CIVIL ENGINEERING UNIT OAKLAND
OAKLAND, CALIFORNIA 94606-5337
PSN 4425125

SPECIFICATIONS

FOR

REPLACE HVAC, BUILDING A & C
AT
SECTOR SAN DIEGO
SAN DIEGO, CA

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DIVISION 01 - GENERAL REQUIREMENTS

PART 1 GENERAL

01 10 00 - GENERAL PARAGRAPHS

1.01 SCOPE OF WORK: This is a design-built project. Contractor shall provide complete services for the design and construction of the HVAC system at Building A and Building C at Sector San Diego, San Diego, California based on scope of work present in this specification. The completed work shall comply with all applicable codes, federal, state, and local regulations referenced in this specification.

A. BASE WORK:

1) Building A: Convert the existing constant air volume HVAC system to a variable air volume and temperature (VVT) HVAC system. Work shall include but is not limited:

(a) Demolish all reheating coils, thermostats, and controls, (twelve sets), and replace them with variable air volume (VAV) terminal units, including VAV boxes, reheating coils, controls, actuators, and accessories required to work with the new VVT system.

(b) Modify the ductwork and piping as required to support the operation of the VVT system and the economizer, including new ductwork, by-pass damper, and duct transition for the VAV terminal units.

(c) Provide a new VVT control system, including but is not limited to, controller, space sensors, zone controller, and touch screen panel required to control the HVAC system. The new touch screen control panel shall be installed inside the mechanical room. The exact location of the panel shall be field determined by Contracting Officer's Representative.

(d) Conducting a major maintenance and rehab work on the existing HVAC equipment that will be reused. Work shall include but is not limited to, replacing all filters, belts, seals and gaskets for pumps and valves, cleaning all ductwork, greasing all moving parts on pumps, valves, and dampers. Refurbishing the existing split systems and the boiler. Calibrating all dampers, instruments, and gauges. Testing and balancing all diffusers and registers. Implement all mandatory control strategies per California Title 24 as allowed by the modification.
(e) Provide power to all equipment as required in accordance with referenced publications and manufacturer’s instruction.

(f) Add insulation to the attic to provide minimum R-35 rating.

2) Building C: Demolish all HVAC equipment, including the boiler, the chiller system, the air handler unit, and all 41 fan coil units and associated piping and replace the HVAC system with a new Variable Refrigerant Flow/Variable Refrigerant Volume (VRF/VRV) heat pump system including compatible fan coil units and controls that can provide either cooling or heating to each of the five structures on demand. Provide a DDC control system that shall meet California Title 24 energy standard.

3) Asbestos and lead paint has been identified on the equipment as indicated in Appendix A. Contractor shall conduct his own test and properly remove the asbestos and lead paint equipment and materials that shall be demolished and disposed them in accordance with all applicable federal, state, and local regulations. See Section 01 35 29.1.04 for detail.

4) Provide advanced meters: Provide one electrical meter for each of the five structures at Building C and one meter for Building A. Total six meters are required. Work shall include providing new advanced electrical meters, power panels, safety disconnects, conduits and cables, and all associated materials and equipment required for the operation of the metering system and place the systems in good working condition in accordance with the requirement indicated in Appendix B and Appendix C, NFPA 70, and all applicable publications listed in this specification. Advanced meters provided shall be compatible with the Obvius, and LLC AcquiSuite DAS as indicated in Appendix C.

5) Label all rooms and provide a permanent placard on each room for both Building A and C. The placard shall be easy readable from 15 feet away.

6) Provide training to Coast Guard personnel for the operation, trouble shooting, and maintenance of all HVAC systems.

B. OPTIONAL WORK ITEM:

1) Building C: Replace all the HVAC heat pump systems in Base Work Item A.2 with Variable Refrigerant Flow /Variable Refrigerant Volume (VRF/VRV) heat recovery systems that will provide simultaneous heating and cooling to all spaces on demand.
1.02 LOCATION: Project site is located at Coast Guard Sector San Diego, San Diego, CA.

1.01 SITE INVESTIGATION: Investigate the site per FAR 52.236-3 to ascertain the general and local conditions which can affect the work or its cost. Contact MAT2 Dennis Amerson Facility Engineering, at (619) 278-7202 to arrange site access.

1.02 CONTRACTOR SECURITY REQUIREMENTS: For each affected Coast Guard facility, the Contractor shall provide a list of all on-site personnel, including sub-contractors (including second and third-tier subcontractors) and suppliers, to the Contracting Officer. The contractor shall update this list when changes occur. Contractor personnel not listed may be denied access to the Coast Guard facility. Contractor personnel will be restricted to designated working areas. Any personnel violating this policy may lose access to the Coast Guard facility. Contractor personnel shall have photo identification at all times while working on Coast Guard facilities.

Contractor and delivery personnel may be required to present personal photo identification to gain access to a Coast Guard installation. If identification does not indicate United States citizenship, Coast Guard Security may require proof of the legal right to work in the United States. Contractor and delivery personnel also may be subjected to an immigration status and outstanding criminal warrants check.

Contractors shall provide the Contracting Officer's Technical Representative with 24 hours of advance notice of every delivery to the site (e.g., steel, lumber, parts, etc.) and provide the company name, delivery person, and phone number of the firm(s) making deliveries. All vehicle access to government property requires vehicle registration and proof of liability insurance. Otherwise access to the Coast Guard facility may be denied.

1.03 CONTINUITY OF FACILITIES OPERATION: Schedule work to minimize interference with the facilities normal operations. Notify the Contracting Officer and the site contact in writing 5 business days in advance of any shutdowns. Perform all on-site work between the hours of 7:00 AM and 5:00 PM, Monday through Friday (Federal Holidays excluded), unless otherwise approved by the Contracting Officer and the Unit Commanding Officer.

1.04 NOTIFICATION OF START AND COMPLETION OF WORK: The Contractor shall notify the Contracting Officer in writing five (5) business days in advance of the date he intends to commence work, and five (5) business days prior to the date that work will be ready for final inspection.
1.05 RECYCLING AND DISPOSAL OF REFUSE: Refuse, excess or waste materials resulting from construction operations shall become the property of the Contractor and shall be recycled and/or disposed of off Government property. All disposals shall be done in accordance with federal, state, and local laws and regulations.

A. Construction Waste Management: Develop and implement a Construction Waste Management Plan quantifying material diversion in order to recycle, reuse and/or salvage to the maximum extent feasible of construction, demolition and land clearing waste.

1.06 ENERGY STAR PRODUCTS: Pursuant to Executive Order 13123, provide Energy Star labeled products or, for product groups where Energy Star programs do not yet exist, products that are in the upper 25 percent of energy efficiency as designated by the Federal Energy Management Program.

1.07 RECYCLED MATERIAL: Use products meeting or exceeding EPA’s recycled content recommendations for EPA-designated products and for other products contractor shall make all attempts to maximize the procurement of materials with recycled content.

1.08 REGIONAL MATERIALS: The contractor shall make all attempts to maximize the procurement of materials within a 500 mile radius of the project site.

1.09 SAFETY: During the execution of this contract, the Contractor shall conform to the rules and regulations as set forth by OSHA Safety and Health Standards, 29 CFR Part 1926 - Safety and Health Regulations for Construction and California Code of Regulations, Title 8, Div. 1, Ch 4, Subchapter 4 - Construction Safety Orders. When the standards differ, the more restrictive standard shall apply. The contractor shall provide barriers, temporary fencing, trench covers, etc. wherever work could cause injury to workers, visitors, Coast Guard personnel, or dependents. An Accident Prevention Plan shall be submitted in accordance with Section 01 35 29, paragraph 1.07.

1.10 TEMPORARY FACILITIES:

A. STORAGE: The location for exterior stock piling of materials is shown on the drawing. The Contractor shall be responsible for protecting materials stockpiled against weather, damage, theft, and other risks of loss. The Coast Guard assumes no responsibility for material or equipment left in the storage area.

B. SANITARY FACILITIES: There are no toilet facilities available for Contractor use at the job site. The Contractor shall provide his own facilities in accordance with 29 CFR 1926, Chapter XVII,
Subpart D, paragraph 1926.51 (c) (1).

C. WATER AND ELECTRICITY: Water and electricity are available at no cost to the Contractor. Cost of these utility connections and disconnections shall be the responsibility of the Contractor. Personnel using extension cords to bring power from another location to construction, maintenance, remodeling, etc., shall employ portable ground fault circuit interrupters (gfcis), even if connecting to building wiring.

D. TELEPHONE: No telephone service is available for contractor use.

1.11 EXISTING UTILITIES: Utility locations shown are approximate. The Contractor shall field verify all utility locations before trenching. This shall include but not be limited to the use of sonic, electronic or magnetic detection devices, by noting pullbox and utility box locations at the surface, and by potholing. Contractor shall be responsible for repairing any utilities damaged during construction at no additional cost to the Government.

1.12 DRAWINGS: The work shall conform to the drawings listed below which form a part of these specifications.

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<td>Building A HVAC Plan</td>
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1.13 REFERENCE DRAWINGS: The drawings listed below are included for reference only. They are known not to accurately reflect all existing conditions. Field verify all necessary information.

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PART 2 PRODUCTS
Not Used

PART 3 EXECUTION
Not Used

END OF SECTION
01 33 00 – SUBMITTALS PROCEDURES

PART 1 GENERAL

1.01 GENERAL

A. Forward all submittals, except as stated elsewhere, to the Contracting Officer on CD-ROM or by email as indicated on the submittal register. Submittals shall be accompanied with the USCG furnished material submittal form in Microsoft Word Format. Unless noted otherwise, all submittals shall be provided in an electronic image format. Provide these submittal images to the Contracting Officer, the Construction Manager, and the Contracting Officer's Representative (COR) simultaneously. If the electronic image is insufficient to ascertain submittal acceptability, the Contracting Officer may request a hard copy submittal. The Contracting Officer will e-mail approval or disapproval of submittals, within 14 calendar days after receipt.

B. The Construction Manager will review all submittals for compliance with these specifications. Submittals shall have been approved by the Contracting Officer before any item is delivered to the job site.

C. Approval of submittals, and corrections or comments made during the review, do not relieve the Contractor from compliance with the requirements of the plans and specifications.

D. The schedule of submittals listed in the submittal register and in the individual sections are the submittals required for this contract. Unsolicited submittals may be returned to the Contractor without review.

1.02 CATALOG CUTS: Catalog cuts shall contain manufacturer's description, specifications and sketches of the material and equipment provided. The catalog cut shall contain sufficient information which can be used to determine compliance with these specifications.

1.03 CERTIFICATES OF COMPLIANCE: Certificates of compliance shall be signed by an authorized officer of the manufacturing company furnishing the material which states that the material being furnished meets all requirements of these specifications and referenced specifications.

1.04 SAMPLES: Samples shall be submitted as described in the referencing specification section.
1.05 SHOP DRAWINGS: Drawings shall indicate layouts, dimensions, materials, and other information required to fully describe the items being installed. In addition to shop drawings for review, submit one reproducible bond paper, full size, set of as-built shop drawings at completion of contract work. If drawings are prepared using computer aided drafting, electronic files shall be prepared with AutoCAD 2012. Submit electronic files in addition to hard copy drawings. Shop drawings shall be provided at the same time of each design review.

1.06 DESIGN CALCULATIONS AND DRAWINGS: Submit all design drawings, material specifications, and engineering calculations that fully show the development of the design as indicated in the Submittal Register. The documents shall include California Title 24, referenced ASHRAE publications, NFPA codes, and building code analysis and shall address environmental concerns, life safety issues, and site constraints. Design drawings shall be provided in AutoCAD 2012 file format, or saved to AutoCAD 2012 file format if an AutoCAD version newer than AutoCAD 2012 is used by the contractor. The Civil Engineering Unit Oakland standard template shall be used, and will be provided upon request, with the CEU Oakland AutoCAD plot style. Drawings shall comply with the National CAD Standards for symbols and layers and shall also comply with Coast Guard standards for font (Romans), font size (0.1 inch minimum height) and title block attributes.

The title block contains attributed information and shall not be exploded. This information shall be entered with specific information based on the titled attribute as shown by the figure at the end of this specification section in order for the information to accurately export to the Coast Guard document management application. Each drawing shall be a separate file; i.e., not a tab of one file.

Drawings shall be submitted on CD-ROM electronic media, with all photos and external reference drawings bound to their respective drawing. Plot styles and fonts used, other than Romans, shall also be included on the CD-ROM. Additionally, provide one hard copy set on 24”x36” bond paper.

A. Include drawings and material specifications that fully show the development of the design. The documents shall address all environmental concerns, life safety issues, and site constraints. The drawings shall indicate, but not be limited to, the following, unless noted otherwise:

1) Structural and equipment plan layout for the work required by the scope, includes but is not limited to, pipe, pipe supports, equipment and supports, and thrust supports. All areas shall be clearly labeled. Include all drawings
necessary to fully describe the work to be performed. Title blocks, in accordance with U. S. Coast Guard drawing standards, shall be used. Drawing numbers on the drawings shall be 4425125-[A], [S], [C], [M], [E] to signify the discipline, followed by a number to indicate the sheet number.

2) Mechanical and Electrical plans, elevations, isometrics with design schemes to provide code compliant equipment, control, piping, alarm, electrical, sequence of operation, detailed P&ID, and flow diagrams clearly indicates how to operate the system. The drawings shall indicate all HVAC equipment, ductwork, registers, diffusers, DDC controls, sequence of operation, pipe and conduit sizes; material types; capacities and type; transformer size and type; conductor sizes and type; panel schedules indicating breaker sizes and type, single line and block diagrams. Provide fan, pump and pump performance, pump/motor efficiency, and system curves, valves, motor capacities; sensors locations to clearly demonstrate how the system works. Provide electrical disconnects on all panels and compressors.

3) Specifications: Include all specifications necessary to fully and accurately describe equipment and materials to be installed.

4) Calculations when needed to confirm all equipment sizing, design load, and flow rate that meet Federal Energy Management Program. Provide fan and pump performance curves, system curves, horse power and efficiency curves to fully describe the system provided. Provide and submit arc flash energy calculations and safety work distance calculations on all panels and electrical equipment as required.

B. Final Plan Review: Upon review by the Coast Guard of the plans and Specification, contractor shall incorporate all review and comment before submitting the revised final design drawings within 7 days. Each drawing shall be signed and stamped by either a Professional Engineer or Registered Architect of the respective discipline indicated by the drawing and who is registered in the State of California where the work will be constructed.

1.07 STATEMENTS OF PROCEDURES: Job-specific detailed procedure statements for aspects of the project requiring special attention. The statements shall indicate all methods and materials to be used for proper execution of the work. The statements shall also indicate any limiting criteria and scheduling requirements.

1.08 STANDARD COMPLIANCE: When materials or equipment must conform to
the standards of organizations such as the American Society for Testing and Materials (ASTM), and Underwriter's Laboratories (UL), proof of such conformance shall be submitted to the Contracting Officer for approval. If an organization uses a label or listing to indicate compliance with a particular standard, the label or listing will be acceptable evidence. In lieu of the label or listing, submit a certificate from an independent testing organization, which is competent to perform the test. The certificate shall state that the item has been tested in accordance with the specified organization's standard.

1.09 TEST RESULTS: Submit test results as described in the individual referencing specification section.

1.10 PERMITS AND CERTIFICATES: Provide Confined Space Entry Statement, Permits, Tests, and Hazard Inspection as required in accordance with all federal, state, and local rules. Provide hot work permit issue by Coast Guard personnel each day when hot work is performed.

1.11 HAZARDOUS MATERIAL IDENTIFICATION: Submit Material Safety Data Sheets (MSDS) for any materials defined as hazardous under the most current revision of Federal Standard 313. One copy of each MSDS shall be submitted to the Contracting Officer's Representative no later than the delivery date of the product. Two copies shall be submitted to the Construction Manager.

1.12 AS-BUILT DRAWINGS: Maintain at the job site one set of full size design drawings marked in red to show any deviations which are found to exist or have been made from the contract drawings. Upon completion of the work, deliver the marked set of prints to the Contracting Officer. Request for final payment will not be approved until the marked prints are delivered to the Contracting Officer.

1.13 WARRANTIES: The Contractor shall provide one year materials and labor warranty on its work after system acceptance by CG. All system/components manufacturers' transferable standard warranties longer than one year as indicated in accepted material submittals, manufacturer's published literatures, and manufacturers' websites, shall be provided to CG at no extra costs. If material warranty is longer than one year, the transferable manufacturers' certificate of warranties and copy of proof of purchases shall be submitted.

1.14 OPERATION AND MAINTENANCE MANUAL: Furnish one hardcopy and one electronic file of the operation and maintenance manual as described in the submittal register. The hard copy manual shall be bound in a standard 8-1/2" x 11", 3 ring, loose leaf, hard cover binder. The manual shall have a general index and each
section shall have a separate index tab. The manual's cover shall carry the following identification:

OPERATION AND MAINTENANCE MANUAL
REPLACE HVAC, Building A & C, SECTOR SAN DIEGO, PSN: 4425125
Contract No. ____________________

The manual shall contain, as a minimum, the following:

1. The manufacturer and local representative's name, address, and telephone number.

2. Catalog sheets, model numbers, and other descriptive literature for each system component.

3. Instructions for installation, connection, start-up, operation, shut-down, trouble-shooting, maintenance, lubrication, overhaul, and safety precautions particular to the equipment being installed.

One preliminary O&M manual shall be submitted as an electronic file on CD-ROM 14 days before the system is put into operation. The Government will review and return the preliminary O&M manual by e-mail within 14 days of receipt. The O&M manual shall be revised and/or amended as required and the hard copy final manual shall be submitted to the Contracting Officer along with a final version in electronic format. Request for final payment will not be approved until the final O&M manuals are complete and approved.

1.15 BAR CHART PROGRESS SCHEDULE: Within 10 calendar days after award, submit a bar chart progress schedule. On-site work shall not begin until a bar chart schedule has been approved. The bar chart shall show the complete sequence of construction by activity (including acquisition of materials and equipment). The chart shall identify the construction start date, the completion date, and all workdays through the duration of the project. If the project requires various delivery dates, dates will be indicated for each of the required deliverable elements (i.e., housing unit or specific building). The bar chart shall also identify the cost for the various activities which shall be used as the basis for the Contractor's periodic request for payments. Submission and approval of as-built drawings and O&M manuals shall each be separate line items (with associated costs) on the bar chart.

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PART 3 EXECUTION

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Not Used
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*Use USPS two ltr abbreviation for state*

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*1: UPON DISPOAL  
*2: AT TIME OF DELIVERY  
*3: 14 DAYS PRIOR TO TRAINING  
*4: AT THE SAME TIME AS DESIGN CALCULATION IS SUBMITTED.
PART 1 GENERAL

1.01 SECTION INCLUDES: This section applies to steps taken by the contractor to comply with the health and safety requirements listed herein. The Contractor shall comply with all applicable federal, state, and local laws and regulations. The ultimate responsibility for identifying applicable requirements and protecting contractor employees or sub-contractors rests with the primary contractor.

1.02 APPLICABLE PUBLICATIONS: The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

A. AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI):

Z359 Series Fall Protection Code, Version 2

B. ENVIRONMENTAL PROTECTION AGENCY (EPA) REGULATIONS:

16 CFR 1303 Ban of Lead-Containing Paint and Certain Consumer Products Bearing Lead-Containing Paint

40 CFR 61 National Emission Standards for Asbestos

40 CFR 204 Noise Abatement Program for Construction Equipment

40 CFR 261 Identification and Listing of Hazardous Waste

40 CFR 302.4 Designation of Hazardous Substances

40 CFR 763 Asbestos Hazards and Emergency Response Act (AHERA)
C. NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 241 Standard for Safeguarding
Construction, Alteration and
Demolition Operations

D. U.S. Army Corps of Engineers (USACE):

EM 385-1-1 Safety and Health Requirements
Manual

E. U.S. DEPARTMENT OF LABOR OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) REGULATIONS:

29 CFR 1910.1001 Occupational Safety and Health Standard for Asbestos

29 CFR 1910.1025 Occupational Safety and Health Standard for Lead


29 CFR 1926.59 Hazard Communication

29 CFR 1926.62 Lead

29 CFR 1926.1101 Asbestos

29 CFR 1926 Subpart L Scaffolds

29 CFR 1926 Subpart M Fall Protection

29 CFR 1926 Subpart P Excavations

40 CFR 745 Subpart E Lead Renovation, Repair, and Painting Program

F. U. S. DEPARTMENT OF TRANSPORTATION REGULATIONS:

49 CFR 100-199 Hazardous Materials
Transportation, Handling, and Storage Regulations

G. U. S. COAST GUARD COMMANDANT INSTRUCTIONS (COMDTINSTs):

COMDTINST M5100.47A U.S. Coast Guard Safety and Environmental Health Manual
Chapter 12 - Asbestos Awareness
1.03 REFERENCE STATUTES: The statutes listed below form a part of this specification to the extent referenced.

