SCOPE OF WORK

Energy Audit & Cogeneration (CHP) Feasibility Study

Menlo Park Veterans Memorial Home
Edison, Middlesex County, N.J

PROJECT NO. A1258-00

STATE OF NEW JERSEY

Honorable Philip D. Murphy, Governor
Honorable Sheila Oliver, Lt. Governor

DEPARTMENT OF THE TREASURY

Elizabeth Maher Muoio, Treasurer

DIVISION OF PROPERTY MANAGEMENT AND CONSTRUCTION

Christopher Chianese, Director

Date: October 21, 2019
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I. OBJECTIVE

The objective of this project is to conduct a comprehensive Energy Audit of Menlo Park Veterans Memorial Home to identify potential Energy Conservation Measures (ECM’s), the projected savings of each ECM, and the cost to implement each ECM. The report will be the first phase of an Energy Savings Improvement Plan per N.J.S.A. 52:34-25.

In addition, the Consultant shall identify and evaluate any viable renewable/distributed energy technologies. Provide a comprehensive feasibility study for a new Cogeneration Combined Heat and Power (CHP) plant.

II. CONSULTANT QUALIFICATIONS

The Consultant shall be a firm pre-qualified with the Division of Property Management & Construction (DPMC) in the P051 Energy Auditing Discipline and have in-house capabilities or Sub-Consultants pre-qualified with DPMC in the P025 Estimating/Cost Analysis Discipline and all other Architectural, Engineering and Specialty Disciplines necessary to complete the project as described in this Scope of Work (SOW).

The firm shall also demonstrate that they have previous experience in conducting energy audits of other campus type facility infrastructure, similar in size and scope to this project.

III. PROJECT COST ESTIMATE

The Consultant shall estimate all costs associated with the recommendations made in the Energy Audit and Cogeneration (CHP) Feasibility Study, including but not limited to, construction costs, design and construction administration fees, affirmative action, DPMC management fees, construction management services, building commissioning, monitoring fees, testing and survey services, inspection fees, contingencies, permits, allowances, and escalation factors for the anticipated construction year(s) of the improvements.

The cost estimate shall be adjusted for items including, but not limited to premium time, construction phasing, regional location, site environmental factors, weather conditions, restrictions regarding the contractor’s use of the premises, imposed constraints caused by Client Agency program schedules or building occupants, temporary relocation and moving costs, demolition costs, removal of hazardous materials, location of work within the buildings, maximum security.
issues, utility interruption and shut down constraints caused by building use, and concurrent construction activities with other projects at the facility.

IV. PROJECT SCHEDULE

A. SCOPE OF WORK DESIGN & CONSTRUCTION SCHEDULE

The following schedule identifies the estimated design and construction phases for this project and the estimated durations.

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<td>3. CHP Draft (90% Completion)</td>
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<td>• Project Team &amp; DPMC Review &amp; Comment</td>
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<td>• Project Team &amp; DPMC Review &amp; Approval</td>
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<td>6. Energy Audit Draft Phase (90% Completion)</td>
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NOTE: The CHP and Energy Audit tasks can proceed concurrently.

B. CONSULTANT’S PROPOSED PROJECT SCHEDULE

The Consultant shall submit a Gantt chart schedule with their technical proposal that reflects their projected schedule to perform the Energy Audit and Cogeneration (CHP) Feasibility Study described in this Scope of Work. The schedule shall include overall task phases above including review and approval periods. Additional tasks should include at a minimum data logger installation, building survey, lighting survey, envelop survey, HVAC evaluation, motor evaluation,
process energy use survey, data logger collection, data analysis, ECM Evaluation, demand response evaluation, presentation of draft report, review of draft report, presentation of final report and approval of final report.

This schedule will be reviewed by the Consultant Selection Committee as part of the evaluation process and will be assigned a score commensurate with the information provided.

V. PROJECT SITE LOCATION & TEAM MEMBERS

A. PROJECT SITE ADDRESS

The location of the project site is:

Menlo Park Veterans Memorial Home
132 Evergreen Road
Edison, New Jersey 08837

See Exhibit ‘A’ for the project site map.

B. PROJECT TEAM MEMBER DIRECTORY

The following are the names, addresses, and phone numbers of the Project Team members.

