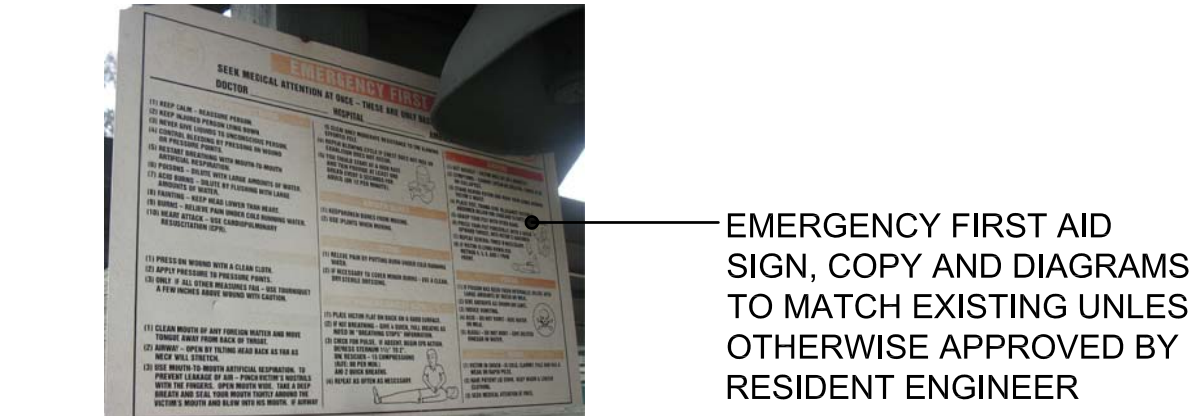
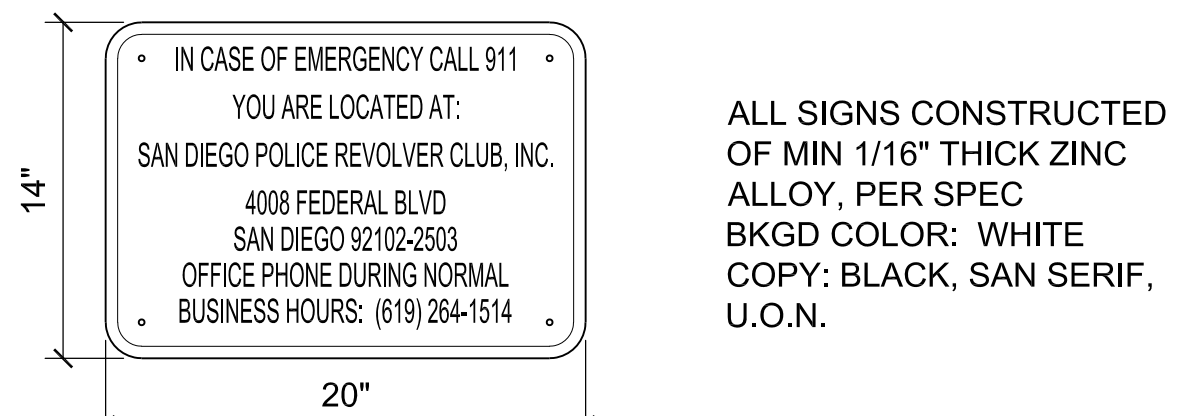
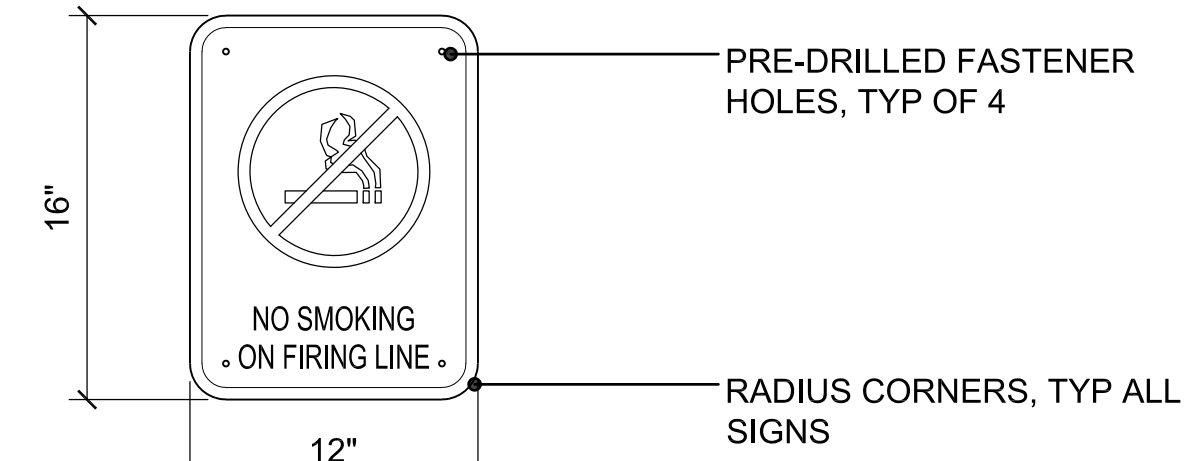
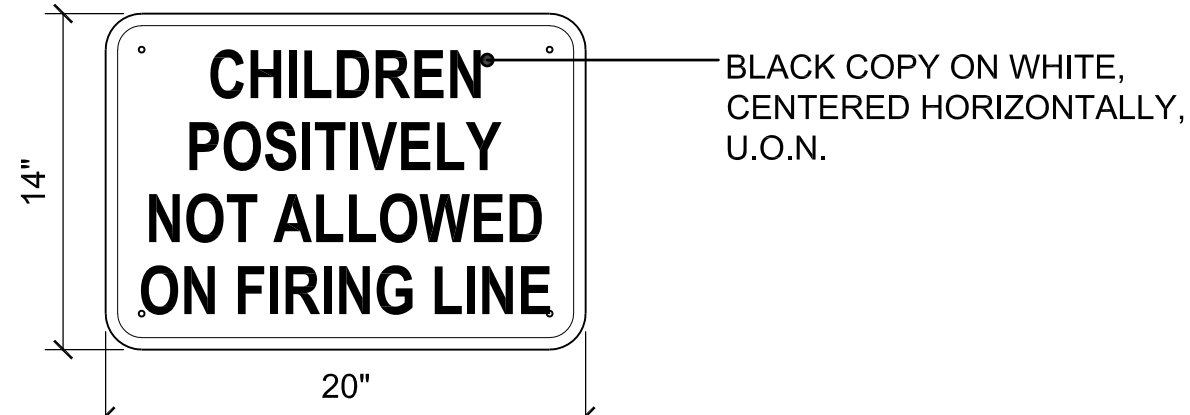
HEIGHT TO FINISH FLOOR OR GROUND FROM BASELINE OF CHARACTER	HORIZONTAL VIEWING DISTANCE	MINIMUM CHARACTER HEIGHT
40 inches to less than or equal to 70 inches	Less than 72 inches	5/8 inch
	72 inches and greater	5/8 inch, plus 1/8 inch per foot of viewing distance above 72 inches
Greater than 70 inches to less than or equal to 120 inches	Less than 180 inches	2 inches
	180 inches and greater	2 inches, plus 1/8 inch per foot of viewing distance above 180 inches
Greater than 120 inches	Less than 21 feet	3 inches
	21 feet and greater	3 inches, plus 1/8 inch per foot of viewing distance above 21 feet