Noise Control Act (NCA) (42 U.S.C. §§ 4901 to 4918)

Residential Lead-Based Paint Exposure Reduction Act (15 U.S.C. §§ 2681 to 2692)

1.04 HAZARDOUS MATERIAL TESTING:

A. Tests have been conducted on the materials expected to be encountered during this work. The results indicated there are lead paint on the pipe and equipment insulation and asbestos may be presented in supports at the building (Appendix A). Contractor shall comply with the requirements of this specification and all federal, state, and local rules in the event any materials are encountered which may pose a potential health hazard.

B. Lead: For bidding purposes only, the contractor shall assume the uncertified data provided in the Appendix A is representative of the actual lead content. After award, but prior to the start of work, the Contractor's Competent Person (CP) as defined in 29 CFR 1926.62 and applicable state laws shall conduct the required inspections, sampling, and testing of questionable materials at the locations where materials will be disturbed. Only the inspection results of the CP shall be used by the Contractor to establish the procedures and personnel protection required to comply with all applicable safety, health and environmental regulations. Results of these tests shall be submitted in accordance with paragraph 1.07. Should the contractor's competent person discover lead levels sufficiently different from those supplied by the government as to result in a greater or lower cost than anticipated in the bid process, a contract modification may be issued.

C. Asbestos: For bidding purposes only, the contractor shall assume the uncertified data provided in Appendix A is representative of the actual asbestos content. After award and prior to the start of work, the contractor shall have a person certified as an AHERA inspector in the state where the work is to be performed conduct required inspections, sampling, and testing of questionable materials at the locations where materials
will be disturbed. If the materials are not known to be asbestos free, the contractor shall test the materials using the negative assessment protocol found in 40 CFR Part 763, Asbestos Hazards and Emergency Response Act (AHERA). Only the inspection results of the Contractor's AHERA inspector shall be used to establish the procedures and personnel protection required to comply with all applicable safety, health and environmental regulations. The Contractor shall insure a laboratory within the state that the work is to occur analyzes all samples necessary to comply with the applicable state's requirement. Results of these tests shall be submitted in accordance with paragraph 1.07. Should the contractor's AHERA inspector discover asbestos levels sufficiently different from those supplied by the government as to result in a greater or lower cost than anticipated in the bid process, a contract modification may be issued.

1.05 UNFORESEEN HAZARDOUS MATERIALS:

A. If, during the course of work, additional material is found that may be hazardous to human health upon disturbance during construction operations, stop that portion of work and notify the Contracting Officer immediately. Within 14 calendar days, the Government will determine if the material is hazardous. If the material is not hazardous or poses no danger, the Government will direct the Contractor to proceed without change. If the material is hazardous and handling of the material is necessary to accomplish the work, the Government will issue a contract modification.

B. If asbestos is the hazard of concern, the materials shall be tested following the negative assessment protocol found in 40 CFR Part 763, Asbestos Hazards and Emergency Response Act (AHERA).

1.06 DEFINITIONS

A. Sediment: Soil and other debris that has been eroded and transported by runoff water.

B. Solid Waste: Rubbish, debris and other discarded solid materials resulting from industrial, commercial, and agricultural operations, and from community activities. Solid waste may also include non-sewage liquids.

C. Rubbish: A variety of combustible and noncombustible
wastes such as paper, boxes, glass, crockery, metal, lumber, cans, and bones.

D. Debris: Includes combustible and noncombustible wastes, such as ashes, waste materials that result from construction or maintenance and repair work, leaves, and tree trimmings.

E. Chemical Wastes: Includes salts, acids, alkalies, herbicides, pesticides, and organic chemicals.

F. Sanitary Wastes:
   1) Sewage: Wastes characterized as domestic sanitary sewage.
   2) Garbage: Refuse and scraps resulting from preparation, cooking, dispensing, and consumption of food.

G. Asbestos and Asbestos Materials: Asbestos means actinolite, amosite, antophyllite, chrysotile, crocidolite, and tremolite. Asbestos material means asbestos or any material containing asbestos such as asbestos waste, scrap, debris bags, containers, equipment, and asbestos-contaminated clothing consigned for disposal. Friable asbestos material means any material that contains more than one percent asbestos by weight and that can be crumbled, pulverized, or reduced to powder, when dry, by hand pressure.

H. Oily Waste: Includes petroleum products and bituminous materials.

I. PCB (Polychlorinated Biphenyls): Toxic and non-biodegradable materials used extensively under trade names, such as Pyranol or Askarel, as insulating cooling fluids in capacitors and transformers.

J. Hazardous Material (HM): Chemicals defined by OSHA 29 CFR 1926.59 and under the U.S. Department of Transportation (DOT) regulations (Title 49 CFR Parts 100 through 199) which are determined by the Secretary of Transportation to present risks to safety, health, and property during transportation. The DOT regulations include requirements for shipping papers, package marking, labeling, transport vehicle placarding, and training of personnel handling hazardous materials.
K. Hazardous Substance: Substances defined under the Clean Water Act and CERCLA as chemicals which are harmful to aquatic life or the environment and are regulated, if spilled or otherwise released to the environment. The EPA has designated "reportable quantities" for each hazardous substance (Table 40 CFR 302.4) under CERCLA. If an amount equal to or greater than the reportable quantity of a hazardous substance is released to the environment, that spill must be reported.

L. Hazardous Waste (HW): Substances which are hazardous and have been discarded are regulated as hazardous waste under RCRA or State Health and Safety Codes and their implementing regulations. A waste is hazardous if it meets certain levels of reactivity, ignitability, corrosivity, or toxicity, or is otherwise listed as a hazardous waste in Title 40 CFR Part 261 or in the respective State Health and Safety Code or Code of Regulations.

M. Lead Containing Paint: Paint or other similar surface coating material containing lead or lead compounds and in which the lead content is in excess of 0.06% by weight of the total nonvolatile content of the paint or the weight of the dried paint film. Abatement of paint containing even trace amounts of lead must meet the requirements of Federal and State laws for protection of employees (e.g., 29 CFR 1926.62 and 40 CFR 745 Subpart E).

1.07 SUBMITTALS: Submit the following in accordance with Section 01 33 00, "Submittal Procedures":

A. Solid Waste Disposal Permit: Upon disposal, provide copies of the acceptance receipts for the material, from the disposal site.

B. HW Manifests: Upon disposal of hazardous waste, submit a copy of the completed manifests within 5 calendar days of delivery of the wastes to the EPA approved treatment, storage and disposal facility.

C. HM/HW Handling Plan: Comply with all local, state, and federal laws and regulations when handling hazardous materials and disposing of and handling hazardous and other wastes. The Contractor shall have a compliance program outlining how the contractor handles and disposes of hazardous materials, petroleum products, hazardous substances, and hazardous waste. The program shall
include, but is not limited to, the following elements as appropriate: a general storage site plan, methods used to analyze whether generated material (blasting debris, paint waste, etc.) is hazardous, any hazardous waste licenses and permits, air district permits, and the identification of hazardous waste and material transportation and disposal contractors. The Coast Guard has the right to require removal from the contract performance of any subcontractor who fails to comply with these laws and regulations or who fails to provide appropriate evidence of compliance with them.

D. Safety Data Sheets (SDS's): Copies of all SDS's for all hazardous materials (including petroleum products) shall be submitted along with a listing of quantities of these hazardous materials proposed to be stored on site.


F. Lead Sampling Certifications: If lead sampling is accomplished under this contract, provide EPA certificates for personnel evaluating the material (lead risk assessors) and certifications of laboratories performing analytical tests for lead.

G. Lead and Asbestos Test Results: Submit full copies of all lead and asbestos sampling and analysis results.

H. Specific work plans are required for the following

1) Lead:

(a) Lead-Based Paint: The contractor shall comply with all applicable local, state, and Federal laws and regulations regarding lead-based or lead-containing paint when engaging in lead-based paint activities or when addressing lead-based paint hazards. Compliance with all such laws and regulations shall be indicated in the HM/HW Abatement Plan. Whenever this contract provides more than one standard for regulating lead-based paint, the contractor shall comply with the most restrictive law or regulation. Applicable laws or regulations include, but are not limited to, 16 CFR §1303, Ban of Lead-Containing Paint; 29 CFR 1910.1025, Occupational Safety and Health Standards for General Industry; 29 CFR 1926.62, Lead Exposure in Construction; 40 CFR Part
745, Subpart E, rule for Lead Based Paint Renovation, Repair, and Painting; 15 U.S.C. §2601, et. Seq.; and the Residential Lead-Based Paint Exposure Reduction Act. Contractors who perform lead-based paint renovations shall be employees of an EPA Certified Firm, EPA Certified Renovators, employ properly trained and certified workers and supervisors, and use lead-safe work practices. Lead-safe work practices include but are not limited to work area containment; prohibition of open-flame burning; the use of power tools with HEPA exhaust control; and thorough clean up followed by verification or clearance of renovated areas.

(b) Lead-Contaminated Material Abatement: The Contractor shall not release lead or lead-contaminated materials into the environment. The Contractor shall not dispose of lead or lead-contaminated materials except in accordance with hazardous waste laws. When handling and storing lead-contaminated materials, the Contractor shall be responsible for compliance with 42 U.S.C. §§ 9601-9675, 42 U.S.C. §§ 6901-6991, and all other applicable Federal, state, and local environmental laws and regulations.

(c) Painting over Lead Based Paint: If it is intended that the contractor is to paint over lead-based paint, prepare surfaces in accordance with the HM/HW abatement plan. Record the exact, detailed locations where the lead-based paint was removed or had new paint applied over it. Provide copies of these records to the Contracting Officer and the Unit. These records must be included in the Unit's building operation and maintenance plan to prevent lead exposure during future work and to disclose the presence of lead in the paint if the Coast Guard sells the property.

2) Asbestos: In no case, will any asbestos be cut or otherwise treated without compliance with the Coast Guard Asbestos Exposure Control Manual (COMDTINST M6260.16). In addition to COMDTINST M5100.47A, any asbestos abatement operations must comply with all Federal, state and local laws and regulations including 29 CFR 1910.1001 and 40 CFR §61.150; National Emission Standards for Asbestos. Provide all
notices to the EPA as required by 40 CFR §61.145 prior to commencing asbestos removal work. Whenever this contract provides more than one standard for asbestos abatement, the contractor must comply with the most restrictive law or regulation. The Contractor will provide forty-eight hours written notice to the Contracting Officer before commencing any asbestos work. Should there be any question as to the existence of asbestos in any material which may be disturbed, it must be treated as if it were asbestos until positively identified.

I. ACCIDENT PREVENTION: Submit a copy of your “Accident Prevention” or “Injury and Illness Prevention” Plan as required under the submittal register. The work plan shall address the specific hazards on the job-site including Fire Prevention and Hot Work authorization per EM-385-1-1 and NFPA 241, Chapter 5.1. EM 385-1-1 Appendix A illustrates typical content for the Accident Prevention Plan (APP). All hot work to be cleared through the unit fire marshal before hot work starts. Hot work is any open torch work which includes all welding work, soldering, brazing, heating, grinding, burning, or similar operation that is capable of initiating fires or explosions.

J. MOBILE EQUIPMENT OPERATOR LIST: A list of qualified operators for all mobile equipment that will be brought onto the job site with employee name(s), qualifications and specific equipment to be operated shall be provided to the Contracting Officer prior to equipment operation. (This includes forklifts, cranes, motorized lifting device, etc.)

K. FALL PROTECTION: All construction activities shall comply with the fall protection requirements of CFR 1926 Subpart M and ANSI Z359. Submit a work plan if required under the submittal register.

L. SCAFFOLDS AND POWERED PLATFORMS: All above ground level work which requires scaffolds shall meet 29 CFR 1926 Subpart L - Scaffolds. The contractor shall submit the name of his/her competent person, designated and authorized by the employer to install and inspect scaffolding. All work that requires powered platforms, vehicle-mounted elevation and rotating work platform shall meet 29 CFR 1910.Subpart F - Power Platforms, Manlifts, and Vehicle-Mounted Work Platforms.
M. TRENCHING AND SHORING: All excavation work shall meet 29 CFR 1926 Subpart P, OSHA standard "Excavation, Trenching, and Shoring." The contractor's competent person shall evaluate the work operations and soil type and determine the appropriate protective measures necessary to protect personnel in trenches, as required by 29 CFR 1926-Subpart P-Excavations. The excavation support system shall be designed and constructed by personnel experienced and knowledgeable of code requirements and familiar with the hazards involved. The excavation shoring or bracing system shall be inspected daily and after a rainstorm, or other hazard.

1.08 DUST CONTROL: Keep dust down at all times, including non-working hours, weekends, and holidays. Sprinkle or treat with dust suppressors, and other areas disturbed by operations. No dry power brooming is permitted. Instead, use vacuuming, wet mopping, wet sweeping, or wet power brooming. Air blowing is permitted only for cleaning nonparticulate debris, such as steel reinforcing bars. No sandblasting is permitted unless dust is confined. Only wet cutting of concrete blocks, concrete, and asphalt is permitted. No unnecessary shaking of bags is permitted where bagged cement, concrete mortar, and plaster is used.

1.09 FOREIGN OBJECTS DAMAGE (FOD): Aircraft and aircraft engines are subject to FOD from debris and waste material lying on airfield pavements. The Contractor shall remove all such materials that may appear on operational aircraft pavements due to their operations on at least a daily basis. If necessary, the Contracting Officer may require the Contractor to install a temporary barricade at the Contractor's expense to control the spread of FOD potential debris. The barricade shall consist of a fence covered with a fabric designed to stop the spread of debris; anchor the fence and fabric to prevent displacement by winds or jet/prop blasts. Remove barricade when no longer required.

1.10 NOISE: Make the maximum use of "low-noise-emission products" as certified by EPA and described at 40 CFR Part 204. No blasting or use of explosives is permitted. Comply with applicable portions of the Noise Control Act (NCA). The Contractor is responsible for complying with all other federal, state, and local noise control laws and regulations.
PART 2 PRODUCTS
Not Used

PART 3 EXECUTION
Not Used

END OF SECTION
PART 1 GENERAL

1.01 SECTION INCLUDES: This section applies to all necessary steps taken by the contractor to comply with the environmental protection requirements listed herein.

1.02 APPLICABLE PUBLICATIONS: The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

A. ENVIRONMENTAL PROTECTION AGENCY (EPA) REGULATIONS:

40 CFR 122 National Pollution Discharge Elimination System

40 CFR 261 Identification and Listing of Hazardous Waste

40 CFR 262 Standards Applicable to Generators of Hazardous Waste

40 CFR 263 Standards Applicable to Transporters of Hazardous Waste

40 CFR 761 Polychlorinated Biphenyls (PCB) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions

B. U.S. DEPARTMENT OF LABOR OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) REGULATIONS:

29 CFR 1910.120 Hazardous Waste Operations

C. U. S. DEPARTMENT OF TRANSPORTATION REGULATIONS:

49 CFR 100-199 Hazardous Materials Transportation, Handling, and Storage Regulations

1.03 REFERENCE STATUTES: The statutes listed below form a part of this specification to the extent referenced.

Clean Air Act (CAA) (42 U.S.C. §§ 7401 to 7642)

Clean Water Act (33 U.S.C. §§ 1251 to 1387)
1.04 ENVIRONMENTAL PROTECTION REQUIREMENTS: Provide and maintain environmental protection during the life of the Contract to control pollution or to correct conditions that develop during construction. Comply with all Federal, State, and local laws and regulations pertaining to water, air, soil, and noise pollution.

1.05 PROTECTION OF NATURAL RESOURCES

A. Preserve the natural resources within the project boundaries and outside the limits of permanent work performed under this Contract in their existing condition or restore to an equivalent or improved condition upon completion of the work. Repair or restore to original condition all trees or other landscape features scarred or damaged by equipment or operations. Obtain Contracting Officer's approval before repair or restoration. Confine construction activities to areas defined by the work schedule, drawings, and specifications. Federal Acquisition Regulation clause 52.236-9 applies.

B. Except in areas indicated to be cleared, do not remove, cut, deface, injure, or destroy trees or shrubs without special written permission from the Contracting Officer. Protect existing trees which may be damaged by construction operations.

C. Construction equipment is to be kept in good repair, without leaks of hydraulic or lubricating fluids. If such leaks or drips do occur, they shall be cleaned up immediately. Drip pans shall be utilized when vehicles are parked. Confine equipment maintenance and/or repair to one location. Control runoff in this area to prevent contamination of soils and water.
D. At or before Contract completion, obliterate all signs of temporary construction facilities such as haul roads, work areas, structures, foundations of temporary structures, stockpiles of excess or waste materials, and all other vestiges of construction. Temporary roads, parking areas, staging areas, and similar temporary use areas where excavation has been accomplished shall be graded in conformance with surrounding areas. Restore all disturbed areas to their original condition.

1.06 CONTROL AND DISPOSAL OF WASTES: With the exception of materials specifically indicated or specified to be salvaged for reuse in construction, or turned over to the Government, all wastes and demolished materials become the contractor's property and shall be removed from the job site daily.

1.07 HAZARDOUS WASTE DISPOSAL: Any hazardous or regulated waste generated by work under this contract is the responsibility of the Contractor and shall be disposed of in accordance with all applicable federal, state, and local regulatory requirements. The facility is the generator of record and will provide the EPA ID number and manage manifests. The site environmental manager must approve and sign all manifests. The contractor may leave wastes on site pending analysis for disposal. The wastes will be accumulated at a location designated by the POC. The facility address will be used on each manifest. CEU Oakland shall not appear on any manifest. The Contractor shall arrange and be responsible for the transportation and final disposal of any hazardous waste. Comply with applicable parts of 40 CFR 262. Any manifest of hazardous waste shall be signed by the Government Hazardous Materials/Hazardous Waste Coordinator at the work site (hereinafter "HM/HW Coordinator"). The Contractor shall contact the HM/HW Coordinator for disposal of any hazardous waste. No contractor or subcontractor shall have the authority to sign a hazardous waste manifest using the facility's EPA generator ID number. Only the HM/HW Coordinator may sign a manifest for hazardous waste.

A. HM/HW Spill Response: Store chemical waste in corrosion resistant containers labeled to identify type of waste and date filled. Comply with 49 CFR 178. Remove containers from Government property and dispose of in accordance with Federal, State, and local regulations. Submit a certified copy of the acceptance receipts for
these materials, indicating quantities. For oil and hazardous material spills which may be large enough to violate Federal, State, and local regulations, notify the Contracting Officer immediately.

B. Dispose of petroleum products and petroleum contaminated soil and water in accordance with procedures meeting Federal, State, and local regulations. Comply with 40 CFR 761 for removal and disposal of PCB containing articles.

C. Comply with 40 CFR 262 and 263, 29 CFR 1910.120, and state regulations for removal, transportation and disposal of hazardous waste as discussed in the Contractor's HM/HW Handling Plan.

D. Coordinate use of sanitary, odor, and pest control systems with COR. The Contractor is responsible for compliance with FIFRA at the work site.

