CAMP PENDLETON REQUIREMENTS

http://www.pendleton.marines.mil/StaffAgencies/AssistantChiefofStaffGF/PublicWorks/AEBranch.aspx

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Date Signed

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APPENDICES

INTRODUCTION TO CAMP PENDLETON REQUIREMENTS

1. **INTRODUCTION**: Camp Pendleton Requirements (CPR) are indexed to relate to Construction Specifications Institute (CSI) MasterFormat. They contain design and specification issues that are unique to Marine Corps Base Camp Pendleton (MCB CPEN) and shall be addressed during the preparation of construction documents or Requests for Proposals (RFP) for work aboard Marine Corps Installation West-Marine Corps Base Camp Pendleton (MCIWEST-MCB CPEN).

2. **SHOULD vs. SHALL**: Contractor shall understand that where the word "should" is used in the manufacturer's recommendations, substitute the word "shall."

3. **REFERENCES and WEBPAGE ADDRESSES**: All planning, design, construction, sustainment, restoration and modernization must adhere to the Whole Building Design Guide (WBDG), Unified Facilities Criteria (UFC) and references contained within the UFC. It is the intent of the CPR to provide requirements which are unique to MCB CPEN, thus the CPR does not list every applicable UFC or reference. Some sections of the CPR list specific UFC series, building code, or other reference which is already a requirement of the UFC, however it is expected that ALL applicable UFC and UFC references are followed.

   NOTE: The proponent offices for specific sections of the CPR have provided the references and webpage addresses and have not been verified by the CPR Team.

4. **CPR UPDATES**: The CPR is updated every two years.

   a. MCB CPEN is committed to the Continuous Process Improvement (CPI) Program and welcomes your feedback on the CPR. Your comments will help improve the quality of this document for future users.

   b. Please describe your suggestions, errors found, or comments and the reason(s) for the requested change / update. Please reference the specific section number of the CPR, paragraph, and / or page number. Some questions you may find useful are as follows:

      (1) What features do you find most useful?

      (2) What errors have you found? (Please include page number.)

      (3) What topics are hard to locate, confusing, or not covered completely?

      (4) What comments or suggestions do you have to improve this document?

   c. Please send your comments and suggestions to the following Points-of-Contacts (POCs):

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   d. To download an electronic version of the 2016 CPR go to:

http://www.pendleton.marines.mil/StaffAgencies/AssistantChiefofStaffGF/PublicWorks/AEBranch.aspx

CSI 01 00 00 GENERAL REQUIREMENTS

SECTION 1: MCB CPEN ACCESS – BUSINESS PASSES AND RAPIDGATE

1. **ACCESS ABOARD MCB CPEN**: Contractors shall obtain a Business Pass or RAPIDGate depending on duration of expected work.

   a. The Business Pass is issued for up to 90 days, once per individual.

   b. The RAPIDGate is issued for 90 days up to one year, and can be renewed.

SECTION 2: MCB CPEN TRAFFIC CONTROL PROCEDURES

1. **REFERENCES**: All Traffic Control Procedures shall follow and conform to the most recent edition of the Manual on Uniform Traffic Control Devices (MUTCD).

2. **PURPOSE**: The purpose of traffic control devices and warrants for their use is to provide safety for motorists, pedestrians, workers, and enforcement / emergency personnel and equipment.

3. **DEPARTMENTS INVOLVED**: Assistant Chief of Staff Safety and Emergency Services (AC/S SES), PMO; Public Works Division (PWD); and Facilities Engineering and Acquisition Division (FEAD) (formerly Regional Officer in Charge of Construction (ROICC)).

4. **TRAFFIC PLANS**:

   a. Traffic plans are government approved submittals and requires 21 calendar days for review. Review period restarts if you have to resubmit.

   b. Work on major roads is from 08:30 to 15:00 and require message boards to be placed out two weeks in advance of the start of the work to inform the public.

   c. Major roads aboard MCB CPEN are as follows: Ammunition, San Mateo, Talega, Basilone, Cristianitos, Las Pulgas, Rattlesnake Canyon, Stuart Mesa, and Vandegrift.

   d. No work shall commence without an approved traffic control plan.

   e. Traffic Plans will only be accepted from the following personnel:

      (1) Professional Traffic Operations Engineer (PTOE)

      (2) Civil Engineer trained / certified in MUTCD

      (3) Certified traffic control company

   f. Traffic plans shall:

(1) Include designer's name and phone number.

(2) Not be overlaid on civil drawings. They are a plan by themselves.

5. **APPLICATION PROCEDURES**:

a. Fill out MCB CPEN Police Department, Traffic Division Traffic Plan Request with all information including nature of work: sewer, communications line, gas line, electrical conduit or others.

b. Attach two copies of traffic plans (11" x 17") showing the following:

(1) Existing features

(2) North direction

(3) Road geometry

(4) Striping

(5) Existing traffic controls (Stop signs, traffic signals)

(6) Location / Vicinity map

(7) Speed limit

(8) Location and description of all posted signage

(9) Taper lengths

(10) Advance warning signage by type, their placement and distances between signs

(11) Arrow board (if closing one or more lanes of traffic)

(12) Proper sidewalk closure (if applicable)

(13) Length and width of work zone

(14) Width of reduced travel lanes

(15) Message boards if impacting major road

(16) Proposed plans shall follow the current MUTCD.

SECTION 3: RANGE SAFETY REQUIREMENTS

1. **REFERENCES**: Range Safety Requirements shall conform to the most recent edition of MCIWEST-MCB CPEN 3500.1, CH 1, "Range and Training Area Standard Operating Procedures (SOP)"; where

standards provide conflicting information pertaining to an issue, the most stringent information shall apply.

2. **SAFETY REQUIREMENTS FOR ENTERING A TRAINING AREA OR RANGE**: In order for the Contractor to work on a Range or in a Training Area, they shall have a certified Administrative Range Safety Officer (RSO) on-site whenever the site is occupied. The Contractor shall do the following in order to obtain certification as a RSO and gain access to the site:

   a. The contractor shall email PNDL_OTRANGEINSPECTORS@usmc.mil with the following information:

      (1) Sponsors name

      (2) Sponsors email

      (3) Sponsors phone number

      (4) Sponsors work area (e.g., FEAD, PW, ES, USGS, FMD, FSC, RTAMD, etc.)

   b. Your sponsor will receive an excel document that shall be filled out in its entirety. Your Sponsor will then forward the completed spreadsheet to PNDL_OTRANGEINSPECTORS@usmc.mil for processing and class availability.

   c. You will receive confirmation of class date and time as well as all necessary instructions and materials to take the examination.

   d. Names of persons who successfully passed the written exam test shall be posted on the RSO roster on the Wednesday following the day of the test. Please refer to the following link:

      https://www.mciwest.usmc.mil/inst/mciwest/rpolicy/rod/RSO%20INFO/Forms/AllItems.aspx?RootFolder=%2Finst%2Fmciwest%2Frpolicy%2Frod%2FRSO%20INFO%2FRSO%20CLASS%20ATTENDANCE%20ROSTER&FolderCTID=0x012000CE84B29EFFAEF14DB4CF582109B00CD0&View={669A16D7-2BFE-4B73-ADCA-C849D9A7F41A}

   e. Schedule the Range Training Area (RTA) through their BASE sponsor. Please allow a minimum of 30-calendar days to schedule a RTA.

   f. Obtain a MCB CPEN 1:50,000 scale Military Installation Map from your BASE sponsor.

   g. Obtain a radio compatible with the Range Operations Division (ROD) communication system. Obtain the radio from your BASE sponsor.

   h. Maintain a copy of a letter from the RSO's company that names the RSO as a competent and knowledgeable person of the activities taking place on / in the RTAs of MCB CPEN. A copy of the letter shall be kept with the RSO and at the job site. The letter shall be on company letterhead and signed by an officer of the company.

   i. Gain positive communication prior to entering the RTA and maintain positive communication while in the RTA. Follow the directions of Range Control while in the RTA.

3. **THE WRITTEN TEST**:

   a. Administrative RSO testing is administered at Building 430301.

   b. Qualification is required for events or activities not related to training, e.g., construction project personnel, environmental survey personnel, etc.

   c. Testing will be conducted every Thursday of each month excluding holidays at 1000 hours sharp.

   d. Administrative RSO shall watch the remote RSO Class on line on YouTube. Search MCB CPEN Range Safety to find. There are a total of three videos. Ensure you watch each portion as it is broken into parts.

   e. Test attendees shall bring to the class, picture ID, BASE sponsor information (name of POC and BASE unit name), pen or pencil, handout and bubble sheet. NOTE: The handout and bubble sheet shall not be provided at the test session.

4. **RANGE ACCESS**:

   a. Prior to entering any RTA site, the Contractor and Base sponsor shall ensure all areas requiring access have been properly scheduled and approved for the dates and times needed.

   b. Failure to schedule these areas through Range Operations Division / Range and Training Area Management Division (ROD / RTAMD) shall result in access being denied from Range Control (Longrifle) until proper scheduling of events has been completed. Contractor shall schedule the site through their Base sponsor.

5. **WORK SITE ROUTE**: The Contractor and their employees shall not deviate from the assigned access route or the work site unless directed by Longrifle or other ROD official.

6. **PRIVATELY OWNED VECHICLE (POV)**: For non-company vehicles, the Contractor shall obtain POV placards from ROD.

   a. Placards shall be issued only for truck type four-wheel drive vehicles. These placards shall be placed in the front window of each POV whenever the vehicle is in a training area or on a range.

   b. To obtain a placard the Contractor shall provide the name of the driver of each vehicle; the year; make, model, and color of the vehicle; and license plate number.

   c. The amount of parking available at the project site may be limited for operational and safety reasons.

SECTION 4: ADAPTABLE ROOM REQUIREMENTS FOR BACHELOR ENLISTED QUARTERS (BEQ's)

1. **REFERENCES**: Adaptable Room Requirements for BEQ's shall conform to the most recent edition of the following standards; where standards provide conflicting information pertaining to an issue, the most stringent information shall apply.

a. Facilities Criteria (FC) 4-721-10N, "Navy and Marine Corps Unaccompanied Housing" which includes references to DoD Memorandum, "Access for People with Disabilities"

2. **ADAPTABLE ROOMS**: The Two Adaptable Rooms required for a typical BEQ, whether new construction or major renovation shall be located close to Architectural Barriers Act (ABA) Standards parking and / or Duty Desk.

SECTION 5: WORK WITHIN EASEMENTS AND RIGHT-OF-WAYS

1. The construction contractor shall be responsible for all notifications, filings, and coordination necessary to perform work (including surveys, studies, and investigations, etc.) within easements, leased areas, and right-of-ways, such as those used by Southern California Edison, AT&T, SDG&E, North County Transit District (NCTD), and Kinder-Morgan. The contractor will be responsible for those providing services and their associated cost, including flagmen and others.

2. Please refer to the following link:

http://www.pendleton.marines.mil/StaffAgencies/AssistantChiefofStaffGF/PublicWorks/AEBranch.aspx

CSI 01 33 00 SUBMITTAL REQUIREMENTS

SECTION 1: DESIGN SUBMITTAL REQUIREMENTS AND DISTRIBUTION

1. **REFERENCES**: All design and construction shall conform to the most recent edition of the following references; where standards provide conflicting information, the most stringent information shall apply.

   a. UFC 1-200-01 "The WBDG: General Building Requirements"

   b. UFC 1-200-02 "The WBDG: High Performance and Sustainable Building Requirements"

   c. 48 CFR § 52.236–25, "Requirements for Registration of Designers"

   d. MCB CPEN, BASE Exterior Architecture Plan (BEAP), CH 11, "Submittal Requirements"

   e. MCB CPEN, "2016 CPR"

   f. FC 1-300-09N, Navy and Marine Corps Design Procedures, Electronic Design Deliverable (EDD) format.

   g. UFC 3-600-01, Section 3-7.3.2, "The WBDG – Fire Protection Engineering for Facilities Installation Requirements"

   h. Unified Facilities Guide Specifications (UFGS) 3-600-01, Section 3-7.3.4, "The WBDG – Fire Protection Engineering for Facilities, Hydrant Protection"

   i. Federal Acquisition Regulations (FAR) 52.236-25, "Requirements for Registration of Designers"

   j. FC 1-300-09N, CH 12, "EDD Format"

2. **GENERAL BUILDING REQUIREMENTS**: All design and construction of new and renovated Government-owned facilities shall conform to UFC 1-200-01, UFC 1-200-02, and the Core UFCs and government criteria referenced therein, and is applicable to all methods of project delivery and levels of construction, regardless of funding source.

   a. UFC 1-200-01 provides applicability of model building codes and government-unique criteria for typical design disciplines and building systems, as well as for accessibility, Antiterrorism / Force Protection (ATFP), security, sustainability, and safety.

   b. UFC 1-200-02 provides minimum unified requirements and coordinating guidance for planning, designing, constructing, renovating, and maintaining high performance and sustainable facilities that will enhance DoD mission capability by reducing total ownership costs.

3. **CRITERIA**: The Contractor shall design Naval shore facilities in accordance with all Navy and DoD Criteria. DoD Design Criteria are available on the following websites:

   a. The WBDG link is http://dod.wbdg.org.

   b. The Construction Criteria Base (CCB) link is http://www.wbdg.org/ccb.

4. **REGISTRATION**: Develop project documents under the direction of a Registered Architect or a Professional Engineer currently licensed in accordance with FAR 52.236-25, "Requirements for Registration of Designers". Each drawing shall be signed, sealed, and dated by the Registered Architect or the Professional Engineer who is registered to practice in the particular field involved for work depicted on that drawing, serves as the Designer of Record (DOR) for that work, and complies with requirements of FAR 52.236-25. Sign Record Documents in accordance with FC 1-300-09N Chapter 12, "EDD Format"

5. **FIELD INVESTIGATION**: The DOR shall obtain all site and building data and investigate existing site conditions, utilities, and facilities as necessary to properly integrate the design of the project with existing conditions. When available, research existing Record Drawings for information and field verify record information and other site features that may influence project design.

6. **BUILDING CODE AND LIFE SAFETY CODE SURVEYS**: Provide Building Code and Life Safety Code Surveys in accordance with UFC 3-600-01.

7. **DESIGN REQUIREMENTS**: Provide drawings, specifications and calculations in accordance with the references listed above, the Core UFCs and government criteria referenced therein, the contract, CPR and BEAP.

8. **SUBMITTAL DISTRIBUTION**: Contractor shall provide copies of each Design Submittal Package for review per the RFP. (See Figures 1-4.)

SECTION 2: SPECIFICATIONS FOR DIGITAL DATA

1. **REFERENCES**: Specifications for Digital Data shall conform to the most recent edition of the following standards; where standards provide conflicting information pertaining to an issue, the most stringent information shall apply.

   a. The United States National Computer Aided Drafting Standards (U.S. NCS)

   b. Computer Aided Design and Drafting / Geospatial Information System (CADD / GIS) Technology Center's Architecture, Engineering and Construction CADD (AEC CADD) Standards Please refer to the following link: https://transportation.wes.army.mil.

   c. Naval Facilities Instruction (NAVFACINST) 4250.1, CH 7, "Electronic Bid Solicitation (EBS) Policy"

d. Environmental Systems Research Institute (ESRI) 102646, "North American Datum (NAD) State Plane California Zone VI and the Federal Information Processing Standard (FIPS) 0406 Projection System"

e. Geodetic Reference System (GRS Spheroid) and the NAD / World Geodetic System (NAD/WGS)

f. Epoch 1991.35, "Horizontal Data Sheet"

g. North American Vertical Datum 88 (NAVD88)

2. **HARD COPY AND DIGITAL FORMAT**: Any maps, drawings, figures, sketches, geospatial data, spreadsheets, or text files prepared for this contract shall be provided in both hard copy and digital form. The hard copy deliverables are defined in "Close Out Submittals".

3. **TEXT, SPREADSHEET, and DATABASE FILES:** The Marine Corps standard computing software is Microsoft Office 2010.

   a. Final Reports and other text documents shall be provided in Microsoft Word 2010 format and Adobe portable document format (pdf).

   b. Spreadsheet files shall be provided in Microsoft Excel 2010 format.

   c. Databases shall be provided in Microsoft Access format, unless specified otherwise, as approved by the Government. Prior to database development, the Contractor shall provide the Government with a Technical Approach Document for approval, which describes the Contractor's technical approach to designing and developing the database.

   d. All text, spreadsheet, and database files shall be delivered on a Compact Disk Read-Only Memory (CD-ROM), Digital Versatile Disc Read-Only Memory (DVD-ROM) or portable external hard drive.

   e. When full sets of drawings are submitted in pdf format, the full set shall be compiled and bookmarked as one pdf.

   f. The name of the CADD files to include project number and building number.

4. **MAPS, DRAWINGS, AND SKETCHES (Digital Geospatial Data)**:

   a. **GEOSPATIAL DATA SOFTWARE FORMAT**: data shall be provided in a form that does not require translation, preprocessing, or post processing before being loaded to the Installation's regionally hosted Geodatabase. The Contractor shall validate any deviation from this specification in writing with the Government Installation Geospatial Information and Services (IGI&S) Manager via the Project Manager (PM). Digital geographic maps and the related data sets shall be delivered in the following software format

      (1) **CADD**: All CADD data shall be provided in Automated Computer Design (AutoCAD) 2016 and shall be in the same projection and use the same coordinate system, datum, and units as stated below in the paragraph titled Geospatial Data Projection. Drawing files shall be full

files, uncompressed, unzipped, and Geo-referenced. "X-REF" drawings shall be bound to the drawing sheets.

and-

(2) **GIS**: If the Subject Project is Military Construction (MILCON) and / or utility project, utilize Personal or file Geodatabase format using ESRI's mapping software (ArcGIS 10.2). The geodatabase shall be importable to a multi-user geodatabase using ESRI's mapping software (ArcSDE 9.3). The delivered data layer(s) shall be provided with x, y domain precision of 1000.

(3) **NOTE**: ESRI's mapping software (ArcGIS 9.3) and ArcSDE are geographic information system software produced by the ESRI of Redlands, California. AutoCAD is software produced by Autodesk, Inc.

b. **GEOSPATIAL DATA STRUCTURE**:

(1) **GIS DATA SETS**: When developing / delivering geospatial data, the Contractor shall develop the initial structure consistent with the most current edition of the MCB CPEN Data Model. The MCB CPEN Data Model shall be followed for geospatial database table structure, nomenclature, and attributes. The Government may approve modifications to the MCB CPEN Data Model if it is determined that the MCB CPEN Data Model does not adequately address subject datasets. Copies of the MCB CPEN data model may be obtained by contacting the MCB CPEN GIS Office at (760) 763-1891.

-and / or-

(2) CADD Drawings / Data: The Contractor shall develop all CADD data in conformance with the latest edition of references (1a - 1c).

c. **GEOSPATIAL DATA PROJECTION**:

(1) Geographic data (regardless of format) shall be provided in U.S. Survey Feet and projected into the California State Plane, "Zone VI and FIPS 0406 Projection System."

(2) The maps and data shall use the GRS 1980 Spheroid and the NAD83/WGS84. Epoch 1991.35 shall be used the vertical datum used is NAVD88. This projection requirement applies to all GIS data layer deliverables as well as all CADD drawings such as As-Designed and Record Drawing project plans. Each data set shall have a projection file if appropriate based on format.

d. **GEOSPATIAL DATA COLLECTION**:

(1) Survey grade Global Positioning System (GPS) data collection shall be performed when specified in the Statement of Work (SOW) or if the Subject Project is a MILCON and / or utility project.

(a) Survey grade GPS data collection shall at a minimum use the Geoid2003 Continental United States (CONUS) epoch 1991.35 and spatial accuracy requirements for survey grade are 95% of GPS points are within 6 cm accuracy.

(b) Every effort shall be made to capture feature locations without using offsets unless obstructions are present.

(2) All final GPS data collection activities shall be logged with MCB CPEN'S GIS Office prior to initiation (temporary benchmarks set up for site work does not need to be logged).

(a) GPS data collection shall tie into the MCB CPEN GPS Station.

(b) Checks shall be made to existing Survey Control Monuments around the area of work (control coordinates; maps and Monument Record Sheets are available at the GIS Office).

(c) All checks made to control points shall be recorded and discrepancies noted in the deliverables.

(d) Data collected but not verified via this method shall not be accepted for submittal.

e. **MAP PRODUCTS AND SUPPORT FILES**: Finished map products, regardless of final print size, shall be presented separately in both hard copy and digital formats. The hard copy deliverables are defined in "Close Out Submittals." Final map products shall be delivered in the following digital formats:

(1) Pdf Format: Resolution of 300 dots per inch (dpi) with no image compression. All fonts shall be embedded. The Contractor shall only use fonts that are licensed and available for use by the Government.

(2) Joint Photographic Experts Group (JPEG) Format: Resolution of 96 dpi with 24-bit true color.

(3) ESRI Map Document (MXD) Format: All maps constructed shall have the associated MXD delivered to allow for future printing and modification, as necessary, by the Government. MXDs shall use the 'relative paths' option. The Table of Contents (TOC) within the MXD shall be orderly, and contain a logical naming structure.

f. **GEOGRAPHIC DATA DOCUMENTATION (Metadata)**: For each digital file delivered containing geographic information (regardless of format), the Contractor shall provide documentation consistent with the GEOFidelis Metadata Guidelines, which follow Federal Geographic Data Committee (FGDC) Content Standards for Digital (CSD) Geospatial Metadata (CSDGM). Both 'Mandatory' and 'Mandatory as Applicable' fields shall be completed for each geographic data set, as well as selected 'Optional' fields. The documentation shall include, but not be limited to, the following:

(1) The name, description, abstract, and purpose of the data set / data layer.

(2) The source of the data and any related data quality information such as accuracy and time period of content.

(3) Descriptions of the receiver and other equipment used during collection and processing, base stations used for differential corrections, software used for performing differential corrections, estimated horizontal and vertical accuracies obtained, and conversion routines used to translate the data into final geographic data delivery format.

(4) Details of all checks made to existing control points and any discrepancies noted.

(5) Type of data layer (point, line, polygon, etc.).

(6) Field names of all attribute data and a description of each field name.

(7) Definition of all codes used in the data fields.

(8) Ranges of numeric fields and the meaning of these numeric ranges.

(9) The creation date of the map layer and the name of the person who created it.

(10) A POC shall be provided to answer technical questions.

(11) Metadata generation tools included in the ESRI's mapping software (ArcGIS 9.3) suite of software (or equivalent technology) shall be used in the production of the required metadata in Extensible Markup Language (XML) format. Regardless of the tools used for metadata creation, the Contractor shall ensure that the metadata is delivered in XML format.

(12) NOTE: The metadata shall be formatted from the Installation database perspective, not the Contractor project perspective. Therefore, such items as POC shall be the Installation's POC currently associated with the data and not the Contractor's PM. The Contractor shall use language and format consistent with existing Installation metadata. Specific guidelines may be found within the GEOFidelis West Metadata Authoring Guide. A copy of the guide may be obtained by contacting the AC/S G-F, PWD, GIS, and IGI&S Manager.

g. **GEOGRAPHIC DATA REVIEW**: The digital geographic maps, related data, and text documents shall be included for review in the draft and final contract submittals. The data shall be analyzed for discrepancies in subject content, correct format in accordance with these specifications, and compatibility with the existing GIS system. The Contractor shall incorporate review comments to data and text prior to approval of the final submittal.

h. **OWNERSHIP**: All digital files, final hard copy products, source data acquired for this project, and related materials, including that furnished by the Government, shall become the property of MCB CPEN and shall not be issued, distributed, or published by the Contractor.

SECTION 3: CLOSEOUT SUBMITTALS

1. **RECORD DRAWINGS (aka AS-BUILT DRAWINGS)**

2. **REFERENCES**: Record Drawings shall conform to the most recent edition of the following standards; where standards provide conflicting information pertaining to an issue, the most stringent information shall apply.

   a. FC 1-300-09N, "Navy and Marine Corps Design Procedures"

   b. FAR 5252.236-9310, "Record Drawings"

3. **DIVISION 01 GENERAL DESIGN CONSIDERATIONS / REQUIREMENTS**:

a. In addition to the requirements of FAR 5252.236-9310, the Contractor shall be responsible for all of the following requirements:

(1) The Contractor shall transform the redline drawings into record documents. The final Record Drawings shall be stamped and signed by a registered Architect or Engineer with formatting in accordance with the FC 1-300-09N, Navy and Marine Corps Design Procedures, EDD format. The Final Record Drawings shall include the following:

(a) Provide additional sheets that contain all underground utilities. Provide one full size utilities sheet covered with plastic laminate.

(b) Provide electronic copies in AutoCAD 2016 and Adobe pdf format, latest edition.

(c) Provide five complete sets on CD-ROM.

(d) Provide cost data on the final cost of the project using UFC compliant DD1354 requirements.

(e) When a completed project involves an historic structure, a full set of all Record Drawings shall be provided to the ES Cultural Resources Section.

(2) The final Record Drawings shall be turned over to the FEAD Construction Manager (CM) at the pre-final inspection.

(3) The FEAD CM shall distribute the final Record Drawings to the following:

(a) AC/S FAC G-F, PWD, Architecture and Engineering (A&E) Branch
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(b) AC/S FAC G-F, Real Property Accountability Officer (RPAO) Branch

(c) FEAD

(d) AC/S FAC G-F, Facilities Maintenance Division, Quality Assurance (FMD, QA) Branch

(e) MCIWEST-MCB CPEN G6

SECTION 4: UNITED STATES GREEN BUILDING CODE, LEADERSHIP IN ENERGY AND ENVIORNMENTAL DESIGN – NEW CONSTRUCTION (U.S. GBC LEED – NC) STRATEGIES

1. **REFERENCES**: U.S. GBC, LEED acceptable strategies shall conform to the most recent edition of the following standards; where standards provide conflicting information pertaining to an issue, the most stringent information shall apply.

a. MCB CPEN, "Basewide Master Planning Vision"

b. LEED-NC (See Figure 5.)

c. Executive Order 13514, "Federal Leadership in Environmental, Energy, and Economic Performance Guidance"

2. **LEED POINT CONSIDERATIONS**: Due to functional constraints aboard MCB CPEN the following LEED points shall be carefully considered:

a. TO ESTABLISH A MINIMUM BUILDING TO SITE RATIO reference the following guidelines:

"The BASE does not have set "property lines", so the determination of the "2% of gross land area" becomes difficult. Per the BASE Master Plan 1.1.1 "Basewide Master Planning Vision", all projects shall "Optimize land use allocation and facility siting by developing a logical and functional land use plan that maximizes real estate use for training; reduces building footprints; improves efficiency; promotes land use compatibility; and permits future expansion."

b. ENVIRONMENTAL ASSESSMENT (EA) Credit 2: On-Site Renewable Energy This credit can be obtained, and is encouraged, through the installation of renewable energy systems. MCB CPEN shall retain Renewable Energy Certificates (REC) to comply with renewable energy mandates. Per Headquarters Marine Corps (HQMC), MCB CPEN is not allowed to purchase REC's to meet energy mandates.

c. EXCLUSIONS: The following points shall not be supported by MCB CPEN, and shall not be included in potential project scorecards:

(1) Indoor Environmental Quality (IEQ) Credit 7.2, Thermal Comfort (Verification): MCB CPEN shall not be conducting "thermal comfort surveys" after project occupancy.

(2) SS Credit 5.2, Site Development (Maximize Open Space): Per the BASE Master Plan 1.1.1 "Basewide Master Planning Vision" all projects shall "Optimize land use allocation and facility siting by developing a logical and functional land use plan that maximizes real estate use for training; reduces building footprints; improves efficiency; promotes land use compatibility; and permits future expansion." However, the requirement that "All open space that is counted toward this credit shall be preserved for the life of the building" shall not be guaranteed "forever".

3. **LEED-NC**

a. FIGURE 5: is a chart of LEED-NC credits mandated by NAVFAC with acceptable strategies for implementing those credits at MCB CPEN.

b. MCB CPEN'S PREFERENCE: The following is a list of acceptable strategies for LEED-NC credits not mandated by NAVFAC, but preferred by MCB CPEN.

(1) SS 4.3: Alternative Transportation / Low Emitting and Fuel Efficient Vehicles.

(a) Electric car ports desirable / Executive Order 13514.

(b) Southwest Regional Fleet Transportation (SWRFT) Office manages vehicles aboard MCB CPEN (Heavy equipment, Government Owned Vehicles (GOV), Garrison Mobile Equipment (GME), etc.).

(2) EA Prerequisite 2: Minimum Energy Performance.

(a) Use variable air control (VAC) or variable air volume (VAV) mechanical systems if technology complies with CPR. Variable refrigerant valve (VRV) systems are not allowed.

(b) Use of re-heat systems desirable.

(c) Geothermal energy shall not be explored. MCB CPEN'S studies have proven the ground water does not support the required temperature needed for geothermal energy design.

(3) EA2: On-Site Renewable Energy. Earn an additional point for Regional Priority Credit.

(4) EA3: Enhanced Commissioning is desired of all heating, ventilating, and air conditioning (HVAC) systems and controls, refrigeration systems and controls, renewable energy systems and hot water systems. Enhanced commissioning shall be provided by third party. Testing and Balancing (TAB) Contractor is not permitted to perform the enhanced commissioning. Return of Contractor after completion of project to implement Enhanced Commissioning shall be enforced; enhanced commissioning shall be under a separate contract from building.

(5) EA6: Green Power. NAVFAC does not allow wind-generated power.

(6) EQ1: Outdoor Air Delivery Monitoring. Desirable on all buildings and shall interface with MCB CPEN Energy Management System (EMS).

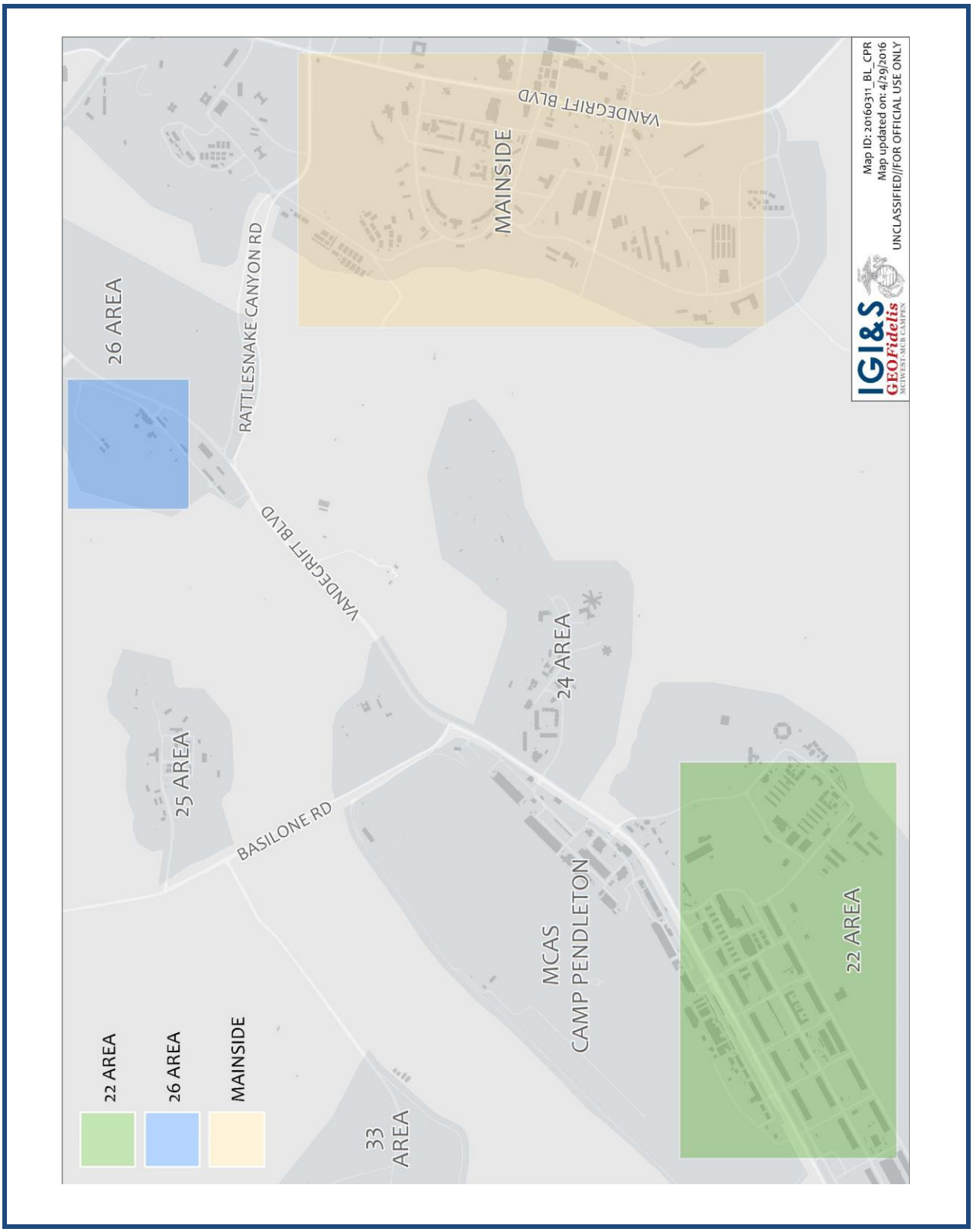


Figure 1: Building Design Submittal Distribution Overview Map

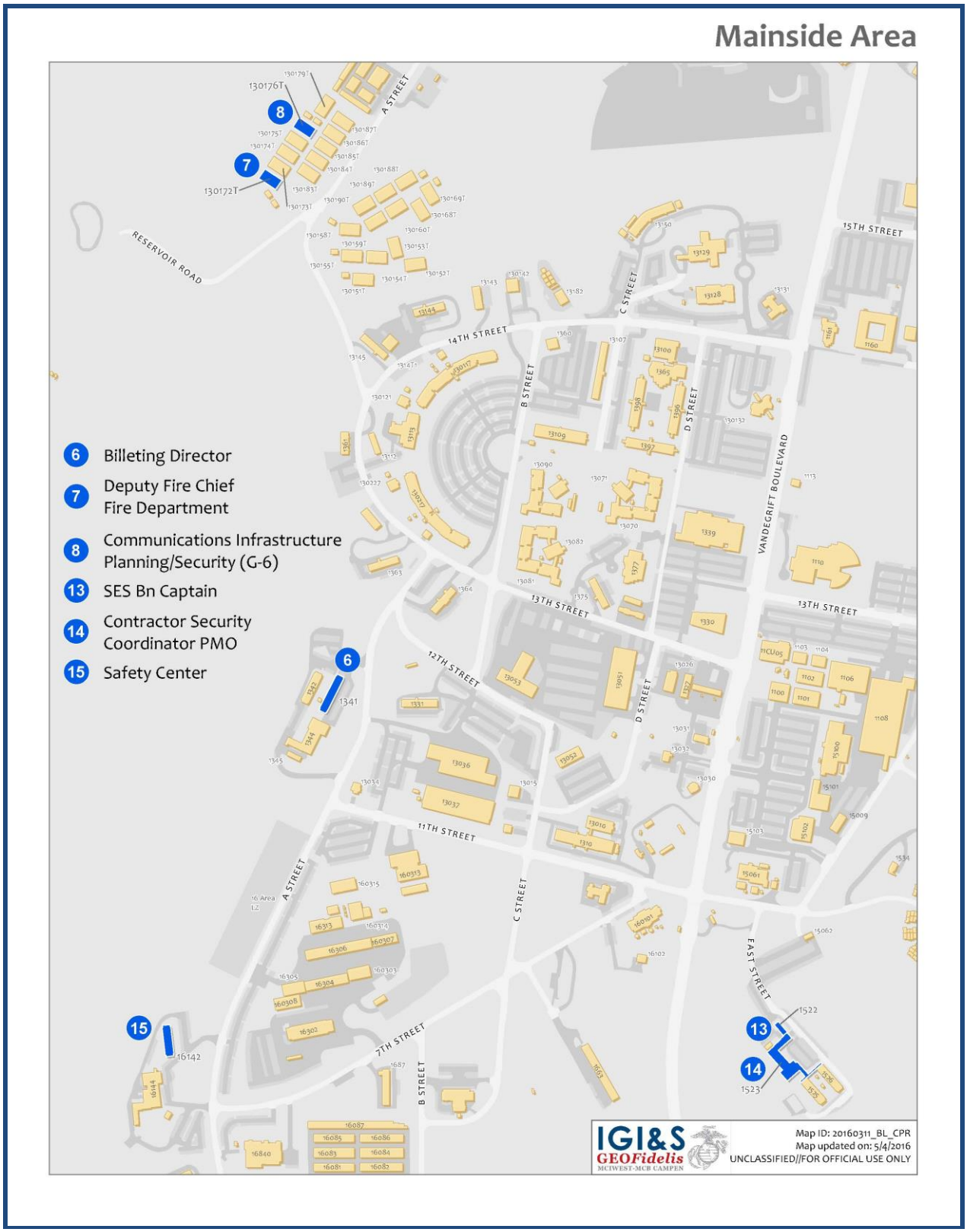


Figure 2: Building Design Submittal Distribution Mainside Area Map

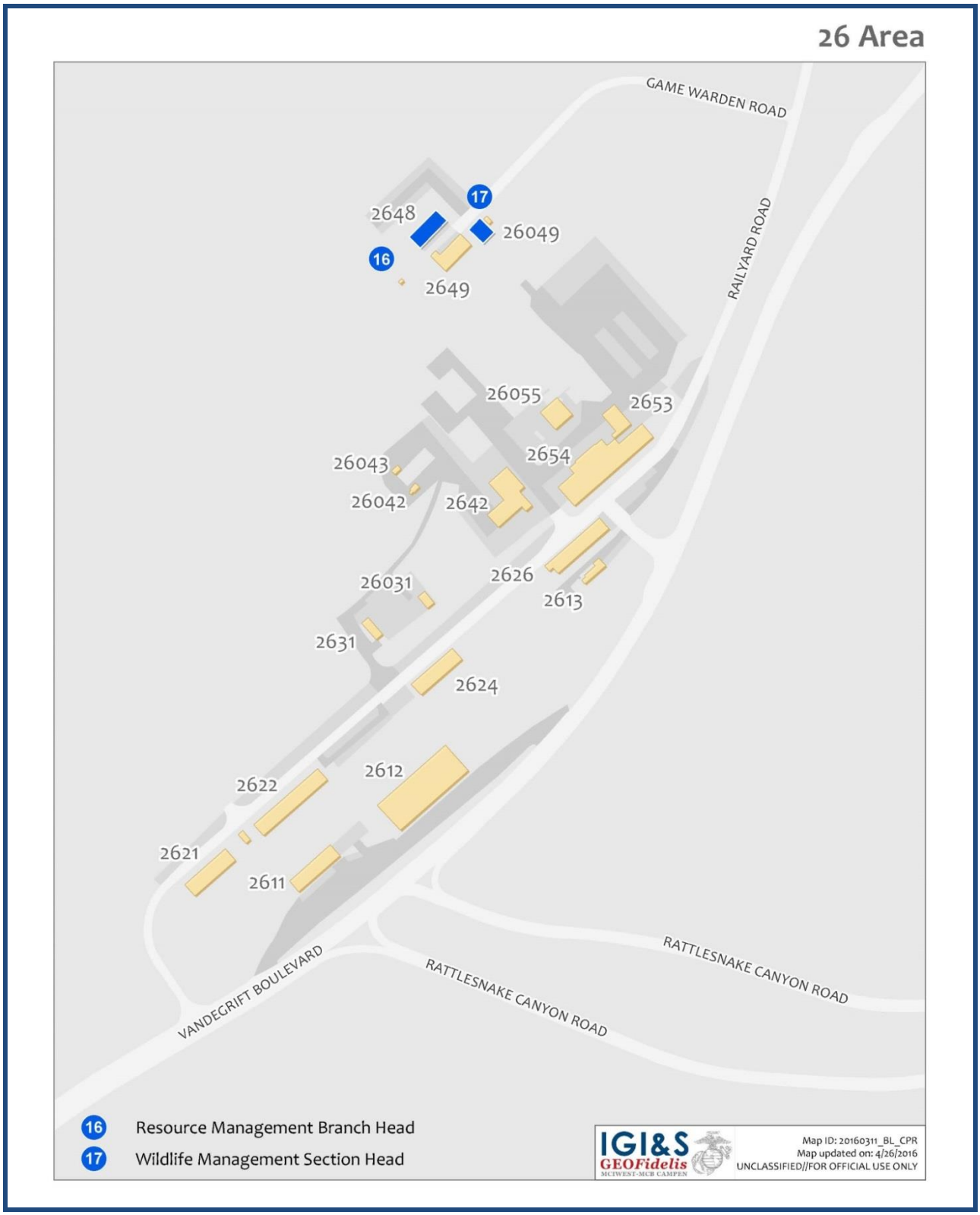


Figure 3: Building Design Submittal Distribution 26 Area Map

Figure 4: Building Design Submittal Distribution 22 Area Map

LEED-NC NAVFAC MANDATED CREDITS		PTS	ACCEPTABLE STRATEGIES FOR USE AT MCB CPEN
SUSTAINABLE SITES			
SS6.1 SS6.1	Design Quantity Control (QC)	1	Comply with: CA Gen. Constr. Stormwater Permit, EISA. Comply with DON LID Policy and UFC 3-210-10. [Reference CPR Stormwater Section for Strategies]
SS6.2	Stormwater Design QC	1	Comply with: CA Gen. Constr. Stormwater Permit. Comply with DON LID Policy and UFC 3-210-10. [Reference CPR Stormwater Section for Strategies]
WATER EFFICIENCY			
WE PreReq	Water Use Reduction by 20%	0	Waterless urinals not approved for use at MCB CPEN
WE 1.1	Water Efficient Landscaping, Reduce by 50%	2-41	Passive captured rain water is acceptable (i.e., divert rain from downspouts to irrigate landscape). Use of recycled wastewater from Tertiary Treatment plants / purple pipe desired. Grey water systems not allowed. Additional Point – Regional Priority Credit.
ENERGY AND ATMOSPHERE			
EA1	Optimize Energy Performance	1-19	Daylight sensors are desired for large spaces (i.e., hangers, warehouses, hangers, storage buildings & mechanical buildings). The use of light shelf and clerestory window design is desirable. Daylight sensors are not desired for BEQ or Administration Buildings. If boilers are used, the best technology fire tube / firebox type available shall be utilized. Separate hot water boilers from HVAC boilers so that each system can function independent from the other.
EA 4	Enhanced Refrigerant Mgt.	2	Discretionary*
EA 5	Measurement and Verification	3	Executive Order 13423
MATERIALS AND RESOURCES			
MR 2.1	Construction Waste Mgt.	1-2	Discretionary (determined on a case-by-case basis)
MR 4.1	Recycled Content 20%	2	Discretionary (determined on a case-by-case basis)
MR 6	Rapidly Renewable Products	1	Discretionary (determined on a case-by-case basis)
MR 7	Certified Wood	1	Discretionary (determined on a case-by-case basis)
INDOOR ENVIRONMENTAL QUALITY (IEQ)			
EQ 3.1	Construction IAQ Mgmt. During Construction	1	Discretionary (determined on a case-by-case basis)
EQ 3.2	Construction IAQ Mgmt. Before Occupancy	1	Discretionary (determined on a case-by-case basis)
EQ 4	Low Emitting Materials	1-4	Executive Order 13423 and 13514
EQ 7.1	Thermal Comfort Design	1	Direct Digital Control (DDC) Controls required for main HVAC design.
EQ 8.1	Daylighting	1	Discretionary (determined on a case-by-case basis)
INNOVATION AND DESIGN			
ID	Moisture Control Plan	1	Discretionary (determined on a case-by-case basis)
ID	Bio-Based Products	1	Executive Order 13423
ID	Energy Star / Energy Efficient Products	1	Executive Order 12902 Sec. 301 Executive Order 13423

Figure 5: LEED-NC Acceptable Strategies for use at MCB CPEN

CSI 02 00 00 EXISTING CONDITIONS

SECTION 1: DEMOLITION

1. **REFERENCES**: All construction shall conform to the most recent edition of the following standards; where standards provide conflicting information pertaining to an issue, the most stringent information shall apply.

   a. NAVFACINST P73, "Real Estate Procedural Manual, Disposal of Real and Related Property"

   b. Secretary of the Navy Instructions (SECNAVINST) 11011.47C, "Acquisition, Management and Disposal of Real Property and Real Property Interests by the Department of the Navy (DON)"

   c. Occupational Safety and Health Administration (OSHA) 42 U.S.C. § 11301, "The Public Health and Welfare: McKinney-Vento Homeless Assistance Act"

2. **UTILITIES**:

   a. When a building is demolished, the utilities associated with the building shall be demolished / removed back to the main connection, see Figure 6.

   b. When a utility is replaced, the existing utility shall be demolished / removed back to the main connection.

   c. When the demolition of utilities path fall outside the Categorical Exclusion (CATEX) boundary, the Contractor shall contact PWD, Planning Branch for an amended CATEX.

SECTION 2: WASTE MANAGEMENT

1. MCB CPEN Landfill (Three Mile Pit) is now closed. All asphalt / concrete (A/C) demolitions materials and soil waste shall be taken off BASE to an approved recycle facility that is in close proximity to MCB CPEN.

2. There is no alternative site for construction waste disposal aboard MCB CPEN.

3. The Contractor shall dispose of all construction waste and debris from the project site at an approved landfill facility off of MCB CPEN.

When demolishing facilities or fire hydrants connected to existing potable water mains creation of dead ends where stagnant water can accumulate under no-flow conditions is prohibited.

Facility demolition shall include disconnection or removal of the branch lateral as close to the distribution main as possible. Usually this will be the branch tee in the main line or the downstream side of the branch valve if one exists at the main (see figure below).

The abandoned branch lateral must be physically removed or separated from the main by use of a standard rated cap or blind.

In some cases it may be impractical or too costly to physically remove the branch lateral. Abandoned laterals may be left in the ground and associated trenching avoided only by exception and with advance approval from Water Resources Division and Public Works. Any runs of pipe abandoned in place and greater than 3" in diameter shall be filled with sand or slurry.

Final configuration including branch tees, valves, and piping left in place, shall be appropriately identified and captured in as-builts and GIS.

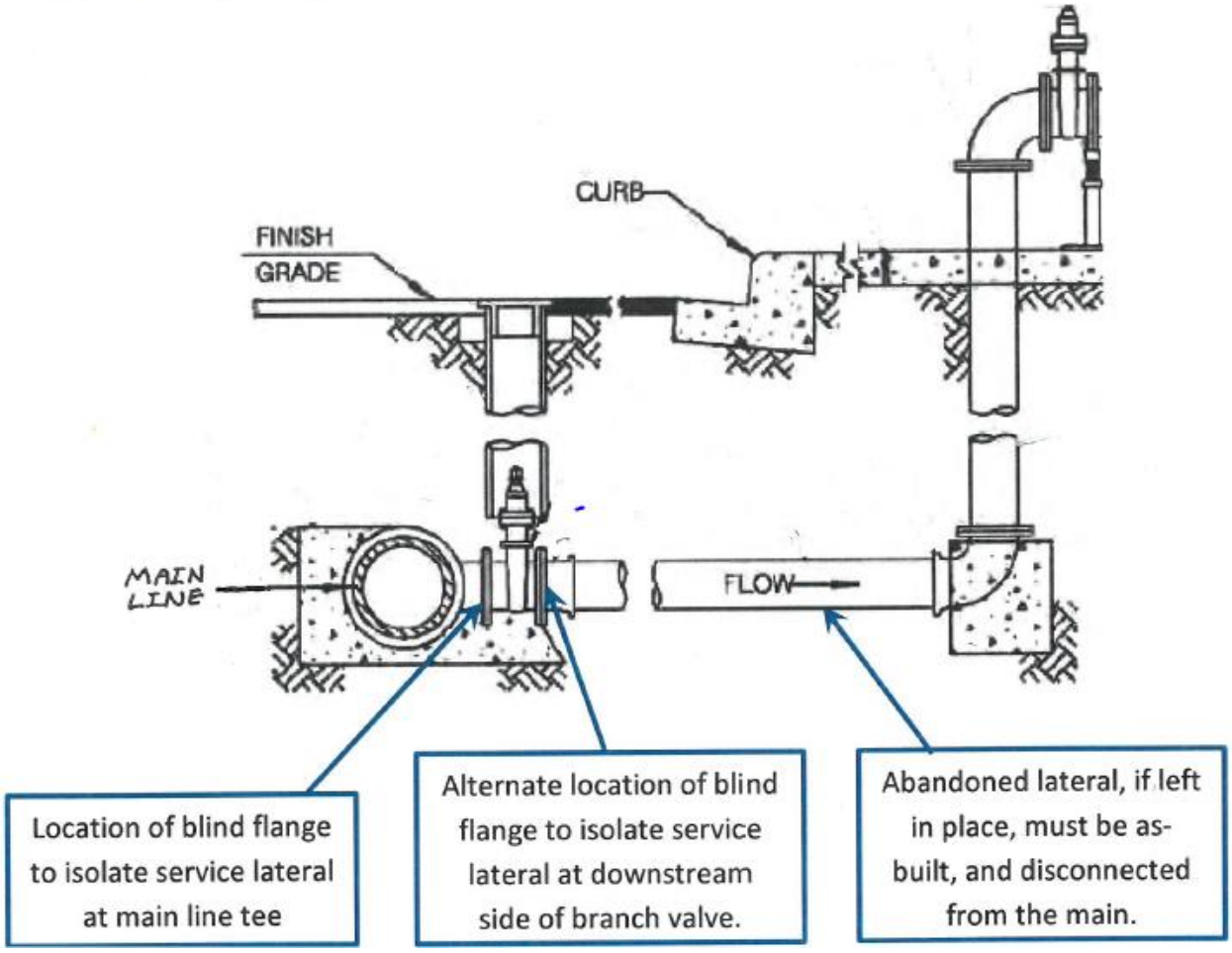


Figure 6: Potable Water Lateral Branch Demolition

CSI 03 00 00 CONCRETE

SECTION 1: CONCRETE FINISHING

1. **SEALED CONCRETE**: There is no single sealer which can accommodate all types of projects. There are two main types of sealers: surface sealers (acrylic, epoxy, and urethane) and penetrating sealers (silicone-based). Be sure to confirm the type of shine desired: level of sheen or matte. There are more concrete sealers than those mentioned here. The selection of a concrete sealer shall be based on the specific need and the desired sheen.

   a. **SURFACE SEALERS**: Surface Sealers are the most common sealers used since they protect the surface, also preventing any foreign objects from passing through; to include rust, oils, salts, water, urine and other stains and chemicals. A stain or color can be applied with the sealer.

   b. **ACRYLIC**: An acrylic concrete sealer is softer compared to the other types. However, this is more suitable for external applications due to its resistance to ultraviolet (UV) rays. This also lets moisture present in the concrete flow out.

   c. **EPOXY**: An epoxy concrete sealer is stronger compared to an acrylic sealer. However, it does not allow moisture to escape. Epoxy sealers offer a shiny, clear finish. Epoxy sealers entail more surface preparation and higher costs.

   d. **URETHANE**: A urethane concrete sealer is the strongest, yet the most expensive among the types of concrete sealer. Urethane sealers are usually meant for industrial uses.

   e. **PENETRATING SEALERS**: Penetrating sealers are oftentimes silicon-based. They infiltrate a surface and react to free lime, forming calcium silicate. This process makes it seem like the capillaries and pores are filled with cement. Through this, the concrete will be stronger and water won't migrate to it. This sealer will produce a matte finish.

SECTION 2: POLISHED CONCRETE FINISHING

1. **POLISHED CONCRETE FLOORING**: shall not be confused with sealed concrete flooring. Polished concrete flooring holds up well on the MCB CPEN, is easy to maintain and is aesthetically pleasing, unlike sealed concrete (penetrating sealer) which can be hard to clean and looks like raw concrete. A stain or color can be applied. Polished concrete flooring is not suitable for areas that have a high likelihood of standing water as it becomes very slippery when wet. Polished concrete will impact the construction schedule because it will require several days to install / grind and shall be coordinated with the contractor at the very beginning of the project.

2. **REQUIREMENTS**: When providing a polished concrete finish, use a multi-step dry mechanical process. Both products and installation shall conform to the manufacturer guidelines. These requirements shall include but are not limited to a lithium silicate densifier, a dry grind process for installation, and a predetermined gloss level:

a. Low Gloss: 30-40

b. Medium Gloss: 41-60

c. High Gloss: 61 & higher

3. **IMPERFECTIONS**: All imperfections in existing slab shall be addressed and repaired. Best efforts shall be made to mitigate the appearance of all imperfections. Inspect the existing substrate and document unsatisfactory conditions in writing. Verify that surfaces and site conditions are ready to receive work. Correct unacceptable conditions prior to installation of System. Commencement of work constitutes acceptance of substrate conditions.

4. **PROTECTION OF CONCRETE**: The Contractor shall protect existing concrete from contamination by petroleum, oil, hydraulic fluid, acid and acidic detergents, paint and other liquid dripping from trades and equipment working over these substrates. If construction equipment shall be used on these substrates, diaper all components that may drip fluids.

5. SPECIFIED TOLERANCES: Where new or existing concrete is not within specified tolerances a polishable cementitious topping shall be installed. Chosen topping shall be approved before installation. If moisture tests results exceed recommended limits refer to topical moisture mitigation system recommendations.

6. **EXPERIENCED INSTALLERS**: Installer shall be experienced and factory-trained in the installation and experienced in performing specified work similar in design, products and scope of this project, with a documented track record of successful, in-service performance and with sufficient production capabilities, facilities and personnel to produce specified work. Installer shall provide written documentation from the manufacturer confirming the Installer's accreditation and training.

7. **MOCK-UP**: Before performing the work in this section, an adequate number of on-site mock-ups shall be installed for review and approval. These mock-ups shall be installed using the same Installer personnel who will perform work. Approved mock-ups may become part of completed work, if undisturbed at time of substantial completion.

8. **POLISHING AIDS**: are required for stain protection.

9. **CLOSE AREAS TO TRAFFIC**: during and after Polished Concrete System application for a time period recommended by the manufacturer.

10. **FLOOR PROTECTION**: is required after installation of polish system and is to remain through the end of construction.

11. **CURING**: Existing concrete shall be cured for a sufficient time period recommended by manufacturer before the application can begin.

12. **MAINTENANCE DATA**: Provide manufacturer's instructions for maintenance of installed work, including methods and frequency recommended for maintaining optimum condition under intended use; these instructions shall contain precautions against cleaning products and methods, which may be detrimental to finishes and performance.

SECTION 3: COMMISSIONING OF MOISTURE PROTECTION (MOISTURE TESTING FOR CONCRETE SLABS)

1. **REFERENCES:**

   a. American Society of Testing Materials (ASTM) F2170, "Standard Test Method for Determining Relative Humidity (RH) in Concrete Floor Slabs"

2. When installing a finished flooring over a concrete slab, provide a moisture mitigation system suited to treat areas of new concrete that may still be damp or have very high moisture readings as well as existing concrete to receive all types of flooring where the level of moisture emissions from the slab exceeds the maximum allowed by the manufacturer of the finished floor covering.

3. The moisture testing shall be completed using the standard RH testing method per reference 1.a. listed above and the System shall be able to handle up to 98% RH sensor.

SECTION 4: CONCRETE PAVEMENT

1. REFERENCES: All construction shall conform to the most recent edition of the following references; where standards provide conflicting information pertaining to an issue, the most stringent information shall apply.

   a. UFC 3-250-04, "Standard Practice for Concrete Pavements, with Change 2"

   b. UFC 3-250-06, "Repair of Rigid Pavements Using Epoxy Resin Grouts, Mortars and Concretes"

CSI 05 00 00 METALS

SECTION 1: METAL BUILDING STANDARDS

1. **REFERENCES**: All construction shall conform to the most recent edition of the following references; where standards provide conflicting information pertaining to an issue, the most stringent information shall apply.

   a. Code of Federal Regulations (CFR) – in particular, but not limited to the following Titles: 1, 10, 18, 32, 40, 41, 45, 47, and 48.

   b. U.S. GBC, LEED

   c. BASE Master Plan

   d. BEAP

   e. International Building Code (IBC) – in particular, but not limited to CH 22, "Steel"

   f. National Fire Protection Association (NFPA) Standards

   g. UFGS – in particular, but not limited to the following: Division 5, "Metals"; Division 7, "Thermal and Moisture Protection"; and Divisions 13, 34, & 19, "Metal Building Systems"

   h. International Mechanical Code (IMC)

   i. International Plumbing Code (IPC)

   j. National Electrical Code (NEC)

2. **REVIEW OF PROPOSED METAL BUILDINGS**: The PWD, A&E Branch, Facilities Projects Team will only consider the review of proposed metal buildings where fiscal constraints will not allow the construction of a fully BEAP compliant building. All efforts shall be made to consider the construction of a typical MCB CPEN concrete masonry unit (CMU) building structure with standing seam metal roof (SSMR), prior to submission of a request for exception. In the event that available funding does not allow a required facility to comply, pre-engineered metal buildings will be considered by the PWO on a case-by-case basis, with the following requirements, beyond general BEAP compliance.

   a. **BUILDING SITING AND EXTERIOR WALL REQUIREMENTS**:

      (1) If the building is to be sited in a high visibility area, it shall include a minimum 4' high split-faced CMU, or cast-in-place concrete, "wainscot" base. Typically, this will be an exterior cladding / surround on the structural metal "skeleton" of the frame. The intent of the concrete or masonry base is to prevent potential damage from machinery or miscellaneous impact in warehouse or shop facilities at the floor level areas; and increase the durable life of the building.

(2) If the building is in a remote area, the CMU or concrete wainscot will not be required; and a standard, metal-clad, pre-engineered building may be approved. All material connections shall be properly detailed, per manufacturer's specifications, to provide weatherproof protection. Other equally effective closure details will be considered for review, see Figures 9-16.

b. **METAL EXTERIOR CLADDING**:

(1) In all cases any exterior metal wall faces will be minimum 24 gage sheet steel.

(2) Exterior metal panels shall be an integrally insulated, weather-tight system. Where insulated metal-clad panels are used above a CMU or concrete wainscot, they will have an exterior 24 gage sheet and a minimum of 26 gage interior sheet. If the panels extend down to the slab level, the interior metal sheet will also be a minimum 24 gage.

(3) Where user comfort is important, and a more finished interior is desired, exterior panels could be single ply metal panels with steel stud, furred interior insulation, and gypsum board interior finish.

(4) Where the building does not require heating or cooling for the comfort of the users, it can be constructed of just the weather-tight, single ply, exterior metal "skin."

c. **EXTERIOR METAL FINISHES**:

(1) All exterior metal shall be factory-applied fluor-polymer finish color coated. Exterior panel colors shall comply with the BEAP Color Board metal finishes (Pantone #7528 or #7536).

(2) On smaller buildings the roof shall be a standing seam metal system, with pitch and color per the BEAP (Section 3.5C3e and the Color Board). The standard color is Pantone #188 red.

(3) On larger span buildings follow manufacturers' recommended roofing specifications.

(4) Downspouts and gutters shall be installed; and drain to an underground storm drain system, or into vegetated or graveled swales. The color of the gutters shall match the roof color. The downspouts' color shall match the majority of the wall color field which they drop across.

d. **NATURAL LIGHTING**:

(1) Where the building spans are large (over 60 feet), the use of a roof configuration to include where the building spans are large (over 60 feet), the use of a roof configuration to include central clerestory windows is highly encouraged for the distribution of natural light into interior spaces, see Figures 7 & 8 and Appendix C, BEAP Addenda, Chapter 3.5 C.

(a) Lighting will be enhanced by the use of white or off-white finish colors on the building interiors' surfaces, particularly in larger structures.

e. **ENERAL BUILDING COMPONENTS**:

(1) Windows, doors and hardware shall comply with the standards of the UFC 4-010-01and the BEAP. Where applicable, they will meet strength and anchorage requirements of ATFP.

(2) At every exterior doorway serving equipment traffic, install concrete-filled, steel bollards inside the jamb areas of the doorway.

(3) All exterior panels shall be weather and insect sealed with rubber gasket inserts, or grout fills at slab level, or above wainscot level. All other closure points will be properly sealed for weather tightness; and other equally effective closure details will be considered for review.

f. **WARRANTY**: All metal buildings shall be expected to perform their intended function, without major maintenance, for a minimum of twenty years.