5. **STROKE THICKNESS:** STROKE THICKNESS OF THE UPPERCASE LETTER 'I' SHALL BE 10% MINIMUM AND 20% MAXIMUM OF THE HEIGHT OF THE CHARACTER.

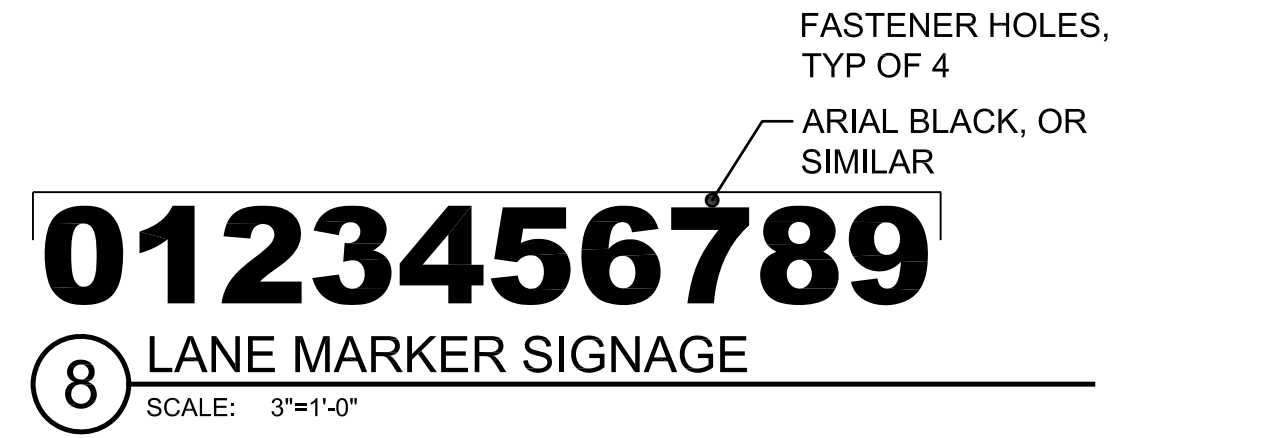
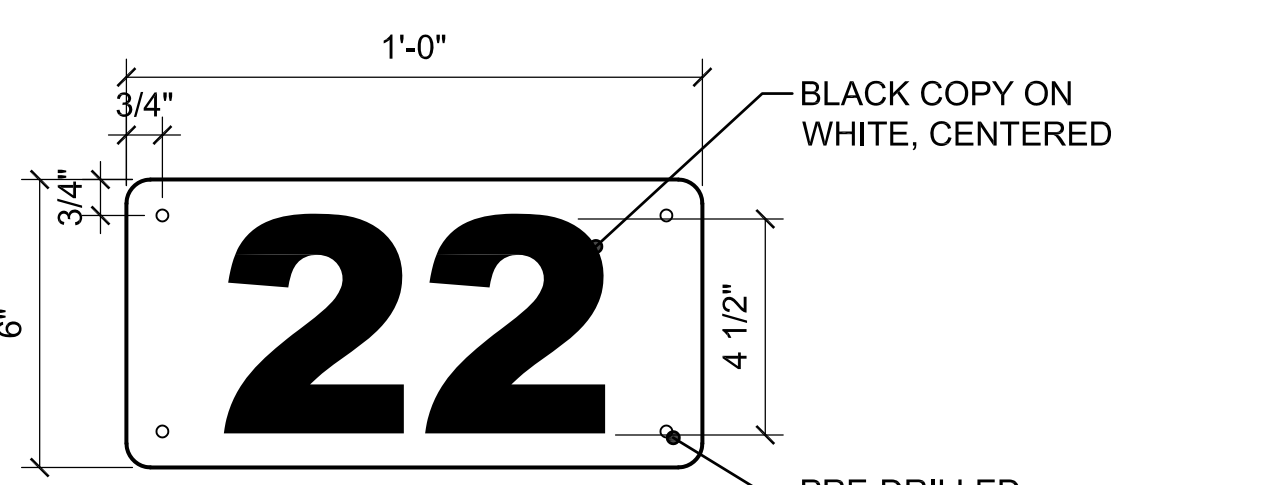
6. **CHARACTER SPACING:** CHARACTER SPACING SHALL BE MEASURED BETWEEN THE TWO CLOSEST POINTS OF ADJACENT CHARACTERS, EXCLUDING WORD SPACES. SPACING BETWEEN INDIVIDUAL CHARACTERS SHALL BE 10% MINIMUM AND 35% MAXIMUM OF CHARACTER HEIGHT.