E. Refrigerants: The Contractor shall at all times adhere to the requirements of section 608 of the Clean Air Act, 42 §§ 7401 et seq., and any implementing regulations. The Contractor may not knowingly vent or otherwise knowingly release or dispose of any Class I or Class II refrigerants, as defined in 42 U.S.C. §7401a, into the environment. The Contractor shall ensure that when servicing small appliances (refrigerators, freezers, water coolers etc.), high pressure systems, or low pressure systems, all servicing and recovery requirements for the appropriate level of equipment are met. Whenever reclaimed refrigerant is used, the Contractor shall provide the Coast Guard Inspector proof that the refrigerant meets the relevant standard of purity. All contractor servicing technicians must have obtained the required level of Environmental Protection Agency certification necessary to service the equipment (i.e. small appliances, high pressure systems, low pressure systems, etc.) in question. Any new system(s) or appliances provided by a Contractor containing chlorofluorocarbon (CFC) or hydrochlorofluorocarbon (HCFC) refrigerants shall be labeled as follows:

"WARNING: Contains (or manufactured with) (name of substance), a substance which harms public health and the environment by destroying ozone in the upper atmosphere."

PART 2 PRODUCTS

4425125
PART 1 GENERAL

1.01 SCOPE OF WORK: This is a design-built project. Contractor shall provide complete services for the design and construction of the HVAC system at Building A and Building C at Sector San Diego, San Diego, California based on scope of work present in this specification. The completed work shall comply with all applicable codes, federal, state, and local regulations referenced in this specification. The work shall include, but is not limited to, the following:

A. BASE WORK:

1) Building A: Convert the existing constant air volume HVAC system to a variable air volume and temperature (VVT) HVAC system. Work shall include but is not limited:

(a) Demolish all reheating coils, thermostats, and controls, (twelve sets), and replace them with variable air volume (VAV) terminal units, including VAV boxes, reheating coils, controls, actuators, and accessories required to work with the new VVT system.

(b) Modify the ductwork and piping as required to support the operation of the VVT system and the economizer, including new ductwork, by-pass damper, and duct transition for the VAV terminal units.

(c) Provide a new VVT system, including but is not limited to, controller, space sensors, zone controller, and touch screen panel required to control the HVAC system. The new touch screen control panel shall be installed inside the mechanical room. The exact location of the panel shall be field determined by Contracting Officer’s Representative.

(d) Conducting a major maintenance and rehab work on the existing HVAC equipment that will be reused. Work shall include but is not limited to, replacing all filters, belts, seals and gaskets for pumps and
valves, cleaning all ductwork, greasing all moving parts on pumps, valves, and dampers. Refurbishing the existing split systems and the boiler. Calibrating all dampers, instruments, and gauges. Testing and balancing all diffusers and registers. Implement all mandatory control strategies per California Title 24 as allowed by the modification.

(e) Provide power to all equipment as required in accordance with referenced publications and manufacturer’s instruction.

(f) Add insulation to the attic to provide minimum R-35 rating.

2) Building C: Demolish all HVAC equipment, including the boiler, the chiller system, the air handler unit, and all 41 fan coil units and associated piping and replace the HVAC system with a new Variable Refrigerant Flow/Variable Refrigerant Volume (VRF/VRV) heat pump system including compatible fan coil units and controls that can provide either cooling or heating to each of the five structures on demand. Provide a DDC control system that shall meet California Title 24 energy standard.

3) Asbestos and lead paint has been identified on the equipment as indicated in Appendix A. Contractor shall conduct his own test and properly remove the asbestos and lead paint equipment and materials that shall be demolished and disposed them in accordance with all applicable federal, state, and local regulations. See Section 01 35 29.1.04 for detail.

4) Provide advanced meters: Provide one electrical meter for each of the five structures at Building C and one meter for Building A. Total six meters are required. Work shall include providing new advanced electrical meters, power panels, safety disconnects, conduits and cables, and all associated materials and equipment required for the operation of the metering system and place the systems in good working condition in accordance with the requirement indicated in Appendix B and C, NFPA 70, and all applicable publications listed in this specification. Advanced meters provided shall be compatible with the Obvius, and LLC AcquiSuite DAS as indicated in Appendix C.
5) Label all rooms and provide a permanent placard on each room for both Building A and C. The placard shall be easy readable from 15 feet away.

6) Provide training to Coast Guard personnel for the operation, trouble shooting, and maintenance of all HVAC systems.

B. OPTIONAL WORK ITEM:

1) Building C: Replace all the HVAC heat pump systems in Base Work Item A.2 with Variable Refrigerant Flow/Variable Refrigerant Volume (VRF/VRV) heat recovery systems that will provide simultaneous heating and cooling to all spaces on demand.

1.02 APPLICABLE PUBLICATIONS: The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

A. Associated Air Balance Council (AABC)

NSTSB-02 National Standards for Total System Balance

B. American National Standards Institute (ANSI)

CEA-709.1 Control-networking protocol

C. Air Movement and Control Association Inc. (AMCA)

204-05R12 Balance Quality and Vibration Levels for Fans

211-13 Product Rating Manual for Fan Air Performance

311-05R10 Product Rating Manual for Fan Sound Performance

511-10R13 Product Rating Manual for Air Control Devices

D. American Society of Heating, Refrigeration and Air-Conditioning Engineers (ASHRAE)

Guideline 36 - High Performance Sequence of Operation for HVAC Systems


Standards 135-2012

The BACNet Standards

Standard 135.1-2011

Method of Test for Conformance to BACNet

52.2-2012 Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size

E. American Society for Testing and Materials (ASTM)

A123-2013 Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

A 53-2012 Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless

B117-2011 Standard Practice for Operating Salt Spray (Fog) Apparatus

C1071-2012 Standard Specification for Fibrous Glass Duct Lining Insulation (Thermal and Sound Absorbing Material)


F. California Title 24 - The Energy Efficiency Standards for Residential and Non Residential Buildings, 2013

G. Federal Communications Commission (FCC)

Title 47, Part 15, Subpart B Radio Frequency Devices

H. Federal Energy Management program (FEMP)

Purchasing Specifications for Energy-Efficient Products
I. International Code Council (ICC)
    IBC-2015 International Building Code
    IFC-2015 International Fire Code
    IMC-2015 International Mechanical Code
    IPC-2015 International Plumbing Code

J. Manufacturers Standardization Society (MSS)
    SP-58-09 Pipe Hangers and Supports - Materials, Design, and Manufacture
    SP-69-03 ANSI/MSS Edition Pipe Hangers and Supports - Selection and Application
    SP-89-03 Pipe Hangers and Supports - Fabrication and Installation Practices
    SP-90-00 Guidelines on Terminology for Pipe Hangers and Supports

D. National Environmental Balancing Bureau (NEBB)
    PSTABES-15 Testing, Adjusting, Balancing of Environmental Systems

K. National Fire Protection Association (NFPA)
    NFPA-70-14 National Electric Code
    NFPA 90a-15 Standard for the Installation of Air-Conditioning and Ventilating Systems
    NFPA-90B-15 Standard for the Installation of Warm Air Heating and Air-Conditioning Systems

E. Sheet Metal & Air Conditioning Contractor’s National Association, Inc. (SMACNA)
    HVAC Duct Construction Standards - Metal and Flexible - 2005 Edition

L. U. S. Department of Energy (DOE)
M. Underwriters Laboratories (UL)

181-96 Factory Made Air Ducts and Air Connectors
555 Fire Dampers
706 Power Ventilators
916-07 Standard for Open Energy Management Equipment
A123-02 Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

1.03 Existing equipment: Field verify all equipment for accuracy prior to any work.

A. Building A: The following equipment shall be refurbished and reused except thermostats. Thermostats shall be replaced.

1) A two-ton split system. AC-1: Carrier, 2 tons, Model #: 38HDC024-341, Series #: 1705X33677, located on the west side of the building. The evaporation unit is in the attic, Model # 30GA045410. The unit was building in 2005.

2) A ten-ton split system. AC-2: Carrier, 10 ton, Model #: 38ARZ012-501, Series #: 2907G10131 located on the south side of the building. The evaporation unit is in the attic, Model # 38AD012410. The unit was building in 2007.

3) Boiler: Hydro Therm, Model #: HC-1000-AV, Series #: GAH1839, located in the mechanical room.

4) Thermostats: Electrical Honeywell touch screen, model#: RTH8500D1013.

B. Building C: The existing HVAC system in Building C is supported by a two-pipe system. There heating and cooling is supported by independent operated chiller and boiler. Only one system can be operated at one time. All these equipment shall be demolished and replaced with VRF/VRV system.

1) Split system: Chiller: Trane, model #:
CGAEC50GABA1FTRV, series #: J95L82805; Air handle system, AH-1; model: Type 10; series #: USB37980.

2) Boiler: Crane, Eighty Series operated on natural gas, model #: 80-600-N; series #: 81549, located in the mechanical room.

3) A two-pipe system supporting 41 fan coil units to provide either cooling or heating to a five-structure complex as indicated on reference drawings.

4) Thermostats: Wired, Coleman, Model# TC-187.

1.04 GENERAL DESIGN REQUIREMENT AND MATERIAL SELECTION:

The goal of this project is to improve customer comfort, equipment energy efficiency, system flexibility, and reliability.

The existing HVAC system at Building A is a constant-volume reheat system. This system requires large amount of heating energy even during periods of moderate outside air temperatures to reheat the 55 degree supply air temperature (SAT) to meet the zone load. Many of the zones temperature were below setpoint due to system being unbalanced and the reheat coils being unable to keep up with the demand. Contractor shall design and convert this system to a VVT system and rebalance the air ducting system so that each space received just enough air to meet its cooling and heating load requirement. Contractor shall fully utilize economizer during time of moderate outside air temperatures to reduce energy consumption.

Temperature in San Diego fluctuates significantly within the same day. As the result, there is a need of cooling and heating within the same day for Building C. The existing HVAC system at Building C consists of a 50-year old boiler, a chiller, and 2-pipe fan coil system. This equipment is old, unreliable, and inefficient which does not meet this operational requirement. Contractor shall select energy efficient VRV / VRF heat pump system that can provide heating and cooling on a same day under demand. If optional item is exercise, a heat recovery system shall be selected instead of heat pump system to provide simultaneous heating and cooling. For heat recovery system, contractor shall provide inverter drives, pulse modulating electronic expansion valves, additional refrigerant piping and solenoid valves, heat exchangers,
and distributed controls that allow system to operate in net heating or net cooling mode, as determined by the space.

All design and equipment provided shall meet government energy efficiency criteria referenced in this specification. All work performed shall be provided by manufacturer certified contractor or engineers.

Contractor shall select reliable, high quality, corrosion resistant equipment and material for a Pacific coastal environment. All piping, fan coils, and fins shall be made of copper. All new equipment finishing systems shall be factory provided. For material other than copper, apply factory application of corrosion resistant coating to the equipment surfaces or select materials as recommended by equipment manufacturer. Manufacturer's standard factory finishing systems shall be proven to withstand 250 hours in a salt-spray fog test. Equipment located outdoors shall be proven to withstand 1,000 hours in a salt-spray fog test. Salt-spray fog test shall be according to ASTM B 117, with acceptance criteria as follows: immediately after completion of the test, the finish shall show no signs of degradation or loss of adhesion beyond (0.125 inch) on either side of the scratch mark.

All equipment sizing, material selection, testing, adjusting and balancing shall adhere to best industry practice, manufacturers' recommendations, and applicable codes. Provide detailed description and steps on quality control for Coast Guard COR to field spot check and reject of field work.

A. Design condition:

1) Outdoor design conditions: Use outdoor design temperature listed in ASHRAE Handbook Fundamental for San Diego area. For comfort cooling, use the 1% dry bulb and corresponding mean coincident wet bulb temperature. For comfort heating, use the 99% dry bulb temperature.

2) Indoor design conditions: The indoor design temperature for comfort cooling shall be 15 degrees F less that the 1% outdoor design temperature, but shall not be lower than 70 degree F or higher than 75 degrees F dry bulb with 50% relative humidity. For
comfort heating, the design temperature shall be 72 degree F dry bulb. The indoor design temperature provided by comfort mechanical ventilation shall be no more than 76 degrees F.

B. Special requirement for Building C:

The complete new VRF/VRV system at Building C shall be designed by the manufacturer or manufacturer approved licensed engineers with at least 5 years of design experience on this type of equipment. Work shall include sizing of the equipment and control, and the design of refrigeration piping and fan coil units. All design and equipment/material selection shall be done in accordance with referenced publications. Integrate all equipment and control to provide best performance and energy saving. Systems shall be designed using best engineering practice and data in the ASHRAE Handbooks (four volumes total), California Title 24, ASHRAE Standard 15, and the SMACNA “HVAC Duct Systems Design” manual. Contractor shall take thermal expansion into piping design.

When selecting VRF/VRV system, the following criteria shall be considered:

1) The VRF/VRV system shall be provided by a single manufacturer, including concrete pads and associated piping and instrument required to operate the system. The required system configuration shall be determined based on number of indoor units and outdoor unit’s capacity and taking into account the total capacity and operational requirements, reliability, and maintenance considerations.

2) Building C consists of five separated structures interconnected by covered hallways. To provide maximum operational flexibility and minimize disruption of operation during construction, each structure shall have a separated VRF/VRV unit.

3) Each VRF/VRV system shall consist of an outdoor unit, branch circuit terminal or branch selector units, multiple indoor fan units and controls. Each indoor unit or group of indoor units capable of operating in any mode independently of other indoor units or group. System capable of changing mode (cooling to heating, heating to cooling) with no interruption to system operation. Sum of connected capacity of indoor air
handlers range from 50% to 130% of outdoor rated capacity.

4) Provide branch selector for individual control and change over for maximum design flexibility.

5) Provide adequate number of branch selectors for each of the structure based on space function and location to allow operational flexibility. For example, separate branch selector shall be provided to support Exchange Office, medical office, conference room, and activity room. For rooms having the same function and design condition, no more than 3 fan coil units shall be group together.

6) Zone load: Zone air flows shall be sized at 110% of calculated cooling or 125% of heating loads, whichever is greater.

7) VAV TERMINAL UNITS: VAV terminal units shall be sized in conjunction with registers to meet room acoustic requirements. Minimum VAV cubic feet per minutes (cfm) settings shall be the minimum ventilation requirements. Use parallel type Fan-Powered VAV terminal units when temperature rise across electric reheat coil exceeds 60°F at minimum cfm settings. Fan motors shall be electronically commutated motor (ECM) types. All terminal units shall be sized at less or equal to 0.08” WC pressure drop when fully open at maximum design airflow rate.

C. Shall use non-ozone depleting environment-friendly refrigerants, such as R-410a.

D. Ventilation: Provide ventilation to all spaces in accordance with California Title 24.

1) Provide a complete ventilation analysis of each HVAC design. Each BEQ room shall maintain at least 60 cubic feet per minutes of fresh air or 20 cfm per person whichever is greater. For VRF system, particulate matter filters or air cleaner shall have a minimum efficiency value (MERV) of not less than 6 and are rated in accordance with ASHRAE 52.2. For Building A HVAC system, air filter shall meet manufacturer’s recommended standard, but shall not be rated less than MERV 13.
2) Provide a balanced air distribution schedule on the drawings, combined with the diffuser/register schedule based on applicable codes and best industry practice. List the total supply and return air and for each room in the schedule.

3) Controls: Provide a standalone control system. The control system shall be BACNet compatible and ready to connect to a building DDC system.

E. Economizer: Due to mild weather conditions in the San Diego area, design shall take advantage of these conditions and incorporate an economizer system to reduce energy consumption to the maximum extent as recommended by the codes.

F. Noise and vibration: Noise and vibration is critical to operation. Contractor shall limit noise and vibration in the office space and BEQs in accordance with acceptable codes and industry standards. For VRF system, maximum equipment noise level: 58 DBa at full load for outdoor unit and 25 DBa for indoor unit.

G. Duct, diffuser, grille, and louvered opening design: If the existing ducts, diffusers, and grilles can be utilized, utilize them in accordance with manufacturer’s recommendation and referenced publications. Provide safety features, such as smoke and fire dampers as required by codes. All new ductwork and components shall have a minimum 2 inch water gage pressure rating. Ensure that duct design incorporates all features necessary to accommodate testing, adjusting, and balancing (TAB). Duct insulation shall be provided in accordance with referenced code and manufacturer’s recommendation.

H. Controls: The digital programmable system shall have proportional-integral-derivative (PID) controls provided by VRF/VRV manufacturer to perform input functions necessary to operate the system. No third party building management system will be required, however, VRV/VRF system shall be capable of communicated with third party BMS. The unit shall be compatible with interfacing with connection to BACNet networks and be BACNet Testing Laboratories listed. Controllers, thermostats, occupancy sensors, and relays shall be incorporated into the control system to allow energy conservation and provide operational flexibility of the system installed as specified by applicable codes and manufacturer’s
guidelines. Provide a centralized control to enables the user to monitor and control the entire system from a single location. Use variable speed compressors with 10 to 100% capacity range to provide flexibility for zoning to save energy. Design control systems in accordance with referenced standards and the HVAC equipment manufacturer’s recommendations.

I. Special requirement for Building A:

1) The new VVT system and its accessories shall be provided by a single supplier as much as practical.

2) Implement all mandatory control strategies per California Title 24 as allowed by the modification. Apply strategies such as modifying the existing ductwork to provide bypass damper to maintain duct static pressure, utilizing outside air as much as possible to minimize mechanical cooling, adjusting the discharge air temperature to minimize unnecessary cooling, providing outside air temperature lockouts when outside air temperature is cold enough, and keeping the economizer at minimum ventilation position to prevent too much hot air from entering the system.

3) Space sensors: Each zone shall get its own space sensor with a local override capability. It shall allow minimum 2 hours of local override. Sensor shall have set point adjustment capability to give local control to change the desired temperature by 2 degrees on each direction. Space sensor shall have a LCD display.

4) Wall mounted, factory tested, system user interface panel: Shall be a BACNet compatible touch screen local control with external access availability from a network computer. The color pixel screen shall not be less than 4.3". It shall allow staff to monitor and control the entire HVAC system for occupant comfort and energy efficiency.

5) Controls to HVAC equipment: Provide bypass damper and VVT bypass controller with integrated actuator (35 in-lb).

6) Zone load: Zone air flow shall be sized at 120% of calculated cooling or 140% of heating loads,
whichever is greater.

7) For the two-ton unit, provide a DDC controller with CO2 sensor for demand controlled ventilation.

J. Insulation: Refrigerant lines from outdoor unit to indoor units shall be insulated in accordance with manufacturer's instructions. Provide insulation to ductwork and piping as recommended by equipment manufacturer.

K. Testing, Adjusting, and Balancing: All work shall meet "National Standards for Total System Balance" or "Procedural Standards for Testing, Adjusting, Balancing of Environmental Systems". Accessories, such as dampers, testing ports, and control valves shall be provided to allow easy testing, adjusting and balancing as recommended by the equipment manufacturer and in accordance with good industry practice.

L. Advanced meter requirement: Provide an advanced meter for Building A. Building C consists of five structures inter-connected by covered hallways. Provide one electrical meter for each structure. Work shall including advanced electrical meter, new power panel, safety disconnect, and all associated materials and equipment required for each of the system to work in accordance with Appendix B and C, NFPA 70, and all referenced publications. Advanced meters provided shall be compatible with the Obvius, and LLC AcquiSuite DAS as indicated in Appendix C.

1.05 SEQUENCE OF OPERATION: Provide most energy efficient operational sequence in accordance with California Title 24, ASHRAE Guideline 36 - High Performance Sequence of Operation for HVAC Systems, and other referenced publications listed in this specification. To reduce energy consumption, provide detailed Sequence of Operation for each working area and equipment, taking full advantage of the applicable codes and weather condition. Following are general design guidelines:

1) Warm-up mode: Hours of operation shall be as scheduled by the controller upon start signal. Activation of Warm-up mode shall provide for temperature recover to building occupied temperature set points. During this period, both supply and return fans shall start. The dampers shall remain in
their normal positions of 100% recirculated air. Cooling shall be locked out until the return air temperature reaches 68 degrees F, at which time the system shall begin the occupied mode.