Figure 7: Example of Good Use of Clerestory Lighting

Figure 8: Good Example - Interior View of Clerestory Lighting

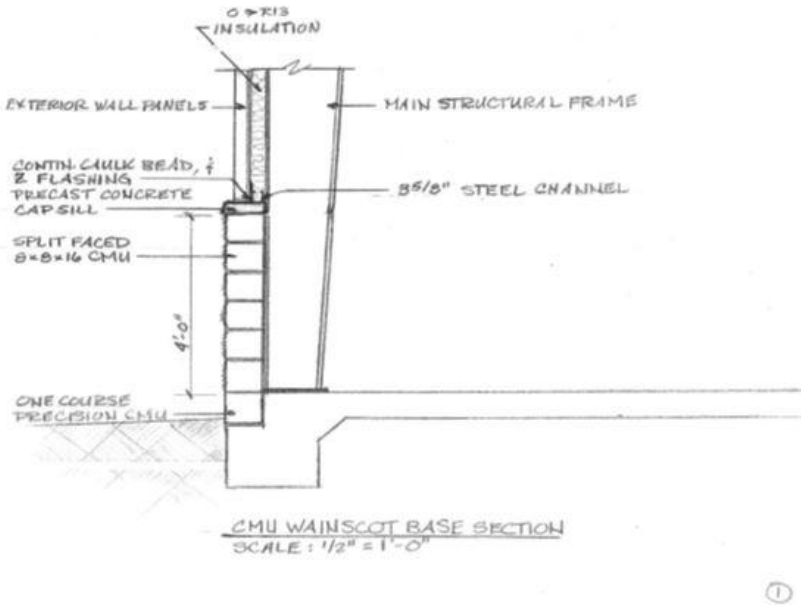


Figure 9: CMU Wainscot Base Section

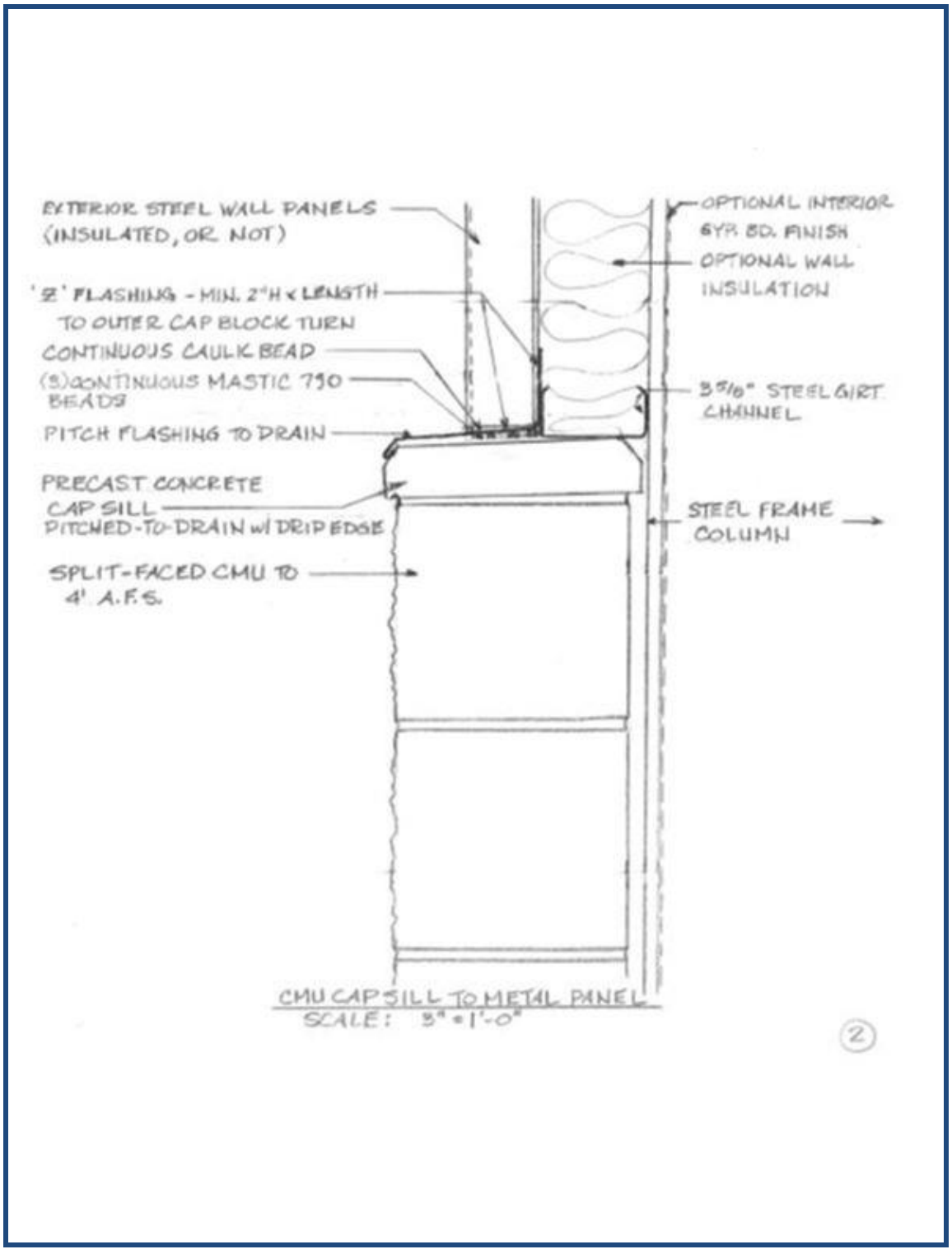


Figure 10: CMU Cap Sill to Metal Panel Detail

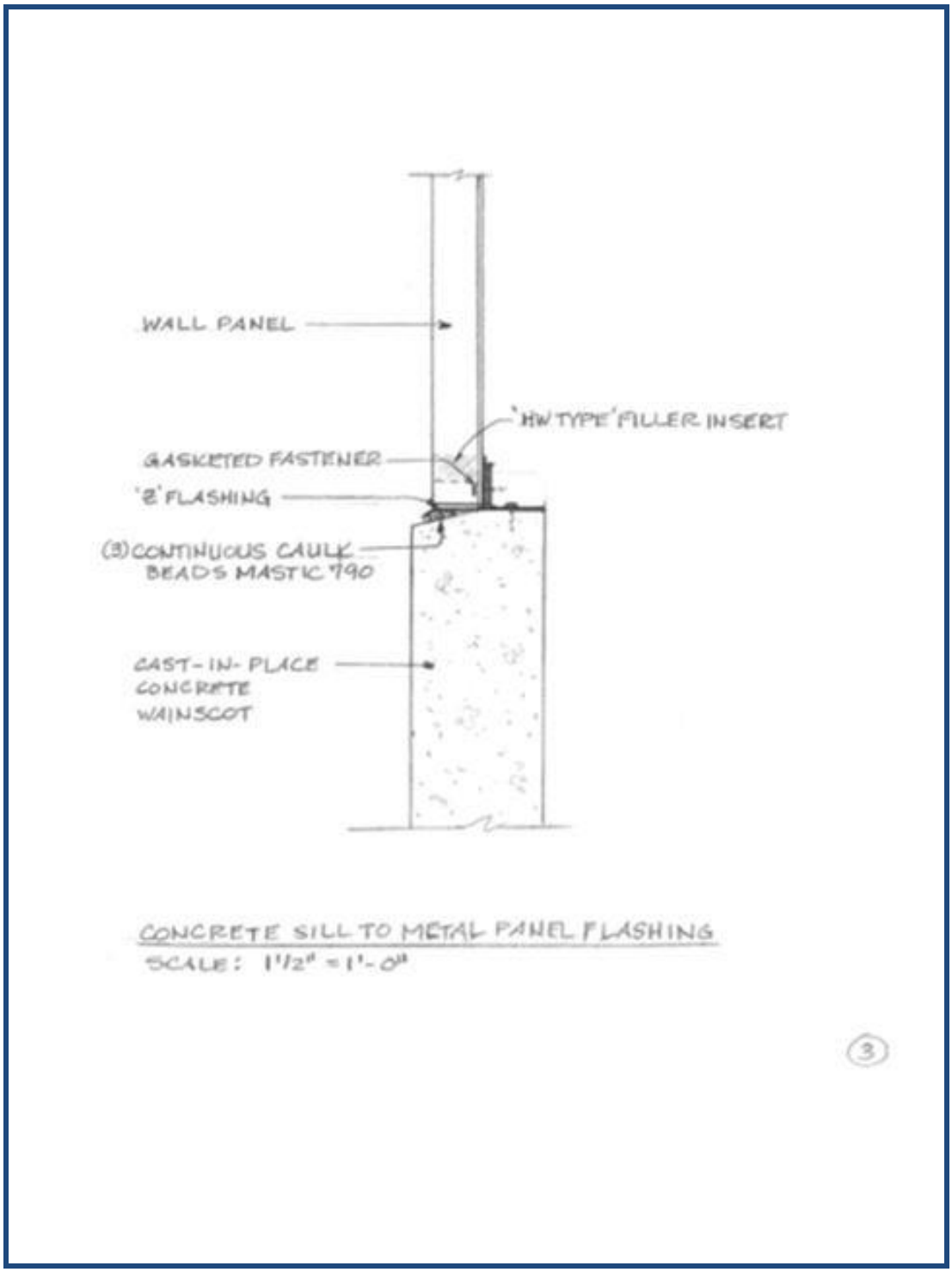


Figure 11: Concrete Sill to Metal Panel Flashing Section

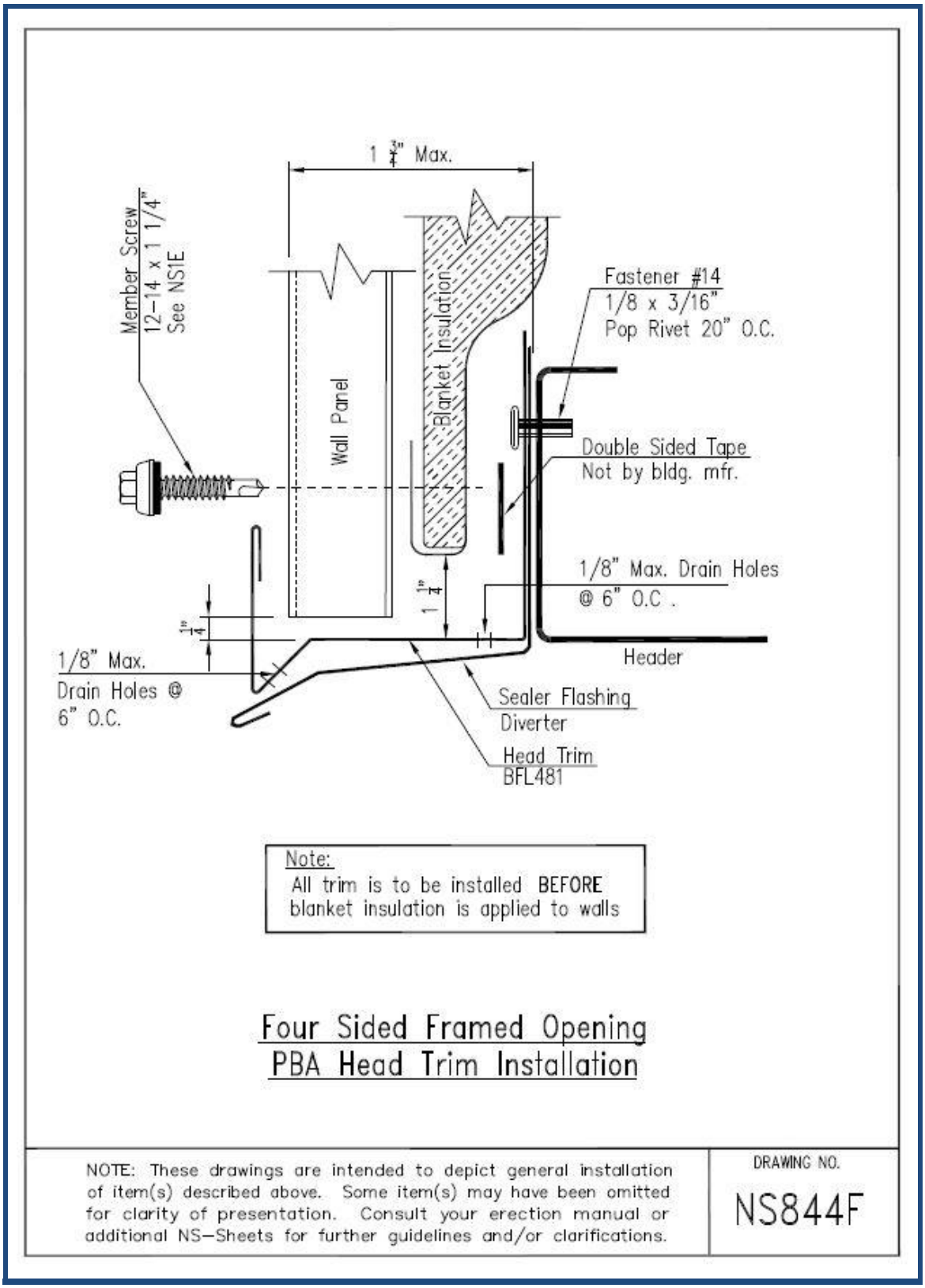


Figure 12: Four Sided Framed Opening Head Trim Installation Detail

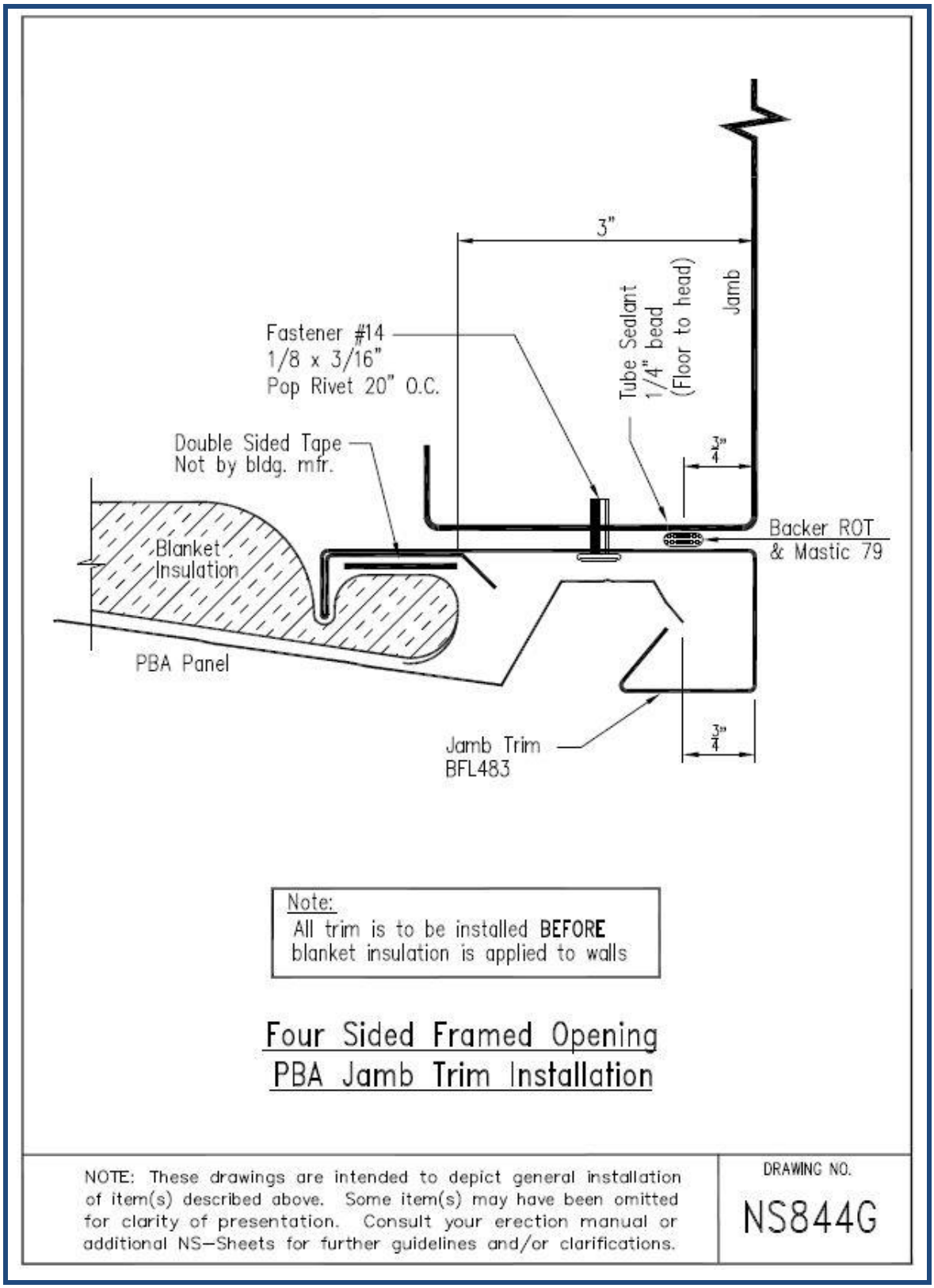


Figure 13: Four Sided Framed Opening Jamb Trim Installation Detail

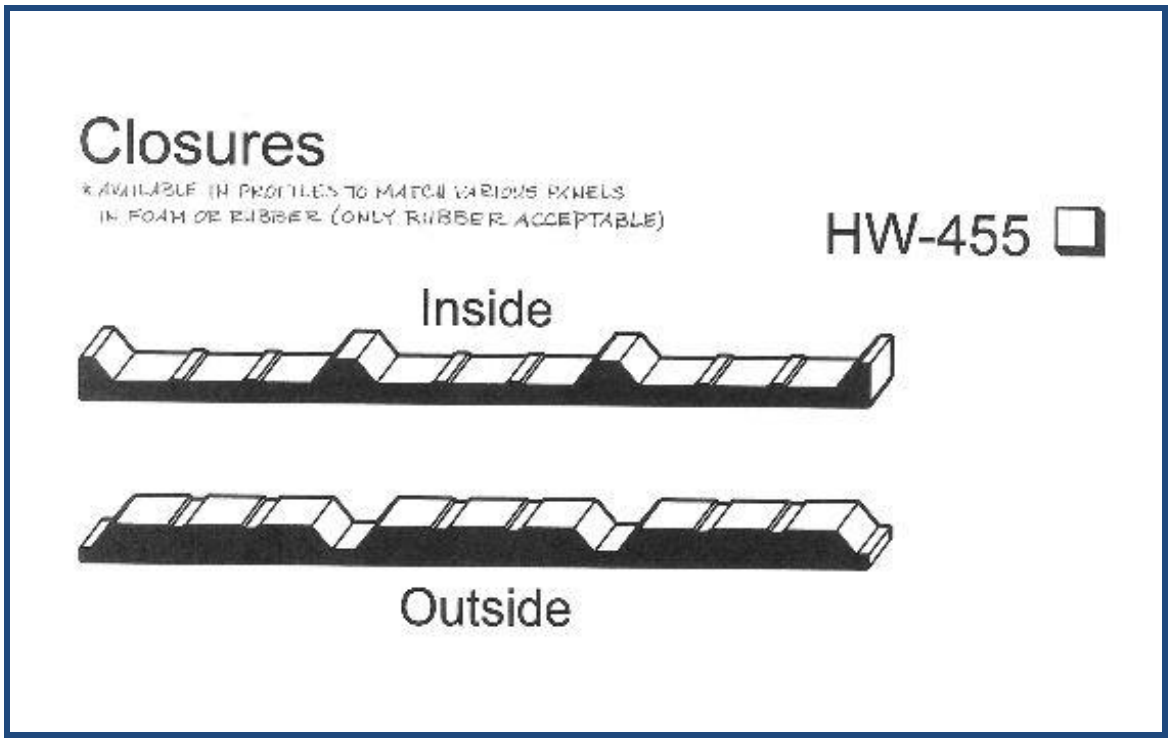


Figure 14: Metal Panel Closure Profiles

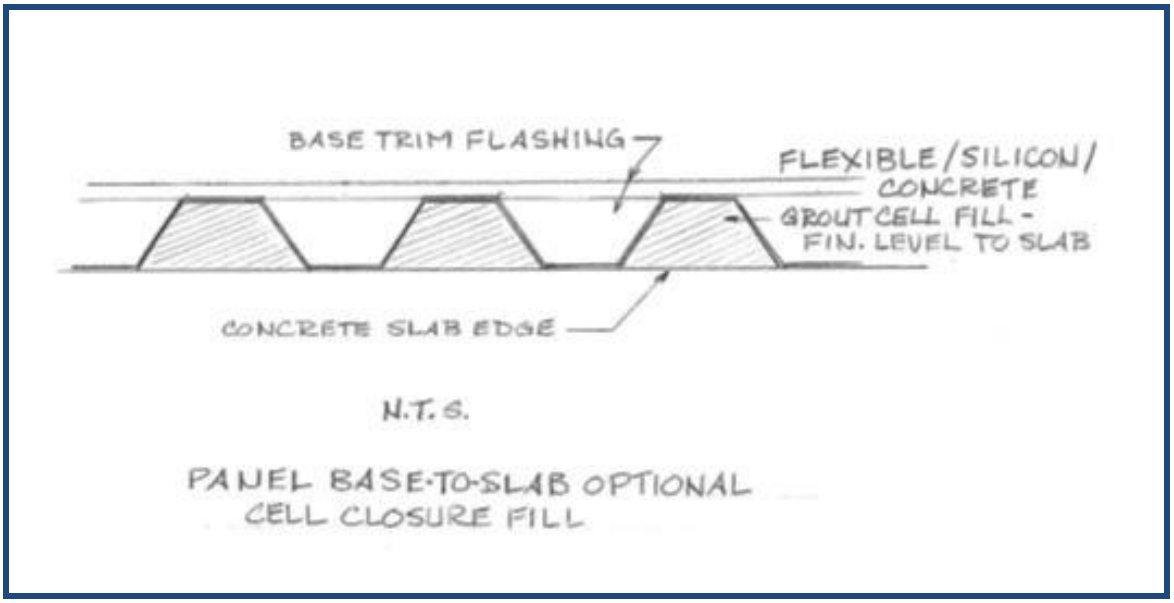


Figure 15: Panel Base-to-Slab Optional Cell Closure Fill Detail

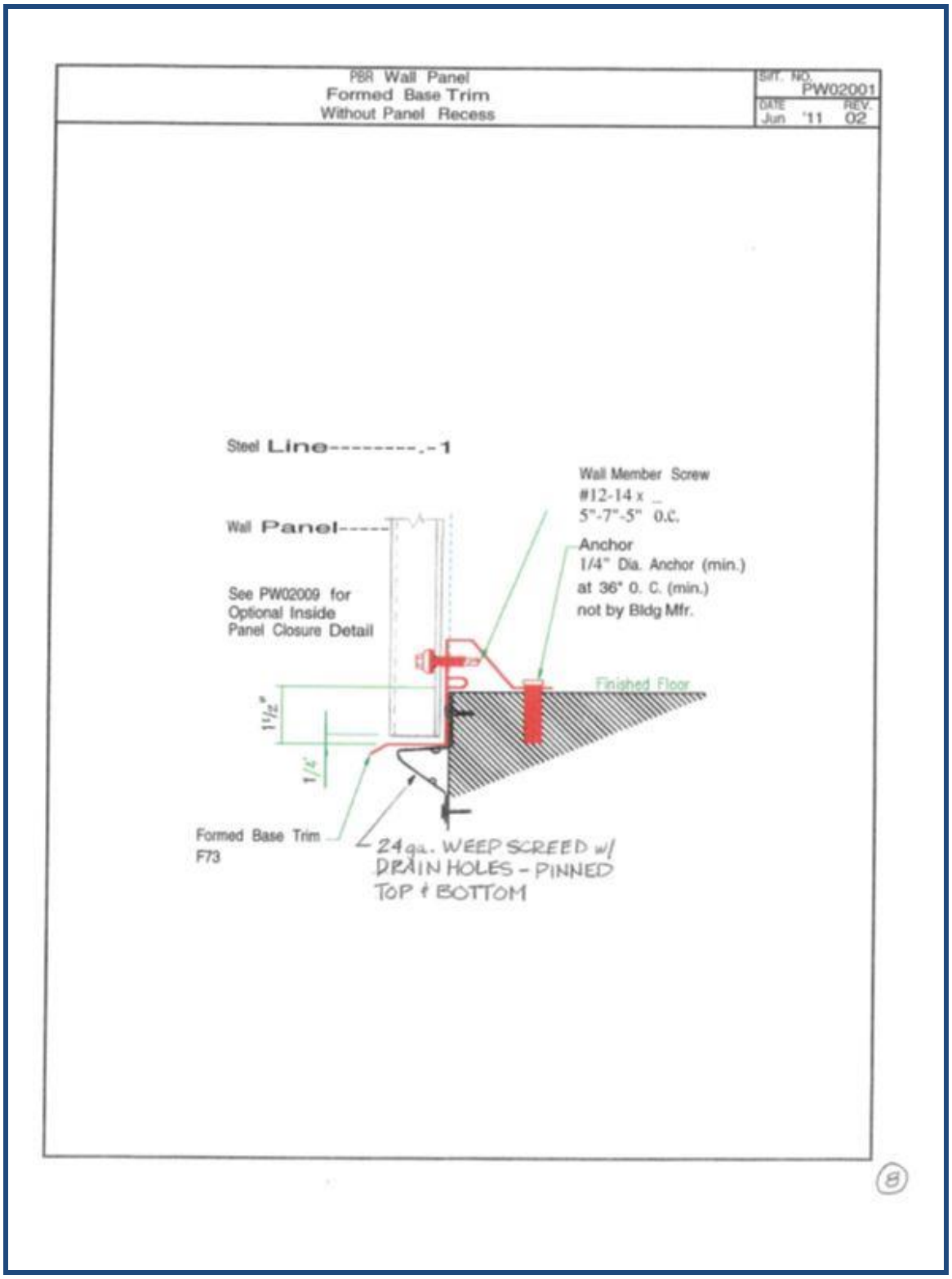


Figure 16: Wall Panel Formed Base Trim Sub-Flashing Detail

CSI 09 00 00 FINISHES / STRUCTURAL INTERIOR DESIGN

SECTION 1: REFERENCES

1. FC 4-721-10N, "Navy and Marine Corps Unaccompanied Housing" which includes references to DoD Memorandum, "Access for People with Disabilities"

SECTION 2: INTERIOR DESIGN STANDARDS – GUIDELINES FOR FINISHES

1. **PHILOSOPHY**:

   a. **FUNCTION**:

      (1) The interior design package shall meet or exceed the functional efficiency of the space for the tasks performed.

      (2) End users continually move throughout the MCB CPEN and to other locations due to changes in duties and missions. The goal is to provide an interiors package that reflects the MCB CPEN standard and shall not reflect the specific taste of the current end user or Interior Designer. By designing to the standard, the space can accommodate the needs of many end users as they move from building to building.

      (3) The interiors package shall be maintainable, adaptable, functional and durable.

   b. **MARINE PROOF:**

      (1) Think muddy boots, sharp things, big young high energy Marines.

      (2) Interiors shall be masculine in nature and create a sense of unity.

      (3) Finishes to be low/no maintenance; Marines will not clean finishes as you would in your home.

      (4) Operations and Maintenance (O&M) Funds for repair or replacement is limited so make design selections accordingly.

   c. **TIMELESS DESIGN**:

      (1) A sense of "classic style" and timelessness is encouraged, see Figure 17.

         (a) A variation in ceiling heights creates a more dynamic space, see Figure 17.

         (b) Artwork displaying USMC accomplishments are encouraged, see Figure 17.

      (2) Designs need to last for a minimum 20-30 years because there are no dollars for repair or replacement.

(3) Marine Corps motto: "The Few, The Proud, The Marines." The interior design concept shall reflect a proud, military culture, which Marines will be proud to live and work in, see Figures 17 & 33.

Figure 17: Good Examples – Classic Style & Timeless Design

SECTION 3: FINISHES

1. **FINISHES REQUIRED**:

   a. Patterns and colors of Structural Interior Design (SID) shall hide soiling, use medium to dark colors and heavy patterning. Patterned flooring in entry ways and high traffic areas help to hide dirt and wear. Darker colored patterned carpet help to hide soiling and wear, see Figure 18.

   b. Finishes shall be zero to low maintenance making it less expensive to maintain.

   c. Finishes shall be sustainable, recyclable and environmentally friendly.

Figure 18: Good Examples - Flooring.

2. **FINISHES PROHIBITED**:

   a. Matte sealed concrete flooring shall not be used except in utility rooms such as electric rooms, mechanical rooms, telephone equipment rooms and in some maintenance work bays. Polished concrete, epoxy, shiny sealer / stained concrete and terrazzo floors are acceptable types of concrete floors for areas where a concrete floor is the best solution. (See Section CSI 03 00 00 Concrete.)

   b. Do not use floor tiles that have a surface color / finish that is not integral throughout the body of the tile.

   c. Wall covering shall not be used (some wall coverings used as artwork / graphics depicting Marines is acceptable).

   d. Black / Espresso and / or white wood is not acceptable for interior building finishes

3. **REQUIRED PROCEDURES FOR SID PACKAGES**:

   a. MCO P10150.1, "Garrison Property Policy Manual"

   b. Follow FC 4-721-10N, "Facilities Criteria, Navy and Marine Corps Unaccompanied Housing" which includes references to DoD Memorandum, "Access for People with Disabilities"

   c. Follow criteria in the CPR Specification Guidance

   d. All SID packages to involve the end user and the PWD, A&E Branch PL.

   e. PWD, A&E Branch to receive SID submittal packages in addition to the RFP required distribution.

   f. The Final SID packages shall be signed off by the PWD, A&E Branch, Interior Designer.

4. **REPLACEMENT AND MAINTENANCE**:

   a. To maintain consistency in the interior design, replacement of a SID interior finish shall duplicate what is currently installed.

   b. If a SID interior finish has been discontinued, alternate items shall be approved by PWD, A&E Branch and / or the Director of Billeting for BEQ's.

SECTION 4: FLUID APPLIED OR RESINOUS FLOORING

1. **Floor Prep:**

   a. Provide mechanical floor prep. Provide calcium chloride testing according to manufacturer's requirement.

b. For existing resinous flooring conditions, prep according to manufacturer's requirements. Provide epoxy primer prior to urethane top coat.

c. For existing broadcast floor, prep according to manufacturer's requirements. Provide new broadcast and urethane top coat.

2. **Commercial Kitchens**:

a. Provide a 1/4" troweled urethane mortar system. A topcoat is required for 0.6 coefficient friction.

3. **Surgical Rooms**:

a. Provide a high solids urethane top coat .

b. A high solids urethane top coat is appropriate for applying over an existing epoxy operating room floor.

4. **All locations with vehicular, wheeled, or trailer equipment traffic**:

a. Provide a 1/4"thick troweled epoxy mortar with a high solids urethane topcoat system.

5. **Corridors, offices, classrooms, conference rooms, multi-purpose rooms, and break areas**:

a. Provide a minimum 40mil thick double broadcast Decorative Flake system. Provide a high solids urethane top coat.

6. **Restrooms, showers, locker rooms and janitors' closets**:

a. Provide a minimum 40mil thick double broadcast Decorative Quartz system. Provide a high solids urethane top coat.

7. **Storage rooms, shops and work spaces that have no requirement for vehicular, wheeled, or trailer equipment traffic**:

a. Provide minimum 20mil thickness. 2 coats 100% solids epoxy with a high solids urethane top coat.

SECTION 5: RESILIENT FLOORING

1. **RESILIENT BASE AND ACCESSORIES**: Resilient floor base and accessories shall be rubber (not vinyl) and 6” in height. Light colors are not acceptable as they show dirt, wear / tear and scuff marks.

2. **VINYL COMPOSITION TILE (VCT)**:

(a) Although the industry is now producing resilient tile flooring with bio-content and other sustainable attributes, the material requires buffing and does not have the longevity of other resilient flooring materials.

(b) Vinyl Composition Tile: shall only be used in small areas where there is no possibility of moisture problems in the substrate / concrete slab; or there is no other alternative due to budget constraints.

3. **LUXURY VINYL TILE**: Luxury vinyl tile is desired by MCB CPEN. It provides a high degree of durability is low maintenance and provides soil-hiding patterns. Luxury vinyl tile shall be at least 3mm gauge. The luxury vinyl tile floor shall be cleaned and sealed as part of the installation provided by the contractor. Dark colors are not allowed due to the scuff marks caused by the light soled Marine and Sailor boots. Heavy textures are not allowed because they trap dirt and are hard to clean.

4. **LINOLEUM FLOORING**: Although the sustainable attributes are highly desirable, the durability of the material and the adhesive has not stood the test of time aboard MCB CPEN. When resilient flooring is called for, an alternate to linoleum is desired.

SECTION 6: TERRAZZO FLOORING

1. The industry offers many varieties of terrazzo flooring. It is recommended that the Interior Designer research the types of terrazzo flooring available and select the best type for the end use. Terrazzo flooring shall not be confused with polished concrete flooring, sealed concrete flooring or epoxy flooring. Terrazzo flooring holds up well aboard MCB CPEN, is easy to maintain and is aesthetically pleasing, unlike matte sealed concrete which is hard to clean and looks like raw concrete.

SECTION 7: WALL COVERING

1. Wall coverings require maintenance / repair / replacement. In general, wall covering is not desired.

2. If wall protection is necessary, another type of material such as diamond metal plate, corner guards, chair rails or tile wainscots are required. Some wall coverings used as artwork / graphics depicting Marines is acceptable when located appropriately (i.e., out of reach from public / human contact). Decorative wallcoverings in low traffic / higher end command suites may be acceptable with approval from PWD, A&E Branch, Facilities Projects Team PL.

3. Wall covering shall not be applied within the sides of a finished window opening.

SECTION 8: PAINT AND COATINGS

1. Interior paint shall be applied over a minimum Level 3 wall finish. Interior paint shall be velvet or eggshell finish unless the area being painted is subject to moisture, such as restrooms and shower rooms, or requires a high degree of clean ability such as a commercial kitchen. These areas shall have semi-gloss.

2. Red paint is a common color used for accent walls. Be aware that in some applications sunlight and / or artificial light reflecting off of the red paint onto an adjacent light colored wall will make the light colored wall appear pink. The use of accent walls are highly encouraged; however, be cognizant of light source. Dark colors are not recommended for high traffic areas unless corner guards and crash guards are provided.

3. Corner guards are required at all corners throughout the project. Dark paint finishes will show scratches and dings

SECTION 9: WALL AND DOOR PROTECTION / CORNER GUARDS

1. Contractors shall use heavy Duty corner guards either of stainless steel or Polyvinyl Chloride (PVC) material to coordinate with surrounding walls on all exterior corners throughout the interiors of all buildings will provide a durable, maintenance free wall finish to gypsum board wall construction.

2. Marines often carry large gear bags throughout all types of buildings and the walls, especially the corners suffer the abuse.

3. Heavy duty corner guards benefit all building types aboard MCB CPEN from industrial and BEQs to command posts, headquarters and administrative buildings, see Figure 19.

Figure 19: Lessons Learned: Use Heavy duty corner guards - Dark Paint Finishes show dings.

SECTION 10: GYPSUM BOARD (Mildew Resistant Gypsum Board Ceiling)

1. Mildew and mold resistant gypsum board shall be used for ceilings in areas with high moisture content such as shower rooms and BEQ bathrooms.

2. A gypsum board ceiling is required for all telephone equipment rooms. This type of ceiling will prevent dust and other debris from contacting the telephone service equipment. Gypsum board ceilings are not required for mechanical equipment rooms or electrical rooms.

SECTION 11: TILING

1. Ceramic tile is acceptable on wall surfaces, but it is not durable enough for floor surfaces. Floor surfaces on the MCB CPEN take a high level of abuse.

2. Where a tile floor is called for, a better solution would be porcelain tile where the color is integral through the entire tile or quarry tile.

3. Use epoxy grout for all tile installations.

SECTION 12: SOLID SURFACE COUNTERTOPS AND WINDOWSILLS

1. Solid surface material provides a durable, repairable countertop surface. Plastic laminate countertops are not allowed. When used in a bathroom, a solid surface integral sink makes the lavatory easy to clean.

2. A solid surface backsplash shall be provided. It shall extend all the way up to the bottom of the upper cabinets. Where there are no upper cabinets, the Contractor shall provide a minimum 6" splash or higher.

3. Provide a solid surface sill at all window openings. Solid surface window sills are not required on windows that are located high or out of reach, see Figure 20.

Figure 20:
Good Example - Solid Surface Window Sills

SECTION 13: WINDOW BLINDS

1. Traditional mini blinds break easily and are noisy when a breeze comes through an open window. A roll-down blind system / solar shade system provides a mesh fabric and manually operated chain drive hardware mounted at the window in a channel system. This type of window treatment is more durable and, when paired with a black out shade, provides filtered sunlight or total black out conditions.

2. All roll-down blinds or shades shall not make contact with any part of the window hardware when the blind or shade is lowered or raised.

CSI 10 00 00 SPECIALTIES

SECTION 1: REFERENCES

1. DoD 4525.6-M, “DoD Postal Manual”

2. ABA Standards and Americans’ with Disabilities Act (ADA)

3. UFC 3-120-10, "The WBDG: Interior Design"

4. FC 4-721-10N, “Navy and Marine Corps Unaccompanied Housing” which includes references to DoD Memorandum, “Access for People with Disabilities”

SECTION 2: BUILDING PLAQUE

1. **PLAQUE DESIGN**: Figure 21 shows the plaque design for all newly constructed buildings aboard MCB CPEN. A plaque shall be hung at each new building in a prominent location. (Two names maximum in a group.)

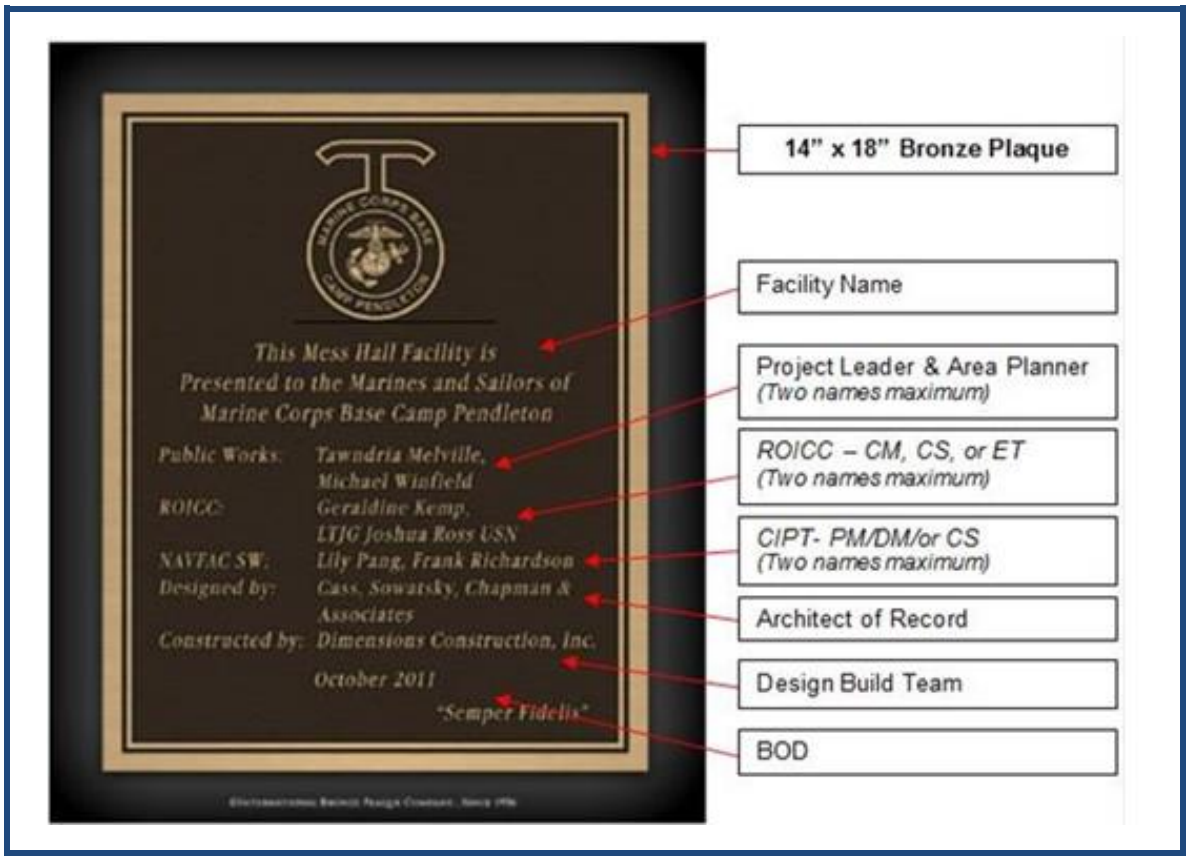


Figure 21: Good Example - Building Plaque

SECTION 3: INTERIOR SIGNAGE

Figure 22: Good Example - Interior Signage

1. Interior Signage Package shall include:

   a. Interior Room Identification.

   b. Sustainable materials.

   c. Compliance with Section 1, references listed above.

   d. Signs designed in conjunction with the Comprehensive Interior Design Package. (See Figure 22.)

   e. Finishes that are durable (Marine-proof) and outlast the longevity of the building.

   f. Zero to low maintenance making them less expensive to maintain.

   g. Coordination with architecture / design of the building.

   h. Interchangeable slide-in labels under a clear panel strip for Administrative, BEQ, and other buildings.

   i. When the facility is renovated, interior room identification signs shall be provided that complies letters (a-h) and for the purposes of ADA. If the end user desires, the nostalgic perpendicular mounted signs found in some of our older facilities can be provided in addition.

SECTION 4: TOILET COMPARTMENTS

1. Toilet compartment partitions of high density plastic (HDP) or solid surface type materials provide the best durability and longevity for Marine environments. Stainless steel or painted metal compartment panels are prone to rusting and plastic laminate compartment panels are prone to de-lamination; and both are prone to scratching / abuse. Graffiti is common (written and scratched) and the partitions shall be highly durable and repairable.

SECTION 5: FULL HEIGHT DEMOUNTABLE INTERIOR PARTITIONS

1. Full height demountable interior partitions are considered furniture, fixtures, and equipment (FF&E) and not construction. As an FF&E item, the quality can be controlled by the Best Value Determination (BVD) process. Interior glazing becomes less expensive than traditional interior glazed partitions. There is flexibility in reconfiguring the space without using construction dollars.

SECTION 6: TOILET, BATH AND LAUNDRY ACCESSORIES

1. Open front toilet seats shall be provided for all toilets.

2. Prison type rod toilet paper holders are required for Open Squad Bay facilities.

SECTION 7: EMERGENCY AID SPECIALTIES / DEFIBRILLATOR CABINETS

1. Defibrillators are proven to save the life of people in cardiac arrest. New construction or major renovation with personnel occupancy of greater than 50, and / or greater than three miles from the nearest fire / rescue station shall install one Automatic Electronic Defibrillator (AED) per floor. Defibrillators shall be provided at obvious points in a building near a fire extinguisher.

SECTION 8: LOCKERS AND LOCKER ROOM BENCHES

1. **PAINTED STEEL LOCKERS**: are not as durable as recycled plastic or phenolic lockers. Steel lockers rust easily when located in areas with heavy moisture such as shower rooms and training tanks. Recycled plastic or phenolic lockers shall have adequate ventilation openings.

2. **LOCKER ROOM BENCHES**: Seating and / or benches in an area that has lockers and / or showers is desired. Careful attention shall be paid that the seating material will not rust or corrode or be damaged easily when located in areas with heavy moisture. Benches that are mounted to the floor are funded as part of construction. Moveable benches are funded as FF&E.

SECTION 9: POSTAL SPECIALTIES

1. All equipment, sorting tables, storage cabinets, etc., for postal distribution centers and postal processing centers shall comply with DoD 4525.6-M DoD Postal Manual. The United States Postal Service (USPS) will provide this equipment when there is a retail component to the Post Office.

CSI 11 00 00 EQUIPMENT

SECTION 1: MAINTENANCE EQUIPMENT / WEAPONS AND PARTS CLEANING TANKS

1. Cleaning tanks for armories, vehicle maintenance facilities, etc., are provided and serviced by an outside vendor contract. Facilities that desire to obtain cleaning tanks shall contact MCB CPEN Environmental Security (ES) at (760) 725-4375/9744.

2. Each cleaning tank requires a San Diego Air Quality Control (QC) permit which is provided by the vendor as part of the service contract; without this permit, a fine will be incurred.

SECTION 2: GARRISON MOBILE EQUIPMENT (GME)

1. REFERENCES:

a. Marine Corps Order (MCO) P11240.106B, "GME"

b. MCO 5530.14A, "Marine Corps Physical Security Program"

c. MCBO 11240.3, "Billing Rates for Transportation Equipment"

d. DoD 4500.36M, "Acquisition, Management, and Use of DoD Non-Tactical Vehicles"

2. **DEFINITIONS**:

a. **GME**: per MCO P11240.106B GME consists of commercially available owned, leased and otherwise controlled passenger carrying vehicles, cargo vehicles, and material handling equipment (MHE), engineer equipment and railway rolling stock. The term passenger carrying includes sedans, station wagons, ambulances, buses, sport utility vehicles (SUVs), and passenger vans. GME fleet managers operate their GME fleets in support of transportation and maintenance requirements at Marine Corps activities. They will not use their GME fleet for tactical purposes, nor will they deploy GME assets. The essential characteristic that clearly identifies GME is wheels or tracks. Equipment similar to GME that does not move on its own power and / or is not wheeled or tracked equipment is not GME. (Example: A forklift is GME; a non-motorized pallet jack is FF&E.)

b. **CENTRALIZED EQUIPMENT POOL**: Per Marine Corps Installation West Order (MCIWESTO) 11240.3: Pooling of equipment, both physically and administratively, to the maximum extent possible is essential to economize effort, maximize service facilities, and ensure effective use of GME. The Fleet Site Managers and GME Responsible Officers (RO's) will establish centralized GME pools and sub pools based on mission, distance, economy, effectiveness, functionality, and other factors. Site Mangers will establish a consolidated

equipment pool to provide general support to many users and refrain from assigning assets for the exclusive use by one section or individual.

c. **OFFICIAL USE ONLY**: Determination of "Official Use" will be in strict compliance with the statutory regulations, see Section 2: GME, references 1.a. – 1.d. above.

(1) Only military and civilian personnel are allowed to operate GME. They will not use government vehicles to conduct personal business or engage in activities of a personal nature.

(2) Official use does not include stopping at the commissary, mess hall, exchange, or fast food restaurants, etc.

(3) GME will not be authorized for transporting personnel over any part of the route between their domicile and work location.

(4) GME will not be assigned to an individual or billet unless specifically authorized in writing by HQMC.

3. **REQUEST FOR PERMANENT ASSIGNED GME**: (DISCLAIMER: GME cannot be purchased as FF&E.) The following steps need shall be taken when a unit decides that they need GME assigned on a permanent basis:

a. Complete the SWRFT Vehicle / Equipment Assignment Justification Form (Figure 23) and submit it to the unit major command, e.g., Marine Logistics Group (MLG) or Division (DIV). GME RO for the respective major command, e.g., MLG or 1st Marine Division (MARDIV).

b. The major command shall review their currently assigned GME to see if they can reassign equipment internally to accommodate that new requirement.

c. If the new requirement cannot be accommodated internally, the major command will forward the request with their recommendations to the Regional Inventory Manager SWRFT at (760) 725-3583. The request will then be considered by MCB CPEN'S Site Manager.

d. Processing will include an analysis of vehicles currently assigned to the respective major command. SWRFT looks for possibilities to increase the efficiency of assets currently assigned to the command. If it is not possible to utilize current assets to meet the new or changed vehicle requirement, SWRFT will then consider reassignment of vehicles within MCB CPEN's fleet and the SWRFT Region fleet. Increasing SWRFT's inventory is not an option without specific authorization from HQMC.

e. If the requested equipment is USMC owned and has been approved for procurement, the request will be included with the annual HQMC Procurement Priority List submitted for each Base. This submission usually occurs during the July-August timeframe. HQMC will then decide what will be purchased and provide the most benefit for the entire Marine Corps, considering available procurement funding.

4. **WAREHOUSE MODERNIZATION PROGRAM**:

a. NOTE: It is recommended that additional MHE requirements be identified during the Planning Phase of any warehouse modernization / improvement program; this will allow time for the procurement process. The earliest the purchase items will arrive is the next year.

b. All GME is centrally managed at the HQMC level. SWRFT is responsible for the HQMC authorized Table of Equipment (T/E) for GME. Any equipment that will be bought, either through the Warehouse Modernization program or through HQMC utilizing Procurement, Marine Corps funding, will need to go through the SWRFT Inventory office before the purchase to properly manage the inventory and the T/E allowances.

c. GME for Marine Corps Community Services (MCCS) projects will not follow the procedure above but shall be coordinated through MCCS management.

VEHICLE / EQUIPMENT ASSIGNMENT JUSTIFICATION
(Class B - Full Time Assignment to Support Daily Requirements)

REFERENCES: DoD 4500.36-R and MCO P11240.106 govern Garrison Mobile Equipment (GME) and require the adequate justification of Class B assigned GME.

Instructions: Only complete forms will be accepted. This completed form is required to justify retaining currently assigned GME, request new/additional GME, and to request a change in GME type (i.e., 12-pax van to 7-pax van, 10k forklift to 6k forklift, etc.).

Responsible Officer (RO) Name			RO Phone #		Date
Command/Activity			JON (if applicable)		SWRFT Dept. ID
Justification for:		New GME		Change GME	Current GME
Tag / ID #	Est. Annual Miles / Hours		Usual # Passengers		Usual Cargo (lbs.)
Description of GME required to accomplish the mission (7- passenger van, pickup truck, 4K forklift, etc.):					
Special equipment required to accomplish mission (lift gate, tow hitch, ladder rack, etc.)					
Justification for GME Class B assignment (Explain in detail why this GME is required):					
Explain why currently assigned equipment, POV, pooled GME, or bus service cannot be utilized:					
Signature of Responsible Officer (RO)		Date	Signature of Authorizing Official		Date
			(This shall be an Official authorized to commit funding for GME support.		

Figure 23: SWRFT Vehicle / Equipment Assignment Justification Form

SECTION 3: WEAPON RACKS

1. REFERENCES:

   a. MCO 5530.14A, "Marine Corps Physical Security Program Manual"

2. Weapons rack cabinets shall meet reference 1.a. requirements listed above.

3. Weapons rack cabinets shall be certified by Tactical Communications (TACOMM) and Marine Corps Systems Command (MARCORSYSCOM).

4. New weapons rack storage systems aboard MCB CPEN shall be compatible and interchangeable with the existing systems.

5. Weapons rack cabinets shall be ganged together from the inside; top to bottom, back to back, side to side, meeting security weight requirement of at least 500 lbs. [227 kilograms (kg)].

6. Weapons rack cabinets to have retractable doors that prevent blocking aisles or neighboring racks and maximize efficiency of the issuance of weapons and gear.

7. Weapons rack cabinets to have perforated doors, sides and cabinet back which aids in the efficiency of conducting weapons inventory.

8. Weapons racks components shall be portable for on and off Base training exercises. The rack storage containers shall be equipped with carrying handles.

9. Weapons racks are to have a hinged locking bar on the front of the rack that meet or exceed military requirements for arms security of conventional arms, ammunitions and explosives. The locking bars will have the hinge pin welded or otherwise secured to prevent easy removal per MCO5530.14A.

10. Door hinges on the weapons racks shall be riveted and welded.

11. Weapons racks cabinets shall be fully welded.

12. All accessories that come into contact with the weapons shall be powder coated, vinyl dipped, rubber, thermoplastic-coated, or made from thermoplastic ensuring weapons are safe from damage.

13. IMPORTANT: It is required that the weapon racks are able to store all weapon systems with "Fully Operational" capability; all attachments shall be stored on the weapon, not in a separate location, e.g., rifle combat optics, laser attachments, etc.

14. Some armories prefer / require weapons storage rack shelving that is carried on a rail system allowing the shelves shall be stacked together thus saving space. Shall this system be required; it shall be

manually operated and not motorized.

15. Weapon racks, although secured to the facility, are moveable in nature and funded by FF&E.

SECTION 4: LAUNDRY

1. REFERENCES:

   a. FC4-721-10N, "Navy and Marine Corps Unaccompanied Housing"

   b. IMC Section 504, "Clothes Dryer Exhaust"

2. All washing machine laundry trays shall have only a drain pipe outlet hole and two inlet holes for the hot and cold water supply pipes. The tray shall be constructed of plastic non-corroding material. All metal laundry trays are prohibited.

3. Attach numbering labels to all laundry washers and dryers. Provide numbers next to circuit breakers that coordinate with numbers on washers and dryers.

4. If the project square footage allows, it is preferred that heavy duty commercial grade washers and dryers be provided.

5. Laundry room square footage and quantities of units to comply with current HQMC standard for new construction. Provide one washer and two dryers per twelve residents as a minimum, per reference 1.a. listed above.

6. Confirm that all new washers and dryers can be maintained under the current BASE service contract. Contact Consolidated Materials and Service Center (CMSC).

7. Washers are to be the top loading type. Marines will break the locking doors off the front loading type.

8. Dryers are to be front loading and stackable.

   a. Dryer Vent Duct:

      (1) Shall not be longer than 25' straight run.

      (2) A run with up to a 45 degree bend shall not be longer than 22.5'.

      (3) A run with a bend 45 degree to 90 degree shall not be longer than 20'.

      (4) Dryer vent shall not be routed to public walkways.

      (5) Per reference 1.b. listed above, clothes dryer transition ducts attached to the backs of the dryers shall be rigid metal or at a minimum 0.4mm thick flexible metal. Transition ducts of flexible foil or plastics is not allowed (these are combustible and not safe or durable).

CSI 12 00 00 FURNISHINGS

SECTION 1: REFERENCES

1. MCO P10150.1, "Garrison Property Policy Manual"

2. DON 11103, "Policy for Procurement of BEQ FF&E

3. FC 4-721-10N, "Navy and Marine Corps Unaccompanied Housing" which includes references to DoD Memorandum, "Access for People with Disabilities"

4. Naval Facilities Southwest (NAVFAC SW) Performance Criteria

SECTION 2: INTERIOR DESIGN STANDARDS – GUIDELINES FOR FURNISHINGS

1. **PHILOSOPHY**:

   a. **FUNCTION**:

      (1) The interior design package shall meet or exceed the functional efficiency of the space for the tasks performed.

      (2) End users continually move throughout the MCB CPEN and to other locations due to changes in duties and missions. The goal is to provide an interiors package that reflects the MCB CPEN standard and shall not reflect the specific taste of the current end user or Interior Designer. By designing to the standard, the space can accommodate the needs of many end users as they move from building to building.

      (3) The interiors package shall be maintainable, adaptable, functional and durable.

   b. **MARINE PROOF:**

      (1) Think muddy boots, sharp things, big young high energy Marines.

      (2) Interiors shall be masculine in nature and create a sense of unity.

      (3) Finishes to be low/no maintenance; Marines will not clean finishes as you would in your home.

      (4) Operations and Maintenance (O&M) Funds for repair or replacement is limited so make design selections accordingly.

   c. **TIMELESS DESIGN**:

      (1) A sense of "classic style" and timelessness is encouraged, see Figure 17.

(a) A variation in ceiling heights creates a more dynamic space, see Figure 17.

(b) Artwork displaying USMC accomplishments are encouraged, see Figure 33.

(2) Designs need to last for a minimum 20-30 years because there are no dollars for repair or replacement.

(3) Marine Corps motto: "The Few, The Proud, The Marines." The interior design concept shall reflect a proud, military culture, which Marines will be proud to live and work in, see Figures 17 & 33.

2. **PHILOSOPHY**:

a. **FUNCTION**:

(1) The interior design package shall meet or exceed the functional efficiency of the space for the tasks performed.

(2) End users continually move throughout the MCB CPEN and to other locations due to changes in duties and missions. The goal is to provide an interiors package that reflects the MCB CPEN standard and shall not reflect the specific taste of the current end user or Interior Designer. By designing to the standard, the space can accommodate the needs of many end users as they move from building to building.

(3) The interiors package shall be maintainable, adaptable, functional and durable.

b. **MARINE PROOF:**

(1) Think muddy boots, sharp things, big young high energy Marines.

(2) Interiors shall be masculine in nature and create a sense of unity.

(3) Marines will not clean finishes or FF&E.

(4) O&M Funds for repair or replacement is limited so make design selections accordingly.

c. **TIMELESS DESIGN**:

(1) A sense of "classic style" and timelessness is encouraged, see Figure 17.

(2) Marine Corps motto: "The Few, The Proud, The Marines." The interior design concept shall reflect a proud, military culture, see Figure 33.

(3) Produce interiors that Marines will be proud to live and work in.

(4) Designs need to last for a minimum 20-30 years because there are no dollars for repair or replacement.

3. **FF&E REQUIRED**:

a. All FF&E (new and replacement) to comply with NAVFAC performance criteria.

b. Interiors shall be commensurate with the rank or level of the individual user, see Figure 35.

c. Classic medium to medium dark stains of wood for furniture is desirable for higher ranks, such as cherry, walnut or mahogany, see Figure 24.

		
Command Deck Mess Area	General's Office	Manager's Office

Figure 24: Good Examples - Commensurate-with-Rank Office Suites

d. FF&E selections shall be visually appealing to a male dominated Marine demographic (think heavy duty: it shall LOOK and BE heavy duty yet with a sense of style; no skinny / minimalist looking furniture). Small scale furniture is not desired, see Figure 25.

e. Patterns and colors of FF&E shall hide soiling. Medium to dark colors and heavy patterning is required, see Figure 29.

f. Provide modesty panels on all desks.

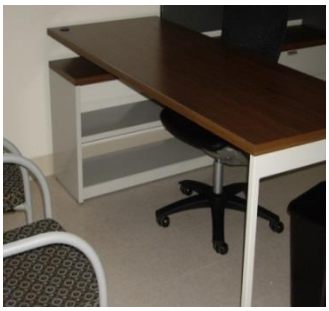
		
The small scale and color of this furniture is not suitable for marines.	The scale of this furniture is too small and minimalist for marines.	Marines do not want to crawl under their desk to get to their bookshelves.

Figure 25: Lessons Learned – Minimalist Furnishings are NOT Desired.

g. Provide wire / cable management at all work areas. Coordinate electrical to avoid running cables across top of the carpet. Modesty panels shall be provided, see Figure 26.

Figure 26: Lessons Learned - Cable Management

h. Work surfaces and table top surfaces may be light in color when light reflectance is important; however, wood grain or a small pattern is preferred for soil-hiding capabilities.

i. FF&E shall be zero to low maintenance making it less expensive to maintain.

j. FF&E shall be sustainable, recyclable and environmentally friendly.

k. Interior spaces to accommodate the specific training needs of the Marines. Training spaces can be customized to accommodate the instruction of specific skills. Conference centers to include Audio Visual (AV) / Media equipment see Figure 27.

Figure 27: Good Examples - Customized Training Spaces

4. **FF&E PROHIBITED**:

a. Style shall not be ultra-modern, trendy or minimalist, see Figure 28.

b. Black / Espresso and / or white wood are not acceptable for FF&E.

c. Solid fabrics and light colored fabrics are not acceptable, even if they are commercial grade. Solid, light colored fabrics will show soiling. White furniture will not hide soiling and will readily show scratches and wear. Wood grain or darker color is a better choice. Credenza units will be used as a foot rest; coffee cut / drink lay down area, etc. The fabric will get stain and will not get cleaned or replaced due to limited funds, see Figure 28.

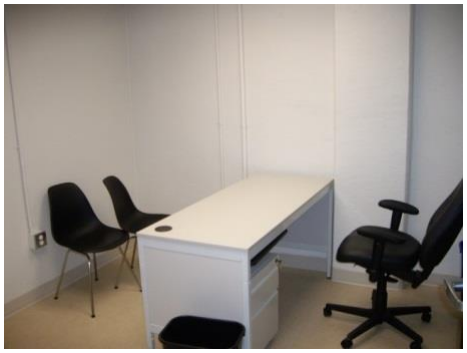


Figure 28: Lessons Learned - Light Colored and White Furniture are NOT Desired.

d. Workstations shall not have low / credenza height work surfaces. Maintain industry standard of 29”-30” high work surfaces, see Figure 32.

e. Binder bins shall not be hung on panels that are less than 60” high.

f. Upholstery on office seating shall not be white or light in color. The chairs will not be cleaned, so choosing a color that hides soiling is important. Darker colored pattered fabrics will help to hide soiling and wear, see Figure 29.

Figure 29: Good Example - Darker Colored Patterned Fabrics are Desired.

g. Mesh chair backs do not hold up at MCB CPEN. Mesh chair backs on task chairs will fail quickly due to the high number of people pulling on the top of the chair as they move in and out of the desk area. A cellular type plastic backed task chair or a dark fabric upholstered back is a better solution. Mesh chair backs surrounded by a hard plastic are acceptable for many applications but are to be a dark fabric because the lighter fabric colors show soiling at the top of the chair from oil / dirt from hands, see Figure 30.

Figure 30: Lessons Learned - Mesh Chairs are NOT Desired.

5. **REQUIRED PROCEDURES FOR FF&E**:

a. MCO P101501.1, "Garrison Property Policy Manual"

h. BEQ FF&E to follow the guidance in the DON, "Policy for Procurement of BEQ FF&E."

c. Follow "FC 4-721-10N, "Navy and Marine Corps Unaccompanied Housing" which includes references to DoD Memorandum, "Access for People with Disabilities"

d. FF&E to comply with NAVFAC Performance criteria.

e. Follow criteria in the CPR Specification Guidance.

f. All FF&E packages to involve the end user and the PWD, A&E Branch, Facilities Projects Team, Interior Designer.

g. PWD, A&E Branch, Facilities Projects Team, Interior Designer to receive FF&E submittal packages.

h. The Final FF&E packages shall be signed off by the PWD, A&E Branch, Facilities Projects Team, Interior Designer.

6. **REPLACEMENT AND MAINTENANCE**:

   a. To maintain consistency in the interior design, replacement of an FF&E item shall duplicate what is currently installed.

   b. If an FF&E item has been discontinued, alternate items shall be approved by PWD, A&E Branch, Facilities Projects Team, Interior Designer and / or the Director of Billeting for BEQ's.

   c. Furnishings are warranted. If they become damaged through normal use contact the following:

      (1) BEQ FURNITURE: Contact the Billeting Director.

      (2) ALL OTHER FURNITURE: Contact the CMSL / BASE Properties.

SECTION 3: BEQ FURNITURE

1. Superior quality, solid wood construction with lockable compartments for storage of large gear / packs.

2. Ability to secure room and personal belongings.

3. FF&E that appeals to Marine demographic nationwide.

4. FF&E shall be space planned with the USMC approved furniture standard.

5. Color and texture introduced to create visually pleasing, stimulating environments.

6. Longer warranties will save Marine Corps dollars.

7. FF&E shall be coordinated with the design of the building.

8. Style shall NOT be ultra-modern, trendy or minimalist, see Figure 28.

9. Black / Espresso and / or white wood are not acceptable for FF&E or interior building finishes.

10. All BEQ furniture (new and replacement) to comply with NAVFAC performance criteria.

11. Per Marine Corps Policy Letter, all new and whole room replacement FF&E for BEQ's shall have approval from MCB CPEN's Bachelor Housing Director prior to placing order.

SECTION 4: BEDROOM FURNISHINGS

1. FF&E packages to include mattress covers that prevent bed bugs.

2. The contractor shall provide a washable, durable fleece blanket in lieu of a fitted bed cap or bedspread.

3. Provide two sets of linens and two blankets per bed.

4. Mattress shall be washable.

SECTION 5: OFFICE FURNITURE AND CASE GOODS

1. Office furniture and case goods shall comply with the philosophy, Section 2 of this chapter.

2. Provide six sets of keys for all FF&E that is lockable such as file cabinets, desk drawers, overhead binder storage, etc. The keys shall be presented to the Government in a key box with labels identifying each key.

3. Full Height Moveable Walls:

   a. Full height moveable walls are effective elements for adding natural lighting and creative design elements into an interior space.

   b. Interior glass partitions allow light to penetrate into interior spaces creating a more pleasant work environment, see Figure 31.

   c. Full height Moveable walls are FF&E funded.

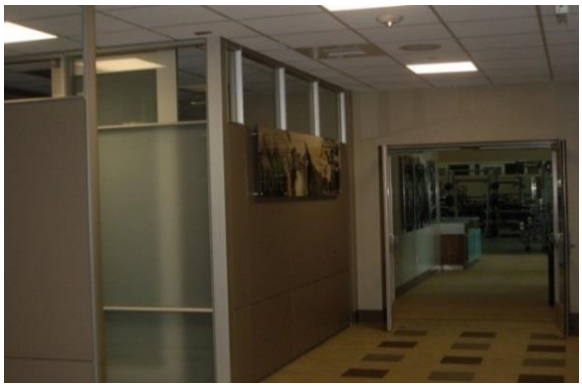


Figure 31: Good Example-Interior Glass Partitions

SECTION 6: SEATING

1. Upholstery on office seating shall not be white or light in color. The oils from hands make the fabric look soiled / dirty. The chairs will not be cleaned, so choosing a color that hides soiling is important. Choose a seat fabric that is dark in color and / or heavily patterned to hide soiling. Engineered fabric systems with an integral moisture barrier that promises permanent resistance to stains and spills is desirable for some applications.

2. Mesh back on chairs will fail quickly due to the high number of people pulling on the top of the chair as they move in and out of the desk area. A cellular type plastic backed task chair is a better solution, see Figure 30.

3. All seating (new and replacement) to comply with NAVFAC performance criteria.

SECTION 7: OFFICE ACCESSORIES/COMPUTER KEYBOARD TRAYS /DRAWERS

1. A computer keyboard tray / drawer shall be provided at each workstation and desk to comply with ADA. However, some end users do not use the keyboard tray / drawer, so a type shall be specified that is capable of being completely pushed / moved out of the way of the end users knees without any tools or special instructions. Computer keyboard tray / drawers can be eliminated from a project with approval from PWD, A&E Branch PL.

SECTION 8: SYSTEM / PANEL HUNG COMPONENT SYSTEM FURNITURE

1. Workstations shall not have low / credenza height work surfaces. Maintain industry standard of 29”-30” high work surfaces, see Figure 32.

2. Binder bins shall not be hung on panels that are less than 60” high, see Figure 32.

3. Style shall NOT be ultra-modern, trendy or minimalist, see Figure 28.

4. Black / Espresso and / or white wood are not acceptable for FF&E or interior building finishes.

5. All systems furniture (new and replacement) to comply with NAVFAC performance criteria.

			
A typical 8x8 U-shape workstation is successful in many applications.	A wardrobe or locker shall be included in all workstations.	Shared workstations can be designed to meet the needs / use of the space.	Workstation components can be applied to private offices to help maximize storage.

Figure 32: Good Examples – Work Stations

SECTION 9: ART

1. The use of artwork and the creativity in the display is encouraged aboard MCB CPEN. Alternatives to a framed and matted piece of art or photograph shall be considered. Of all the armed forces, the Marines Branch passionately celebrates the history of their missions, their leadership and their background. Photographs of historical and present day mission accomplishments are welcomed artwork themes. The use of original artwork from local artists is highly encouraged, see Figure 33.

A contemporary version of a Command Board.

Artwork does not have to be a framed poster.

Figure 33: Good Examples - Artwork and Creative Interior Features

SECTION 10: RUGS AND MATS

1. **ENTRANCE MATS**: Entrance mats shall be provided at both the interior and exterior of all entrances to buildings.