b. **LINE SPACING:** SPACING BETWEEN THE BASELINES OF SEPARATE LINE OF CHARACTERS WITHIN A MESSAGE SHALL BE 135% MINIMUM AND 170% MAXIMUM OF THE CHARACTER HEIGHT.

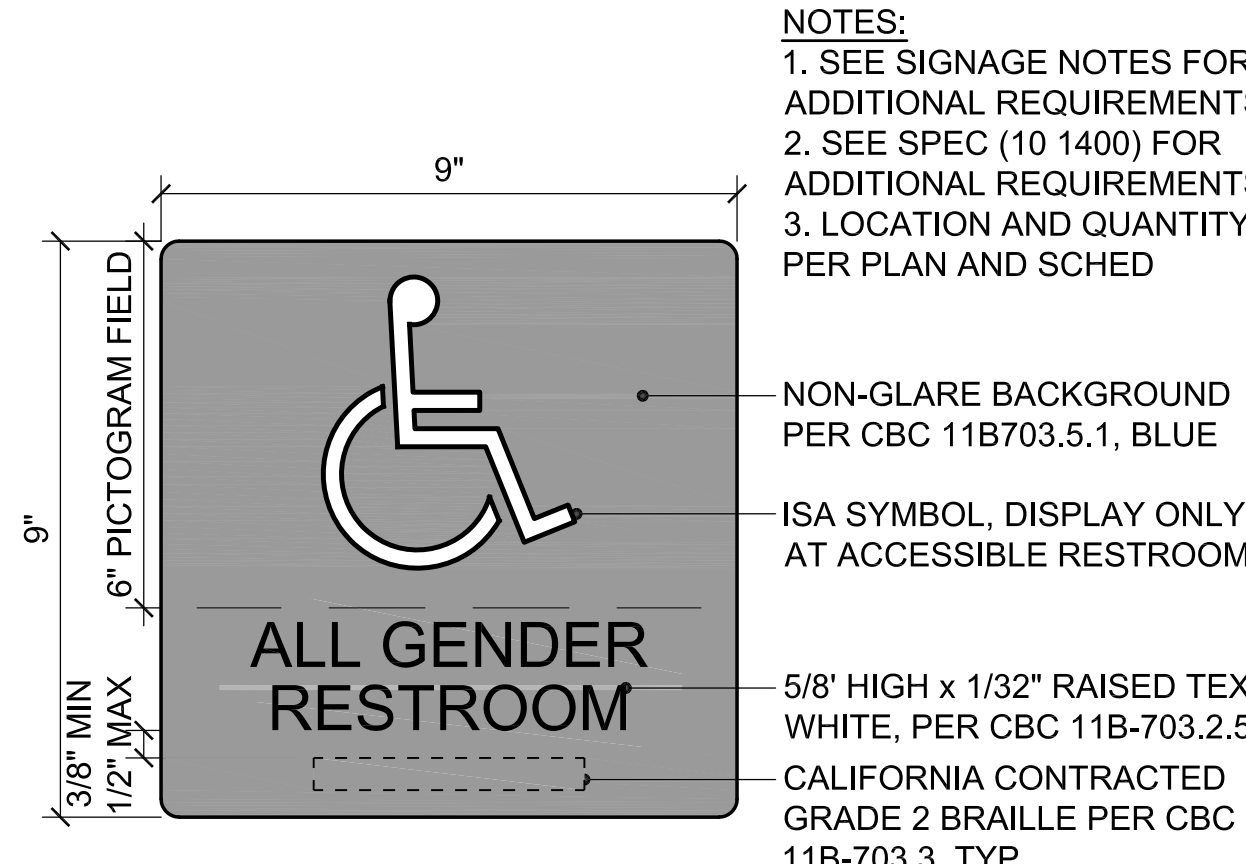
c. **PICTORIAL SYMBOL SIGNS:** PICTORIAL SYMBOLS SIGNS SHALL BE ACCOMPANIED BY TEXT DESCRIPTORS PLACED DIRECTLY BELOW THE PICTOGRAM. THE OUTSIDE DIMENSION OF THE PICTOGRAM FIELD SHALL BE A MINIMUM OF 6 INCHES IN HEIGHT.