1. DPMC Representative:

Name: William Golubinski, Manager – Energy Initiatives Unit
Address: Division of Property Management & Construction
         20 West State Street, 3rd Floor PO Box 235
         Trenton, NJ 08625-0235
Phone No: (609) 292-5210
E-Mail No: william.golubinski@treas.nj.gov

2. Department of Military and Veterans Affairs:

Name: Scott Mueller, Assistant CEO
Address: Menlo Park Veterans Memorial Home
         132 Evergreen Road, P.O. Box 3013
         Edison, NJ 08818
Phone No: (732) 452-4104
E-Mail No: scott.mueller@dmava.nj.gov
VI. PROJECT DEFINITION

A. BACKGROUND

Menlo Park Veterans Memorial Home, was rebuilt in 1999 on 109-acres in Middlesex County. It is a modern skilled care nursing home providing 24/7 quality healthcare. The 312-bed facility features a "Town Square" core with services and resident living areas arrayed around it.

Electricity is delivered by the Public Service Electric & Gas. Natural Gas is delivered by Elizabethtown Gas. Electricity and Natural Gas are supplied by Direct Energy a third party supplier.

The building is occupied on a 24/7/365 continuous basis.

VII. CONSULTANT RESPONSIBILITIES

The information provided in this section of the Scope of Work is intended as a guide for the Consultant to understand the overall basic objective of the Energy Audit and Cogeneration (CHP) Feasibility Study for this project. The Consultant is expected to use their professional judgment to include items that may not be listed and that will demonstrate major energy savings for the facility and identify the technical, economic, and environmental benefits of a cogeneration combined heat and power plant.

A. PROJECT COMMENCEMENT

Prior to the start of the Energy Audit and Cogeneration (CHP) Feasibility Study, the Consultant shall meet with the members of the Project Team to obtain and/or coordinate the following information:
1. **Scope of Work Review:**

Conduct a meeting with the Project Team members and approved facility representatives to discuss the objective of the project scope of work, the project schedule, and the procedures that will be used by the Consultant to inspect the buildings, equipment, systems, and facility infrastructure for the Energy Audit and Cogeneration (CHP) Feasibility Study. Request necessary data (energy bills, maintenance records, major equipment inventory including which equipment specific data, building plans, list of maintenance staff (by titles and qualifications only). The State utilizes an energy tracking and bill management system from which this data can be retrieved.

2. **Project Directory:**

Develop a project directory that identifies the name and phone numbers of key designated representatives of the facility that must be contacted to arrange the project site visits and building inspections.

3. **Existing Documentation:**

A complete set of the building’s original construction plans is available. The Division of Property Management and Construction has participated in a few projects at this facility. As a result, DPMC can furnish only a few relevant facility alteration projects.

Review these documents and any additional information that may be provided at a later date such as reports, studies, surveys, equipment manuals, as-built drawings, etc. The State does not attest to the accuracy of the information provided and accepts no responsibility for the consequences of errors by the use of any information and material contained in the documentation provided. It shall be the responsibility of the Consultant to verify the contents and assume full responsibility for any determination or conclusion drawn from the material used. If the information provided is insufficient, the Consultant shall take the appropriate actions necessary to obtain the additional information required.

All original documentation shall be returned to the provider at the completion of the project.

**B. COGENERATION (CHP) FEASIBILITY STUDY**

The objective of the Cogeneration Combined Heat & Power Feasibility Study is to assess the technical and economic viability of constructing and operating a new cogeneration facility onsite and determine if it meets the requirements of the NJ Energy Master Plan and Policy on Energy Resiliency strategy to increase energy efficiency and reduce energy consumption, cost and resiliency.
Items to review shall include, but not be limited to the following:

1. **Determine and Evaluate the Facilities Energy Profile:**

   Compare current and projected electricity consumption, with and without implementation of the recommended ECM’s.

   Compare current and projected heating and cooling requirements, with and without implementation of the recommended ECM’s.

   Identify the facility thermal/electric load ratio throughout a typical year.

2. **Optimal Cogeneration (CHP) Facility Design & Configuration:**

   Describe the optimal cogeneration combined heat and power plant configuration to achieve N+1 redundancy and the ability to achieve and maintain “island mode” for electric generation, including prime mover type and specifications, design features, recommended fuel(s), heat recovery methods and use.

   Provide backup information supporting the recommendations made.

   Describe the required performance guarantees, warranties, efficiencies of the recommended cogeneration equipment and systems as well as the maintenance requirements.

   Determine the integration requirements of the new cogeneration facility equipment and systems with any existing facility equipment, systems and utility infrastructure.

   Investigate and quantify the environmental impacts of the cogeneration facility versus traditional utility-grade energy supply.

   Evaluate the facility energy requirements for one year of operation.

   Determine the spare parts and backup systems required for the cogeneration facility, including utility interconnection requirements and the annual cost of maintaining utility backup service.