2) Occupied mode: Minimum position for the outside air damper shall be set in accordance with ASHRAE 62.1 to maintain fresh air supply. During the occupied mode, dampers shall open to minimum position and the automatic discharge air temperature control shall be enabled as required to maintain supply air temperature set point. Fully integrate the economizer in accordance with code. Economizer damper and duct heating are modulated in sequence in accordance with referenced federal energy standards. Return air and outside air temperatures are compared and the economizer controller shall determine if outside air is suitable for cooling. No mechanical cooling until the economizer is on 100% outdoor air. Supplement the outdoor air cooling as required. Continue to use outdoor air until the outdoor air is not suitable for cooling. If return air temperature is higher than 73 degrees F and more than 2 degrees F higher than outside air, then the damper shall be modulated to maintain a constant supply air temperature of 55 degrees F. The supply air temperature set point shall be reset based on the building cooling load, as measured by the return air temperature. Do not heat until the economizer is on minimum outdoor air. The demand controlled ventilation system can override the temperature based control of the economizer cycle if necessary to maintain adequate ventilation.

3) Unoccupied mode: During this period, supply and return fans shall be off. Dampers shall be in their normal positions. Upon call for unoccupied mode cooling as sensed by high temperature limit, fans shall be returned to the occupied mode of operation as required to maintain a high temperature limit of no more than 90 degree F (5 degree F differential). System shall return to unoccupied mode once the thermostat senses 85 degree F.

4) Non-scheduled controls and safeties:

(a) Volume control: Monitor supply and return air quantities to provide slightly positive building
pressure (0.025" w.c.).

(b) Dirty filter: A differential pressure switch across the filter shall provide filter maintenance alarm.

1.06 SUBMITTALS:

A. Catalog cuts as specified in Section 01 33 00 for the following:

1) Each VFV/VRV system which include all accessories, foundations, supports, and lifting devices

2) Control systems, including all sensors, thermostats, and related components

3) Complete VVT system, including bypass damper and controller, zone damper and controller, space sensors, and touch screen system control panel.

4) Electrical materials, including breakers, power panels, safety disconnects, equipment and materials required to support the advanced metering program.

5) Piping, valves, gauges, instruments, and fittings.

6) Ductwork and all related components such as registers, diffusers, etc.

7) All new equipment and materials provided, such as DDC control, VAV boxes and associated accessories, controllers, all sensors, such as controlled temperature sensors, outdoor controlling (reset) temperature sensors, and return controlled temperature sensors; digital thermostats, and electrical equipment and materials to support the new system.

8) Ceiling insulation.

9) Advanced meters

B. Work Plan: Fully describe how work shall be performed, including all activities and any shut downs.

C. Maintenance and rehab report for Building A: Provide detailed report specified in this specification. As a minimum, report shall include the following:
1) All maintenance, adjustment, calibration, and recommissioning work performed on all equipment and materials.

2) Detailed maintenance requirement and instructions on future maintenance requirement include required parts.

D. SHOP DRAWINGS: As indicated in 01 33 00.1.05

E. DESIGN CALCULATIONS & DRAWINGS: As indicated in 01 33 00.1.06.

1) 50% DESIGN COMPLIANCE REVIEW: Submit CADD and PDF files. The design document shall include all work identified in Section 01 61 00.1.04, such as design load profile, load calculations, system configuration including number of indoor units and outdoor condensing unit capacity, equipment sizing, layouts, equipment catalogs and control component cut sheets, equipment automatic control schematic, and sequences of operation that will meet the performance requirements.

2) 95% DESIGN COMPLIANCE REVIEW: Submit all design documentations and calculations with drawings in CADD and PDF files. Provide all routings, sizes, designed values, equipment schedules, notes and installation details.

3) FINAL DESIGN DRAWINGS: Submit 5 complete hard copies and AUTOCAD 2012 files. The hard copies shall be wet signed by the DOR.

F. AS-BUILT DRAWINGS: As indicated in 01 33 00.1.12.

G. OPERATION AND MAINTENANCE MANUAL: As indicated in 01 33 00, Paragraph 1.14.

H. TEST REPORTS:

(1) Tests performed at manufacturer’s facility. Submit the report at the time equipment is delivered.

(2) Detailed duct leak tests. Submit the report 10 days after the work is completed.

(3) Testing, Adjusting, and Balancing Reports: Provide all forms specified by either NEBB, TABB, or SMACNA whenever applicable. As a minimum, the following
shall be submitted 14 days prior to the start of TAB field measurements in accordance with Section 01 33 00, Submittal Procedures:

(a) TAB schematic drawings, include balancing devices and all testing points.

(b) Product Data: Procedures, instrument calibration, system readiness check, and proposed TAB execution.

Once the tests are completed, submit and sign the complete TAB reports and ductwork leak test no later than 14 days after the execution of TAB. The report shall be certified and in the following specified format and include the following data:

(a) Report Format: Report forms and report data shall be typewritten. Handwritten report forms or reports data are not acceptable.

(b) Temperatures: Include the indoor and outdoor dry bulb temperature range within which the TAB data was recorded, on each TAB report form, reporting TAB work accomplished on HVAC thermal energy transfer equipment.

(c) Instruments: List the types of instruments actually used to measure the TAB data. Include in the listing each instrument's unique identification number, calibration date, and calibration expiration date.

(d) Certification: Include the typed name of the TAB supervisor and the dated signature of the TAB supervisor.

I. Contractor's Certification: Provide a signed written certificate by the contractor's officer indicating all design and installation meet the VRV/VRF manufacturer's requirements and applicable codes.

J. CONTRACTOR'S QUALIFICATION: Submit the contractor's qualification for the prime contractor, licensed professional design engineering subcontractor, and the TAB agency. The prime contractor and first tier subcontractors all shall have successfully completed at least 4 projects of the same scope and the same size or
larger within the last 5 years and meet the licensing requirements in the state. Provide manufacturers training certificates or documents. Contractor shall have experience brazing and pressure testing refrigerant piping up to 600 psig.

1) Design engineering firm and control subcontractor: The firm and engineers shall be trained and approved by VRV/VRF manufacturer and shall be first tier subcontractor. No work shall be accomplished by unqualified personnel.

2) TAB agency qualification: The testing, adjusting, and balancing (TAB) firm shall be either a member of Associated Air Balance Council (AABC), or certified by National Environmental Balancing Bureau (NEBB), or the testing, adjusting, and balancing Bureau (TABB), and certified in all categories and functions where measurements or performance are specified on the plans and specifications. The firm shall be a first tier subcontractor and shall be financially and corporately independent of the prime contractor.

K. WARRANTY:

1) HVAC work: Provide at least two year of unlimited warranty on all work performed on this contract, including parts and labor.

2) VFD/VRV system service support: Two year full warranty on parts and labor.

3) Contractor shall perform recalibration every six months at summer and winter peak time for a period of two years and make sure the system is operating in most energy efficient way as designed.

L. TRAINING DOCUMENTATION: Provide 5 set of hard copies, including CADD and PDF files at least 14 days before training.

1.07 QUALITY ASSURANCE:

A. The equipment, materials, installation and workmanship shall be in accordance with the required and advisory provisions of International Building Code, International Mechanical Code, International Plumbing Code, NFPA 70, and ASHRAE 135 BACNet standards, and referenced
publications in this specification except as modified herein. The new system shall be designed for earthquakes and shall include all materials, accessories and equipment necessary to provide the system complete and ready for use. Devices and equipment shall be of a make and type listed by the Underwriter's Laboratories Inc. In the publications referred to herein, the advisory provision shall be considered to be mandatory, as though the word "shall" had been substituted for "should" wherever it appears; reference to the "authority having Jurisdiction" shall be interpreted to mean the U.S. Coast Guard.

B. Materials and equipment shall be standard products of a manufacturer regularly engaged in the manufacturing of such products, which are of a similar material, design and workmanship. The standard products shall have been in satisfactory commercial or industrial use for 2 years prior to bid opening. For ease of maintenance and parts replacement, to the extent possible, use equipment of a single manufacturer. Parts and equipment specified herein shall have an attached nameplate to list the manufacturer's name, address, component type or style, model or serial number, catalog number, capacity or size, and the system which is controlled. Plates shall be durable and legible throughout equipment life and made of durable material. Plates shall be fixed in prominent locations with stainless steel or nonferrous screws or bolts.

PART 2 PRODUCTS:

2.01 Engineered Packaged Variable Refrigerant Flow (VRF) / Variable Refrigerant Volume (VRV) Systems: The entire VRF/VRV systems, including the heat pumps, branch selectors, controls, variable speed compressors, indoor fan coils/evaporator units and associated piping, and concrete pad shall be provided by a single manufacturer. Fan coil units shall be high performance, low noise type with high efficiency electronically commutated motors (ECM). Following are acceptable manufacturers:

A. Daikin

B. Mitsubishi

C. Trane
D. Fujitsu

E. Other manufacturers that provide equal or better system.

Each manufacturer has a specific refrigerant distribution system that is proprietary. If alternate manufacturer is accepted, provide detailed Basis-of-Design documents, including all drawings and calculations, equipment locations, and all modifications.

If alternative bid is executed, provide complete packaged heat recovery system in accordance with VRF/VRV manufacturer's requirements.

2.02 PIPING, VALVES, INSULATION, AND OTHER RELATED EQUIPMENT FOR THE VRF/VRV SYSTEMS: All materials and equipment, such as copper piping, separation tubes/headers, valves, instruments, and gauges shall be supplied or approved by VRF/VRV system manufacturer. Provide pipe expansion loop, isolation valves and instruments as required for easy operation and maintenance.

2.03 DIRECT DIGITAL CONTROL (DDC) SYSTEM: Provide a DDC system each for Building C. The system shall be of native BACNet, with hierarchical controls, from the zone level, through, to the heating and cooling source, such that all automated sequences are in an integrated manner, providing maximum efficiency, and addressing the requirements of California State Code Title 24. For VRF systems, the DDC controls are fully-featured and integrated with the prescribed type of VRF system assigned:

A. All components shall be listed under UL916 with plenum rating.

B. All components shall meet FCC Part 15, Class A requirements.

C. The rated voltage for all DDC controllers and LCD display units shall be 20-30 Vac. A real-time clock and DC power supply shall be integral for all DDC unitary controllers.

D. All DDC controllers shall be programmable to achieve the intended sequence of operation, include automatic temperature control, calculations and interlocking functions. DDC controllers shall be interoperable with all VAV damper controllers and display unit.
E. LCD Display unit shall allow the end users to access and display all information in the DDC system, include all set points, VAV airflow settings, measured values, operation parameters and operation status. The LCD display unit shall allow the end users to change the values of all operating parameters, include all temperature set points, VAV airflow settings, and differential values required for calculations without the use of an additional device. LCD display shall allow users to program and retrieve trend log and alarm messages on all adjustable and measurable setpoints, status and values without the use of an additional device.

F. All zone temperature and duct temperature sensors shall be of thermistor type and have an accuracy of ±0.36 °F. All zone temperature sensors shall have a digital display of the measured temperatures.

G. All control wirings shall be plenum rated.

H. Airflow measuring sensors/probes shall allow measurement of outside air intakes and output shall not be affected by either the turbulence created by the louver, moisture eliminator or modulating dampers. All measurements shall be real-time temperature compensated. Accuracy shall be plus or minus 15% of the design minimum outside air airflow.

I. Airflow transducer shall sum up airflow quantities from all airflow measuring sensors/probes and displays on a LCD screen. The transducer shall provide a visual alert to the occupants when the outside airflow falls below 90% of the design minimum. The visual alert device shall be remotely mounted at a designated location as shown on floor plan.

J. Provide BACNet compatible centralized control system with digital programmable thermostats per manufacturer’s installation instructions

K. Provide a calibration report of all sensors.

2.04 Complete VVT system for the operation of the entire HVAC system for Building A as specified by the specification.

2.05 Ductwork, fire damper, indoor fan coil units, ceiling cassette /registers /diffusers: As recommended by
VRF/VRV manufacturer, design engineers on record, and referenced publications in this specification. Modify the existing ductwork to allow the system to fully utilize the economizer.

2.06 ELECTRICAL WORK: Provide power to all equipment as required. All materials and equipment shall meet HVAC and VRV/VRF manufacturer’s requirements and NFPA 70.

A. Electrical system: All electrical components shall be UL listed with the following additional requirements:

1. All wire shall be rated to meet or exceed electrical requirements for voltage, ampacity, and dielectric strength of sheathing and temperature rating per location and manufacturer’s requirement.

2. All power wiring shall be enclosed in metallic sheathed box and include the identifying marker corresponding to the wiring diagram.

3. All control wiring shall terminate at terminal strips with an identifying marker to correspond with the wiring diagram marker.

4. Provide Unit Control Panel that includes 24 volt transformer, line and low voltage terminal blocks, blower motor starter and overload (if motor is not thermally protected), fuse block.

5. Provide shut off switches as recommended by equipment manufacturer and applicable publication referenced in this specification.

B. Tie-down bolts, nuts, and foundation supports: Provide stainless steel bolts and nuts and new foundation supports as recommended by equipment manufacturer in accordance with International Building Code seismic requirements. The reinforced concrete foundations shall be 3” above the grade.

2.07 Building A attic insulation: Insulation shall meet ASTM E84 and ASTM C665. Assuming the existing attic insulation has an R-10 value. Provide additional fiberglass butts to provide minimum total insulation not less than R-35.

2.08 Structure steel and pipe supports: All steel shall be
hot-dip galvanized in accordance with referenced publications. Size of steel shall be determined by design engineers on record in accordance with International Building Code and manufacturer’s instructions.

2.09 Advance electrical meters: Provide an advance electrical meter for each structure in accordance with Appendix B - Coast Guard Shore Facilities Utilities Metering Guidance and Appendix C - Advanced Meter - New Installations - USCA. The exact location of each meter shall be field determined. The advanced meters provided shall be compatible with the Obvius, and LLC AcquiSuite DAS as indicated in Appendix C.

2.010 Name plates: Parts and equipment specified shall have an attached nameplate to list the manufacturer's name, address, component type or style, model or serial number, catalog number, capacity or size, and the system which is controlled. Plates shall be durable and legible throughout equipment life and made of stainless steel. Plates shall be fixed in prominent locations with corrosion resistant screws or bolts. For room identification, provide durable plate for each room in prominent locations with corrosion resistant screws or bolts.

PART 3 EXECUTION

3.01 SPECIAL REQUIREMENT:

A. To minimize the interruption of building operation, contractor shall shut down one structure at a time. Provide at least one week of advanced written notice for any shut down of facilities. Provide temporary heating and cooling equipment during construction to allow continued operation of the buildings. Working on after working hours or weekend may be required to minimize interruption of building operation.

B. Submit Work Plan within 30 calendar days after award. As a minimum, the work plan shall clearly indicate any shutdown of equipment and displacement of personnel and the schedule. The shutdown of equipment and offices shall be conducted in an orderly fashion and in multiple phases to minimize the interruption of the building’s normal operations. Provide at least 5 business day advanced written notice to Contracting Officer and Site
Contact of any shutdown to allow ordering temporary relocation of personnel from one BEQ to another. No personnel from BEQs shall be displaced. Do not begin work until all materials and equipment are on hand and authorization is received from the contracting officer.

C. Examination: After becoming familiar with all details of the work, perform verification of dimensions in the field, and advise the Contracting Officer of any discrepancy before performing any work.

D. Reuse materials: If after engineering study, the existing concrete pads for the chiller can be reused, reused them.

E. The testing and balancing of all equipment and distribution system shall be based on applicable codes, referenced publications, and best engineering practice. Maximum duct leak shall be limited to less than 5% of total flow rate. Final flow rates for diffusers and grilles shall be limited to within 10% of the design rates. Replace all damaged piping or undersized piping that will be reused as required. Contractor shall exercise all valves and recalibrate all gauges and instruments. Repair or replace all damaged equipment, valves, fittings, or belts. Submit drawings to document all equipment and room modifications that were not previously recorded as specified in Section 01 33 00, Paragraph 1.12, As-Built Drawings.


1. Follow manufacturer’s instruction regarding to the amount of required open space around the units to allow adequate air movement.

2. Only ACR (air conditioning and refrigeration field services) pipe shall be used. All pipe joints shall be brazed joints with dry nitrogen with no flared fittings. Piping should be supported every 6 feet or less without pinching insulation. Do not allow suspension rods, ducts, or conduits to touch the
piping to avoid electrolysis. Weather coat the outdoor insulation on piping with a weather-resistant PVC coating. Valves should have removable and reinstallable covers. Label piping with weather-resistant pipe labels including directional arrows.

3. Installation shall meet manufacturer's instruction and all applicable publications. Refrigerant piping cleanliness is essential. Pipe shall clean to ASTM established limit for residue. Pipe shall be purged with dry nitrogen and sealed with rubber plugs with positive nitrogen pressure inside the tube. Continuous nitrogen purge during installation. Maintains factory cleaned and capped integrity. Prevents contamination by the oxides and residuals produce by brazing. Caps pipes that are not connected at the end of the day to keep dirt and moisture out.

4. For VAV/VRF system, refrigerant piping shall be pressure test with dry nitrogen at minimum 550 psi. Piping shall be triple evacuated to less than 500 microns and hold for 1 hour.

5. Provide a services ball-type shut-off valve with a charging port at the connection to the unit.

6. Connect refrigerant piping to unit, run piping so as not to interfere with access to unit. Insulate refrigeration lines with at least \( \frac{7}{8} \)" thick closed-cell foam insulation. Connect the ceiling support unit to duct through a 4" long flexible connection. Do not allow kinks in the flexible connection. Install furnished field mounted accessories.

7. Apply correct refrigerant oil for the refrigerant. For example, R410A system shall use an ester oil or alkylbenzene as directed by equipment manufacturer.

8. Provide accumulator when required due to length of refrigerant piping. Install piping level and plumb.

9. Provide condensate pump that will meet lift requirements. Provide drain pan. Use trap, provide secondary drain pipe or heavy-duty redundant pump. Confirm unit shut down upon failure of condensate pump.

10. Provide vibration isolation as recommend by
manufacturer. When vibration isolators are provided, provide 6" long flexible braided copper connector on refrigerant piping that connects to the unit. Do not bend flexible connectors excessively.

11. Provide condensate drainage from indoor units and branch selection devices.

12. All equipment shall be properly braced so that they will not laterally tilt due to high winds or move during earthquake.

13. Assure that filters, unit control panel, and fan motor are all easily accessible for periodic maintenance or replacement.

G. Install and test the advance electrical meters in accordance with the requirements listed in Appendix B.

H. Obtain all permits; install all equipment, controls, piping, fittings, hangers, supports, hook-up and start-up per manufacturer's instructions. All work shall be in accordance with design documents, the plans and specifications of manufacturer's instructions, and referenced codes.

3.02 MAJOR MAINTENANCE WORK AT BUILDING A: Perform major maintenance work in accordance with applicable publications and manufacturer's instruction. Work shall include but is not limited to replace all filters, valve seals, pump gaskets, and belts, grease all moving parts, and replace chemicals for chemical feeder. Provide disposable air filters during construction for all system, minimum rating is MERV 8.

3.03 REFURBISHING, CLEANING, FLUSHING, AND PRESSURE TEST ALL EQUIPMENT AND PIPING SYSTEM FOR REUSE: All work performed shall be done in accordance with referenced publications and manufacturer's instructions. All piping and equipment that will be reused, such as piping and boiler in Building A, shall be flushed, cleaned, and pressure tested before put to work. Perform major maintenance and recalibration on all equipment, instruments, and piping for the complete HVAC system. Provide written detailed documentation document all work performed and all future maintenance requirements with parts information for to Coast Guard personnel for future maintenance. Chemical water used for flushing shall be
collected and discharged in accordance with all applicable codes.

3.04 START UP:

A. Factory certified service representative shall supervise start-up in accordance with manufacturer's instructions.

B. Make final adjustments to assure proper operation of load system. Demonstrate final set up and programming to Coast Guard.

C. Test units in modes of operation and demonstrate compliance with requirements. Replace damaged or malfunctioning equipment and controls.