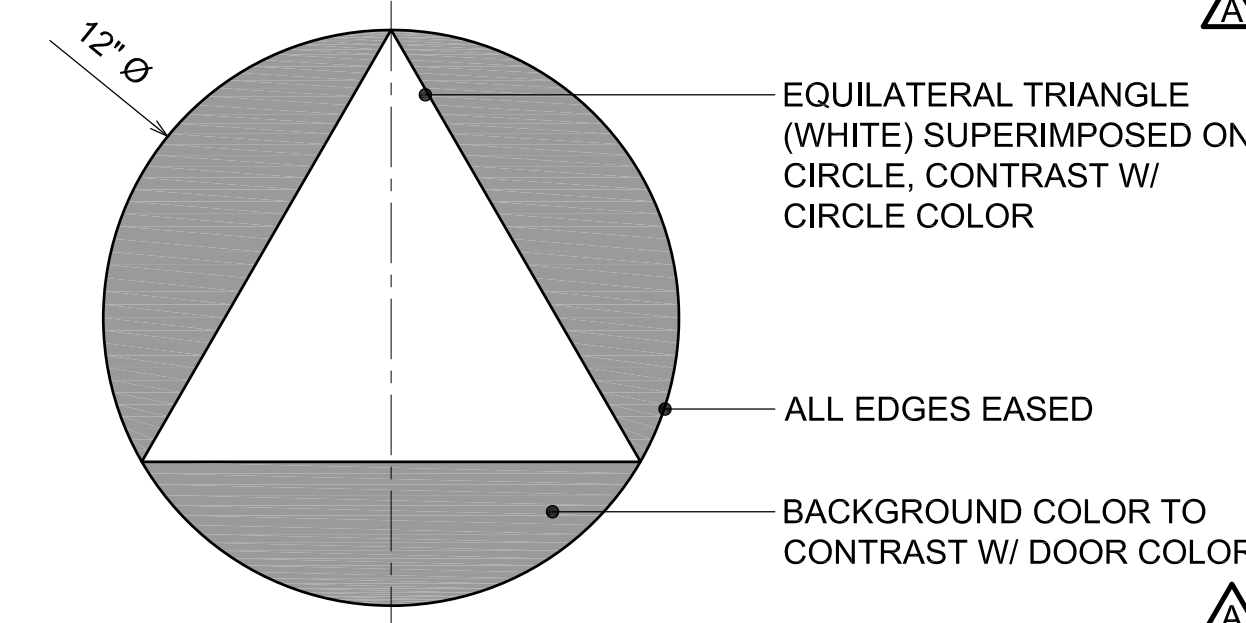
7 MISCELLANEOUS RANGE SIGNAGE
SCALE: 1-1/2"=1'-0"



8 LANE MARKER SIGNAGE
SCALE: 3"=1'-0"

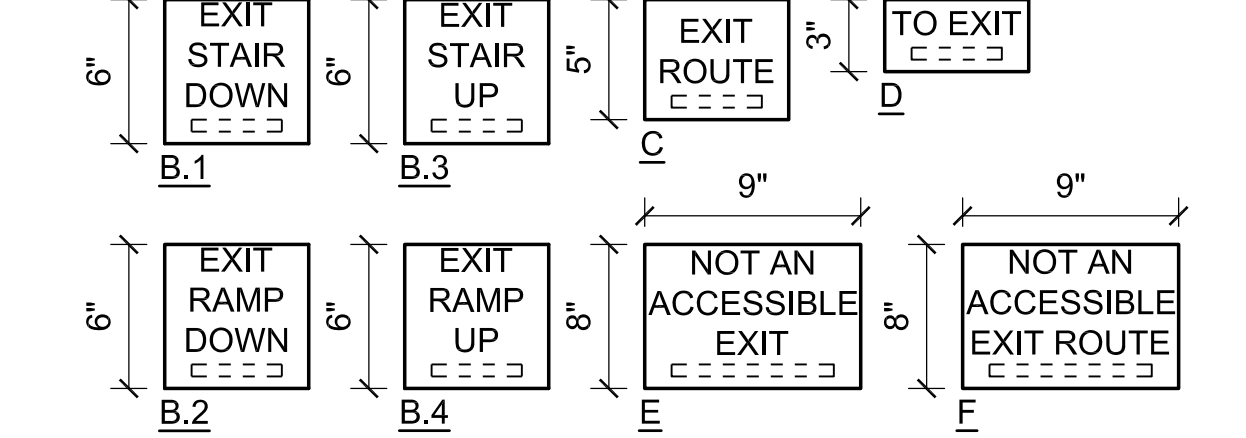
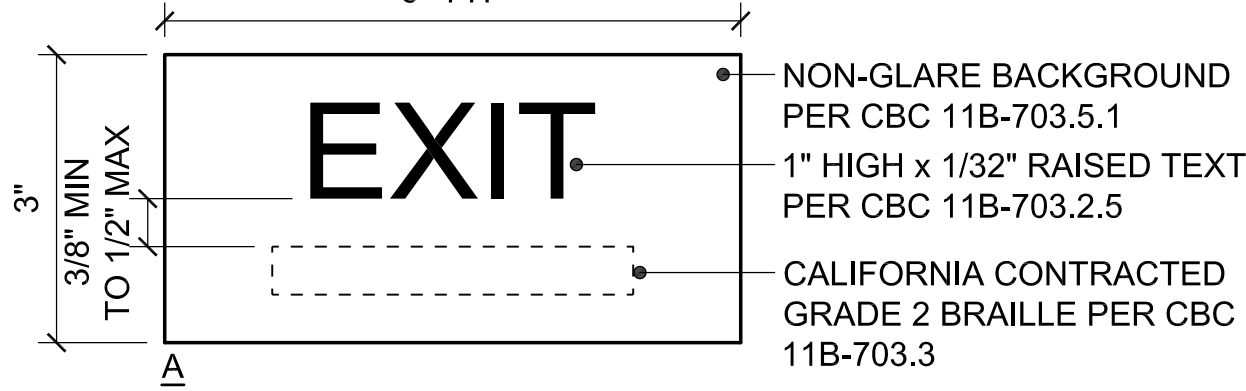