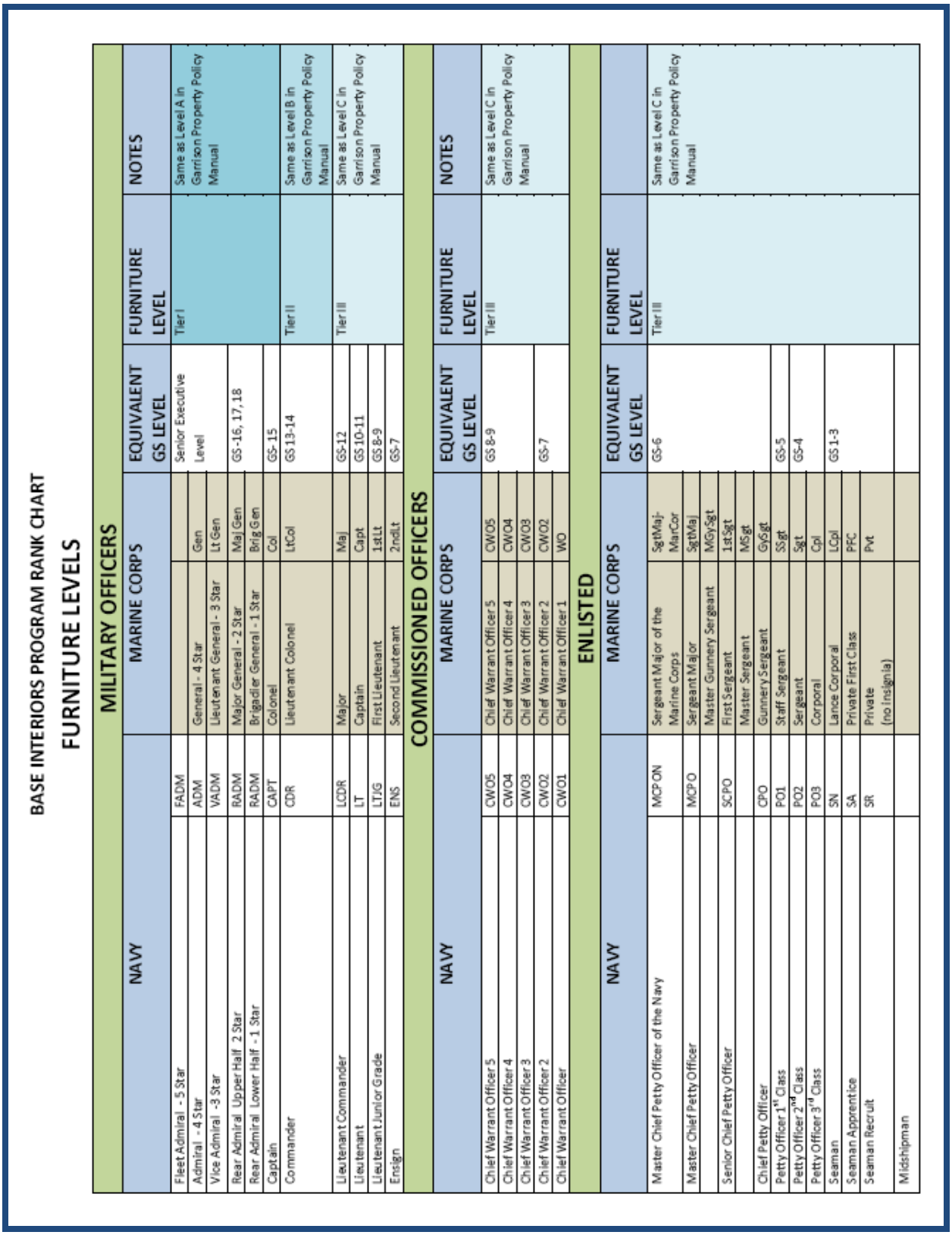
2. **CHAIR MATS:** Chair mats are useful to extend the life of carpet at workstations and desk areas. Chair mats shall be provided at all carpeted workstation and desk areas and shall be extra heavy duty to withstand the weight of big Marines. The chair mats shall withstand a weight of at least 300 pounds and shall have a warranty of at least 5 years or more.

SECTION 11: SITE FURNISHINGS

1. The use of outdoor spaces is encouraged by placing suitable seating and tables in gathering areas. The outdoor furniture shall be made of materials that do not require painting or ongoing maintenance.

2. Public areas shall have furniture that is attractive, vandal proof, secured to the ground, sturdy and sized appropriately for Marines, see Figure 34. Outdoor furnishings located on a balcony or secured private patio area need not be bolted to the ground. The outdoor furniture shall be Marine proof (i.e., heavy duty, scaled to comfortably accommodate.)

Figure 34: Good Example Public Area Furniture



BASE INTERIORS PROGRAM RANK CHART

FURNITURE LEVELS

MILITARY OFFICERS							
NAVY		MARINE CORPS			EQUIVALENT GS LEVEL	FURNITURE LEVEL	NOTES
Fleet Admiral - 5 Star	FADM				Senior Executive Level	Tier I	Same as Level A in Garrison Property Policy Manual
Admiral - 4 Star	ADM	General - 4 Star	Gen				
Vice Admiral -3 Star	VADM	Lieutenant General - 3 Star	Lt Gen				
Rear Admiral Upper Half 2 Star	RADM	Major General - 2 Star	Maj Gen		GS-16, 17, 18		
Rear Admiral Lower Half - 1 Star	RADM	Brigadier General - 1 Star	Brig Gen				
Captain	CAPT	Colonel	Col		GS-15		
Commander	CDR	Lieutenant Colonel	LtCol		GS 13-14	Tier II	Same as Level B in Garrison Property Policy Manual
Lieutenant Commander	LCDR	Major	Maj		GS-12	Tier III	Same as Level C in Garrison Property Policy Manual
Lieutenant	LT	Captain	Capt		GS 10-11		
Lieutenant Junior Grade	LTJG	First Lieutenant	1stLt		GS 8-9		
Ensign	ENS	Second Lieutenant	2ndLt		GS-7		
COMMISSIONED OFFICERS							
NAVY		MARINE CORPS			EQUIVALENT GS LEVEL	FURNITURE LEVEL	NOTES
Chief Warrant Officer 5	CWO5	Chief Warrant Officer 5	CWO5		GS 8-9	Tier III	Same as Level C in Garrison Property Policy Manual
Chief Warrant Officer 4	CWO4	Chief Warrant Officer 4	CWO4				
Chief Warrant Officer 3	CWO3	Chief Warrant Officer 3	CWO3				
Chief Warrant Officer 2	CWO2	Chief Warrant Officer 2	CWO2		GS-7		
Chief Warrant Officer	CWO1	Chief Warrant Officer 1	WO				
ENLISTED							
NAVY		MARINE CORPS			EQUIVALENT GS LEVEL	FURNITURE LEVEL	
Master Chief Petty Officer of the Navy	MCPON	Sergeant Major of the Marine Corps	SgtMaj-MarCor		GS-6	Tier III	Same as Level C in Garrison Property Policy Manual
Master Chief Petty Officer	MCPO	Sergeant Major	SgtMaj				
		Master Gunnery Sergeant	MGySgt				
Senior Chief Petty Officer	SCPO	First Sergeant	1stSgt				
		Master Sergeant	MSgt				
Chief Petty Officer	CPO	Gunnery Sergeant	GySgt				
Petty Officer 1st Class	PO1	Staff Sergeant	SSgt		GS-5		
Petty Officer 2nd Class	PO2	Sergeant	Sgt		GS-4		
Petty Officer 3rd Class	PO3	Corporal	Cpl				
Seaman	SN	Lance Corporal	LCpl		GS 1-3		
Seaman Apprentice	SA	Private First Class	PFC				
Seaman Recruit	SR	Private (no insignia)	Pvt				
Midshipman							

Figure 35: BASE Interiors Program Rank Chart – Furniture Levels

CSI 14 00 00 CONVEYING EQUIPMENT

SECTION 1: ELEVATOR CONSTRUCTION REQUIREMENTS

1. **REFERENCES**: All Elevator Construction and installation shall conform to the most recent edition of the following standards, not the California Code of Regulations (CCR). Where standards provide conflicting information pertaining to an issue, the most stringent information shall apply.

   a. Title 8 CCR Subchapter 6, "Cal / OSHA Standards: Elevator Safety Orders"

   b. American Society of Mechanical Engineers (ASME) A17.1-2010 / Canadian's Standards Association CSA B44-10, "Safety Code for Elevators and Escalators / Safety Code for Elevators"

   c. NAVFAC, "Elevator Design – WBDG," NAVFAC Interim Technical Guidance (ITG), 01-13

   d. UFGS-14 24 00, "The WBDG: Hydraulic Elevators"

   e. UFGS-14 21 23, "The WBDG: Electrical Traction Passenger Elevators"

   f. UFGS-14 21 13, "The WBDG: Electric Traction Freight Elevators"

   g. NFPA 70, "NEC"

   h. IBC

   i. IPC

   j. NEC

   k. NFPA 70

2. **ELEVATOR CONSTRUCTION REQUIREMENTS**: The following requirements shall be included as applicable:

   a. Machine room and hoist-way construction shall have a two hour fire rating. Machine room doors shall have a minimum one and one-half hour fire rating, be self-closing and self-locking. Means such as fire rated caulking and foam shall be applied as necessary to add to the control of smoke and gases.

   b. Only machinery, equipment, electrical equipment, electrical wiring, raceways, cables, fire detecting systems, pipes, ducts, tanks, and sprinklers used in conjunction with the function or use of the elevator shall be permitted in the elevator machine room and hoist-way.

   c. Ventilation means, either natural or mechanical shall be provided in elevator machine rooms and hoist-ways. Machine room temperature and humidity shall be maintained in the range specified by the elevator equipment manufacturer to ensure safe and normal operation of the elevator. Hoist-ways of elevators serving three or more floors shall be equipped with natural or forced means of

ventilation. Means such as fire rated caulking and foam shall be applied as necessary to add to the control of smoke and gases.

d. Elevator Pits (See Section 1: Elevator Construction Requirements, reference 1.b. above):

(1) Shall have a submersible pump capable of removing a minimum of 3000 gallons per hour (gph) and 50 gallons per minute (gpm) of water per shaft. The submersible pump shall move the wastewater minimizing the emulsification of any trace of oil. The submersible pump shall be electric, 120 Volts (120V), and can be operated manually or operated automatically. Utilize pumped-flow installation with indirect connection as shown in Figures 36 & 37.

(2) A control panel shall be installed to alert personnel of high oil level, or high water level in the sump. The panel shall have audible and visual alarms. Dry contacts shall be used to tie into the building automation system. The panel shall operate the submersible pump. A hand-off-automatic switch (three-position switch) shall be used to operate the submersible pump.

(3) Separators shall be designed to receive oily wastewater by pump flow and process it on a once-through or circulating basis. Separators shall not have moving parts to fail or that require expensive maintenance. Separator shall be specifically designed for elevator sumps which are subject to contamination from elevator equipment. Separators shall remove hydraulic and lubrication oils which could be harmful to the sewer system. An automatic stop-valve shall be built into the separator which stops flow when separator reaches maximum oil capacity. Separators shall be equipped with a high oil float switch, and a high oil alarm panel mounted at a remote location. Authorized waste disposal company shall be able to remove oil from the separator.

(4) Separators shall be structurally and hydraulically engineered conforming to the Universal Plumbing Code (UPC). Manufacturer shall submit performance calculations for oil and water separation certified by a licensed professional engineer. Field excavation and preparation shall not be completed prior to delivery of the separator.

(5) Separators shall be sized to be twice the capacity of the hydraulic system and not the Sump (oil spill capacity). For example, if the System oil spill capacity is 50 gallons, the separator capacity shall be 100 gallons; if the System oil spill capacity is 250 gallons, the separator capacity shall be 500 gallons.

(6) The "hydraulic system" oil capacity includes the sump. Meaning it includes the capacity of the sump and the hydraulic system.

(7) Water shall be treated prior to discharging into the local sewer.

e. Grout areas and components as necessary, i.e., landing sills at landings and underneath landing sills on the hoist-way side, entrance frames, bottom of guide rails, etc.

f. Seismic requirements shall be provided as follows:

(1) Hydraulic Elevators shall be provided with an Over-speed / Rupture / Safety Valve / Automatic Shutoff Valve, installed immediately adjacent to the hydraulic cylinder (jack) head.

(2) Electric Traction Elevators shall be provided with Counterweight Derailment Detection Devices in the hoist-way and Seismic Motion Detection Switches in the machine room.

g. The ASME A17.1, "Elevator Safety Code for Elevators and Escalators" requires means to automatically shut down elevators prior to the application of water through fire sprinklers located in elevator machine rooms and top of hoist-ways. A NAVFAC Fire Protection Engineer shall determine when a fire sprinkler is required at the top of the hoist-way. DON policy requires water flow switches (not Heat Detectors) in the fire sprinkler lines to automatically shut down the elevator(s) through a shunt trip circuit breaker. Each water flow switch arrangement shall include a shut-off valve (SOV), check valve, and inspector's test valve. The water flow switch arrangements shall be installed on the outside of machine rooms and hoist-ways. The control voltage for the shunt trip circuit breaker shall be supervised at the building Fire Alarm Control Panel (FACP) panel. Water flow switches shall be nonadjustable factory set at zero time delay. Disconnect switches and circuit breakers shall be labeled with circuit identification and origination.

h. Smoke detectors shall be provided in elevator lobbies at all floors and in the elevator machine room. If a fire sprinkler is installed at the top of the hoist-way a smoke detector shall also be installed at the top of the hoist-way. Activation of any one of the smoke detectors mentioned here shall recall the elevator(s) in accordance with ASME A17.1 Safety Code for Elevators and Escalators. The "Fireman's Hat" light indicator located in the elevator car operating panel (COP) shall light continuously when a smoke detector in an elevator lobby is activated, and shall light intermittently (flash on-and-off) when a smoke detector in the elevator machine room or top of hoist-way is activated.

i. Ground Fault Circuit Interrupt (GFCI) convenience outlets shall be provided in every pit, elevator car top, and machine room. Convenience outlets in pits located less than 48" above the pit floor shall have a National Electrical Manufacturer's Association 4 (NEMA 4) water tight enclosure. Provide label with circuit identification and origination.

j. A fused or circuit breaker type disconnect switch shall be provided for each elevator in the elevator machine room for each 120 volts alternating current (VAC) dedicated lighting circuit. Lighting switches, disconnect switches, and convenience outlets shall be labeled with circuit identification and origination.

k. A Hydraulic Elevator shall be provided with two oil SOV's. One in the pit and one in the elevator machine room. The valves shall be 1500 pounds per square inch (psi) rated water / oil / gas (WOG) ball valves.

l. All elevators shall be provided with two alarm bells. One bell shall be battery operated, and one shall be a 120VAC operated bell. Both bells shall be activated through the push button marked "ALARM" located on the elevator COP. Both bells may be installed on the elevator car top.

m. A separate certificate frame shall be provided in the elevator adjacent to or on the elevator COP. The certificate frame shall not be an integral part of the COP that requires opening the COP to gain access to the certificate.

n. All elevators shall be provided with either hall lanterns and gongs at every landing, or car riding lanterns and gongs. Lighting means shall be reliable, long lasting, energy efficient, and be virtually maintenance free

o. Hydraulic elevators with hole-less / above-ground cylinder-plunger assemblies shall utilize single-stage cylinder-plunger assemblies. Telescopic / multistage hydraulic cylinder-plunger assemblies are prohibited. Hole-less / above-ground hydraulic single-stage cylinder-plunger assemblies shall be installed with the cylinder mounted directly on the pit floor and the plunger connected to the elevator car (inverted installation is prohibited).

p. Elevator guide rails shall be "T" rails. No other type of guide rail is acceptable.

q. Standard safety railing shall be installed on the top of the elevator when the horizontal distance between the edges on the top of the elevator and the hoist-way enclosure exceeds 12".

r. Controllers, controls, control valves, switches, components, devices and tools shall be non-proprietary. Proprietary knowledge, training, tools, programs, software, or hardware shall not be required to operate, adjust, analyze, troubleshoot, or repair the elevator system in its entirety.

s. Minimum Elevator Cab shall be 6'x8', clear, interior dimensions. Contractor shall also reference NAVFAC, "Elevator Design – WBDG," NAVFAC Interim Technical Guidance (ITG), 01-13 for required numbers and types of elevators per building stories requirements and minimum door opening 4'x7' clear.

t. Emergency communication is required from the elevator cab to an emergency response desk that is manned twenty-four hours a day / seven-days a week (24/7); this is NOT to be an automated answering service.

(1) The emergency response communication system shall be answered by emergency personnel and not by an automated answering system.

(2) In addition, the elevator cab communication system shall automatically identify the elevator location and provide the capability for voice communication between the elevator MR and elevator cab per Off-the-Grid (OTG-2013), Requirement 2-3.3 and ASME A17-1/Section 2.27.

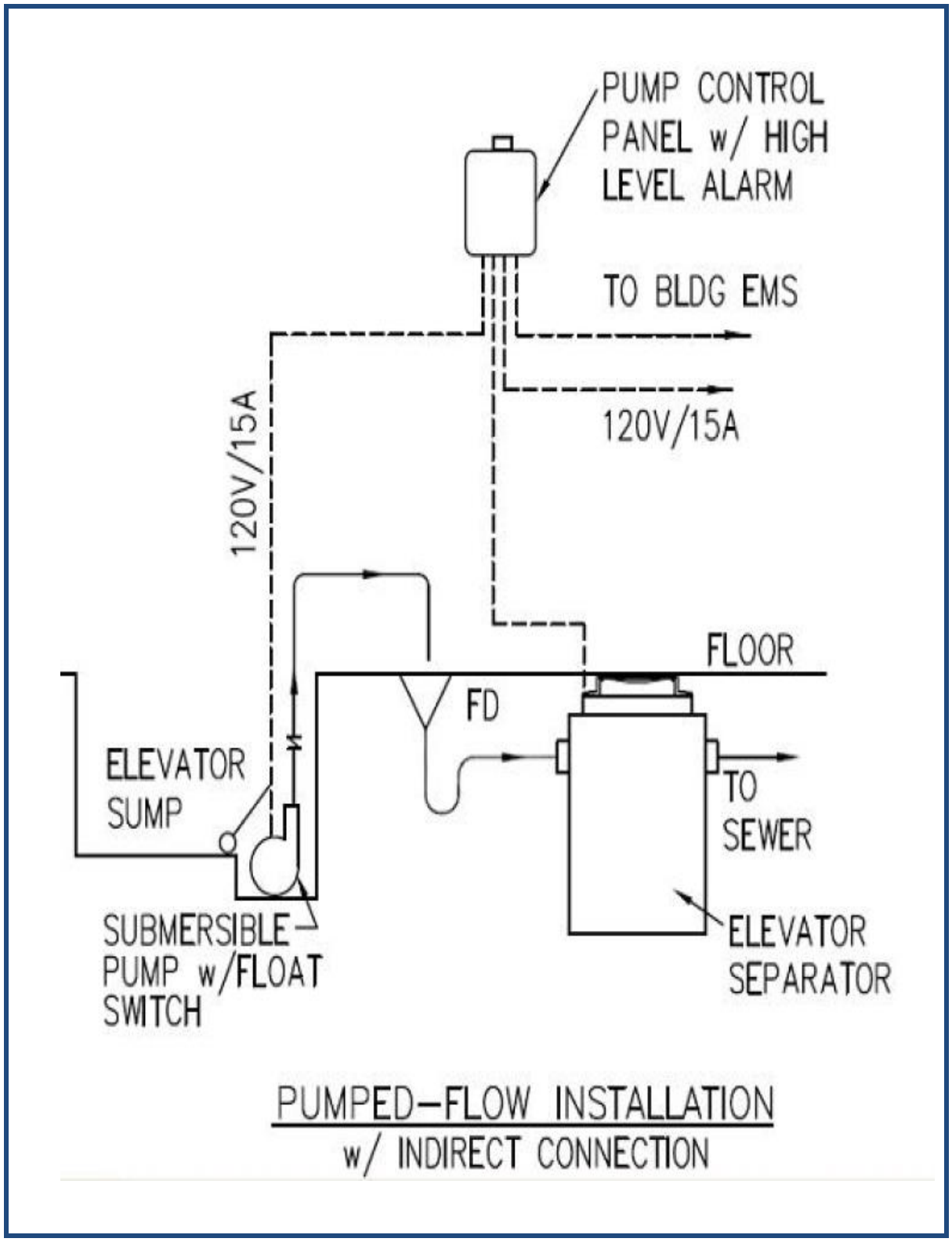


Figure 36: Pumped-Flow Installation with Indirect Connection

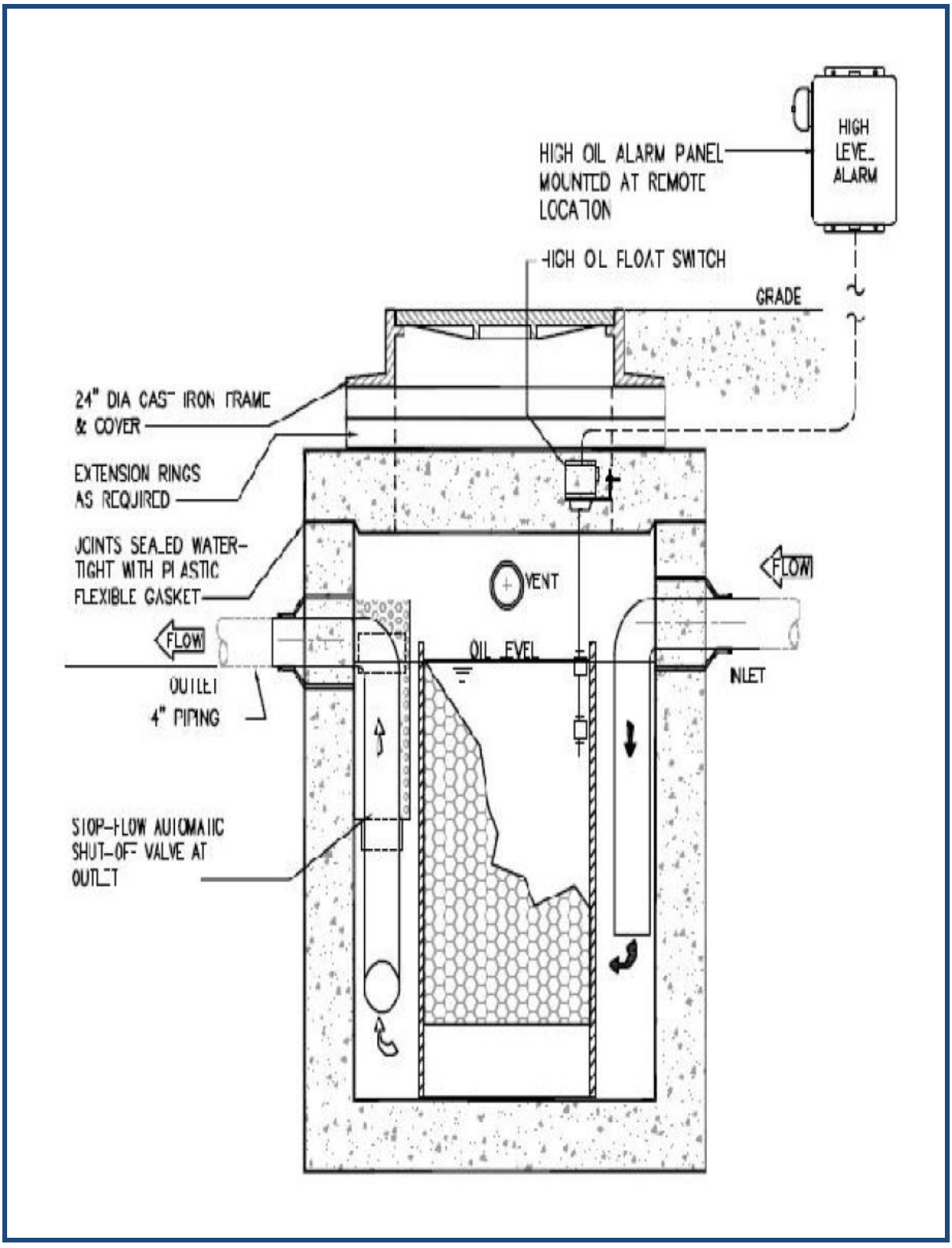


Figure 37: Pumped-Flow Installation with Indirect Connection (Detail)

CSI 22 00 00 PLUMBING

SECTION 1: PLUMBING FIXTURES

1. **SINKS**:

   a. Porcelain coated cast iron sinks are not permitted in restrooms.

   b. Ceramic drop in sinks shall be used.

   c. Stainless steel sinks shall be used in break rooms, coffee messes and food service areas.

   d. Wall hung porcelain sinks shall be used in open squad bay barrack gang lavatories.

   e. Sink drains to be a grid drain assembly (no pop-up drains).

2. **SHOWERS**:

   a. Wrap solid surfacing material from shower surround all the way to adjacent door frames and walls to prevent drywall damage from moisture.

   b. A triangular shaped soap dish constructed of solid surface material shall be provided, one per occupant.

   c. Shower pans shall be prefabricated solid surface and extend up wall behind solid surface shower surround wall panels ensuring a water tight condition.

   d. The mixing valve for showers shall be a minimum 18 gauge stainless steel surface mounted type to allow for access to plumbing behind the wall without having to break through the wall. The valve to have an adjustable stop screw to limit handle turn.

   e. All glass shower doors are prohibited. Plastic shower doors are acceptable, but shower curtains are preferred.

   f. Shower curtain shall drop to 1½ inches below the shower dam top edge.

   g. Shower head shall be of the swivel type with an adjustable spray pattern and FIP threaded connection into a MIP threaded shower arm. The shower head shall be all brass, vandal resistant with ball joint.

   h. Direction of shower head flow shall not be out of the shower.

i. Control lever shall not be on back inside wall, rather on side so the water temperature can be regulated without entry.

j. Towel racks shall not be placed in any location where they come in contact with the opening of bathroom or toilet room doors.

3. **FAUCETS**:

a. Water savings is important to MCB CPEN. Faucets with batteries that regulate the duration of water require replacement of the battery; which might not happen depending on funding or manpower available.

b. Self-metering faucets are acceptable.

c. Faucets in open squad bay barracks gang lavatories to be double handle (one handle for hot and one for cold) with ¼ turn ceramic cartridge and grid drain assembly. (No pop-up drains.)

d. Waterless urinals will NOT be installed. NOTE: Waterless urinals have been used at MCB CPEN previously, but were removed due to poor performance and maintenance issues.

e. Demolition: When demolishing potable water lines, refer to Figure 5 Potable Water Lateral Branch Demolition.

CSI 23 00 00 HVAC

SECTION 1: GENERAL MECHANICAL REQUIREMENTS

1. **REFERENCES**: All Mechanical System Construction shall conform to the most recent CFR requirements. If the standard sought does not appear in these requirements, then the latest edition of the following standards shall be utilized:

   a. ASME Standards

   b. American Petroleum Institute (API) Standards

   c. American Society of Heating, Refrigeration, and Air Conditioning (ASHRAE) Standards

   d. ASTM Standards

   e. IPC

   f. IMC Standards

   g. Unified Mechanical Code (UMC)

   h. UPC Standards

   i. Air Conditioning, Heating, and Refrigeration Institute (AHRI) Standards

   j. American Water Works Association (AWWA) Standards

   k. Sheet Metal and Air Conditioning Contractors' National Association (SMACNA) Standards

   l. NFPA Standards

   m. Underwriters Laboratory (UL) Standards

   n. American Welding Society (AWS) Standards

   o. National Board Inspection Code (NBIC)

2. **ADDITIONAL REQUIREMENTS**:

   a. Provide accessibility and clearance for maintenance to all mechanical and electrical equipment, machines, pumps etc.

   b. All HVAC units that are installed during construction shall have all filters replaced with new filters prior to the building being turned over for occupancy.

   c. HVAC Secondary condensate drain lines shall not terminate above any doorway or within 5' of the entry or exit pathways. (This is to prevent an obvious slip hazard.)

3. **ACCESS AND SERVICE SPACE**: All equipment, piping and controls located in attic and mechanical room shall be easily accessible for inspection, service, repair and replacement without disabling the functionality of other adjacent equipment.

   a. Utility chases shall not be placed on or near the perimeter walls where a sloped roof interferes with access to the chase.

   b. All utility chases shall be accessible for maintenance, inspection, service, repair and replacement.

   c. Placement of equipment, piping and controls located in attics shall take into consideration access from below with regard to furniture, built-ins and other equipment that could prevent a ladder from being set up under access point.

4. **TESTING AND BALANCING (TAB)**: TAB consultants shall be certified by the National Environmental Balancing Bureau (NEBB).

5. **VENTILATION**: Vent limiting means or devices are not permitted aboard MCB CPEN. Mechanical equipment with appliance pressure regulators requiring access to the atmosphere for successful operation shall be equipped with vent piping leading outdoors.

SECTION 2: FOUR-PIPE SYSTEM FOR NEW BEQs

1. **REFERENCES**: Four-pipe system for new BEQs shall conform to the most recent edition of the following standards; where standards provide conflicting information pertaining to an issue, the most stringent information shall apply.

   a. FC 4-721-10N, "Navy and Marine Corps Bachelor Housing" which includes references to DoD Memorandum, "Access for People with Disabilities"

   b. Figure 38, "Piping Specifications"

2. **GENERAL REQUIREMENTS FOR A FOUR-PIPE SYSTEM FOR NEW BEQs**:

   a. Provide a four-pipe reverse-return heating and cooling piping system from the Mechanical Room throughout the building vertical pipe chase, attic, and to each individual fan coil unit in each room.

   b. Provide vents at the high points of the system and drains at the low points. Drains (except BEQ fan coil units) shall be piped to a floor sink or other suitable entrance to the building's sanitary sewer system.

   c. Provide expansion loops, isolation ball valves at the drops, piping insulation, control valves, and all necessary supports, joints, couplings, caps and other items to complete the piping system. Joints on direct-bury factory prefabricated, pre-insulated copper pipes shall be silver-brazed.

3. **VERTICAL FOUR-PIPE FAN COIL UNITS AND CONTROLS**:

   a. Provide vertical four-pipe fan coil units and controls.

b. Heat exchange coils shall consist of copper fins on copper tubes.

SECTION 3: BOILER REQUIREMENTS

1. **REFERENCES**: In order to meet the federal energy efficiency requirements and energy reduction mandates, boilers used aboard MCB CPEN facilities shall be of highest efficiency, best technology available, and meet the FAR Subpart 23.2 for Energy and Water Efficiency and Renewable Energy, Authorizing law and regulations for FAR 23.2. Boiler General Requirements shall conform to the most recent edition of the following standards; where standards provide conflicting information pertaining to an issue, the most stringent information shall apply.

   a. 42 U.S.C. § 6361(a)(1), "The Public Health and Welfare: Federal Energy Conservation Programs"

   b. 42 U.S.C. § 6901-6992k, et seq., "The Public Health and Welfare: Resource Conservation and Recovery Act (RCRA) of 1976"

   c. 42 U.S.C. § 8253, "The Public Health and Welfare: Energy Management Requirements"

   d. 42 U.S.C. § 8259(b), "The Public Health and Welfare: Federal Procurement of Energy Efficient Products"

   e. 42 U.S.C. § 8262(g), "The Public Health and Welfare: Procurement and Identification of Energy Efficient Products"

   f. 42 U.S.C. § 8262(g), "The Public Health and Welfare: Procurement and Identification of Energy Efficient Products"

   g. 42 U.S.C. § 8287, "The Public Health and Welfare: Authority to Enter into Contracts"

   h. 42 U.S.C. § 7671, "The Public Health and Welfare: Clean Air Act Title VI: Stratospheric Ozone Protection"

   i. Executive Order 11912, "Delegations of Authority Relating to Energy Policy and Conservation Act (EPCA)"

   j. Executive Order 13423, "Strengthening Federal Environmental, Energy, and Transportation Management"

   k. Executive order 13514, "Federal Leadership in Environmental, Energy, and Economic Performance Guidance"

   l. 48 CFR 23.801(b), § 706 D, "OSHA: FAR System, Authorities, Title VII of the Omnibus Appropriations Act"

   m. ASME CSD-1, "Controls and Safety Devices for Automatically Fire Boilers"

ABOVE-GROUND SANITARY DRAINAGE AND VENT PIPE	
MATERIAL	**STANDARD**
Acrylonitrile butadiene styrene (ABS) plastic pipe in iron pipe standards (IPS) diameters, including Schedule 40, DR 22 (PS 200) and DR 24 (PS 140); with a solid, cellular core or composite wall.	ASTM D2661; ASTM F628; ASTM F1488; CSA B181.1
Polyvinyl chloride (PVC) plastic pipe in IPS diameters, including schedule 40, DR 22 (PS 200), and DR 24 (PS 140); with a solid, cellular core or composite wall	ASTM D2665; ASTM F891; ASTM F1488; CSA B181.2
PVC plastic pipe with a 3.25-inch outside diameter (O.D.) and a solid, cellular core or composite wall	ASTM D 2949; ASTM F 14
UNDERGROUND BUILDING DRAINAGE AND VENT PIPE	
MATERIAL	**STANDARD**
ABS plastic pipe in IPS diameters, including schedule 40, DR 22 (PS 200) and DR 24 (PS 140); with a solid, cellular core, or composite wall	ASTM D2661; ASTM F628; ASTM F1488; CSA B181.1
PVC plastic pipe in IPS diameters, including schedule 40, DR 22 (PS 200) and DR 24 (PS 140); with a solid, cellular core, or composite wall	ASTM D2665; ASTM F891; ASTM F1488; CSA B181.2
PVC plastic pipe with a 3.25”O.D. and a solid, cellular core, or composite wall	ASTM D2949; ASTM F1488
PIPE FITTING	
MATERIAL	**STANDARD**
ABS plastic pipe in IPS diameters	ASTM D2661; ASTM F628; CSA B181.1
ABS plastic pipe in sewer and drain diameters	ASTM D2751
PVC plastic in IPS diameters	ASTM D2665; ASTM F1866
PVC plastic pipe in sewer and drain diameters	ASTM D3034
PVC plastic pipe with a 3.25-inch O.D.	ASTM D2949
BUILDING SEWER PIPE	
MATERIAL	**STANDARD**
ABS plastic pipe in IPS diameters, including schedule 40, DR 22 (PS 200) and DR 24 (PS 140); with a solid, cellular core or composite wall	ASTM D2661; ASTM F628; ASTM F1488; CSA B181.1
ABS plastic pipe in sewer and drain diameters, including Standard Dimension Ratio (SDR) 42 (PS 20), PS 35, SDR 35 (PS 45), PS 50, PS 100, PS 140, SDR 23.5 (PS 150) and PS 200; with a solid, cellular core or composite wall	ASTM F1488; ASTM D2751 Asbestos-cement pipe; ASTM C
PVC plastic pipe in sewer and drain diameters, including PS 25, SDR 41 (PS 28), PS 35, SDR 35 (PS 46), PS 50, PS 100, SDR 26 (PS 115), PS 140 and PS 200; with a solid, cellular core or composite wall	ASTM F891; ASTM F1488; ASTM D3034; CSA B182.2; CSA B182.4
PVC plastic pipe with a 3.25” O.D. and a solid, cellular core or composite wall.	ASTM D2949; ASTM F1488

Figure 38: Piping Specifications

2. **BOILER REQUIREMENTS**:

a. All boilers used for heating hot water (HHW) shall be fire tube / fire box type boilers utilizing the best energy efficient technology available for this type of boiler. The boilers shall have Industrial Risk Insurers (IRI) gas train and meet ASME "Controls and Safety Devices-1" (CSD-1) compliance.

b. The usage of condensing boilers shall be allowed as long as the following parameters are met:

(1) The original design of the entire heating system shall be designed to use condensing boilers. The mechanical design shall not be a "fire tube / fire box" design system with a condensing boiler "plugged in" as a substitution. The implication of that would be that the distribution piping and pressures would not be adequate to support a condensing unit. It is the intent being to avoid constructing distribution piping with inadequate pressure to support a condensing unit.

(2) The system shall run at a temperature of 130-140 degrees maximum on supply, and 100-110 degrees return in a low temperature loop.

(3) All condensing water heaters and boilers shall have a neutralizer in the stack drain prior to entering MCB CPEN wastewater piping.

(4) The design shall be for 100% occupancy.

(5) The system shall run at approximately 50 pounds per square inch gauge (psig) operating pressure for a five story building.

(6) In order to maximize energy efficient usage of the boilers, they shall be set up as a series of smaller, modular units which meet total demand load; but, which can be programmed for staging individual unit activation as the demand load increases.

(7) The Final Submission documents shall be reviewed by FMD and the Energy Branch for their compliance with the parameters listed.

c. Domestic hot water (DHW) systems shall be designed to produce and store at a minimum of 140 degrees Fahrenheit, and DHW return pumps shall be running continuously. All DHW systems shall be designed with no "dead end" legs, or install heat tracing to maintain 122 degrees Fahrenheit to all outlets. For water temperatures allowed/required in uses such as Child Development Centers (CDC's), verify with the applicable UFC.

d. Any new unit (boiler, process heater, or steam generator) with a heat input rating of 1 million British Thermal Unit / per hour (BTU / hr.) or greater may require an Air Permit.

e. When acquiring energy-consuming products listed in the ENERGY STAR Program or Federal Energy Management Program (FEMP), agencies shall purchase ENERGY STAR or FEMP designated products.

f. Per Energy Star recommendations, boilers shall have an Annual Fuel Utilization Efficiency of 85% or better.

g. The HHW supply system for swimming pools' water shall have a "double wall" heat exchanger installed, instead of the standard "single wall."

SECTION 4: DHW BOILERS AND HHW BOILERS (Over 400,000 BTU / hr. input)

1. **REFERENCES**: Low Pressure Water Heating Boilers (over 400,000 BTU / hr. output) shall conform to the most recent edition of the following standards; where standards provide conflicting information pertaining to an issue, the most stringent information shall apply.

   a. ASME CSD-1-2004, "CSD for Automatically Fired Boilers"

   b. NBIC

   c. 29 CFR § 1910.22(D), "OSHA: General Requirements, OSHA, Walking-Working Surfaces"

   d. ASME CSD-1-2009, paragraph CE-110 page 9 and CF-310 (d), page 21, "Controls and Safety Devices for Automatically Fired Boilers"

   e. ASME CSD-1- 2012, Part CG-500 , "Controls and Safety Devices for Automatically Fired Boilers: Certification and Reporting"

   f. ASME CSD-1-2012, paragraph CF0-140, page 17, "Controls and Safety Devices for Automatically Fired Boilers Certification and Reporting, Gas Fired Boiler Units, Equipment"

   g. NBIC, Appendix F, F-2000, "Randon Control Methods"

   h. UFC 3-420-01, Appendix D, "The WBDG: HVAC, Minimum Control Points List"

   i. UPC 603.4, "Water Supply and Distribution, Specific Requirements"

2. **USE DDC SYSTEM**: Use DDC System for Facility Management System (FMS) and Heating Systems. Pneumatic Control Systems are not allowed. Provide separate over ride switches for all equipment being controlled by the Industrial Control Systems (ICS) (formerly known as FMD UNITY Room). All remote operator communication (by others) shall be through connection to the existing MCB CPEN FMS with connectivity to the ICS room. (See Section CSI 25 00 00 Integrated Automation.)

3. **APPROVAL**: Boiler submittals shall be approved by FMD Boiler Inspector.

4. **FIRE TUBE FIREBOX**: Only install "Hurst" fire tube firebox heating boiler or equal.

5. **BOILER ISOLATION VALVES**: Shall be ball valve or gate outside screw and yoke design and flanged ends valves the valves shall be installed as close to the boiler as possible.

6. **BOILER GAS TRAINS**: Shall comply with IRI gas control system requirements with Honeywell RM-7800-L-1012 (Infrared scanner) or approved equal for flame safeguard control panel. Gas train shall have leakage test valves installed as per ASME CSD-1-2004, paragraph CF-150 (d).

7. **BOILER VENTS (forced draft)**: Shall comply with positive pressure type for boiler stacks.

8. **LOW WATER CONTROL PIPING**: Ensure McDonnell and Miller Test N Check Valves Model #TC-4 (or approved equal) is being installed on low water control piping.

9. **QUICK DISCONNECT SWITCHES**: Provide quick disconnect switches on each boiler at each entrance door properly labeled for identification. If there is more than one door to the boiler room, there shall be a switch located at each door as per ASME CSD-1-2009 paragraph CE-110 page 9 and CF-310 (d) page 21.

10. **REPETITIVE SELF-CHECKING CIRCUIT**: Ensure Boiler Burner Combustion Flame Safeguard system shall be provided with a repetitive self-checking circuit.

11. **BOILER CONTROL PANEL CABINET**: Ensure boiler control panel cabinet is remotely mounted either on the side of the boiler or on the wall away from boiler burner front, and is installed so that the alarm lights on the cabinet are located approximately 4-5' above floor.

12. **VENT LINES**: Ensure two separate vent lines are being installed for gas train normally open vent valve and for gas diaphragm pressure switches / gas pressure regulator.

13. **DRIP LEGS**: Provide drip legs on each boiler gas train as per CSD-1 paragraph CF0-140 page 17.

14. **UNION FITTING**: Provide union fitting on boiler relief valve discharge line.

15. **WATERPROOF / DRIPTIGHT ENCLOSURE**: Ensure where electrical components and devices are subject to dripping moisture / water shall be provided in a weatherproof / driptight enclosure.

16. DHW STORAGE TANKS: shall be cement lined. When DHW storage tank is equipped with a heat exchanger, the heat exchanger shall be double wall type.

17. **CHEMICAL POT FEEDER**: Only install Chemical Pot Feeder with "legs," (5 gallons capacity) with maximum pressure / temperature of 200 psig / 200F.

18. **IDENTIFICATION**: Ensure piping insulation and equipment are identified, labeled and marked for direction of flow.

19. **WARRANTY TAGS**: Per "Closeout Procedures" ensure "Warranty Tags" are being attached on each newly installed equipment / product. Furnish with each warranty the name, address, and telephone number of the guarantor's representative nearest to the location where the equipment and appliances are installed. The guarantor's representative, upon request of the station representative, shall honor the warranty during the warranty period, and shall provide services prescribed by the terms of the warranty.

20. **"TYPE K"**: Due to the hard domestic water aboard MCB CPEN, provide "Type K" of copper tube for all domestic and heating water aboveground piping to reach a life expectancy of 20-years.

21. **THERMOMETER**: Provide a thermometer on all domestic storage tanks. The thermometer shall at all times indicate the temperature of the water in the tank at or near the outlet.

22. **"GUARD POST"**: Provide and install "Guard Post" (4" Schedule 80 Steel Pipe filled with concrete and paint with brilliant yellow) where the gas meter and or regulator may be subjected to vehicular damage.

23. **AUTOMATIC AIR VENT VALVE**: Shall be equipped with a vent line running to the floor.

24. **CIRCULATING PUMP INSTALLATION**: Ensure circulating pumps are not installed overhead to facilitate repairs without using a step-ladder.

25. **GAS LINE INSTALLATION**: Ensure main gas line in the boiler room is being installed overhead to prevent trip hazard to the personnel.

26. **HOSE BIB CONNECTION**: Provide .5" hose bib connection in the boiler room for performing Boiler Preventative Maintenance.

27. **MCB CPEN PROCEDURES FOR CERTIFICATION OF BOILERS ARE**:

    a. Witness 150% hydrostatic test of 1.5 times of the boiler highest safety valve popping pressure or 1.5 times of the boiler maximum allowable working pressure (MAWP), whichever is less. (This is to determine if leakage causing damages have occurred during shipment / installation.)

    b. Receive documentation of boil-out of boiler for each boiler.

    c. Receive combustion tests report of boiler for each boiler.

    d. Receive documentation to show newly installed boilers have had the HHW systems chemically treated.

    e. Witness operational tests of all boiler safety controls.

    f. Receive Boiler Manufacturer Data Report Sheet and Manual for each boiler. (Form H2/H3 for ASME Section IV) or (Form P2/P3 for ASME Section I)

    g. Receive a copy of the boiler Start-up Report.

28. **NEW UNITS**: Any new unit (boiler, process heater, or steam generator) with a heat input rating of one million BTU / hr. or greater may require an Air Permit.

29. **CHEMICALLY TREATED POOL WATER**: Shall not make contact with the boiler tubes.

30. **WHERE WATER PRESSURE IS IN EXCESS OF 80 psi**: an approved type pressure regulator, preceded by an adequate water strainer, shall be installed to reduce the static water pressure to 80 psi or less as per UPC 608.2.

31. **TRIP HAZARDS**: Covers shall be provided over trip hazards to protect personnel, as per OSHA 1910.22(D) requirements.

32. **MANUFACTURER'S RECOMMENDATIONS**: Where the word "should" is used in the manufacturer's recommendations, substitute the word "shall".

33. **ALL MANUALLY OPERATED GAS SOV's**: Shall be of the T-handle or lever-handle type and shall be operable without the use of tools, as per CSD-1 CF-150.

34. **PRESSURE DIFFERENTIAL**: The pressure differential between the relief valve set pressure and the boiler operating pressure shall be at least 10 psi or 25% of the boiler operating pressure, whichever is greater, per NBIC, Appendix F, F-2000.

35. **EMERGENCY SHOWER AND EYEWASH STATIONS**: Shall be installed in all mechanical rooms containing chemical pots, in accordance with UFC 3-420-01, Appendix D.

36. **BOILER ROOMS**: All boiler rooms over 500 square feet (SF) containing one or more boilers having a combined fuel capacity of 1,000,000 BTU / hr. or more shall have two means of egress, as per NBIC, Part One, Section 3.4.1, "Installation".

37. **HEATING BOILERS**: Shall have a minimum of 36" of unobstructed clearance around all sides and above the boiler, as per NBIC, Part One, Section 3.3.4.a. In the case of renovation where current room dimensions will not allow 36" clearance, or other unforeseen conditions, the Government may waive the 36" clearance requirement. Maximize clearances to the greatest extent feasible to accommodate for the safe operation and maintenance of the boiler and associated equipment.

38. **BOILER ISOLATION VALVES**: Shall not be used as throttling valves.

39. **ADJUSTABLE CONTROLS**: All boilers shall have an adjustable, high temperature control with a manual reset button.

CSI 25 00 00 INTEGRATED AUTOMATION

SECTION 1: CERTIFICATION AND ACCREDITATION (C&A)

1. **MODIFICATIONS**: The system owner shall ensure all modifications to existing Information System components to include the installation of new Information System hardware and software components connecting to the existing approved system shall be accredited through the Risk Management Framework (RMF) process prior to being placed on the Marine Corps Enterprise Network (MCEN) or any system within the installation. All projects shall coordinate with MCIWEST G6 for RMF requirements.

3. **ALL DIGITAL CONTROLLERS**: should be Niagra JACE 7000, JACE 8000, or approved equal and configured to operate independently (off network). All ICS submittals for equipment, controllers, sensors, and O&M shall be provided to Government in pdf format.

4. **APPROVAL**: The Contractor shall obtain approval from the System Owner prior to ordering any Information System hardware or software. The information systems and programming shall be provided so the equipment functions together as an integrated system at the unit process level, the plant level, and the system-wide level in order to gain approval from the Marine Corps-Designated Approving Authority (MC-DAA).

SECTION 2: DIRECT DIGITAL CONTROL (DDC) SYSTEM REQUIREMENTS

1. **REFERENCES**: DDC Systems Requirements shall conform to the most recent edition of the following standards; where standards provide conflicting information pertaining to an issue, the most stringent information shall apply.

   a. UFC 3-410-02, “The WBDG: Lonworks© DDC for HVAC and Other Local Building Systems”

   b. UFGS-23 09.23 01, “The WBDG: Lonworks © DDC for HVAC and Other Building Control Systems” (for DDC field devices)

   c. UFGS-23 09.53.00 20, “The WBDG: Lonworks© Space Temperature Control Systems”

   d. UFGS-25 10 10, “The WBDG: Utility Monitoring and Control System (UMCS) Front End Integration”

   e. UFGS-25 08 10, “The WBDG: Stand Alone Buildings”

   f. American National Standards Institute / California Earthquake Authority (ANSI / CEA) 709.1-B, “Control Network Protocol Specification”

   g. ANSI / CEA-852.1, "Enhanced Protocol for Tunneling Component Network Protocols Over Internet Protocol Channels"

h. Future versions of this document shall be based on UFC 3-410-02 and UFGS-23 09.23.13 20 "Lonworks© based DDC for HVAC" and UFGS-23 09.53.00 20 "Space Temperature Control Systems."

2. **EMS LON CONTROL DEVICES:** shall be LonMark© Certified utilizing a Lonworks© Network Services (LNS) based database structure. Configuration parameters of the LonMark certified devices shall be directly accessible via an LNS based application interface (plug-in).

   a. The "plug-in" shall be installed and its use demonstrated with commercial off-the-shelf (COTS) LNS management tool.

   b. The "plug-in" shall be freely available and / or provided by the installing Contractor.

3. **THE SYSTEM**: shall be of a flat, open architecture and the devices shall communicate utilizing the ANSI / CEA 709.1-B (LonTalk©) Protocol and CEA 852.

   a. Installed LON networks shall be readied for connection to the existing Basewide MCB CPEN EMS system ICS utilizing the most feasible and economical option available including; hardwire (709.1-B) connection to existing FMS Cable, network drop (CEA 852) located in Next Generation / Telecommunication (NEXGEN / Telcom) Room, wireless Lonworks© router (709.1-B), and / or wireless network (CEA 852) connection.

   b. It is recommended, as part of project design that the DDC System submittals be turned into the ICS Manager or representative separately for approval.

SECTION 3: COMMUNICATION SUPPORT REQUIREMENTS FOR MONITORING UTILITIES

1. **REFERENCES**: All construction shall conform to the most recent edition of the references cited in the UFC; where standards provide conflicting information pertaining to an issue, the most stringent information shall apply.

   a. UFC 3-580-01, "The WBDG: Telecommunication Building Cabling Systems Planning and Design"

   b. UFC 3-580-10, "The WBDG: Navy and Marine Corps Instruction (NMCI) Standard Construction Practices"

2. **NOTE**: Regarding the Advanced Metering Infrastructure (AMI), as of this writing, the specifics of the AMI (AMI0) are not included in the UFC 3-580-01 or UFC 3-580-10. Until the UFC guidance is updated contact the Subject-Matter Experts (SMEs), MCB CPEN'S Energy Office at (760) 725-0567 or the ICS Manager (formerly the UNITY Room Manager) at (760) 212-7417 if you have any questions or need clarification.

3. **MCIWEST G6**: shall be involved with all wireless planning aboard MCB CPEN. The G6 does not assume any responsibility for the installation, commissioning, operation, or maintenance of any commercial communication system. Each wireless project shall be vetted through the MCIWEST G6 Cyber Security and approved by MC-DAA granting an Authority to Operate (ATO) prior to being placed online.

4. **BASIC THEORY**:

   a. Signals (data) from the meter source (endpoints) are transmitted via radio frequency (RF) to a collector, see Figure 39. The meter shall use ERT technology compatible with the collector. In some cases, it may be necessary to supplement the signal strength of an endpoint with a repeater.

   b. The goal is to transmit the meter data from the collector to the "Fixed Network" data repository. The collector shall have access to Inside Plant (ISP) transport architecture. From the collector, the signal transport can be via hard-wire or RF Wireless - Fidelity (Wi-Fi).

   c. If using RF, data from the collector shall be relayed to a subscriber RF unit. The RF subscriber unit shall be configured to communicate with an RF Access point connected to the Ethernet Backhaul. IP addresses for the collector and RF subscriber unit shall be requested and assigned, see Figures 40 & 41.

   d. If the collector is to use physical cabling to reach the BASE backhaul, copper or fiber optic shall be used to connect and interface with data switching equipment inside the Telecommunications Room (TR). An IP address shall be requested and assigned to provide data communications with the appropriate Network Application server (e.g., ICS room).

5. **AMI MAJOR COMPONENTS INFORMATION**:

   a. Meters (endpoints), Repeaters, Collectors, RF Ethernet radios, Ethernet switches, cabling)

   b. Power Supply Unit(s).

   c. External Conduit(s) and Path.

   d. Cabling - types and terminations (external, internal); protection (physical and functional).

   e. NEXGEN Ethernet - bandwidth (IP Address), interconnects, and data ports.

   f. Voice / Data connectivity shall be connected from the Information Processing Node (IPN) to the Area Distribution Node (ADN) to the TR.

6. **PLACEMENT OF COLLECTORS WITHIN AN AR**EA:

   a. For collectors which are physically cabled to the TR, here are cabling types and the allowable distances for such a setup from Collector to TR (end-to-end):

      (1) Use Copper Cat6/6A (24 AWG) shielded twisted pair) if distance is 295' or less.

      (2) Use Copper Cat 3 PE-89 (24 AWG) twisted pair for distances up to 18,000' (load coils needed when over 5,000').

      (3) Use Fiber Optic Cable (FOC) SSM PE-90 – Best for long-haul distances (requires SC duplex termination). Can be used for applications over 18".

b. All copper and fiber cabling shall be run in rigid conduit when installed external to a building.

c. Collectors that use RF to communicate data to the backhaul shall be installed in a manner consistent with the collector manufacturer's installation documents.

(1) Select approved radio subscriber unit

(2) Spectrum Analysis shall be provided to the MCIWEST G6 Spectrum Manager (760) 725-2808.

7. **NOTES**:

a. All Outside Cable Plant (OSP) copper cabling entering a facility shall be terminated with a Protected Entrance Termination (PET) before any services can be provided by MCIWEST G6 within TR.

b. All external cabling shall be run through rigid conduit. For conduit details refer to the MCIWEST G6 Supplement, please refer to the following link:

http://www.pendleton.marines.mil/StaffAgencies/AssistantChiefofStaffGF/PublicWorks/AEBranch.aspx

c. Enterprise Zone Modules are not to be placed within the MCIWEST G6 TRs. To clarify: Any design or concept statement shall include, "Non-MCIWEST G6 TRs," or words to that effect. The reason is that MCIWEST G6 TRs shall be dedicated and / or exclusive for DoD system purposes.

(1) This mean AMI or any other commercial enterprise system cannot share the same Equipment Room containing MCIWEST G6 TRs.

(2) Any demarcation points between MCIWEST G6 and Commercial services shall be approved by MCIWEST G6 Infrastructure Planning and coordinated with the MCIWEST G6 Information Security Manager. Other security and approvals may also apply.

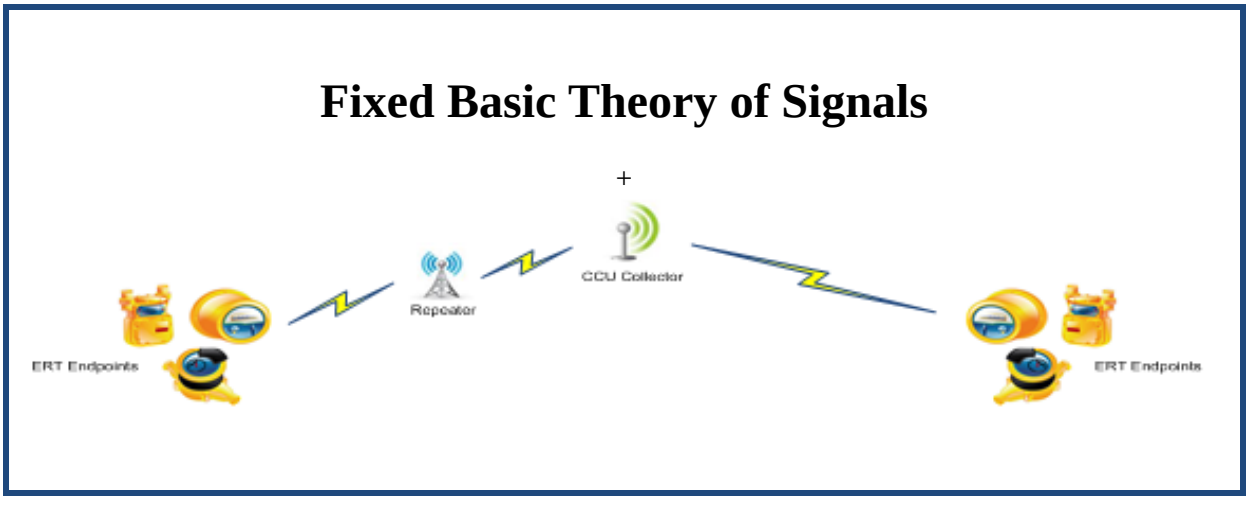


Figure 39: Basic Theory of Signals

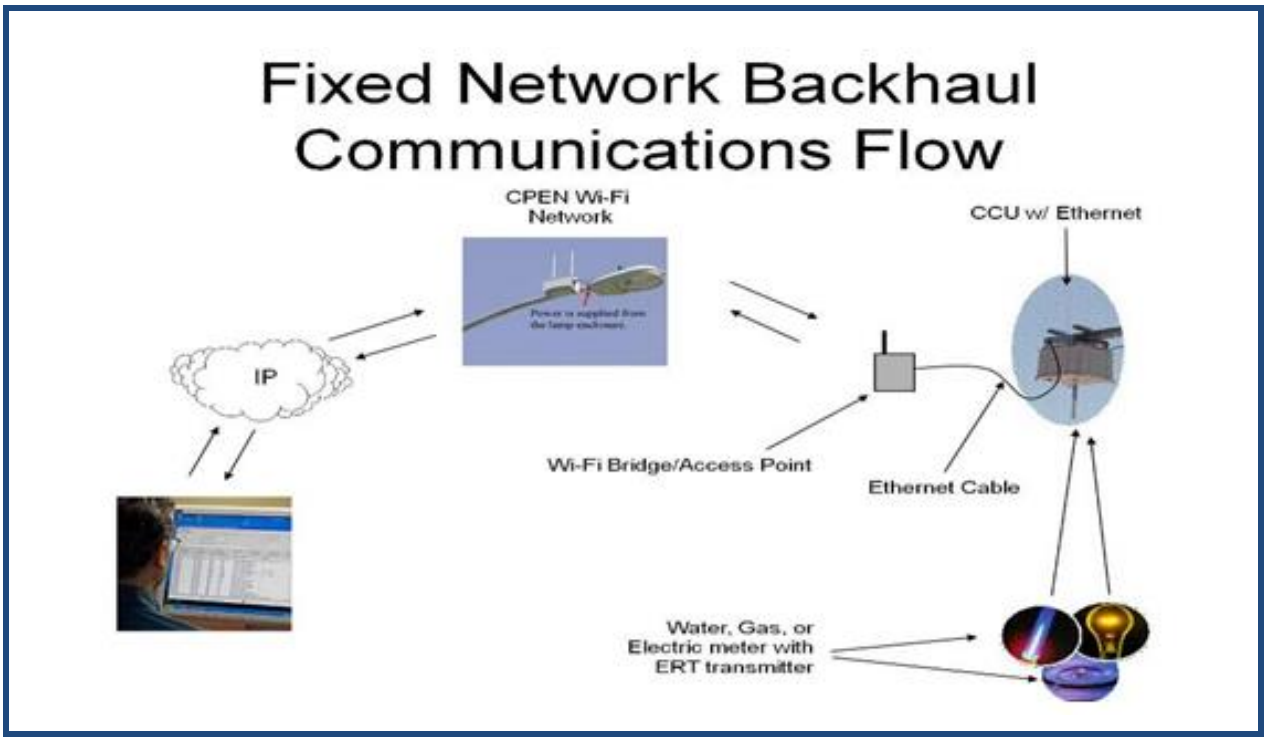


Figure 40: Backhaul Concept - Wireless connection between Collector and Data Repository

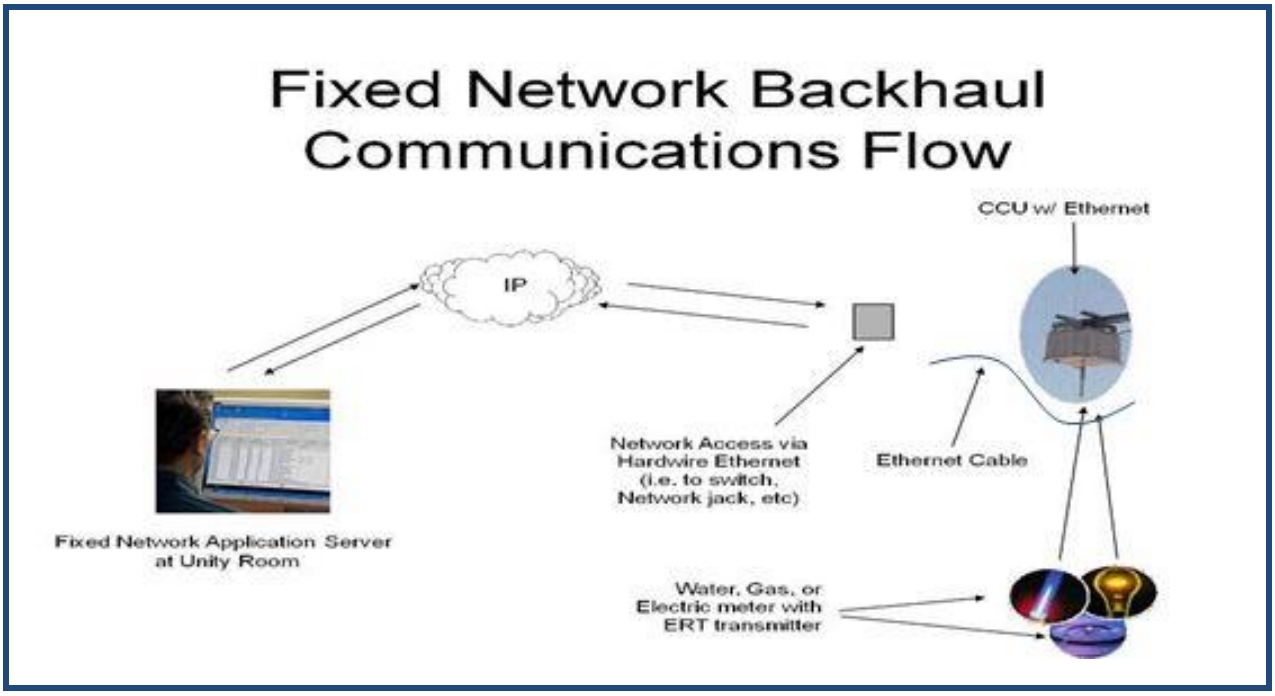


Figure 41: Backhaul Concept - Hardwire connections between Collector and Data Repository

CSI 26 00 00 ELECTRICAL

SECTION 1: ELECTRICAL REQUIREMENTS

1. **REFERENCES**: All electrical system construction shall conform to the most recent UFC and CFR requirements. If the Standard sought does not appear in these requirements, then the latest edition of the following Standards shall be utilized in the order listed:

   a. NEC

   b. San Diego Gas and Electric (SDG&E), "Electric Service Standards and Guide Manual, Specifications and Standard Construction Details"

   c. Institute of Electrical and Electronics Engineering (IEEE) C57.12.29, "IEEE Standard for Pad-Mounted Equipment-Enclosure Integrity for Coastal Environments"

   d. Photovoltaic (PV) Specifications, CPR (CSI 26 04 00), "Electrical Requirements"

   e. SDG&E, "Electric Service Standards and Guide Manual, Signage Standards"

   f. Department of Energy (DOE) LED, "Roadway Specifications"

   g. DOE, "Model Specification for LED Roadway Luminaires"

   i. ASTM D877 / D877M-13, "Standard Test Method for Dielectric Breakdown Voltage of Insulating Liquids Using Disk Electrodes"

   j. ASTM D92-12b, "Standard Test Method for Flash and Fire Points By Cleveland Open Cup Tester"

   k. ASTM D97-16, "Standard Test Method for Pour Point of Petroleum Products"

   l. U.S. EPA 712-C-98-076, "Fate Transformation Test Guidelines: Office of Prevention, Pesticides and Toxic Substances (OPPTS) 823.3110 Ready Biodegradability"

   m. U.S. EPA 600/4-90/027F, "Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms"

   n. Factory Mutual (FM) Research Approval Guide, Item P7825, "The Physical Object"

   o. U.S. EPA 712-C-98-075, "Natural Ester Dielectric Fluid Development"

   p. NFPA 70, "National Electric Code"

   q. NFPA 70B, "Recommended Practice (RP) for Electrical Equipment Maintenance"

2. **PERMIT AND / OR INSPECTION**: Before any digging or disturbing in any location, the Contractor shall be responsible to coordinate with MCB CPEN's ES Office for permit and / or inspection.

3. **ELECTRICAL UTILITIES**: All electrical constructions, including for primary and secondary power, communications, cable TV, and low voltage service cable for all types of facilities projects (M1, R1, M2, R2, and MILCON) shall be installed underground, unless an exception is provided in writing by the PWD, A&E Branch, Electrical Engineer. All underground conduit shall be a minimum PVC Schedule 40. Conduit duct for communications, cable TV and primary power will be concrete encased. Concrete shall have a minimum compressive strength of 3,000 psi. red dye shall be added to the 3,000 psi concrete mix for primary power constructions.