   Determine the requirements and costs for construction management, building commissioning firms during construction, measurement & verification and energy management software capable of retrieving energy use data via the internet.
3. Regulatory Authority Coordination:

Determine any required State regulating authority approvals, licenses, permits, and design coordination responsibilities required for the construction and operation of the new cogeneration facility.

Determine all potential State, Federal and Utility funded energy rebates, tax incentives, reimbursements, third party energy sharing or purchase agreements, cost savings, etc.

4. Cogeneration (CHP) Facility Space Requirements:

Determine the approximate physical size of the cogeneration (CHP) facility based on the space requirements of the equipment, systems, infrastructure, and any required operational components.

Analyze and recommend a facility location and the most efficient layout of the equipment and infrastructure in the new facility.

5. Cogeneration (CHP) Facility Operation:

Determine the manpower required to operate the facility and all related costs.

Describe the experience, licenses, training, and any other related requirements for the facility operators.

Determine the capability of the facility staff to operate the facility.

Determine recommended/required manufacturer servicing agreements.

6. Cost Analysis:

Determine the construction costs of the cogeneration facility based on a minimum of three design configurations and operating options.

Investigate the purchase, lease, or other potential funding options available to finance the project.

Determine the operating and maintenance costs of the cogeneration facility.

Perform an economic evaluation and simple payback of the cogeneration facility to determine if the project is financially viable, using fuel and grid electricity price projection that are provided state contract rates in effect through the NJ Consolidated Energy Savings Program.

Assess the economic and financial risks associated with the proposed new cogeneration facility.
7. Evaluation of Cogeneration (CHP) Facility Performance:

Describe the methods to evaluate the cogeneration plant performance after construction to ensure it meets the guarantees of the design specifications. Recommend measurement and verification protocol options best suited to evaluate specific technology determined to be the best fit for these facilities (IPMVP options A thru D).

C. COGENERATION (CHP) FEASIBILITY STUDY REPORT

Based on the results of the Cogeneration (CHP) Feasibility Study findings, the Consultant shall prepare a bound 8 ½” x 11” Cogeneration (CHP) Feasibility Study Report that incorporates the following elements:

1. Table of Contents:

Provide a table of contents and page numbers for the Cogeneration (CHP) Feasibility Study Report.

2. Executive Summary:

Include a brief description of the Cogeneration (CHP) Feasibility Study objective and the overall conclusions and recommendations for each item reviewed in the outline above including justifications for the selections made.

3. Building & Equipment Information:

Provide a general description of the cogeneration (CHP) facility and the prime mover, electricity generator, heat recovery system, control automation systems, operational profiles, and schedules of all mechanical and electrical equipment to be installed and how they will operate. Include a schematic one line diagram showing the mechanical & electrical equipment, system infrastructure, etc. in the cogeneration facility.

Describe the coordination requirements needed to construct the new cogeneration facility, tie into the existing or new infrastructure, and operate the existing powerhouse equipment, systems and infrastructure during construction.

Describe redundancy capabilities and requirements for plant downtime (incorporated n+1 redundancy, grid power, rental generators/boilers or other solutions as recommended)
4. Energy Savings Summary:

Provide an economic analysis of the new cogeneration (CHP) facility including all appropriate accounting information, selected charts and graphs, etc. that will demonstrate the anticipated overall life cycle cost savings of the new facility. Items shall include, but not be limited to:

Estimated construction costs, including cost of all equipment and materials, and source of cost estimate.

Estimated energy savings (in energy specific volume units and total MMBTU’s).

Estimated annual energy cost savings based on historical energy costs of the facility and projected fuel costs, which will be determined in consultation with DPMC.

Estimate of any rebates/financial incentives available through New Jersey’s Clean Energy Program, the NJ Economic Development Authority, the federal government, or from other sources.

Estimated annual operating cost savings, including reductions in maintenance expenses, demand reduction/management as well as demand response revenue.

Estimated lifetime energy cost savings.

Simple payback and return on investment.

Options for funding the installation of recommended measures.

5. Cost Estimates:

All costs shall be estimated and presented in CSI format (2004) in an appendix of the report. Each cost estimate shall include:

Narrative explanation of the work, including diagrammatic sketches if required to explain the work.

List of assumptions made in compiling the estimate.

Cost of demolition of existing systems (if required).

Cost of impact of facility operations on the construction of the new cogeneration (CHP) facility (work restrictions).
See Section III of this Scope of Work for additional cost estimating information.