3.05 TESTING, ADJUSTING, AND BALANCING:

A. Upon completion and prior to acceptance, Contractor shall furnish equipment, instruments, materials, labor, and supervision required for the testing, adjusting, and balancing of all equipment and air flow in accordance with applicable codes, manufacturers' guidelines, and referenced publications in this specification. Prior to start up, clean all equipment as recommended by the manufacturer. Adjust safety and operating controls to place them in proper operation. Contractor shall test the system to demonstrate compliance with performance and capacity requirements of the manufacturer. All tests shall be conducted in the presence of Contracting Officer's Technical Representative (COTR).

B. All work shall meet "National Standards for Total System Balance", NEBB, TABB, SAMCNA, or "Procedural Standards for Testing, Adjusting, Balancing of Environmental Systems", latest edition, whichever is more stringent. Accessories, such as dampers, testing ports, and control valves shall be provided to allow easy testing, adjusting and balancing as recommended by the equipment manufacturer and in accordance with good industry practice. As a minimum, the following shall be submitted in accordance with Section 01 33 00 - Submittals Procedures.

1) TAB schematic drawings and report form, include balancing devices and all testing points, shall be submitted no later than 14 days prior to the start of TAB field measurements.
2) Product Data: Submit following TAB related HVAC submittals no later than 14 days prior to the start of TAB field measurements: procedures, instrument calibration, system readiness check, and proposed TAB execution.

3) Test and balance support for control systems: The controls subcontractor shall coordinate with and provide on-site support to the test and balance (TAB) personnel. This support shall include:

(a) On-site operation and manipulation of control systems during the testing and balancing.

(b) Control setpoint adjustments for balancing all relevant mechanical systems, including VAV boxes.

(c) Tuning control loops with setpoints and adjustments determined by TAB personnel.

4) Test Reports: Submit and sign the complete TAB reports and ductwork leak test no later than 10 days after the execution of TAB.

3.06 TRAINING AND DEMONSTRATIONS: Contractor shall conduct training for the operating staff as designated by the Contracting Officer, minimum 5 people. This training shall be conducted by the manufacturer's approved representative that is familiar with the system. Provide minimum 8 hours of training during normal working time. The training shall be conducted after the system is functionally completed, but prior to final system acceptance. Training shall cover all items contained in the operation and maintenance manuals, as well as demonstrations of routine maintenance operations and emergency shutdown, including lockout and tag out program.

3.05 DISPOSAL OF MATERIALS: Removed refrigerant, piping, and equipment shall be properly recycled in accordance with Division 1, General Requirement, Section 01 35 43, Part 1.07 of this specification. All materials and equipment removed shall become the property of the Contractor and shall be removed and disposed off Government Property in accordance with all federal, state, and local government regulations. Title to materials resulting from demolition is vested in the Contractor upon approval by the Contracting Officer. The Government will not be
responsible for the condition or loss of, or damage of demolished materials and equipment.

3.06 RESTORATION: Surfaces to remain, when cut, damaged, or otherwise disturbed during demolition, removal, and installation shall be restored and refinished as necessary to provide a smooth, clean, complete, and finished installation to match adjoining surfaces in appearance and texture. Refinish shall be to the nearest undamaged intersecting surface or other natural breaking point.

3.07 CLEANUP DEBRIS AND RUBBISH: Remove rubbish and debris from the station daily. Store materials that cannot be removed daily in areas specified by the Contracting Officer. Remove and transport debris and rubbish in a manner that will prevent spills on pavements, streets, or adjacent areas. Clean up spills from pavements, streets, and adjacent areas.

END OF SECT
APPENDIX A

LIMITED ASBESTOS AND LEAD-BASED PAINT SURVEY REPORT AT SECTOR SAN DIEGO
September 18, 2014

Ms. Joan Haberman
Supervisor
Regional Execution Design Section B
CEU Oakland Product Line
United States Coast Guard (USCG)

Subject: Limited Asbestos and Lead-Based Paint Survey Report
Replace HVAC, Bldg. A & C
Sector San Diego
San Diego, CA
Project Serial Number: 4425125

Dear Ms. Haberman:

EnviroApplications, Inc. (EAI) has prepared the following report presenting the results of a limited asbestos and lead-based paint (LBP) survey and sampling activities at the United States Coast Guard (USCG) Facility, Sector San Diego, located in the City of San Diego, California (the Site). It is EAI's understanding that the buildings' HVAC system is planned for replacement.

The objective of the sampling was to identify potential asbestos containing materials (ACMs) and LBP at the Site in preparation for pending HVAC replacement. Samples were collected using the methods presented in the Federal Asbestos Hazard Emergency Response Act (AHERA) regulations (40 CFR, Part 763) and the Department of Urban Housing (HUD) as a guideline and in accordance with the USCG Memorandum, dated August 27, 2014. A brief discussion of the assessment findings are presented herein.

The Site is currently a fully functioning U.S. Coast Guard base. Only the attics and the HVAC room of buildings A & C were inspected as part of the survey and sampling activities.

On September 5, 2014, as part of the sampling activities, 27 asbestos bulk material samples and 6 paint chip samples were collected from the HVAC systems of buildings A & C. The bulk asbestos and paint chip samples were submitted to LA Testing (LAT) in South Pasadena, CA. Bulk asbestos samples containing multiple layers were separated by layer at the laboratory and analyzed as individual samples. Potential ACM samples were analyzed using Polarized Light Microscopy (PLM) by U.S. Environmental Protection Agency (EPA) Method 600/R-93/116 and potential LBP samples were analyzed using SOP Method #L01/1, after EPA SW-846 Method 7420. All laboratory analyses were reported to have been conducted in accordance with methodology approved by the EPA. LAT is accredited under the National Institute of Standards and Technology's National Voluntary Laboratory Accreditation Program.

[Further contents of the report are not shown in the image.]
Asbestos Containing Materials

According to the EPA, ACM is defined as material containing more than one percent (>1.0%) asbestos by volume. The California Occupational Safety and Health Administration (Cal-OSHA) defines ACM, for the purpose of worker protection, as material containing greater than one tenth of one percent (>0.1%) asbestos by volume. **None of the samples collected during the ACM survey were found to contain more than 1.0% asbestos.** The following was identified as potential ACM, but sampling would cause damage to the operating HVAC system, so the materials are assumed ACMs:

- Vibration reducers located throughout the HVAC systems of both Buildings A & C are assumed ACM.

A further description of the material sample locations, photographs and laboratory results are provided in the tables and attachments.

Lead-Based Paint Results

According to the EPA, LBP is defined as paint containing more than 0.5% lead by weight. Based on the sample results, the following materials were found to be lead-based (>0.5% lead by weight):

- Green paint located on the boiler – Bldg C – Boiler Room
- Dark gray paint located on the air handler – Bldg C – Boiler Room

A further description of the material sample locations and laboratory results are provided in the enclosures.

Findings and Recommendations

No ACM was detected. All of the vibration reducers located throughout the HVAC systems of both Buildings A & C are assumed to be ACM. These materials can either be removed prior to removal of the HVAC system or can be sampled prior to disturbance. Materials sampled during this survey were found to be lead based. EAI recommends that any identified LBPs be removed by a state-licensed abatement contractor prior to any activities that may disturb the materials. Should suspect materials (asbestos and/or lead materials) be found during renovation which have not been previously sampled, it is recommended that a sample be collected and the material(s) remain undisturbed until the sample analytical results are obtained. Additionally, EAI recommends that during activities that could cause dust disturbance, respiratory protection be used. In general, work should be conducted in accordance with federal, state and local regulations, including, but not limited to, the EPA National Emission Standard for Hazardous Air Pollutants (NESHAP), the Cal-OSHA, the San Diego Air Pollution Control District (SCAPCD) and the HUD. A summary of asbestos regulations is attached herein.
If you have any questions or comments regarding the information enclosed herein, please contact the undersigned at your convenience.

Respectfully submitted,

EnviroApplications, Inc.

[Signature]

Amanda K. Santifer, C.A.C.
Project Scientist
CA Certified Asbestos Consultant ID#05-3888
CA DHS Lead Related Inspector/Assessor ID#12962

Enclosures:  Statement of Limitations
       Summary of Analytical Results
       Photographic Log
       Personnel Certifications
       Summary of Current Regulations
       Laboratory Analytical Report and Chain-of-Custody
       Laboratory Accreditations
       Lead Hazard Evaluation Report
STATEMENT OF LIMITATIONS

The conclusions and recommendations contained in this report/assessment are based upon professional opinions with regard to the subject matter. These opinions have been arrived at in accordance with currently accepted standards and practices applicable to this location and are subject to the following inherent limitations:

- The data and findings presented in this report are valid as of the dates when the investigations were performed. The passage of time, manifestation of latent conditions or occurrence of future events may require further exploration at the site, analysis of the data, and reevaluation of the findings, observations, and conclusions expressed in the report.

- The data reported and the findings, observations, and conclusions expressed in the report are limited by the Scope of Work.

- Unless otherwise stated in the report, because of the limitations stated above, the findings observations, and conclusions expressed by EAI in this report are not, and should not be, considered an opinion concerning the compliance of any past or present owner or operator of the site with any federal, state or local law or regulation.

- No warranty or guarantee, whether express or implied, is made with respect to the data or the reported findings, observations, and conclusions, all of which, however, accurately reflect site conditions in existence at the time of investigation.

- EAI reports present professional opinions and findings of a scientific and technical nature. While attempts were made to relate the data and findings to applicable environmental laws and regulations, the report shall not be construed to offer legal opinion as to the requirements of, nor compliance with, environmental laws, rules, regulations or policies of federal, state or local governmental agencies. Any use constitutes acceptance of the limits of EAI's liability. EAI's liability extends only to those parties contracted to complete this project and not to any other parties who may obtain the Report. Issues raised by the report should be reviewed by appropriate legal counsel.

- This report is based, in part, on unverified information supplied to EAI by third-party sources. While efforts have been made to substantiate this third-party information, EAI cannot guarantee its completeness or accuracy.
<table>
<thead>
<tr>
<th>Sample ID</th>
<th>Date Collected</th>
<th>Sampling Location</th>
<th>Material Description</th>
<th>Analytical Result</th>
<th>Estimated Quantity</th>
<th>Friable (Y/N)</th>
<th>Condition</th>
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<tbody>
<tr>
<td>01</td>
<td>09/05/14</td>
<td>Building A - Attic</td>
<td>Pipe Insulation - Elbows</td>
<td>ND</td>
<td>NA</td>
<td>Y</td>
<td>Good</td>
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<tr>
<td>02</td>
<td>09/05/14</td>
<td>Building A - Attic</td>
<td>Insulating Paper - Duct</td>
<td>ND</td>
<td>NA</td>
<td>N</td>
<td>Good</td>
</tr>
<tr>
<td>03</td>
<td>09/05/14</td>
<td>Building A - Attic</td>
<td>Insulating Wrap Fabric</td>
<td>ND</td>
<td>NA</td>
<td>N</td>
<td>Good</td>
</tr>
<tr>
<td>04</td>
<td>09/05/14</td>
<td>Building C - Attic</td>
<td>Insulating Wrap Fabric</td>
<td>ND</td>
<td>NA</td>
<td>N</td>
<td>Good</td>
</tr>
<tr>
<td>05</td>
<td>09/05/14</td>
<td>Building C - Attic</td>
<td>Insulating Paper - Duct</td>
<td>ND</td>
<td>NA</td>
<td>N</td>
<td>Good</td>
</tr>
<tr>
<td>06</td>
<td>09/05/14</td>
<td>Building C - Attic</td>
<td>Pipe Insulation - Elbows</td>
<td>ND</td>
<td>NA</td>
<td>Y</td>
<td>Good</td>
</tr>
<tr>
<td>07</td>
<td>09/05/14</td>
<td>Building C - Boiler Room</td>
<td>Pipe Insulation</td>
<td>ND</td>
<td>NA</td>
<td>Y</td>
<td>Good</td>
</tr>
</tbody>
</table>

Notes:
Quantity estimates are for estimation purposes only and are not to be used in abatement bid formulation. All bidding contractors are required to provide their own quantity estimates for bidding purposes.
# Summary of Lead-Based Paint Sample Analytical Results

**Sector San Diego**

**San Diego, CA**

<table>
<thead>
<tr>
<th>Sample ID</th>
<th>Sample Location</th>
<th>Sample Description</th>
<th>% Lead By Weight</th>
</tr>
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<tbody>
<tr>
<td>01-Pb</td>
<td>Building A - Attic</td>
<td>White Paint - Piping</td>
<td>0.037%</td>
</tr>
<tr>
<td>02-Pb</td>
<td>Building C - Attic</td>
<td>White Paint - Piping</td>
<td>&lt;0.010%</td>
</tr>
<tr>
<td>03-Pb</td>
<td>Building C - Boiler Room</td>
<td>Green Paint - Boiler</td>
<td>2.3%</td>
</tr>
<tr>
<td>04-Pb</td>
<td>Building C - Boiler Room</td>
<td>Light Green Paint - Boiler</td>
<td>&lt;0.18%</td>
</tr>
<tr>
<td>05-Pb</td>
<td>Building C - Boiler Room</td>
<td>Dark Gray Paint - Air Handler</td>
<td>3.0%</td>
</tr>
<tr>
<td>06-Pb</td>
<td>Building C - Boiler Room</td>
<td>Gray Paint - Air Handler</td>
<td>0.058%</td>
</tr>
<tr>
<td>Client:</td>
<td>U.S. Coast Guard</td>
<td>Job Number:</td>
<td>01.GSACG10.14</td>
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<tr>
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<td>------------------</td>
<td>-------------</td>
<td>---------------</td>
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<tr>
<td>Site Name:</td>
<td>USCG San Diego</td>
<td>Location:</td>
<td>Sector San Diego</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>San Diego, CA</td>
</tr>
<tr>
<td>Photographer:</td>
<td>Amanda Santifer</td>
<td>Date:</td>
<td>September 5, 2014</td>
</tr>
</tbody>
</table>

**Photograph No. 1**

*Typical Pipe Elbow Throughout Buildings A & C*

**Photograph No. 2**

*Attic Space Showing HVAC System*
<table>
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<tr>
<th>Client:</th>
<th>U.S. Coast Guard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site Name:</td>
<td>USCG San Diego</td>
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<tr>
<td>Photographer:</td>
<td>Amanda Santifer</td>
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<td>Location:</td>
<td>Sector San Diego</td>
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<tr>
<td>Date:</td>
<td>September 5, 2014</td>
</tr>
</tbody>
</table>

**Photograph No. 5**

Vibration Reducers on HVAC System (Assumed ACM)

**Photograph No. 6**

Dark Gray Paint on the Air Handler - Bidg C - Boiler Room (Identified LBP)
State of California
Division of Occupational Safety and Health
Certified Asbestos Consultant

Amanda K Santifer

Name
Certification No. 05-3888
Expires on 11/17/14

This certification was issued by the Division of Occupational Safety and Health as authorized by Sections 7180 et seq. of the Business and Professions Code.
SUMMARY OF CURRENT REGULATIONS

The following is a summary of current state and federal regulations which contain requirements related to the performance of building surveys for asbestos. These summaries are not intended to be all inclusive and do not contain every aspect of the regulations discussed. Regulations pertaining to the removal and disposal of ACMs are not included.

EPA NESHAP

Under the National Emission Standard for Hazardous Air Pollutants (NESHAP), 40 CFR Part 61, regulation, no visible emissions are allowed during building demolition or renovation activities which involve regulated asbestos-containing materials (RACMs). For this reason, all buildings must be surveyed for ACMs prior to demolition or renovation. The EPA and/or the local air quality management district which implements EPA actions must be notified prior to any building demolition even if no ACMs are present. RACM is defined as any material with an asbestos content of greater than one percent and is friable, or Category I non-friable ACM that has or will become friable, or Category II non-friable ACM that may become or will become crumbled, pulverized, or reduced to powder by the forces expected to act on the material in the course of demolition or renovation.

According to NESHAP, ACM is material containing more than one percent asbestos as determined using the methods specified in Appendix A, Subpart E, 40 CFR Part 763, Section 1, PLM. The NESHAP classifies ACM as friable or non-friable. Friable ACM is ACM that contains more than one percent asbestos and when dry, can be crumbled, pulverized, or reduced to powder by hand pressure.

Non-friable ACM also contains more than one percent asbestos and is further classified as either Category I ACM or Category II ACM. The materials are distinguished by their potential to release fibers when damaged. Category II ACMs are much more likely to release fibers when damaged. Category I ACM includes asbestos-containing gaskets, packings, resilient floor coverings and mastics, and asphalt roofing products. Asphalt roofing products are those products which contain asbestos and include built-up roofing, asphalt-containing single ply membrane systems, asphalt shingles, asphalt-containing underlayment felts, asphalt-containing roof coatings and mastics, and asphalt-containing base flashings. Category II ACM includes all other non-friable ACM; for example: asbestos cement shingles, asbestos cement tiles, and transite boards or panels.
San Diego Air Pollution Control District

The San Diego Air Pollution Control District (SDAPCD) is a government agency that regulates sources of air pollution within San Diego County to protect public health. The District’s regulating and enforcement authority comes from state law and, in certain cases, federal law. In response to the NESHAP requirements, SDAPCD implemented Rule 351.145 that pertains to demolition/renovation activities including the removal and associated disturbance of ACMs. These requirements for demolition and renovation activities include notification, ACM removal procedures, time schedules, ACM handling and cleanup procedures, storage, disposal, and landfill requirements for asbestos-containing waste materials. Rule 351.145 is applicable to owners and operators of any demolition or renovation activity and associated disturbance of ACMs. Failure to comply with Rule 351.145 requirements could result in violations that carry daily penalties (penalties assessment is based upon the size of the project and severity of noncompliance).

AHERA

AHERA requires performance of asbestos surveys and the development of Asbestos Management Plans for all of the nation's primary and secondary schools. The general procedures mandated under AHERA are considered the industry standard and are used as guidelines for all surveys performed by EAI.

California Occupational Safety and Health Administration (Cal-OSHA)

Per Cal-OSHA standards 1926.1101, ACMs are defined as any materials with an asbestos content greater than one-tenth of one percent (>0.1%) and are further classified as Class I, Class II Class III or Class IV ACM. The materials are distinguished by their potential to release fibers when damaged. OSHA prescribes specific engineering controls and work practices for each Class of ACM.

- **Class I** This Class refers to ACMs identified as Thermal System Insulation (TSI) or surfacing (sprayed-on or troweled-on) materials. These materials are generally considered friable.
- **Class II** This Class refers to ACMs identified that are not Thermal System Insulation (TSI) or surfacing materials. These materials are generally considered non-friable.
- **Class III** This Class refers to repair and maintenance operations of all identified ACMs.
- **Class IV** This Class refers to incidental contact with identified ACMs such as custodial staff.

California Health and Safety Code

The California Health and Safety Code 25915 (former Connelly Bill) requires all building owners in the State of California to provide written notification to employees, tenants, and contractors of the presence and location of asbestos-containing construction materials (ACCMs) within their buildings. Some exclusions to the notification rule for restricted access areas are allowed. All documentation related to asbestos surveys (and air monitoring) must be made
available to employees, tenants, or contractors for review. ACCMs are defined as any materials with an asbestos content greater than one-tenth of one percent (>0.1%).

The California Health and Safety Code also require that a seller with any knowledge of ACMs on a property disclose such information or knowledge to other parties involved in a real estate transaction.

Asbestos Removal and Building Demolition/Renovation

In accordance with the EPA's NESHAPs regulation and the SDAPCD, all facilities planned for renovation or demolition must be surveyed for ACMs prior to the planned renovation or demolition. Subsequent removal of identified ACMs is also required. Removal involves, to the greatest extent practical, the complete removal, disposal, and replacement, if necessary, of the asbestos-containing building material (ACBM). Removal usually also requires encapsulation of the remaining structure to lock down residual fibers which may exist. Removal of ACMs is required prior to renovation and/or demolition activities.

The EPA and AQMD require removal of all ACMs prior to demolition or renovation. ACMs include friable ACMs, (Class I) which have or will become friable or that has been subjected to sanding, drilling, grinding, cutting, or abrading; and Class II ACMs that may become or has become crumbled, pulverized, or reduced to powder by the forces expected to act on the material in the course of demolition or renovation.