4. **ALL TRENCH GROUND WIRES**: Shall not be installed with other medium voltage class cables in conduit(s), but rather shall be installed in the duct bank concrete encasement.

5. **OVERHEAD ELECTRICAL UTILITIES**: Shall be constructed in accordance with SDG&E Standards, SDG&E Section 1600 for Avian Protection. All electrical distribution poles installed on MCB CPEN shall be galvanized steel poles. All requests to install wood poles within the contonement areas to be approved by FEAD, CM.

6. **NEW SDG&E SERVICE REQUIREMENTS**: The Contractor shall be responsible to apply and pay costs for all new SDG&E service requirements.

7. **ALL WET TYPE TRANSFORMERS AND SWITCHES**:

   a. Shall have less-flammable liquids.

   b. NFPA 70, NEC, Article 450.23, "Less-Flammable Liquid-Insulated Transformers" and FM P7825 for less-flammable liquids having a fire point not less than 300 degrees C tested per ASTM D 92 and a dielectric strength not less than 33 kilovolts (kV) tested per ASTM D 877.

   c. The fluid shall be a biodegradable electrical insulating and cooling liquid classified by UL and approved by FM as "less flammable".

   d. Fluid properties shall meet pour point ASTM D 97, less than -15 degree C, aquatic biodegradation U.S. EPA 712-C-98-075, 100% and trout toxicity Organization for Economic Cooperation and Development (OECD) Test 203, zero mortality of U.S. EPA 600/4-90/027F, pass.

   e. Maintain a five foot clearance around the three closed sides of a transformer; and maintain an eight foot clearance on the side with doors.

8. **NOT PERMITTED**:

   a. Live-Front Padmount switches or transformers are not permitted.

   b. Sulfur Hexafluoride 6 (SF6) Gases are not permitted.

9. **SPARE FUSES**: A complete set of spare fuses shall be provided for all medium voltage oil-filled switches and transformers.

10. **WHEN INSTALLED WITHIN FIVE MILES OF THE OCEAN**: All outdoor electrical equipment such as switchboards and panels, pad mounted switches, housing for backup generators and transformer enclosures shall be stainless steel NEMA 4x and comply with IEEE C57.12.29 for coastal environments.

11. **SERVICE TRANSFORMER INSTALLATIONS**: Aboard MCB CPEN shall not be considered a NEC defined "supervised location" as identified in NEC Table 450.3(A), Note 3.

12. **TRANSFORMER SECONDARY OVERCURRENT PROTECTION**: shall not exceed 150% of rated capacity.

13. **PAD-MOUNT TRANSFORMERS**: shall contain stainless steel bases to minimize corrosion where subject to landscape irrigation or standing water.

14. **ALL REMOVABLE SUBSTATIONS AND SWITCHBOARD CIRCUIT BREAKERS**: shall be provided with mechanical hoist; circuit breaker carts and storage cabinet in the same area as the substations switchboard. Where application is outdoor, carts provided shall be made of stainless steel.

15. **ELECTRICAL METERS**: See Section CSI 33 00 00, "MCB CPEN Utility Meter Requirements".

16. **ELECTRICAL DESIGN**: shall comply with Commercial building design standards and practices to allow for the traditional approach in determining the distribution system panel and feeder size / ratings based on a more conservative demand-adjusted connected load to better accommodate surges or future load growth.

17. **ALL ELECTRICAL SWITCHBOARD AND PANELBOARD BUSES**: shall be copper.

18. **PANELBOARD CIRCUIT BREAKERS**: shall be bolt-on type. Include a main circuit breaker or switch in every electrical subpanel.

19. **ELECTRICAL PANEL PHASES / LOADS**: shall be reasonably balanced within normally accepted tolerances, standards or guidelines.

20. **PANEL SCHEDULE**: shall show all connected loads per phase.

21. **ALL SERVICE, FEEDER AND BRANCH CIRUIT WIRING**: shall be copper.

22. **METAL-CLAD CABLE**: Is not permitted.

23. **ELECTRICAL METAL TUBING (EMT)**: Use steel compression connectors and couplings on EMT conduit.

24. **NOTE**: All abandoned conduits and pipes shall be properly filled and capped at all vaults, hand holes, and junction areas.

25. **RECEPTACLES**: Shall be minimally rated heavy-duty specification, commercial or premium grade.

26. **OUTDOOR LED LUMINARIES:** shall be American-made, ARRA compliant at least one year of commercial service, listed to UL 1598, TESTED TO lm79 AND lm80, HAVE AN EFFICACY > 50 lumens/watt, L70 life> 75,000 hours, CRI > 6500 and IP rating 54 with onboard surge protection and with a minimum 57 to 10 year light engine / enclosure coating warranty. Color temperature range for outdoor LED lamps shall be from 4,000K to 6,000K. Roadway luminaries shall comply with DOE LED roadway specifications version 1.0 dated OCT 2011, have area cutoff to minimize glare and / or comply with existing installed LED fixtures approved by MCB CPEN'S Energy Office.

27. **LIGHT FIXTURES FOR PARKING LOTS AND CANOPY LIGHTING**: shall be LED, or induction and /or comply with existing installed fixtures in the area or by exception approved by MCB CPEN'S Energy Office, have 49-watt, T-5 High Output (HO) fluorescent lamps and electronic ballasts that meet BASE requirements and item 26 above for LED.

28. **WALL PACKS**: shall be LED or induction type with individual photo cell and comply with existing installed fixtures in the area.

29. **LIGHT FIXTURES LOCATED IN HI-BAY APPLICATIONS**: shall be LED or by exception approved by PWD, A&E Branch, Utilities Projects Team, Electrical Engineer, be 49-watt, T-5 HO fluorescent lamps and electronic ballasts.

30. **EGRESS LIGHTING ILLUMINATION LEVEL**: shall be a minimum of one footcandle along the path of egress. Egress Lighting Photometric study is required.

31. **EMERGENCY LIGHT SELF-CONTAINED WALL-PACK, CEILING, or SEPARATE HEAD UNITS**: shall contain LED light source for lower battery / power consumption and reduced maintenance costs. When installing exit signs in locations subject to damage, provide a protective wire cage, e.g., basketball courts and drop down ceiling mounted exit signs in BEQ walkways.)

32. **LED LIGHTING**: Any new interior lighting or replacement of existing fixtures will be LED and meet IESNA standards and have a minimum 7 to 10 year warranty. Any exception shall be approved by MCB CPEN'S Energy Office or the PWD, A&E Branch, Electrical Engineer.

33. **COMPACT FLUORESCENT TWIN-TUBE OR QUAD LAMPS** (for lamp replacement projects): Shall be horizontally mounted where installed in recessed or surface downlight open-can fixtures for better, glare-free illumination.

34. **FOUR FOOT FLUORESCENT FIXTURES** (for lamp replacement projects): Shall be provided with 25-watt Super T-8 fluorescent lamps and electronic ballasts with NEC required quick disconnects.

35. **COLOR TEMPERATURE FOR FLUORESCENT LAMPS**: shall normally be 4100 (indoors) to 5000 (outdoors) degrees Kelvin for most applications except where other color temperatures can be reasonably justified for specific purposes when color rendition is of prime importance.

36. **COLOR TEMPERATURE FOR INTERIOR LED LAMPS**: shall be 3,500 K to 5,000 K.

37. **STEEL LIGHT POLES**: shall be powder coated inside and out.

38. **EXTERIOR LIGHT POLES**: shall have dry-pack grout at base. All poles that are not direct bury type shall be securely tightened down on anchor bolts.

    a. Dry-pack non-shrink mortar (grout) shall be placed under the pole base plate, base casting (where applicable), and around the conduits and ground rod, and shall have a 0.5" diameter drain hole located at the low point to prevent water accumulations in the base.

    b. Grout shall fill all voids under the base and shall be neatly finished where exposed.

39. **NEW CONDUIT**: Where new conduit is specified to be installed in existing foundations, the conduit shall be installed by carefully cutting a slot in the foundation avoiding rebar reinforcement, installing the required conduit and patching the opening with grout.

40. ELECTRICAL CONDUITS: penetrating electrically classified hazardous areas such as sewage wet wells shall be properly sealed in accordance with NEC, Articles 500-504, and other requirements as applicable.

41. **SYSTEM-CIRCUITED STREET, WALKWAY, SECURITY, and PARKING LOT LIGHTING FIXTURES**: shall be provided with individual fusing to locally isolate internal fault-caused loss of power from affecting the remainder of the branch circuit lighting.

42. **TIME SWITCHES**: shall be digital electronic type with battery back-up and shall contain astronomic or photocell control feature where used for operating lighting.

43. **NIGHT LIGHTS**: All old style BEQ lighting designs that do not contain a vestibule entry or hallway with separate localized illumination, but rather have entry directly into the sleeping room with a bright main light fixture over the sleeping area, shall incorporate a LED or low-wattage compact fluorescent night light inside the main fluorescent light fixture that provides minimal lighting in sleeping area. The night light shall be separately switched from the main light and the switch shall be located at the entry door. The main light switch shall be located near the hallway to the bathroom to avoid accidentally switching-on the main light upon sleeping room entry.

44. **DIMMER OR FAN SPEED CONTROLS**: shall contain a separate "on / off" switch to allow for preset dimming or fan speed without losing the adjusted setting when the lights or fan are turned "on" or "off". The separate switch is usually more durable and has a longer operational life than continually moving the slider control for switching power "on" or "off".

45. **MOLDED CASE MAIN SWITCH**: shall be installed in lieu of a main circuit breaker in an electrical subpanel as a disconnecting means where feeders are protected by a properly sized circuit breaker installed in the switchboard or panelboard immediately upstream of the affected subpanel. Provide a label adjacent to the main switch for identification to avoid possible confusion with the main circuit breaker that may be located elsewhere.

46. **BASEWIDE BONDING**: Is required of all 12 kV overhead pole line construction.

47. **BARE GROUNDING**: All "at and below" grade connections of bare grounding shall be the exothermic weld type of connection to include splicing and terminations.

48. **WYE CONFIGURATION**: The contractor shall ensure the secondary side of the transformers serving power to any BASE facilities that are part of either the water distribution system or the sewer system with pump and motor loads shall be a wye configuration.

49. **OUTDOOR ELECTRICAL ENCLOSURES**: shall be made inaccessible to rodents and wildlife.

50. **GROUND OPERATED AIR BREAK (GOAB) SWITCH:** GOAB switches shall be made of metal only, no fiberglass. Provide the proper rated fuse with the highest rated current flow to prevent the fuse material from melting.

51. **ARC-FAULT CIRCUIT INTERRUPTER (AFCI)**: In compliance with the 2014 NEC, all receptacle outlets in a BEQ shall be individually equipped with an AFCI, rather than just the first one on the circuit. AFCI circuit breakers in panelboards are not a viable alternative due to expensive maintenance issues involving time-consuming trouble-shooting for false and actual tripping nuisances.

SECTION 2: PHOTOVOLTAIC SYSTEM

1. **REFERENCES**: See Section CSI 01 00 00 "General Requirements".

2. **PHOTOVOLTAIC (PV) SYSTEM**: All new PV systems installed aboard MCB CPEN shall comply with (Figures 38-43) and the following requirements:

   a. PV system rated 30 kilowatt (30 kW) and larger shall have SDG&E meter, BASE meter, and third party California Energy Commission (CEC) approved data acquisition verification systems. Each Data Acquisition System (DAS) shall come with a 5-year agreement with the respective Contractor and is paid for by the project Contractor. PV System less than 30 kW shall require SDG&E meter and BASE meter. All meters shall meet current BASE specifications for AMI electric meter.

   b. For solar thermal systems, all arrays shall include a BTU meter that constantly monitors solar BTU contribution to respective building, equipment or training pool. BTU meters shall have communication capability to communicate in real time with Building Automation System and report back to the ICS room or Hub.

   c. The selected site shall not contain elements that cause shading of the array during daylight hours.

   d. For roof-mounted PV array, the roof dimension shall be used to establish a ratio that shall make the building aesthetically pleasant.

   e. The PV array surface shall be desoiled by the Contractor during the last half of the warranty period.

   f. Roof-mounted PV arrays shall have vertical and lateral air flow along the back surface of the modules.

   g. All fixed position PV systems shall have the following orientation:

(1) The azimuth and tilt angles are equal to 195° and 33°, respectively. This is predicted to optimize the system to collect annual energy that is site specific to MCB CPEN, see Figure 42.

(2) In a situation where the orientation in part (a) is not a viable option, the azimuth and tilt angles can be selected from the ranges of 170°- 210° and 20° - 40°, respectively. Attempt shall be made to select an orientation that is near the optimum azimuth and tilt angles. It is predicted that approximately 3% or less reduction in annual energy collection shall be achieved when the selected orientation stays within the azimuth and tilt angle ranges, see Figures 43-45.

h. All new construction shall provide signage and placards with the new PV system with regard to primary metering, sub stations of power sources and disconnects. The information on any existing signs and placards shall be incorporated into the new sign / placard and all of the old signs / placards shall be removed so that only the one new sign / placard remain, see Figures 46-47.

i. All inverter equipment for PV systems installations on grade shall be on a concrete pad and protected from damage with secured chain linked fencing and lockable gate per BEAP 3.17C Screening Guidelines.

j. The estimated orientation requirement is based on the analysis of a made-up 100 kW PV system situated in San Diego. PVWatt software that was provided by the National Renewable Energy Laboratory (NREL) was used to acquired the data. Figures 39-41 depict PV Watt outputs for the system. Due to marine layer that is prevalent in Southern California, the azimuth is observed to have been shifted.

Photovoltaic

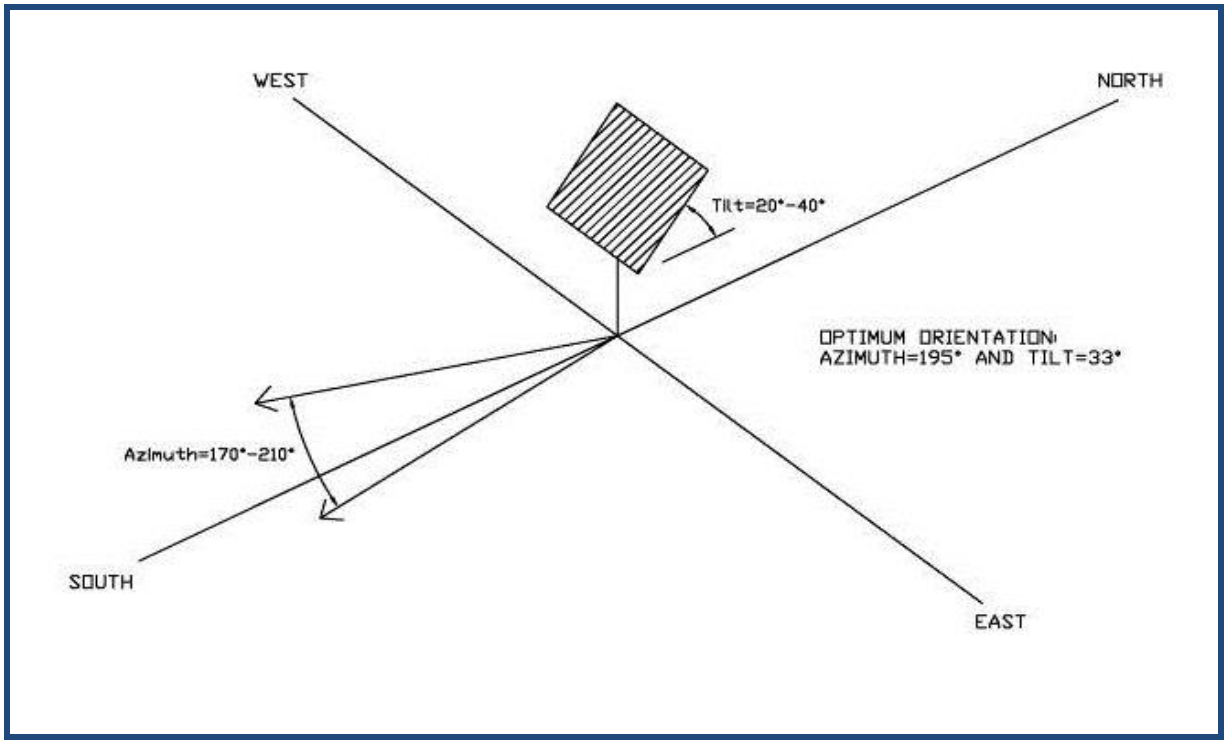


Figure 42: Array Orientation

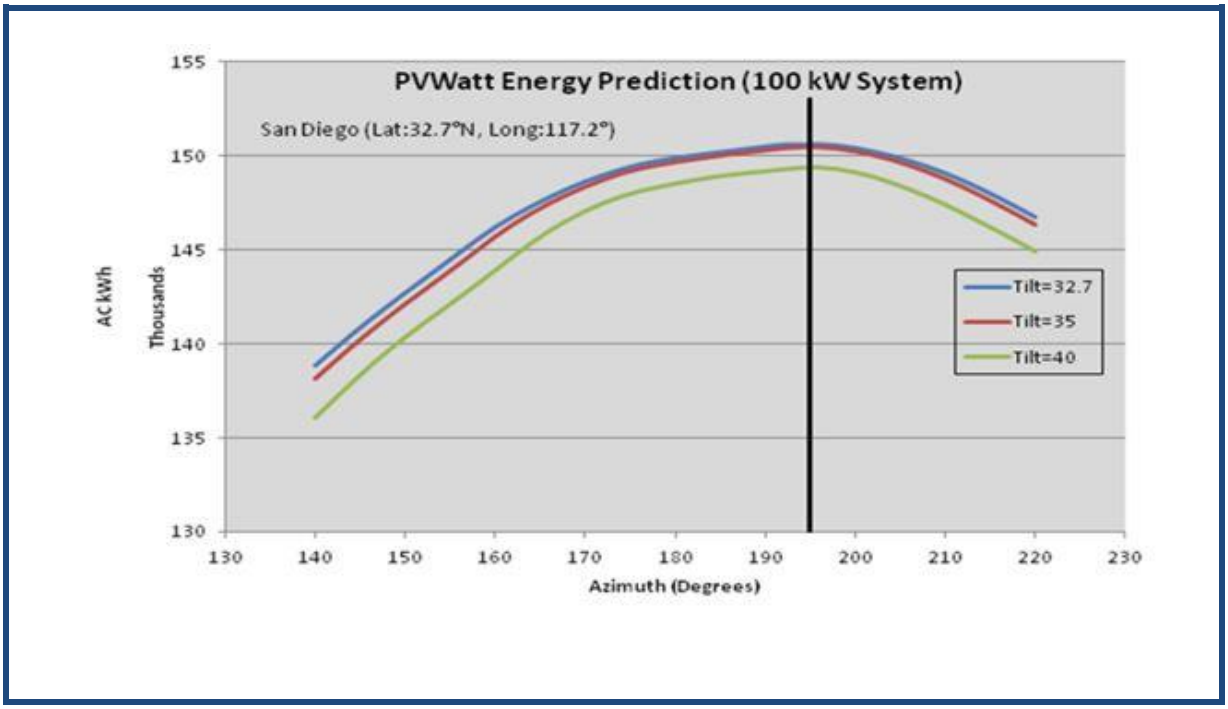


Figure 43: Annual Performance as a Function of Azimuth Angle

Photovoltaic

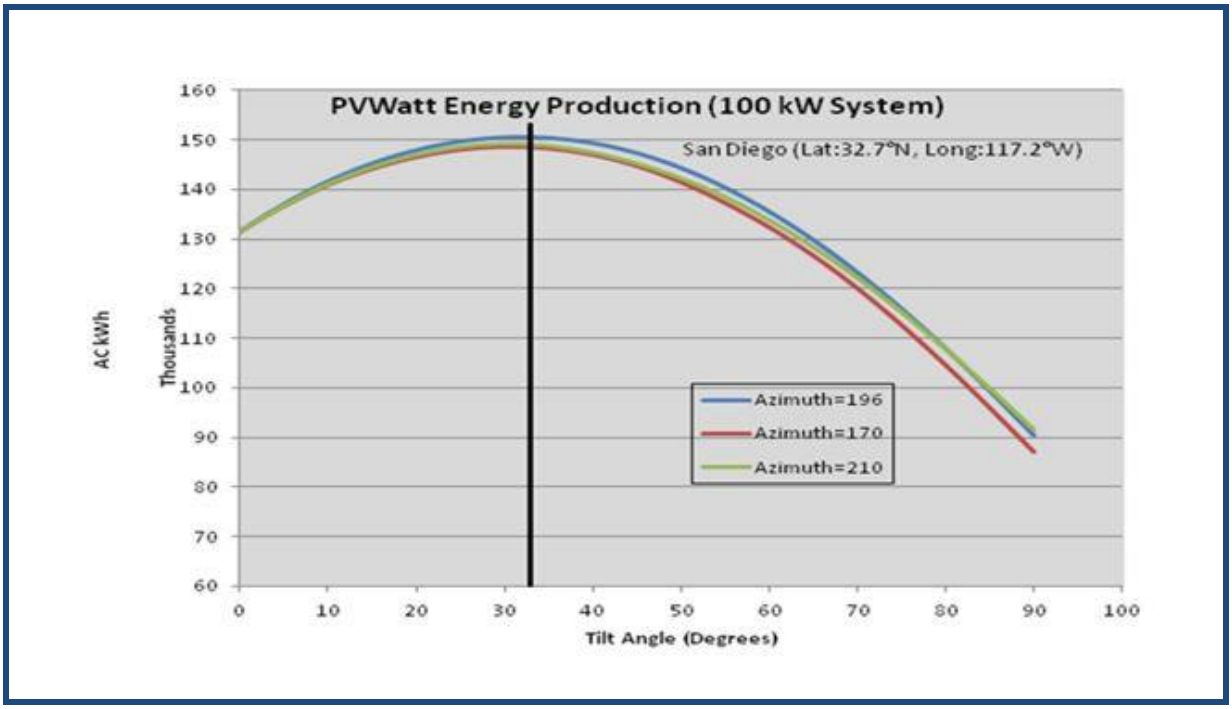


Figure 44: Annual Performance as a Function of Tilt Angle

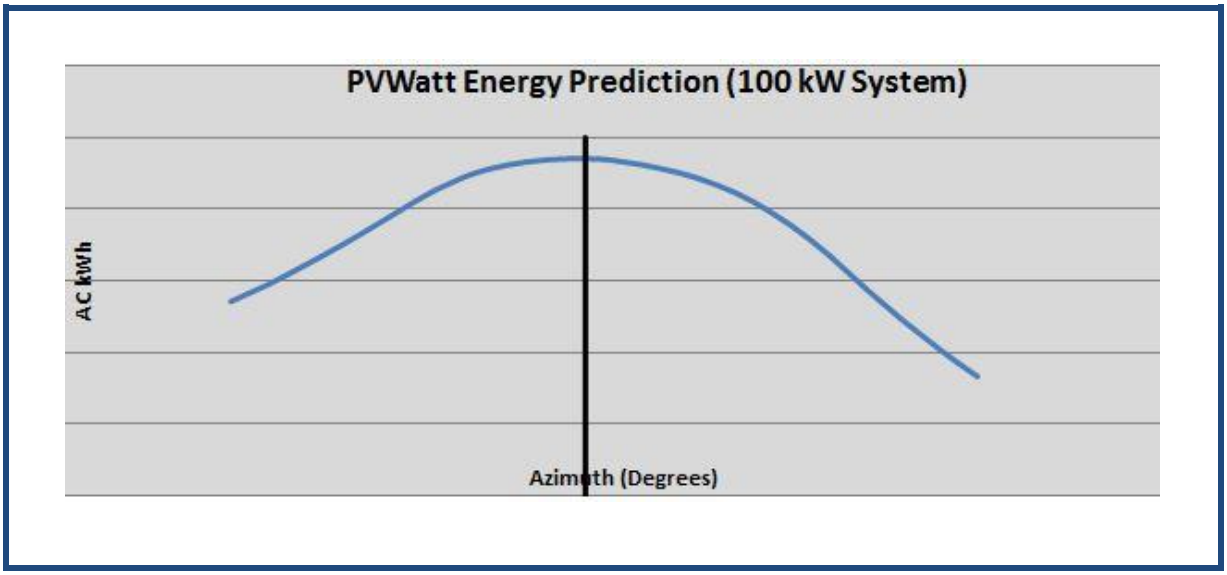
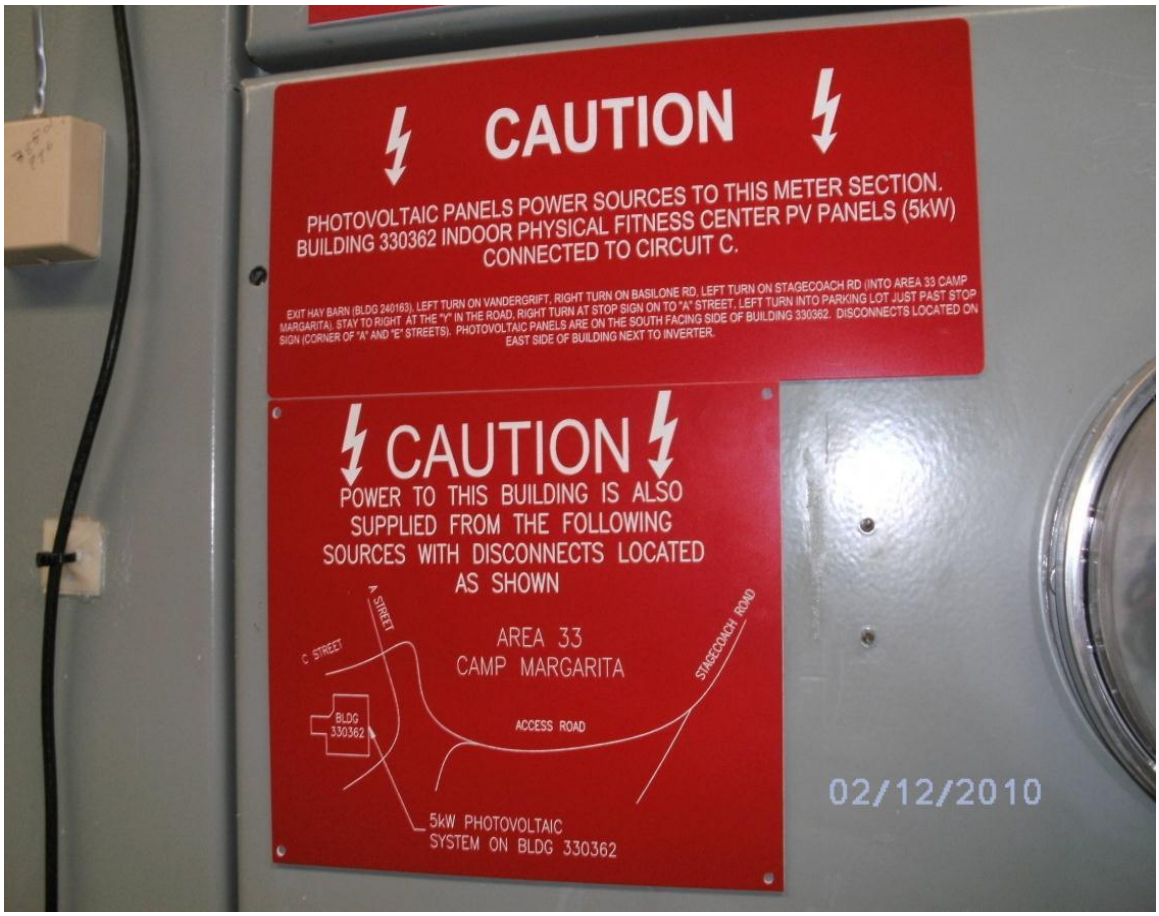


Figure 45: Mock-Up System in Phoenix

(NOTE: There is no marine layer in Phoenix so best azimuth is dead south at ~180 degrees.)

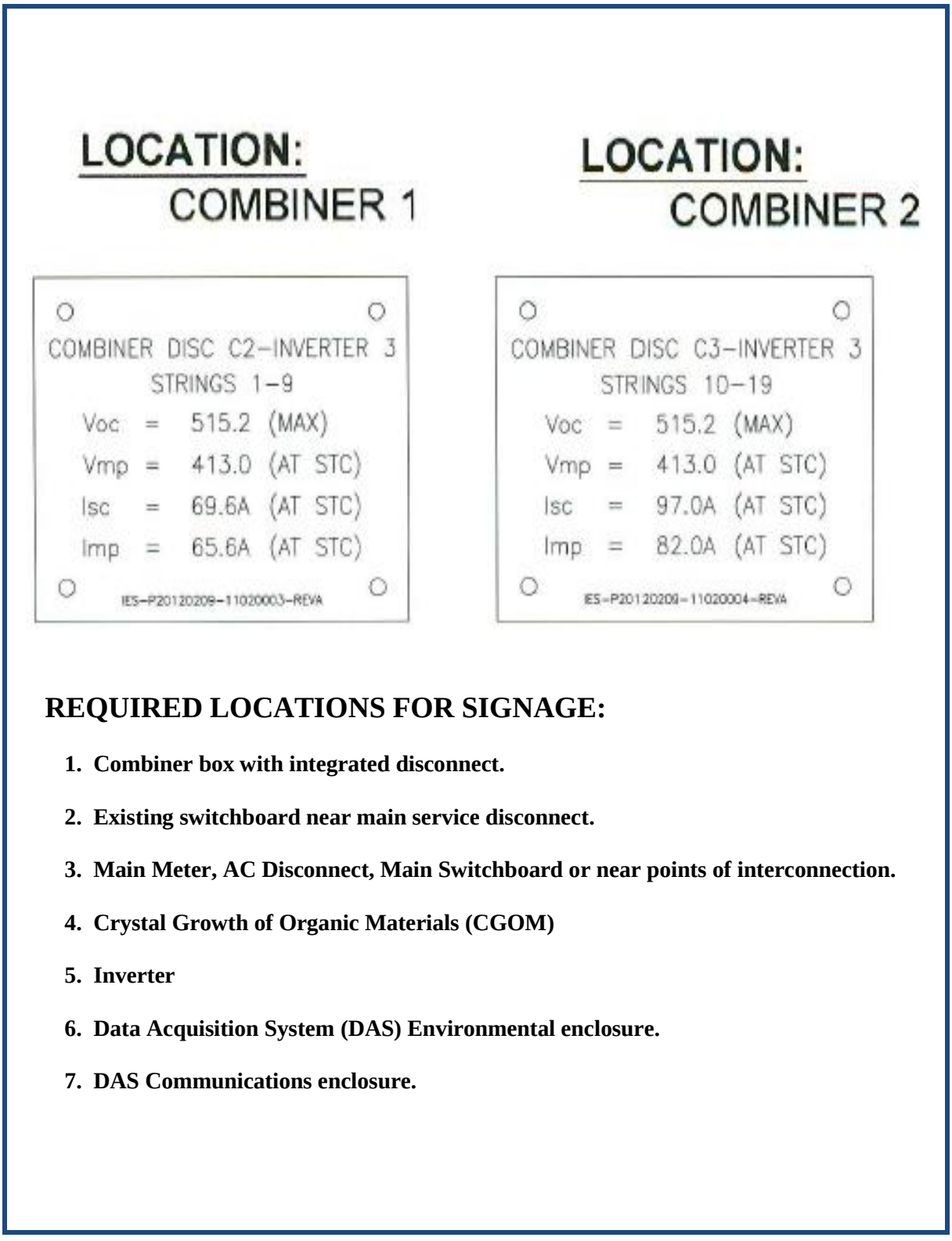
SECTION 3: EXAMPLES OF REQUIRED PHOTOVOLTAIC SIGNAGE: (See SDG&E Signage Standards.)



DESCRIPTION OF PLACARD:

1. Font sizes are in inches from largest to smallest as follows:
   a. .25" Title
   b. .125" Content
2. Placard color shall be red on front with white lettering engraved.
3. Mounting holes are .125" diameter through .25" from each edge typically at all four corners.
4. Break all edges, chamfer and debur.

Figure 46: Description of Placard



REQUIRED LOCATIONS FOR SIGNAGE:

1. **Combiner box with integrated disconnect.**
2. **Existing switchboard near main service disconnect.**
3. **Main Meter, AC Disconnect, Main Switchboard or near points of interconnection.**
4. **Crystal Growth of Organic Materials (CGOM)**
5. **Inverter**
6. **Data Acquisition System (DAS) Environmental enclosure.**
7. **DAS Communications enclosure.**

Figure 47: Required Location for Signage

SECTION 4: DIESEL GENERATOR REQUIREMENTS

1. **REFERENCES**: All construction shall conform to the most recent edition of the following references; where standards provide conflicting information pertaining to an issue, the most stringent information shall apply.

   a. Title 17 CCR § 93115, " Airborne Toxic Control Measure Section (ATCM) for Stationary Compression Ignition Engines" http://www.arb.ca.gov/diesel/documents/FinalReg2011.pdf

   b. San Diego Air Pollution Control District (SDAPCD) - Use for all Areas except the 64 Area (Talega). http://www.sdapcd.org/

   c. South Coast Air Quality Management District (SCAQMD) – Use for equipment located in the 64 Area (Talega). http://www.aqmd.gov/

   d. EC&M, "Common Ground in Article 100"

   e. EC&M, "Disconnect Requirements in Article 430

   f. EC&M, "Ampacity of Generator Conductors in Article 445"

2. **GENERATORS**: Shall be permitted through SDAPCD for the majority of the Base and SCAQMD for equipment located in the 64 Area (Talega).

3. **APPLICATION**: The Contractor shall complete the application in the name of MCB CPEN and pay for the application costs. The ES Air Quality Office shall review and approve the application prior to submitting to SDAPCD. This process takes at least six weeks and could take as long as, six months. Submit the application as soon as possible (ASAP), even if it means submitting without knowing specific engine information, such as, engine serial numbers.

4. **DIESEL ENGINES**: Shall be Tier 3 certified, when available. The actual emission standards required for the engines depend on the size of the engine as follows:

5. **EQUIPMENT PERMIT**: All equipment greater or equal to 50 Horse Power (HP) requires a permit from local air district. The State of California developed requirements specifically for diesel engines that required certain emission standards. These Standards have been categorized into "Tier" Standards. In the near future, all diesel engines shall be meeting at least Tier 3 standards. For this reason, all new diesel equipment shall meet Tier 3 emission standards when available. This allows future flexibility for the BASE to use the engine, if needed and it helps in reducing the BASE 's emissions, which are annually monitored and reported to the district for use in regulating the BASE.

6. **BACK-UP POWER**: If the engine is used to provide emergency back-up power, then there typically is a self-imposed limit on the number of allowable non-emergency operation hours of operation (i.e., testing / maintenance usage). If the generator provides back-up power to a critical unit; it is typically 30, 50, or 52 hours. If the unit provides non-critical back-up power, then hours are limited to 20 hours. The regulation still requires that Tier Standards are met according to the engine size.

7. **NEW ENGINE STANDARDS**: Even though there are some engine sizes that do not yet require Tier 3 Standards, MCB CPEN requires new engines to meet the most stringent standards available.

8. **GENERATORS**: Shall be installed per the NEC, specifically but not limited to Article 100 (Accessibility for maintenance and operation), Article 430, "Motors, Motor circuits, and Controllers" (Ventilation and location of motors), and Article 445, "Generators".

9. **ACCESS TO EQUIPMENT**: Accessibility to allow maintenance and operation of generators may require additional features such as rungs or steps on the generator, a 4' catwalk around the generator, or some means of providing access to equipment. The Contractor shall review accessibility design with FMD.

10. **ADDITIONAL REQUIREMENTS**:

    a. The generator unit needs to comply with MCB CPEN Spill Prevention, Control, and Countermeasure (SPCC) Plan, which requires secondary containment for all fuel and fuel storage greater than 55 gallons; BMP's requires it for smaller quantities. All generator sub-base above ground storage tank and piping systems shall comply with STI SP001 industry standards, NFPA 30 and NFPA 704 fire codes.

    b. There shall not be an impact to federally listed wildlife species as a result of the project. Generally, all of the power units shall be installed within the cantonment areas and adjacent to the buildings.

    c. Larger projects that require extended planned power outages (> 12 hours) need to identify which, if any, emergency backup generators will be affected, and alternative power arrangements will need to be made for the generators with air emission permits.

11. **EMERGENCY OUTAGES**: MCB CPEN's emergency generators shall only be used for emergency outages. Service provider shall determine if the planned electrical outage will affect users with mission-critical applications or facilities that shall have continuous electrical power. Service provider shall then provide temporary electrical power to these mission-critical applications or facilities.

CSI 27 00 00 COMMUNICATIONS

SECTION 1: TELECOMMUNICATIONS

1. **CSI 27 13 00** Telecommunication Outside Plant Cabling and Pathways (OSP).

2. **CSI 27 14 00** Telecommunications Protective Distribution System (PDS).

3. **CSI 27 15 00** Telecommunication Inside Plant (ISP) Structural Cabling.

4. **PROVIDE:** NMCI / Telecom spaces with independent heating and cooling systems. The space cooling equipment `shall` be able to operate year-round, without regard to whether the rest of the facility requires cooling, heating, or only ventilation. Heating and cooling systems on building time clocks or other temperature setback means, are not to be used for NMCI / Telecom spaces. Install HVAC in accordance with UFC 3-580-10.

5. **Complete Telecommunications Guidance** is located at the following website:

http://www.pendleton.marines.mil/StaffAgencies/AssistantChiefofStaffGF/PublicWorks/AEBranch.aspx

6. **DROP STANDARDS**:

   a. Home Run Drops (from tap to outlet)

      (1) Use RG-6 for pre or post wires.

      (2) Length not to exceed 250 FT (tap to set).

      (3) For drops greater than 250 FT and no more than 400 FT, use RG-11 for pre and post wires.

      (4) A minimum of two home run drops to any barracks room to be provided.

      (5) Digital Media Extension (DMX) cable is not desired aboard MCB CPEN.

SECTION 2: COX COMMUNICATIONS REQUIREMENTS

1. **TIME AND MEETING REQUIREMENTS**:

   a. Project lead time notices to COX should be at least six months.

   b. Current pole applications take at least four months plus up to two months for construction.

   c. The service can be brought in overhead or underground.

   d. The contractor shall assist the pathway and accessibility.

e. If COX has a current active presence in the building, coordinate with COX prior to construction commencing. (Customer Service number is (760) 599-6060. Please ask for Planning.)

f. Include COX for Partnering Meetings and in Concept Design Workshops.

g. Add COX contact by name in the plans and / or bid documents: Cox Communications, 1922 Avenida Del Oro, Oceanside, CA 92056.

(1) Cox Communications,
1922 Avenida Del Oro,
Oceanside, CA 92056.

(2) Construction Liaison
Joe Griffith – Joe.griffith@cox.com
(760) 806-2050

(2) Construction Liaison (Northern Camps)
Rey Castro – Rey.castro@cox.com
(949) 546-2466

2. **OVERVIEW**:

a. Two 2" PVC conduits for roadway portions and minimum of one 2" PVC conduit to the inside minimum point of entry or main point of entry (MPOE).

b. Lengths no more than 500 FT between pedestals or communication rooms.

c. No more than three 90 degree sweeps between pedestals or communication rooms.

d. Backboard room sufficient for COX's equipment to feed drops being routed to that communication room. The more drops to the communication room, the more wall space that is required by COX.

e. Minimum 2' x 2' backboard required depends on size conditions, 4' x 8' backboard is preferred.

f. Provide a common box for connection interface with COX and Satellite Providers.

g. Locates for COX facilities can be handled through traditional resources: 811 and COX personnel.

h. For remodels COX requests involvement before construction begins, preferably during MCB CPEN's assessment of the building. Provide requirements / specifications to include wiring / drop standards and coordination with COX.

i. When COX service is brought to a building, a wall mounted amplifier (size of a loaf of bread) is typically installed in the air-conditioned Telecommunications Room (TR). If not installed in the TR, the amplifier needs to be in a well-ventilated room / area. In either location it shall have a dedicated 120V electric outlet to power an uninterruptible power source (UPS) supplying 89VAC to COX's network to convert / boost signals.

CSI 28 00 00 ELECTRONIC SAFETY AND SECURITY

SECTION 1: VAULT AND SECURE ROOM CONSTRUCTION STANDARDS (OPEN STORAGE AREA)

1. **REFERENCES**: All construction shall conform to the most recent edition of the following standards; where standards provide conflicting information pertaining to an issue, the most stringent information shall apply.

   a. MCO 5530.14A, CH 7, Section 7006, Page 7-23, "Marine Corps Physical Security Program Manual"

   b. Military Handbook (MIL-HDBK)-1013/1A, "Design Guidelines for Physical Security of Facilities"

   c. Federal Specification AA-D-2257

   d. Federal Specification AA-D-600

   e. Federal Specification FF-L-2740

   f. UL 634 Standards

2. **VAULT**:

   a. **FLOOR AND WALLS**: 8" of reinforced concrete to meet current structural standards. Walls shall extend to the underside of the roof slab.

   b. **ROOF / CEILING**: shall be Monolithic reinforced concrete slab, with the thickness determined by structural requirements, but no less than the floors and walls.

   c. **DOORS**: Vault door and frame units shall conform to Federa1 Specification AA-D-2757, Class 8 vault door, or Federal Specification AA-D-600, Class 5, vault door. Doors shall be equipped with a built-in General Services Administration (GSA) approved combination lock meeting Federal Specifications FF-L-2740.

3. **SECURE ROOM (SR)**:

   a. **WALLS, FLOORS, AND ROOF CONSTRUCTION**: shall be of permanent construction materials; plaster, gypsum wallboard, metal panels, hardboard, wood, plywood, or other materials offering resistance to, and evidence of unauthorized entry into the area. Walls shall extend from the floor to the true ceiling with permanent construction materials or 18-gauge expanded steel screen on one face.

   b. **CEILINGS**: shall be constructed of plaster, gypsum, wallboard material, hardwood, or any other acceptable material.

c. **DOORS**: The access doors to the room shall be substantially constructed of wood, metal, or other solid material and equipped with a built-in GSA-approved combination lock meeting Federal Specification FF-L-2740.

(1) For open storage areas approved under previous standards, the lock may be a previously approved GSA combination lock until the door has been retrofitted with a lock meeting Federal Specification FF-L-2740.

(2) When double doors are used an astragal shall be installed on the active leaf of the door. The hinge pins of the out-swinging doors shall be peened, brazed, spot-welded, or equipped with a hinge secure pin to prevent removal.

(3) Doors other than access doors shall be secured from the interior (e.g., by a dead bolt lock, panic dead bolt lock, rigid wood or metal bar that extends across the width of the door, or by any other means that shall prevent entry from the exterior).

(a) Key operated locks that can be accessed from the exterior side of the door are not authorized.

(b) A balanced magnetic switch meeting UL 634 standards shall protect each perimeter door.

d. **WINDOWS**: All windows that might reasonably afford visual observation of classified activities within the facility shall be made opaque or equipped with blinds, drapes, or other coverings.

(1) Windows located less than 18' above the ground (measured from the bottom of the window), or that are easily accessible by means of objects directly beneath the windows shall be constructed from, or covered with, materials which provide protection from forced entry.

(2) The windows shall be protected with an Intrusion Detection System (IDS), either independently or with motion detection sensors in the space. Window protection does not need be stronger than the contiguous walls.

e. **OPENINGS**: Utility openings such as ducts and vents shall be kept at less than man-passable 96 square inches (sq. in.) opening. Openings larger than 96 sq. in. shall be hardened per reference (b).

4. **ELECTRONIC SECURITY SYSTEMS (ESS)**: In those instances where construction projects require ESS, including IDS, Mass notification System (MNS), Closed Circuit Television (CCTV), etc. commands shall ensure that the installation PS Chief forwards a request for support and / or Cost Estimates to SES, PS Branch.

a. This shall provide notification of a requirement and allow sufficient time for planning and funding.

b. SES, PS Branch manages a centrally funded program that provides security services and equipment to the installations.

c. These systems and equipment are considered collateral equipment and cannot be funded with MILCON funds but can be included in the MILCON project contract for contracting efficiency provided the funding is separate and distinct from MILCON funds.

5. **INFRASTRUCTURE REQUIREMENTS**: Commands shall ensure that infrastructure requirements are coordinated with and reviewed by MCIWEST G6, SSD, Customer Service Manager and PWD, A&E, PL.

6. **FURNITURE FLOOR PLAN**: Submit an electronic furniture floor plan required for MNS and IDS.

   a. HQMC funded projects one to three years out.

   b. Site funded projects as soon as user identifies areas requiring IDS.

   c. No later than 50% design review. (Meeting with MCB CPEN, PS and end user is required).

SECTION 2: FIRE DETECTION AND ALARM / MASS NOTIFICATION SYSTEM

1 . FIRE DETECTION AND ALARM

a. **REFERENCES**: All construction shall conform to the most recent edition of the following references, General Requirements; where standards provide conflicting information pertaining to an issue, the most stringent information shall apply.

(1) Department of Defense Instruction (DODI) 5200.08, “Security of DoD Installations and Resources and the DoD Physical Security Review Board (PSRB)”

(2) DODI 2000.16, “DoD Antiterrorism Standards”

(3) UFC 4-010-01, “The WBDG: DoD Minimum Antiterrorism Standards for Buildings”

(4) UFC 4-021-01, “The WBDG: Design and O&M: MNS”

(5) MCO P11000.5G, W/CH 1 & 2, "Real Property Facilities Manual, Volume IV, Facilities Projects Manual"

(6) MCO P110000.12C, W/CH 1, “Real Property Facilities Manual, Volume III, Facilities Planning and Programming"

(7) MCO 5530.14A, “Marine Corps Physical Security Program Manual”

(8) SECNAVINST M-5510.36 DON, “Information Security Program (ISP)”

b. **FIRE DETECTION AND ALARM (FDA)**:

(1) All alarm initiating devices shall be addressable. All components shall be individually attached to or contain an addressable device. All devices shall be easily accessible.

(2) In Section D4010, FA and Detection System, all devices requiring a key to access equipment and reset devices shall be keyed alike with a CAT 60 key.

(3) Type thermo-plastic weatherproof nylon / thermo-plastic heat-resistant nylon (THWN / THHN) insulated wire is not acceptable for underground wiring of FA circuits. Contractor shall provide type THW or moisture-resistant, flame retardant thermoset insulation for wiring (XHHW) in wet locations.

(4) Surface boxes, when provided for surface mounted manual pull stations, shall be the station manufacturer's approved back box. Back box finish shall match station finish. Surface boxes shall have smooth side surfaces devoid of any knockouts. The surface boxes shall closely match the exterior contour of the manual pull stations.

(5) The FACP shall be located in either the Telecommunication or Electrical Room A building floor plan shall be located and permanently mounted next to the FACP. The floor plan shall be at a minimum laminated, show all initiating devices, all room numbers / names, and device addresses.

(6) The FACP shall have the capability to silence FA audible signals including water-flow signals.

(7) The Digital Alarm Communication Receiver (DACR) is located at the Joint Emergency Communications Center is a Radionics / Bosch D6600. The receiving station dispatch software is GE MasterMind Monitoring Software. The preferred mode of FA signal transmission is Contact ID.

(a) The primary and backup phone numbers shall be made available during the pre-final inspection.

(b) The FACP shall be programmed with primary and backup phone numbers.

(c) The DACR shall receive a distinct description for each type of initiating device.

(8) The Digital Alarm Communication Transmitter (DACT): The phone lines shall be installed in conduit from the DACT location to the telephone backboard location.

(9) All site specific programming, software, and pass codes shall be provided to MCB CPEN prior to final acceptance of the FA system. The Fire Detection and Alarm / Mass notification System (FDA / MNS) system batteries shall provide 60 hours of standby power followed by 15 minutes of alarm power.

c. **FIRE SPRINKLER**:

(1) Provide locks and chains on back flow preventer in lieu of tamper switches.

(2) Locate Fire Department Connection (FDC) facing the street so it is easily accessible for the Fire Department.

(3) Shotgun risers shall be provided eliminating the alarm check valve and retard chamber style.

(4) All exposed steel piping that is used for water fire demand shall be painted in the industry standard color "red" to signify fire systems and include a backflow device.

(5) Provide KNOX (lockable) FDC caps on the FDC.

d. **KNOX BOX**:

(1) Provide all KNOX Boxes model #3275 (or equal) recessed mounted with hinged door.

(2) Exact size and location for installation and ordering shall be coordinated with MCB CPEN Fire Department.

(3) Provide master keys and FA keys in KNOX box.

(4) Provide KNOX box even if there is a 24-hour duty desk inside the facility.

(5) MCB CPEN'S Fire Department has an order form for the KNOX boxes.

(6) Mount KNOX boxes on outside of building near front entrance not higher than 6'.

e. **FIRE ACCESS LANE**: The minimum inside turning radius for any fire access lane shall be 37'**.** All fire lanes shall be 20' wide all weather paving with continuous 13'-6' vertical clearance.

2. MASS NOTIFICATION SYSTEM (MNS)

a. **REFERENCES**: All construction shall conform to the most recent edition of the following standards; where standards provide conflicting information pertaining to an issue, the most stringent information shall apply.

(1) DoDI 5200.08, "Security of DoD Installations and Resources and the DoD PSRB""

(2) DoDI 2000.16, "DoD AT Standards"

(3) UFC 4-010-01, "The WBDG: DoD Minimum Antiterrorism Standards for Buildings"

(4) UFC 4-021-01, "The WBDG: Design and O&M MNS"

(5) SECNAVINST M-5510.36 DON, "Information Security Program"

(6) MCO P11000.5G, W/CH 1 & 2, "Real Property Facilities Manual, Volume IV, Facilities Projects Manual"

(7) MCO P11000.12C, W/CH 1, "Real Property Facilities Manual, Volume II, Facilities Planning and Programming"

(8) MCO 5530.14A, "Marine Corps Physical Security Program Manual," CH 1, Page 1-10, Section 101, "Physical Security Requirements for MNS"

b. **PROJECT PLANNING**: All plans for construction, MILCON, and Facility Sustainment, Repair, and Modernization (FSRM) shall incorporate PS and ATFP features, in accordance with the aforementioned references.

(1) If a MNS is required, the system shall be combined with the FA, see Figure 48.

(a) LED text signs are not required as part of the MNS system.

(b) Provide clear strobes marked with the word "ALERT" for shared use by the building's combination MNS / FA.

(c) A means to initiate prerecorded MNS messages at the buildings MNS / FA panel shall not be required. However, the FA/MNS panel shall have the capability to provide at least eight pre-recorded messages.

(2) USMC MNS utilizes the WAVES – Wireless Audio Visual (AV) Alerting Emergency System. Equipment shall be Cooper notification, SGIS software or approved equal.

(3) All dedicated conduit runs for the MNS Antenna and speakers are to have a pull string and shall be adequately marked.

3. **FIRE SYSTEM**: It is preferred that the company installing the Fire System, voice capable speakers and strobes (strobes shall be marked with "ALERT") be activated by the FACP as well as the MNS. Combination speaker / strobes are preferred for a cleaner installation.

4. **MILCON AND FSRM CONSTRUCTION DRAWINGS**: All plans, subsequent design review phases, and final 100% drawings for MILCON and FSRM construction shall be reviewed by one or more of the following, as applicable to the specific project requirement:

   a. PMO or designated representative

   b. MCB CPEN Security Officer, SES, PS Branch

   c. ATFP

   d. MCB CPEN Fire Department

   e. NOTE: Contract for Bid shall be processed after documentation of design has been reviewed by the above listed parties. The contract for bid shall not be processed without documentation of design review.

5. **ALL CONSTRUCTION PROJECTS** (to include MILCON and FSRM projects): Shall be reviewed by the MCB CPEN, PS Chief and Antiterrorism Officer (ATO) and verified by Security Division and Commandant, U. S. Marine Corps, Installations and Logistics (CMC, I&L) during validation, to ensure PS and ATFP requirements have been addressed.

6. **REQUEST FOR SUPPORT**: In those instances where construction projects require ESS, (including IDS, MNS, CCTV, etc.) commands shall ensure that the installation PS Chief forwards a request for support and / or CE to SES, PS Branch.

   a. This shall provide notification of a requirement and allow sufficient time for planning and funding.

b. SES, PS Branch manages a centrally funded program that provides security services and equipment to the installations.

c. These systems and equipment are considered collateral equipment and cannot be funded with MILCON funds but can be included in the MILCON project contract for contracting efficiency provided the funding is separate and distinct from MILCON funds.

7. **INFRASTRUCTURE REQUIREMENTS**: Commands shall ensure that infrastructure requirements are coordinated with and reviewed by MCB CPEN GIS-Support Director and PWD, A&E Branch PL.

8. **FURNITURE FLOOR PLAN**: Submit an electronic furniture floor plan (required for MNS & IDS).

a. HQMC funded projects one to three years out.

b. Site funded projects as soon as user identifies areas requiring IDS.

c. No later than 50% design review. (Meeting with MCB CPEN, PS and end user is required)

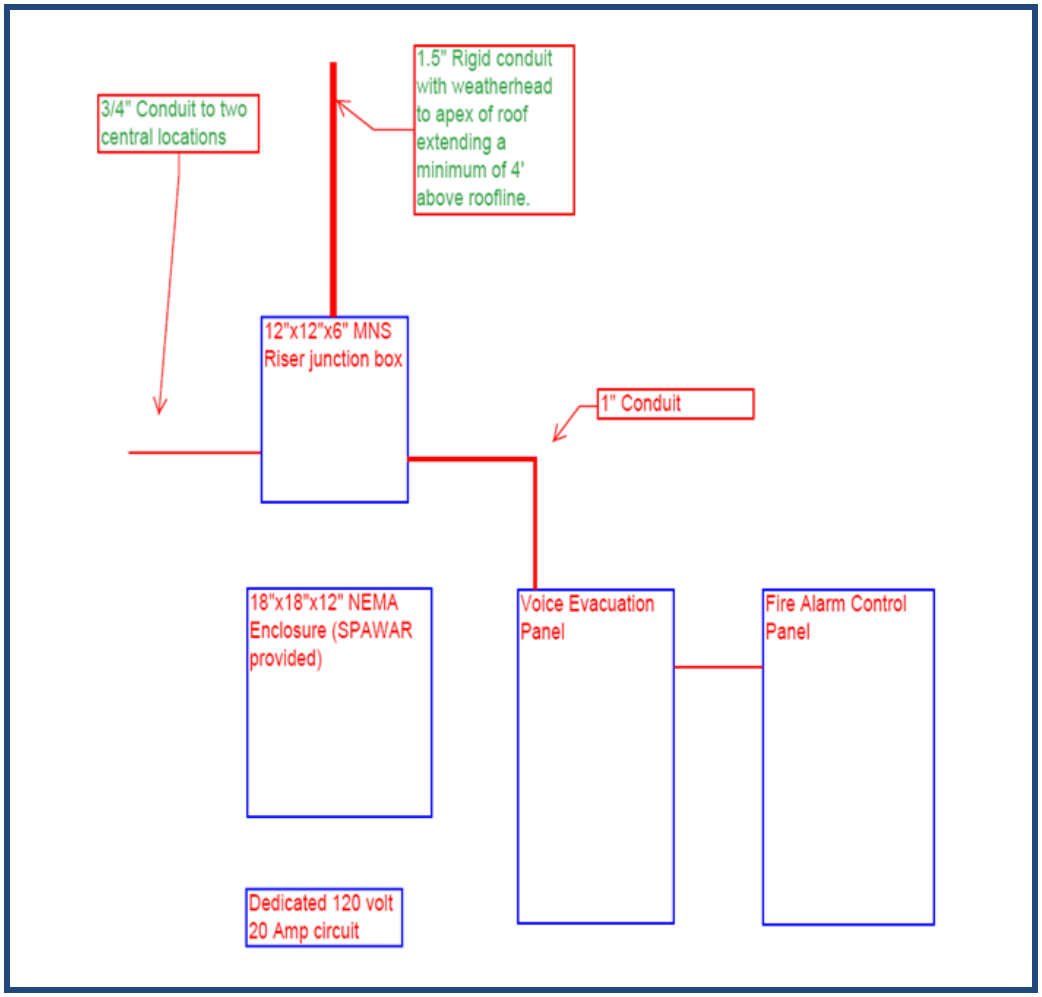


Figure 48: Physical Security Requirements for MNS

CSI 31 00 00 EARTHWORK

SECTION 1: RADON MANAGEMENT PLAN: Please refer to the following link:

http://www.pendleton.marines.mil/StaffAgencies/AssistantChiefofStaffGF/PublicWorks/AEBranch.aspx

SECTION 2: ROADWAY IMPROVEMENTS

1. REFERENCES: All construction shall conform to the most recent edition of the following:
   a. California Transportation (Caltrans) Standard Specifications
   b. CA MUTCD
2. **REQUIREMENTS:**
   a. All pavements for non-tactical vehicular parking areas shall include a minimum of 3" A/C pavement over 6" aggregate base materials.
   b. All pavements for secondary roads and streets shall include a minimum of 4" of A/C pavement over 8" aggregate base materials.
   c. All pavements for primary / main roads shall include a minimum of 6" of A/C pavement over 8" aggregate base materials.
   d. All metal beam guard railing shall use steel galvanized posts and plastic blocks.
   e. Reference Utilities CPR, CSI 33 00 00, Section 11, "Stormwater Best Management Practices (BMPs) for possible application of permeable pavement.

CSI 32 00 00 EXTERIOR IMPROVEMENTS

SECTION 1: LANDSCAPE GUIDELINES

1. **REFERENCES**: See Section CSI 01 00 00 General Requirements.

2. **PLANTING**:

   a. No vegetation shall be planted near or around backflow devices, hydrants, or any equipment that requires routine maintenance.

   b. Container plants shall be minimum 1 gallon. Use of smaller containers, such as 4" pots or plugs, may be approved by the PWD, A&E Branch on a case-by-case basis, for example, in large bioretention areas where seeding is not viable or practical.

   c. HydroSeeding, sometimes called hydraulic mulch seeding, is a planting process in which a slurry containing seed, hydroseeding mulch, fertilizer and a tackifier (bonding agent) is sprayed onto the ground. HydroSeeding can be an economical and effective way to achieve plant cover over large areas and may be acceptable as a restoration technique. However, inappropriately specified or poorly applied hydroseed is likely to fail and unsuccessful hydroseed applications will not be accepted by the PWD, A&E Branch, see Figure 49.

      (1) Use personnel or subcontractors certified and trained in the proper procedures for mixing and application of hydroseed / hydromulch as defined by the manufacturers / suppliers specifications and verified by the DOR.

      (2) Hydroseeding shall not be used in areas receiving concentrated flow or on slopes greater than 3:1 unless used in combination with other stabilization techniques.

      (3) Hydroseeding is not appropriate in highly pedestrian trafficked areas unless species are traffic tolerant and protected until established.

      (4) Seed mixes shall be site specific. Spaces in or adjacent to natural areas and / or intended shall be re-vegetated as native scrub shall use the MCB CPEN ES approved seed mix as a starting point and shall consult with the ES Compliance Division to address specific habitat concerns. Slope planting shall focus on long term erosion control and root mass. In populated areas, species shall be tolerant of some foot traffic and periodic mowing and are not required shall be purely native. Seed rates shall be referenced by Pure Live Seed vs. bulk pounds, and native seed shall be sourced within two counties from MCB CPEN. Seed mix shall contain both fast establishing annuals and permanent, long-lived perennials with substantial root mass.

      (5) Hydroseed shall be applied between November and January. Application of hydroseed outside of this planting window greatly reduces the chance of successful establishment, especially with native plants. If necessary, and in general to minimize the period during which a cut or filled surface remains exposed, species that provide rapid short term coverage shall be used in combination with species that provide long term permanent coverage. Mowing and re-application of permanent species will likely be necessary during the planting window.

(6) Hydroseed shall be irrigated. Permanent, below ground spray irrigation with full head to head coverage is required for most sites within cantonment areas. Aboveground, temporary spray irrigation may be approved for Range projects and on a case by case basis for Cantonment Areas, by the PWD, A&E Branch. Temporary irrigation shall be left in place for 1 year and shall be removed at the end of this year. Irrigation with a water truck is generally not successful and will only be approved if no other alternative is available. Non-irrigated hydroseed is rarely successful and will only be approved in extreme circumstances, and when applied / re-applied during the planting window.

(7) Hydroseed shall be applied from two opposing directions to soil surface to achieve optimum soil surface coverage. Rough surfaces (rocky terrain, cat tracks and ripped soils) may require higher application rates to achieve 100% cover. Seedbed shall be prepared according to planting preparation specifications. A two-step application is optimal. Hydraulic mulch shall be capable of maintaining integrity for a minimum of nine Months.

(8) Hydroseed on slopes shall be applied to geotechnically stable slopes that have been designed and constructed to divert runoff away from the face of the slope. Slope interruption devices or water diversion techniques are required when slope lengths exceed 100 FT (30 m). Slopes greater than 3:1, and in excess of 15 FT in vertical height, shall be planted with shrubs having a one gallon minimum size or trees having a five gallon minimum size. The maximum spacing for shrubs and trees shall be 10 FT on center each way.

(9) Permanent plant cover shall be established within the 1 year maintenance / establishment period. Establishment will be reviewed at the 6 month and 1 year walks by a government representative. For native species, plants shall average 4" tall and 2-4 perennial plants shall be present per SF. Annual species shall also be present. At 1 year, coverage of 70%, as compared to the native background plants shall be achieved. For turf grass and other non-natives, a minimum of 85% cover is required. If these establishment rates are not achieved at either walk, the contractor is required to re-seed and the maintenance / establishment period for these areas will restart.

Example of well-established hydroseed.

Example of failed hydroseed.

Figure 49: Good Examples - Hydroseed (Well-established and Failed)

d. MCB CPEN is home to five or more differing native plant environments / communities including Coastal, Oak Woodland, Grassland, Chaparral, and Riparian. For projects in rural locations, select plant species compatible with native plant environment indigenous to project location and project facility type. For projects in more urban locations, select native plant environment indigenous to project location and project facility type. For projects in more urban locations, select native and drought tolerant plant species compatible with project facility type. Provide the minimum native plant species by project facility type as follows:

(1) 100% Native Trees, Shrubs, and Groundcover: Open Space and Range.

(2) 80% Native Trees / 50% Native Shrubs and Groundcover: Armory, Administration, Housing / Barracks, Learning Center, Recreation, Training / Multi-Purpose Field, Parking Lot, Streetscape, Environmental Management Systems / Naval Criminal Investigation Service (EMS / NCIS), and Warehouses.

(3) 50% Native Trees / 20% Native Shrubs and Groundcover: Headquarters, Child Development Center, Retail, Commercial, Medical, and Dining / Mess Hall.

(4) 0% Native Trees, Shrubs, and Groundcover: Historic and Church / Chapel.

e. Provide tree species able to tolerate drought following one year of installation. High-water use species like Alnus rhombifolia are to be used only in riparian-like locations where supplemental irrigation water is not necessary.

(1) It is the responsibility of the site design team: architect, civil engineer and landscape architect to coordinate locations of all site utilities in the early stage of design. Provide adequate planting area to accommodate trees proposed by landscape architect where utilities occur. Provide minimum horizontal clearance of 10 feet (FT) between wet utilities and trees. If minimum distance is not possible, obtain approval from PWD, A&E Branch for use of root control barriers.

(2) It is the purpose of parking lot trees to provide shade for both vehicles and paving to reduce heat gain (the heat island effect). Provide parking lot trees that at maturity can produce a strong single trunk and broad canopy to maximize parking lot shade potential.

(3) Parking lot planter islands are designed and provided for parking lot shade trees. Site lighting and mechanical systems are to be located outside of parking lot planter islands and out of conflict with all trees.

3. **EDGING**: When used aboard MCB CPEN, landscape edging shall reinforce a durable and easily maintained site design. It shall be used when a more formal aesthetic is desired and / or when it reduces maintenance. Designs shall not rely exclusively on edging patterns, but shall have strong planting and paving concepts. Mulch (organic or inorganic) shall not dominate a site. Informal planting design and thoughtful choice of materials can eliminate the need for edging.

a. When used, a 6” concrete mow strip is required. In limited circumstances, commercial grade steel, or aluminum edging may be approved by the PWD, A&E Branch. This edging shall be brown or black in color to coordinate with mulch (Not green) and 4” minimum. Redwood, faux-wood (Trex or equivalent), and plastic edgings are prohibited, see Figure 50.

Unacceptable redwood edging warping.

Unacceptable TREXedging trip hazard.

Unacceptable wood edging used at edge of asphalt.