6. **Cogeneration (CHP) Feasibility Study Report Copies:**

Provide 6 copies of the Cogeneration (CHP) Feasibility Study Report at each phase of the project to the Project Manager. Also provide 2 CD disks of the final approved report in .PDF format, the contents with any drawings in “.dwg” (native file format for AutoCAD) and ‘.pdf” (Adobe Portable Document Format) file formats for photos.

**D. ENERGY AUDIT**

1. **Data Gathering Coordination:**

The Consultant shall meet with the Project Team members and approved representatives of the facility to develop an approved schedule and times to access each building, identify the areas and equipment that will be inspected, describe the methods and equipment that will be used to acquire needed data, the number of interviews to be conducted, and the duration of each building inspection.

Surveys, measurements, photographs and other data collection methods shall be performed in such a way as to minimize disruption to the building occupants. A structured interview process shall be used to determine existing equipment, utilities, maintenance, and operation issues for the building.

**Note:** The Consultant is responsible for protecting the images and information collected and preventing its’ disclosure to unauthorized personnel. Individual site requirements will be discussed at the Consultant Pre-bid meeting.

**Note:** Provide a unit cost per sub-meter including installation, monthly rental rate, and removal, for all energy utilities including but not limited too; electrical, heating hot water, chilled water, and steam.

A one week “look ahead” schedule shall be provided to the facility representatives for review and approval prior to each building inspection.

2. **Building, Equipment and Systems Profile:**

Provide the name and number for each building, the year of original building construction and any building additions, and building square footage.

Characterize the building usage, type of construction, occupancy profiles, construction features including a description of the building envelope.
Provide a detailed inventory and descriptive narrative for all building energy consuming equipment including an estimate of their energy consumption, efficiency, and remaining useful life. Items shall include, but not be limited to boilers and furnaces, cooling systems, chillers, energy recovery systems, heating systems, ventilation systems, domestic hot water heaters, meters, automatic control systems, energy management systems, electrical systems and lighting, data centers, motors, manual controls, etc.

Review all aspects of interdependency or contingency of equipment and/or controls so that recommended ECM’s are assured of compatibility with other elements of the structure and systems.

Assess how the various building systems and equipment are set-up, their actual operating conditions, and the control methods used to manage the systems. Provide colored photographs of the equipment and systems inspected.

Evaluate the building envelope for energy consumption, including but not limited to the roof and walls, insulation, external windows, and doors.

Evaluate the operation, maintenance, and testing programs for the building equipment.

3. Measurements & Observations:

Provide specific measurements such as temperature, relative humidity, light levels, air flows, etc. where appropriate. Also, relevant observations shall be noted such as damper positions, operating deficiencies, control settings, damaged equipment, maintenance shortfalls, etc.

4. Facility Energy Profile:

The annual facility energy use and peak demand for each energy type shall be reported. This shall include annual consumption, cost, and greenhouse gas emissions associated with each energy type. This information shall be supplied in the sample Facility Energy Profile Table format provided in Exhibit ‘B’.

E. ENERGY AUDIT REPORT

Based on the results of the Energy Audit findings, the Consultant shall prepare a bound 8 ½” x 11” Energy Audit Report that incorporates the following elements:

1. Table of Contents:

Provide a table of contents and page numbers for the Energy Audit Report.
2. **Executive Summary:**

Include a brief introduction to the facility and a description of the project objective and overall conclusions and recommendations of the Energy Audit.

3. **Building/Facility Information:**

Provide a general background description of the facility, building components, mechanical systems, electrical systems, automation systems, and operational profiles and schedules. A description of the building envelope (windows, doors, insulation, etc.), age and construction history, number of employees, occupancy patterns, and a discussion of the O&M program shall be included.

The building information section shall also contain relevant photos of the facility, buildings, and mechanical systems, a description of energy types used, and a description of the primary mechanical systems and controls.

4. **Equipment List:**

Provide a detailed inventory of equipment, which contains pertinent information for all energy consuming equipment including estimate of equipment efficiency and remaining useful life. For example, for lighting, for each area of each building, provide existing fixture type, existing lamp type, existing lamp count and existing ballast type, current watts per fixture and current energy cost per room/building. Similar detail should be provided for other equipment.

5. **Utility Summary:**

Provide energy accounting information for a minimum of one year, as well as selected charts and graphs that will demonstrate the overall energy demand trend and usage patterns of the facility or building. Provide site plan indicating one-line utility distribution and meter locations.

6. **Historic Energy Consumption:**

Compile energy usage and costs for each facility/building for the twelve months prior to the audit including kW, kWh, BTUs, therms, etc. and shall include billing meter readings that corroborate usage.