Trace ACMs are asbestos materials with less than 1 percent, but greater than 0.1 percent asbestos. These ACMs require an abatement plan during demolition that is protective of worker health and safety. However, unlike an EPA ACM, trace ACMs do not necessitate special disposal requirements.
# Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

<table>
<thead>
<tr>
<th>Sample</th>
<th>Description</th>
<th>Appearance</th>
<th>Non-Asbestos</th>
<th>Asbestos</th>
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<tr>
<td>01</td>
<td>BLDG A PIPE ELBOW INSULATION</td>
<td>Gray</td>
<td>20% Fibrous</td>
<td>75% Non-fibrous (other)</td>
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<td>321416123-0001</td>
<td></td>
<td>Fibrous Heterogeneous</td>
<td>3% Min. Wool</td>
<td>2% Fibrous (other)</td>
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<tr>
<td>02</td>
<td>BLDG A PIPE ELBOW INSULATION</td>
<td>White</td>
<td>2% Cellulose</td>
<td>78% Non-fibrous (other)</td>
</tr>
<tr>
<td>321416123-0002</td>
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<td>Fibrous Heterogeneous</td>
<td>20% Min. Wool</td>
<td></td>
</tr>
<tr>
<td>03</td>
<td>BLDG A PIPE ELBOW INSULATION</td>
<td>Brown</td>
<td>5% Cellulose</td>
<td>70% Non-fibrous (other)</td>
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<td>Fibrous Heterogeneous</td>
<td>25% Glass</td>
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<tr>
<td>04</td>
<td>BLDG A DUCT INSULATING PAPER</td>
<td>Brown/Silver</td>
<td>50% Cellulose</td>
<td>40% Non-fibrous (other)</td>
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<td>321416123-0004</td>
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<td>Fibrous Heterogeneous</td>
<td>10% Glass</td>
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<td>05</td>
<td>BLDG A DUCT INSULATING PAPER</td>
<td>Brown/Silver</td>
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<td>Fibrous Heterogeneous</td>
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<td>06</td>
<td>BLDG A DUCT INSULATING PAPER</td>
<td>Tan</td>
<td>20% Cellulose</td>
<td>80% Non-fibrous (other)</td>
</tr>
<tr>
<td>321416123-0006</td>
<td></td>
<td>Fibrous Heterogeneous</td>
<td></td>
<td></td>
</tr>
<tr>
<td>07</td>
<td>BLDG A BLDG INSULATING WRAP FABRIC</td>
<td>Beige</td>
<td>50% Cellulose</td>
<td>50% Non-fibrous (other)</td>
</tr>
<tr>
<td>321416123-0007</td>
<td></td>
<td>Fibrous Heterogeneous</td>
<td></td>
<td></td>
</tr>
<tr>
<td>08</td>
<td>BLDG A BLDG INSULATING WRAP FABRIC</td>
<td>White</td>
<td>50% Cellulose</td>
<td>50% Non-fibrous (other)</td>
</tr>
<tr>
<td>321416123-0008</td>
<td></td>
<td>Fibrous Heterogeneous</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Analysis(s):**
- Danny Fonseca (10)
- Kieu-anh Pham Duong (21)

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Samples analyzed by LA Testing South Pasadena, CA NVLAP Lab Code 200232-0, CA ELAP 2283

Initial report from 09/11/2014 10:41:45
Attn: Amanda Santifer  
Enviroplications, Inc.  
2831 Camino Del Rio South  
Suite 214  
San Diego, CA 92108


<table>
<thead>
<tr>
<th>Sample</th>
<th>Description</th>
<th>Appearance</th>
<th>% Fibrous</th>
<th>% Non-Fibrous (other)</th>
<th>% Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>09</td>
<td>BLDG A PIPE INSULATING WRAP FABRIC</td>
<td>White</td>
<td>60%</td>
<td>30%</td>
<td>None Detected</td>
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<tr>
<td>10</td>
<td>BLDG C INSULATING WRAP FABRIC</td>
<td>White</td>
<td>50%</td>
<td>50%</td>
<td>None Detected</td>
</tr>
<tr>
<td>11</td>
<td>BLDG C INSULATING WRAP FABRIC</td>
<td>White</td>
<td>50%</td>
<td>50%</td>
<td>None Detected</td>
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<tr>
<td>12</td>
<td>BLDG C INSULATING WRAP FABRIC</td>
<td>White</td>
<td>80%</td>
<td>20%</td>
<td>None Detected</td>
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<tr>
<td>13</td>
<td>BLDG C DUCT INSULATING PAPER</td>
<td>Silver/Beige</td>
<td>50%</td>
<td>40%</td>
<td>None Detected</td>
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<td>14</td>
<td>BLDG C DUCT INSULATING PAPER</td>
<td>Silver/Beige</td>
<td>50%</td>
<td>40%</td>
<td>None Detected</td>
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<td>15</td>
<td>BLDG C DUCT INSULATING PAPER</td>
<td>Silver/Beige</td>
<td>50%</td>
<td>50%</td>
<td>None Detected</td>
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<tr>
<td>16</td>
<td>BLDG C DUCT INSULATING PAPER</td>
<td>Brown/Silver</td>
<td>50%</td>
<td>40%</td>
<td>None Detected</td>
</tr>
</tbody>
</table>

Analyst(s)  
Danny Fonseca (10)  
Kieu-anh Pham Duong (21)  

Jerry Drapala Ph.D, Laboratory Manager  
or other approved signatory

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Samples analyzed by LA Testing South Pasadena, CA NVLAP Lab Code 200232-0, CA ELAP 2283

Initial report from 09/11/2014 10:41:45

Test Report PLM-7.28.9 Printed: 9/11/2014 10:41:45 AM
## Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

<table>
<thead>
<tr>
<th>Sample</th>
<th>Description</th>
<th>Appearance</th>
<th>Non-Asbestos</th>
<th>Asbestos</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>% Fibrous</td>
<td>% Non-Fibrous</td>
<td>% Type</td>
</tr>
<tr>
<td>17</td>
<td>BLDG C DUCT INSULATING PAPER</td>
<td>Brown/Silver Fibrous</td>
<td>40% Cellulose 60% Non-fibrous (other)</td>
<td>None Detected</td>
</tr>
<tr>
<td>18</td>
<td>BLDG C DUCT INSULATING PAPER</td>
<td>Brown/Silver Fibrous</td>
<td>40% Cellulose 45% Non-fibrous (other)</td>
<td>None Detected</td>
</tr>
<tr>
<td>19</td>
<td>BLDG C DUCT INSULATING PAPER</td>
<td>Brown/Silver Fibrous</td>
<td>30% Cellulose 60% Non-fibrous (other)</td>
<td>None Detected</td>
</tr>
<tr>
<td>20</td>
<td>BLDG C PIPE INSULATON ELBOWS</td>
<td>Gray Fibrous</td>
<td>5% Cellulose 75% Non-fibrous (other)</td>
<td>None Detected</td>
</tr>
<tr>
<td>21-Wrap</td>
<td>BLDG C PIPE INSULATON ELBOWS</td>
<td>Beige Fibrous</td>
<td>50% Cellulose 50% Non-fibrous (other)</td>
<td>None Detected</td>
</tr>
<tr>
<td>21-Insulation</td>
<td>BLDG C PIPE INSULATON ELBOWS</td>
<td>Gray Fibrous</td>
<td>20% Min. Wool 80% Non-fibrous (other)</td>
<td>None Detected</td>
</tr>
<tr>
<td>22-Wrap</td>
<td>BLDG C PIPE INSULATON ELBOWS</td>
<td>White Fibrous</td>
<td>50% Cellulose 50% Non-fibrous (other)</td>
<td>None Detected</td>
</tr>
<tr>
<td>22-Insulation</td>
<td>BLDG C PIPE INSULATON ELBOWS</td>
<td>Gray Fibrous</td>
<td>20% Min. Wool 80% Non-fibrous (other)</td>
<td>None Detected</td>
</tr>
</tbody>
</table>

### Analyst(s)

Danny Fonseca (10)
Kieu-anh Pham Duong (21)

Jerry Drapała Ph.D., Laboratory Manager or other approved signatory

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Samples analyzed by LA Testing South Pasadena, CA NVLAP Lab Code 200232-Q, CA ELAP 2283

Initial report from 09/11/2014 10:41:45

Test Report PLM-7.28.9 Printed: 9/11/2014 10:41:45 AM

<table>
<thead>
<tr>
<th>Sample</th>
<th>Description</th>
<th>Appearance</th>
<th>Non-Asbestos</th>
<th>Asbestos</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>% Fibrous</td>
<td>% Non-Fibrous</td>
</tr>
<tr>
<td>23</td>
<td>BLDG C PIPE INSULATION ELBOWS</td>
<td>White</td>
<td>40% Glass</td>
<td>20% Cellulose</td>
</tr>
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<td>32146123-0023</td>
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</tr>
<tr>
<td>24</td>
<td>BLDG C PIPE INSULATION ELBOWS</td>
<td>Beige</td>
<td>50% Cellulose</td>
<td>10% Glass</td>
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<tr>
<td>32146123-0024</td>
<td></td>
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</tr>
<tr>
<td>25-Wrap</td>
<td>BLDG C PIPE INSULATION BOILER RM</td>
<td>White</td>
<td>40% Cellulose</td>
<td>60% Non-fibrous (other)</td>
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<tr>
<td>32146123-0025</td>
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<tr>
<td>25-Insulation</td>
<td>BLDG C PIPE INSULATION BOILER RM</td>
<td>Gray</td>
<td>20% Min. Wool</td>
<td>80% Non-fibrous (other)</td>
</tr>
<tr>
<td>32146123-0025A</td>
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<tr>
<td>26-Wrap</td>
<td>BLDG C PIPE INSULATION BOILER RM</td>
<td>White</td>
<td>40% Cellulose</td>
<td>60% Non-fibrous (other)</td>
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<td>32146123-0026</td>
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<tr>
<td>28-Insulation</td>
<td>BLDG C PIPE INSULATION BOILER RM</td>
<td>Gray</td>
<td>20% Min. Wool</td>
<td>80% Non-fibrous (other)</td>
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<td>32146123-0026A</td>
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<tr>
<td>27</td>
<td>BLDG C PIPE INSULATION BOILER RM</td>
<td>Tan/Yellow</td>
<td>20% Cellulose</td>
<td>70% Non-fibrous (other)</td>
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<td>32146123-0027</td>
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</tr>
</tbody>
</table>

Analyst(s)

Danny Fonseca (10)
Kieu-anh Pham Duong (21)

Jerry Drapala Ph.D, Laboratory Manager or other approved signatory

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Initial report from 09/11/2014 10:41:45

Test Report PLM-7.28.9 Printed: 9/11/2014 10:41:45 AM

THIS IS THE LAST PAGE OF THE REPORT.
# Asbestos Chain of Custody

**EMSL Order Number (Lab Use Only):**

21416123

---

**Company:** EnviroApplications, Inc.  
**Street:** 2831 Camino Del Rio S Ste 214  
**City:** San Diego  
**State/Province:** CA  
**Zip/Postal Code:** 92108  
**Country:** United States  
**OrderID:** 321416123  
**Email Address:** asantifer@enviroapplications.com  
**Project Name/Number:** 01, GSAGC10.14

---

**Phone:** 1-800-303-0047  
**Fax:** 619-291-3636  
**Purchase Order:**  
**Please Provide Results:**  
**Connecticut Samples:** Commercial [ ] Residential [ ]

---

**Turnaround Time (TAT) Options** – Please Check

<table>
<thead>
<tr>
<th>TAT Option</th>
<th>Time (hr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 Hour</td>
<td>6</td>
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<tr>
<td>24 Hour</td>
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<td>48 Hour</td>
<td>48</td>
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<tr>
<td>72 Hour</td>
<td>72</td>
</tr>
<tr>
<td>96 Hour</td>
<td>96</td>
</tr>
</tbody>
</table>

---

**Temperature:**

- **FCM – Air:**  
  - NIOSH 7400  
  - w/OSHA 6hr, TWA  
  - PLM EPA 600R-93/116 (<1%)  
  - PLM EPA NOB (<1%)  
  - Point Count  
  - 400 (<0.25%)  
  - 1000 (<0.1%)  
  - Point Count w/Gravimetric  
  - 400 (<0.25%)  
  - 1000 (<0.1%)  
  - NYS 198.1 (frangible in NY)  
  - NYS 198.6 NOB (non-frangible-NY)  
  - "NIOSH 9002" (<1%)  

- **TEM – Air:**  
  - 4-4.5hr TAT (AHERA only)  
  - AHERA 40 CFR, Part 763  
  - NIOSH 7402  
  - EPA Level II  
  - ISO 10312  

- **TEM – Bulk:**  
  - TEM EPA NOB  
  - NYS NOB 198.4 (non-frangible-NY)  
  - Chatfield GOP  
  - TEM Mass Analysis-EPA 600 sec. 2.5  

- **TEM – Water:**  
  - EPA 100.2  
  - Fibers >10µm  
  - Waste  
  - Drinking  
  - All Fiber Sizes  
  - Waste  
  - Drinking  

- **TEM – Dust:**  
  - Microvac – ASTM D 5765  
  - Wipe – ASTM D6480  
  - Carpet Sonication (EPA 600/193/167)  
  - Soil/Rock/Vermiculite  
  - PLM CARB 435 - A (0.25% sensitivity)  
  - PLM CARB 435 - B (0.1% sensitivity)  
  - TEM Qual. via Filtration Technique  
  - TEM Qual. via Drop-Mount Technique  
  - Other  

---

**Check For Positive Stop – Clearly Identify Homogenous Group**

**Filter Pore Size (Air Samples):** 0.8µm [ ] 0.45µm [ ]

---

**Sample Name:** Amanda Santifer  
**Samplers Signature:** [Signature]

---

<table>
<thead>
<tr>
<th>Sample #</th>
<th>Sample Description</th>
<th>Volume/Area (Air)</th>
<th>HA # (Bulk)</th>
<th>Date/Time Sampled</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Blag A – Pipe Elbow Insulation</td>
<td></td>
<td></td>
<td>09/05/14</td>
</tr>
<tr>
<td>02</td>
<td>Blag A – Duct Insulating Paper</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>03</td>
<td>Blag A – Pipe Insulating Wrap Fiber</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>05</td>
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<td>06</td>
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<td>07</td>
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<tr>
<td>08</td>
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**Client Sample # (s):** [ ] 27  
**Total # of Samples:** 27

**Relinquished (Client):** [ ]  
**Date:** 09/05/14  
**Time:** 1600

**Received (Lab):** [ ]  
**Date:** 09/05/14  
**Time:** 9:20am

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Page 1 of 2 pages
<table>
<thead>
<tr>
<th>Sample #</th>
<th>Sample Description</th>
<th>Volume/Area (Air)</th>
<th>Date/Time Sampled</th>
</tr>
</thead>
<tbody>
<tr>
<td>09</td>
<td>Bldg A - Pipe Insulating Wrap Fabric</td>
<td></td>
<td>09/05/14</td>
</tr>
<tr>
<td>10</td>
<td>Bldg C - Insulating Wrap Fabric</td>
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<td></td>
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<tr>
<td>12</td>
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</tr>
<tr>
<td>13</td>
<td>Bldg C - Duct Insulating Paper</td>
<td></td>
<td></td>
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<tr>
<td>14</td>
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<tr>
<td>19</td>
<td></td>
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</tr>
<tr>
<td>20</td>
<td>Bldg C - Pipe Insulation - Elbows</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21</td>
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<tr>
<td>24</td>
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<tr>
<td>25</td>
<td>Bldg C - Pipe Insulation - Boiler Rm</td>
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</tr>
<tr>
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<tr>
<td>27</td>
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</tbody>
</table>

*Comments/Special Instructions:
**Test Report: Lead in Paint Chips by Flame AAS (SW 846 3050B/7000B)**

<table>
<thead>
<tr>
<th>Client Sample Description</th>
<th>Lab ID</th>
<th>Collected</th>
<th>Analyzed</th>
<th>Lead Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>01-PB</td>
<td>321416121-0001</td>
<td>9/9/2014</td>
<td></td>
<td>0.037% wt</td>
</tr>
<tr>
<td></td>
<td>Site: BLDG A-PIPING WHITE PAINT</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>02-PB</td>
<td>321416121-0002</td>
<td>9/9/2014</td>
<td></td>
<td>&lt;0.010% wt</td>
</tr>
<tr>
<td></td>
<td>Site: BLDG C-PIPING WHITE PAINT</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>03-PB</td>
<td>321416121-0003</td>
<td>9/9/2014</td>
<td></td>
<td>2.3% wt</td>
</tr>
<tr>
<td></td>
<td>Site: BLDG C-BOILER-GREEN PAINT</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Data reported might be unreliable due to insufficient sample weights submitted. Suggested weight for analysis is 0.2 g. Results should not be used to evaluate compliance with regulatory standards.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>04-PB</td>
<td>321416121-0004</td>
<td>9/9/2014</td>
<td></td>
<td>&lt;0.18% wt</td>
</tr>
<tr>
<td></td>
<td>Site: BLDG C-BOILER LIGHT GREEN PAINT</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Data reported might be unreliable due to insufficient sample weights submitted. Suggested weight for analysis is 0.2 g. Results should not be used to evaluate compliance with regulatory standards.</td>
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<td></td>
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<tr>
<td>05-PB</td>
<td>321416121-0005</td>
<td>9/9/2014</td>
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<td>3.0% wt</td>
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<tr>
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<td>Site: BLDG C-AIR HANDLER PARK GRAY PAINT</td>
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</tr>
<tr>
<td>06-PB</td>
<td>321416121-0006</td>
<td>9/9/2014</td>
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<td>0.058% wt</td>
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<td></td>
<td>Site: BLDG C-AIR HANDLER GRAY PAINT</td>
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<td></td>
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</tr>
</tbody>
</table>

*Analysis following Lead in Paint by EMSL SOP/Determination of Environmental Lead by FLAA. Reporting limit is 0.010 % wt based on the minimum sample weight per our SOP. Unless noted, results in this report are not blank corrected. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities. Samples received in good condition unless otherwise noted. "<" (less than) result signifies that the analyte was not detected at or above the reporting limit. Measurement of uncertainty is available upon request. The QC data associated with the sample results included in this report meet the recovery and precision requirements established by the AIHA-LAP, unless specifically indicated otherwise.