Figure 50: Lessons Learned - Unacceptable Edging

b. Provide a 6" concrete mow strip between grass / planted areas and specialized surfaces such as running tracks, exercise stations, horseshoe pits, volley ball courts, etc.

c. Provide a 6" concrete curb edging along the sides of asphalt walkways and parking lots.

d. Minimum depth for concrete curb is 6". For areas where adjacent material is a specialized surface, asphalt, or decomposed granite, depth of concrete curb is to be 2" deeper than adjacent material.

4. **GROUND COVER AND MULCH**: All areas disturbed during construction shall receive permanent cover to retain moisture, reduce erosion, and suppress weed growth and seed germination. Permanent cover shall be achieved through a combination of inorganic mulch and planting.

a. Inorganic Mulch: Includes any type of rock (cobble, gravel, disintegrated granite (DG), glass, or rubber chips. Rock mulch shall be minimum 3" thick. DG shall be four inches 4" thick. Finish grade of mulch shall be 1" below adjacent paving. Coconut fiber jute type weed fabric (Not plastic mesh type) shall be installed below inorganic mulch. Color shall be coordinated with adjacent sites and building materials. For rock cobble greater than 3" diameter, provide ¾" to 1 ½ " crushed rock to fill voids.

b. Where container plants are intended as permanent ground cover, organic mulch may be used in limited circumstances as temporary cover until plants reach their ultimate size.

c. Organic mulches include any material of natural origin that decomposes naturally, such as bark chips, grass clippings, straw, leaves, compost, rice hulls, saw dust or gorilla hair. Since they decay over time, they are temporary. As they decay, they provide nutrients. These temporary mulches will perform the various functions of mulch for approximately 1-2 years. If not replaced, they will lose effectiveness after this period. Organic mulches are generally flammable, some more than others. The following criteria shall be met and clearly noted on plans in order to use organic mulch in this capacity:

(1) Planting beds shall have permanent, conventional spray irrigation with full coverage able to keep mulch damp and address fire concerns.

(2) Plant quantities, species, and spacing shall provide complete ground coverage within one to two years, see Figure 51.

(3) Mulch shall be high quality, absent of trash or construction waste and filtered to remove large pieces over 4 inches long / wide.

(4) Planting beds adjacent to natural open space or identified as part of a brush management zone shall not use organic mulch due to extreme fire danger. Gorilla hair mulch is particularly flammable and shall be approved by the PWD, A&E Branch on a case by case basis. Refer to the BEAP Brush Management guidelines (3.6 H-9). These areas shall be carefully planned and planted with fire resistant species and shall use inorganic mulch.

Example of poor vegetative cover.

Example of 100% vegetative cover.

Figure 51 Good Examples - Vegetative Cover (Poor and 100%)

5. **MAINTENANCE AND ESTABLISHMENT PERIOD**: All Landscape Contractors are required to provide a 365 day (1 year) maintenance and establishment warranty period on installed landscapes.

   a. A temporary sign shall be provided and located on site to notify users that the site is under warranty. This sign is to include: dates of warranty period, company providing landscape maintenance, contact number to report landscape issues. It shall be located in a centralized, clearly visible location and shall be durable enough to last through the warranty period.

   b. A landscape maintenance checklist and seasonal irrigation schedules shall be included with the Operations and Maintenance Support Information (OMSI) package and provided to MCB CPEN, PWD, A&E Branch. The Landscape maintenance checklist shall outline the frequency and types of tasks shall be performed during the maintenance period. The irrigation schedule shall outline seasonal and microclimate specific irrigation needs and estimated establishment period.

   c. Maintenance logs / reports shall be provided to the PWD, A&E Branch at the 6 month and 1 year warranty walks. Proper establishment is critical to the ultimate success of the landscape. At a minimum, the following maintenance tasks are required:

(1) Weeding and Cultivating: The entire site shall be kept free of weeds, noxious grasses, clods, trash and debris on a monthly basis. Hand remove all weeds larger than 3 inches tall or wide. Apply pre-emergent as required.

(2) Plant Replacement: During the maintenance period, plants which die or are in unhealthy or badly impaired condition shall be replaced by the Landscape Contractor within 1 month after unsatisfactory condition is evident. If plants are replaced during the maintenance period, then the 365 day maintenance period for those plants shall restart at the date of installation and acceptance of the replacement plants.

(3) Pruning: Prune all plant material as needed and as appropriate on a monthly basis. Remove all dead, diseased or unsightly growth. Pruning is required when necessary to provide horizontal and / or vertical sight line clearances. Prune back groundcover and shrubs overhanging curbs, sidewalks or parking lots. Do not shear plants or create vertical edges; prune them in a manner that enhances the natural form, shape and size. Prune all trees to encourage upward growth and a high branching structure (ultimately, a minimum vertical clearance of 6' in pedestrian areas and 9' in parking / street areas is required for all trees other than those specifically chosen as multi-trunk or low branching specimens for screening). Remove all sucker growth. Tree stakes shall be removed at the end of the maintenance period to avoid girdling and damage to trees, see Figure 52.

(4) Mulch and Erosion Repair: Replace mulch that has been washed or knocked out of place and smooth finish surface of mulch. Repair any erosion damage and provide permanent solution to address cause of erosion. Use coconut fiber jute type erosion control fabric (Not plastic mesh type).

(5) Irrigation Adjustment and Repair: Make irrigation system inspections on the entire system for proper operation and coverage on a monthly basis. Repair and clean / flush as necessary to keep the system in proper, full operation. Adjust spray nozzles to obtain optimum coverage and minimum overspray on hardscape elements, into drains or stormwater facilities. Seasonally adjust irrigation controllers for frequency and cycle length.

Tree stakes broken and girdling tree.

Tree stakes grown into tree.

Figure 52: Lessons Learned - Problems with Tree Stakes

6. **IRRIGATION / VALVE BOXES**:

   a. Valve boxes shall be chosen to blend in with surrounding ground cover, see Figure 53.

   b. Concrete valve boxes are preferred.

   c. For reclaimed water, purple valve boxes shall be used.

   d. When plastic valve boxes are specified for potable water use, specify tan colored valve boxes when boxes will be located in wood or rock mulch areas. All valve box covers shall have identification label or number attached or engraved to the top of the cover with "RW" branded on the lid and purple identification tag attached to the valve.

   e. Provide a meter for irrigation.

Unacceptable green valve boxes in tan gravel.

Unacceptable green valve boxes in organic mulch.

Figure 53: Lessons Learned - Unacceptable Green Valve Boxes

7. **SITE IMPROVEMENTS**:

   a. All walkways and pedestrian paving to have expansion joints at a maximum of 10 feet on center and crack control joints spaced at a minimum of 5 FT and 1 ½ times the width of the paved area. Provide control joints perpendicular to paving edge. Avoid creating acute angles in pavement. Finishes and concrete stamping are to be approved by PWD, A&E Branch. Paints and surface stains are not acceptable.

   b. Wherever decomposed granite (DG) is used, provide a PWD, A&E Branch approved stabilizing binder fully incorporated to DG mix. Surface applications are not acceptable.

c. Where bollards are used, provide stationary and removable decorative concrete or concrete-filled steel bollards compatible with facility design.

d. Use of synthetic / artificial turf at MCB CPEN is limited to multi-purpose athletic and parade fields unless otherwise approved by PWD, A&E Branch. Synthetic turf suppliers and installers shall have a minimum of five years industry experience with a minimum of three relevant projects completed within the previous three years prior to contract award. Water reduction or visual appeal do not constitute justification for use of synthetic turf given public health and environmental concerns associated with bacteria susceptibility, heat gain, and landfill disposal.

e. Identify fragile utilities at curb intersections by providing "curb stamps."

CSI 33 00 00 UTILITIES

SECTION 1: GENERAL UTILITY REQUIREMENTS

1. **REFERENCES**: All construction shall conform to the most recent edition of the references cited as follows; where standards provide conflicting information pertaining to an issue, the most stringent information shall apply.

   a. The FEAD Pre-construction Package

2. **STATEMENT OF WORK (SOW)**: Shall include the following:

   a. **Utility Location Coordination Report**: When utilities locations are furnished; the Contractor shall submit a report outlining the activities and agencies contacted. The "DIG ALERT" inquiry identification shall be provided in the report.

      (1) No activity that could damage underground utilities may begin until the Contracting Officer approves the Utility Location Coordination Report.

      (2) Contractor shall add Utility Location Coordination Report to Submittal paragraph. It shall be annotated "G" for Government approval.

   b. **Location of Underground Facilities / Utilities**: Contractor shall provide his own facilities and utility locator services, ensure the construction site is scanned with electromagnetic or sonic equipment and mark the surface of the ground where existing underground facilities / utilities are discovered.

      (1) Verification of related work includes, but is not limited to: elevation of existing utilities, piping, and other underground obstructions not indicated or specified to be removed but indicated or discovered during scanning in locations to be traversed by piping, ducts, and other work to be installed.

      (2) Verification of elevations before installing new work closer than nearest manhole or other structure at which an adjustment in grade can be made.

      (3) Coordination after contract award and prior to commencement of any clearing and grubbing, trenching, boring, earthwork, pile driving, or other operation that may damage underground utilities.

      (4) The Contractor shall coordinate utility locating service with other applicable activities and agencies including but not limited to MCIWEST G6, Communication Infrastructure Planning at (760) 763-5263 and "DIG ALERT" at (800) 422-4133.

      (5) Review all available MCB CPEN'S facility Record Drawings for the area under construction.

         (a) These drawings are located at the RPAO.

(b) Request to review these drawings shall be submitted to the RPAO, with a copy furnished to the Contracting Officer, at least 15-working days in advance of the date when the Contractor desires to review these drawings.

c. **Broken Utilities:** Contractors shall be required to submit an Emergency Utility Repair Plan prior to performing any excavation. Emergency shall be defined as the interruption of any and / or damage of any utility service. Including but not limited to the spill, or potential spill of any fuel oil, gas, potable water, sewage effluent, raw sewage or stormwater outside of system facilities.

(1) The Emergency Utility Repair Plan shall include the following elements:

(a) Equipment list of available pumps with sizes, excavation equipment, tools, and repair materials that are available onsite.

(b) Labor force that shall be available as a minimum to respond to emergencies.

(c) Site-specific plan for locating, potholing, protecting, avoiding, and repairing any damage caused to existing, or newly installed utilities.

(d) Include the same level of detail for any subcontractors that perform work involving excavation.

(e) Include a description of any planned effort that would involve bringing in subcontractor personnel to respond to emergencies.

(f) The Contractor shall call:

1) To report damaged telecommunications call: BASE Watch Officer at (760) 763-0173.

2) To obtain approval of repair materials and methods from AC/S G6, Communication Infrastructure Planning Office, and Information Planning Manager call (760) 763-5263.

(g) The plan shall be subject to approval by the Contracting Officer.

(2) Contractor shall demonstrate in his Emergency Utility Repair Plan that they are capable of responding to utility interruptions that could be caused by their construction operations or impacts from them.

(a) Immediately upon discovery of the situation, the Contractor shall react in a way that shall ensure safety, minimize utility interruptions, releases, spills, impacts to utility customers, and potential for fines or notices of violations.

(b) In no case shall repairs be left to be resolved the next day without the approval of the Contracting Officer.

(3) The Contractor's Emergency Utility Repair Plan shall address the above items for each utility potentially impacted by construction, crossed by excavation, or known to be in the area but possessing properties that cause difficulties in identification of the exact location.

(4) In the event that a utility is broken, all repairs affected shall be the responsibility of the Contractor.

(a) The Contractor shall repair any damage to those facilities under the supervision of a Title 17 Distributor Operator, including those that are the property of a third party, resulting from failure to comply with the requirements of this contract or failure to exercise reasonable care in performing the work.

(b) If the Contractor fails or refuses to repair the damage promptly, the Contracting Officer may have the necessary work performed and charge the cost to the Contractor.

(c) Repairs to High Density Polyethylene (HDPE) piping shall use fusion welding.

(5) MCIWEST G6, IT Security Requirements: All Contractors requiring access to Restricted Areas (Level II), and or Secure Spaces shall follow and comply with bullet information in sections (1) (a) through (1) (g) above.

(6) Access shall be coordinated through MCIWEST G6 Information Technology Security Manager (ITSM) at (760) 763-1975 or Customer Service Desk at (760) 763-0173.

(7) Those Contractors that meet these regulations may obtain a DoD Common Access Card (CAC) card under the Contractor Verification System (CVS) Program. This shall eliminate the need to have the MCIWEST G6 escort those Contractors that require access to controlled spaces.

(8) Once a Contractor is properly vetted they shall receive a proper credential and receive a security brief prior to being given access to MCIWEST G6 controlled spaces. The DoD CAC shall also allow them to obtain a BASE Decal for the duration of the contract.

(9) Not all Contractors require a DoD CAC. Contractors that have completed the proper vetting process can escort the remaining Contractors who require access to controlled spaces. (Those security measures shall be covered during the security brief.)

3. **UTILITY LATERALS**: Utility laterals for buildings shall be located so each building connects to a main at a sewer manhole or a Water Resource Division (WRD) Engineering approved repair method, i.e., building laterals shall not be linked together in any fashion absent of a main line.

4. **PROHIBITED**: Utility laterals are prohibited from crossing the site to achieve the shortest distance possible. All mains shall be located in roadways unless approved by the PWD / WRD.

5. **MAINS**: All utilities located within roadways shall be considered mains and current capacity shall be maintained, e.g., when connecting to a 4" gas main in a roadway, the 4" main shall be extended to a point that is perpendicular to the building to be serviced.

6. **CAPACITY MAINTAINED**: When connecting to utility mains for service and required to extend the main, this project shall size the mains so current capacity is maintained.

7. **GOVERNING REQUIREMENTS**: For requirements governing the installation of all pipelines by third-parties within railroad right-of-way see Section CSI 01 00 00 "General Requirements", Section 5, "Work within Easements and Right-of-Ways."

8. **DEMOLITION**: When demolishing utility lines, refer to CPR CSI 02 00 00 Existing Conditions, Section 1: Demolition.

SECTION 2: UTILITY TRENCH DETAIL

1. **REFERENCES**: All construction shall be placed in accordance with the most recent edition of Caltrans Encroachment Permits Manual and conform to the most recent edition of the following SDRS; where standards provide conflicting information pertaining to an issue, the most stringent information shall apply, as applicable.

   a. San Diego Regional Standard Drawings (SDRSD), "Trench Resurfacing A/C Streets"

   b. SDRSD, Section G-24A,"Trench Resurfacing Notes and Details"

   c. SDRSD, Section G-24B," "Trench Resurfacing Portland Cement Concrete (PCC) Surface Streets"

   d. SDRSD, Section G-25,"Trench Resurfacing PCC Surfaced Streets"

   e. SDRSD, Section M-15, "Joint Trench Location"

   f. Caltrans Encroachment Permits Manual, CH 6, Section 602.1, "Temporary Steel Plate Bridging – with a Non-Skid Surface" Note: Where the statement "As required by the District" is used it shall mean MCB CPEN.

2. **UTILITY TRENCHES**: Shall conform to SDRSD as applicable. Combination of wet and dry utilities in a common trench is only allowed with prior approval by MCB CPEN, PWD, A&E Branch, Utilities Projects Team and shall not form the basis of a contractor proposal. Combination will only be considered or approved on a case-by-case basis.

3. **UTILITY TRENCH WORK**: Shall be a two-step process:

   a. First, the contractor shall saw cut A/C pavement, excavate, install the pipe, and backfill while fulfilling other necessary procedures as specified on the drawings.

   b. Second, the contractor shall create a "T" section by cutting the trench edges to the depth of the existing AC and to a width as specified on the drawings. If the existing AC depth is greater than 8" thick, the contractor shall be allowed to grind to 4" depth and patch, keeping the minimum width of the trench edges.

4. **TEMPORARY STEEL PLATES:** shall be placed in roadways in accordance with Section 602.1, "Temporary Steel Plate Bridging with a Non-Skid Surface" of the most current Caltrans Encroachment Permits Manual. Plates shall be installed per Method 1 for all areas with posted speeds of 35 MPH or greater.

5. **NOTES**:

   a. All communication infrastructures shall be concrete encased and separated from other utilities by a minimum of 6".

b. Effect of possible pipe migration due to subsurface water table movement shall be considered in design for underground utilities.

c. Please see Section CSI 01 00 00 “General Requirements”, Section 2, “MCB CPREN Traffic Control Procedures” for additional information.

SECTION 3: UTILITY METERS

1. **REFERENCES**: MCB CPEN utility meters shall conform to the most recent edition of the following standards; where standards provide conflicting information pertaining to an issue, the most stringent information shall apply.

   a. SDG&E, "Electric Service Standards and Guide Manual, Metering Standards"

   b. NEC

   c. UFC

2. MCB CPEN **REQUIREMENTS**: All new meters aboard MCB CPEN shall be compatible, field tested and verified with the BASE Itron wireless RF meter reading system. The system is Itron MV-RS. The meters shall be centrally located if feasible. This is handled on a project by project basis.

3. **METER REQUIREMENTS**: Are as follows.

   a. Electric meters shall be Itron Centron Poly digital meters with ERT / RF output. "They shall be able to read demand and Time-of-Use (TOU)." Transformer-rated meters shall have a test switch installed in the switchgear or metering enclosure. The meter shall be mounted in accordance with SDGE Standards. Test switch wiring and color codes shall match SDG&E standards. The only approved forms are 2S, 5S, 9S & 16s. All electric meters shall be programmed at the factory with CPEN customer requirements. The current transformer ratio shall be written on the face of the meter in the space provide & on a data plate mounted on the switchgear or metering enclosure. The current transformers will be utility grade & have a minimum RF of 3.

      (1) Transformer-rated Meters: shall have a test switch installed in the switchgear or metering enclosure. The meter shall be mounted in accordance with SDG&E Standards. Test switch wiring and color codes shall match SDG&E standards. The meter shall have a test switch installed in the switchgear or metering cabinet. The only approved forms are 2S, 5S, 9S and 16S.

      (2) Poly-phase Electric Meters installed aboard MCB CPEN: shall meet the technical specifications in order to ensure compatibility with the BASE’s Meter Reading System and data gathering requirements.

4. **GAS METERS**: shall be the American brand or equal with an Itron ERT / RF compatible model 100G with data logging or better and installed per manufacturer’s recommendation. The meter shall be sized for the appropriate load of the building(s) and or cantonment area. The meter be installed by the Contractor and inspected by MCB CPEN gas distribution personnel after installation.

5. **WATER METERS**: shall be Neptune or equal with an Itron ERT / RF compatible model 100W series end point. The meter units shall be K gallons. This gallon unit measure will be displayed on the meter under the pit lid, or on a building wall where the meter is located. This shall be decided on a project-by-project basis. The meter shall be sized for the appropriate load of the building. The meter shall be installed by the Contractor and inspected by the FMD / Energy Office personnel after installation.

6. **NOTE**: All water and gas meters except for special conditions, shall be aboveground and protected from physical damage. Large master meters shall also be fenced with gravel or concrete pads. Working clearance shall be approved by MCB CPEN FMD personnel.

7. **MULTI-TENANT FACILITES**: When a building is shared by multiple lease tenants, provide a separate meter for each lease tenant space.

8. **LOCAL VENDORS include**:

   a. Electric Meters:

      (1) McAvoy & Markham Engineering & Sales Co. (949) 727-3966, or approved equal

   b. Gas Meters:

      (1) US Metering & Technology (888) 651-1130

      (2) Submeter Solutions, Inc. (888) 646-3837

      (3) Measurement Control Systems, Inc. (800) 826-1682

   c. Water Meters:

      (1) Equarious Waterworks, (424) 271-2898

      (2) Todd Piping Supply, (310) 349-5100

      (3) Ferguson, (619) 515-0300

SECTION 4: NATURAL GAS REQUIREMENTS

1. **REFERENCES**: All natural gas system construction shall conform to the most recent edition of the following standards; where standards provide conflicting information pertaining to an issue, the most stringent information shall apply.

   a. NFPA 54, “National Fuel Gas Code”

   b. UFC 3-430-09, “The WBDG: Exterior Mechanical Utility Distribution”

   c. 49 CFR Part 192, “Transportation of Natural and Other Gas for Pipeline: Minimum Federal Safety Standards”

d. 49 CFR § 192.629, "Transportation of Natural and Other Gas By Pipeline: Purging of Pipelines"

e. International Fuel Gas Code (IFGC)

f. ASME, "Purging of Pipelines and Mains"

g. UFGS

h. SDG&E, "Electric Service Standards and Guide Manual, Specifications and Standard Construction Details"

i. ASTM

j. American Public Works Association (APWA) Uniform Color Code

2. **STANDARD DESIGN AND CONSTRUCTION DETAILS**: In addition to the preceding codes, the Contractor shall ensure the following items are adhered to during design and construction.

a. All natural gas piping layouts, SOV and excess flow valve (EFV) locations, reducer stations, (Figure 59) , riser assemblies (Figure 60) and master meter station details (if part of work), shall be submitted as part of the construction plan set.

b. Prior to construction of a natural gas utility connection, Contractor shall notify FMD natural gas technicians to inspect and approve the pre-connection, installation, and post connection, in order to ensure compliance with standards set forth within the requirements. Submittal shall include drawings detailing the location, method of connection, and load calculations proving the new line shall be able to support the new and existing buildings. Personnel performing fusion welding shall submit an up-to-date polyethylene (PE) fusion card for FMD review prior to performing fusion work.

c. All gas pipeline products shall be bimodal HDPE 4710 for mains and high-pressure service and bimodal medium-density polyethylene (MDPE) 2708 for distribution and low pressure service or approved equal. Gas piping shall be minimum SDR-11. .

d. All pipe shall be buried a minimum of 36" below finished grade or as recommended by the manufacturer, whichever is greater.

e. Tape an insulated yellow #10 American Wire Gauge (AWG) PE coated tracer wire to the top of the pipe (NOT spiral wrapped) and terminated a minimum of 12" above grade at vertical risers. Tracer wire connections shall be water tight.

f. Buried piping shall include magnetic warning tape installed 12" below finished grade. Tape shall be 3" wide and have the words "Caution buried gas line below".

g. All coated anode-less vertical risers and aboveground pipe shall be black steel, minimum schedule 40 in non-coastal areas and galvanized in coastal areas. Pipes 2" and smaller shall have threaded ends. Pipe greater than 2" shall be butt welded in accordance with ASME standards. Provide galvanized piping on regulator / meter assemblies in coastal areas.

h. All aboveground pipes and components, not factory primed and painted, shall be cleaned to Society of Protective Coatings (SSPC) (formerly Steel Structures Painting Council) 2 or 3, primed per Master Painters Institute (MPI) 23 then painted using an intermediate and top coat meeting MPI 94. The paint shall be identifying natural gas color yellow per the APWA uniform color code. (formerly Steel Structures Painting Council)

i. All aboveground piping shall have proper labeling per ASME, including directional labeling.

j. Only pre-engineered traffic rated valve canister assemblies for valves shall be accepted by PWO / FEAD. All EFV box covers shall be molded with the letters "EFV" in the center of the cover and all SOV box covers shall be molded with the word "GAS" in the center of the cover. The top of the valve box cover shall be flush with grade and easily accessible. Top covers shall be painted with the natural gas identifying color yellow per APWA uniform color code. Valve boxes in unpaved areas shall have a 12"x12"x4" reinforced concrete pad around them

k. All below-ground fittings shall be hot-fused, no flanges or threaded fittings are allowed. For above-ground fittings, the contractor shall use soft-set type natural gas thread sealant (pipe dope), not tape. Threaded bushings shall not be used.

l. Before purging a natural gas line, Contractor shall provide Activity Hazards Assessments (AHA) and site specific purge plan to the FEAD CM / ET for the project, or Authority having Jurisdiction (AHJ) for approval. Contractor performing the purging shall fulfill the certification requirements of the AHJ and purging shall only be performed by a qualified agency as per NFPA 54-17. All purging shall follow CFR 49 Part 192 and ASME Purging of Pipelines and Mains. All abandoned lines shall be purged with nitrogen and be checked for percentage gas with a meter at purge point.

m. New gas lines located in vegetated areas, away from paved areas shall have pipeline markers indicating presence of the lines. Contractor shall place markers at or near all taps, tees, and caps, and so as to ensure continuous line of sight is established at intervals not to exceed 500' along natural gas lines.

n. A gas line connection shall include an HDPE SOV and an EFV. SOV shall be placed upstream of the EFV and both shall be installed close to the point of connection, approximately 18" from the main, and 18" between the SOV and EFV (if in accessible locations), allowing maintenance and maximum protection of lateral. All valves shall have a 2" operating head minimum.

o. All new gas lines shall have a SOV installed at the point of connection at the gas supply.

p. Whenever a factory-built fireplace or gas appurtenance is installed the associated gas "shut-off" valve shall not be concealed and shall be accessible nearby. Secondary means of shutting off the gas supply shall be provided on exterior of facility.

q. Where an outdoor barbeque (BBQ) is installed, all gas connections shall be accessible and the gas flex and service valve shall not be concealed. An emergency SOV shall be installed near the

adjacent building. The installation of a service gas supply pressure regulator beneath the BBQ compartments or BBQ counter is prohibited. This does not include the pressure regulator supplied by the manufacturer of the BBQ unit.

r. Where a union is used on a gas line, the SOV shall be upstream of the union at all times.

s. All components on the natural gas system shall be suitable for natural gas use and pressure service.

t. Stub-out's shall include warning tape located several feet on either side in order to prevent hitting the stub-out during parallel trenching.

u. Gas lines and appurtenances shall be a minimum of 12" from any other utility or structure.

v. Provide aboveground piping and appurtenances with support in accordance with applicable Manufacturers Standardization Society (MSS) and ANSI standards at a minimum, and with seismic restraints in accordance with the SMACNA Seismic Restraint Manual for Zone 4. Riser assemblies shall be afforded access for maintainability and protected from traffic and other hazards.

w. Transitional flanges shall be a minimum of 4" above grade. Pipe risers shall be primed and wrapped with grease / wax tape, bubble wrap and 20 mm gas tape, and sleeved. Piping into building shall also be sleeved and the annular space properly filled

3. **PRESSSURE REDUCER STATION / MASTER METER STATION**: Reduces pressure and / or meters gas flow for whole or part of a cantonment area. Station shall include the following components and adhere to the following requirements and detail:

a. Primary Reducing Station line and secondary bypass Reducing Station line allowing maintenance to the station without service interruption to the area.
b. Two reducing valves in series on both the primary and bypass line.

c. The reducing valves shall be sized to accommodate the entire downstream load as well as a percentage to accommodate for future loads.

d. NOTE: master meter stations shall have the same requirements as a reducer station, except they don't require reducing valves.

e. For protection, install an 8' tall fence with a barbed wire top guard around the reducer station. The fence posts shall be in the concrete slab with a sleeve. Fence shall be grounded and bonded and shall have a lockable double swing gate entrance. Fence shall be installed in accordance with UFC 4-022-03. Metal beam guard railing around station with flared end, steel posts, notched steel blocks, and guard rail reflectors.

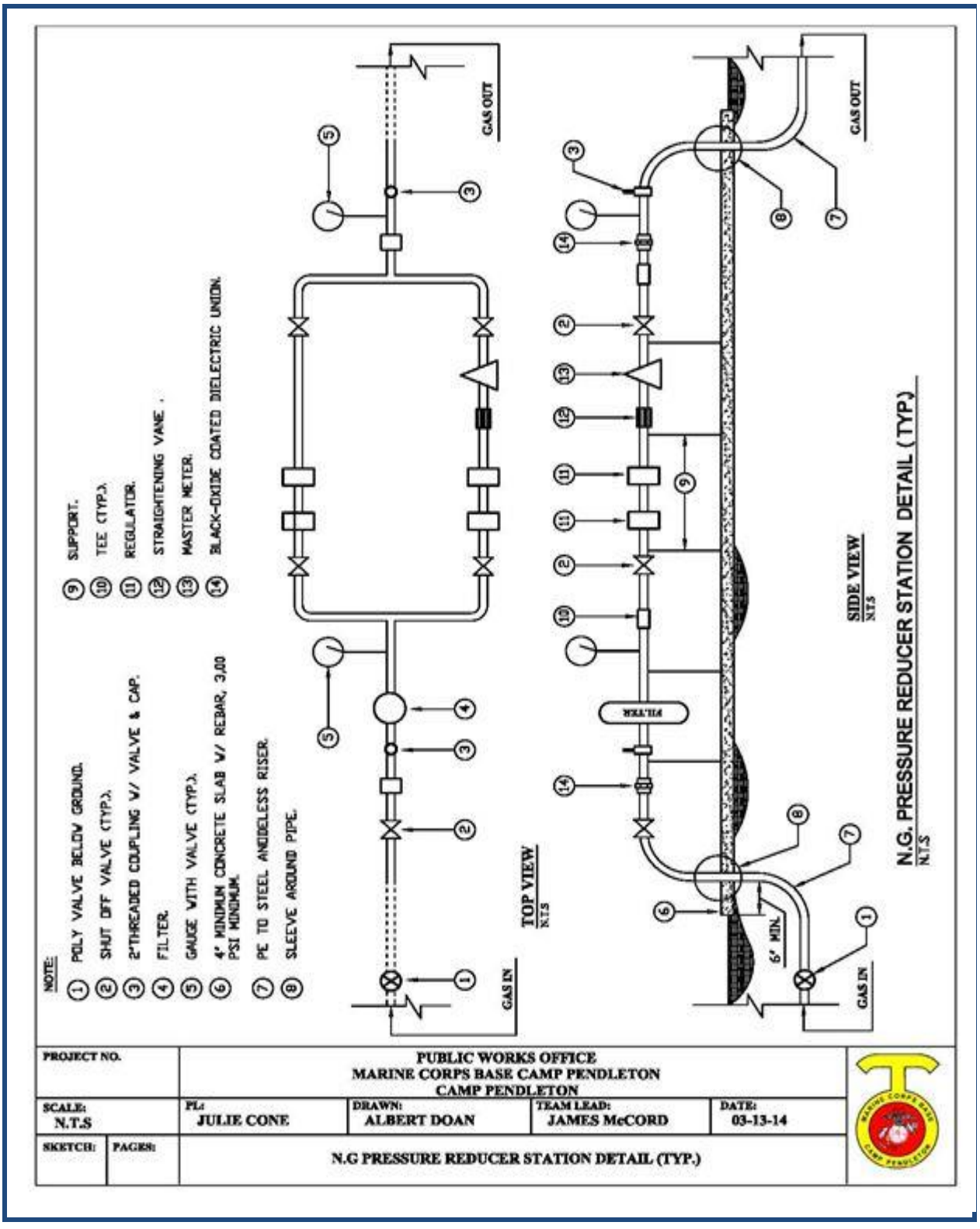


Figure 59: Natural Gas Pressure Reducer Station Detail (TYP.)

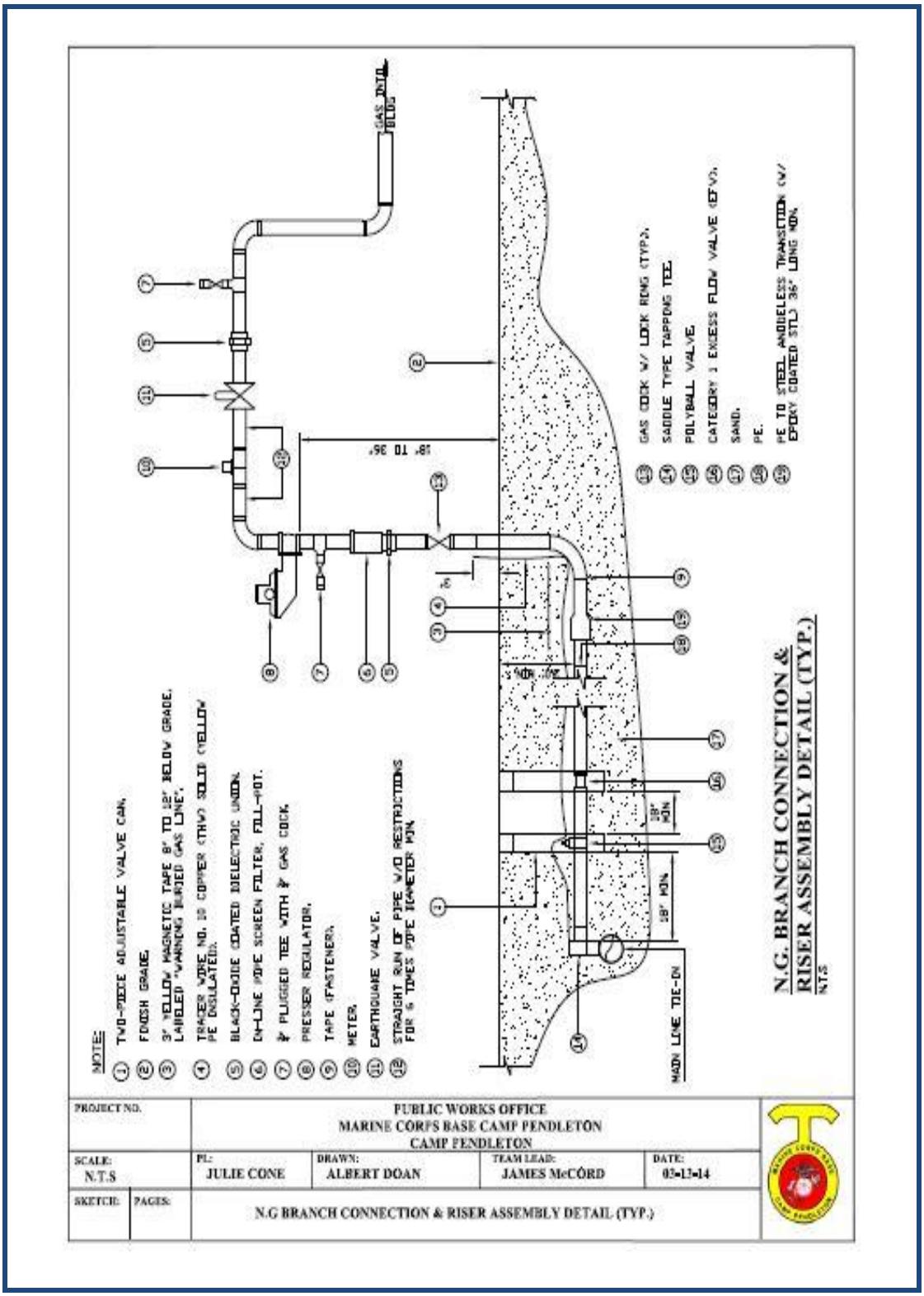


Figure 60: Natural Gas Connection and Riser Assembly Detail (TYP.)

SECTION 5: POTABLE WATER REQUIREMENTS

1. **REFERENCES**: All water works construction shall conform to the most recent edition of CPR and Safe Drinking Water Act (SDWA) requirements to the most recent UFC and CFR requirements. In case of a conflict of requirements, the most stringent shall govern. If the standard sought does not appear in these requirements, then the latest edition of the following standards shall be utilized in the order listed:

   a. SDWA Requirements

   b. Statewide Water Resources Control Board, Division of Drinking Water (SWRCB, DDW)

   c. Title 17 CCR, Division 1, Chapter 5, Group 4

   d. Title 22 CCR, Division 4

   e. AWWA Standards

   f. National Sanitation Foundation (NSF), Standard 61

   g. SDRSD, Book W

   h. City of Oceanside, California, "Water, Sewer and Reclaimed Water Design and Construction Manual"

   i. Orange County Public Works (OCPW) Standard Plans

   j. Standard Specifications for Public Works Construction (SSPWC) or Greenbook Construction Standards

   k. MCO 5090.2A, "Environmental Compliance and Protection Manual"

   l. NAVMED P-5010-5, CH 5, "Manual of Naval Preventive Medicine: Water Supply Ashore"

   m. UFC 4-022-03, "The WBDG: Security Fences and Gates"

2. **POTABLE WATER GENERAL REQUIREMENTS**:

   a. Prior to any construction of a utility connection, all construction plans for a water system service connection shall be submitted to the PWD Utilities Projects Team and AC/S G-F, WRD for approval.

   b. Well, Booster Pump Station, and reservoir alarms and control signals shall be sent to the Advanced Water Treatment (AWT). The controls / alarms shall be integrated into the AWT system including modification to the screens.

3. **WATER PIPE MATERIAL**:

   a. The following pipe types require approval by WRD Engineering, see Figure 38:

(1) Ten inch diameter or larger AWWA C200 Steel Pipe with AWWA C205 Cement-Mortar Lining and Coating (CMLC).

(2) Ten inch diameter or larger AWWA C151 Ductile Iron (DI) Pipe with AWWA C104 Cement-Mortar Lining and AWWA C105 Polyethylene Encasement.

b. Lateral Lines: For lateral lines 4" diameter or less, material shall be PVC schedule 80 or approved equal. For lateral lines greater than 4" diameter, material shall be PVC per AWWA C- 900 and C-905 or approved equal. The limits of the lateral lines are from the connection at the distribution line to a stub-out 5' from the building. Minimum 10' copper (type K) from the end of the lateral to a connection to the interior of the building is required. The interior plumbing shall be copper (type K).

c. Irrigation Lines: Material for reclaimed water shall be Schedule 40/80 purple PVC per pressure requirement.

4. **NEW CONNECTIONS TO THE EXISTING WATER SYSTEM**:

a. Connections to existing pipelines shall be made with the installation of a Tee with three-valve cluster. The design shall be approved in advance by PWD Utilities Projects Team or AC/S G-F, WRD prior to performing the work. Upon completion, notification shall be made to AC/S G-F, WRD and their approval shall be received prior to placing the new connection in service.

b. In certain exceptional instances, and only where approved by PWD Utilities Projects Team, wet (hot) tapping may be allowed as follows: A wet tap design and plan of execution shall be submitted to PWD Utilities Projects Team prior to performing the work.

c. New connections to existing lines solely for the purpose of a hydrant or blow-off valve may be performed with a single valve to isolate the hydrant after obtaining approval from the PWD Utilities Projects Team or AC/S G-F, WRD.

5. **WATER SYSTEM STANDARD DETAILS**:

a. Pressure Regulating Valve (PRV) stations shall be aboveground, on concrete pads with fence. They shall have OS and Y valves installed as isolation valves. The pressure sustaining / regulating valves shall be equipped with stem indicating assemblies and pressure gauges, indicating upstream and downstream pressures, see Figure 55. Fence shall be installed in accordance with UFC 4-022-03.

b. Back flow preventers, double-check detection assembly (DCDA) and reduced pressure principal assembly (RPPA's) are per San Diego County Requirements but with an isolation valve.

(1) Access and clearance shall include a minimum of 1' between the lowest portion of the assembly and grade, floor, or platform and a 2' clearance around the entire backflow device for maintenance access. Installations elevated more than 5' above floor or grade shall be provided with a platform capable of supporting maintenance personnel.

(2) Whenever a backflow preventer is installed the nominal diameter of the line shall remain the same through the assembly.

c. Backflow preventer concrete pad: Backflow devices larger than 2" shall have a concrete pad installed. The concrete pad shall be 6" thick concrete with wire mesh and shall be sized so that there is a minimum of 2 horizontal feet (FT) from the edge of the equipment (farthest point from center line) to the edge of the concrete pad. The pipe risers shall be encased in a collar and the collar shall be filled on the inside with sand or a comparable material

d. All backflow devices shall have a below-ground isolation valve adjacent to the upstream side of the backflow preventer riser. The backflow device shall have above-ground isolation valves upstream and downstream to facility removal and replacement.

e. Minimum Compacted Depth of Cover Required: 36" for 12" mains and smaller: Depths less than 36" requirement requires encasement and PWD Utilities Projects Team approval.

6. **WATER SERVICE LINES**: All water service lines shall be cut and capped by installation of a threaded plug on saddles, or installation of a blind flange device on the exterior of installed gate valves. The capped device shall be permanently restrained by installation of a thrust block encapsulating the restraining device, as depicted in the San Diego Green Book. Concrete Thrust and Anchor Block Installations Drawing Number WT-01 Sheet 1 of 3 End Cap figure. Also refer to "Potable Water Lateral Branch Demolition Guidelines below:

a. Lead abatement and remediation, involving cast iron lines, shall be accomplished per CCR. No cast iron lines shall be installed.

b. See Figure 6, "Potable Water Lateral Branch Demolition."

7. **ABOVEGROUND WATER SUPPLY PIPING**:

a. Exposed or surface mounted supply piping shall be configured and installed to allow for maintenance repairs to piping and pipe fittings and at no time shall supply piping be embedded in block walls or concrete. The only exception is when supply piping penetrates the building, in which case the pipe shall penetrate the building or wall completely.

b. If a copper pipe or tubing is connected to PVC piping, the following adapter configuration shall be used:

(1) If the water flows from the copper pipe towards the PVC pipe, a threaded copper male adapter shall be used to connect to a threaded PVC female adapter.

(2) If the water flows from the PVC pipe to the copper pipe, a threaded PVC male adapter shall be used to connect to a threaded copper female adapter.

(3) All copper piping shall be type "K".

c. All exposed steel piping that is used for water fire demand, including the backflow device, shall be primed and painted in the industry standard color "red" to signify fire systems.

d. All pipe flanges shall have bolts and nuts torqued to manufactures' specification, have full engagement with a minimum of 2-3 threads past the face of the nut after being torqued and a maximum bolt length of 1" of exposed bolt threads past the nut.

8. **WATER SOFTENER**:

a. All commercial kitchens shall be plumbed for water softener equipment.

b. Number of tanks and location shall be coordinated with softener provider

c. The use of salt self-regenerating exchange processes is not allowed.

d. Water softener piping shall have a separate meter (digital read-out meter to track soft water usage) and shall only be connected to food service equipment.

9. **WATER DISINFECTION**:

a. For new or repaired water mains, disinfection shall be in compliance with AWWA C651-05, Standard for Disinfecting Water Mains. Contractor personnel performing disinfection and flushing procedures shall be qualified and familiar with applicable AWWA Standards.

b. New and repaired water lines shall be tested and certified in accordance with applicable codes and standards. At a minimum, samples shall be taken by a State certified laboratory and tested for Total Coliform, Escherichia Coli (E. Coli), Heterotrophic Plate Count (HPC), and free Chlorine Residual. Certified test results shall be returned to the Government for review and approval by the WRD Chemist prior to lines being returned to service. Test results shall include sample location and project number. Only certified and authorized AC/S G-F, WRD Operators may operate valves to return new or repaired lines to service.

c. All permanent chlorine delivery piping shall utilize one-quarter turn sweeps in lieu of 90 degree elbows, and shall be constructed of Schedule 80 C-PVC or equal unless approved in writing in advance by the Government.

d. When the Contractor performs repairs or modifications to a reservoir that requires the reservoir to be emptied, the Contractor shall be responsible for the final disinfection. This shall be accomplished under the supervision of a State certified operator (disinfection). The Contractor shall be responsible for final disinfection immediately prior to the refilling of the reservoir. If the Contractor performs a disinfection prior to the reservoir being refilled and additional work is performed requiring the reservoir to be disinfected again, it shall be the responsibility of the Contractor.

10. **VALVES**:

a. Assume lead joints shall be present on cast iron water lines. The Contractor shall be responsible for replacement and disposal of lead joints found within the project footprint. Disposal of any lead based material shall be off Base as required by regulations.

b. Butterfly and rising stem valves are for above grade installation only.

c. Only single-disc, non-rising stem, resilient seat gate valves shall be installed into new or existing below grade water lines. Double disc valves are not allowed. "Single-disc" requirements need to include:

(1) The wedge shall be of cast iron completely encapsulated with rubber.

(2) The sealing rubber shall be permanently bonded to the cast iron wedge.

(3) ASTM test for rubber metal bond ASTM D429.

(4) Valves shall be supplied with O-ring seal at all joints

(5) The stem nut shall be independent of the wedge and shall be made of solid bronze; there shall be a smooth, unobstructed waterway free of all pockets, cavities and depressions in the seat area.

(6) The body and bonnet shall be coated with fusion bonded epoxy both interior and exterior, complying with AWWA C550 and be NSF 61 approved.

(7) Each valve shall have the maker's name, pressure rating and year in which manufactured cast on the body and electro-plated nuts and bolts.

d. All water valve boxes shall be of the screw type, minimum 5¼'' shaft diameter, cast iron construction, consist of a base section, middle section (if required) and top section. Plastic valve covers are not acceptable. Water line valves shall be molded with the word "WATER" in the center and painted blue. Irrigation valves shall be molded with the word "IRRIGATION" in the center. Raw water line valves shall be molded with the words "RAW WATER" in the center painted red.

e. Ensure valve cans are protected in place during paving projects and all lids are freely removable after paving or sealing operations.

f. The Contractor shall install approved hot and cold water isolation ball valves for each floor or wing in large multi-story buildings to minimize outage interruptions during repairs. SOV's shall be easily accessible and shall not be installed in living spaces or offices.

11. **WELL CONSTRUCTION**:

a. Wells shall be constructed as per the California Department of Water Resources (DWR) Southern District. All appurtenances of the well shall be attached with structural shaller bolts, washers, and nuts; torque to standards, witnessed and torque striped, with at least three threads exposed beyond the nut. Columns and casing shall be Type 304 Passivated Stainless Steel with Type 316 Passivated Stainless Steel threaded locking collars and screens.

b. All well installations shall be designed and constructed with appropriate splash block and energy dissipators.

c. Exceptions to the above standards are as follows:

(1) NOTE: All observation, turn-on / shut down shall be performed by AC/S G-F, WRD Operators or properly licensed Chief Operator.

(2) 304 SS Louvered Screens

(3) 304 SS Well Casings

(4) 304 SS Pump Columns (with threaded connector couplings)

(5) 316 SS Pump Shafts

(6) 304 SS Sounding Tubes (with electronic transducer installed, 3" diameter)

(7) Two inch diameter port capped or plugged at top of well casing aligned along inside face of well casing for use in placing well depth tape measurement tape device; placed so that the drop is straight down into the casing between pump column and the well casing without any obstruction.

(8) All controls, meters and gauges shall be set at a height to ensure accessibility by persons of average height.

(9) All doors to have "Hold-Open" door closers installed.

(10) All doors and frames shall be aluminum with fluor polymer factory coated finish color as per the BEAP.

(11) All aboveground piping shall be mechanical fitting DI, including pump control and high pressure relief discharge lines.

(12) Surge anticipators are not to be installed.

(13) All wells shall be equipped with emergency low water level shutdown with a soft alarm to AWT (Building 2470). A local bypass to the emergency shutdown shall also be installed at the well head to override a shutdown shall it be necessary by AC/S G-F, WRD Operator.

(14) Glass block windows type shall be of pre-manufactured unit prepared in an aluminum frame.

(15) Surface Annular Seal (Sanitary seal required by the California Department of Public Health (CDPH). The space between the borehole wall and the well casing shall be sealed to the depth or to a greater depth than that required by the California DWR Bulletin 74-81 "Water Well Standards, State of California" and its supplement Bulletin 74-90. Seal material and placement of the seal material shall also conform to the California DWR Bulletin 74-81 "Water Well Standards, State of California" and its supplement Bulletin 74-90.

(16) All controls, gauges, meters, etc., shall be ergonomically placed or packaged so they all are in easy reach and vision levels without stooping or requiring steps or ladders to view in the proper perspective.

(17) Sampling devices shall be constructed of "Lead Free" brass connections, with quarter-turn ball valves, and Stainless Steel 180° gooseneck downturn tubing.

12. **FIRE HYDRANTS**: For additional information on Fire hydrants, reference "Water Loop Requirements" and "New Connections to the Existing Water System."

a. All fire hydrants shall comply with the following regardless of whether the facility is sprinklered or unsprinklered.

b. The Contractor shall be responsible for obtaining or performing fire flow tests. All hydrant flow tests require advanced notification to WRD. Fire flow tests shall be recorded on the Hydrant Flow Test Report and submitted to FEAD, with copies to WRD, BASE Fire Department, and PWD A&E Branch.

(1) The hydrant flow test procedures and report are at the end of the Potable Water Requirements section under "attachments", see Figure 54.

(2) All new or existing facility projects shall have fire hydrants capable of providing a minimum flow of 1,250 gpm at 20 psi residual for two hours. In the event the existing water distribution system is unable to accommodate these pressures or flows, the Contractor shall provide an alternate solution incorporating a fire pump and / or water storage tanks for FEAD NAVFAC SW, DM approval.

c. A facility being served by a single fire hydrant may be served by a single lateral on an un-looped system subject to FEAD approval. An Automatic Flush valve shall be installed. This lateral shall have a minimum inside diameter (I.D.) of 8". If multiple hydrants are required along a single lateral, they shall be in a loop, per NAVMED P-5010-5, CH 5, "Manual of Naval Preventive Medicine: Water Supply Ashore"

d. A facility or group of facilities requiring more than one fire hydrant shall be installed on a looped system. The loop and the laterals serving the fire hydrants shall have a minimum I.D. of 8".

e. Fire Hydrant configuration shall follow, in priority:

(1) Priority 1 - CPR

(2) Priority 2 - UFC 3-600-01, Section 3-7.3.2, "The WBDG: Fire Protection Engineering for Facilities, Installation Requirements"

f. All parts of the building exterior shall be within 106m (350') of a hydrant with consideration given to accessibility and obstructions (UFC 3-600-01). The following requirements are in addition to what is in the referenced UFC section:

(1) UFC 3-600-01 Section 3-7.3.2 "The WBDG: Installation Requirements": Hydrant shall have a buried watch valve to isolate the hydrant if damaged and the lower section of the hydrant flange or breakaway spool shall be a minimum of 2"-4" above finished grade (AFG) or concrete pad.

(2) UFC 3-600-01, Section 3-7.3.4 "The WBDG: Hydrant Protection": Hydrants installed within 3' of the curb shall be protected by bollards.

g. Hydrants shall be California Wet Barrel type Hydrants with one 4" (100mm) suction and two 2.5" connections minimum. All fire hydrant supply ports shall contain (2 each) 2.5" and (1 each) 4" hose connections.

h. Hydrants shall be located to minimize likelihood of discharge to storm drains during flow testing and routine maintenance, and to maximize infiltration in vegetated areas, where possible.

i. All bolts at base of hydrants are to be installed from the bottom up. These are hollow break-away bolts and the hollow threaded end shall be facing up. Fill hollow with silicone to prevent water / rust.

13. **MCB CPEN HYDRANT FLOW TEST PROCEDURES**:

a. Due to insufficient data collection of hydrant flow test data aboard MCB CPEN, the following Hydrant Flow Testing Procedures have been developed in order to accurately capture and compile the data. The data secured during the testing of hydrants and recorded on a standard form and compiled for future use shall be extremely valuable for the analysis of the current Basewide Fire protection and water distribution system capabilities. With this in mind, it is required that the following procedures be utilized for every hydrant flow test aboard MCB CPEN.

b. Erosion and BMP measures shall be set in place prior to flow test to meet State of California National Pollutant Discharge Elimination System (NPDES) permit covering potable water discharge.

c. For Contractors who need to perform hydrant flow tests aboard MCB CPEN for a project, the FEAD Engineering Technician (ET) shall use the following procedures to coordinate the testing: Following a request from the Contractor for a hydrant flow test, the FEAD shall coordinate the fire flow test with the following departments:

(1) The FEAD shall contact the WRD to observe and operate the hydrant valve (opening and closing to prevent water hammering of the system) and to determine the status of lines in the vicinity (repairs, out of service, excessive load, supply closed, etc.), and to advise the time and location of hydrant testing.

(2) The FEAD shall also contact the AC/S SES, Fire Department, Deputy Fire Chief for Prevention to advise the time and location of hydrant testing if the Fire Department wants to coordinate with area officials. The Fire Prevention Inspector, may or may not, decide to be present during the testing.

(3) The FEAD shall provide the Contractor with the Hydrant Flow Test Report Form prior to the hydrant flow testing; and shall be completed by the Contractor during the test, see Figure 54.

(4) The FEAD shall obtain a completed copy of the Hydrant Flow Test Report Form and submit via hard copy or electronically within 5-days to the PWD, A&E Branch, Utilities Projects Team.

d. NOTE: Contractors shall submit a copy of The Hydrant Flow Test Report to the FEAD CM / ET for the project. FEAD shall cc: MCB CPEN Fire Department, AC/S G-F, WRD, and PWD, A&E Branch, Utilities Projects Team.

14. **WATER LOOP REQUIREMENTS**:

a. Requires potable and fire suppression water systems to be designed in a Loop, i.e., continuous circulation pattern per MCO 5090.2A and NAVMED P-5010-5, CH 5, "Manual of Naval

Preventive Medicine: Water Supply Ashore." This is to minimize any section of the water supply from becoming septic. The following requirements (b and c), are included as further direction to designers and constructors of new or reconditioned water services aboard MCB CPEN.

b. Water service for new construction shall be provided by a looped system. Dead end water lateral lines (other than building connections and fire hydrants) require the approval of PWD WRD in the design phase. All dead ends shall be fitted with appropriate automatic flushers. Water loop systems shall be connected to two separate water supply mains. This is defined as two separate sources of supply where if one connection is shut down, there is a second water supply to the project site. In the case where the secondary water main is more than 1,000' from the facility, the Contractor shall be allowed to connect to the same water main. However, in this event, the two points of connection shall be a minimum of 100' apart, with a tee and three-valve cluster at each point of connection.

c. Water loops shall be designed to fall within the footprint of the approved Environmental Boundary (EA, CATEX, etc.). If a water loop cannot be installed within this boundary the Contractor shall contact PWD WRD before beginning their design. This shall include all ground disturbances.

15. **POTABLE WATER DISCHARGE REQUIREMENTS**: Non-recurring discharges of raw, potable, or super-chlorinated (> 4.0 mg/L) water in excess of 50 kgal to Waters of the US will require submission and approval of a Discharge Request Form. Erosion and BMP measures shall be set in place prior to discharge. For form or further information contact WRD at (760) 763-7220.

Hydrant Flow Test Report

Location Map:

Include a sketch of the location of the hydrants including hydrant identifications, and streets or intersections on the back of this form.

To the extent possible, show connecting lines, line sizes, and distance to next cross-connected line, valves, and hydrant branch size. Indicate North.

Show flowing hydrants – Label A1, A2, A3, A4. Show location of static and residual hydrant – Label B.

Indicate B: Hydrant Sprinkler Other (identify)

Project number / title _____

Location _____

Test made by _____

Date / Time _____

Representative of _____

Specify witness _____

State purpose of test _____

If pumps affect test, indicate pumps operating

Flow hydrants _____ A_1 _____ A_2 _____ A_3 _____ A_4

Size nozzle

Pitot reading

Discharge coefficient Total gpm

GPM

Static B _____ psi Residual B _____ psi

Projected results @20 psi Residual _____ gpm; or @ _____ psi Residual _____ gpm

Remarks:

Figure 54: Hydrant Flow Test Report

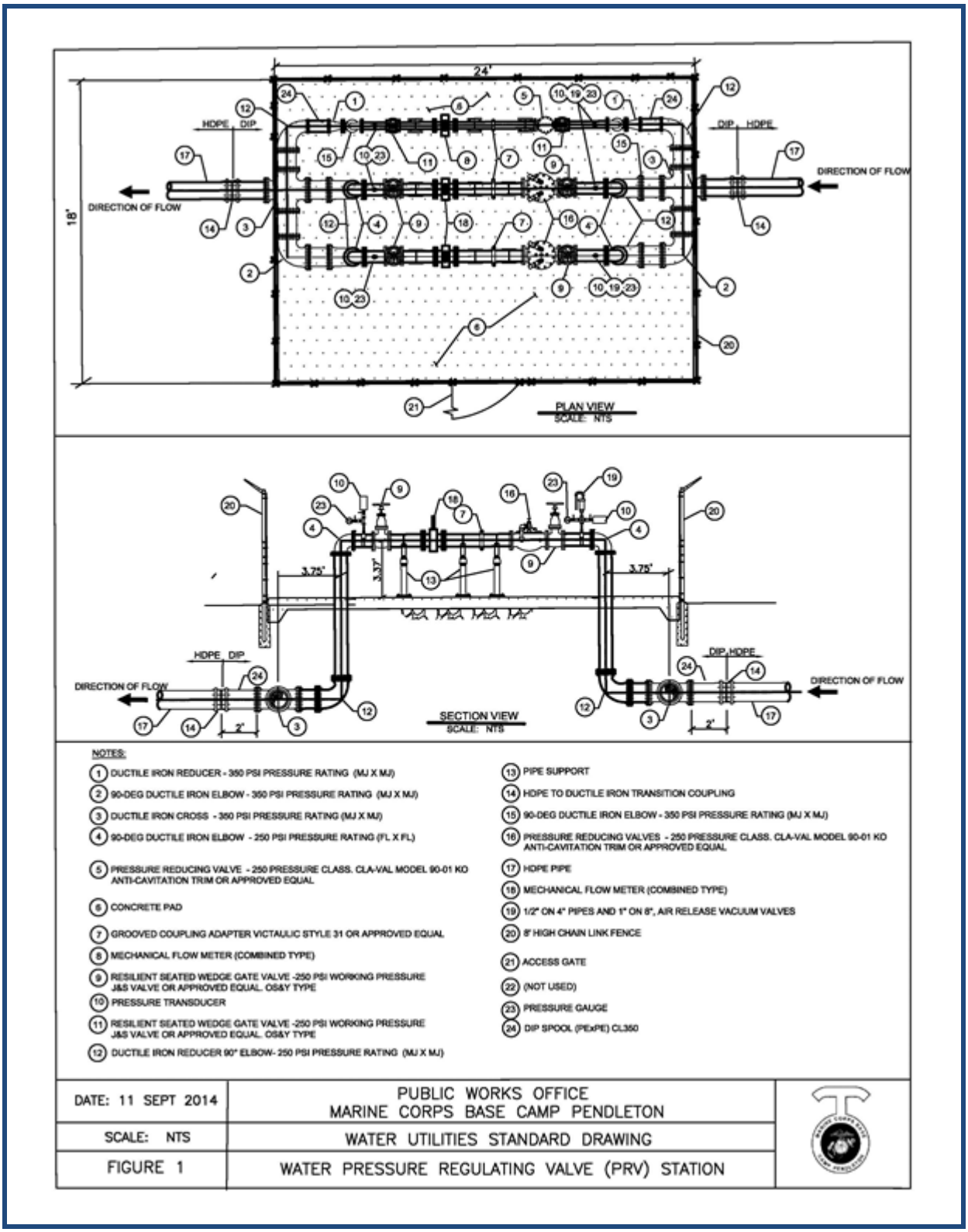


Figure 55: Water PRV Station

SECTION 6: WASTEWATER REQUIREMENTS

1. **REFERENCES**: All sewer system construction shall conform to the most recent CPR, UFC and CFR requirements. If the standard sought does not appear in these requirements, then the latest edition of the following standards shall be utilized in the order listed:

   a. SWRCB

   b. AWWA Standards

   c. City of Oceanside, California, "Water, Sewer and Reclaimed Water Design and Construction Manual"

   d. SDRSD, Book S

   e. SSPWC or Greenbook Construction Standards

   f. CRWQCB, San Diego Region, Order No. R9-2013-0112, NPDES No. CA019347, "Waste Discharge Requirements (WDR) for the MCB CPEN, SRTT Plan, and AWT Plant, Discharge to the Pacific Ocean via Oceanside Ocean Outfall"

2. **UTILITY CONNECTIONS**: Prior to any construction of a utility connection, all construction plans for a wastewater system service connection shall be submitted to and approved by PWD, A&E Branch, Utilities Projects Team and / or AC/S G-F, WRD in order to ensure compliance with standards set forth within these requirements.

3. **PRIOR TO GOVERNMENT ACCEPTANCE**: All new or repaired sewer lines shall be cleaned and CCTV to ensure the lines are undisturbed and clear of debris after repairs have been completed. The video shall contain the pipe segment numbers, direction of survey, manholes associated with the sewer main, pipe size, material, and distance traveled. Any deficiencies or debris found shall be corrected by the Contractor.

4. SEWER PIPE MATERIAL: See Figure 38 for approved piping material.

5. **GRAVITY SEWER SYSTEMS:** Gravity lines include trunk lines, main lines, and building connections. Pipe material, size, and velocity requirements shall include the following:

   a. Size of building connections:

      (1) Minimum size of building connection lines and lateral lines shall be 6".

      (2) The minimum size of main lines shall be 8".

      (3) For all gravity lines, a minimum velocity of 2.5 ft./sec shall be maintained at peak flow.

   b. For wastewater pipes, material shall be PVC Standard Dimension Ratio-35 (SDR-35) and shall meet ASTM D3034 requirements.

c. Laterals shall connect to the main line at a manhole. Two-way cleanouts shall be installed and a maximum 100' spacing shall be allowed between cleanouts.

d. Connections into sewer laterals shall be made with the use of a wye fitting. The use of taps or saddles of any kind are prohibited.

6. **FORCE MAIN LINES**:

a. The minimum depth of cover required is 48".

b. Air relief valves shall be stainless steel. Each air relief valve shall be installed with a catchment container.

c. A minimum velocity of 2.5 ft/s shall be maintained in the force main at all flow conditions (i.e., single pump running).

7. **MANHOLES (Sanitary Manhole and Sewer Manhole)**: The location of manholes shall conform to the following:

a. Manholes shall be provided at all pipe intersections and at changes in elevation, direction, size, diameter and shape.

b. Manholes shall be placed a maximum of 400' apart in the closest paved street.

c. Manholes and clean outs serving the main lateral shall be accessible via a Vactor truck supportable path for maintenance operations and emergency access.

d. Manholes shall be installed level to a ½" AFG to prevent submergence of the manhole cover.

e. Manholes shall not be placed in the following locations:

(1) Gutters and other depressions;

(2) sidewalks, crosswalks, private yards, high pedestrian traffic areas, building entrance and public gathering areas;

(3) within 20' of an occupied residence building or messhall. If it is within 20' of unoccupied structure, an approved gas tight manhole cover shall be installed;

(4) within any area subject to flooding;

(5) Athletic fields or sports courts; and

(6) a sewer cleanout shall not be installed or placed within 5' in any direction from the storm drain grate or catch basin inlet.

f. For manholes over twelve feet in depth, ladder shall comply with Greenbook Standard 636-2 and be in compliance with UFC 3-240-01.

8. **SEWER LIFT STATION (SLS)**:

a. The SLS Basis of Design (BOD) shall include a description of project concepts that address salient points of the design including the following:

(1) How pump duty is controlled and cycled among the three pumps. (Small systems may use two pumps if one pump can handle the peak demand.)

(2) Telemetry requirements and compatibility with existing MCB CPEN'S System.

b. All lift stations shall be installed with alarms reporting to the UNITY Room, Building 2291 and include: high level, low level, pump run status, seal failure alarm, over-temperature alarm, generator status, ATS failure, daily flow, and discharge pressure.

c. Any connections to the ICS room shall be coordinated with the ICS room and PWD WRD.

d. Conduct a surge analysis and include as part of design submittal.

e. Wet wells shall be sized for a minimum 30 minute retention time at average daily flow.

(1) Spill Location Indication: Influent sewer and pump station spill locations shall be indicated on the design drawings (lowest upstream elevation or wet well cover elevation where backup spill shall occur). Mean sea level (MSL) elevation shall be included for information for spill location.

f. General Lift Station Requirements: In addition to the above submittal requirements, wastewater lift stations shall include the following:

(1) All SLS require a properly sized emergency backup diesel generator.

(2) All SLS require 3 pumps minimum. Small systems may use 2 pumps if 1 pump can handle the demand and is approved by the PWD, A&E Branch, Utilities Projects Team or AC/S G-F, WRD.

(3) Wet wells and all concrete components exposed to wastewater gases shall be coated or lined with a suitable, protective material.

(4) Corrosion resistant materials shall be used for all mechanical and electrical components, including impellers. Use type 316 Passivated Stainless steel for brackets and supports. Use fiberglass grating and ladders. Exterior of DI piping (if approved for use) shall be epoxy coated.

(5) Pump stations shall be equipped with soft start motor controllers or variable frequency drives (VFD's), to reduce surge pressures and reduce the impact on downstream treatment components.

(6) Station shall have ultrasonic level sensor with float backup. Pumps shall alternate between all pumps. High level alarm shall send alarm to the ICS room high / high float shall call for all pumps to run.

(7) Low level alarm shall send alarm to the ICS room low / low shall shut-off pumps.

(8) Pumps shall pass 3" solids. Plug valves shall be used for suction and discharge isolation.

(9) A post with a safety chain shall be required at wet well opening. A magnetic flow meter and bypass around meter for servicing and replacement.