Identify the utility rate schedule under which services are provided to each meter.
Enter the required building and utility data into the U.S. Environmental Protection Agency's (EPA) Portfolio Manager energy benchmarking system. Note the EPA Score for each building, and provide the information necessary to access the Portfolio Manager account.

7. Energy Conservation Measures:

Provide a narrative summary for each recommended ECM that meets the objective of this project scope of work. Clearly document the key assumptions made in analyzing each measure and describe the method of analysis.

Provide the estimated cost, estimated savings, simple payback, and other data for each ECM in the required Energy Conservation Measure Summary Format Table depicted in Exhibit ‘C’. The description of each ECM shall also include the following information following this Energy Conservation Measure Summary Format Table:

A one or two page description of each ECM and supporting calculations. Identify complimentary measures that when combined produce a result more beneficial than if either is employed independently.

No-cost measures such as adjusting equipment, control systems, or schedules shall be addressed first.

Energy use and savings calculations and economic analysis.

Assumptions that were made regarding operation or equipment efficiency.

Estimated installation cost, including cost of all equipment and materials, and source of cost estimate.

Estimated energy savings (in energy specific volume units and total MMBTU’s).

Estimated annual energy cost savings based on current historical energy costs of the facility.

Estimate of any rebates/financial incentives available through New Jersey’s Clean Energy Program or from other sources.

Estimated annual operating cost savings, including reductions in maintenance expense.

Estimated lifetime energy cost savings.

Simple payback.
Options for funding the installation of recommended measures.

Identify minimum and suggested equipment standards that must be used in the design, procurement, and installation of all ECM’s such as ASHRAE 90.1, ASHRAE 155P for Commercial Boiler Efficiency, etc.

8. **Renewable/Distributed Energy Measures:**

Recommend any viable renewable/distributed energy technologies, including solar power, wind power, geothermal systems, etc. which could be cost effectively implemented for the facility. Identify available grants, incentives and/or sources of funding. Prove an analysis of costs and savings comparing current and future costs of electric and thermal energy with and without each technology assessed.

9. **Energy Purchasing and Procurement Strategies:**

For each facility develop a load profile for each electric and natural gas account. Provide an analysis of the utility tariff under which the facility is currently served. Assess potential savings from purchasing from third party suppliers.

10. **Energy Audit Report Copies:**

Provide 6 copies of the Energy Audit Report at each phase of the project to the Project Manager. Also provide 2 CD disks of the final approved report (.pdf) and all of the contents with any drawings in “.dwg” (native file format for AutoCAD) and “.pdf” (Adobe Portable Document Format) file formats.

**F. MEETINGS & PRESENTATIONS**

1. **Meetings:**

Conduct the appropriate number of review meetings with the Project Team members during each phase of the project so they may determine if the project meets their requirements and make changes where appropriate. Selected studies, sketches, cost estimates, schedules, and other relevant information shall be presented to support the recommendations proposed.

It shall also be the responsibility of the Consultant to arrange and require all critical Sub-Consultants to be in attendance at the meetings.
2. **Presentations:**

The minimum number of presentations required for each phase of this project is identified below for reference:

Cogeneration CHP Feasibility Study Phase (50% Completion): One (1) oral presentation at the phase completion.

Cogeneration CHP Feasibility Study Phase (90% Completion): One (1) oral presentation at the phase completion.

Cogeneration CHP Feasibility Study Phase (100% Completion): One (1) oral presentation at the phase completion.

Preliminary Energy Audit Phase (50% Completion): One (1) oral presentation at the phase completion.

Draft Energy Audit Phase (90% Completion): One (1) oral presentation at the phase completion.

Final Energy Audit Phase (100% Completion): One (1) oral presentation at the phase completion.

**G. SUB-CONSULTANT PARTICIPATION**

It is the responsibility of the Consultant to ensure that they have provided adequate hours and/or time allotted in their technical and fee proposal so that their Sub-Consultants may participate in all appropriate phases and activities of this project. This includes the pre-proposal site visit and the various meetings and site visits described in this Scope of Work. All costs associated with such services shall be included in the base bid of the Consultant’s fee proposal.

**VIII. GENERAL REQUIREMENTS**

**A. SCOPE CHANGES**

The Consultant must request any changes to this Scope of Work in writing. An approved DPMC 9d Consultant Amendment Request form reflecting authorized scope changes must be received by the Consultant prior to undertaking any additional work. The DPMC 9d form must be approved and signed by the Director of DPMC and written authorization issued from the Project Manager prior to any work being performed by the Consultant. Any work performed without the executed DPMC 9d form is done at the Consultant’s own financial risk.
IX. SOW SIGNATURE APPROVAL SHEET

This Scope of Work shall not be considered a valid document unless all signatures appear in each designated area below.