3 RESTROOM TACTILE SIGNAGE
SCALE: NOT TO SCALE



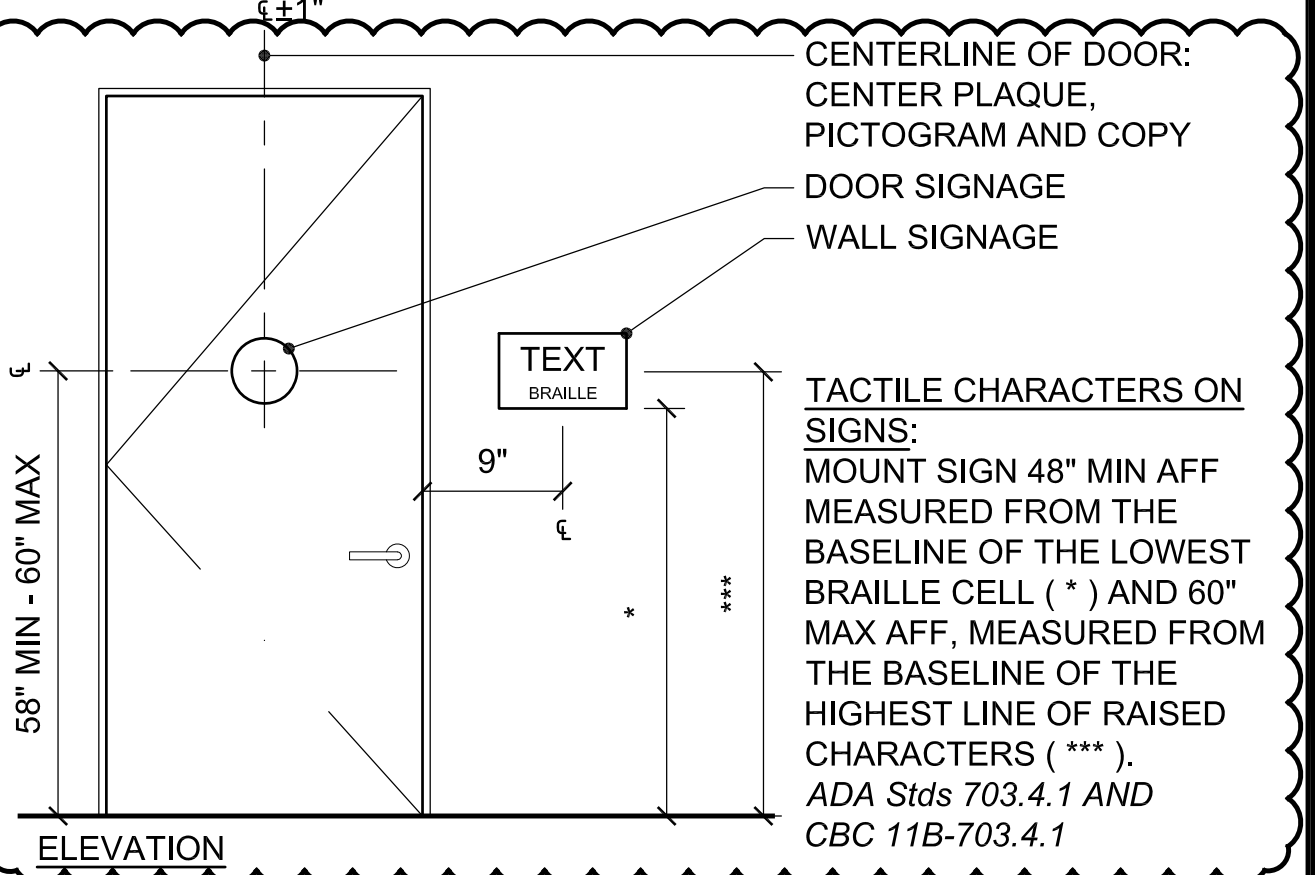
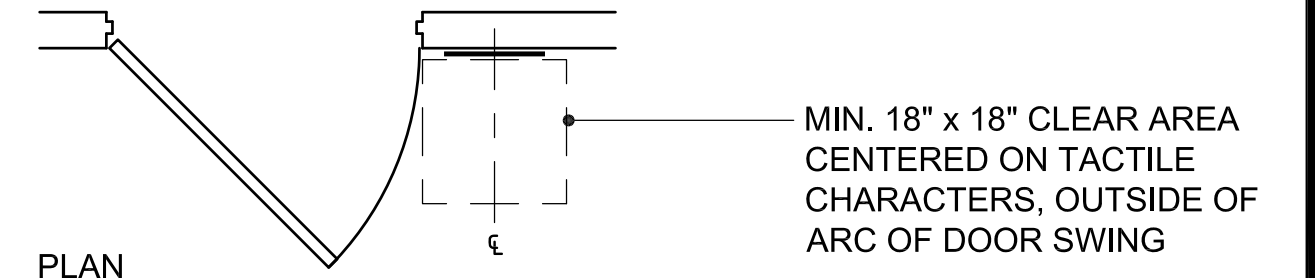
NOTES:
1. SIGN SURFACE TO BE COMPLETELY FLUSH, NO PROJECTIONS.
2. GEOMETRIC SYMBOL REQUIRED AT EACH RESTROOM DOOR, NON-TACTILE, NO RAISED SURFACES