Samples analyzed by LA Testing South Pasadena, CA CA ELAP 2283, AIHA-LAP, LLC ELAP 102914

Initial report from 09/09/2014 11:21:47

Test Report ChmSnglePrmInQC-7.32.3 Printed: 9/9/2014 11:21:47 AM
**OrderID:** 321416121

**Company:** EnviroApplications, Inc.

**Street:** 2831 Camino Del Rio S Ste 214

**City:** San Diego **State/Province:** CA **Zip/Postal Code:** 92108

**Telephone #:** 619-291-3636 **Fax #:** 323-254-9982

**Project Name/Number:** 01.GSACG10.14

---

**Lead (Pb) Chain of Custody**

**EMSL Order ID (Lab Use Only):** 21416121

**Third Party Billing requires written authorization from third party**

**Turnaround Time (TAT) Options** - Please Check

- [ ] 3 Hour  - [ ] 6 Hour  - [ ] 24 Hour  - [ ] 48 Hour  - [ ] 72 Hour  - [ ] 96 Hour  - [ ] 1 Week  - [ ] 2 Week

---

**Matrix**

**Method**

<table>
<thead>
<tr>
<th>Matrix</th>
<th>Method</th>
<th>Instrument</th>
<th>Reporting Limit</th>
<th>Check</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chips</td>
<td>% by wt.  mg/cm²</td>
<td>Flame Atomic Absorption</td>
<td>0.01%</td>
<td></td>
</tr>
<tr>
<td>Air</td>
<td>NIOSH 7082</td>
<td>Flame Atomic Absorption</td>
<td>4 µg/filter</td>
<td></td>
</tr>
<tr>
<td></td>
<td>NIOSH 7105</td>
<td>Graphite Furnace AA</td>
<td>0.03 µg/filter</td>
<td></td>
</tr>
<tr>
<td></td>
<td>NIOSH 7300 modified</td>
<td>ICP-AES/ICP-MS</td>
<td>0.5 µg/filter</td>
<td></td>
</tr>
<tr>
<td>Wipe*</td>
<td>SW846-7000B</td>
<td>Flame Atomic Absorption</td>
<td>10 µg/wipe</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SW846-6010B or C</td>
<td>ICP-AES</td>
<td>1.0 µg/wipe</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SW846-7000B/7010</td>
<td>Graphite Furnace AA</td>
<td>0.075 µg/wipe</td>
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<tr>
<td>TCLP</td>
<td>SW846-1311/7000B/SM 3111</td>
<td>Flame Atomic Absorption</td>
<td>0.4 mg/L (ppm)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SW846-1131/SW846-6010B or C</td>
<td>ICP-AES</td>
<td>0.1 mg/L (ppm)</td>
<td></td>
</tr>
<tr>
<td>Soil</td>
<td>SW846-7000B</td>
<td>Flame Atomic Absorption</td>
<td>40 mg/kg (ppm)</td>
<td></td>
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<tr>
<td></td>
<td>SW846-7010</td>
<td>Graphite Furnace AA</td>
<td>0.3 mg/kg (ppm)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SW846-6010B or C</td>
<td>ICP-AES</td>
<td>2 mg/kg (ppm)</td>
<td></td>
</tr>
<tr>
<td>Wastewater</td>
<td>SM3111B/SW846-7000B</td>
<td>Flame Atomic Absorption</td>
<td>0.4 mg/L (ppm)</td>
<td></td>
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<tr>
<td>Preserved with HNO₃ pH &lt; 2</td>
<td>EPA 200.9</td>
<td>Graphite Furnace AA</td>
<td>0.003 mg/L (ppm)</td>
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<tr>
<td>Preserved with HNO₃ pH &lt; 2</td>
<td>EPA 200.7</td>
<td>ICP-AES</td>
<td>0.020 mg/L (ppm)</td>
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<tr>
<td>Drinking Water</td>
<td>EPA 200.9</td>
<td>Graphite Furnace AA</td>
<td>0.003 mg/L (ppm)</td>
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</tr>
<tr>
<td>Preserved with HNO₃ pH &lt; 2</td>
<td>EPA 200.8</td>
<td>ICP-MS</td>
<td>0.001 mg/L (ppm)</td>
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<tr>
<td>TSP/SPM Filter</td>
<td>40 CFR Part 50</td>
<td>ICP-AES</td>
<td>12 µg/filter</td>
<td></td>
</tr>
<tr>
<td></td>
<td>40 CFR Part 50</td>
<td>Graphite Furnace AA</td>
<td>3.6 µg/filter</td>
<td></td>
</tr>
</tbody>
</table>

**Other:**

**Name of Sampler:** Amanda Santifer  
**Signature of Sampler:**

---

**Sample #**

<table>
<thead>
<tr>
<th>Sample #</th>
<th>Location</th>
<th>Volume/Area</th>
<th>Date/Time Sampled</th>
</tr>
</thead>
<tbody>
<tr>
<td>01-Pb</td>
<td>Bldg A - Piping - White Paint</td>
<td></td>
<td>09/05/14</td>
</tr>
<tr>
<td>02-Pb</td>
<td>Bldg C - Piping - White Paint</td>
<td></td>
<td></td>
</tr>
<tr>
<td>03-Pb</td>
<td>Bldg C - Boiler - Green Paint</td>
<td></td>
<td></td>
</tr>
<tr>
<td>04-Pb</td>
<td>Bldg C - Boiler - Light Green Paint</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05-Pb</td>
<td>Bldg - Air Handler - Dark Grey Paint</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**_client_sample#s**

**Total # of Samples:** 6

**Relinquished (Client):**  
**Date:** 09/05/14 **Time:** 1600

**Received (Lab):**  
**Date:** 09/05/14 **Time:** 9:20am

**Comments:**
<table>
<thead>
<tr>
<th>Sample #</th>
<th>Location</th>
<th>Volume/Area</th>
<th>Date/Time Sampled</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ce Pb</td>
<td>Blk. C - Ais Handler Curb/Paint</td>
<td></td>
<td>07/05/14</td>
</tr>
</tbody>
</table>

Comments/Special Instructions:
AIHA Laboratory Accreditation Programs, LLC

acknowledges that

LA Testing
520 Mission Street, South Pasadena, CA 91030
Laboratory ID: 102814
along with all premises from which key activities are performed, as listed above, has fulfilled the requirements of the AIHA Laboratory Accreditation Programs (AIHA-LAP), LLC accreditation to the ISO/IEC 17025:2005 international standard, General Requirements for the Competence of Testing and Calibration Laboratories in the following:

LABORATORY ACCREDITATION PROGRAMS

✓ INDUSTRIAL HYGIENE
✓ ENVIRONMENTAL LEAD
✓ ENVIRONMENTAL MICROBIOLOGY
☐ FOOD
☐ UNIQUE SCOPES

Accreditation Expires: 02/01/2016

Specific Field(s) of Testing (FoT)/Method(s) within each Accreditation Program for which the above named laboratory maintains accreditation is outlined on the attached Scope of Accreditation. Continued accreditation is contingent upon successful on-going compliance with ISO/IEC 17025:2005 and AIHA-LAP, LLC requirements. This certificate is not valid without the attached Scope of Accreditation. Please review the AIHA-LAP, LLC website (www.aihaaccreditedlabs.org) for the most current Scope.

Larry S. Pierce
Chairperson, Analytical Accreditation Board

Cheryl O. Morton
Managing Director, AIHA Laboratory Accreditation Programs, LLC

Revision 13: 03/12/2013

Date Issued: 02/28/2014
AIHA Laboratory Accreditation Programs, LLC
SCOPE OF ACCREDITATION

LA Testing
520 Mission Street, South Pasadena, CA 91030

Laboratory ID: 102814
Issue Date: 02/28/2014

The laboratory is approved for those specific field(s) of testing/methods listed in the table below. Clients are urged to verify the laboratory’s current accreditation status for the particular field(s) of testing/Methods, since these can change due to proficiency status, suspension and/or withdrawal of accreditation.

**Industrial Hygiene Laboratory Accreditation Program (IHLAP)**

Initial Accreditation Date: 11/01/2003

<table>
<thead>
<tr>
<th>IHLAP Scope Category</th>
<th>Field of Testing (FoT)</th>
<th>Technology sub-type/Detector</th>
<th>Published Reference Method/Title of In-house Method</th>
<th>Method Description or Analyte (for internal methods only)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asbestos/Fiber Microscopy Core</td>
<td>Phase Contrast Microscopy (PCM)</td>
<td></td>
<td>NIOSH 7400</td>
<td></td>
</tr>
</tbody>
</table>

A complete listing of currently accredited Industrial Hygiene laboratories is available on the AIHA-LAP, LLC website at: [http://www.aihaaccreditedlabs.org](http://www.aihaaccreditedlabs.org)
AIHA Laboratory Accreditation Programs, LLC acknowledges that

LA Testing
520 Mission Street, South Pasadena, CA 91030
Laboratory ID: 102814

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LABORATORY ACCREDITATION PROGRAMS

- INDUSTRIAL HYGIENE
- ENVIRONMENTAL LEAD
- ENVIRONMENTAL MICROBIOLOGY
- FOOD
- UNIQUE SCOPES

Accreditation Expires: 02/01/2016

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Larry S. Pierce
Chairperson, Analytical Accreditation Board

Cheryl O. Morton
Managing Director, AIHA Laboratory Accreditation Programs, LLC

Date Issued: 02/28/2014
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**Environmental Microbiology Laboratory Accreditation Program (EMLAP)**

**Initial Accreditation Date:** 11/01/2003

<table>
<thead>
<tr>
<th>EMLAP Category</th>
<th>Field of Testing (FoT)</th>
<th>Method</th>
<th>Method Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fungal</td>
<td>Air - Direct Examination</td>
<td>05-TP-003.5</td>
<td>Standard Operating Procedure for the Analysis of Airborne Fungal Spores, Hyphal Fragments, Pollen, Insect Fragments, Skin Fragments and Fibrous Particulate by Optical Microscopy of Spore Trap Samples</td>
</tr>
<tr>
<td></td>
<td>Bulk - Direct Examination</td>
<td>SOP M041</td>
<td>Standard Operating Procedure for the Microscopic Examination of Fungal Spores, Fungal Structures, Hyphae, Pollen, Insect Fragments, and Fibrous Material from Surface Samples</td>
</tr>
<tr>
<td></td>
<td>Surface - Direct Examination</td>
<td>SOP M041</td>
<td>Standard Operating Procedure for the Microscopic Examination of Fungal Spores, Fungal Structures, Hyphae, Pollen, Insect Fragments, and Fibrous Material from Surface Samples</td>
</tr>
</tbody>
</table>

A complete listing of currently accredited Environmental Microbiology laboratories is available on the AIHA-LAP, LLC website at: [http://www.aihaaccreditedlabs.org](http://www.aihaaccreditedlabs.org)
AIHA Laboratory Accreditation Programs, LLC

acknowledges that

LA Testing
520 Mission Street, South Pasadena, CA 91030
Laboratory ID: 102814

along with all premises from which key activities are performed, as listed above, has fulfilled the requirements of the AIHA Laboratory Accreditation Programs (AIHA-LAP), LLC accreditation to the ISO/IEC 17025:2005 international standard, General Requirements for the Competence of Testing
and Calibration Laboratories in the following:

LABORATORY ACCREDITATION PROGRAMS

✓ INDUSTRIAL HYGIENE Accreditation Expires: 02/01/2016
✓ ENVIRONMENTAL LEAD Accreditation Expires: 02/01/2016
✓ ENVIRONMENTAL MICROBIOLOGY Accreditation Expires: 02/01/2016
☐ FOOD Accreditation Expires: 02/01/2016
☐ UNIQUE SCOPES Accreditation Expires: 02/01/2016

Specific Field(s) of Testing (FoT)/Method(s) within each Accreditation Program for which the above named laboratory maintains accreditation is outlined on the attached Scope of Accreditation. Continued accreditation is contingent upon successful on-going compliance with ISO/IEC 17025:2005 and AIHA-LAP, LLC requirements. This certificate is not valid without the attached Scope of Accreditation. Please review the AIHA-LAP, LLC website (www.aihaaccreditedlabs.org) for the most current Scope.

Larry S. Pierce
Chairperson, Analytical Accreditation Board

Cheryl O. Morton
Managing Director, AIHA Laboratory Accreditation Programs, LLC

Revision 13: 03/12/2013

Date Issued: 02/28/2014
AIHA Laboratory Accreditation Programs, LLC

SCOPE OF ACCREDITATION

LA Testing
520 Mission Street, South Pasadena, CA 91030

Laboratory ID: 102814
Issue Date: 02/28/2014

The laboratory is approved for those specific field(s) of testing/methods listed in the table below. Clients are urged to verify the laboratory's current accreditation status for the particular field(s) of testing/Methods, since these can change due to proficiency status, suspension and/or withdrawal of accreditation.

The EPA recognizes the AIHA-LAP, LLC ELLAP program as meeting the requirements of the National Lead Laboratory Accreditation Program (NLLAP) established under Title X of the Residential Lead-Based Paint Hazard Reduction Act of 1992 and includes paint, soil and dust wipe analysis. Air analysis is not included as part of the NLLAP.

Environmental Lead Laboratory Accreditation Program (ELLAP)
Initial Accreditation Date: 11/01/2003

<table>
<thead>
<tr>
<th>Field of Testing (FoT)</th>
<th>Method</th>
<th>Method Description (for internal methods only)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paint</td>
<td>EPA SW-846 3050B</td>
<td></td>
</tr>
<tr>
<td></td>
<td>EPA SW-846 7000B</td>
<td></td>
</tr>
<tr>
<td>Soil</td>
<td>EPA SW-846 3050B</td>
<td></td>
</tr>
<tr>
<td></td>
<td>EPA SW-846 7000B</td>
<td></td>
</tr>
<tr>
<td>Settled Dust by Wipe</td>
<td>EPA SW-846 3050B</td>
<td></td>
</tr>
<tr>
<td></td>
<td>EPA SW-846 7000B</td>
<td></td>
</tr>
<tr>
<td>Airborne Dust</td>
<td>NIOSH 7082</td>
<td></td>
</tr>
</tbody>
</table>

A complete listing of currently accredited Environmental Lead laboratories is available on the AIHA-LAP, LLC website at: [http://www.aihaaccreditedlabs.org](http://www.aihaaccreditedlabs.org)

Effective: 03/12/2013
102814_Scope_ELLAP_2014_02_28
Page 1 of 1
LEAD HAZARD EVALUATION REPORT

Section 1 — Date of Lead Hazard Evaluation
September 5, 2014

Section 2 — Type of Lead Hazard Evaluation (Check one box only)
☐ Lead Inspection ☐ Risk assessment ☐ Clearance Inspection ☐ Other (specify)

Section 3 — Structure Where Lead Hazard Evaluation Was Conducted
Address [number, street, apartment (if applicable)]
2710 N. Harbor Drive
City San Diego
County San Diego
Zip Code 92101
Construction date (year) of structure 1970s
Type of structure ☑ Multi-unit building ☐ School or daycare
☐ Single family dwelling ☐ Other
Children living in structure?
☐ Yes ☑ No ☐ Don’t Know

Section 4 — Owner of Structure (if business/agency, list contact person)
Name United States Coast Guard
Address [number, street, apartment (if applicable)]
1301 Clay Street, Ste 700N
City Oakland
State CA
Zip Code 94612
Telephone number (510) 637-5547

Section 5 — Results of Lead Hazard Evaluation (check all that apply)
☐ No lead-based paint detected ☑ Intact lead-based paint detected ☐ Deteriorated lead-based paint detected
☐ No lead hazards detected ☐ Lead-contaminated dust found ☐ Lead-contaminated soil found ☐ Other

Section 6 — Individual Conducting Lead Hazard Evaluation
Name Amanda Santifer
Telephone number 619-291-3636 ext 223
Address [number, street, apartment (if applicable)]
2831 Camino Del Rio S, Ste 214
City San Diego
State CA
Zip Code 92108
CDPH certification number 12962
Signature
Date 09/18/14
Name and CDPH certification number of any other individual conducting sampling or testing (if applicable)

Section 7 — Attachments
A. A foundation diagram or sketch of the structure indicating the specific locations of each lead hazard or presence of lead-based paint;
B. Each testing method, device, and sampling procedure used;
C. All data collected, including quality control data, laboratory results, including laboratory name, address, and phone number.

First copy and attachments retained by inspector
Second copy and attachments retained by owner
Third copy only (no attachments) mailed or faxed to:
California Department of Public Health
Childhood Lead Poisoning Prevention Branch Reports
850 Marina Bay Parkway, Building P, Third Floor
Richmond, CA 94804-6403
Fax: (510) 620-5656

CDPH 8552 (6/12)
MEMORANDUM

From: J.K. Ingalsbe, CAPT
COMDT (CG-43)

To: CG SILC

Subj: SHORE FACILITIES UTILITIES METERING GUIDANCE

Ref: (a) U.S. Coast Guard Commandant’s Sustainability, Environmental and Energy Policy Statement.
(b) Executive Order (EO) 13514; Federal Leadership in Environmental, Energy, and Economic Performance; signed on October 5, 2009.
(c) Energy Independence and Security Act (EISA) – 2007, Public Law 110-140

1. Consistent with the Commandant’s recognition of the importance of sustainable development, outlined in reference (a), the Office of Civil Engineering (CG-43) is committed to reducing the total ownership cost of Coast Guard shore assets by designing and constructing high performance new facilities and improving the energy efficiency and sustainable operations and maintenance (O&M) of existing facilities.

2. As the Coast Guard’s corporate real property asset manager, I am responsible for improving the performance of the shore assets in conformance with current legislative mandates and Executive Orders. This memo promulgates the Utilities Metering Guidance, provided as Enclosure (I), which will be included in the next update to the Coast Guard Civil Engineering Manual. The responsibility to deliver and maintain sustainable facilities resides with the SILC and the field units with assigned Resource Efficiency Managers (REMs) and designated Energy Managers. CG-43 will collect energy performance data to assess compliance with this guidance, as required by references (a) through (e) and report our progress in the Coast Guard Operational Sustainability Performance Plan (OSPP) submitted annually to DHS and the performance of individual units for all stakeholders to see.

3. The SILC Engineering Services Division (ESD) and the Mission Support Product Line at CEU Providence will develop the Process Guides necessary to implement the Shore Facilities

APPENDIX B
Utilities Metering Guidance. The Utilities Data Management will be managed by the Mission Support Product Line, ESD and the Business Operations Division at SILC.

4. The SILC ESD shall develop a Utilities Meters Implementation Plan, to include budget and timeline, based on the guidance and the technical requirements and recommendations published by the Department of Energy (DOE). SILC ESD shall develop performance measures to track progress with annualized project prioritization. The performance measures will include, as a minimum, a list of covered buildings, piers, and shore ties; their consumption and the percentage of agency consumption represented by these buildings, piers and shore ties. The SILC ESD shall also promote ready access to energy demand and consumption data for all stakeholders to see and use as tools for monitoring and reducing overall energy consumption at the unit and building occupant level.

5. Any questions or comments relating to utilities metering guidance may be referred to Mr. Hassan Zaidi (CG-435).

Encl: (1) U.S. Coast Guard Shore Facilities Utilities Metering Guidance

Copy: COMDT (CG-46, CG-47)
CEU Providence
CG FDCC
CEU Juneau
CG Academy
CG TRACEN Petaluma
CG TRACEN Yorktown
CG TISCOM
CG Base Detachment St. Louis
CG Base Portsmouth
CG Base Cape Cod
CG Base National Capital Region

CEU Miami
CG TRACEN Cap May
CG DOL
CG Yard
CG FORCECOM
CG Base Seattle
CG Base New Orleans
CG Base Boston
CG Base Ketchikan

CEU Cleveland
CG Base Honolulu
CG Base Alameda
CG Base Seattle
CG Base Ketchikan

CEU Miami
CG Base New Orleans
CG Base Boston
CG Base Ketchikan

CEU Oakland
CG ATC Mobile
CG Base Kodiak
CG Base Honolulu
CG Base Los Angeles Long Beach
CG Base Miami
CG Base Elizabeth City
CG Base Cleveland
A. SCOPE:

In the early 1970s, US Congress began mandating reductions in energy consumed by the Federal Agencies, primarily by improving the efficiency of buildings and facilities and by reducing fossil fuel use. Initially, a 10% energy reduction goal was established for federal buildings as measured against a 1985 baseline. Over time, efficiency requirements became more aggressive as resources were constrained. The United States Coast Guard (USCG), like other Federal Agencies, faces these challenges of dwindling resources, expanding mission requirements and increased efficiency performance targets for shore assets. These standards can only be met by making shore assets high performing with measureable and trackable performance metrics. The US Coast Guard is committed to improving efficiencies and implementing the latest technologies an integral part of our response to these challenges.

The Energy Policy Act 2005, section 103, requires the federal agencies to install standard or advanced meters, to extent practicable, at federal facilities, based on the guidelines developed by the Department of Energy (DOE). The Executive Order (EO) 13423 - Strengthening Federal Environmental, Energy and Transportation Management - requires agencies to report the number of buildings metered and percentage of utilities consumed by these buildings. Added to these challenges, the DHS directives, Energy Independence and Security Act (EISA) 2007 and EO 13514 - Federal Leadership in Environmental, Energy, and Economic Performance signed Oct, 2009 require measurable performance matrix to be reported on a regular basis.

In partial response to these mandates, the USCG has already undertaken substantial initiatives; reducing consumption, improving energy efficiencies and installing over 1960 advance energy meters throughout its shore assets. Under the 'Advanced Metering Infrastructure' (AMI) Initiative the agency is working with CG-6 on a pilot project to connect these meters to a Data Acquisition Server (DAS) on Coast Guard Network as a central repository for energy consumption data of shore assets. The Shore Infrastructure Logistic Center (SILC) has assigned this initiative to the Shore Infrastructure Mission Support Product Line at the Civil Engineering Unit (CEU) Providence, R.I.