(10) Night lighting.

(11) Spring assisted aluminum covers for wet well and valve vault.

(12) External arm, swing check valves.

(13) Wet well ventilation.

(14) Hour meters for each pump.

(15) Valve vault shall be large enough for easy access for changing of valves.

(16) J-Box for float and ultrasonic shall not be installed in the wet well;

(17) Pressure transducer and isolation valves on discharge piping with signal to the ICS room.

(18) A 1" Potable water hose bibb installed at the site.

(19) Fencing per UFC with a minimum 12' gate for Vactor truck access.

(20) Emergency pump connection with isolation valve and female cam-lock fitting.

(21) Electrical conduit penetrating electrically classified hazardous areas such as sewage wet wells shall be properly sealed in accordance with NEC and other requirements as applicable.

(22) Discharge manifold shall be equipped with emergency pump connection with isolation valve and female cam-lock fitting.

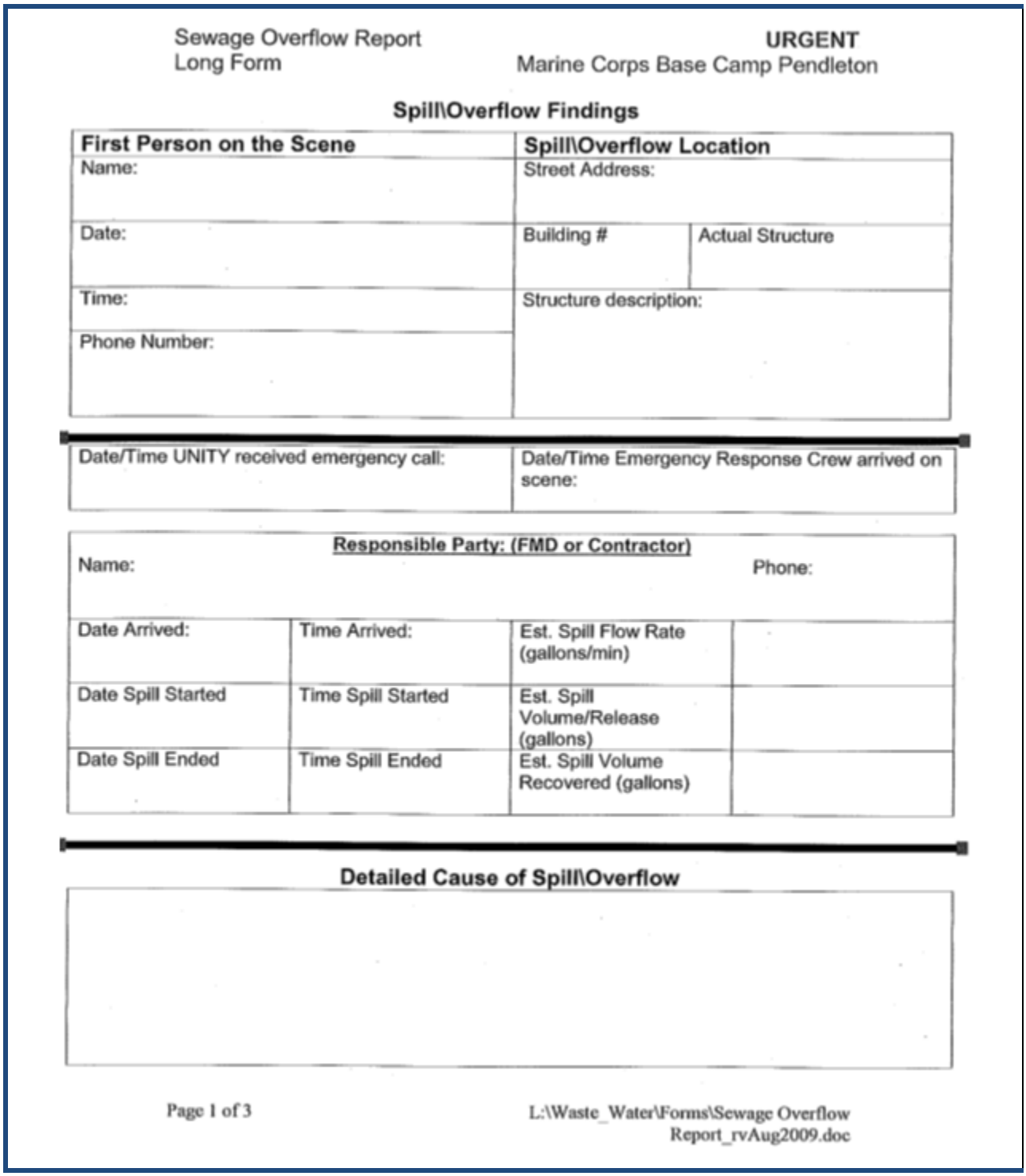
(23) Asphalt paving / concrete pad.

(24) Submersible pumps shall include chain and rail to facilitate removal for repairs and / or replacement of pumps.

(25) Weight tested fall protection anchor points capable of allowing personnel to work over any hole or opening without impeding mobility or range of motion. Anchor points must be built independent of support structures for platforms or any other elevated work area, and must be capable of supporting a 5,000-pound load per employee attached with a fall restraint system

9. **DISCHARGES**: Discharges of untreated or partially treated wastewater of any volume resulting from a sanitary sewer system infrastructure failure shall be reported to UNITY Room (760) 725-4348/4324 within two hours of the notifier becoming aware of the spill. In addition, the notifier will be responsible for completing and submitting two spill reporting forms. The Short Spill Form shall be

completed and submitted within 24 hours of the notifier becoming aware of the spill. The Long Spill Form shall be completed and submitted within 48 hours of the notifier becoming aware of the spill, see Figures 56-58.



Sewage Overflow Report
Long Form

URGENT
Marine Corps Base Camp Pendleton

Spill\Overflow Findings

First Person on the Scene	**Spill\Overflow Location**	
Name:	Street Address:	
Date:	Building #	Actual Structure
Time:	Structure description:	
Phone Number:		

Date/Time UNITY received emergency call:	Date/Time Emergency Response Crew arrived on scene:

Responsible Party: (FMD or Contractor)

Name: Phone:

Date Arrived:	Time Arrived:	Est. Spill Flow Rate (gallons/min)	
Date Spill Started	Time Spill Started	Est. Spill Volume/Release (gallons)	
Date Spill Ended	Time Spill Ended	Est. Spill Volume Recovered (gallons)	

Detailed Cause of Spill\Overflow

Page 1 of 3

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Figure 56: Sewage Overflow Report (Long Form) – Pg. 1 of 3

Sewage Overflow Report
Long Form

URGENT
Marine Corps Base Camp Pendleton

Cause of Spill\Overflow (check all that apply)

☐ Blockage	☐ Infiltration	☐ Rocks	☐ Roots	☐ Construction	☐ Debris	☐ Grease	☐ Vandalism	☐ Line Break	☐ Flood Damage
☐ Manhole Failure	☐ Power Failure	☐ Pump Station Failure	☐ Other						

Root Issues of Spill\Overflow (check all that apply)

☐ Blockage	☐ Root Control Applied	☐ Red Flag Notification	☐ Tree Removal	☐ If Tree Removal, then MAXIMO No.	☐ Other

Path of Spill\Overflow (please circle)

Did spill reach surface waters?	**Yes or No**	Did spill enter storm water?	**Yes or No**
If yes, identify initial receiving water			
Secondary receiving water			
Did effluent pond?	**Yes or No**	Did effluent percolate?	**Yes or No**
Expect public contact?	**Yes or No**	Total distance traveled (in feet)	
Was there measureable precipitation during 72-hur period prior to the spill\overflow?		**Yes or No**	
Spill path and final location:			

Action and Response to Spill\Overflow

Method to stop spill			
Method to contain spill			
Method to disinfect spill			
No. of signs posted at spill site?		No. of days signs posted at spill site?	
Surface water quarantined?	**Yes or No**	No. of signs posted at quarantined site?	No. of days signs posted at quarantined site?
If signs posted, location			

Page 2 of 3

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Figure 56: Sewage Overflow Report (Long Form) – Pg. 2 of 3

Sewage Overflow Report
Long Form

URGENT
Marine Corps Base Camp Pendleton

Action and Response to Spill\Overflow (continue)

Description of corrective actions taken\planned:
Description of preventative actions taken\planned:

Report Processing Spill\Overflow

Signature of responsible party		Date/Time
Received by FMD Environmental		Date/Time
Received by AC/S Environmental		Date/Time
Longitude:	**Latitude:**	
Additional Remarks		

AC/S ES USE ONLY

RWQCB Notification		**DEH Notification**		**OES Notification**		**AC/S ES**	
Oral Report? Yes or No	FAX? Yes or No	Oral Report? Yes or No	FAX? Yes or No	Oral Report? Yes or No		Oral Report? Yes or No	
Date	Time	Date	Time	Date	Time	Date	Time
POC:		POC:		POC:		POC:	
Reported by:		Reported by:		Reported by:		Reported by:	

Page 3 of 3

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Figure 56: Sewage Overflow Report (Long Form) – Pg. 3 of 3

MCBCP SEWER SYSTEM OVERFLOW, PERIOD OF NON-COMPLIANCE, OR IN-PLANT OVERFLOW QUICK REPORT FORM

USE FOR IMMEDIATE VERBAL NOTIFICATION FOR OVERFLOWS

ES Wastewater Branch Spill Cell Phone # (760) 390-0784

Provide the following information to ES Wastewater Branch, if information is UNKNOWN at the time, then please write unknown or N\A.

NECESSARY (INITIAL) INFORMATION:	
1. NAME\PHONE of person making verbal report:	
2. LOCATION\TYPE of structure (inc. size\type of line)	
3. START DATE/TIME:	
4. STOP DATE/TIME:	
5. ESTIMATED AMOUNT OF OVERFLOW/AMOUNT RECOVERED:	
6. FINAL DESTINATION OF OVERFLOW:(Surface Water)	
7. POTENTIAL PUBLIC CONTACT? YES or NO	
8. SUSPECT CAUSE:	
9. Method of stopping/containing overflow:	
10. Method of disinfection or clean-up:	

Sewage Overflow Report form must be completed in addition to this form

(PRINT) Name of person reporting

Signature and Date

Page 1 of 1

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2/28/2012

Figure 57: Sewage Overflow Report (Quick Report Form)

WASTEWATER TREATMENT PLANT REPORT

NPDES PERMIT REPORTING REQUIREMENTS

1. PLANNED PLANT BYPASS/CHANGE OF PLT OPERATION: z (10 day prior notice required)
2. PLANT BYPASS: z (immediate notification required)
3. PLANT UPSET: z (immediate notification required)
4. POTENTIAL PLANT UPSET: z (immediate notification required)
5. PERIOD OF PERMIT NONCOMPLIANCE: z (immediate notification required)
6. CHANGE OF PLANT OPERATION: z (immediate notification required)
7. PLANT SPILL: z (immediate notification required)

8. PLANT NUMBER (CIRCLE ONE): 1 (Bldg 14831) 2 (Bldg 17831) 3 (Bldg 22831) 8 (Bldg 33831) 9 (Bldg 43831) 10 (Bldg 53831) 11 (Bldg 52831) 12 (Bldg 62831) 13 (Bldg 20831)

9. NONCOMPLIANCE FINDINGS:

Name of Person Responding: _____ Date & Time arrived: ___/ /_____

10. ESTIMATE START AND END OF NONCOMPLIANCE:

START DATE:		START TIME:		ESTIMATED VOLUME OF BYPASS/UPSET/SPILL (Gallons)	
STOP DATE:		STOP TIME:		ESTIMATED VOLUME RECOVERED FOR RETREATMENT (Gallons)	

11. DETAILED CAUSE OF NONCOMPLIANCE(UPSET/BYPASS/PLANT SPILL):

_____

_____

_____

_____

12. DESCRIBE & ESTIMATE TOTAL DISTANCE, & PATH OF SPILL INCLUDING FINAL DESTINATION IN OR OUT OF PLANT.

_____

_____

13. IF BYPASS/UPSET; LIST PLANT PROCESSES/COMPONENTS AFFECTED:

_____

_____

14. CORRECTIVE MEASURES (Circle all steps taken for SPILL/UPSET/BYPASS) AND PROVIDE ANY ADDITIONAL INFORMATION:

SPILL: stop, recover, disinfect spill area

UPSET: use of absorbent materials to stop pollutants from traveling through plant

BYPASS: list steps & provide any additional info taken to minimize impact:

_____

_____

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Figure 58: WWTP (NPDES Permit Reporting Requirements) - Pg. 1 of 2

15. PREVENTATIVE MEASURES (steps taken to reduce, eliminate and prevent re-occurrence of noncompliance):

If a potential or actual plant upset: Were SAMPLES collected? (Circle one) Yes No

If a potential or actual plant upset: Were UPSTREAM Sources Investigated? (Circle one) Yes No

REQUIRED SIGNATURES:

16. Person Responding onsite: Date: Time:
    Responder provided immediate verbal report to supervisor: Date: Time:
17. Wastewater/Kilo Supervisor: Date: Time:
18. Verbal Report to AC/S ES: Date: Time:
19. Received by AC/S ES: Date: Time:

==========

20. AC/S ES USE ONLY: RWQCB NOTIFICATION Date: Time:
    IF PUBLIC THREAT - DEH NOTIFICATION Date: Time:
    IF OVER 1,000 GAL - OES NOTIFICATION Date: Time:

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Figure 58: WWTP Report (NPDES Permit Reporting Requirements) – Pg. 2 of 2

SECTION 7: RECYCLED WATER

1. **REFERENCES**: All new construction shall conform to the most recent edition of the UFC and CFR requirements. The latest edition of the following standards shall be utilized in order listed; where standards provide conflicting information pertaining to an issue, the most stringent information shall apply.

   a. SWRQB

   b. AWWA Standards

   c. Rules and Regulations for Recycled Water Use and Distribution, MCB CPEN, April 2013 (Amendment to Engineering Report for the Production, Distribution and Use of Recycled / Reused Water Southern Regional Tertiary Treatment Plant MCB CPEN)

   d. City of Oceanside, California, "Water, Sewer and Reclaimed Water Design and Construction Manual"

   e. SDRSD

   f. SSPWC or Greenbook Construction Standards

   g. State of California DWR

   h. RWQCB San Diego Region, Master Reclamation Permit Order No. R9-2014-0006

   i. RWQCB San Diego Region, Master Reclamation Permit Order No. R9-2009-0021

2. **RECYCLED WATER SYSTEM DESIGN DRAWINGS AND SPECIFICATIONS**: Per MCB CPEN Rules and Regulations for Recycled Water Use and Distribution, ES shall submit the recycled water system design drawings and specifications to the appropriate regulatory agencies for review. This shall include the County of San Diego Department of Environmental Health (SDDEH), who shall perform a plan check and subsequent site inspection prior to initiating recycled water usage at the site.

   a. Recycled water plans and procedures shall be consistent with the County's "Recycled Water Plan Check and Inspection Manual", please refer to the following link:

      http://www.sandiegocounty.gov/content/sdc/deh/lwqd/lu_recycled_water.html

3. **PIPES FOR RECYCLED WATER shall be sized based on the following criteria:**

   a. Velocity requirements shall follow UFC3-230-01 for potable water.

4. **DEPTH OF PIPE COVER**:

   a. The minimum depth of cover required is 36".

   b. Recycled water mains shall not be installed over potable water mains.

5. **VALVES AND RISERS**: Valve cans and risers shall be 6" PVC class 200, C-900 Pipe and colored purple. Three-valve clusters shall be installed at all tee connections. Valves shall be easily accessible. Piping color is purple.

6. **FINAL DESIGN SUBMITTAL**: Shall print recycled water piping in purple.

7. **IRRIGATION SYSTEM**: All new irrigation system construction shall have color purple piping and have a single point of connection.

8. **DISCHARGES**: Discharges of tertiary treated disinfected recycled water of any volume resulting from a recycled water system infrastructure failures shall be reported to UNITY Room (760) 725-4348/4324 within two hours of the notifier becoming aware of the spill. In addition, the notifier will be responsible for completing and submitting two spill reporting forms. The Short Spill Form shall be completed and submitted within 24 hours of the notifier becoming aware of the spill. The Long Spill Form shall be completed and submitted within 48 hours of the notifier becoming aware of the spill.

SECTION 8: ABOVEGROUND STORAGE TANKS (AST)

1. **REFERENCES**: AST's containing petroleum and flammable products shall conform to the most recent edition of the following standards; where standards provide conflicting information pertaining to an issue, the most stringent information shall apply.

   a. 40 CFR 112.7, "EPA: General Requirement for SPCC"

   b. UL 142, "Aboveground Flammable Liquid Tanks"

   c. UL 2085, "Standard for Protected Aboveground Tanks for Flammable and Combustible Liquids"

   d. NFPA 704, "Standard System for the Identification of the Hazards of Materials for Emergency Response"

   e. National Environmental Protection Act (NEPA)

   f. AC/S SES, Fire Department Requirements

   g. Steel Tank Institute (STI) SP001, "Standard for AST"

   h. NFPA 704, "Standard System for the Identification of the Hazards of Materials for Emergency Response"

   i. NFPA 30, "Flammable and Combustible Code"

2. **REQUIREMENTS FOR ALL NEW PETROLEUM, OIL LUBRICANTS (POL) TANKS ON MCB CPEN**:

   a. Double Wall, UL 142 listed for combustibles, UL 2085 listed for flammable liquids.

   b. UL listed primary and emergency venting shall be installed on AST.

c. AST secured by mechanical fasteners to a reinforced concrete pad approved by the tank manufacturer.

d. High level alarm (Morison Bros. Co. adjustable level sensor with alarm 918S-924, 918S-924S or equal).

e. Secondary space leak gauge (Morison Bros. Co. interstitial space liquid sensor FIG 924LS or equal).

f. Primary tank level gauge (Morison Bros. Co. clock gauge FIG 818, 818F or equal).

g. Fill line spill bucket container (better or equal to Pomeco 221-AST Spill container, min. 5 gallons.).

h. NFPA 30 markings (flammable and combustible liquid codes).

i. Vehicle collision protection (concrete-filled steel pipe bollards) spaced in accordance with manufacturer's recommendations.

j. All piping shall be aboveground and visible (single wall), unless approved prior to construction by ES and PWD, A&E Branch because of extenuating circumstances. Any underground piping shall be double-walled and electronically monitored).

k. Piping shall be painted, labeled for product contained and direction of flow indicated by arrows.

l. Gasoline tanks 250 gallons and greater require an Air Pollution Control District Permit.

m. MCB CPEN AC/S SES, Fire Department, Deputy Fire Chief for Prevention; ES (NEPA and Spill Prevention Sections) and AC/S G3/5, Operations ATFP shall approve tank site plans prior to installation. ES NEPA conducts an Environmental Analyses of the site and support providing the NEPA documentation (i.e., Decision Memo, EA or EIS.)

SECTION 9: STORMWATER

1. **REFERENCES**: All construction shall conform to the most recent edition of the UFC and CFR requirements and standards; where standards provide conflicting information pertaining to an issue, the most stringent information shall apply. The following references shall be used to design stormwater facilities aboard MCB CPEN:

   a. Energy Independence and Security Act (EISA), "Stormwater Management for Federal Facilities," Section 438, "Stormwater Runoff Management"

   b. EISA, "Technical Guidance on Implementing the Stormwater Runoff Requirements for Federal Projects," under Section 438 (U.S. EPA 841-B-09-001)

   c. SWRCB, Water Quality Order No. 2013-0001-DWQ, "NPDES", General Permit No. CA S000004, "WDRs for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems (MS4s)"

   d. UFC 3-210-10, "The WBDG – LID Manual"

e. California Stormwater Quality Association (CASQA) BMP Handbooks, "New Development and Redevelopment; Municipal; Industrial; Construction"

f. Department of Water Quality (DWQ) NPDES, "General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities (Order 2009-0009-DWQ, NPDES No. CAS000002)

g. UFC 3-201-01, "The WBDG: Civil Engineering"

h. Caltrans, "Stormwater Quality Handbooks Project Planning and Design Guidelines"

i. If the standard sought does not appear in the above requirements, then the latest edition of the following standards shall be used in the order listed. If a conflict exists, the MCB CPEN Requirements have primacy.

(1) San Diego County Drainage Design Manual

(2) San Diego County Hydrology Manual

(3) County of San Diego County LID Handbook

(4) San Diego County Standard Urban Stormwater Mitigation Plan (SUSMP)

(5) UFC 3-230-17fa, "The WBDG: Drainage in Areas other than Airfields"

(6) SDRSD

(7) SPWC or Greenbook Standards

(8) Caltrans, "Standard Specifications and Construction Details, Stormwater Design Guidelines"

(9) Federal Highway Administration (FHWA), "Urban Drainage Design Manual, Hydraulic Engineering Circular No. 22"

2. **SUMMARY OF REQUIREMENTS**:

a. Conceptual Overview: A number of overlapping stormwater regulatory and engineering requirements apply to MCB CPEN projects. Many of the regulations, policies and NPDES permits require the use of LID or Green Infrastructure techniques to manage stormwater.

(1) Basic principles of LID include managing stormwater on-site, as close as possible to the source and maintaining the pre-development hydrology using natural, passive drainage systems that mimic nature by allowing for maximum infiltration, filtration through vegetation, interception by plants or trees, evaporation and slow release of stormwater.

(2) Additional principles of LID include maintaining existing soils, contours, vegetation and natural channels, disconnection and minimization of impervious surfaces, designing the site with multiple, decentralized BMPs, and minimizing compaction during construction.

(3) LID techniques are typically used to manage the stormwater from the smaller, more frequent storms, with the goal of reducing pollutant loads, improving water quality of receiving waters and preventing damage from erosion.

(4) In addition, traditional flood control measures shall also be employed to protect people and property from large, infrequent and potentially damaging flood events. Combining LID and flood control techniques ensures that both water quality and quantity are addressed during site design.

b. Regulatory Specifics:

(1) Water Quantity: The primary regulatory driver for water quantity (hydrology) is the EISA. EISA Section 438 requires development or redevelopment projects involving a Federal facility with a footprint area of disturbance that exceeds 5000 SF to use site planning, design, construction and maintenance strategies for the property to maintain or restore, to the maximum extent technically feasible, the pre-development hydrology of the property with regard to temperature, rate, volume and duration of flow. This can be achieved with LID techniques using the 95th percentile storm, 24-hr. or via a site-specific hydrologic analysis using continuous simulation modeling or other tools. The DoD policy on implementing EISA defines "pre-development" as "pre-project."

(2) Water Quality: The primary regulatory driver for water quality is the California MS4 NPDESS Permit. MCB CPEN is designated as a Non-traditional Small MS4 Permittee (Permit Section F). Permit coverage is limited to cantonment (developed) areas and housing areas only. Projects that create and / or replace between 2500-5000 SF of impervious surface shall implement specific Site Design Measures. All new development and redevelopment projects that create and / or replace 5000 SF or more of impervious surface shall implement specific LID Design Standards. This includes street and road projects with 5000 SF or more of contiguous new impervious surface, including sidewalks, bicycle lanes and road widening (addition of traffic lanes). LID Design Standards incorporates Site Design Measures, Stormwater Treatment / Hydromodification Management and Source Control Measures. The overall objective of these measures is to reduce the volume and improve the quality of runoff by maximizing infiltration, evapotranspiration, treatment and / or harvesting / reuse of stormwater. This can be achieved using the 85^{th} percentile, 24-hr. storm.

(3) LID Policy: In addition to EISA and MS4, several other LID requirements or policies may be applicable. The California General Construction Permit requires runoff reduction using LID techniques be implemented for projects located in areas which are not already covered by the MS4 permit. Documentation of LID design shall be submitted as part of the Construction Permit application process. The State Water Board Stormwater Multiple Applications and Report Tracking System (SMARTS) Post-Construction / Water Balance Calculator may be used to quantify runoff reduction predicted for permitted Construction projects located outside of cantonment / housing areas. The SMARTS Calculator may also be used to quantify runoff reduction for MS4 Site Design Measures. The DON LID Policy (dated 2007, and often referred to as the Penn Memo) established a goal of no net increase in sediment or nutrient loading for major construction and renovation projects, and this goal was incorporated into UFC 3-210-10. LID design may be used to meet LEED stormwater credits which are also required by DON policy. San Diego County is designated as a large MS4 and has developed a number

of stormwater management plans and design manuals which can be used as guidance aboard MCB CPEN.

3. **DEFINITIONS**:

   a. BMP's: Structural and nonstructural methods of treating stormwater to prevent pollution.

   b. Pre-development Hydrology: Pre-project hydrologic conditions of temperature, rate, volume and duration of stormwater flow.

   c. 95th Percentile Storm: The storm event whose precipitation total is greater than or equal to 95 percent of all 24-hour storms on an annual basis.

   d. Two-year Storm: The largest amount of rainfall expected over a specified duration occurring during a 2-year interval.

   e. Ten-year storm: The largest amount of rainfall expected over a specified duration occurring during a 10-year interval.

   f. Run-on–Stormwater: Stormwater which drains into a project area from off-site

   g. Engineered Soil Media: A specified mixture of sand, soil and organic compost.

   h. Disconnection of Impervious Surfaces: Disconnect paved areas from the stormwater system by directing surface runoff into infiltration BMPs or other means of reuse. Disconnect roof areas by directing roof gutter downspouts to landscaping areas or infiltration BMPs rather than connecting directly into stormwater pipes.

4. **NOTE**: Contractors may request a copy of the latest version of the MCB CPEN Illustrated Guide to Stormwater Terminology for more information regarding specific BMPs (such as basins, bioretention areas, bioswales, cisterns, permeable pavement, buffers, etc.); engineered channels; inlet and outlet structures; pipes, culverts and headwalls; manholes and junctions; flow control structures; and energy dissipators. Contractors shall use BMP terminology consistent with the CPR, Illustrated Guide, EISA and CA NPDES Permits in order to correctly identify stormwater features on design plans.

5. **STORMWATER REPORT DESIGN SUBMITTALS**: shall consist of four sections: Flood Control; EISA 438 and Water Quality; Schematic Stormwater Design and CE, and Closeout Submittals. Calculations shall include contributing upstream drainage system. The submittals shall be divided into sections and in accordance with CPR, CSI 01 33 00. Electronic files shall be organized with bookmarks or hyperlinks to simplify viewing. Larger submittals can be submitted on a data disk in pdf format.

   a. **Flood Control**:

      (1) **Hydrology and Hydraulics**: This section shall follow the typical format in the San Diego County Manuals, which includes the following: a cover page, TOC, project discussion (boundary conditions, Manning's "n" value used, description of existing and proposed conditions, and summary tables), existing condition hydrology calculations, existing condition hydrology map, proposed condition hydrology calculations, proposed condition hydrology map,

line hydraulics, water surface elevation calculations, inlet calculations, channel calculations, and energy dissipator calculations.

(2) **Hydrograph and Flood Routing**: This section shall be submitted for projects which include a flood control basin. The report shall follow the format of the San Diego County Manuals, which includes a cover page, TOC, project discussion (boundary conditions, description of existing and proposed conditions, and summary tables), existing condition hydrograph calculations, existing condition hydrology map, proposed condition hydrograph calculations, proposed condition hydrology map, outlet structure hydraulics, and emergency spillway calculations.

b. **EISA 438 and Water Quality**:

(1) **EISA 438 Design**: This section shall be submitted for projects subject to EISA requirements. The summary shall include the following:

(a) An explanation / justification of LID design, supporting calculations and drawings.

(b) A summary of how the requirements of EISA 438 are being achieved.

1) If EISA 438 option 1 is used, then the report shall show that the 95th percentile storm is being retained on site.

2) If EISA 438 option 2 is used, then the report shall show that post-development condition does not increase flow rates, volume, duration or temperature above the pre-development condition.

(c) For projects where LID has been deemed technically infeasible, a waiver is subject to EISA requirements and shall be approved by ES, Stormwater Branch and NAVFAC.

(2) **Water Quality Design**: This section shall follow the guidelines of the San Diego County SUSMP and shall include the following:

(a) The facility's pollutants of concern shall be identified and the clearly addressed through various BMP facilities.

(b) Each BMP facility shall have design calculations showing compliance with MS4 design standards, proper sizing and acceptable O&M requirements.

(c) Shop drawings for manufactured treatment and / or detention BMPs and accessory equipment, including principal dimensions, filter placement, location of fittings and unit foundation.

(d) Include data to verify center of gravity with the unit empty and filled with water.

(e) Submit design flow calculations for manufactured treatment and / or detention BMPs, and include specification for type of media or filter.

(f) Submit manufacturer's certifications / qualifications, instructions, and O&M requirements.

(3) **Geotechnical Engineering**: Site-specific geotechnical investigation shall be attached to the Water Quality Report.

(a) Geotechnical investigation shall include sufficient borings, in-situ infiltration testing and / or laboratory soil characterization in order to adequately characterize surface soil and subsoil properties in each area of the site, and shall address the potential presence of an impermeable layer.

(b) These soil properties shall be used in LID design, as well as in Construction Stormwater Permit risk determination (if permit is required).

c. **Schematic Stormwater Design and Cost Estimate**:

(1) Integrated Site Plan: The schematic stormwater site plan shall graphically illustrate the overall stormwater concept for the project. This plan shall be a product of the Concept Design Workshop and shall be interdisciplinary. Its purpose is to integrate the architectural, landscape, and engineering designs as they relate to stormwater and overall site design.

(a) The plan shall include: all roof runoff locations and type (downspout, sheet flow, etc.), all surface and subsurface flows (indicate if sheet flow, channelized, piped, etc.), locations and types of infiltration areas and all general LID BMPs, and basic design concepts (formal and informal areas, educational, information opportunities, etc.).

(b) The plan shall refer to and complement the Flood Control and Water Quality Sections. If available, the plan shall incorporate the recommendations of PWD's camp-by-camp Stormwater Conveyance Engineering Studies.

(2) Cost Estimate (CE): The CE of the stormwater facilities shall accompany the schematic. The cost shall include construction costs as well as ongoing maintenance costs, such as the price of filters for manufactures devices.

d. **Closeout Document Submittals**: Shall be submitted in accordance with CPR (CSI 01 78 30), and shall include the following elements:

(1) O&M manuals for all stormwater BMPs, plus manufacturer's specifications and warranty for manufactured treatment / detention BMPs.

(2) Pre-operational and in-service test results for manufactured treatment / detention BMPs, including inspection reports from the maintenance period and photographs taken during the respective inspection.

(3) Pre-operational and in-service infiltration test results for infiltration BMP.

(4) Warranty inspection reports and photographs for stormwater facilities.

(5) Construction Permit documents (if permit is required): redlined Stormwater Pollution Prevention Plan (SWPPP), all permit-required submittals, including inspection and sampling records, exceedance reports, notice of Intent, notice of Intent Acceptance Letter, Certification Statements, notice of Termination, notice of Termination Acceptance Letter, and Annual Report.

SECTION 10: STORMWATER DESIGN STANDARDS

1. **REFERENCES**: All construction shall conform to the most recent edition of the UFC and CFR requirements and standards; where standards provide conflicting information pertaining to an issue, the most stringent information shall apply. The following references shall be used to design stormwater facilities aboard MCB CPEN:

   a. San Diego County Drainage Design Manual

   b. San Diego County Hydrology Manual

   c. U.S. EPA EISA § 438, "Stormwater Management for Federal Facilities, Stormwater Runoff Management"

   d. CASQA Stormwater BMP Handbook

   e. FHWA, "Urban Drainage Design Manual, Hydraulic Engineering Circular No. 22"

   f. LEED, "SS Credit 6.1, Stormwater Management Rate and Quality"

   g. LEED, "SS Credit 6.2 Stormwater Design – QC"

   h. DON LID Policy, "Implementation and Site Development of NAVFAC Projects," (Penn Memo)

   i. DoD Policies, "UFC 3-210-10, for Low Impact Development (LID)"

   j. State of California Regulations, Regional Water Quality Control Board (RWQCB)

2. **STORMWATER DESIGN**: The CA Small MS4 Permit supplemented by references (1.a. & 1.b.) shall be used for stormwater design; including the required design storm duration / frequency, methodology, and capacity, except as provided below.

3. **WATER QUALITY AND LID**:

   a. Stormwater Post-Construction Management requirements are detailed in Section F.5.g of the Small MS4 Permit. These requirements consist of Site Design Measures and LID Design Standards.

      (1) Site Design Measures shall be implemented for projects that create and / or replace between 2500-5000 SF of impervious surface.

      (2) LID Design Standards shall be applied to all new development and redevelopment projects that create, add and / or replace 5000 SF or more of impervious surface as well as to all streets and roads projects that create 5000 SF or more of new contiguous impervious surface. LID Design Standards incorporates Site Design Measures, Source Control Measures, and Stormwater Treatment / Hydromodification Management Measures, and shall be implemented subject to the requirements of CPR Section 334004.

         (a) LID Design Standards apply as follows.

1) For new development, runoff from the entire project shall be included in BMP design.

2) For redevelopment projects with more than 50% increase in impervious area, runoff from all existing, new and / or replaced impervious surfaces shall be included in BMP design

3) For redevelopment projects with less than 50% increase in impervious area, only runoff from the new and / or replaced impervious surfaces shall be included in BMP design. For new road construction projects, runoff from the entire project shall be included in BMP design.

4) For road widening projects with more than 50% increase in impervious area, runoff from all existing, new and / or replaced impervious surfaces shall be included in BMP design.

5) For road widening projects with less than 50% increase in impervious area, only runoff from the new and / or replaced impervious surfaces shall be included in BMP design. Specific exclusions for roads projects; and alternative designs, adjustments for special site conditions, and exceptions for bioretention BMP facilities are stated in the Permit.

(b) Site Design Measures include:

1) Stream setbacks and buffers

2) Soil quality improvement and maintenance

3) Tree planting and preservation

4) Rooftop and impervious area disconnection

5) Permeable pavement

6) Vegetated swales

7) Rain barrels and cisterns

(c) Source Control Measures includes the following areas and activities:

1) Accidental spills or leaks

2) Interior floor drains

3) Parking / Storage area maintenance

4) Indoor and structural pest control

5) Landscape / outdoor pesticide use

6) Pools, spas, ponds, decorative fountains, and other water features

7) Restaurants, grocery stores, and other food service operations

8) Storage and handling of solid waste

9) Outdoor storage of equipment or materials

10) Vehicle and equipment cleaning

11) Vehicle and equipment repair and maintenance

12) Fuel dispensing areas

13) Loading docks

14) Fire sprinkler test water

15) Drain or wash water from boiler drain lines, condensate drain lines, rooftop equipment, drainage sumps, and other sources

16) Unauthorized non-stormwater discharges

17) Building and grounds maintenance

b. MCB CPEN is included on the isopluvial maps necessary to follow the County of San Diego procedures, and the 85th percentile storm shall be used for water quality (treatment control) design. If there is a pollutant of concern associated with the project, then water quality BMPs shall remove the pollutant to a high level (above 75%). All other pollutants shall be removed to the maximum extent practicable, but shall at a minimum remove pollutants at a medium level (above 50%).

4. **WATER QUANTITY AND LID**: EISA requires the 95th percentile storm. For water quantity design, EISA 438 shall be followed, and is primarily implemented via LID. The 95th percentile depth is 1.5", which was calculated using data from the MCAS Pendleton rain gage. Site specific calculation of the 95th percentile event is acceptable, but shall be reviewed and approved by ES, Stormwater Branch. EISA 438 option 2 requires that the hydrographs of the pre-development condition and the post- development condition match. Special attention shall be given to the EISA 438 requirement for volume and duration since these are highly dependent upon soil conditions. Run-on shall be routed around, through or under the site, or detained upstream so that LID design may be limited to runoff generated on-site.

5. **FLOOD CONTROL**: Flood control basins shall be designed such that the storage volume and the flow control outlet structure, at a minimum, manage increases in the peak discharge rates for both the 2-year and 10-year storm events. If the site will affect critical facilities or major roadway downstream, then the site shall detain the 100-year storm event in addition to the 2-year and 10-year storm events. Flood control basins shall be sited upstream of cantonment areas where possible, to intercept water entering the camps and protect critical facilities from flooding. Inlets on roadways shall be designed to comply with the FHWA Urban Drainage Design Manual, Hydraulic Engineering Circular No. 22, latest edition, in order to minimum spread.

SECTION 11: STORMWATER COLLECTION / CONVEYANCE SYSTEM

1. **REFERENCES**: Stormwater collection / conveyance system shall conform to the most recent edition of the following standards; where standards provide conflicting information pertaining to an issue, the most stringent information shall apply.

   a. San Diego County Hydrology Manual

   b. San Diego County Drainage Design Manual

   c. U.S. EPA EISA § 438, "Stormwater Management for Federal Facilities, Stormwater Runoff Management"

   d. CASQA, " Stormwater BMP Handbook"

   e. FHWA, "Urban Drainage Design Manual, Hydraulic Engineering Circular No. 22"

   f. LEED, "SS Credit 6.1, Stormwater Management Rate and Quality"

   g. LEED, "SS Credit 6.2 Stormwater Design – QC"

   h. NAVFAC LID, "Implementation and Site Development of NAVFAC Projects," (Penn Memo)

   i. DoD Policies, "UFC 3-210-10 for LID"

   j. State of California Regulations, RWQCB

   k. National Transportation Safety Board (NTSB)-PSS-73-1, "Prevention of Damage to Pipelines"

   l. WBDG, "GSA Public Buildings Service"

   m. American Gas Association (AGA) 72-D-56, "Merco Tape Non-Detectable Underground Tape"

   n. API RP 1109, "Marking Liquid Petroleum Pipeline Facilities"

   o. 29 CFR § 6.956 (c)(1), "1910 OSHA General Industry Regulations Book: Underground Lines, Trenching and Excavating"

   p. APWA, "Uniform Color Code"

   q. ASME PD370-B31.8, "Gas Transmission & Distribution Piping System"

   r. 49 CFR § 192.321(e), "Transportation of Natural and Other Gas By Pipeline: Minimum Federal Safety Standards"

2. **CAPACITY, SLOPE, RADIUS, ALIGNMENT, SETBACK AND COVER**: References (1.a.) and (1.b.) shall be used to determine the design standards for pipe and channel capacity.

a. Minimum pipe diameter shall be 6" I.D.

b. Minimum pipe diameter for main lines shall be 24" I.D.

c. Minimum pipe diameter for laterals shall be 18" I.D.

d. Pipe capacity shall not decrease in the direction of flow.

e. Open channel capacity shall not decrease in the direction of flow.

f. Minimum bend radius shall be 22.5'.

g. Minimum longitudinal pipe slope shall be above 0.5%.

h. Minimum velocity shall be 2.5 ft./sec.

i. Slope less than 0.5% is allowable for engineered channels.

j. Side slope for earthen channels shall not be steeper than 3H:1V.

k. Stormwater pipe shall not pass under buildings and shall be set back a minimum of 10' from building foundations.

l. Minimum pipe cover shall be 12".

m. All Stormwater pipes shall be designed with sufficient cover to bear surface loads.

n. All Stormwater pipes shall have a 4' horizontal separation distance and a 1' vertical separation distance from potable water pipes and wastewater pipes, with potable water pipes on top.

3. **CONVEYANCE**:

a. Stormwater shall be conveyed to the next downstream stormwater facility, if existing, or to a nearby drainage channel or creek. Where downstream capacity of existing stormwater pipe or engineered channel within the project boundary is insufficient to convey the design flow, the downstream capacity shall be increased. This does not apply to natural channels. If stormwater is released to the street, the designer shall show that the gutter, if existing, has capacity. If there is no gutter, then water cannot be release to the street.

b. Where downstream engineered conveyances are damaged or unable to pass design flows, these conveyances shall be repaired or replaced. In the event that the downstream undersized or damaged stormwater facility is located outside the project boundary, the boundary can be amended to correct the drainage problem, but PWD, A&E Branch, PL shall decide the appropriate course of action and obtain required environmental approvals.

c. If existing pipes cannot adequately convey increased post-construction peak flood flows, then the site shall detain to the preconstruction level. If downstream channels shall be damaged by increased peak flows, then the site shall detain to the preconstruction level.

d. Off-site run-on shall be included in the site design. Run-on may either be detained upstream or routed around or through the site drainage system.

e. Existing natural channels shall be preserved wherever possible. Additional requirements related to natural channels can be found in the project's environmental documentation.

4. **PIPE MATERIAL**:

a. The San Diego County Drainage Design Manual shall be used to select appropriate pipe material, except as stated below. All stormwater piping outside of cantonment areas (such as undeveloped areas susceptible to wild fires) shall be Reinforced Concrete Pipe (RCP). Stormwater piping within cantonment areas shall be RCP or corrugated HDPE pipe.

b. Underdrains shall be constructed of perforated plastic drain pipe, constructed within a washed gravel layer. Underground detention structures may be corrugated metal pipe (CMP), RCP or HDPE. CMP may be used for risers. Galvanized metal pipes shall be avoided, however if necessary, galvanized pipes with protective coating may be used (per Commander, Naval Regional Southwest (CNRSW) policy).

c. All pipe materials shall have a minimum service life of 60-years. Service life of CMP shall by confirmed by Geotechnical Report using resistivity tests of the soil in which the pipe shall be placed.

5. **CHANNEL MATERIAL**: Vegetated or rock-lined channels are preferred. If not possible, engineered channels may be constructed of concrete. Asphalt channels are prohibited.

6. **UTILITY LOCATION**: Tracer tape shall be installed on stormwater pipes to enable future underground utility location. Stormwater pipe tape shall be green with the words, "CAUTION: BURIED STORM DRAIN LINE BELOW", in black ink. The tape shall be installed 6" to 12" below grade in the excavation ditch and shall conform to references (1.j.) through (1.q.).

7. **CULVERTS**: Concrete arch or box culverts shall be used in natural channels to allow maximum flows to pass unobstructed. Metal arches are also acceptable. One or more round, box or arch culverts may be used in small engineered channels. Elliptical culverts are allowable when existing conditions do not allow the installation of circular culverts.

8. **HEADWALLS**: All culvert entrances and exits shall be installed with concrete headwalls. Headwalls with flared wing walls, headwalls with parallel wing walls and mitered-end headwalls are allowable. Straight headwalls are prohibited. Concrete apron slabs are allowed in conjunction with headwalls.

9. **ENERGY DISSIPATION**: Energy dissipators shall be designed and sized to reduce the scouring potential of stormwater at the design flow rate at the inlet and outlet structures. The use of gabions is not desirable. For pipes which discharge to a vegetated channel, outlet velocity shall not exceed 5 ft./sec. If the outlet velocity exceeds 5 ft./sec, erosion protection shall be implemented.

10. **MANHOLES AND JUNCTIONS**: Manhole cover shall be inscribed with the words "STORMWATER" or "STORM DRAIN" in order to delineate between storm sewer manholes and sanitary sewer manholes.

a. Design of manholes and junction boxes shall comply with County of San Diego standards.

b. Junction angles shall be 45 degrees or less.

c. Manholes shall be placed at mainline junctions, at changes in horizontal or vertical alignment of pipe at appropriate locations for maintenance and access, and at the following intervals:

(1) every 300' for pipes of diameter 24" or less;

(2) every 400' for pipes of diameter 24"-48"; and

(3) every 500' for pipes of diameter greater than 48" in diameter. "Where stormwater cleanouts are installed, the cleanout shall terminate with a threaded female adapter and plug, and have an access box over the cleanout with the word "stormwater" stamped on the lid for identification."

11. **INLET AND OUTLET STRUCTURES**: Water shall be released at grade. Waterfall pipe outlets are prohibited.

a. Grate-top drop inlets, curb inlets, box-top inlets, surface linear inlets (trench drains) and riser outlets are allowable. Open-pipe inlets and outlets shall be accompanied by a headwall.

b. Outlet structures may be designed with weir plates, orifices or gates to produce the design discharge flow rate. Grate inlet covers shall use "bicycle proof" design where appropriate. In landscaped areas or vegetated BMPs, elevated brass atrium or beehive-style grates may be used to prevent mulch from blocking inlets and outlets.

c. Detention basins and infiltration basins shall be designed with an emergency overflow to limit damage to the basin and to downstream facilities.

12. **DOWNSPOUT**: Stormwater from downspouts (roof drains) shall be controlled and routed away from the building to a nearby stormwater BMP or landscaped area.

a. The route from the downspout to the stormwater BMP can be aboveground or underground.

b. The route shall not cross over or drain onto a sidewalk, patio or other paved areas.

c. Downspouts shall not be directly connected to the conveyance system (pipes, catch basins, etc.) unless the conveyance discharges to a stormwater BMP.

SECTION 12: STORMWATER BMP's

1. **REFERENCES**:

a. U.S. EPA EISA § 438, "Stormwater Management for Federal Facilities, Stormwater Runoff Management"

b. U.S. EPA 841-B-09-001, "Technical Guidance on Implementing the Stormwater Runoff Requirements for Federal Projects Under Section 438 of the EISA"

c. SWRCB, Water Quality Order No. 2013-0001-DWQ, "NPDES", General Permit No. CA S000004, "WDR for Stormwater Discharges from Small MS4s"

d. UFC 3-210-10, "LID"

e. CASQA BMP Handbooks, "New Development and Redevelopment; Municipal; Industrial; Construction"

f. DWQ NPDES, "General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities (Order 2009-0009-DWQ, NPDES No. CAS000002)

g. UFC 3-201-01, "The WBDG: Civil Engineering"

h. If the standard sought does not appear in the above requirements, then the latest edition of the following standards shall be used in the order listed. If a conflict exists, the MCB CPEN Requirements have primacy

(1) San Diego County Drainage Design Manual

(2) San Diego County Hydrology Manual

(3) San Diego County SUSMP

(4) SDRSD

(5) SSPWC or Greenbook Construction Standards

(6) Caltrans, Standard Specifications and Construction Details, Stormwater Design Guidelines

(7) FHWA Urban Drainage Design Manual, Hydraulic Engineering Circular No. 22.

2. **ACCEPTABLE BMPs**: Figure 57 contains a complete listing of BMPs which shall be allowed for each type of facility. Specific restrictions on the use of each type of BMP are detailed below the table. ES, Stormwater Branch may approve BMPs that are functionally equivalent to those in the table on a case-by-case basis.

3. **PROHIBITED BMPs**: BMPs not listed in the table are prohibited. Prohibited BMPs include Green Roofs, Infiltration Wells and Injection Wells. Any BMP which would require an individual discharge or drilling permit is prohibited.

4. **BMP SPECIFICS**:

a. **INFILTRATION BMPs** include the following: Bioretention Areas; Bioswales; Permeable Pavement; Infiltration Trench; Infiltration Basin. Infiltration BMPs are preferred unless site conditions do not allow their use. Inappropriate site conditions include unsuitable soils and hill slope locations. In order to prevent siltation and clogging of the soil voids, Infiltration BMPs shall be protected from sediment-laden inflows, and located such that runoff from bare soil areas, including training roads, cannot enter the BMP. Special care is required in designing / siting BMPs in perimeter areas of camps. Berms or curbs shall be used to control entry of runoff to infiltration BMP.

Vegetated swales and filter strips may also be used to pre-treat, collect sediment, and slow water movement into bioswales, bioretention areas, permeable pavement, infiltration trenches, and infiltration basins. Infiltration BMPs shall treat runoff from impervious areas only. Infiltration BMPs shall not be used in industrial areas, in areas where hazardous materials are handled or stored, or where spills or leaks are likely to occur. The San Diego RWQCB requires 10' of vertical separation between the bottom of the BMP's infiltration zone and groundwater.

b. **PERMEABLE PAVEMENT**: Permeable Pavement includes pavers, permeable asphalt and pervious concrete. For high volume parking lots and permeable pavement may be used in parking spaces, with traditional pavement in traveling lanes. All requirements applying to infiltration BMPs also apply to permeable pavement.

c. **DETENTION BASIN**: May be used as part of a system of BMPs, or for flood control purposes. A basin alone does not qualify as LID.

d. **STORMWATER WETLAND / POND**: Due to the large land area required, and potential natural resources concerns, constructed wetlands and ponds shall be approved by PWD, A&E Branch, Civil Projects Team on a case-by-case basis.

e. **VEGETATED BUFFER or RIPARIAN BUFFER**: Vegetated buffer areas (filter strips) may be planted, or existing vegetated areas may be maintained, to slow down and filter runoff and prevent erosion. A riparian buffer is the naturally vegetated corridor along a stream. Existing riparian buffers shall be preserved whenever possible. Buffers shall not be placed in terrain that is too steep or where excessively large tributary areas would cause erosion flow.

f. **CISTERN (rain barrel)**: Cisterns may be used to capture and reuse rainwater from building roofs. The use of a cistern requires approval by PWD, A&E Branch, Civil Projects Team and shall be determined on a case-by-case basis in the following limited circumstances: Cisterns shall only be used where there shall be a continuing, on-site use for water; where the cistern can serve a dual educational / public awareness purpose; and where the project sponsor has committed to use of the cistern. The design of cisterns shall provide a visible reminder of water conservation and stormwater goals. Cisterns may be a tank or a rain barrel, and may be underground or aboveground. Some level of minimum treatment, such as a filter or UV light treatment, may be required, depending upon the planned re-use.

g. **GENERAL LID BMPs**: General LID practices include disconnected downspouts, disconnected and minimized impervious surfaces, maintaining existing soils, contours, vegetation and natural channels, and use of vegetated buffers. These BMPs are desirable at all types of facilities.

h. **MANUFACTURED TREATMENT BMPs**: Manufactured treatment BMPs consist of filters, cartridges, separators, media or inserts, used individually or in combination, and housed within an underground vault or manhole, used for the purpose of treating stormwater and removing pollutants prior to discharge. The specific type of treatment unit shall be designed to treat the pollutants expected shall be generated at the facility, e.g. using a hydrocarbon filter at a vehicle maintenance facility. These units may be used in the following circumstances: where permanent site activities shall be industrial or commercial in nature; or where site conditions do not allow the use of infiltration BMPs. Manufactured treatment BMPs are less desirable than other BMPs and shall be avoided wherever possible. Small, individual catch basin hydrocarbon filters may only be used in high volume parking lots and industrial facilities.

i. **MANUFACTURED DETENTION BMPs**: Manufactured detention BMPs, consisting of underground concrete, HDPE or CMP galleries or chambers, may only be used at sites with extreme space limitations. Due to the difficulty of accessing these underground detention systems for maintenance, manufactured detention BMPs shall be preceded by a pretreatment BMP designed to remove sediment, spills and any other pollutant of concern at the site. Manholes shall be included at 100' intervals, junctions or other reasonable locations to allow for maintenance of underground detention systems. Underground detention shall not be used at industrial facilities.

j. **BMP SITING and DESIGN REQUIREMENTS**:

(1) BMPs shall be integrated into other functional components of the site, such as the landscaping and infrastructure, without impeding or significantly affecting their function.

(a) Stormwater shall not be allowed to accumulate at building foundations.

(b) BMPs shall be customized to adapt to the physical constraints of the site, such as available open space, facility use and function, degree of soil compaction, microclimate, and the location of sewers, utilities, and the groundwater table. Infiltration BMPs, permeable pavement and detention basins shall not be sited on hillside slopes.

(c) DOR must design to meet documentation of appropriate site-specific soil characteristics as provided. BMPs shall be designed to intercept and / or treat stormwater near the source. BMPs shall be designed to meet the stormwater management objectives of a specific site.

(d) This includes addressing pollutants of concern of the specific site, as well as addressing pollutants of concern (impairments) in nearby water bodies, according to the latest approved CA 303(d) impairment list. BMPs shall be designed to minimize concentrated flows to reduce downstream erosion and maintain surface hydrology.

(2) Storm drains shall not be sited downslope of, or immediately adjacent to, loading docks, garbage dumpsters or hazardous materials / waste storage areas unless appropriate treatment and / or containment are provided.

(a) Storm drains shall be stenciled using the approved MCB CPEN storm drain stencil.

(b) Restaurants shall provide a janitorial area with sanitary sewer floor drain and grease interceptor for washing floor mats and disposing of mop water.

(c) For indoor maintenance or industrial areas, trench drains are not desirable, however if required, shall be dead-end containment trenches only, and shall not be connected to the sanitary sewer or to the storm drain system.

(d) Parking structure floor drains shall be connected to the sanitary sewer system. Refer to CASQA BMP Manuals for appropriate source control BMPs.

k. **CONSTRUCTION SEQUENCING**: Proper construction sequencing shall be used such that Infiltration BMPs shall not be installed until the drainage area has been stabilized, so as to prevent damage / siltation of BMP during construction. Similarly, proper construction sequencing shall be used such that site soils in the vicinity of infiltration BMPs do not become compacted during construction.

FACILITY CATEGORY AND ALLOWABLE BMP's

LODGING FACILITIES:	ALLOWABLE BMP:
BEQs BOQs Temporary Lodging **MEDICAL & DENTAL CLINICS** **LOW VOLUME PARKING LOTS** 50 parking spaces or less **RECREATIONAL FACILITIES** Fitness Centers Golf Courses Equine Facilities Movie Theaters Bowling Centers Skeet and Trap Areas **RETAIL FACILITIES** Exchange Home Center Garden Center Mini-Exchanges Apparel Other Shops **EXTERIOR COMMON AREAS** Muster Areas Parade Decks Plazas Sidewalks	Bioretention Area Bioswale Detention Basin Infiltration Trench or Basin Manufactured Detention BMPs Manufactured Treatment BMPs Permeable Pavement Vegetated / Riparian Buffer

Figure 61: Facility Category and Allowable BMPs – Pg. 1 of 2

FACILITY CATEGORY AND ALLOWABLE BMP's

ADMINISTRATIVE & INSTRUCTIONAL FACILITIES: CDC's Classrooms Offices Schools	**ALLOWABLE BMP:** Bioretention Area Bioswale Cistern Detention Basin Infiltration Trench or Basin Manufactured Detention BMPs Manufactured Treatment BMPs Permeable Pavement Vegetated / Riparian Buffer
HIGH VOLUME PARKING LOTS: more than 50 parking spaces	**ALLOWABLE BMP:** Bioretention Area Bioswale Catch Basin Hydrocarbon Filters Detention Basin Infiltration Trench or Basin Manufactured Detention BMPs Manufactured Treatment BMPs Permeable Pavement Vegetated / Riparian Buffer
FOOD SERVICE ESTABLISHMENTS: Restaurants Dining Halls Vendors	**ALLOWABLE BMP:** Bioretention Area Bioswale Detention Basin Manufactured Detention BMPs Manufactured Treatment BMPs Permeable Pavement Vegetated / Riparian Buffer
TRAINING FACILITIES within CANTONMENT AREAS: Rappel Towers Obstacle Courses	**ALLOWABLE BMP** Bioretention Area Bioswale Detention Basin Infiltration Trench or Basin Vegetated / Riparian Buffer
LIGHT INDUSTRIAL FACILITIES: Gas Stations Tactical Vehicle Maintenance and Storage Armories Wash Racks	**ALLOWABLE BMP:** Catch Basin Hydrocarbon Filters Detention Basin Manufactured Detention BMPs Vegetated / Riparian Buffer

Figure 61: Facility Category and Allowable BMPs – Pg. 2 of 2

SECTION 13: MANUFACTURED TREATMENT AND DETENTION BMP'S

1. **REFERENCES**:

   a. U.S. EPA EISA § 438, "Stormwater Management for Federal Facilities, Stormwater Runoff Management"

   b. U.S. EPA 841-B-09-001, Section 438, "Technical Guidance on Implementing the Stormwater Runoff Requirements for Federal Projects"

   c. SWRCB, Water Quality Order No. 2013-0001-DWQ, "NPDES", General Permit No. CA S000004, "WDR for Stormwater Discharges from Small MS4s"

   d. UFC 3-210-10, "LID"

   e. CASQA BMP Handbooks, "New Development and Redevelopment; Municipal; Industrial; Construction"

   f. DWQ NPDES, "General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities (Order 2009-0009-DWQ, NPDES No. CAS000002)

   g. UFC 3-201-01, "The WBDG: Civil Engineering"

   h. If the standard sought does not appear in the above requirements, then the latest edition of the following standards shall be used in the order listed. If a conflict exists, the MCB CPEN Requirements have primacy.

      (1) San Diego County Drainage Design Manual

      (2) San Diego County Hydrology Manual

      (3) San Diego County SUSMP

      (4) SDRSD

      (5) SSPWC or Greenbook Construction Standards

      (6) Caltrans, Standard Specifications and Construction Details, Stormwater Design Guidelines

      (7) FHWA Urban Drainage Design Manual, Hydraulic Engineering Circular No. 22.

2. **ACCEPTABLE MANUFACTURED BMPS**: Where no other BMP options are feasible, manufactured BMPs may be selected. Manufactured BMPs shall conform to the following requirements:

   a. Manufactured treatment systems shall be capable of removing the specified pollutants to a high efficiency.

b. Manufactured systems shall be designed to be as simple as possible, with a minimum number of components.

c. The system shall not include moving parts.

d. Replacement parts, such as filters or media, shall be commercially available.

e. Plan drawings for the specific model shall be provided.

f. Selected system shall be functionally equivalent to existing systems aboard MCB CPEN so as to minimize maintenance requirements.

g. Manufactured underground detention systems shall be properly designed for aboveground structural loads.

3. **PROHIBITED MANUFACTURED BMPS**:

a. Proprietary / manufactured systems which would obligate the Government to obtain replacement parts or services from a single vendor are prohibited.

b. Systems requiring a pump are prohibited.

c. Systems requiring the use of chemicals are prohibited.

d. Systems requiring maintenance more than twice per year are prohibited.

e. Systems requiring permit required confined space entry for maintenance shall be avoided unless absolutely necessary.

f. Limited exceptions for industrial facilities shall be approved by ES, Stormwater Branch.

4. **MANUFACTURER / INSTALLER'S QUALIFICATIONS**: Prior to installation, the contractor shall submit proof of manufacturer / installer's experience and qualifications which shall include 3-years on projects of similar complexity. Documentation shall include names and locations of two projects successfully completed and proven to perform as specified.

5. **DELIVERY, STORAGE, AND HANDLING**: Manufactured unit materials shall be inspected for damage upon delivery. Materials stored on-site shall be housed in an enclosure or under protective coverings. Materials shall not be stored directly on the ground.

6. **INSTALLATION**: Manufactured unit and accessory equipment shall be installed in accordance with manufacturer's recommendations.

a. Unit shall be leveled and anti-flotation ballast shall be installed to prevent hydrostatic uplift and ensure unit stability.

b. Each item of equipment shall have a nameplate bearing the manufacturer's name, address, model name and number, and serial number securely affixed in a conspicuous place. The nameplate of the distributing agent shall not be acceptable.

c. Cartridges / filters / media shall not be installed until the drainage area is clean and stabilized.

SECTION 14: WARRANTY, TESTING AND INSPECTION OF STORMWATER FACILITIES

1. **REFERENCES**:

a. U.S. EPA EISA § 438, “Stormwater Management for Federal Facilities, Stormwater Runoff Management”

b. U.S. EPA 841-B-09-001, "Technical Guidance on Implementing the Stormwater Runoff Requirements for Federal Projects Under Section 438 of the EISA"

c. SWRCB, Water Quality Order No. 2013-0001-DWQ, “NPDES”, General Permit No. CA S000004, “WDR for Stormwater Discharges from Small MS4s”

d. UFC 3-210-10, “LID”

e. CASQA BMP Handbooks, “New Development and Redevelopment; Municipal; Industrial; Construction”

f. DWQ NPDES, "General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities (Order 2009-0009-DWQ, NPDES No. CAS000002)

g. UFC 3-201-01, “The WBDG: Civil Engineering”

h. If the standard sought does not appear in the above requirements, then the latest edition of the following standards shall be used in the order listed. If a conflict exists, the MCB CPEN Requirements have primacy.

(1) San Diego County Drainage Design Manual

(2) San Diego County Hydrology Manual

(3) San Diego County SUSMP

(4) SDRSD

(5) SSPWC or Greenbook Construction Standards

(6) Caltrans, Standard Specifications and Construction Details, Stormwater Design Guidelines

(7) FHWA Urban Drainage Design Manual, Hydraulic Engineering Circular No. 22

2. **WARRANTY**: Provide one-year warranty on all stormwater facilities, including LID features and manufactured treatment / detention systems, as well as all landscaped areas. The warranty period shall be for 365-calendar days. The warranty period shall begin on the Basic Occupancy Date (BOD) of the contract, or for projects with a construction permit, the warranty period shall begin upon acceptance and approval of the notice of Termination by the RWQCB, whichever occurs later.

3. **PRIOR TO THE BOD**: The following stormwater facility maintenance activities shall be completed prior to BOD: trash and debris removal, sediment removal, weed/brush removal, cartridge, media and / or filter replacement, street sweeping and / or vacuuming of pavement areas, system flushing or other maintenance required for proper function of the BMP.

   a. All impermeable surfaces shall be clean and free of dirt and debris.

   b. All catch basins, vaults, manholes, pipes and culverts shall be free of sediment and debris.

   c. Erosion damage shall be repaired during maintenance period. For manufactured BMPs with a separate one-year warranty, cartridge, media and / or filter replacement and other provided maintenance shall be as directed by the manufacturer and at a minimum, mandatory at the end of the warranty period.

4. **WARRANTY MAINTENANCE**: Stormwater facility warranty maintenance shall be integrated with Landscape Maintenance for all vegetated BMPs. Landscape maintenance contractor shall be familiar with the design and function of the specific stormwater measure(s) to ensure proper function of stormwater BMPs. Chemical applications are prohibited. Landscape Maintenance Log shall be used to document all landscape maintenance actions in vegetated BMPs during the warranty period. Refer to BEAP Section 3.6 D LANDSCAPE GUIDELINES, Maintenance and Establishment Period.

5. **FIELD QC TESTING AND INSPECTIONS**:

   a. The Contracting Officer shall witness field tests and conduct field inspections specified in this section.

      (1) The Contractor shall perform field tests and provide labor, equipment, and incidentals required for testing.

      (2) The contractor shall produce evidence, when required, that each item of work has been constructed in accordance with the drawings and specifications.

      (3) The contractor shall submit written documentation of results, including photographs, after each QC test or inspection.

   b. Pre-operational and in-service tests shall be conducted to ensure proper installation and functioning of stormwater BMPs.

      (1) For manufactured treatment / detention BMPs, the manufacturer's service representative is required to be present and certify successful completion of tests.

      (3) For infiltration BMPs, pre-operational and in-service tests shall consist of in-situ infiltration testing or other verification of design infiltration rate. Pre-operational tests shall be conducted

prior to BOD. In-service tests shall be conducted at the 11-month warranty site walk. Test results shall be documented.

c. During the warranty period, the contractor shall conduct a minimum of two physical inspections of each stormwater facility, including all BMPs.

(1) The first stormwater facility inspection shall be conducted after a significant storm event or at the end of the rainy season.

(2) The second stormwater facility inspection shall be conducted near the end of the warranty period, preferably after a significant storm event or at the end of the rainy season.

(3) Landscape warranty inspections shall be conducted concurrently for vegetated BMPs. Corrective actions required as a result of inspections shall be completed during the warranty period, and coordinated with the FEAD Office and FMD QA Inspector. Inspection results shall be documented and photographed.

SECTION 15: SPECIAL CONSIDERATIONS FOR STORMWATER MAINTENANCE AND ACCESS

1. **REFERENCES**: All construction shall conform to the most recent edition of the following standards; where standards provide conflicting information pertaining to an issue, the most stringent information shall apply.

a. CASQA BMP Handbooks, "New Development and Redevelopment; Municipal; Industrial; Construction"

b. UFC 4-010-01, "The WBDG: DoD Minimum Antiterrorism Standards For Buildings"

c. UFC 4-010-02, "The WBDG: DoD Minimum Antiterrorism Standoff Distances For Buildings"

d. UFC 4-022-03, "The WBDG: Security Fences and Gates"

e. LID / EISA

f. MCO 5530.14A, "Marine Corps Physical Security Program Manual"

2. **MAINTENANCE CONSIDERATIONS**: Site design shall minimize long-term maintenance costs. See CASQA Stormwater BMP Handbooks for maintenance considerations.

a. Site design shall include maintenance access points which allow maintenance personnel and heavy equipment safe access to stormwater collection and conveyance system, including BMPs, basins and manholes /junctions.

b. Some underground structures, such as vaults and baffled manholes, may require multiple manhole openings in order to provide maintenance access for personnel and / or equipment such as vacuum trucks.

c. Design of maintenance access location shall account for maximum pumping height and distance for BMPs requiring maintenance by vacuum truck.

d. Access ramp and entry road shall be provided for flood control basins.

e. Forebays shall be designed as sediment cleanouts to reduce maintenance of basins.