4 GEOMETRIC SYMBOL PLAQUE
SCALE: 3"=1'-0"

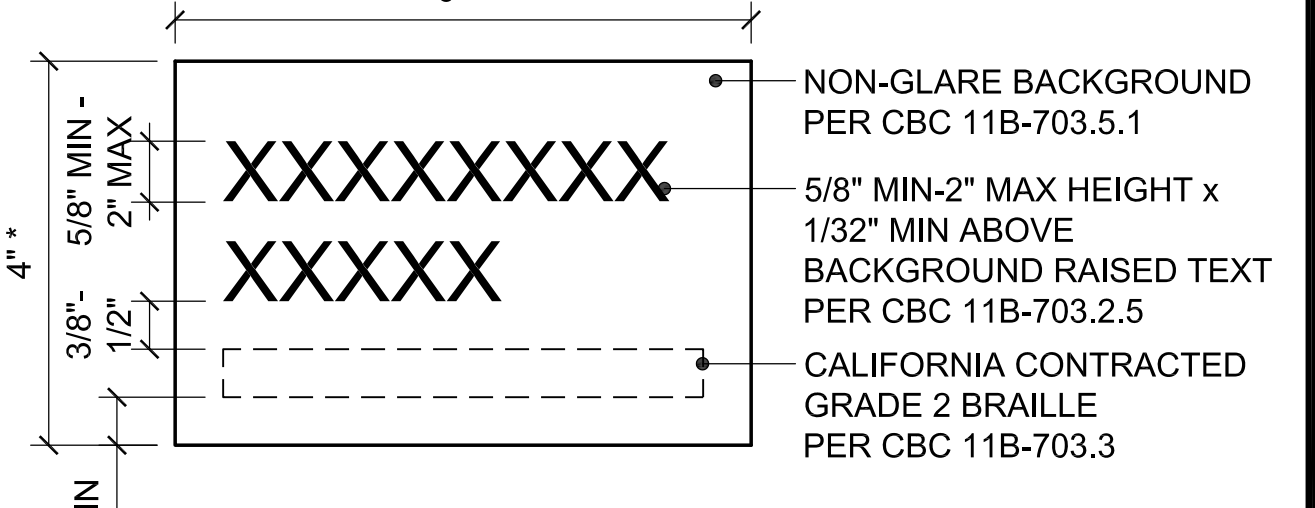


5 TACTILE SIGNAGE - EXIT
SCALE: 6"=1'-0"

NOTE: WHERE A TACTILE SIGN IS PROVIDED AT A DOOR, THE SIGN SHALL BE LOCATED ALONGSIDE THE DOOR AT THE LATCH SIDE. WHERE A TACTILE SIGN IS PROVIDED AT DOUBLE DOORS WITH ONE ACTIVE LEAF, THE SIGN SHALL BE LOCATED ON THE INACTIVE LEAF. WHERE A TACTILE SIGN IS PROVIDED AT DOUBLE DOORS WITH TWO ACTIVE LEAFS, THE SIGN SHALL BE LOCATED TO THE RIGHT OF THE RIGHT HAND DOOR. WHERE THERE IS NO WALL SPACE AT THE LATCH SIDE OF A SINGLE DOOR OR AT THE RIGHT SIDE OF DOUBLE DOORS, SIGNS SHALL BE LOCATED ON THE NEAREST ADJACENT WALL. SIGNS CONTAINING TACTILE CHARACTERS SHALL BE LOCATED SO THAT A CLEAR FLOOR SPACE OF 18" MIN x 18" MIN, CENTERED ON THE TACTILE CHARACTERS, IS PROVIDED BEYOND THE ARC OF ANY DOOR SWING BETWEEN THE CLOSED POSITION AND 45 DEGREE OPEN POSITION. WHERE PERMANENT IDENTIFICATION SIGNAGE IS PROVIDED FOR ROOMS AND SPACES THEY SHALL BE LOCATED ON THE APPROACH SIDE OF THE DOOR AS ONE ENTERS THE ROOM OR SPACE. SIGNS THAT IDENTIFY EXITS SHALL BE LOCATED ON THE APPROACH SIDE OF THE DOOR AS ONE EXITS THE ROOM OR SPACE. ADA Stds 703.4.2 AND CBC 11B-703.4.2



1 SIGNAGE MOUNTING LOCATION
SCALE: NOT TO SCALE



* SIGN SIZE MAY VARY DUE TO LENGTH OF ROOM NAME. LARGER SIGNS SHALL BE PROVIDED AS NECESSARY AT NO ADDITIONAL COST TO THE CITY.

NOTES:
1. SEE SIGNAGE NOTES FOR ADDITIONAL REQUIREMENTS.
2. SEE SPEC (10 1400) FOR ADDITIONAL REQUIREMENTS.
3. LOCATION, QUANTITY AND COPY PER PLAN AND SCHED.

2 TACTILE SIGNAGE - ROOM I.D.
SCALE: 6"=1'-0"

A-33

PLANS FOR THE CONSTRUCTION OF:			
POLICE RANGE REFURBISHMENT PROJECT - PHASE II			
SIGNAGE DETAILS			
CITY OF SAN DIEGO, CALIFORNIA DEVELOPMENT SERVICES DEPARTMENT SHEET 61 OF 131 SHEETS			W.B.S. 518005
APPROVED	DATE	APPROVED	DATE
<i>Samur M</i>	05/10/2019	<i>Samur M</i>	05/10/2019
FOR CITY ENGINEER	DATE	FOR CITY ENGINEER	DATE
DESCRIPTION	BY	APPROVED	DATE
ORIGINAL	MOA	<i>Samur M</i>	05/10/19
ADDENDUM A	MOA	<i>Samur M</i>	6/17/19
AS-BUILTS			
CONTRACTOR			DATE STARTED
INSPECTOR			DATE COMPLETED
			41205 - 61-D