The Client Agency approval signature on this page indicates that they have reviewed the design criteria and construction schedule described in this project Scope of Work and verifies that the work will not conflict with the existing or future construction activities of other projects at the site.

SOW APPROVED BY:  
JAMES WRIGHT, MANAGER  
DPMC PROJECT PLANNING & INITIATION  

SOW APPROVED BY:  
WILLIAM GOLUBINSKI, MANAGER  
DPMC ENERGY INITIATIVES UNIT  

SOW APPROVED BY:  
SCOTT MUELLER, ASSISTANT CEO  
DEPARTMENT OF MILITARY AND VETERAN AFFAIRS  

SOW APPROVED BY:  
THOMAS WALKER, DIV. OF ST. ENERGY SERVICES  
NEW JERSEY BOARD OF PUBLIC UTILITIES  

SOW APPROVED BY:  
RICHARD FLODMAND, DEPUTY DIRECTOR  
DIV PROPERTY MGT & CONSTRUCTION  

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X. CONTRACT DELIVERABLES

The following is a listing of Contract Deliverables that are required at the completion of each phase of this project.

PROJECT COMMENCEMENT

Meetings & Minutes (Minutes within 5 working days of meeting)

Correspondence

Project Commencement

SOW Review
Site Visit Policies, Contractors Use of the Premises, Project Directory
Collect Existing Documentation

COGENERATION CHP FEASIBILITY STUDY (ALL PHASES)

Meetings & Minutes (Minutes within 5 working days of meeting)

Correspondence

Cogeneration CHP Feasibility Study Submission Requirements

Determine and Evaluate the Energy Consumption Profile
Optimal Cogeneration Facility Design & Configuration
Regulation Authority Coordination
Cogeneration Facility Space Requirements
Cogeneration Facility Operation
Cost Analysis
Evaluation of Cogeneration Facility Performance

Cogeneration CHP Feasibility Study Report

Table of Contents
Executive Summary
Building & Equipment Information
Energy Savings Summary
Cost Estimates in CSI Format & Cost Analysis 38 Form
Cogeneration CHP Feasibility Study Report: 6 sets each submission
Diagrammatic Sketches/Drawings if appropriate: 6 hardcopy sets and on disc in “.dwg” (native file format for AutoCAD and “.pdf” (Adobe Portable Document Format) file formats.
Bar Chart of Cogeneration Feasibility Study Schedule
Oral Presentation of Submission to Project Team (Oral Presentation @50%, 90%, 100% w/6 sets of Cogeneration Feasibility Study each submission)
SOW Compliance Statement
This Submission Checklist
Deliverables Submission in Booklet Form: 6 sets

Approval of Submission

Respond to Submission Comments

ENERGY AUDIT (ALL PHASES)

Energy Audit Submission Requirements

Data Gathering Coordination
Building, Equipment & Systems Profile
Measurements & Observations
Facility Energy Profile

Energy Audit Report Submission Requirements

Table of Contents
Executive Summary
Building/Facility Information
Equipment Lists
Utility Summary
Historic Energy Consumption
Energy Conservation Measures
Renewable/Distributed Energy Measures
Energy Purchasing and Procurement Strategies
Cost Estimates in CSI Format & Cost Analysis 38 Form
Energy Audit Report: 6 sets each submission
Diagrammatic Sketches/Drawings if appropriate: 6 hardcopy sets and on disc in “.dwg” (native file format for AutoCAD and “.pdf” (Adobe Portable Document Format) file formats.
Bar Chart of Energy Audit Schedule
Oral Presentation of Submission to Project Team (Oral Presentation @50%, 90%, 100% w/6 sets of Energy Audit each submission)
SOW Compliance Statement
This Submission Checklist
Deliverables Submission in Booklet Form: 6 sets

Approval of Submission

Respond to Submission Comments

PROJECT CLOSE-OUT PHASE

Responsibilities: Plan, Schedule and Execute Close-Out Activities

Commencement: Initiate Close-Out w/DPMC 20A Project Close-Out Form

Determination of Substantial Completion

Initiation of Final Contract Acceptance Process

Final Payment

A/E Invoice and Close-Out Forms for Final Payment

Final Performance Evaluation of the A/E

XI. EXHIBITS

The attached exhibits in this section will include a sample project schedule, and any supporting documentation to assist the Consultant in the design of the project such as maps, drawings, photographs, floor plans, studies, reports, etc.