This Utilities Metering Guidance is expected to have a significant positive impact in improving operational efficiencies, reducing energy consumption and Green House Gas (GHG) emissions in USCG facilities. This guidance applies equally to new acquisition, expansion or recapitalization/renovation of existing assets as well as maintenance and operations of all owned and leased assets of the US Coast Guard.
B. OBJECTIVES:

The Coast Guard Utilities Metering Development guidance embodies the requirements of the Federal Mandates and EOs and establishes the following objectives for incorporation and deployment of utilities meters in Shore Facilities:

1. Reduce energy/utility use.
2. Reduce energy/utility costs.
3. Improve overall building operations.
4. Improve equipment performance and operations.
5. Develop and implement advance metering at all ‘covered facilities’ (facilities over 5,000 square feet).
6. Develop and implement Data Acquisition and analysis capability at the enterprise level as part of CG One web application.
7. Determine and develop sub-metering systems, where cost-effective, for large buildings with mixed-use operations or campus environment.

C. APPLICABILITY:

The Office of Civil Engineering (CG-43) shall be responsible, through SILC and report progress on this initiative. The civil engineering program shall use utility meters to for electricity, steam, fuel oil, natural gas, and water consumption for all buildings 5,000 square feet and above and cutter shore ties, when it is determined by the SILC to be cost effective and practical.

The uses for metered data vary from site-to-site and while not all sites have the same uses, some of the more common applications are:

1. To verify utility bills.
2. To compare utility rates.
3. To accurately allocate costs for billing to reimbursable tenants.
4. To determine demand response and load balancing, measurement and verification (M&V) of energy projects.
5. To benchmark energy use of the building.
6. To identify operational efficiency improvement and retrofit opportunities.
7. Reporting and tracking building performance in meeting federal efficiency mandates.
D. IMPLEMENTATION, MAINTENANCE AND REPORTING:

Electricity, natural gas, water, fuel oil and steam (where applicable) will be metered with remote metering capability or automatic meter reading (AMR) at designated facilities, where cost-effective. The meters shall meet the following minimum criteria:

1. Meters shall be installed on any new construction or major renovation of $200,000 or above when it is cost effective. All shore ties and new renewable energy projects are included in this guidance.
2. Provide utilities meters for all existing buildings over 5,000 square feet in area and existing piers, where cost effective.
3. Unit Facilities Engineers (FEs), Resource Efficiency Managers (REMs), and CEU/SILC planners shall contact CEU Providence for guidance when planning for installation of advanced meters. Advanced meters shall be included as an Energy Conservation Measure (ECM) in the ESPC/UESC projects.
4. Unit FEs/REMs/Planners should consider implementing load aggregation and sub-metering when installing advanced meters.
5. The Cost effectiveness of metering will use 10 year simple payback, assuming 2% or higher savings on the use of the metered data.
6. Digital meters are preferred over analog meters.

The meters will follow the following guidelines:

D.1: Electrical and natural Gas Meters

The electrical and natural gas meters shall be installed in accordance with the following criteria:

1. Install advanced energy meters that meet the full intent of EPAct 2005. The electric meters should provide data at least daily and should record at least hourly consumption of electricity.
2. Provide all buildings or facilities with electric and/or natural gas meters equipped with remote metering capability or Automatic Meter Reading (AMR).
3. The natural gas meters depend on the application, flow rate, installation access, and desired accuracy of the meter. Install meters that compensate for density variations between standard and actual conditions to accurately define flow rate. Utility companies use interval meters at the service entrance to an installation for billing purposes. With utility company permission, FE/REM should establish a way to have access, on a real or near real time basis, to utility interval metered data to assist in energy management.

D.2: Water Meters

1. The water meters should be installed based on water use and flow at the whole building level. The water meters must comply with EO 13514 requirements for potable and process water use reporting requirements.
2. Provide water meters for specialized use such as central boiler or chilled water plants, high water use activities such as piers and vehicle washing stations in addition to the above.

D.3: Steam Meters

1. Provide steam meters employing compliant steam meter technology consistent with the requirements of the EOs and Federal Mandates at steam plants and where cost effective.

2. Coordinate meter installation with Steam provider in a campus environment. Ensure steam distribution system integrity while installing meters.

D.4: Special Metering Considerations

The Energy use associated with certain building types, for example data centers, has increased significantly over the years. This trend is expected to continue in the future for technology automation and equipment upgrades. This requires concentrated effort to meter building consumption on a sub-building level though sub-metering. The FE/REM is responsible to determine the operational considerations for sub-metering.

D.5: Maintenance

Meter maintenance is the responsibility of the FE and facilities maintenance personnel. The CEU or SILC shall be involved in maintenance when a metered property is divested. Electrical meters are considered as electronics equipment. Proper tracking and accounting of the acquisition, use, and disposal of CG electronics equipment is required to comply with the Electronics Manual, COMDTINST M10550.25 (series), DHS and CG property management policies.

D.6: Reporting

Complete one hundred percent (100%) inventory of all meters (existing and new meters) from all funding sources and all utilities. The inventory must be kept current and reported through the Shore Asset Management (SAM) system data protocol and as established by DHS/EOs and other federal mandates.

E: UTILITIES METERS DATA MANAGEMENT

Data management is an integral part of the Utilities Metering system. The data originates from the sensors and meters to a central storage for analysis, reporting, and archiving purposes. Regardless of the meter type, data management protocol must be developed to use data input in devising and managing utilities management system to meet the federal mandates. The SILC shall also promote ready access to energy demand and consumption data for all stakeholders to see and use as tools for monitoring and reducing overall energy consumption at the unit and building occupant level.

The Coast Guard Advance Metering Initiative (CG-AMI) is underway as a pilot under contract with SILC. An Operational Requirements Documentation (ORD) is drawn describing the functional characteristics of an Energy Data Management System (EDMS). The ORD stipulates implementing IBM TRIREGA Environmental Sustainability Manager application running in conjunction with CG’s Shore Asset Management (SAM) system. The AMI project is starting with energy use data but is
expected to include water use intensity, solid waste recovery, natural gas, heating oil and other utilities as required by data management in a fully operational mode. Figure 1 below envisions the operational level view of the AMI system architecture:

![AMI System Architecture Diagram](image)

Fig. 1 USCG Utilities Metering Network

**F: TRAINING & EDUCATION:**

The Civil Engineering program supports energy management training, with assistance from the Office of Energy Management (CG-46) for the CE staff through in-person and web-based training programs. COMDT (CG-43) will work with CG-46 to provide an annual training budget and program with input from SILC and the Headquarter Units Facilities Engineers.

SILC will develop Process Guides and training/certification standards for positions critical to the oversight and implementation of the shore energy program. Training shall include, but not be limited to, EDMS for the operations and maintenance staff of the serving units. The roles, responsibilities and tasks shall be identified and analyzed to develop training solutions.

**G: TECHNICAL RESOURCES:**

The resources cited below were current at the publication time of this guidance. As organizations and agencies are continuously upgrading their sites and resources, some links may not work in the future (as websites are constantly getting updated, revised and consolidated) but most information can be found using common internet search engines.
1. Metering Best Practices by FEMP, 2011:
   http://www1.eere.energy.gov/femp/pdfs/mbpg.pdf
2. Advance Utility Metering System – Guide Specifications by GSA:
   http://www.gsa.gov/graphics/fas/AdvancedMeteringSOW.pdf
   https://www1.eere.energy.gov/femp/pdfs/adv_metering.pdf
4. Metering for Operations and Maintenance, FEMP:
5. Advanced Electric Metering in Federal Facilities Training at WBDG:
   http://www.wbdg.org/pdfs/FEMP05_CourseSupplement.pdf
6. Whole Building Design Guide at www.wbdg.org listing resources from across the
government about Sustainability.
7. The United States Green Building Council (USGBC) at www.usgbc.org for LEED™ forms,
requirements and procedures.
   Costing, and Sustainable Development (2001) at
   http://www.nap.edu/catalog/10093.html?send
   for High Performance and Sustainable Buildings.
10. Guidelines for Energy Management by EPA at
   http://www.energystar.gov/index.cfm?c=guidelines.guidelines_index
11. GSA’s Design and Construction website: http://www.gsa.gov/portal/content/104549
    includes a comprehensive guide for Federal Project Managers: “Procurement of Architectural
    and Engineering Services for Sustainable Buildings.”

H: EXECUTIVE ORDERS AND OTHER FEDERAL RESOURCES RELATED TO
UTILITIES METERING

1. Executive Order 13514—Federal Leadership in Environmental, Energy, and Economic
2. Executive Order 13423—Strengthening Federal Environmental, Energy, and
3. Federal Agency Strategic Sustainability Performance Plans:
   http://www.whitehouse.gov/administration/eop/ceq/sustainability/plans


I: DEFINITIONS:

To improve readability and understanding of Enclosure 1 the terms and usage is defined below:

- **Advanced meters**: Advanced meters (electric, gas, steam, and water) are those that have the capability to measure and record interval data (at least hourly for electricity), and communicate the data to a remote location (DAS/EDMS) in a format that can be easily integrated into an advanced metering system.

- **Standard meters**: Electromechanical or solid state meters that cumulatively measure, record, and store aggregated usage data that are periodically retrieved for use in customer billing or energy management. Meters that are not advanced meters are standard meters.

- **Advanced metering system** – A system that collects time-differentiated energy or water usage data from advanced meters via a network system on either an on-request or defined schedule basis. The system is capable of providing usage information on at least a daily basis and can support desired features and functionality related to energy-use management, procurement, and operations.

- **Automated meter reading (AMR)** – A form of advanced (or enhanced) metering that uses communications devices to communicate data from the meter to the meter data-management provider. AMR may be used to transmit simple energy-use data from the meter, or to transmit more complex measures of energy recorded in the meter, or to implement advanced functionality, such as outage detection or remote programming.

- **Load aggregation** – Aggregation of energy consumption from facilities that are geographically separate from each other for purposes of acquiring and billing utility services.

- **Sub-metering** – Separation of energy consumption from facilities that are geographically separate from each other for the purpose of acquiring energy consumption data (distribution of loads) among buildings within a facility (campus).
Advanced Meter-New Installations- USCG

The Coast Guard has existing advanced metering systems installed and in use which are consistent with this specification. The existing systems are based on Obvius AcquiSuite data acquisition servers using Obvius ModHopper wireless transceivers, and using Obvius's Building Manager Online service for data storage and accessibility. The metering systems installed under this specification shall be compatible with the existing systems such that the metering data shall be of the same format and stored at the same location with the same user interface as existing data.

1.1 SYSTEM DESCRIPTION

A. A given metering site can have multiple meters managed by a single data acquisition server.

B. The communication between the meters and the data acquisition server shall be via wireless transceivers.

C. Meter products, communication media, data acquisition servers, repeaters, wireless devices shall comprise a unified metering network.

1.2 DATA COLLECTION

A. Metering data shall be recorded by the data acquisition server at 15 minute intervals.

B. The data acquisition server shall have the ability to store a minimum of one 24 hours worth of data locally, and upload data to internet based data storage system daily.

1.3 INTERNET UPLOAD

A. Data shall be uploaded to the internet based data storage system via existing fax lines and existing dial up internet services.

B. The specific location that the data is uploaded to shall be easily changeable to an alternate location.

1.4 DATA STORAGE

A. Metering data shall be stored at internet based data storage servers managed by the data acquisition server manufacturer. The eventual objective is for the Coast Guard to maintain their own data storage servers: using the data acquisition server manufacturer’s data storage service is a temporary solution until such time as the Coast Guard’s data storage servers are established.

B. All data shall remain the property of the Coast Guard

APPENDIX C
PART 2 - SYSTEM CAPABILITIES

2.1 LOCATION TO BE METERED

A. The meters shall measure the input electrical service of the location being metered.

B. The meters shall be sized with an amp measuring capability equal to the rating of the circuit breaker which is protecting the line to be measured. If the main circuit breaker current rating is not a standard meter rating, the next lower standard meter rating may be used.

C. Meter equipment shall be installed in NEMA 4X enclosure in exposed or extremely harsh areas.

2.2 DATA TO BE METERED

A. kW: total, min/max/average, and per phase

B. kWh, kVAR, kVA, Power factor: total load and per phase

C. Voltage: line to line, line to neutral and for each phase

D. Amperage: average current and per phase

2.3 COMMUNICATION

A. Communication shall be RS-485, Modbus RTU for metering interconnectivity to the data acquisition server.

B. The wireless transceiver must utilize 256 bit AES encryption technology

PART 3 - PRODUCTS

3.1 METERS

A. The power meter shall consist of three split-core CTs hinged at both axis with the power metering electronics embedded inside of the master CT.

B. The meter shall measure true (rms.) power demand (kW) and consumption (kWh).

C. The meter shall report 26 energy variables serially over an RS-485 connection using the Modbus (RTU) protocol, including:
   1. kW: total, min/max/average, and per phase
   2. kWh, kVAR, kVA, Power factor: total load and per phase
   3. Voltage: line to line, line to neutral and for each phase
   4. Amperage: average current and per phase

D. The consumption (kWh) variable shall be stored in non-volatile memory and retained in the event of a power outage.

E. The meter shall directly accept any voltage input from 208-480 VAC.
F. The meter shall be calibrated as a system and be accurate to +/- 1% from 5% to 100% of the rated current over a temperature range of 0-60°C.

G. The meter shall conform to ANSI C12.1 metering standards.

H. The power meter shall be internally isolated to 2000 VAC.

I. The power meter case isolation shall be 600 VAC.

J. The power meter series shall have models available for the following amperage ratings: 100, 300, 400, 800, 1600, 2400.

3.2 DATA ACQUISITION SERVER

A. The Data Acquisition Server (DAS) shall be a standalone wall-mounted device powered by a 120V wall transformer.

B. The DAS shall accept up to 32 Modbus device inputs on the RS 485 serial input terminals. The DAS shall provide automatic recognition and configuration for Modbus power meters as well as other Modbus devices (see below).

C. The DAS shall accept up to 8 inputs directly. Each input shall be capable of being configured for the following:
   1. 0-10 V - Min/Max/Ave/Instantaneous
   2. 4-20 mA - Min/Max/Ave/Instantaneous
   3. Pulse - Consumption, Rate
   4. Resistance - Min/Max/Ave/Instantaneous
   5. Runtime - Runtime, Status

D. The DAS shall provide automatic recognition and configuration of Modbus devices, the meters and the wireless transceivers, that are installed as a part of this system. In addition, the DAS shall provide automatic recognition and configuration of at least 3 other manufacturer's meters, to facilitate system expandability.

E. The DAS shall provide user interface for initial configuration via standard web browser using an integrated Ethernet RJ45 jack.

F. The DAS shall provide control output using two onboard digital outputs rated at a minimum of 30 Vdc and 150 mA.

G. The DAS shall provide time stamping of measured values from all devices on user selected intervals from 1 to 60 minutes.

H. The DAS shall provide alarm set points for all measured values including the option for either high/low or warning/alarm.

I. The DAS shall be capable of using either existing LAN connections (static IP or DHCP), telephone modem or cell modem (GSM) for data upload.

J. The DAS shall provide data in standard delimited text form (.txt)
K. Data uploads shall be either push or pull at the option of the user, on user-selected intervals

L. The DAS shall store all recorded variables in non-volatile memory

M. The DAS shall function as a gateway device, using Modbus TCP to retrieve specific data from connected devices as required

3.3 WIRELESS TRANSCEIVERS

A. The transceiver shall be a standalone wall-mounted device powered by a 120V wall transformer or 9-30VDC.

B. The transceiver shall operate in one of the Instrumentation, Scientific and Medical (ISM) radio frequencies (400 MHz, 900 MHz, 2.4 GHz)

C. The transceiver shall transmit at 1000 mW power

D. The transceiver must be installed without the need for a site license.

E. The transceiver shall be frequency hopping spread spectrum (FHSS) protocol to avoid interference

F. The transceiver shall communicate with other transceivers to develop a self-managing mesh network without the need for a host PC or software to manage the network

G. The transceiver shall have one RS 485 port for serial communications and two auxiliary terminals for pulse inputs

H. Each transceiver shall provide the following status indications:
   1. RS 485 xmit
   2. RS 485 receive
   3. Pulse indication (2)
   4. Alive
   5. Alarm

I. Each transceiver shall provide the capability for signal strength indication using the LED’s listed above and a push button mounted on the transceiver with no external interface

J. The transceiver network shall continuously monitor the performance of the network to optimize the routing of transmissions from connected devices to the Modbus master and adjust routes to optimize throughput

K. The transceiver must perform at a maximum range of 3000' indoors, without line-of-sight and up to 14 miles with line of sight

L. The transceiver must utilize 256 bit AES encryption technology

3.4 COMMUNICATION CABLE
A. The RS-485 cable which connects the meter with the wireless transceiver, and
the data acquisition server with the wireless transceiver, shall be 600V, 1pr,
18awg, stranded, foil shield, PVC jacket.

PART 4 - TYPICAL SYSTEM DIAGRAM

PART 5 - EXECUTION

5.1 SITE VISIT
A. Thoroughly examine site prior to installation of equipment. Report
discrepancies and/or conflicts to COTR for resolution before starting work.
B. Take care to verify that locations where meters are to be installed have adequate
space to install meters.

5.2 GENERAL WORKMANSHIP
A. Equipment, installation, and wiring shall comply with industry specifications
and standards and local codes for performance, reliability, and compatibility
B. Entire installation shall comply with NEC standards

5.3 MODBUS DEVICE IDENTIFICATION
A. Each device on the metering network: meters, transceivers and server, must have
a unique Modbus address, which is settable via dipswitches on each device.
5.4 METER INSTALLATION
A. Meters shall be installed in existing electrical switchboards and panel boards. Install meters according to manufacturer's recommendations.
B. Install meters rigidly and adequately for operating environment. Cables and cords shall be neatly secured.
C. Upon final installation, meters shall not interfere with the Panelboard or switchgear covers or doors.

5.5 WIRELESS TRANSCEIVER MOUNTING
A. Install transceivers as per manufacturer's recommendations and best practices, in order to maximize strength of wireless communication. If the wireless connection between meters and the data acquisition server is weak or intermittent, additional relay transceiver(s) shall be installed in between the meters and servers to facilitate reliable communication.
B. Mount transceivers securely to the wall.
C. Transceivers are powered by a 120v wall mounted transformer, and thus must be mounted close to an available receptacle.
D. RS485 cable, power cable, and any other wires shall be neatly routed and secured resulting in a neat, orderly appearance.

5.6 DATA ACQUISITION SERVER MOUNTING
A. Data Acquisition server must be mounted near an existing fax line to support data upload to the internet. Contractor to supply required fax line extension and
B. Mount DAS securely to the wall.
C. The DAS is powered by a 120v wall mounted transformer, and thus must be mounted close to an available receptacle.
D. RS485 cable, power cable, and any other wires shall be neatly routed and secured resulting in a neat, orderly appearance.

5.7 COMMUNICATION WIRING
A. RS485 wiring shall be protected from abrasion upon passing through electrical panel cutout or hole.

5.8 INSTALLATION, SYSTEM CONFIGURATION AND COMMISSIONING
A. All manufacturers' installation directions shall be followed.
B. After the system components are installed, the data acquisition server must be configured. The configuration shall be performed as per manufacturer's instructions. The unit shall notify Mission Support Product Line Civil Works Asset Line Manager when metering system is installed, updated, or replaced.
C. The Contractor shall arrange for a representative from Obvius, LLC (1-866-204-8134) support@obvius.com to be on-site for final system configuration as part of any contracts to install metering equipment.
D. Successful configuration will result in the data acquisition server accurately recognizing all components on the system will no errors.

5.9 SYSTEM DEMONSTRATION AND ACCEPTANCE
A. The system shall be accepted upon demonstration that the data acquisition server successfully configured and if internet available, uploads metering data from all connected meters to the internet based data storage.

5.10 SUBMITTALS
A. Complete bill of materials indicating quantity, manufacturer, model number, and relevant technical data of equipment to be used.
B. Manufacturer's description and technical data such as performance curves, product specifications, and installation and maintenance instructions
C. Data storage system details, including storage size capabilities, access instructions, description of graphical capabilities, and other relevant technical data.