CONSULTANT

MANUEL ONCINA ARCHITECTS INC. ARCHITECTURE PLANNING INTERIORS
5711 La Jolla Blvd
La Jolla, CA 92037
tel 858/459.1221
fax 858/459.1214
www.oncinaarc.com

SPEC NO. 1847

05/10/2019

REVISION: REVISE DETAIL 1, 4, AND NOTES

ADDENDUM A

POLICE RANGE REFURBISHMENT PROJECT - PHASE II

Bid Results

Bidder Details

Vendor Name West Coast General Corporation
Address 13700 Stowe dr
 ste. 100
 Poway, CA 92064
 United States
Respondee David Davey
Respondee Title President
Phone 619-561-4200 Ext. 114
Email nwalters@wgcgcorp.com
Vendor Type PQUAL,CADIR,Local
License # 479019
CADIR 1000002666

Bid Detail

Bid Format Electronic
Submitted July 2, 2019 1:48:33 PM (Pacific)
Delivery Method
Bid Responsive
Bid Status Submitted
Confirmation # 182811
Ranking 0

Respondee Comment

Buyer Comment

Attachments

File Title	File Name	File Type
Contractors Cert of Pending Actions	Contractor's Certification of Pending Actions.pdf	CONTRACTOR'S CERTIFICATION OF PENDING ACTIONS
Mandatory Disclosure of Business Interest	Mandatory Disclosure of Business Interests Form.pdf	MANDATORY DISCLOSURE OF BUSINESS INTERESTS FORM
Subcontractor Listing other than first tier	Subcontractor Listing (other than first tier).pdf	SUBCONTRACTOR LISTING (OTHER THAN FIRST TIER)
Asbestos Qualifications	ASBESTOS AND LEAD ABATEMENT QUALS.pdf	ABATEMENT CONTRACTOR ASBESTOS SUBMITTAL
Historic Treatment of Wood WIndows Quals	HISTORIC - Windows and Doors - Copy.pdf	HISTORIC TREATMENT SPECIALIST, SECTION 080152.93
Painting Restoration	HISTORIC - Painting.pdf	PAINTING RESTORATION SPECIALIST, SECTION 090190.91
Soil Nail Wall Qualifications	Soil Nail Wall Qualifications.pdf	SOIL NAIL RETAINING WALL CONTRACTOR, SECTION 313236
Bid Bond	Bid Bond.pdf	Bid Bond

Line Items

Type	Item Code	UOM	Qty	Unit Price	Line Total	Comment
	Main Bid					

Bid Results

Type	Item Code	UOM	Qty	Unit Price	Line Total	Comment
1	Bonds (Payment and Performance)					
	524126	LS	1	\$67,000.00	\$67,000.00	
2	Building Permits (EOC Type I)					
	236220	AL	1	\$20,000.00	\$20,000.00	
3	Specialty Inspection Paid For By the Contractor (EOC Type I)					
	236220	AL	1	\$25,000.00	\$25,000.00	
4	Preparation of Hazardous Waste Management Plan and Reporting					
	238990	LS	1	\$2,200.00	\$2,200.00	
5	Monitoring of Contaminated Soil					
	541690	LS	1	\$44,748.00	\$44,748.00	
6	Testing, Sampling, Site Storage, and Handling of Soils Containing RCRA Hazardous Waste					
	238990	LS	1	\$253,561.00	\$253,561.00	
7	Loading, Transportation, and Disposal of soils containing RCRA Hazardous Waste (EOC Type I)					
	238990	AL	1	\$25,000.00	\$25,000.00	
8	Archaeological and Native American Monitoring Program					
	541690	LS	1	\$19,415.00	\$19,415.00	
9	Archaeological and Native American Mitigation and Curation (EOC Type I)					
	541690	AL	1	\$4,000.00	\$4,000.00	
10	Mobilization					
	238990	LS	1	\$329,146.00	\$329,146.00	
11	Field Orders (EOC Type II)					
		AL	1	\$50,000.00	\$50,000.00	
12	Construction of Police Range Refurbishment Project - Phase II					
	238990	LS	1	\$10,119,110.00	\$10,119,110.00	
13	WPCP Development					
	541330	LS	1	\$633.00	\$633.00	
14	WPCP Implementation					
	237990	LS	1	\$38,500.00	\$38,500.00	
Subtotal					\$10,998,313.00	
Total					\$10,998,313.00	

Subcontractors

Name & Address	Description	License Num	CADIR	Amount	Type
McGrath Consulting PO BOX 2488 El Cajon, CA 92021 United States	Portion of WPCP Development CONSULTANT ELBE	na	1000037165	\$575.00	ELBE,CADIR
Loveless Linton, Inc. 1421 W Lewis St. San Diego, CA 92103 United States	Archaeological and Cultural Monitoring Program CONSULTANT SLBE	na	1000047263	\$17,650.00	
		PlanetBids, Inc.			