3. **VAULT DOORS / MANHOLES AND ACCESS LADERS**: Contractor shall install all vault doors / manholes and access ladders in all underground manufactured treatment vaults. Each door shall be equipped with a recessed lifting handle, a locking hinge to prop doors open, and a locking latch or other means to securely close.

4. **SAFETY**: Roadside conveyances shall be designed with appropriate separation or physical barrier so as to minimize the possibility of vehicle accidents.

a. Metal debris rack, fencing or other protective measures shall be provided for stormwater facilities located in areas likely to be frequented by pedestrians.

b. Rack shall be sized to maintain pipe capacity while preventing access to pedestrians.

5. **PUBLIC HEALTH**: Standing water has the potential to harbor mosquitoes, therefore stormwater facilities shall be designed to infiltrate or drain completely within 72 hours.

6. **PHYSICAL SECURITY**: At all locations where perimeter security fences cross drainage channels or culverts, provide security barriers to prevent access by intruders. Designs shall comply with references (1.b.) through (1.c.). When conflicts arise between LID/EISA and UFC 4-010-01 or 4-010-02, UFCs 4-010-01 and 4-010-02 and UFC 4-022-03 take precedence. Consult with current service policies on specific requirements regarding fence height and assets that may require a higher level of protection. For specific situational security fence requirements comply with MCO.5530.14A, "Marine Corps Physical Security Program Manual."

7. **SIGNAGE**:

a. **REQUIRED SIGNAGE**: Signage prohibiting tactical or recreational vehicle use shall be installed near applicable BMPs. Signs shall be constructed of durable exterior materials and shall be warrantied for a period of at least 5-years. Signs shall be designed in accordance with the recommendations in the BEAP and shall conform to any other MCB CPEN signage requirements from the FMD.

b. **OPTIONAL SIGNAGE**: An interpretive sign covering the key site LID components may be installed where the sign can serve a dual educational / public awareness purpose. Interpretive signs may be used to meet LEED requirements. The use and content of an interpretive sign requires approval by PWD, A&E Branch, Civil Projects Team and shall be determined on a case-by-case basis. Interpretive sign shall be placed in high foot traffic areas, at an appropriate viewing location, either indoors or outdoors. Outdoor signs shall be constructed of durable exterior materials and shall be warrantied for a period of at least 5-years.

SECTION 16: BEAP CONSIDERATIONS FOR STORMWATER BMP'S

1. **REFERENCES**: All construction shall conform to the most recent edition of the following standards; where standards provide conflicting information pertaining to an issue, the most stringent information shall apply.

   a. County of San Diego Standards:

      (1) Concrete Structures

      (2) Drainage Systems: Details D-30 to D-34 shall be used only as reference details for overall dimensions. Wing- walls shall be required for all the headwalls as indicated in Detail D-40.

      (3) General Surface Improvements: Detail G-36 shall not be used.

         (a) Sprinkler Irrigation Systems

         (b) Traffic Control Plans

         (c) Sewerage Systems: Pending review from the PWD, A&E Branch, Utilities Projects Team.

         (d) Water Systems: Pending review from the PWD, A&E Branch, Utilities Projects Team.

         (e) The contractors shall delete the "County of San Diego" name when the standard details are used as part of the drawings and specifications.

   b. State of California Manual of Traffic Controls:

      (1) Construction and Maintenance Work Zones

   c. Caltrans Standards Specifications:

      (1) Grading Sections

      (2) Sub-bases and Bases Sections

      (3) Surfacing and Pavements Sections

      (4) Drainage Facilities Sections

      (5) Right of Way and Traffic Control Facilities Sections

      (6) Materials Sections

         (a) The Caltrans Standard Specifications are only applicable in their technical or engineering value, not in "measurements, and payment" related to the to specific agency requirements.

         (b) If conflict between these standard specifications and others requirements in the CPR, the CPR requirements prevail.

d. Standard Plans – State of California, Department of Transportation (DoT):

(1) Pavement Markers, Traffic Lines and Pavement Markings: All Plans

(2) Excavation and Backfill: Miscellaneous Details, Concrete Pipe Culverts, Cast-In-Place Reinforced Concrete Box and Arch Culverts, and Metal / Plastics Culverts

(3) Portable Concrete Barrier: All Plans

(4) Object Markers, Delineators, Channelizers and Barricades

(5) Concrete Barrier Type 60 Series: All Plans

(6) Metal Beam Guard Railing: Standard Railing Sections: All Plans

(a) All Posts and Separators shall be Typical Layout for Embankments

(b) Typical Layout for Embankments

(c) Typical Layout for Structures

(d) Typical Layout for Fixed Objects

(e) End Anchorage and Rail Tensioning Assembly

(f) Connection Details and Transition Railing to Bridge Railings, Abutments and Wall

(g) Terminal System End Treatment

(h) All the posts and separators between the Beam Guard Railing and the Post shall be galvanized steel to avoid damage during wild fires.

(7) Three-Beam Barrier: All Plans

(a) Standard Barrier Sections

(b) At Fixed Objects and on Bridge

(c) End Anchorage, End Treatment and Emergency Passageway

(d) Connections to Bridge Railings, Abutments, Walls and Barrier

(e) Transition Railings

(f) All the posts and separators between the Beam Guard Railing and the Post shall be galvanized steel to avoid damage during wild fires.

(8) Crash Cushions: All Plans

(9) Steel Crib Walls: Construction Details, and Design Data

(10) Drainage Inlets, Steel Pipe Inlets, Concrete Pipe Inlets, and Grates:

(a) Drainage Inlets Details

(b) Steel Pipe Inlets Details

(c) Concrete Pipe Inlets: Ladder and Trash Rack Details

(d) Grate Details

(e) Bicycle Proof Grate Details

(11) Concrete Pipe: Direct Design Method: All Plans

(12) Box Culverts: All Box Culverts shall include Wing Walls at Both Ends

(13) Pipe and Arch Culvert: End Walls and Warped Wing Walls: All Plans

(14) Pipe Down-drains, Anchorage Systems and Over-side Drains: All Plans

(15) Construction Loads on Culverts and Strut Details: All Plans

(16) Pipe Head Walls, End Walls, and Wing Walls: Pipe Culvert Head Walls, End Walls, and Wing Walls: Types A, B & C.

(17) Flared End Sections: Metal and Plastic Flared End Sections

(18) Pipe Coupling and Joint Details: All Plans

(19) Slotted and Grated Line Drains: All Plans

(20) Retaining Walls: All Plans

2. **LANDSCAPE AND PLANTING DESIGN**:

a. All landscape areas shall conform to the BEAP unless specifically outlined otherwise in this document. Plants play a very important role in natural drainage patterns, and landscape-based stormwater treatment (vegetated BMPs) is encouraged as an effective, aesthetic, and relatively simple way to achieve LID goals.

b. Plants can be used to aid in infiltration, evapotranspiration, sedimentation, pollutant trapping, phytoremediation, and soil stabilization. Given these varying and important functions, each planting plan shall be carefully designed and shall be site and BMP specific with the long term goal of naturalization. Ability to tolerate heat, coastal conditions, flooding and wind shall also be considered.

3. **SITE DESIGN**:

   a. The design intent shall be to integrate vegetated BMPs into the greater site and landscape design. The intent of vegetated BMPs is to mimic natural systems. Techniques to achieve this include natural contour grading, diversity of species, and full coverage of slopes. Having a cross disciplinary team (landscape architect, civil engineer and architect, etc.) involved from conceptual planning through design and construction shall ensure a more unified design.

   b. Existing vegetation shall be maintained where possible to serve as a buffer.

4. **PLANT SELECTION**:

   a. The MCB CPEN Approved Plant list was developed using plants with characteristics such as drought-tolerance, lack of invasive potential, and minimal maintenance demands, and which are suitable in the different micro-climates and low soil fertility found aboard MCB CPEN. Plants used in vegetated BMPs shall meet these criteria, and also shall tolerate periodic inundation, be adapted to well-drained soils, have phytoremediation capabilities, and not have invasive roots. Observation of the surrounding natural landscape, design that mimics plant communities, biodiversity, and overall durability shall drive the planting design. Not every species is appropriate for every site.

   b. Vegetated BMP area shall contain an appropriate mix of trees, shrubs and herbaceous perennial ground cover. Containerized plants or plugs shall be used in vegetated BMP areas. Seeding is unreliable due to the fluctuating water levels that are typical in BMPs, and shall therefore not be used in inundation areas or in the flow pathway. Plant spacing shall be dense in order to achieve quick soil coverage. A density of one tree or shrub per 50 SF of vegetated BMP areas is the desired average, with herbaceous perennials between. Additional details on plant spacing may be found in the RFP. A mix of at least three species in each category shall be used in order to avoid the development of monoculture. Trees shall be kept to the periphery of the planting area and be placed so as to provide shade for the greater landscape as necessary. All plants shall be placed in order to function properly in terms of filtration and retention, but also shall be integrated into the aesthetics of the site design. Full coverage of ground cover shall be achieved by end of warranty period.

5. **IRRIGATION**:

   a. Permanent, automatic, below-ground irrigation is required in all landscaped areas and bioretention facilities. Irrigation shall conform to current BEAP and CPR standards. Temporary aboveground irrigation systems may be used for seeded or hydroseeded areas as approved by the FEAD, CM. Irrigation systems shall be designed to minimize water use, avoid overwatering, and prevent underdrain discharges during dry weather. Spray heads shall be positioned to avoid direct spray into stormwater inlets, outlet structures or onto paved surfaces.

   b. Vegetated BMPs may need to be irrigated more than once a day. Irrigation schedules shall be designed to operate in a series of short cycles, rather than one longer cycle. This aids in water penetration and minimizes run-off. Irrigation controls shall allow separate zone control of times and durations of irrigation for vegetated BMPs vs. other landscape areas. Contractor shall confer with WRD to determine if recycled wastewater is available at project site and if it shall be utilized in vegetated BMPs.

6. **FERTILIZATION**:

   a. Due to the potential for conveying nutrients to storm drains, no fertilizer shall be added to vegetated BMPs or landscape areas that drain into them. Compost tea, available from various nurseries and garden supply retailers, may be applied at a recommended rate of 5 gallons mixed with 15 gallons of water per acre.

   b. Compost tea can be applied up to 2-weeks prior to planting and once per year between March and June. Application is not recommended when temperatures are below 50 F or above 90 F or when rain is forecast in the next 48 hours. Additional applications may be needed to correct nutrient deficiencies.

7. **MULCH AND ROCK**:

   a. Mulch is required for the purpose of retaining moisture, preventing erosion and minimizing weed growth.

   b. Rock mulch (gravel) or 6”-12” river cobble as appropriate shall be used in the flow path of stormwater for lower velocity flow areas and where complete plant cover is not expected. For higher velocity flow paths, provide 6”-12" angular cobble.

   c. When using organic mulch in vegetated BMPs, aged mulch, also called composted mulch, shall be used to reduce the tendency to float into overflow inlets during intense storms.

   d. Organic mulch may be used in the ponding areas. Organic mulch shall not be used in the primary flow path of stormwater.

   e. Mulch shall be at least 3” thick to prevent weed growth.

   f. Gravel or small diameter river rock may be used to stabilize the soil around storm drain inlets.

8. **WEED CONTROL**:

   a. During the maintenance period, weeds shall be controlled primarily by manual methods and soil amendment.

   b. In response to problem areas or threatening invasions, corn gluten, white vinegar, vinegar- based products, or non-selective natural herbicides may be used.

   c. NOTE: Weed fabric shall not be used in vegetated BMPs.

9. **PEST AND DISEASE CONTROL**:

   a. Synthetic pesticides shall not be used on bioretention facilities.

   b. Beneficial nematodes and non- toxic controls may be used.

CSI 40 00 00 PROCESS INTEGRATION

SECTION 1: GEOTECHNICAL CONSIDERATIONS FOR STORMWATER SOIL PROPERTIES

1. **REFERENCES**:

   a. EISA, "Stormwater Management for Federal Facilities," Section 438

   b. U.S. EPA 841-B-09-001, "Technical Guidance on Implementing the Stormwater Runoff Requirements for Federal Projects Under Section 438 of the EISA"

   c. SWRCB, Water Quality Order No. 2013-0001-DWQ, "NPDES", General Permit No. CA S000004, "WDR for Stormwater Discharges from Small MS4s"

   d. UFC 3-210-10, "LID"

   e. CASQA BMP Handbooks, "New Development and Redevelopment; Municipal; Industrial; Construction"

   f. DWQ California Construction General Permit (Order 2009-0009-DWQ, NPDES No. CAS000002) DWQ NPDES, "General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities (Order 2009-0009-DWQ, NPDES No. CAS000002)

   g. UFC 3-201-01, "The WBDG: Civil Engineering"

   h. If the standard sought does not appear in the above requirements, then the latest edition of the following standards shall be used in the order listed. If a conflict exists, the MCB CPEN Requirements have primacy.

      (1) San Diego County Drainage Design Manual

      (2) San Diego County Hydrology Manual

      (3) San Diego County SUSMP

      (4) SDRSD

      (5) SSPWC or Greenbook Construction Standards

      (6) Caltrans, Standard Specifications and Construction Details, Stormwater Design Guidelines

      (7) FHWA Urban Drainage Design Manual, Hydraulic Engineering Circular No. 22.

2. **INFILTRATION BMPs**: Where existing soil properties do not provide sufficient infiltration rates, infiltration BMPs shall be designed using imported engineered soil media and / or underdrains.

a. Engineered soil shall be specifically developed shall be sufficiently permeable to infiltrate runoff at a design rate of 1"-5" per hour and have sufficient moisture retention to support healthy, vigorous plant growth.

b. Engineered soils shall be a mixture of 85-88% sand, 8-12% fines and 3-5% organic matter. Design infiltration rate and soil mix may be modified based upon site conditions and targeted pollutant(s) and shall be tested to meet above objectives.

c. Engineered soil shall have a Phosphorus Index less than or equal to 30.

d. Use of an underdrain (perforated pipe) may be necessary to allow BMP soils to drain properly. The underdrain conveys filtered water downstream, however with these site conditions, there may be little to no infiltration into underlying soils. In this case, EISA Section 438 Option 2 – to match existing hydrology – would be the only feasible alternative. Lining the bottom of an infiltration BMP produces the same outcome.

e. Where infiltration BMPs shall be used, consideration shall be given to the potential presence of subsurface impermeable layers and the relative likelihood that infiltrated water may migrate to alternate pathways such as structures, roadways, or utility trenches, and the site shall be designed to avoid damage to those facilities. An impervious cutoff wall may be necessary for infiltration BMPs located within 10' of structures or other geotechnical hazards, however this situation shall be avoided if possible.

3. **SLOPE PROTECTION**: A slope of 3H:1V is preferred for hillside cuts within cantonment areas, however a slope of 2H:1V is allowable. If a steeper slope is proposed, a geotechnical engineering analysis shall be provided to justify that the recommended slope shall be sufficiently stabilized. Water shall be intercepted at the top of slope and conveyed safely down the slope by means of a concrete brow ditch. Outlet shall be placed beyond the toe of slope so as to avoid eroding the toe of slope.

4. **PERMANENT STABILIZATION**: Permanent stabilization and establishment of vegetation shall be demonstrated prior to termination of construction permit (if permit is required) and prior to contract closeout.

5. **EXTERIOR FOUNDATION**: Stormwater shall not be allowed to accumulate at building foundation. Finished grade shall slope away from exterior foundations at a minimum of 2% to maintain positive drainage to a stormwater facility. Stormwater shall not be allowed to accumulate at building foundations.

6. **COMPACTION AT INFILTRATION BMPs**: Soils shall be minimally compacted in stormwater BMP areas designed to infiltrate.

APPENDIX A: ACRONYM DEFINITIONS

A

A&E	Architecture and Engineering
A/C	Asphalt / Concrete
AC/S	Assistant Chief of Staff
ABA	Architectural Barriers Act
ABS	Acrylonitrile butadiene styrene
ADA	Americans' with Disabilities Act
ADN	Area Distribution Node
AEC	Architecture, Engineering and Construction
AED	Automatic Electronic Defibrillator
AFCI	Arc-Fault Circuit Interrupter
AFG	Above Finished Grade
AGA	American Gas Association
AHA	Activity Hazards Assessments
AHRI	Air Conditioning, Heating, and Refrigeration Institute
AMI	Advanced Metering Infrastructure
ANSI	American National Standards Institute
API	American Petroleum Institute
APWA	American Public Works Association
ASAP	As Soon As Possible
ASHRAE	American Society of Heating, Refrigeration, and Air Conditioning
ASME	American Society of Mechanical Engineers
AST	Aboveground Storage Tank
ASTM	American Society of Testing Materials
ATCM	Airborne Toxic Control Measure Section
ATFP	Antiterrorism Force Protection
ATO	Antiterrorism Officer, Authority to Operate
AutoCAD	Automated Computer Design
AV	Audio Visual
AWG	American Wire Gauge
AWS	American Welding Society
AWT	Advanced Water Treatment
AWWA	American Water Works Association

B

BBQ	Barbeque
BEAP	BASE Exterior Architecture Plan
BEQ	Bachelor Enlisted Quarters

BHMA	Builders Hardware Manufacturers Association
BMP	Best Management Practices
BOD	Basis of Design, Basic Occupancy Date
BTU	British Thermal Unit
BUMED	Bureau of Medicine
BVD	Best Value Determination

C

CD-ROM	Compact Disk Read-Only Memory
CAB	Cellulose Acetate Butyrate
CAC	Common Access Card
CADD	Computer Aided Design and Drafting
Caltrans	California Transportation
CASQA	California Stormwater Quality Association
CATEX	Categorical Exclusion
CCB	Construction Criteria Base
CCR	California Code of Regulations
CCTV	Closed Circuit Television
CDC	Child Development Center
CDPH	California Department of Public Health
CDR	Commander
CE	Cost Estimates
CEA	California Earthquake Authority
CEC	Civil Engineering Corps, California Energy Commission
CFR	Code of Federal Regulations
CGOM	Crystal Growth of Organic Materials
CM	Construction Manager
cm	centimeters
CMC	Commandant, U. S. Marine Corps
CMP	Corrugated Metal Pipe
CMSC	Consolidated Materials and Service Center
CMU	Concrete Masonry Unit
CNRSW	Commander, Naval Regional Southwest
COP	Car Operating Panel
COTS	Commercial off-the-shelf
CPI	Continuous Process Improvement
CPR	Camp Pendleton Requirements
CSA	Canadian's Standards Association
CSD	Controls and Safety Devices, Content Standards for Digital
CSDGM	Content Standards for Digital Geospatial Metadata
CSI	Construction Specifications Institute

CVS	Contractor Verification System

D

DVD-ROM	Digital Versatile Disc Read-Only Memory
DACR	Digital Alarm Communication Receiver
DACT	Digital Alarm Communication Transmitter
DAS	Data Acquisition System
DCDA	Double-Check Detection Assembly
DDC	Direct Digital Control
DDW	Division of Drinking Water
DG	Disintegrated Granite
DHW	Domestic Hot Water
DI	Ductile Iron
DIACAP	DoD Information Assurance Certification and Accreditation Process
DIV	Division
DM	Design Manager
DMX	Digital Media Extension
DoD	Department of Defense
DODI	Department of Defense Instruction
DOE	Department of Energy
DON	Department of the Navy
DOR	Designer of Record
DOT	Department of Transportation
dpi	dots per inch
DWQ	Department of Water Quality
DWR	Department of Water Resources
DWV	Drain, Waste, and Vent

E

E. Coli	Escherichia Coli
EA	Environmental Assessment
EBS	Electronic Bid Solicitation
EDD	Electronic Design Deliverable
EFV	Excess Flow Valve
EISA	Energy Independence and Security Act
EMS	Energy Management System
EMT	Electrical Metal Tubing
EPA	Environmental Protection Agency, Environmental Protection Act
EPCA	Energy Policy and Conservation Act
EPDM	Ethylene Propylene Diene Monomer

ERT	Encoder Receiver Transmitter
ES	Environmental Security
ESRI	Environmental Systems Research Institute
ESS	Electronic Security Systems
ET	Engineering Technician

F

FF&E	Furniture, Fixtures, and Equipment
FDA/MNS	Fire Detection and Alarm / Mass Notification System
ft/s	Feet / per second
FACP	Fire Alarm Control Panel
FAR	Federal Acquisition Regulations
FDC	Fire Department Connection
FEAD	Facilities Engineering and Acquisition Division (formerly ROICC)
FEMP	Federal Energy Management Program
FGDC	Federal Geographic Data Committee
FHWA	Federal Highway Administration
FIPS	Federal Information Processing Standard
FM	Factory Mutual
FMD	Facilities Maintenance Division
FMO	Facilities Maintenance Officer
FMS	Facility Management System
FOC	Fiber Optic Cable
FSRM	Facility Sustainment, Repair, and Modernization
FT	Feet

G

G-F	General - Facilities
GBC	Green Building Code
GFCI	Ground Fault Circuit Interrupt
GIS	Geospatial Information System
GME	Garrison Mobile Equipment
GOV	Government Owned Vehicles
gph	gallons per hour
gpm	gallons per minute
GPS	Global Positioning System
GRS	Geodetic Reference System
GSA	General Services Administration

H

HDP	High Density Plastic
HDPE	High Density Polyethylene
HHW	Heating hot water
HID	High Intensity Discharge
HO	High Output
HP	Horse Power
HPC	Heterotrophic Plate Count
HQMC	Headquarters Marine Corps
HVAC	Heating, Ventilating, and Air Conditioning

I

I&L	Installations and Logistics
IGI&S	Installation Geospatial Information and Services
I.D.	Inside Diameter
IBC	International Building Code
ICS	Industrial Control Systems
ID	Identification
IDS	Intrusion Detection System
IEEE	Institute of Electrical and Electronics Engineering
IEQ	Indoor Environmental Quality
IFGC	International Fuel Gas Code
IMC	International Mechanical Code
IP	Inside Plant
IPC	International Plumbing Code
IPN	Information Processing Node
IPS	Iron Pipe Standards
IRI	Industrial Risk Insurers
ISP	Information Security Program
IT	Information Technology
ITG	Interim Technical Guidance
ITSM	Information Technology Security Manager

J

JPEG	Joint Photographic Experts Group

K

kg	kilograms
kV	kilovolt
kW	kilowatt

L

LEED	Leadership in Energy and Environmental Design
LID	Low Impact Development

M

MS4	Municipal Separate Storm Sewer Systems
MC-DAA	Marine Corps-Designated Approving Authority
MIL-HDBK	Military Handbook
MARCORSYSCOM	Marine Corps Systems Command
MAWP	Maximum Allowable Working Pressure
MCB CPEN	Marine Corps Base Camp Pendleton
MCCS	Marine Corps Community Services
MCEN	Marine Corps Enterprise Network
MCIWEST	Marine Corps Installation West
MCIWESTO	Marine Corps Installation West Order
MCO	Marine Corps Order
MDPE	Medium-Density Polyethylene
MHE	Material Handling Equipment
MILCON	Military Construction
mils	1/1,000 of an inch
MITSC	Marine Information Technology Support Center
MLG	Marine Logistics Group
mm	millimeters
MNS	Mass Notification System
MPI	Master Painters Institute
MPOE	Main Point of Entry
MSL	Mean Sea Level
MSS	Manufacturers Standardization Society
MUTCD	Manual of Uniform Traffic Control Devices
MXD	Map Document

N

No.	Number
NAD	North American Datum
NAVD	North American Vertical Datum
NAVFAC	Naval Facilities
NAVFACINST	Naval Facilities Instruction
NAVFAC SW	Naval Facilities Southwest
NBIC	National Board Inspection Code
NC	New Construction

NCIS	Naval Criminal Investigation Service
NCTD	North County Transportation District
NDL	No Dollar Limit
NEBB	National Environmental Balancing Bureau
NEC	National Electrical Code
NEMA	National Electrical Manufacturer's Association
NEPA	National Environmental Protection Act
NEXGEN	Next Generation
NFPA	National Fire Protection Association
NMCI	Navy and Marine Corps Instruction
NPDES	National Pollutant Discharge Elimination System
NRCA	National Roofing Contractors Association
NREL	National Renewable Energy Laboratory
NSF	National Sanitation Foundation
NTSB	National Transportation Safety Board

O

O&M	Operations and Maintenance
O.D.	Outside Diameter
OCPW	Orange County Public Works
OECD	Organization for Economic Cooperation and Development
OMSI	Operations and Maintenance Support Information
OPPTS	Office of Prevention, Pesticides and Toxic Substances
OSHA	Occupational Safety and Health Administration
OSP	Outside plant
OTG	Off-the-Grid

P

P&E	Planning and Estimating
PB	Polybutylene
PCC	Portland Cement Concrete
pdf	portable document format
PDS	Protective Distribution System
PE	Polyethylene
PET	Protected Entrance Termination
PISD	Placed in Service Date
PL	Project Leader
PM	Project Manager
PMO	Provost Marshall's Office
POC	Points-of-Contact
POL	Petroleum Oil Lubricants

POV	Privately Owned Vehicle
PRV	Pressure Regulating Valve
psi	per square inch
psig	per square inch gauge
PSRB	Physical Security Review Board
PTOE	Professional Traffic Operations Engineer
PTS	Performance Technical Specification
PUB	Publication
PV	Photovoltaic
PVC	Polyvinyl Chloride
PWD	Public Works Division
PWO	Public Works Officer

Q

QA	Quality Assurance
QC	Quality Control

R

RAPIDGate	Registered and Previously Identified Gate
RCP	Reinforced Concrete Pipe
RCRA	Resource Conservation and Recovery Act
REC	Renewable Energy Certificates
REV	Revision
RF	Radio Frequency
RFP	Requests for Proposals
RH	Relative Humidity
RMF	Risk Management Framework
RO	Responsible Officer
ROD	Range Operations Division
RP	Recommended Practice
ROICC	Regional Officer in Charge of Construction
RPAO	Real Property Accountability Officer
RPM	Reinforced Plastic Mortar
RPPA	Reduced Pressure Principal Assembly
RSO	Range Safety Officer
RTA	Range Training Area
RTAMD	Range and Training Area Management Division
RTR	Reinforced Thermosetting Resin
RWQCB	Regional Water Quality Control Board

S

SF6	Sulfur Hexafluoride
SCAQMD	South Coast Air Quality Management District
SDAPCD	San Diego Air Pollution Control District
SDDEH	San Diego Department of Environmental Health
SDG&E	San Diego Gas and Electric
SDR	Standard Dimension Ratio
SDRSD	San Diego Regional Standard Drawings
SDWA	San Diego Water Authority, Safe Drinking Water Act
SECNAVINST	Secretary of the Navy Instructions
SES	Safety and Emergency Services
SF	Square Feet
SID	Structural Interior Design
SIPRnet	Secret Internet Protocol Router Network
SLS	Sewer Lift Station
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association
SMARTS	Stormwater Multiple Applications and Report Tracking System
SME	Subject-Matter Experts
SOP	Standard Operating Procedures
SOV	Shut-off Valves
SOW	Statement of Work
SPAWAR	Space and Naval Warfare
SPCC	Spill Prevention, Control, and Countermeasure
sq. in.	Square Inches
SR	Secure Room
SSMR	Standing Seam Metal Roofing
SSPC	Society of Protective Coatings (formerly Steel Structures Painting Council)
SSPWC	Standard Specifications for Public Works Construction
STI	Steel Tank Institute
SUSMP	Standard Urban Stormwater Mitigation Plan
SUV	Sport Utility Vehicle
SWPPP	Stormwater Pollution Prevention Plan
SWRCB	State Water Resources Control Board
SWRFT	Southwest Regional Fleet Transportation

T

T/E	Table of Equipment
TAB	Testing and Balancing
TACOMM	Tactical Communications
TDR	Time-Domain Reflectometer
THHN	Thermo-plastic Heat-resistant Nylon

THWN	Thermo-plastic Weatherproof Nylon
TIA	Telecommunications Industry Association
TOC	Table of Contents
TOU	Time-of-Use
TPO	Thermoplastic Polyolefin
TR	Telecommunications Room

U

U.S. GBC	United States Green Building Council
U.S. NCS	United States National Computer Aided Drafting Standards
UFC	Unified Facilities Criteria
UFGS	Unified Facilities Guide Specifications
UL	Underwriters Laboratories
UMC	Unified Mechanical Code
UMCS	Utility Monitoring and Control System
UPC	Universal Plumbing Code
UPS	Uninterruptible Power Supply
USMC	United States Marine Corps
USN	United States Navy
USPS	United States Postal Service
UV	Ultraviolet

V

V	Volts
VAC	Volts Alternating Current, Variable Air Control
VAV	Variable Air Volume
VFD	Variable Frequency Drives
VOC	Volatile Organic Chemicals
VRV	Variable Refrigerant Valve

W

Wi-Fi	Wireless-Fidelity
WBDG	Whole Building Design Guide
WDR	Waste Discharge Requirements
WGS	World Geodetic System
WOG	Water / Oil / Gas
WRD	Water Resources Division
WWTP	Wastewater Treatment Plant

APPENDIX B: LIST OF REFERENCES CITED IN THE CPR

DISCLAIMER: All planning, design, construction, sustainment, restoration and modernization must adhere to the WBDG, UFC and references contained within the UFC. It is the intent of the CPR to provide requirements which are unique to MCB CPEN, thus the CPR does not list every applicable UFC or reference. Below is a compiled list of references cited throughout the 2016 CPR.

1. 29 CFR § 1910.22(D), "General Requirements, Occupational Safety and Health Administration, Walking-Working Surfaces"
2. 29 CFR § 1910.27, "Fixed Ladders"
3. 29 CFR § 1926.956 (c) (1), "1910 OSHA General Industry Regulations Book, Underground Lines, Trenching and Excavating"
4. 40 CFR § 112.7, "General Requirement for SPCCP"
5. 42 U.S.C. § 11301, "The Public Health and Welfare: McKinney - Vento Homeless Assistance Act"
6. 42 U.S.C. § 6361(a) (1), "The Public Health and Welfare: Federal Energy Conservation Programs"
7. 42 U.S.C. § 6901-6992k, "The Public Health and Welfare: RCRA"
8. 42 U.S.C. § 7671, "The Public Health and Welfare: Clean Air Act Title VI, Stratospheric Ozone Protection"
9. 42 U.S.C. § 8253, "The Public Health and Welfare: Energy Management Requirements"
10. 42 U.S.C. § 8259(b), "The Public Health and Welfare: Federal Procurement of Energy Efficient Products"
11. 42 U.S.C. § 8262(g), "The Public Health and Welfare: Procurement and Identification of Energy Efficient Products"
12. 42 U.S.C. § 8287, "The Public Health and Welfare: Authority to Enter into Contracts"
13. 48 CFR § 23.801(b), § 706 D, "Federal Acquisition Regulations System, Authorities, Title VII of the Omnibus Appropriations Act"
14. 48 CFR § 52.236–25, "Requirements for Registration of Designers"
15. 49 CFR §192, "Transportation of Natural and Other Gas for Pipeline: Minimum Federal Safety Standards"
16. 49 CFR § 192.321, "Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards, Installation of Plastic Pipe"
17. 49 CFR § 192.321(e), "Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards"
18. 49 CFR § 192.629, "Transportation of Natural and Other Gas by Pipeline: Purging of Pipelines"
19. ABA – Architectural Barriers Act Standards.
20. ADA – Americans' with Disabilities Act Standards
21. AGA 72-D-56, "Merco Tape Non-Detectable Underground Tape"
22. AHRI – Air Conditioning, Heating, and Refrigeration Institute Standards.
23. ANSI – American National Standards Institute Standards.
24. ANSI / BHMA A156.13, Series 1000, "Mortise Locks"

25. ANSI / CEA 709.1-B, “Control Network Protocol Specifications”
26. ANSI / CEA 852.1, “Enhanced Protocol for Tunneling Component Network Protocols over Internet Protocol Channels”
27. ANSI / CTA 2045, "Modular Communications Interface for Energy Management"
28. API, RP - American Petroleum Institute, Recommended Practices
29. API, RP 1109, “Marking Liquid Petroleum Pipeline Facilities”
30. APWA Uniform Color Code
31. ASHRAE – American Society of Heating, Refrigeration, and Air Conditioning Engineers Standards
32. ASME - American Society of Mechanical Engineers Standards
33. ASME A17.7-2007 / CSA B44.7-07 (R2012) Handbook, “Performance-Based Safety Code for Elevators and Escalators”
34. ASME A17.1-2010 / CSA B44-10, "Safety Code for Elevators and Escalators / Safety Code for Elevators"
35. ASME CSD-1-2012, "Controls and Safety Devices for Automatically Fire Boilers".
36. ASME CSD-1-2012, paragraph CF0-140, page 17, “Controls and Safety Devices for Automatically
37. ASME CSD-1- 2012, Part CG-500, "Controls and Safety Devices for Automatically Fired Boilers: Certification and Reporting”
38. ASME PD370-B31.8, "Gas Transmission & Distribution Piping System"
39. ASTM - American Society of Testing Materials Standards
40. ASTM D2661-14, "Standard Specification for ABS"
41. ASTM D2665-14, "Standard Specification for PVC Plastic Drain, Waste, Vent (DWV) Pipe and Fittings”
42. ASTM D2751-05, "Standard Specification for ABS Sewer Pipe and Fittings”
43. ASTM D2949-10, "Standard Specification for 3.25” O.D. PVC Plastic DWV Pipe and Fittings”
44. ASTM D3034-15e1, "Standard Specification for type PSM PVC Sewer Pipe and Fittings”
45. ASTM D877 / D877M-13, "Standard Test Method for Dielectric Breakdown Voltage of Insulating Liquid Using Disk Electrodes”
46. ASTM D92-12b, "Standard Test Method for Flash and Fire Points by Cleveland Open Cup Tester"
47. ASTM D97-16, "Standard Test Method for Pour Point of Petroleum Products"
48. ASTM F14-80, "Standard Practice for Making and Testing Reference Glass - Metal Bead-Seal"
49. ASTM F1488-14, "Standard Specification for Coextruded composite Pipe, ABS, CPVC, Cellular, Coextruded, Composite, PVC”
50. ASTM F1866-13, "Standard Specification for PVC Plastic Schedule 40 Drainage and DWV Fabricated Fittings, Standard by ASTM International”
51. ASTM F2170, "Standard Test Method for Determining RH in Concrete Floor Slabs"
52. ASTM F628-12e2, "Standard Specification for ABS Schedule 40 Plastic DWV Pipe with a Cellular Core”
53. ASTM F891-10, "Standard Specification for Coextruded PVC Plastic Pipe with a Cellular Core”
54. AWS - American Welding Society Standards
55. AWWA - American Water Works Association Standards.

56. BHMA - Builders Hardware Manufacturers Association Standards
57. Bureau of Medicine Instruction (BUMEDI) 5010-5 (Rev 6-2008 or latest edition) 0510-LP-107-3451, CH 5, “Water Supply Ashore”
58. Caltrans - California Department of Transportation Standards
59. Caltrans, "Office of CADD and Engineering GIS Support Standards"
60. Caltrans, "Stormwater Quality Handbooks Project Planning and Design Guidelines".
61. CASQA - California Stormwater Quality Association Standards
62. CASQA, "New Development and Redevelopment BMP Handbooks"
63. CASQA, “Stormwater BMP Handbook”
64. CRWQCB – California Regional Water Quality Control Board Standards
65. CRWQCB, SD Region, Order No. R9-2013-0112, NPDES No. CA019347, "WDR for the MCB CPEN, SRTT Plan, and AWT Plant, Discharge to the Pacific Ocean via Oceanside Ocean Outfall”
66. CSA B181.1, "ABS DWV Pipe and Pipe Fittings Defines Requirements for ABS”.
67. CSA B181.2, "DWV Piping - Plastic"
68. CSA B182.4, "Profile PVC Sewer Pipe and Fittings - Plumbing Products and Materials"
69. DoD 4500.36M, "Acquisition, Management, and Use of DoD Non-Tactical Vehicles"
70. DoD 4525.6-M, "DoD Postal Manual"
71. DODI 2000.16, “DoD Antiterrorism Standards”
72. DODI 5200.08, “Security of DoD Installations and Resources and the DoD PSRB”
73. DODI 8510.01, "RMF for DoD IT"
74. DOE, "Model Specification for LED Roadway Luminaires”
75. DON 11103, "Policy for Procurement of BEQ FF&E”.
76. DON LID Policy, “Implementation and Site Development of NAVFAC Projects, (Penn Memo)”
77. DWQ NPDES, "General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities (Order 2009-0009-DWQ, NPDES No. CAS000002)”
78. EC&M - Electrical Construction & Maintenance Standards
79. EC&M, “Ampacity of Generator Conductors in Article 445”
80. EC&M, “Common Ground in Article 100”
81. EC&M, “Disconnect Requirements in Article 430”
82. EISA - Energy Independence and Security Act
83. Epoch 1991.35 Horizontal Data Sheet
84. ESRI - Environmental Systems Research Institute Standards
85. ESRI 102646, NAD, “State Plane California Zone VI and the FIPS 0406 Projection System”
86. Executive Order 11912, “Delegations of Authority Relating to EPCA”
87. Executive Order 12902, Section 301, "Energy Efficiency and Water Conservation at Federal Facilities: Agency Goals and Reporting Requirements for Energy and Water Efficiency in Federal Facilities”

88. Executive Order 13423, “Strengthening Federal Environmental, Energy, and Transportation Management”
89. Executive Order 13514, “Federal Leadership in Environmental, Energy, and Economic Performance Guidance”
90. Factory Mutual Research Approval Guide, Item P7825, "The Physical Object"
91. FAR - Federal Acquisition Regulations and Standards.
92. FAR 52.236-25, “Requirements for Registration of Designers”
93. FAR 5252.236-9310, “Record Drawings”
94. FC – Facilities Criteria Standards
95. FC 1-300-09N, “Navy and Marine Corps Design Procedures, EDD format”
96. FC 4-721-10N, “Navy and Marine Corps Unaccompanied Housing” which includes references to DoD Memorandum, “Access for People with Disabilities”
97. Federa1 Specification AA-D-2757, "Federal Specification: Modular Vault Systems"
98. Federal Specification AA-D-600, "General Services Administration: Door, Vault, and Security"
99. Federal Specifications FF-L-2740, "Locks"
100. FHWA - Federal Highway Administration Standards.
101. FHWA Urban Drainage Design Manual, Hydraulic Engineering Circular No. 22
102. GRS - Geodetic Reference System Standards
103. GRS Spheroid and the NAD / WGS
104. IBC - International Building Code
105. IBC, Section 1009.6, “Stairway to Roof for Access Requirements”
106. IEEE - Institute of Electrical and Electronics Engineering Standards
107. IEEE C57.12.29, "IEEE Standard for Pad-Mounted Equipment-Enclosure Integrity for Coastal Environments”
108. IFGC - International Fuel Gas Code.
109. IMC - International Mechanical Code
110. IMC, Section 306.5, “Equipment and Appliances on Roofs and Elevated Structures"
111. IMC Section 504, “Clothes Dryer Exhaust”
112. IPC - International Plumbing Code.
113. LEED NC – Leadership in Energy and Environmental Design - New Construction Standards
114. LEED Credit 6.1, "Stormwater Management Rate and Quantity"
115. LEED Credit 6.2, "Stormwater Design-QC"
116. LID - Low Impact Development Standards
117. MCB CPEN 2030 BASE Master Plan 1.1.1, “Basewide Master Planning Vision"
118. MCB CPEN BASE Master Plan
119. MCB CPEN BEAP - BASE Exterior Architecture Plan
120. MCB CPEN, “Rules and Regulations for Recycled Water Use and Distribution”
121. MCBO 11240.3, "Billing Rates for Transportation Equipment"

122. MCIWEST, “Demolition Memorandum”
123. MCIWEST-MCB CPEN 3500.1, CH 1, “Range and Training Area SOPs"
124. MCO 5530.14A, "Marine Corps Physical Security Program Manual"
125. MCO 5530.14A, CH 1, Page 1-10, Section 101, “Marine Corps Physical Security Program Manual: Physical Security Requirements for MNS”
126. MCO 5530.14A, CH 7, Section 7006, Pgs. 7-23, “Marine Corps Physical Security Program Manual”
127. MCO P11000.12C, W/CH 1, “Real Property Facilities Manual, Volume II, Facilities Planning and Programming".
128. MCO P110000.12C, W/CH 1, “Real Property Facilities Manual, Volume III, Facilities Planning and Programming"
129. MCO 11000.5, W/CH 1 & 2, "Real Property Facilities Manual, Volume IV, Facilities Projects Manual"
130. MCO.5530.14A, “Marine Corps Physical Security Program Manual”.
131. MCO P11240.106B, "GME"
132. MCO P5090.2A, “Environmental and Protection Manual”
133. MUTCD - Manual on Uniform Traffic Control Devices
134. NAD / WGS – North American Datum / World Geodetic System Standards
135. NAVFACINST 4250.1, CH 7, “Electronic Bid Solicitation Policy”
136. NAVFACINST P73, "Real Estate Procedural Manual, Disposal of Real and Related Property"
137. NAVFACINST, “Elevator Design – WBDG”
138. NAVMED P-5010-5, CH 5, "Manual of Naval Preventive Medicine: Water Supply Ashore”
139. NBIC - National Board Inspection Code
140. NBIC Part 1, Section 3.4.1, "Installation"
141. NBIC, Appendix F, F-2000, "Randon Control Methods"
142. NEC - National Electrical Code
143. NEC, EC&M, Article 430, "Motors, Motor Circuits, and Controllers".
144. NEC, EC&M, Article 445, "Generators"
145. NEPA - National Environmental Policy Act
146. NFPA - National Fire Protection Association Codes and Standards
147. NFPA 30, “Flammable and Combustible Code”
148. NFPA 54, “National Fuel Gas Code”
149. NFPA 70, "National Electric Code"
150. NFPA 70B, “Recommended Practice for Electric Equipment Maintenance”
151. NFPA 704, “Standard System for the Identification of the Hazards of Materials for Emergency Response”
152. NPDES - Department of Water Quality National Pollutant Discharge Elimination Standards
153. NSF - National Sanitation Foundation Standards

154. NSF Standard 61
155. NTSB - National Transportation Safety Board Standards
156. NTSB-PSS-73-1, “Prevention of Damage to Pipelines”
157. OCPW - Orange County Public Works Standard Plans and Specifications
158. OSHA - Occupational Safety & Health Administration Standards
159. Rules and Regulations for Recycled Water Use and Distribution, MCB CPEN, April 2013 (Amendment to Engineering Report for the Production, Distribution and Use of Recycled / Reused Water SRTTP MCB CPEN)
160. RWQCB - California Regional Water Quality Control Board Standards
161. RWQCB San Diego Region, "Master Reclamation Permit Order No. R9-2009-0021"
162. RWQCB San Diego Region, "Master Reclamation Permit Order No. R9-2014-0006"
163. San Diego County Drainage Design Manual
164. San Diego County Hydrology Manual
165. SCAQMD - South Coast Air Quality Management District Rules, Regulation, and Standards
166. SDAPCD - San Diego Air Pollution Control District List of Current Rules
167. SDG&E - San Diego Gas & Electric Standards
168. SDG&E, "Electric Service Standards and Guide Manual, Metering Standards"
169. SDG&E, "Electric Service Standards and Guide Manual, Signage Standards”
170. SDG&E, “Electric Service Standards and Guide Manual, Specifications and Standard Construction Details”
171. State of California, City of Oceanside Water, “Sewer and Reclaimed Water Design and Construction Manual”
172. State of California, City of San Diego Public Works Department, "Sewer Design Guide"
173. State of California, City of San Diego SDW-104, "Fire Hydrant Installation"
174. State of California, City of San Diego Sewer System Management Plan
175. State of California, City of San Diego, Public Utilities Department, "Sewer Design Guide, “Lift Station Emergency Storage”
176. State of California, Code of California Regulations
177. State of California, County of San Diego LID Handbook
178. SDRSD - San Diego Regional Standard Drawings Requirements
179. SDRSD, Book S
180. SDRSD, Book W
181. SDRSD, Section M-15, “Joint Trench Location”
182. SDRSD, "Trench Resurfacing Asphalt Concrete Streets”
183. SDRSD, “Trench Resurfacing Notes and Details”
184. SDRSD, “Trench Resurfacing PCC Surface Streets”
185. SDWA - San Diego Water Authority Requirements

186. SECNAVINST 11011.47C, “Acquisition, Management and Disposal of Real Property and Real Property Interests by the DON”
187. SECNAVINST M-5510.36 "DON Information Security Program”
188. SMACNA - Sheet Metal and Air Conditioning Contractors’ National Association Standards
189. SSPWC - The Greenbook, "Standard Specifications for Public Works Construction"
190. Standard Specifications State of California, Division IV "Subbases and Bases, Section 26, "Aggregate Bases"
191. Standard Specifications State of California, Division IX "Traffic Control Facilities," Section 83 "Railing and Barriers"
192. Standard Specifications State of California, Division V "Surfacing and Pavement", Section 39 "Hot-Mix Asphalt Specifications"
193. State of California Department of Water Resources Standards
194. State of California DWR Bulletin 74-81, "Water Well Standards - State of California"
195. State of California Regional Water Quality Control (RWQC) Board Standards
196. SUSMP - San Diego County Standard Urban Stormwater Mitigation Plan.
197. SWRCB - State Water Resources Control Board Laws and Regulations
198. SWRCB Waste Discharge Order No.98-04
199. SWRCB, NPDES, General Permit for WDRs for Stormwater Discharges from MS4s
200. SWRCB, Water Quality Order No. 2013-0001-DWQ, NPDES, General Permit No. CA S000004, “WDRs for Stormwater Discharges from Small MS4s”
201. Title 8 CCR, Subchapter 6, “Cal/OSHA Standards: Elevator Safety Orders”
202. Title 17 CCR, Division 1, Chapter 5, Group 4
203. Title 17 CCR § 93115, "ATCM for Stationary Compression Ignition Engines"
204. Title 22 CCR, Division 4
205. U.S. Environmental Protection Agency Standards
206. U.S. EPA 600/4-90/027F, "Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms”
207. U.S. EPA 712-C-98-075, "Natural Ester Dielectric Fluid Development"
208. U.S. EPA 712-C-98-076, "Fate, Transformation Test Guidelines: OPPTS 823.3110 Ready Biodegradability".
209. U.S. EPA 841-B-09-001, "Technical Guidance on Implementing the Stormwater Runoff Requirements for Federal Projects Under Section 438 of the EISA”
210. U.S. EPA EISA § 438, “Stormwater Management for Federal Facilities, Stormwater Runoff Management”.
211. U.S. GBC, LEED Standards
212. U.S. NCS - The United States National Computer Aided Drafting Standards
213. UFC 1-200-01, “The WBDG: General Building Requirements”
214. UFC 1-200-02 “The WBDG: High Performance and Sustainable Building Requirements”
215. UFC 3-110-03, "WBDG: Roofing"

216. UFC 3-120-10, "The WBDG: Interior Design"
217. UFC 3-201-01, "The WBDG: Civil Engineering"
218. UFC 3-210-10, "The WBDG: LID Manual"
219. UFC 3-250-04, "Standard Practice for Concrete Pavements, with Change 2"
220. UFC 3-250-06, "Repair of Rigid Pavements Using Epoxy Resin Grouts, Mortars and Concretes"
221. UFC 3-230-17fa, "The WBDG: Drainage in Areas other than Airfields"
222. UFC 3-410-02, "The WBDG: Lonworks© DDC for HVAC and other Local Building Systems"
223. UFC 3-420-01, Appendix D, "The WBDG: HVAC, Minimum Control Points List".
224. UFC 3-430-09, "The WBDG: Exterior Mechanical Utility Distribution".
225. UFC 3-580-01, "The WBDG: Telecommunication Building Cabling Systems Planning & Design"
226. UFC 3-580-10, "The WBDG: NMCI Standard Construction Practices"
227. UFC 3-600-01, Section 3-7.3.2, "The WBDG: Fire Protection Engineering for Facilities, Installation Requirements"
228. UFC 3-600-01, Section 3-7.3.4, "The WBDG: Fire Protection Engineering for Facilities, Hydrant Protection"
229. UFC 4-010-01, "The WBDG: DoD Minimum Antiterrorism Standards For Buildings"
230. UFC 4-010-02, "The WBDG: DoD Minimum Antiterrorism Standoff Distances For Buildings"
231. UFC 4-021-01, "The WBDG: Design and O&M: MNS"
232. UFC 4-022-03, "The WBDG: Security Fences and Gates"
233. UFGS - Unified Facilities Guide Specifications
234. UFGS-05 50 00, "The WBDG: Metal Fabrications"
235. UFGS-14 21 13, "The WBDG: Electric Traction Freight Elevators"
236. UFGS-14 21 23, "The WBDG: Electrical Traction Passenger Elevators"
237. UFGS-14.24 00, "The WBDG: Hydraulic Elevators"
238. UFGS-23 09 23.13 20, "The WBDG: BACnet DDC Systems for HVAC"
239. UFGS-23 09.23 01, "Lonworks © DDC for HVAC and Other Building Control Systems"
240. UFGS-23 09.53.00 20, "Lonworks© Space Temperature Control Systems"
241. UFGS-25 10 10, "The WBDG: UMCS Front End Integration".
242. UL - Underwriters Laboratories Standards
243. UL 142, "Aboveground Flammable Liquid Tanks"
244. UL 2085, "Standard for Protected Aboveground Tanks for Flammable and Combustible Liquids".
245. UMC - Unified Mechanical Code.
246. UPC - Universal Plumbing Code
247. UPC 603.4, "Water Supply and Distribution, Specific Requirements"
248. UPC 608.2, "Water Supply Distribution, Excessive Water Pressure"

APPENDIX C: BEAP ADDENDA (this section contains revisions to the 2010 BEAP)

CHAPTER 3.5: ARCHITECTURE

1. GENERAL

a. Provide details for transition conditions from existing to new construction components (pavement, roof, pipe, walls, etc.).

2. DOORS AND HARDWARE

a. All steel doors shall be Level 3, extra heavy duty, seamless construction, flush top and vertical stiffeners as defined in the Steel Door Institute manual. The doors and frames shall have reinforced backing for closers, strikes, hinges, locks and latch-sets.

b. Solid core wood doors are acceptable for use on private offices and conference rooms in Administrative areas. The frames shall be metal. The doors and frames shall have reinforced backing for closers, strikes, hinges, locks, and latch-sets.

c. All architectural door hardware shall be, as a minimum, Grade 1 heavy duty as defined in the ANSI and the Builders Hardware Manufacturers Association (BHMA) Inc. Exterior and other high-use doors not requiring exit devices shall use Security Grade 2 extra heavy duty door hardware. Door hardware finish shall be #304 stainless steel in a #4 finish.

   Secure rooms (Secret Internet Protocol Router Network (SIPRnet) system, etc.) shall use all required security hardware, as specified in the MCO 5530.14a, PCN 10208597900, Marine Corps "Physical Security Program Manual".

d. Submit hardware specifications for approval by PWD, A&E Branch, Facilities Projects Team and FEAD prior to purchase and installation.

e. The latch bolt and dead bolt shall be operated simultaneously by rotating inside knob, except at ADA Room lever. Locks shall be operated only by a correctly encoded cardkey. Use of a newly issued keycard automatically rekeys the lock and voids the previous keycard. Locks shall have memory that is capable of recording up to 140 entries into each room, identification of the keycard used to access the room, the date and time of entry.

f. System shall be capable of accepting a minimum of 12 keycard access levels, security auditing and computer interfacing with the existing or new management systems. On-site service shall be provided within 3 hours from request within the first 12 months of occupancy.

g. Provide a 5-year parts and labor warranty.

h. Provide large opening roll-up doors at all mechanical rooms and mechanical buildings to allow for ease of access, removal and replacement of equipment and additional natural light when open. The roll-up doors shall be manually operated unless the size of the door prohibits manual operation, and motorized operation shall be used.

3. **MASONRY BLOCK**

a. CMU precision block shall be used at all soffit and wall connections.

b. Termite control in the soil or under the slab in new construction is not necessary for buildings constructed with CMU.

4. **SHADE STRUCTURES**

a. The color of the underside of the roof shall be white.

b. Following the BEAP:

(1) The length of the roof overhang shall be a minimum of 1' with a minimum 8" fascia.

(2) Provide gutters and downspouts.

(3) The roof pitch is 4:12 or minimum 3:12 to match adjacent building roof pitch.

c. The caps on the top of the CMU columns shall be 18"x18" concrete precast, or approved by PWD, A&E Branch, Facilities Projects Team.

d. The CMU columns shall be 16"x16".

e. The color of the structural members shall be per DOR to match adjacent buildings.

5. **ROOFING AND EAVES**

a. PVC, Thermoplastic Polyolefin (TPO), Ethylene Propylene Diene Monomer (EPDM), or any single ply roofing materials have a scrim that acts as reinforcement to the product. The following are performance based minimum requirements:

(1) The sheet (field) membrane shall have a nominal thickness of 80 mils.

(2) The base / wall and curb sheet flashing shall have a nominal thickness of 60 mils.

b. PVC roof materials shall be free of stress cracks and tears, prior to and post-installation. Pre-fabricated deck sheets will be used to maximize the use of factory controlled welds. Only when absolutely necessary, will roll goods be used when there is a large presence of mechanical equipment. Pre-fabricated accessories, curbs, stacks, flashings, etc., will be used. These accessories will be fabricated with a reinforced, high strength, weft-inserted polyester, and rip resistant scrim with a minimum thread pattern of 18 x 14 threads psi.

c. All single ply, not just PVC, shall have a probe test completed by the manufacturer prior to turnover.

d. All roof- skylights shall be mounted on a curb at least 4" above roof plane. The warranty of the skylights will be included in the total system, 20-year no dollar limit (NDL) warranty.

e. Roofing transition shall be secured with positive drainage and material.

f. SSMR: Provide details for eaves, ridges, hips and gutters with closure.

g. Provide overflow drains with inlet details to scupper on low pitch new or renovation roof work.

h. Rigid insulation is required on roofs unless approved otherwise by Public Works.

i. Hi-Temp UV resistant self-adhesive membranes are required at all ridges, valleys, and shall be extended to a minimum distance of 18" each side of the ridge or valley line. Underlayment is required. All penetrations such as skylights or tubes, and curbs shall be fully covered and sealed with self-adhesive membrane. Crickets are required at all skylights or tubes, curbs and conditions where roofs slope toward walls. Counter flashing is required at all points where the roof transitions to a wall; all such conditions require counter flashing. Counter flashing is required to be let into the CMU and fully sealed. Flashed diversion channels are required when water drains to the back side of a wall to slow the flow of water and redirect to a valley. National Roofing Contractors Association (NRCA) compliance is required, but does not limit the requirements within this section.

j. Sealants shall be silicone; color matched, and shall be approved by PWD, A&E Branch, Facilities Projects Team PL.

k. A 20-year NDL with Consequential Damages is the standard requirement for flat and low slope roof systems. The warranty will not require any maintenance to the roof system, nor any type of follow-on inspections for at least 20 years.

6. **SEALANTS FOR STANDING SEAM ROOFS**

a. Where SSMR is cut, and forms a junction with other roof members (louvers, etc.), the following issues shall be addressed:

(1) Sealant or caulking is never a substitute for proper flashing detailing.

(2) All sealants shall be UV reflective to a standard level comparable to the roof surface on which they are being used.

(3) Where a manufacturer's recommended application of a sealant calls for two coats, two coats shall be applied.

(4) Acceptable sealant types shall meet the performance and warranty standards as per the project RFP.

(5) No attic or interior system supports (suspended ceiling grids, piping supports, etc.) shall ever have their fasteners drilled through the standing seam metal roofing (SSMR). Care shall be exercised to make sure that any drilling is done through the bottom flutes of a roof deck; and that the screws used to fasten are not longer than the dimension from the bottom to top flutes

of the deck. Any penetration of these fasteners through the standing seam roof surface is unacceptable.

7. **ROOFING WARRANTY REQUIREMENTS**

a. REFERENCE: UFC 3-110-03, "The WBDG: Roofing"

b. Any new, permanent construction facility and replacement roofs shall be designed and specified with a warranty that meets the following requirements:

(1) NDL 20-years Warranty (System Warranty). This includes either the replacement or repair of part or all of the roofing system and also includes the furnishing or cost of labor to repair the roofing system.

(2) NDL Warranty will cover incidental and consequential damages derived from leak caused by defects warranted.

(3) Signatures on Warranty shall be from the roof System Manufacturer and the Government User, not the General Contractors.

(4) Annual inspections shall be the responsibility of the building facility support personnel and will not void warranties when not performed.

(5) Furnish a typewritten information card for facility records and a card laminated in plastic and framed for interior display at roof access point.

8. **METAL ARCHITECTURAL ELEMENTS (Awnings, Shade Structures, etc.)**

a. Prior to the powder coating, the galvanized steel shall have an appropriate SSPC-SPG sweep blast to etch the galvanization.

b. Prebake items in oven at 410 degrees Fahrenheit, apply outgas forgiving epoxy primer.

c. Apply a “Super Durable” polyester top-coat finish in the approved color.

9. **ROOF ACCESS**

a. REFERENCES:

(1) IBC, Section 1009.6, “Stairway to Roof for Access Requirements”

(2) 29 CFR § 1910.27, "Fixed Ladders"

(3) IMC, Section 306.5, “Equipment and Appliances on Roofs and Elevated Structures"

(4) UFGS-05 50 00, “The WBDG: Metal Fabrications”

(5) UFGS-05 21 13, “The WBDG: Electric Traction Freight Elevators”

b. See current addition of the IBC, Section 1009.6, "Stairway to Roof for Access Requirements."

c. All attic spaces shall have adequate maintenance access from within the building.

d. Attic spaces shall be insulated to allow temperature to remain less than 10 degrees Fahrenheit over exterior ambient temperature.

e. Fixed metal ladders installed in facilities at MCB CPEN are to comply with 29 CFR § 1910.27 and IMC, Section 306.5. The ladder side rails are to extend a required (3'-6") above the access / egress level or landing platform it serves.

f. UFGS-05 21 13 does not require the extension of the side rails and creates an unsafe condition.

10. **DOWNSPOUT AND EXTERIOR FOUNDATION**

a. Top of any exterior foundation details shall extend above the elevation of the street gutter at point of discharge at the inlet of an approved drainage device a min. 12" plus 2%.

b. Stormwater from downspouts shall be controlled and routed away from the building to a nearby stormwater conveyance system (i.e., storm drain, detention / retention basin, swale, etc.) the route from the downspout to the stormwater conveyance system can be underground or aboveground. The route shall not cross over or drain onto a sidewalk, walkway or concrete patio area.

c. See also stormwater design standards & storm collection / conveyance systems section.

11. **LIGHTNING PROTECTION**

a. MCB CPEN is not in a weather zone that gets a significant amount of lightning (such as the Midwest, East Coast or Southern States). Lightning protection is not necessary or desired unless:

(1) The building or structure is a tower and is fabricated out of metal (such as a paraloft).

(2) The building or structure houses or stores hazardous materials or explosives.

CHAPTER 3.5.C: BASEWIDE ARCHITECTURAL STANDARDS

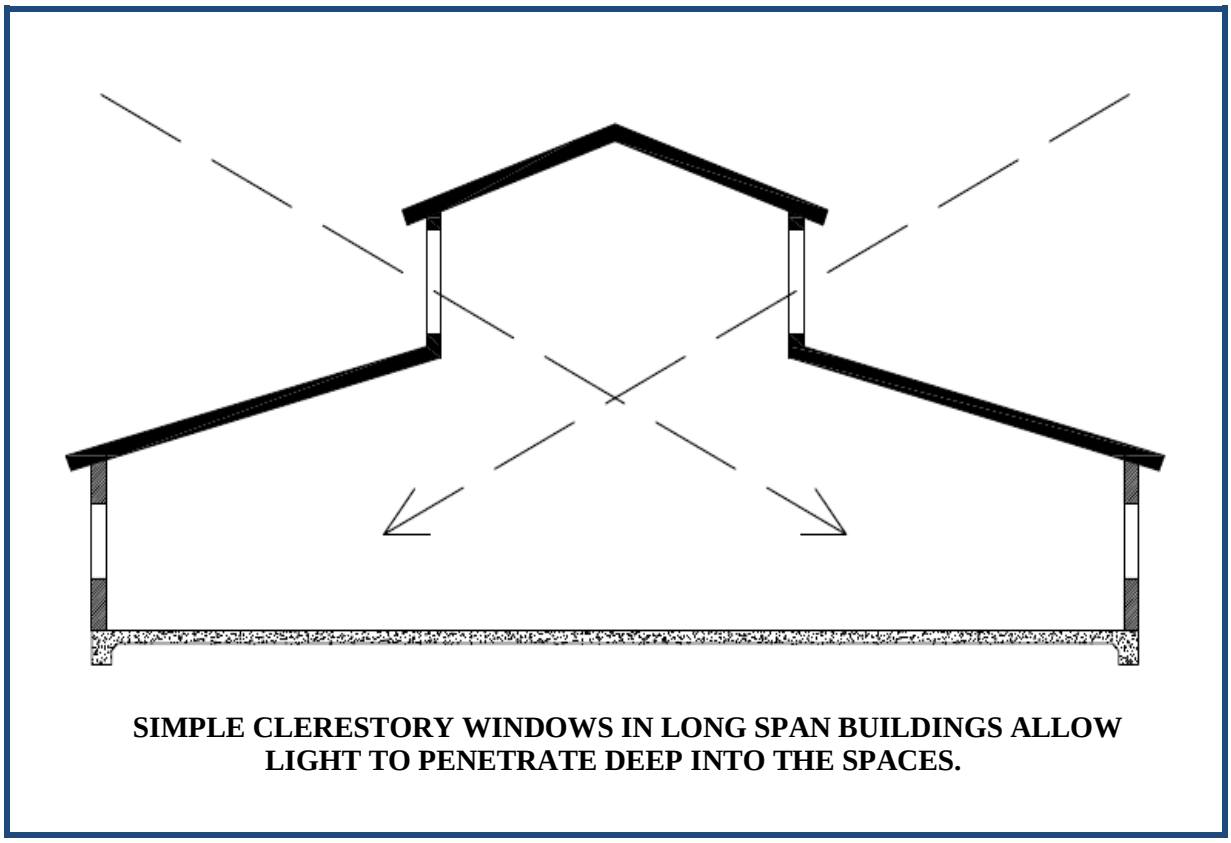
1. **BASEWIDE ARCHITECTURAL STANDARDS**

a. Provide kerf cut set back 1" from the face of exterior CMU header and precast sill. Kerf shall be a minimum of ¼" deep.

b. Window frame shall be set back 2"- 4" from the face of exterior CMU.

2. **BUILDING MASS AND SCALE**

a. **Use of Skylights vs. Clerestory Windows (Figure 3.5C):** The use of multiple skylights, or sunlight-reflective tube style roof openings, in new or renovation construction of long span buildings is discouraged. Multiple roof penetrations are not desired due to the increased risk of roof leakage. The preferred method of achieving interior day lighting is through the design and usage of clerestory windows when standard height windows do not provide adequate daylighting to interior spaces due to building size, configuration, etc. This simple change shall be incorporated early in the process for new roof construction design.



SIMPLE CLERESTORY WINDOWS IN LONG SPAN BUILDINGS ALLOW LIGHT TO PENETRATE DEEP INTO THE SPACES.

Figure 3.5 C: Simple Clerestory Window in Long Span Building

CHAPTER 3.5.C.3.e: BUILDING GUIDELINES - ROOFS

1. **BIRD DETERRENT**

   a. All soffits shall be protected with 45 degree angle corner transition and metal soffit to deter mud swallows. (See Figure 3.5 C-3e.)