A. Project Site Location Map – Menlo Park Veterans Memorial Home
B. Facility Energy Profile Sample Form
C. Energy Conservation Measure Summary Sample Form

END OF SCOPE OF WORK
Project Site Location Map
Menlo Park Veterans Memorial Home

EXHIBIT ‘A’
**FACILITY ENERGY PROFILE (REQUIRED SUMMARY FORMAT WITH SAMPLE DATA)**

<table>
<thead>
<tr>
<th>Energy Type (Primary)</th>
<th>Annual Volume (with relevant units)</th>
<th>Energy Conversion Factor</th>
<th>Annual Energy Consumption (Site kBtu's)</th>
<th>Annual Energy Cost ($)</th>
<th>Average Cost per Unit Volume</th>
<th>Average Cost per MMBTU</th>
<th>CO2 Conversion Factor</th>
<th>Equivalent CO2 Emissions (Metric Tons)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricity</td>
<td>7,000,000 kWh</td>
<td>3.412 kBtu/kWh</td>
<td>23,884,000</td>
<td>$560,000</td>
<td>$0.14/kWh</td>
<td>$23.45</td>
<td>1.1 lb/kWh</td>
<td>1,995</td>
</tr>
<tr>
<td>Natural Gas</td>
<td>200,000 therms</td>
<td>100 kBtu/th</td>
<td>20,000,000</td>
<td>$170,000</td>
<td>$0.85/therm</td>
<td>$8.50</td>
<td>120.6 lb/MMBTU</td>
<td>273</td>
</tr>
<tr>
<td>#2 Oil (Diesel)</td>
<td>3,000 gallons</td>
<td>138 kBtu/gal</td>
<td>414,000</td>
<td>$5,400</td>
<td>$1.80/gal</td>
<td>$13.04</td>
<td>22.4 lb/gal</td>
<td>30</td>
</tr>
<tr>
<td>#4 Oil</td>
<td>3,000 gallons</td>
<td>144 kBtu/gal</td>
<td>432,000</td>
<td>$5,010</td>
<td>$1.67/gal</td>
<td>$11.60</td>
<td>22.4 lb/gal</td>
<td>30</td>
</tr>
<tr>
<td>#6 Oil (LS)</td>
<td>3,000 gallons</td>
<td>144 kBtu/gal</td>
<td>432,000</td>
<td>$5,010</td>
<td>$1.67/gal</td>
<td>$11.60</td>
<td>26 lb/gal</td>
<td>35</td>
</tr>
<tr>
<td>Propane</td>
<td>100 gallons</td>
<td>91.6 kBtu/gal</td>
<td>9,160</td>
<td>$90</td>
<td>$0.90/gal</td>
<td>$9.83</td>
<td>12.7 lb/gal</td>
<td>1</td>
</tr>
<tr>
<td>Chilled Water</td>
<td>6,000 ton-hours</td>
<td>12 kBtu/ton-hr</td>
<td>72,000</td>
<td>$900</td>
<td>$0.15/ton-hr</td>
<td>$12.50</td>
<td>TBD</td>
<td>TBD</td>
</tr>
<tr>
<td>Hot Water</td>
<td>15,000 CF</td>
<td>7.3 kBtu/CF</td>
<td>109,500</td>
<td>$1,369</td>
<td>$0.09/CF</td>
<td>$12.50</td>
<td>TBD</td>
<td>TBD</td>
</tr>
<tr>
<td>Steam</td>
<td>80 Mlbs</td>
<td>1,000 kBtu/MLb</td>
<td>80,000</td>
<td>$1,216</td>
<td>$15.20/mlb</td>
<td>$15.20</td>
<td>TBD</td>
<td>TBD</td>
</tr>
</tbody>
</table>

| Total Annual Energy Consumption (Site kBtu) | 45,432,660 |
| Total Area of Facility Conditioned Space (sq. ft.) | 250,000 |
| Facility Energy Use Intensity (Site kBtu/sq ft) | 182 |

1. Should only list primary energy types for this summary (ex: including natural gas fuel for boiler but not the boiler steam production)
2. Should only include secondary energy types in this table if they are purchased from a separate entity (ex: third party CHP supply)
3. For CO2 emissions, 2205 lbs = 1 metric ton
4. Actual energy conversion factors for secondary energy types to be determined by consultant based on relevant metrics (ex: temp, pressure, metered units, etc)
5. CO2 conversion factors for secondary energy types should be based on fuel and efficiency of provider, if known
6. When reporting #2 fuel oil or diesel, only count what is used for facility purposes. Do not include diesel consumption for vehicle fueling.