Bid Results

Name & Address	Description	License Num	CADIR	Amount	Type
DLG Contractors Inc. PO Box 2361 Alpine, CA 91903 United States	portion of toilet and bath specialties CONSTRUCTOR ELBE	988588	1000003891	\$4,300.00	LAT,MALE,ELBE,CA DIR,SDB
Construction Testing & Engineering, Inc. 1441 Montiel Road Ste. 115 Escondido, CA 92026 United States	portion of survey CONSULTANT	na	1000006116	\$27,240.00	CADIR
FJ Willert 1869 Nirvana Ave Chula Vista, CA 91911 United States	portion of earthwork, stockpiling and handling of soils containing RCRA Hazardous Waste, clearing CONSTRUCTOR	402473	1000004062	\$160,000.00	
Geocrete Brow Ditch 1295 Distribution Way Vista, CA 92081 United States	portion of gunite ditch CONSTRUCTOR	832725	1000037902	\$22,329.91	
Spectra Company 2510 Supply Street Pomona, CA 91767 United States	portion of historic treatment of wood windows and painting restoration CONSTRUCTOR	605280	1000006472	\$86,839.54	
Statewide Stripes Inc. PO Box 600710 San Diego, CA 92160 United States	portion of striping CONSTRUCTOR SLBE	788286	1000001334	\$2,450.00	SLBE,DBE,CADIR
Eagle Paving Company, Inc. dba Toro Engineering 13915 Danielson Street #201 Poway, CA 92064 United States	portion of asphalt, base, crack seal, grind CONSTRUCTOR	944939	1000002648	\$56,181.90	PQUAL
Drill Tech Drilling & Shoring, Inc 2200 Wymore Way Antioch, CA 94509 United States	portion of soil nail retaining wall and shotcrete architectural finish CONSTRUCTOR	745354	1000004866	\$961,280.00	
Minegar Concrete, Inc. 925 Poinsettia Ave., Suite 10 Vista, CA 92081 United States	portion of site concrete, structural concrete, tilt ups CONSTRUCTOR	1002276	1000029244	\$1,002,327.71	
In-line Construction, Inc. PO Box 2637 Ramona, CA 92066 United States	portion of fencing and gates CONSTRUCTUR SLBE	769516	1000002605	\$72,875.00	
Rossin Steel, Inc. 2660 Cactus Road San Diego, CA 92154 United States	portion of structural steel CONSTRUCTOR	869611	1000013292	\$513,930.00	CAU,MALE,CADIR
Action Target PO Box 636 Provo, UT 84606 United States	portion of Bullet Trap, Targets, Knee Wall CONSTRUCTOR	1007241	PW-LR1000407538	\$3,055,000.00	
Coast Landscaping Inc. 2230 La Mirada Dr Ste B Vista, CA 92081 United States	portion of landscape and irrigation CONSTRUCTOR SLBE	353359	1000004310	\$89,900.00	CAU,MALE,SLBE,PQ UAL
HPS Mechanical, Inc. 3100 E. Belle Terrace Bakersfield, CA 93307 United States	portion of wet ug, water, storm drain CONSTRUCTOR	793014	1000001107	\$269,611.00	CADIR,PQUAL
Ace Electric Inc 6061 Fairmount Ave San Diego, CA 92120 United States	portion of electrical, PA System, and sports lighting CONSTRUCTOR	835109	1000001519	\$724,000.00	CAU,MALE,PQUAL
Argus Contracting PO Box 1268 Lancaster, PA 17608 United States	portion of asbestos and lead abatement CONSTRUCTOR	934189	1000018624	\$224,850.00	

Bid Results

Name & Address	Description	License Num	CADIR	Amount	Type
San Diego Sheet Metal, Inc. 430 Jamul Court Chula Vista, CA 91911 United States	portion of shade structure roof, cap flashings, light brackets CONSTRUCTOR	1047664	1000063457	\$127,688.00	CAU,MALE,CADIR

Line Totals (Unit Price * Quantity)								
Item Num	Section	Item Code	Description	Reference	Unit of Measure	Quantity	West Coast General Corporation - Unit Price	West Coast General Corporation - Line Total
1	Main Bid	524126	Bonds (Payment and Performance)	1-7.2.1	LS	1	\$67,000.00	\$67,000.00
2	Main Bid	236220	Building Permits (EOC Type I)	2-2.3	AL	1	\$20,000.00	\$20,000.00
3	Main Bid	236220	Specialty Inspection Paid For By the Contractor (EOC Type I)	4-3.4	AL	1	\$25,000.00	\$25,000.00
4	Main Bid	238990	Preparation of Hazardous Waste Management Plan and Reporting	7-3.1	LS	1	\$2,200.00	\$2,200.00
5	Main Bid	541690	Monitoring of Contaminated Soil	7-3.1	LS	1	\$44,748.00	\$44,748.00
6	Main Bid	238990	Testing, Sampling, Site Storage, and Handling of Soils Containing RCRA Hazardous Waste	7-3.1	LS	1	\$253,561.00	\$253,561.00
7	Main Bid	238990	Loading, Transportation, and Disposal of soils containing RCRA Hazardous Waste (EOC Type I)	7-3.1	AL	1	\$25,000.00	\$25,000.00
8	Main Bid	541690	Archaeological and Native American Monitoring Program	6-6.2.1.1	LS	1	\$19,415.00	\$19,415.00

9	Main Bid	541690	Archaeological and Native American Mitigation and Curation (EOC Type I)	6-6.2.3.1	AL	1	\$4,000.00	\$4,000.00
10	Main Bid	238990	Mobilization	7-3.4.1	LS	1	\$329,146.00	\$329,146.00
11	Main Bid		Field Orders (EOC Type II)	7-3.9	AL	1	\$50,000.00	\$50,000.00
12	Main Bid	238990	Construction of Police Range Refurbishment Project - Phase II	7-3.1	LS	1	\$10,119,110.00	\$10,119,110.00
13	Main Bid	541330	WPCP Development	1001-4.2	LS	1	\$633.00	\$633.00
14	Main Bid	237990	WPCP Implementation	1001-4.2	LS	1	\$38,500.00	\$38,500.00
							Subtotal	\$10,998,313.00
							Total	\$10,998,313.00