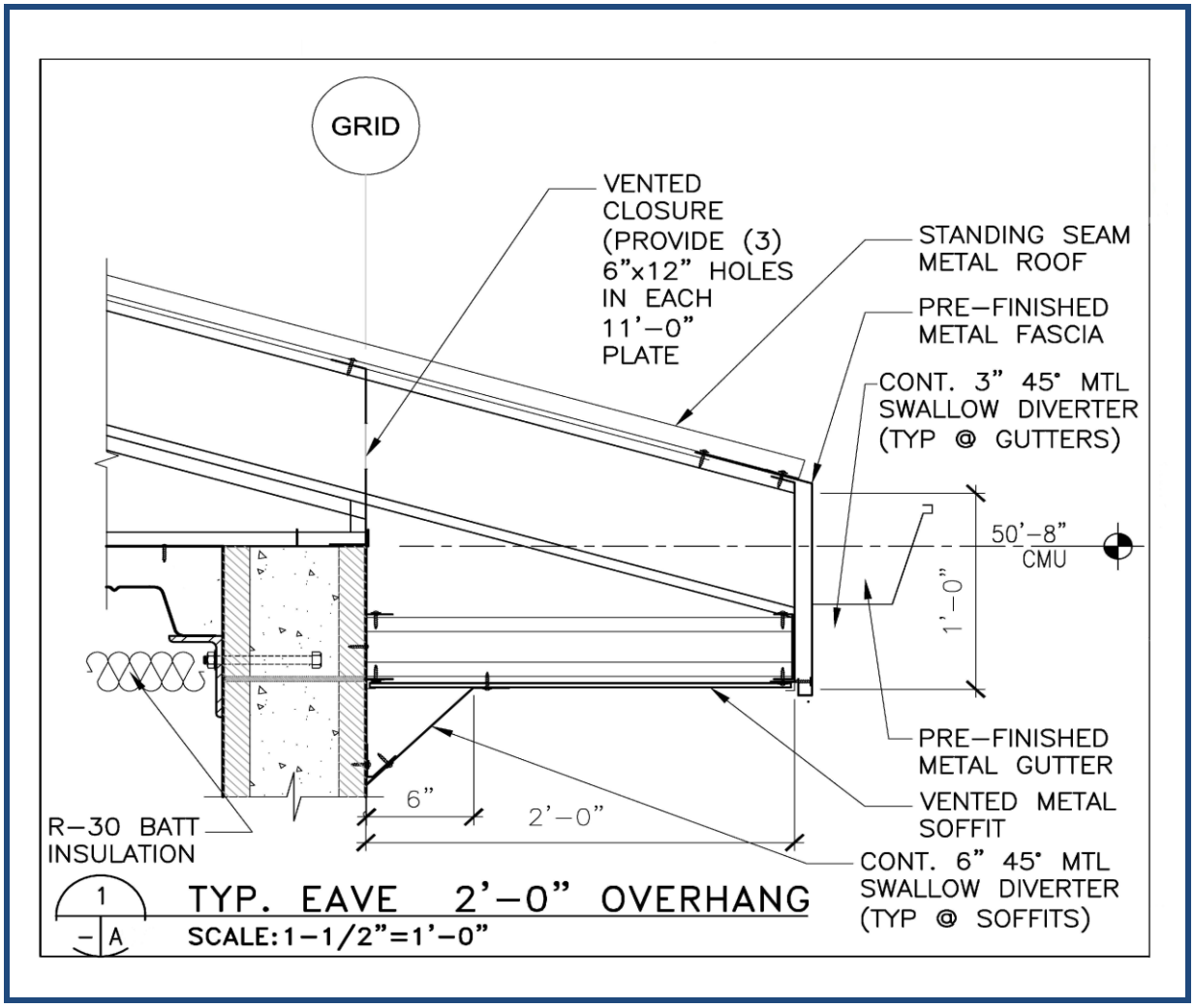


Figure 3.5 C-3.e: Bird Deterrent Soffit

CHAPTER 3.5.C-4.b: BUILDING MATERIALS - ROOFS

1. **ROOF MATERIALS**

   a. When reroofing flat roofs, keep in mind that a new PVC membrane is not compatible with asphalt-based products. (Like oil and water.)

      (1) When tearing off old asphalt roofs take steps to ensure the asphalt dust does not contaminate PVC materials.

      (2) Do not use sealants, caulks and pitch pockets fillers do not contain asphalt.

      (3) If the existing asphalt roof will remain under the new PVC roof, a suitable separator shall be installed.

      (4) If asphalt comes in contact with the new PVC membrane, clean it immediately using a non-solvent

CHAPTER 3.5 C-4.e: BUILDING APPURTENANCES

1. Utilize factory applied fluor-polymer coating system resin finish to match roof color or CMU color for downspouts when applicable for all appurtenances (metal roof trim, gutters, downspouts, vents, etc.). An unpainted galvanized finish is not allowed on roof appurtenances.

CHAPTER 3.6 H: MAINTENANCE - EROSION CONTROL

1. Please see Section CSI 32 00 00 "Exterior Improvements," Section 1, "Landscape Guidelines." The effects of erosion can be reduced by the appropriate use of the following methods:

   a. Splash erosion is best controlled by vegetative ground covers and leafy canopies

   b. To blend in with the surrounding area, use native materials adjacent to open space.

   c. Sheet erosion is kept in check by grasses and plants with fibrous root systems.

   d. A combination of stone rip rap and plant material is acceptable for erosion control. Use bio-degradable filter fabric under stones to control weeds.

   e. Plant groundcover for manufactured or graded slopes adjacent to open space with mixes that are compatible in growth requirement with existing plant material.

   f. Plant or hydroseed interior slopes between building pads with mixes that is compatible in growth requirements with surrounding plants.

   g. Follow the natural topography when planting on slopes. Plants are to reflect the pattern that plant materials tend to exhibit in the natural environment.

h. Control ground burrowing rodents to minimize their effect in creating erosion problems.

CHAPTER 3.9: PEDESTRIAN CIRCULATION

1. NOTE: The below detail replaces detail 8.6 C-1 in the 2010 BEAP.

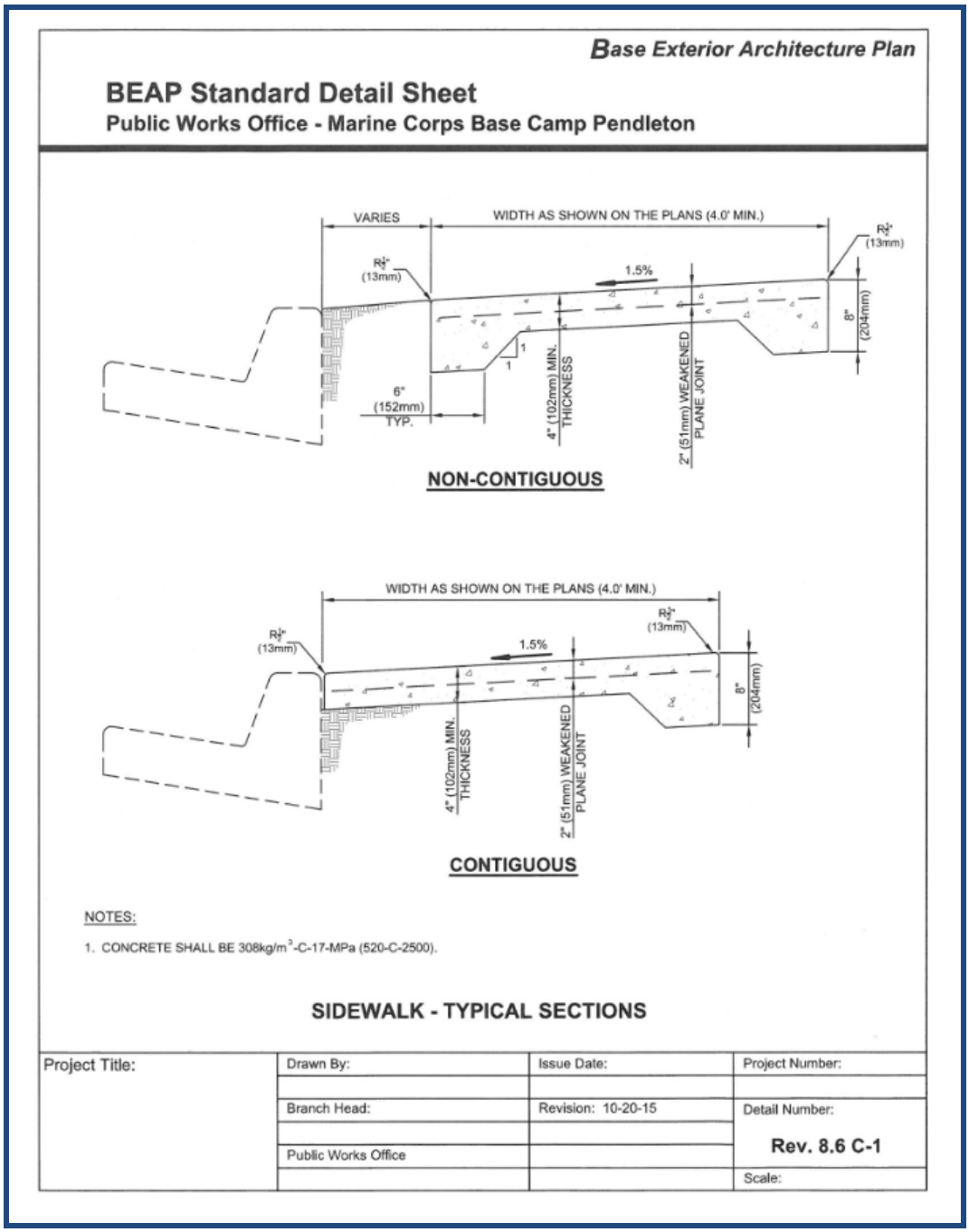


Figure 3.9: Sidewalk-Typical Sections, BEAP Rev. 8.6 C-1

CHAPTER 3.10: EXTERIOR SIGNAGE

1. **IDENTIFICATION SIGNS OF ANCILLARY STRUCTURES - (Figures 3.10.-A – 3.10L)**

a. Ancillary Structures include but are not limited to:

a. Trash Enclosures

b. Utility Boxes

c. Bleachers / Viewing Stands

d. Basketball Courts

e. Bus Shelters

f. Training Towers

g. Valve Covers, Manholes, etc.

2. GENERAL:

a. A number identification sign is desired for each ancillary structure, however, if there is more than one access point (i.e., a trash enclosure that could be approached by trash trucks or emergency vehicles from opposite sides or a bus shelter that is approached from opposite sides), then two or more sets of numbers may be required.

b. All signs and their locations shall be approved by MCB CPEN Sign Shop before fabrication and / or installation.

c. CM to obtain ancillary structure numbers from RPAO Lead located in Building 220102T at 760-763-7832.

d. Number Font: Helvetica Bold.

e. Sign Material Specifications:

(1) VINYL LETTERS:

(a) Type: Pressure Sensitive Vinyl

(b) Series: 2100 High Performance

(c) Color: 006 Yellow, 002 White, 003 Black

(2) SIGN BACKING:

(a) Type: Federally Rated Fiberglass

(b) Thickness: .06”

(c) Color: White for all Marine Corps structures and blue for all NAVFAC structures

(3) **INDIVIDUAL METAL NUMBERS:**

(a) Type: Bronze Anodized Aluminum

(b) Size: 6” high

(c) Building identification signage for multi-story shall typically be mounted at the second floor deck level, and be illuminated per BEAP Section 3.10011.

(d) Ensure that the illumination of the building numbers do not create extreme shadows making the number unreadable at night.

3. **EXTERIOR SIGNAGE**:

a. **UTILITY BOXES SIGN PLACEMENT**: Locate identification number sign on the upper right hand corner of the front of the Utility Box. The number identification sign will be individual 3” yellow vinyl numbers, see Figure 3.10 D-1.

b. **BUS SHELTER SIGN PLACEMENT**: Number identification signs to be mounted on ends of bus shelter so that signs are easily visible from traffic approaching from both sides. The number identification sign will be individual 3” white vinyl numbers, see Figure 3.10 D-2.

Photo 1: Utility Box

Utility Boxes Sign Placement

Figure 3.10 D-1: Signage – Utility Boxes

Photo 2: Bus Shelter

Bus Shelter Sign Placement

Figure 3.10 D-2: Signage – Bus Shelter

c. **TRASH ENCLOSURE SIGN PLACEMENT**: Locate identification number signs on the upper corner of an outside wall closet to the accessible side of the enclosure. The sign will be 6” black vinyl numbers on an 8” x 24” white fiberglass backing. The sign will be mounted onto the block

wall of the trash enclosure with anchoring screws, see Figure 3.10 D-3. Do not locate signs inside the trash enclosure.

Trash Enclosure (Correct Placement)

Trash Enclosure (Incorrect Sign Placement)

Figure 3.10 D-3: Signage – Trash Enclosure (Correct & Incorrect Sign Placement)

d. **BASKETBALL COURTS SIGN PLACEMENT**:

(1) Number Identification Signs to be mounted on both ends of the fence near the basketball backboard / poles. The signs will be 6" black vinyl numbers on an 8" x 24" white fiberglass backing. The signs to be mounted on the fence with vandal proof hardware, see Figure 3.10-D-4 below.

(2) If a fence is not available, the number identification sign is to be mounted vertically on the pole of the backboard with bottom of last number at 7'-0" high. The number identification sign will be individual 3" white vinyl numbers, see Figure 3.10 D-4.

Correct Sign Placement on Fence of Basketball Court

Incorrect Sign Placement on Pole of Backstop.

Figure 3.10 D-4: Signage – Basketball Court (Correct / Incorrect Placement)

e. **BLEACHERS / VIEWING STANDS SIGN PLACEMENT:** Number identification signs to be mounted vertically on support poles, individual 3" white vinyl numbers or on an easily accessible overhang, 6" black vinyl numbers on an 8" x 24" white fiberglass backing, see Figure 3.10 D-5.

Sign on road accessible side of bleachers.

Sign on overhang of viewing stands.

Figure 3.10 D-5: Signage – Signs on Bleachers / Viewing Stands

f. **BEQ SHADE STRUCTURE SIGN PLACEMENT:** Locate Number Identification Sign on an easily accessible side of the structure. Sign to be made up of 6" high individual bronze anodized aluminum characters in Helvetica Bold font per the MCB CPEN BEAP. Numbers to be in contrast with background, see Figure 3.10 D-6.

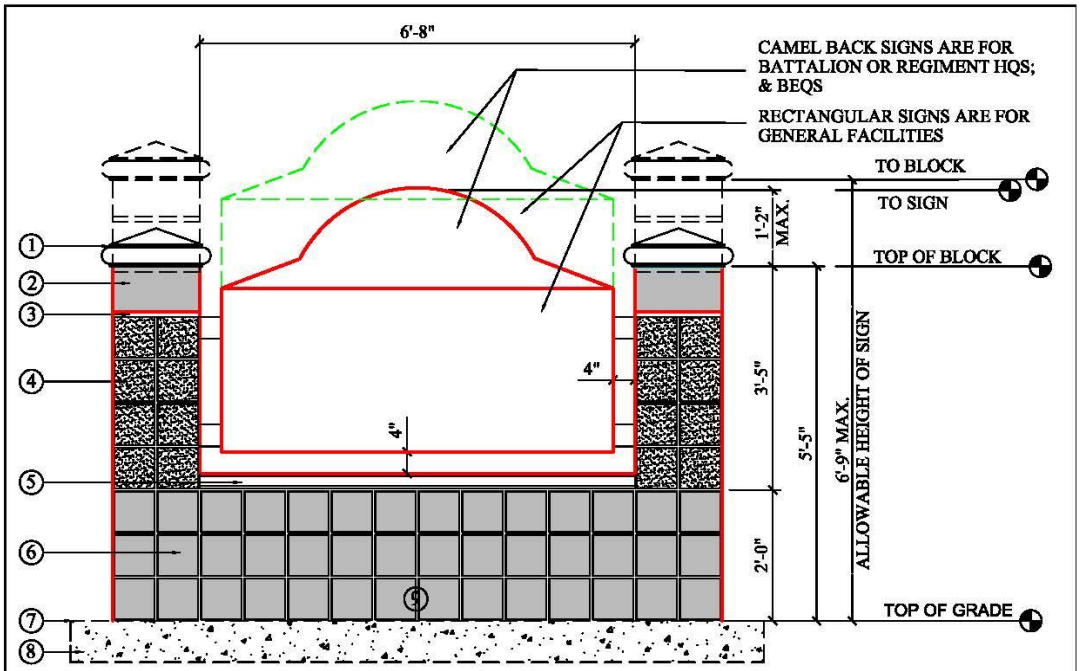
g. **NAVFAC ANCILLARY STRUCTURES SIGN PLACEMENT**: Locate Identification Number Signs on the upper corner of an outside wall. The sign will be 6" white vinyl numbers on an 8" x 24" blue fiberglass backing. The sign will be mounted onto the structure with anchoring screws, see Figure 3.10 D-7.

Number Identification Sign on BEQ Shade Structure.

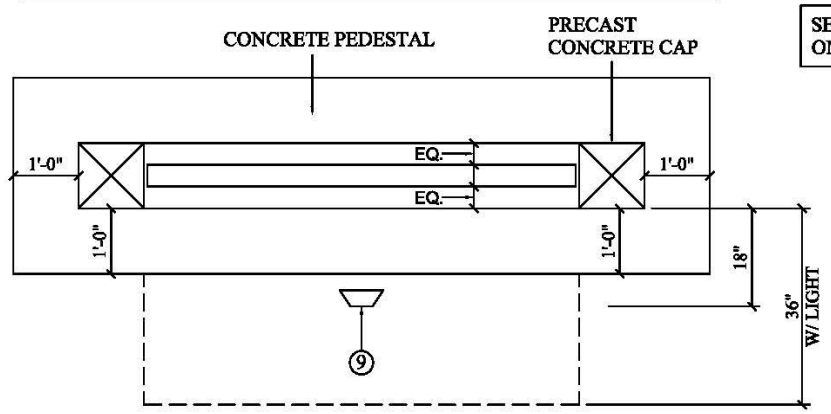
NAVFAC Ancillary Structure

Figure 3.10 D-6: Signage – BEQ Shade Structure **Figure 3.10 D-7 NAVFAC Ancillary Structure**

CHAPTER 3.10 D-8: STANDARD CMU MOUNTING FOR CAMEL BACK SIGNS & STANDARD UNIT / BUILDING SIGNS



ELEVATION: TYPICAL CONCRETE PEDESTAL FOR MONUMENT SIGNS

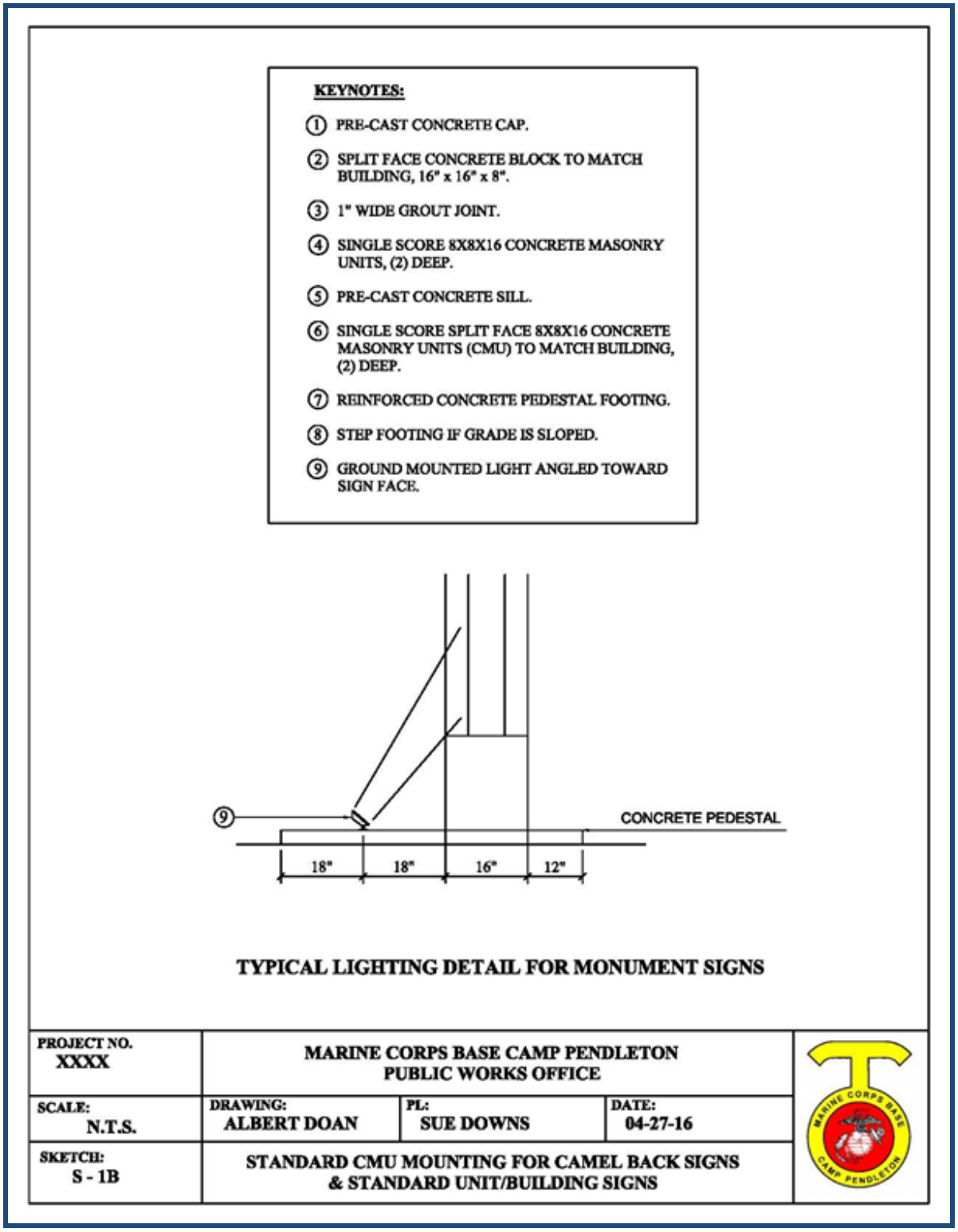


PLAN VIEW: TYPICAL CONCRETE PEDESTAL FOR MONUMENT SIGNS

PROJECT NO. XXXX	**MARINE CORPS BASE CAMP PENDLETON PUBLIC WORKS OFFICE**		
SCALE: N.T.S.	**DRAWING:** ALBERT DOAN	**PL:** SUE DOWNS	**DATE:** 04-27-16
SKETCH: S - 1A	**STANDARD CMU MOUNTING FOR CAMEL BACK SIGNS & STANDARD UNIT/BUILDING SIGNS**		

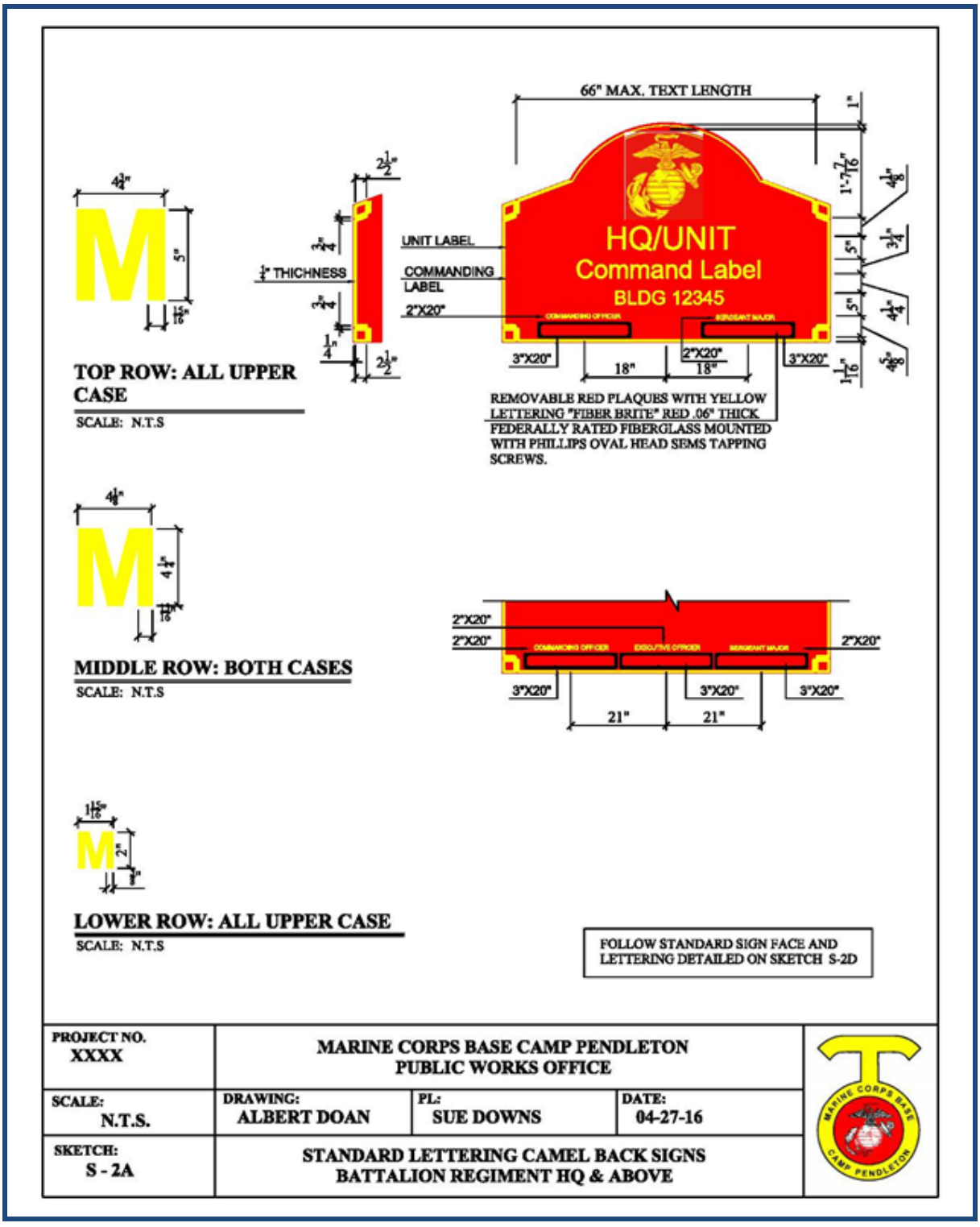
NOTE: The above figure replaces the similar figure found in the 2010 BEAP.

CHAPTER 3.10 D-9: TYPICAL LIGHTING DETAIL FOR MONUMENT SIGNS



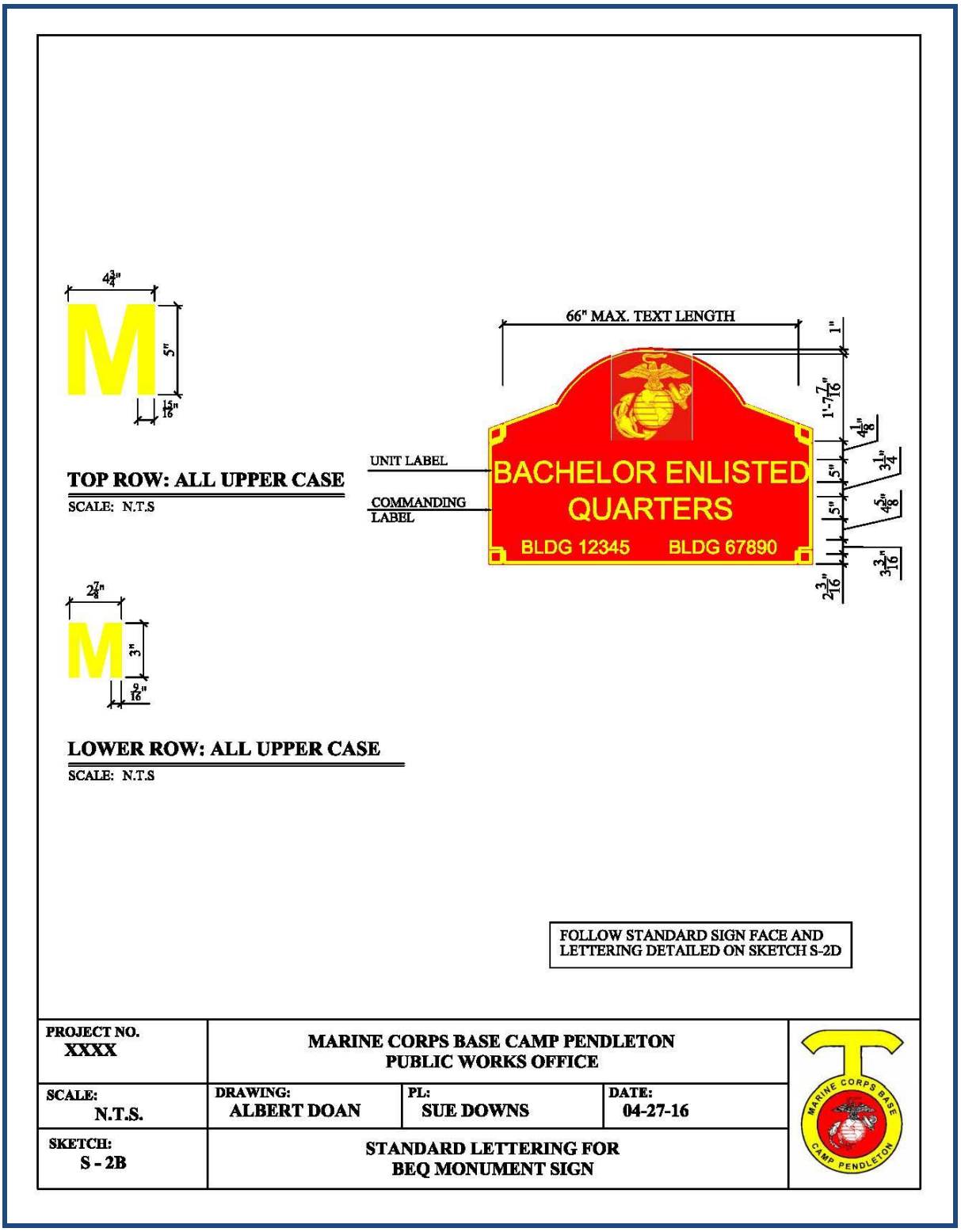
NOTE: The above figure replaces the similar figure found in the 2010 BEAP.

CHAPTER 3.10 D-10: STANDARD LETTERING CAMEL BACK SIGNS BATTALION REGIMENT HQ & ABOVE



NOTE: The above figure replaces the similar figure found in the 2010 BEAP.

CHAPTER 3.10 D-11: STANDARD LETTERING FOR BEQ MONUMENT SIGN

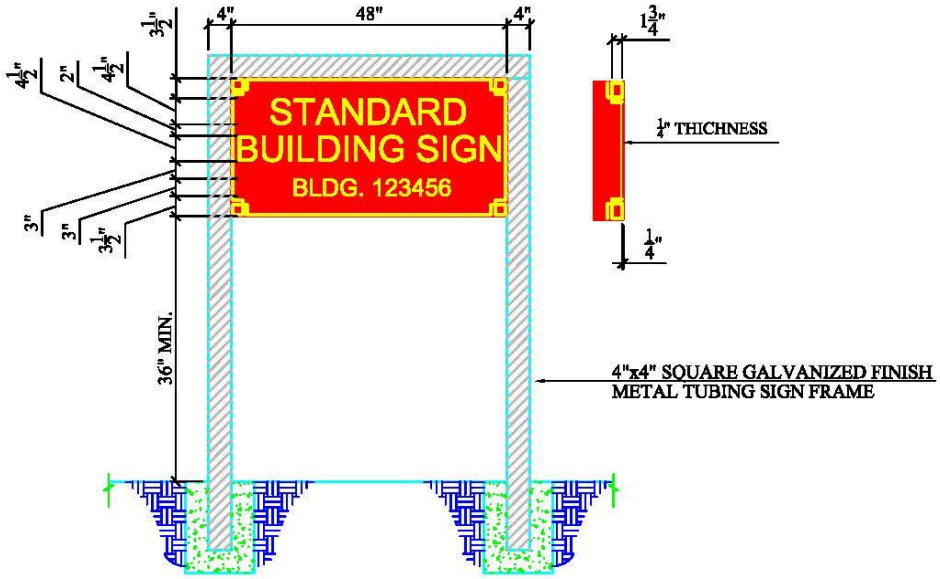


NOTE: The above figure replaces the similar figure found in the 2010 BEAP.

CHAPTER 3.10 D-12: STANDARD LETTERING for Building Sign Lettering and Mounting

STANDARD UNIT BUILDING SIGN NOTES:

1. HEIGHT OF SIGN WILL VARY DEPENDING ON AMOUNT AMOUNT OF TEXT.
2. CONSTRUCT SIGN FRAME OF 4"x4" SQUARE GALVANIZED PERFORATED UNISTRUCT METAL TUBING THAT RUNS ALONG SIDES AND OVER TOP OF SIGN OR MOUNT ON BLDG IF SPACE IS NOT AVAILABLE FOR POST MOUNTED SIGN.
3. MOUNT POSTS PER MCB CAMP PENDLETON BEAP DETAIL 8.7 A-13.
4. PROVIDE THIS SIGN ONLY IF CMU MONUMENT SIGN WILL NOT FIT ON FACILITY SITE.

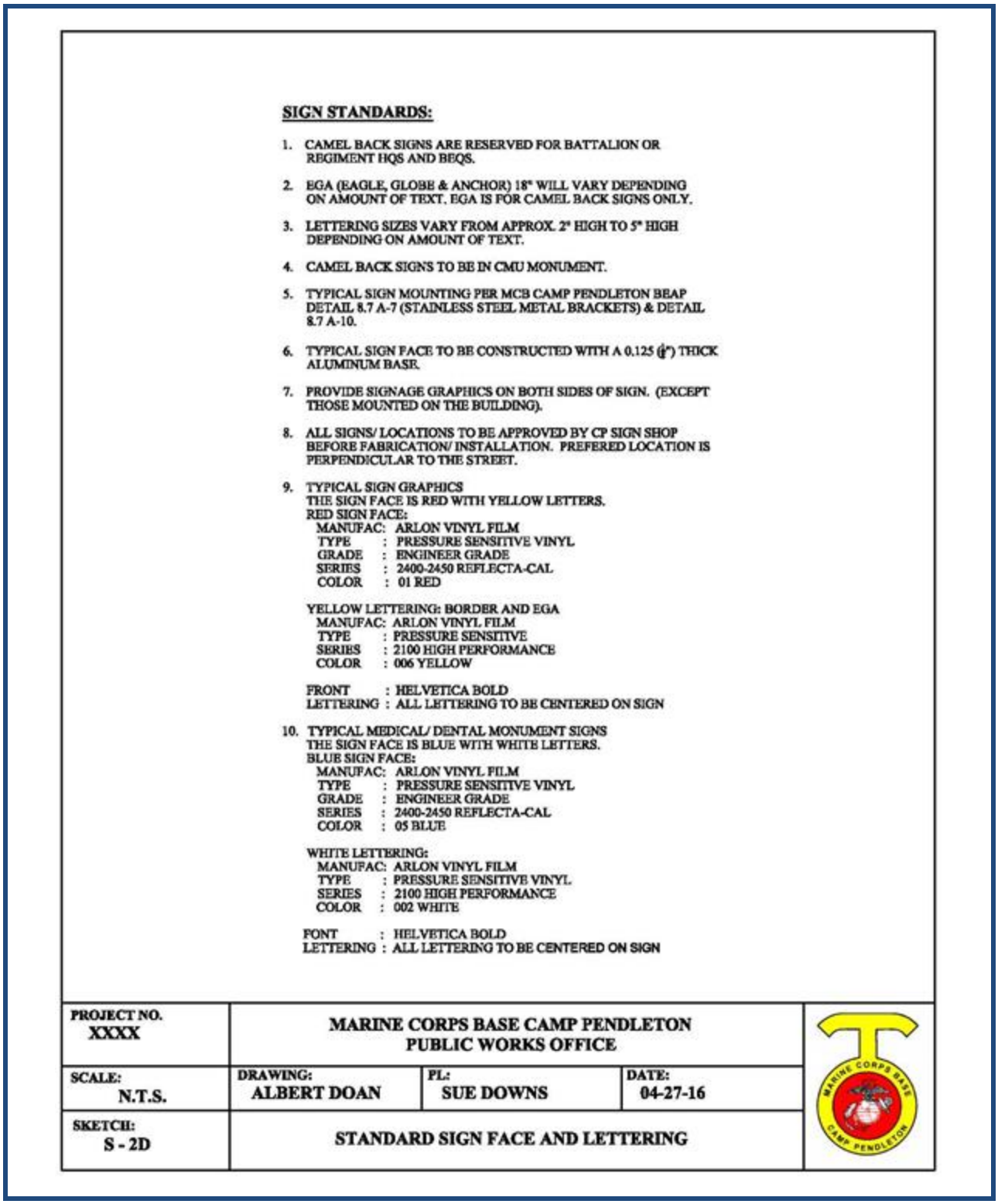


FOLLOW STANDARD SIGN FACE AND LETERING DETAILED ON SKETCH S-2D

PROJECT NO. XXXX	MARINE CORPS BASE CAMP PENDLETON PUBLIC WORKS OFFICE		
SCALE: N.T.S.	DRAWING: ALBERT DOAN	PL: SUE DOWNS	DATE: 04-27-16
SKETCH: S - 2C	STANDARD UNIT BUILDING SIGN LETTERING & MOUNTING		

NOTE: The above figure replaces the similar figure found in the 2010 BEAP.

CHAPTER 3.10 D-13: STANDARD SIGN FACE AND LETTERING



SIGN STANDARDS:

1. CAMEL BACK SIGNS ARE RESERVED FOR BATTALION OR REGIMENT HQS AND BEQS.
2. EGA (EAGLE, GLOBE & ANCHOR) 18" WILL VARY DEPENDING ON AMOUNT OF TEXT. EGA IS FOR CAMEL BACK SIGNS ONLY.
3. LETTERING SIZES VARY FROM APPROX. 2" HIGH TO 5" HIGH DEPENDING ON AMOUNT OF TEXT.
4. CAMEL BACK SIGNS TO BE IN CMU MONUMENT.
5. TYPICAL SIGN MOUNTING PER MCB CAMP PENDLETON BEAP DETAIL 8.7 A-7 (STAINLESS STEEL METAL BRACKETS) & DETAIL 8.7 A-10.
6. TYPICAL SIGN FACE TO BE CONSTRUCTED WITH A 0.125 (⅛") THICK ALUMINUM BASE.
7. PROVIDE SIGNAGE GRAPHICS ON BOTH SIDES OF SIGN. (EXCEPT THOSE MOUNTED ON THE BUILDING).
8. ALL SIGNS/ LOCATIONS TO BE APPROVED BY CP SIGN SHOP BEFORE FABRICATION/ INSTALLATION. PREFERED LOCATION IS PERPENDICULAR TO THE STREET.
9. TYPICAL SIGN GRAPHICS
   THE SIGN FACE IS RED WITH YELLOW LETTERS.
   RED SIGN FACE:
   MANUFAC: ARLON VINYL FILM
   TYPE : PRESSURE SENSITIVE VINYL
   GRADE : ENGINEER GRADE
   SERIES : 2400-2450 REFLECTA-CAL
   COLOR : 01 RED

   YELLOW LETTERING: BORDER AND EGA
   MANUFAC: ARLON VINYL FILM
   TYPE : PRESSURE SENSITIVE
   SERIES : 2100 HIGH PERFORMANCE
   COLOR : 006 YELLOW

   FRONT : HELVETICA BOLD
   LETTERING : ALL LETTERING TO BE CENTERED ON SIGN
10. TYPICAL MEDICAL/ DENTAL MONUMENT SIGNS
    THE SIGN FACE IS BLUE WITH WHITE LETTERS.
    BLUE SIGN FACE:
    MANUFAC: ARLON VINYL FILM
    TYPE : PRESSURE SENSITIVE VINYL
    GRADE : ENGINEER GRADE
    SERIES : 2400-2450 REFLECTA-CAL
    COLOR : 05 BLUE

    WHITE LETTERING:
    MANUFAC: ARLON VINYL FILM
    TYPE : PRESSURE SENSITIVE VINYL
    SERIES : 2100 HIGH PERFORMANCE
    COLOR : 002 WHITE

    FONT : HELVETICA BOLD
    LETTERING : ALL LETTERING TO BE CENTERED ON SIGN

PROJECT NO. XXXX	MARINE CORPS BASE CAMP PENDLETON PUBLIC WORKS OFFICE		
SCALE: N.T.S.	DRAWING: ALBERT DOAN	PL: SUE DOWNS	DATE: 04-27-16
SKETCH: S - 2D	STANDARD SIGN FACE AND LETTERING		

NOTE: The above figure replaces the similar figure found in the 2010 BEAP.

MARINE CORPS LOGO: to be placed in locations other than walking surfaces. In respect for the Eagle / Globe / Anchor, do not place on horizontal surfaces where the logo would be walked upon.

MARINE CORPS LOGO
EAGLE / GLOBE / ANCHOR

PMS STANDARD COLORS

Designation Band:	Old Glory Blue	PMS 280
Letters, Borders and Rope:	Yellow	PMS 136
• When metallic is used:	Bronze	PMS 873
Background:	Scarlet or Marine Corps Scarlet	PMS 200 PMS 185
Device:		
Eagle, Globe, Anchor, Scroll Gold Brown		PMS 471
• When metallic is used: Bronze		PMS 874
Shading and Details	Black	PMS 1

Colors provided by:
Institute of Heraldry
www.tioh.hqda.pentagon.mil

Figure 3.10 D-14: Signage – Marine Corps Logo

CHAPTER 3.10 D-1.b: EXTERIOR SIGNAGE - SECONDARY ENTRY GATE SIGNS

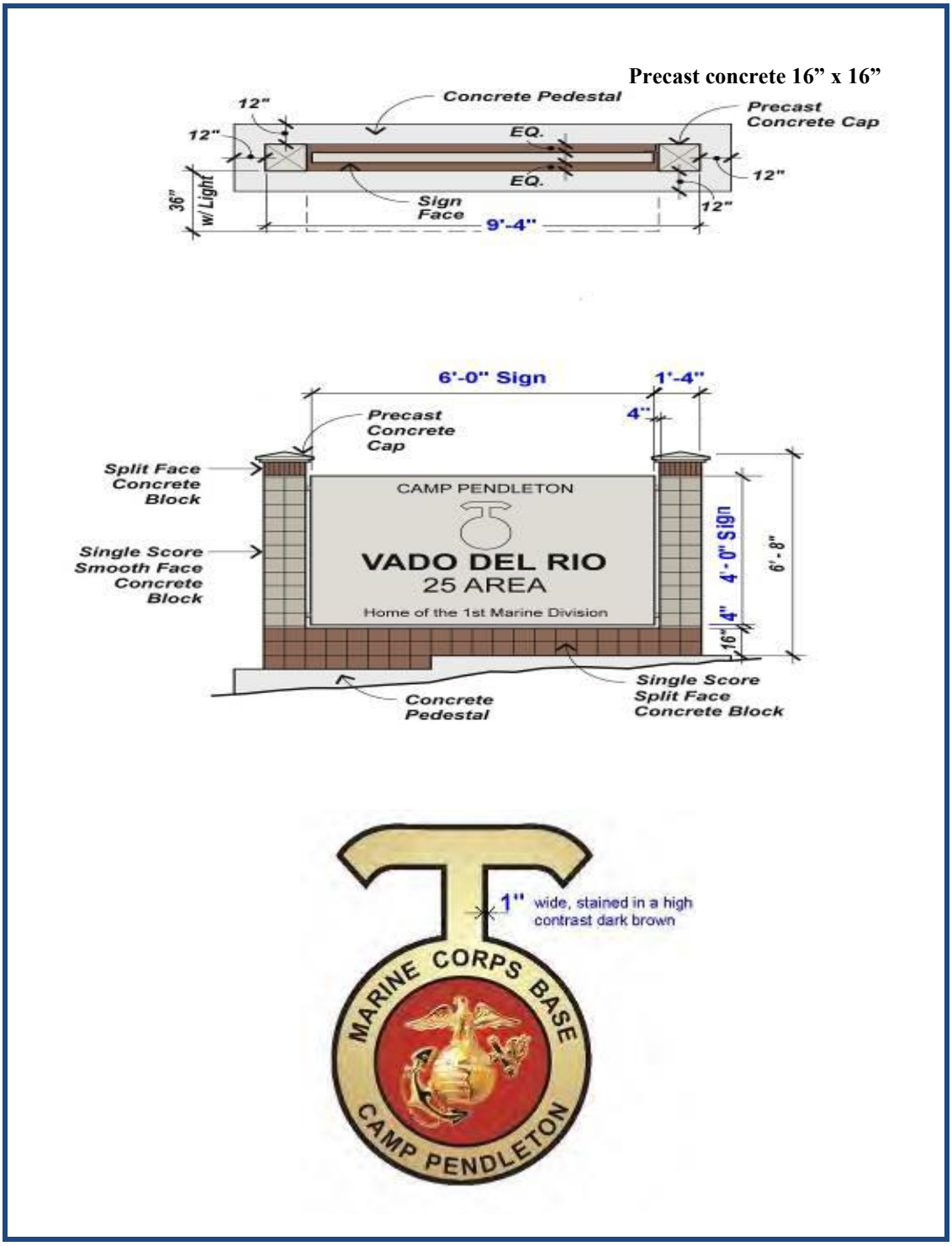


Figure 3.10 D-15: Signage - Secondary Entry Gate Signs

NOTE: The above figure replaces the similar figure found in the 2010 BEAP.

CHAPTER 3.10 D-2: EXTERIOR SIGNAGE - CANTONMENT ENTRY SIGNS

1. Construct a 2x6 inch “tongue and groove” wood material sign face with a solid or opaque stain background and yellow letters.

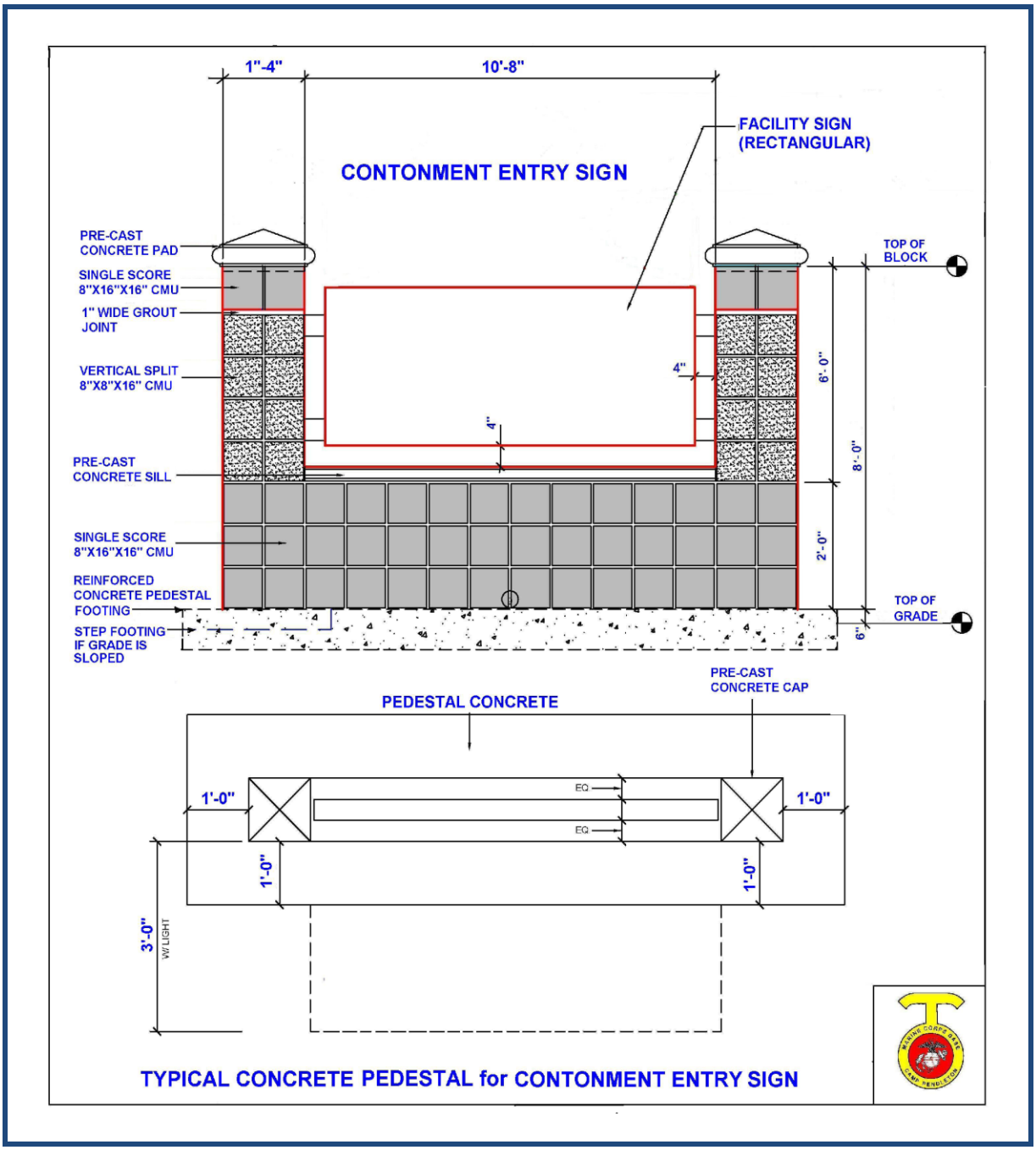


Figure 3.10 D-16: Signage - Cantonment Entry Sign

(NOTE: The above figure replaces the similar figure found in the 2010 BEAP.)

CHAPTER 3.12: SITE FURNITURE

1. FLAGPOLE: Provide flagpoles that are round, tapered, anodized aluminum 65 FT high with a hinged base for ease of maintenance.

2. BOLLARD: Bollard color shall be yellow.

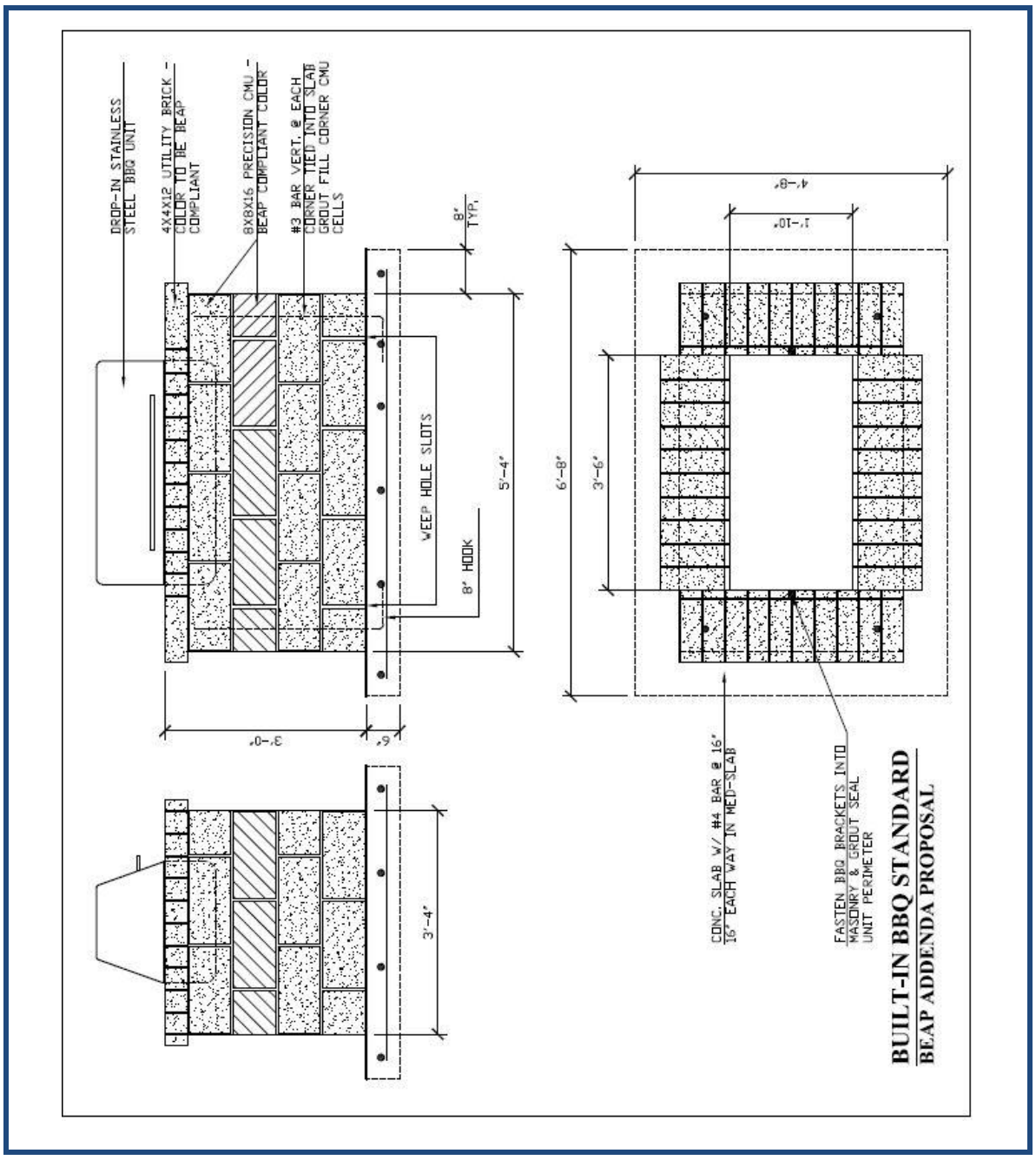


Figure 3.12: Self-Help BBQ and CMU Counter Surround

(The above detail is to provide the standard dimensions and materials for a MCB CPEN Self Help BBQ.)

CHAPTER 3.16: TRASH ENCLOSURES & RECYCLING CONTAINERS

1. Dumpsters shall be inside the enclosures and NOT be located in open areas.

CHAPTER 3.16 C: TRASH ENCLOSURE GUIDELINES

1. **TRASH ENCLOSURE DESIGN**:

   a. The enclosure will not have gates.

   b. 3’ high steel bollards shall be installed to protect impacts to each wing wall of the enclosure.

2. **BEAP TRASH AND RECYCLING CONTAINERS REQUIREMENTS:**

   a. Each new building constructed on the Base shall have a CMU enclosure with trash and recycling containers. Comply with the BEAP for enclosure requirements. Trash and recycling containers shall be included in the construction budget and purchased and installed by the General Contractor. Size and quantity shall be determined during initial design phase of project.

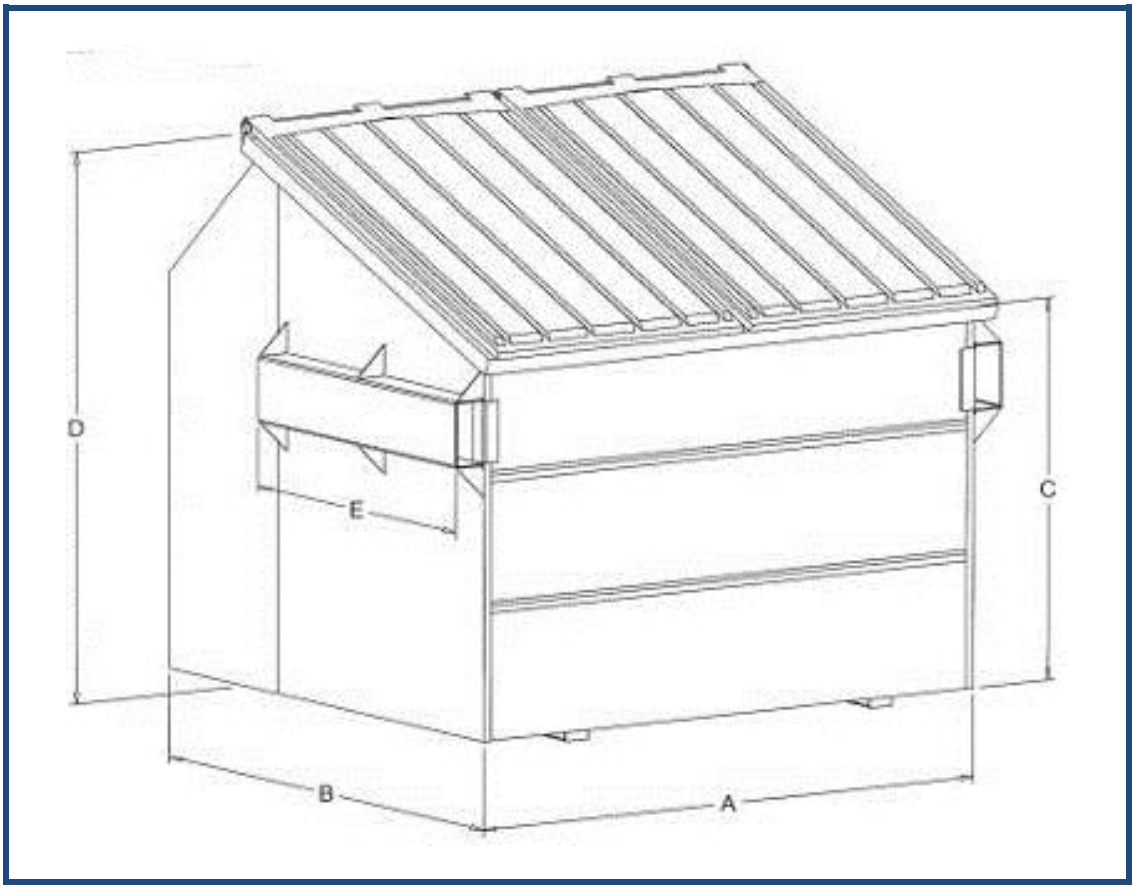


Figure 3.16 C-4: Trash and Recycle Container

b. **TRASH CONTAINER – 6 YARD HUMPBACK WITH 12 GAUGE BOTTOM**

- SERIAL #: 357736 – 357831
- GSA SCHEDULE: #GS-07F-5512P
- MFG PART: #40-9007
- COLOR: Marine Corps Green
- LABEL: Stencil per special instructions
- CONTACT: MCB CPEN Recycling Center Manager at (760) 725-4982

SIZE	A*	B	C	D	E
6 YD	72"	66"	50"	69"	41.5

* Add 4” per side (A) for sleeve width

Figure 3.16 C-5: 6-Yard Humpback with 12 Gauge Bottom

c. **SPLIT RECYCLING CONTAINER - 4 YD PITCH TOP SPLIT UNIT W/12 GA BOTTOM**

- Split ½ Cans and ½ Paper / Cardboard (See Figure 3.16.C-4)
- SERIAL #: 327467 - 327487
- GSA SCHEDULE: #GS-07F-5512P (Some options are not on GSA)
- MFG PART #40-9007
- COLOR: ½ White and ½ Blue
- LABEL: Stencil Per Special Instructions
- CONTACT: MCB CPEN Recycling Center Manager at (760) 725-4982

SIZE	FRONT HEIGHT	BACK HEIGHT	WIDTH	LENGTH
	C**	D**	B	A*
4 YD	46"	57"	50.5"	72"

* Add 4” per side (A) for sleeve width
** Casters add 8” to height

Figure 3.16 C-6: 4-Yard Pitch Top Split Unit with 12 Gauge Bottom

CHAPTER 3.17: ABOVEGROUND STORAGE TANK (AST)

1. AST's are commonly used to store gasoline, diesel fuel, oils, lubricants, and other liquids. AST's refer to both permanent, fixed tanks, as well as portable containers 55 gallons or greater in size. The visible blight associated with AST's shall be minimized where practical. AST's will benefit from more complete screening than is offered by a chain link fence. Chain link fences shall be installed in accordance with UFC 4-022-03. Supplemental visual screening shall be used where appropriate.

CHAPTER 3.17 B: AST OBJECTIVES

1. Screen unsightly AST's from view with durable, low-maintenance materials. The coordinated design of AST screened enclosures will enhance the function, appearance of the MCB CPEN exterior, and reinforce the design theme.

2. All fuel / oil AST's shall come complete with a level gauge and leak alarm.

CHAPTER 3.17 C: AST SCREENING GUIDELINES

1. FENCES

a. Use fences where safety and security are needed, such as around electrical substations and where partial view blockage is desirable, such as at service courts and materials storage areas.

b. Augment fences with landscaping where screening is desired and irrigation is feasible. (See Section 3.6–Landscaping). Landscape planting includes trees only. Shrub planting and hedges Are not allowed. Do not use fence slats.

c. All security and equipment perimeter fencing shall have a minimum fence fabric height of 7 FT (2.13m), excluding the top guard. Fence height including outriggers shall be a minimum 8 FT (2.44m) in accordance with UFC 4-022-03. Modifications to existing fences are required. For MCB CPEN'S perimeter security fencing requirements see MCO 5530.14A, CH 5, Section 5006, "Marine Corps Physical Security Program Manual: Barriers and Openings."

CHAPTER 8.9 E-5: HOT CHARCOAL CONTAINER

1. Hot charcoal containers to be provided by the Contractor at all charcoal BBQ locations.

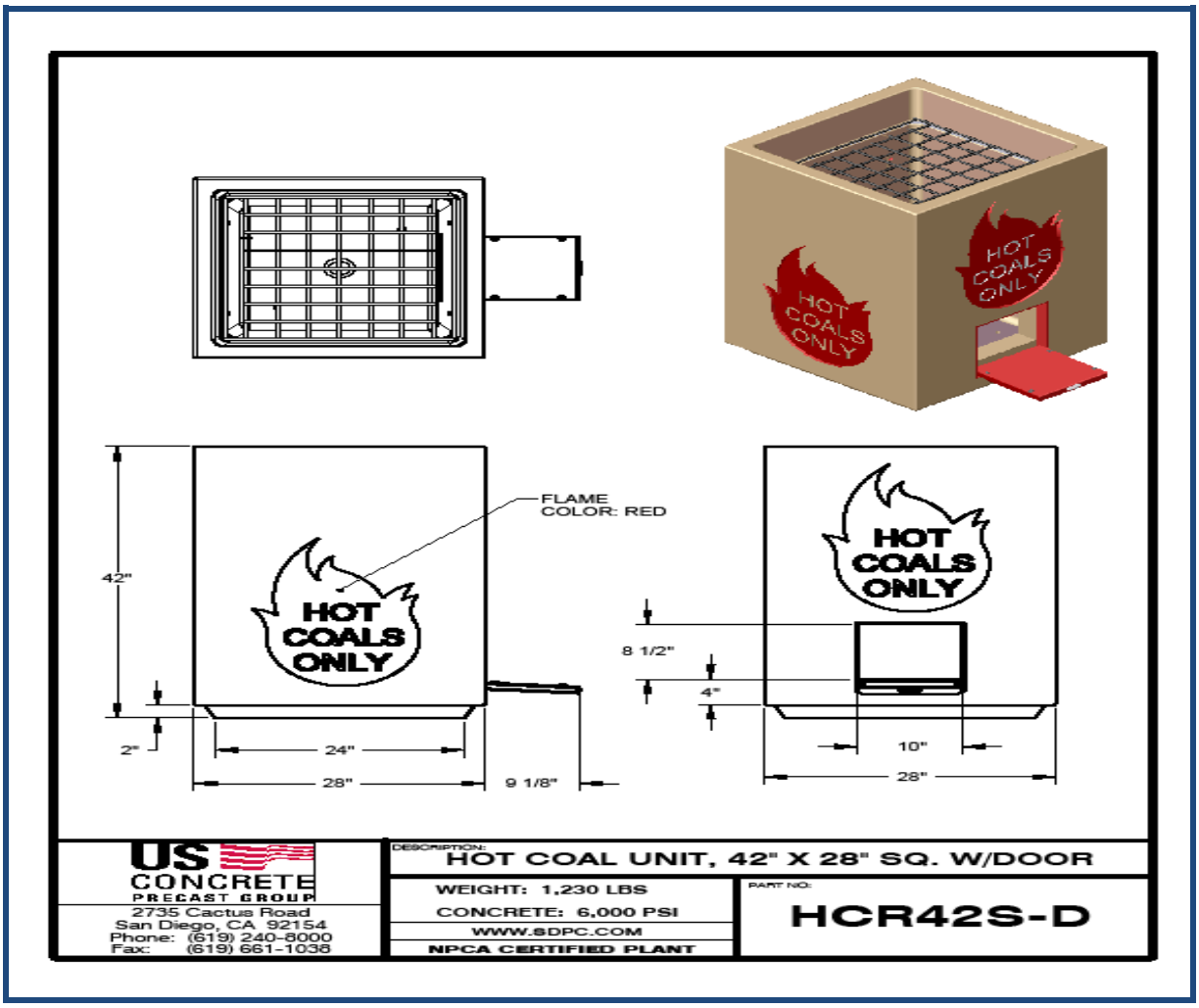


Figure 8.9: Hot Charcoal Container