**EXHIBIT 'B'**
ENERGY CONSERVATION MEASURE SUMMARY (REQUIRED SUMMARY FORMAT WITH SAMPLE DATA)
(List in order of simple payback)

<table>
<thead>
<tr>
<th>ECM No.</th>
<th>ECM Description</th>
<th>Annual Electricity Use Reduction (kWh)</th>
<th>Annual Electricity Cost Savings ($)</th>
<th>Annual Fuel Use Reduction (MMBTU)</th>
<th>Annual Fuel Cost Reduction ($)</th>
<th>Annual Water Use Savings (gal)</th>
<th>Annual Water Cost Savings ($)</th>
<th>Annual O&amp;M Cost Savings ($)</th>
<th>ECM Gross Cost ($)</th>
<th>Rebates or DR Revenue ($)</th>
<th>ECM Net Cost ($)</th>
<th>Total Annual Energy Reduction (MMBTU)</th>
<th>Total Annual Cost Savings ($)</th>
<th>Annual CO2 Reduction (metric tons)</th>
<th>Simple Payback (years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Water conserving fixtures</td>
<td>0</td>
<td>$0</td>
<td>82</td>
<td>$698</td>
<td>142,800</td>
<td>$571</td>
<td>$0</td>
<td>$1,064</td>
<td>$0</td>
<td>$1,064</td>
<td>82</td>
<td>$1,269</td>
<td>2</td>
<td>0.8</td>
</tr>
<tr>
<td>2</td>
<td>Lighting upgrade with sensors</td>
<td>536,230</td>
<td>$75,072</td>
<td>0</td>
<td>$0</td>
<td>0</td>
<td>$0</td>
<td>$9,525</td>
<td>$160,000</td>
<td>$17,060</td>
<td>$0</td>
<td>$142,940</td>
<td>1,830</td>
<td>$84,597</td>
<td>268</td>
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<tr>
<td>3</td>
<td>VFD's and motors ¹</td>
<td>338,884</td>
<td>$47,444</td>
<td>0</td>
<td>$0</td>
<td>0</td>
<td>$0</td>
<td>$143,500</td>
<td>$33,147</td>
<td>$0</td>
<td>$110,353</td>
<td>1,156</td>
<td>$47,444</td>
<td>169</td>
<td>2.3</td>
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<tr>
<td>4</td>
<td>HVAC Controls Upgrade</td>
<td>10,887</td>
<td>$1,524</td>
<td>3,579</td>
<td>$30,422</td>
<td>0</td>
<td>$0</td>
<td>$25,000</td>
<td>$363,000</td>
<td>$0</td>
<td>$336,000</td>
<td>3,616</td>
<td>$56,946</td>
<td>91</td>
<td>6.2</td>
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<td>5</td>
<td>Demand-Controlled Ventilation ¹</td>
<td>0</td>
<td>$0</td>
<td>415</td>
<td>$15,500</td>
<td>0</td>
<td>$0</td>
<td>$0</td>
<td>$95,200</td>
<td>$0</td>
<td>$0</td>
<td>$95,200</td>
<td>415</td>
<td>$15,500</td>
<td>25</td>
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<tr>
<td>6</td>
<td>Transformer Upgrade</td>
<td>183,312</td>
<td>$25,664</td>
<td>0</td>
<td>$0</td>
<td>0</td>
<td>$0</td>
<td>$0</td>
<td>$159,040</td>
<td>$0</td>
<td>$0</td>
<td>$159,040</td>
<td>625</td>
<td>$25,664</td>
<td>91</td>
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<tr>
<td>7</td>
<td>Solar (PV) System</td>
<td>80,000</td>
<td>$11,200</td>
<td>0</td>
<td>$0</td>
<td>0</td>
<td>$0</td>
<td>$0</td>
<td>$525,800</td>
<td>$0</td>
<td>$48,000</td>
<td>$525,800</td>
<td>273</td>
<td>$59,200</td>
<td>40</td>
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<td></td>
<td>1,149,313</td>
<td>$160,904</td>
<td>4,076</td>
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<td>142,800</td>
<td>$571</td>
<td>$34,525</td>
<td>$1,420,604</td>
<td>$50,207</td>
<td>$48,000</td>
<td>$1,370,397</td>
<td>7,997</td>
<td>$290,620</td>
<td>795</td>
</tr>
</tbody>
</table>

¹ ECMs should be summarized in a way that avoids overlap and double counting (ex: claiming the same electricity use reduction from VFDs and Demand-Controlled Ventilation)

² Should represent total energy reduction for each measure, expressed in million Btu's (MMBTU)